Emergency Response Plan

Johnson County Special Utility District
Johnson County
740 FM 3048
Joshua, Texas 76058
TX1260018

June, 2021

Prepared for:
Johnson County Special Utility District
740 FM 3048
Joshua, Texas 76058

Project Number: 7654-3

Prepared by:
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PE Firm Registration No. 1151
PG Firm Registration No. 50103
RPLS Firm Registration No. 10011900

CWS and ERP Information

Please fill in the information below as indicated.

PWSID	TX1260018
Street Address	740 FM 3048
City, State Zip Code	Joshua, Texas 76058
Phone number	(817) 760-5200
Population Served	56,941
Prepared by	Enprotec / Hibbs & Todd, Inc. (eHT)
Reviewed by	Daniel Armstrong, Operations Manager
Date completed	(by end of June 2021) See Appendix A for the ERP certification

PLAN DISTRIBUTION

Please fill in the recipient's name and title, the person who gave them the plan and on what date.

RECIPIENT/TITLE	DISTRIBUTED BY	DATE
For the ERP certified on June xx, 2021.		
Daniel Armstrong, Operations Manager, JCSUD	Luci Dunn, P.E. with eHT	by end of June 2021
Jaime Moore, Johnson Co Emergency Mgmt Coordinator (see Appendix B for coordination emails)	Luci Dunn, P.E. with eHT	by end of June 2021

CHANGE HISTORY

Please describe the changes made to this plan since its original development, who made the changes and on what date the changes were incorporated into this plan.

DESCRIPTION OF CHANGE	NAME/TITLE	DATE

For the change history of the county-wide emergency operations plan (EOP) refer to EOP Annex A. The EOP is National Incident Management System (NIMS) compliant. The EOP is referenced herein as applicable.

TABLE OF CONTENTS

INDEX OF ACRONYMS

AWIA	America's Water Infrastructure Act of 2018
CFR	Code of Federal Regulations
CWS	Community Water System
DWW	Drinking Water Watch
eHT	Enprotec / Hibbs & Todd, Inc.
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
EST	Elevated Storage Tank
G	Gallons
GIS	Geographic Information System
GST	Ground Storage Tank
GW	Groundwater
Haz Comm	Hazardous Communications Program
Hwy	Highway
ICS	Incident Command Center
IT	Information Technology
MG	Million Gallons
MWD	Municipal Water District
N/A	Not Applicable
NIMS	National Incident Management System
O&M	Operation and Maintenance
OSHA	Occupational Health and Safety Organization
PPE	Personal Protective Equipment
PS	Pump Station
PWS	Public Water System
PWSID	Public Water System Identification Number
RMP	Risk Management Plan
RO	Reverse Osmosis
RRA	Risk and Resilience Assessment
RWRF	Raw Water Roughing Facility
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SUD	Special Utility District
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
WTP	Water Treatment Plant

UTILITY INFORMATION

During an incident, you need to have system information about your water utility readily available for your personnel, first responders, repair contractors/vendors, the media, and other response partner agencies.

i Utility Overview

Provide basic information about your utility.

Utility Information	
PWSID	TX1260018
Utility name and address	Johnson County Special Utility District, 740 FM 3048, Joshua, TX 76058
Owner	Johnson County Special Utility District (SUD)
Directions to utility from major roadway, include lat./long. coordinates	Joshua is located approximately 21 miles south of Ft. Worth in Johnson County. Johnson County Special Utility District (JCSUD) is 0.65 miles east of the intersection of Hwy 174 and FM 3048 at 740 FM 3048. 32.420864°, -97.372211°.
Total population served and total service connections	56,941 population served. The calculated population served includes the direct customers as well as the wholesale customers but excludes emergency connections and is per the Environmental Protection Agency (EPA) Safe Drinking Water Information System (SDWIS) and Texas Commission on Environmental Quality (TCEQ) Drinking Water Watch (DWW).
Name, title, phone number of primary contact (e.g., ERP Lead)	**Johnson County SUD**: Mr. Daniel (Danny) Armstrong, Operations Manager; darmstrong@jcsud.com; office: (817) 760-5224; cell: (817) 240-5870. Johnson County SUD 24-hour emergency: (817) 760-5255 **Johnson County Emergency Management**: Mr. Jamie Moore; EM@johnsoncountytx.org; office: (817) 556-6346; cell: (817) 933-6261
Alternate contact	Johnson County SUD 24-hour emergency: (817) 760-5255 For County-wide emergencies, call 911. Dispatch will contact applicable responder and Johnson County Emergency Management, as needed.

Utility Information	
Location of treatment, distribution, collection schematics and operation manuals	Johnson County SUD assets are shown with latitudes/longitudes on the attached Water System Schematics in ERP Appendix C. A list with asset addresses is also provided in Appendix C. Schematics and operations manuals are located at the Johnson County SUD office. Paper copies of the Johnson County SUD asset maps are found on District trucks by parcel # and map page # to assist staff with locating assets.

Use this checklist to ensure the following additional utility information (as applicable) is included as a part of your ERP. References to utility information locations are provided, as applicable.

☒ Map of distribution systems –Refer to Water System Schematics in ERP Appendix C for an overview. Detailed distribution system information is available at the Johnson County SUD office and in staff trucks as described above.

- ☒ Pressure boundary map – Refer to Water System Schematics in ERP Appendix C.
- ☒ Process flow diagram – See the Water System Schematic in Appendix C.
- ☒ Site plans and "as built" drawings for the following components of your system (as applicable): – "As-Builts" are available at the Johnson County SUD office.
  - Pumping and storage facilities
  - Reservoir facilities
  - Water treatment facilities
  - Chemical storage locations
  - Booster pump stations
  - Pressure-regulating valve (PRV) sites
- ☒ Distribution system diagrams and instrumentation information – Distribution system diagrams are available via Johnson County SUD office and on staff trucks as described above.
- ☒ Equipment specifications and operation instructions – Equipment and operation instructions are available at the Johnson County SUD office.
- ☒ Emergency power and light generation operation specifications – Operations specifications are typically located with the unit and/or at the Johnson County SUD office.
- ☒ Supervisory Control and Data Acquisition (SCADA) system operation instructions -SCADA instructions are available at Johnson County SUD office and/or with the SCADA equipment.
- ☒ Communications systems operation instructions – Cell phones are used for JCSUD communications; no operating instructions are required. For Johnson County Office of Emergency Management communications, see the EOP Annex B – Communications.

ii Personnel Information

Attach your personnel roster here or fill out the table below.

For Johnson County SUD Emergency Contact Roster, see Appendix D.

iii Primary Utility Components

List all the components necessary to maintain effective operation of your utility. Simply add more rows to the tables below if you have additional components. Text in italics represents examples – be sure to delete italicized text as necessary as you fill out the tables below and throughout this template.

Schematics of the water system which include the source waters (groundwater and purchased treated water), groundwater treatment, and distribution system assets is provided in Appendix C of this ERP. See the Risk and Resilience Assessment (RRA) Report Section 2.2 Asset Characterization Section for water system asset details. See the RRA Report Appendix G - Site Visits for water asset details and photos.

Water System Assets: Wells, Plants, Tanks, and Pump Stations			
Plant Service Area	**Plant Name**	**Asset Name**	**Location**
Plant 1	Plant 17	Well #17T (90 GPM) Chlorine (Cl2) Facility (treatment)	32.412779, -97.376715 340 Dove Creek Rd. (CR 800) Cleburne, TX 76031 UCS 078-340-193
		500,000 G GST (Also fed from TST Supply Line)	
		3 Service Pumps (125 HP / 1200 GPM)	
	Plant 1	1,000,000 G EST	32.35339, -97.32382 2425 CR 425 Cleburne, TX 76031 UCS 113-148-745
Plant 3	Plant 3	Well #3T (332 GPM)	32.347778, -97.214722 4245 CR 401 Alvarado, TX 76009 UCS 078-340-210
		Chlorine (Cl2) Facility (treatment)	
		500,000 G GST	
		2 Service Pumps (40 HP / 800 GPM)	
		Pressure Tank (12,000 G)	
		Pressure Tank (10,000 G)	

Plant Service Area	Plant Name	Asset Name	Location
Plant 5	Plant 5	Well #5T (100 GPM)	32.284167, -97.273333 5749 CR 305 Cleburne, TX 76031 UCS 078-340-131
		Well #5P (41 GPM)	
		Chlorine (Cl2) Facility (treatment)	
		100,000 G GST	
		100,000 G GST	
		2 Service Pumps (20 HP / 420 GPM)	
		Pressure Tank (12,000 G)	
Plant 8	Plant 28	2 Service Pumps (350 HP / 2400 GPM)	High Service Pumps @ SWATS BRPUA 5912 Matlock Rd, Granbury UCS 098-531-825
		2 Service Pumps (350 HP / 2980 GPM)	
	Plant 21 (TST)	3,000,000 G Stand Pipe	32.455028, -97.425458 7013 Reservoir Rd. Joshua, TX 76058 Brushy Nob UCS 093-519-907 Guard Lights & UCS 078-340-254
		500,000 G Stand Pipe	
		Service Pump (75 HP / 700 GPM)	
		2 Service Pumps (125 HP / 1870 GPM)	
	Plant 8	1,000,000 G EST	32.53068, -97.41154 3432 CR 919 Crowley, TX 76036 UCS 098-150-066
Plant 9	Plant 9	Well #9T (102 GPM)	32.373056, -97.544167 4512 FM 2331 Godley, TX 76044 UCS 078-340-209
		Well #9P (45 GPM)	
		Chlorine (Cl2) Facility (treatment)	
		50,000 G GST	
		50,000 G GST	
		2 Service Pumps (20 HP / 400 GPM)	
		Pressure Tank (8,000 G)	
Plant 10	Plant 10	Well #10T (154 GPM)	32.288314, -97.486622 2201 CR 1224 Cleburne, TX 76031 UCS 078-341-190
		Chlorine (Cl2) Facility (treatment)	
		100,000 G GST	
		2 Service Pumps (15 HP / 220 GPM)	
		Pressure Tank (10,000 G)	

Plant Service Area	Plant Name	Asset Name	Location
Plant 13	Plant 11	270,000 G GST (Fed from TST Supply Line)	32.44817, -97.54871 8145 CR 1128 Godley, TX 76044 UCS 079-641-338
		Service Pump (75 HP / 700 GPM)	
		2 Service Pumps (75 HP / 750 GPM)	
	Plant 13	750,000 G EST	32.48165, -97.52696 12404 FM 2331 Godley, TX 76044 UCS 076-173-155
Plant 18	Plant 18	Well #18T (86 GPM)	32.264153, -97.3925 2160 Hwy 174 (near Rio V) Cleburne, TX 76031 UCS 078-340-186
		Chlorine (Cl2) Facility (treatment)	
		100,000 G GST	
		2 Service Pumps (15 HP / 300 GPM)	
		Pressure Tank (5,000 G)	
Plant 19	Plant 19	Well #19T (215 GPM)	32.296028, -97.346633 2601 CR 310 Cleburne, TX 76031 UCS 078-340-185
		Well #19P (140 GPM)	
		Chlorine (Cl2) Facility (treatment)	
		500,000 G GST	
		Service Pump (30 HP / 315 GPM)	
		Service Pump (60 HP / 735 GPM)	
		Service Pump (50 HP / 800 GPM)	
		Pressure Tank (18,000 G)	

Plant Service Area	Plant Name	Asset Name	Location
Plant 24	Plant 16	Well #16T (168 GPM)	32.415628, -97.179192 8736 E. Hwy 67 Alvarado, TX 76009 Direct Energy ESI-ID 10443720003155620 Meter # 107274272LG
		Well #16P (40 GPM)	
		Chlorine (Cl2) Facility (treatment)	
		200,000 G GST	
		2 Service Pumps (20 HP / 300 GPM)	
	Plant 24	Well #24T (174 GPM)	32.434167, -97.231389 6801 CR 604 Alvarado, TX 76009 UCS 078-340-000
		Well #24P (60 GPM)	
		Chlorine (Cl2) Facility (treatment)	
		500,000 EST (Also fed from TST)	
Plant 25	Plant 14	Well #14T (185 GPM)	32.5019444, -97.209722 5101 CR 608 Lillian, TX 76061 UCS 078-339-621
		Well #14P (122 GPM)	
		Chlorine (Cl2) Facility (treatment)	
		100,000 G GST	
		2 Service Pumps (25 HP / 490 GPM)	
	Plant 15	Well #15T (166 GPM)	32.508889, -97.176111 11513 E. FM 917 Lillian, TX 76061 UCS 078-340-267
		Well #15P (78 GPM)	
		Chlorine (Cl2) Facility (treatment)	
		100,000 G GST	
		2 Service Pumps (25 HP / 490 GPM)	
		500,000 EST	

Plant Service Area	Plant Name	Asset Name	Location
Plant 34	Plant 34	Well #34T (30 GPM)	32.471667, -97.388056 618 N. Main Joshua, TX 76058 Direct Energy ESI-ID 10443720003289354 Meter # 107273423LG Well Direct Energy ESI-ID 10443720008388141 Meter # 105047538LG Service Ctr 618 N Main Bldg B Vac Truck Bldg Direct Energy ESI-ID 10443720009633633 Meter # 105047548LG
		Chlorine (Cl2) Facility (treatment)	
		200,000 GST (Also fed from TST Supply Line)	
		2 Service Pumps (40 HP / 815 GPM)	
		750,000 G EST	
Plant 25M Transmission	Mansfield Meter	9 MGD	32.535268, -97.107020
	Plant 27	1,000,000 G GST	32.52382, -97.10493 2632 Chambers St. Venus, TX 76084 UCS 093-105-455
		2 Service Pumps (400 HP / 2800 GPM)	
	Plant 26	1,000,000 G GST	32.42905, -97.33696 4217 CR 805 Cleburne, TX 76031 UCS 012-179-000
		2 Service Pumps (300 HP / 4500 GPM) (Feeds TST)	
N/A	Plant 35	150,000 G GST (Fed from TST Supply Line)	32.44509, -97.38174 Ground Storage Booster 700 Plum St. UCS 078-340-580
		2 Service Pumps (100 HP / 750 GPM)	
N/A	Plant 36 Emergency Only	500,000 G EST	314 Bentley Dr. , Joshua Direct Energy ESI-ID 10443720007253112 Meter # 104040575LG Meter # 123827803LG
Plant 20 Emergency Only	Plant 20	Well #20T (80 GPM) (emergency only)	32.400531, -97.430858 3103 Windmill Rd (CR 1017) Cleburne, TX 76031 UCS 079-641-347
		Well #20P (52 GPM) (emergency only)	
		Chlorine (Cl2) Facility (treatment)	
		500,000 GST	
		2 Service Pumps (50 HP / 600 GPM)	
		Pressure Tank (10,000 G)	
See Water System Schematics in Appendix C for areas served and interconnections.			
EST = Elevated Storage Tank; G = Gallons; GST = Ground Storage Tank; PS = Pump Station			

Treatment Chemical Storage Facilities		
Plant Name	**Chemical**	**Chemical Location**
Plant 3	Chlorine gas in 150-pound cylinders is stored and used to treat the groundwater. There are two cylinders located at each groundwater plant.	32.347778, -97.214722 4245 CR 401 Alvarado, TX 76009 UCS 078-340-210
Plant 5		32.284167, -97.273333 5749 CR 305 Cleburne, TX 76031 UCS 078-340-131
Plant 9		32.373056, -97.544167 4512 FM 2331 Godley, TX 76044 UCS 078-340-209
Plant 10		32.288314, -97.486622 2201 CR 1224 Cleburne, TX 76031 UCS 078-341-190
Plant 14		32.5019444, -97.209722 5101 CR 608 Lillian, TX 76061 UCS 078-339-621
Plant 15		32.508889, -97.176111 11513 E. FM 917 Lillian, TX 76061 UCS 078-340-267
Plant 16		32.415628, -97.179192 8736 E. Hwy 67 Alvarado, TX 76009 Direct Energy ESI-ID 10443720003155620 Meter # 107274272LG
Plant 17		32.412779, -97.376715 340 Dove Creek Rd. (CR 800) Cleburne, TX 76031 UCS 078-340-193
Plant 18		32.264153, -97.3925 2160 Hwy 174 (near Rio V) Cleburne, TX 76031 UCS 078-340-186
Plant 19		32.296028, -97.346633 2601 CR 310 Cleburne, TX 76031 UCS 078-340-185
Plant 24		32.434167, -97.231389 6801 CR 604 Alvarado, TX 76009 UCS 078-340-000

Plant Name	Chemical	Chemical Location
Plant 34	Chlorine gas in 150-pound cylinders is stored and used to treat the groundwater. There are two cylinders located at each groundwater plant.	32.471667, -97.388056 618 N. Main Joshua, TX 76058 Direct Energy ESI-ID 10443720003289354 Meter # 107273423LG Well Direct Energy ESI-ID 10443720008388141 Meter # 105047538LG Service Ctr 618 N Main Bldg B Vac Truck Bldg Direct Energy ESI-ID 10443720009633633 Meter # 105047548LG
Plant 20 (Emergency Only)		32.400531, -97.430858 3103 Windmill Rd (CR 1017) Cleburne, TX 76031 UCS 079-641-347

Chlorine gas in 150-pound cylinders is stored and used to treat the groundwater. There are two cylinders located at each groundwater plant. The Risk Management Plan rules per 40 Code of Federal Regulations (CFR) §68 are not applicable because the maximum quantity on each site of 300 pounds of chlorine gas does not exceed the EPA threshold quantity of 2,500 pounds.

All assets are designed in accordance with TCEQ water system regulations (30 Texas Administrative Code (TAC) §290) which specify the appropriate safety equipment (such as eye wash stations and/or showers) for each type of chemical used and/or stored.

Other Key Facilities – N/A

iv Industry Chemical Handling and Storage Facilities

List surrounding chemical production, handling or storage industries that could impact your utility during incidents such as accidental releases or tornados.

Industry Chemical Handling Facilities

Facility Name	Location	Distance	Chemical and Exposure Pathway
N/A			

Chemical Storage Tanks – N/A

v Safety

List safety materials and important safety information to help protect utility personnel during an incident. You may also reference your utility Health and Safety Plan, if available.

Safety Materials

Type	Location
Toxic material detection and testing supplies	N/A
Emergency food and water supplies	Refer to EOP Annex M – Resource Management. The Johnson County SUD may choose to provide emergency food and water supplies to its employees directly.
Emergency PPE (note what PPE are present at each location)	JCSUD staff are issued job-appropriate Personal Protective Equipment (PPE). For example, each water operator is issued chemical resistant gear (boots, gloves, etc.) and an escape respirator with organic chlorine cartridges. Face shields, leather and/or cloth gloves, and other protective gear are issued as warranted.
Other equipment (note what is present at each location)	Refer to EOP Annex M – Resource Management.

Safety Information

Topic	Description
There is no separate health and safety plan for JCSUD. Compliance with TCEQ regulations related to water system operations is maintained.	

vi Response Resources

Provide an inventory of available resources (e.g., equipment, supplies) either maintained on site or readily available off site (e.g., neighboring water system) in the table below, or insert an existing inventory sheet. (Examples: Generator, Fuel, Pump, Other).

Resources			
Kind	**Type**	**Quantity**	**Location**
The JCSUD equipment inventory is maintained at the JCSUD office.			
An equipment inventory for the entire County is maintained by the County Emergency Manager.			
Fuel is obtained by JCSUD from the contracted diesel provider.			
The response resource list associated with the EOP is maintained by the County Emergency Manager.			
For essential resources such as emergency drinking water supplies, ice, portable toilets, etc., refer to EOP Annex M – Resource Management. JCSUD currently has portable toilets for emergency use.			
For debris handling procedures and resources, refer to EOP Annex K – Public Works & Engineering.			
For detailed utility resources including local utility information and information related to small emergency generators, refer to EOP Annex L – Utilities. JCSUD is considering generators for key asset locations.			
For spill response resources, refer to EOP Annex Q- Hazardous Materials & Oil Spill Response. DPC is a resource in the event of a chlorine gas release.			
For terrorist incident response specialized resources, refer to EOP Annex V.			

vii Key Local Services

Note the closest locations of key logistical and medical services that you or mutual aid and assistance providers may need during an incident. Include a map if available.

Essential Services	
Facility	**Location/Description**
For essential services / critical facilities, see Appendix E.	

1 RESILIENCE STRATEGIES

This section contains strategies and resources to improve the resilience of the system, including the physical security and cybersecurity of the system.

1.1 Emergency Response Roles

Describe the roles and responsibilities for key utility and external response partner personnel in the table below. You can add, edit or delete rows, as necessary.

Water Utility and Partner Roles

Name/Title	Emergency Response Role	Responsibilities
Pete Kampfer / General Manager	Emergency Response Lead	Responsible for all incident response activities, including developing strategies and tactics and ordering and releasing resources.
Danny Armstrong / Operations Manager	Alternate Emergency Response Lead	Perform duties as assigned by ER Lead; assumes duties listed above when ER Lead is not available.
Dana Collier / System Development Manager	Alternate Emergency Response Lead	Perform duties as assigned by ER Lead; assumes duties listed above when ER Lead is not available.
Jaime Moore / Johnson County Emergency Manager	Johnson County Emergency Management Lead	Implements EOP when warranted.
Refer to the EOP for all other Partner Roles led by the Johnson County Emergency Management. If an emergency is beyond the scope of the JCSUD, the EOP is implemented by contacting 911, the appropriate responder(s) are dispatched, and the Johnson County Emergency Management is contacted.		

External Response Partner Roles

Organization
Refer to the EOP for all External Partner Roles led by the Johnson County Emergency Management. As stated in the previous table if an emergency is beyond the scope of the JCSUD, the EOP is implemented by contacting 911, the appropriate responder(s) are dispatched, and the Johnson County Emergency Management is contacted. The EOP contains Local Partners, State Partners, and Federal Partners.

1.2 Incident Command System (ICS) Roles

ICS is used to organize both near-term and long-term field-level operations for a broad spectrum of emergencies, from small to complex incidents, both natural and manmade. An ICS Incident Organization Chart (ICS Form 207), available at FEMA's ICS Resource Center, may be completed for your utility and inserted here or attached to your ERP.

JCSUD will establish an ICS Organization Chart for each applicable incident. See the ICS Incident Organization Chart (ICS Form 207) form in Appendix F.

1.3 Communication

Communication during an incident is critical to relay information to employees, response partners and critical customers about potential risks to health, infrastructure, and the environment.

1.3.1 Internal Communication

List all utility emergency response team members, their response role, title and contact information.

Contact List

Name	Role/Title	Phone	Alternate Phone	Email
See the JCSUD Emergency Contact Roster in Appendix D for contact information.				

1.3.2 External Response Partner Communication

List all external response partners, their response role or position as well as contact information.

External Response Partner Contact List

Organization or Department	Point Person Name or Position	Phone	Alternate Phone	Email or Website
For local, state, and federal response partner communications refer to the EOP Basic Plan. For external response partner communications and for overall communications details, see EOP Annex B – Communications.				

1.3.3 Critical Customer Communication

List critical customers below who should be given priority notification due to their reliance on the water supply either for medical reasons, based on usage, public health mission or because they may serve customers considered to be sensitive sub-populations.

Critical Customer Contact List

Organization or Department	Point Person Name or Position	Contact Instructions	Phone	Alternate Phone	Email or Website
See the Critical Customer List in Appendix E.					

1.3.4 Communication Equipment Inventory

Inventory your utility's communication equipment below.

Communication Equipment			
Type	**Assigned to**	**Location**	**Number/Frequency/Channel**
JCSUD uses cell phones for communications with staff. Refer to EOP Annex B – Communications for communications resources. Detailed communications equipment available through the Johnson County EOC is listed in the EOP Annex N – Direction & Control.			

1.4 Media Outreach

List contact information for all media outlets that your utility may coordinate with during notification efforts. Additionally, include existing risk communication procedures, such as composing and delivering messages (e.g. message mapping), or reference an existing Risk Communication Plan.

Contact List				
Organization or Department	**Point Person Name & Position**	**Phone**	**Alternate phone**	**Email or Website**
JCSUD sends texts to current customers, emails customers, and posts information on its website for notifications. Johnson County EOC outreach is handled per EOP Annex I – Public Information for media outreach communications information.				

1.5 Public Notification Templates

Insert your templates for public notifications here, or reference where they may be found. Ensure that your templates are consistent with the regulatory requirements for public notification contained in the Public Notification Rule (see 40 CFR 141, Subpart Q) and all relevant state regulations.

Water system public notices are conducted in accordance with TCEQ regulation 30 TAC §290.47(c)(1). The reference regulation includes a template for Boil Water Notice for Community Public Water Systems.

For other notifications, refer to EOP Annex A – Warning for early warning procedures and public information templates, EOP Annex C – Shelter and Mass Care for related public notification templates and sample press releases, and EOP Annex N – Direction & Control for EOC implementation procedures including message and report templates.

2 EMERGENCY PLANS AND PROCEDURES

This section contains plans and procedures that can be implemented in the event of a malevolent act or natural hazard that threatens your utility's ability to deliver safe drinking water.

2.1 Core Response Procedures

Core procedures are the "building blocks" for incident specific response procedures, as they are typically implemented across a broad variety of incidents (e.g., hurricane, earthquake, flood). List all your core procedures here.

Access	
Item	**Description**
Debris clearing	JCSUD has some limited ability to clear debris, but may need to reply on the County for a large debris clearing effort. Refer to EOP Annex K – Public Works & Engineering for debris clearing procedures and resources.
Alternate routes	Refer to EOP Annex S – Transportation for guidance on transportation of people, supplies, and materials.
Identification badges	JCSUD utilizes ID badges for staff. Refer to EOP Annex G – Law Enforcement for personnel staffing access guidance, including the use of ID badges by County staff.
Other	Refer to the EOP Basic Plan for Core Response Procedures.

Physical Security	
Item	**Description**
Access control procedures	JCSUD utilizes ID badges for staff.
Restricted areas	The JCSUD office is highly secure with room access panels and bullet-proof glass screen at the customer service counter.
Evidence protection measures	
Security culture	Refer to EOP Annex G – Law Enforcement for area security and incident scene control procedures.
Other	N/A

Cybersecurity	
Item	**Description**
Disconnect procedure	The JCSUD participates in the Texas Municipal League's (TML's) cyber-security training program.
Notification	
Assess procedure	
Implementation processes	
Documentation	
Other	N/A

Power Loss	
Item	**Description**
Backup power systems	Onsite backup power generation to operate critical water utility assets is being considered due to the 2021 winter storm emergency. Typically, redundancy between JCSUD facilities and electricity grids has provided sufficient resilience in an emergency with power outage; however, since the scope of the 2021 disaster was state-wide, the use of backup power in being considered.
Power utility	
Fuel plan	Diesel fuel contractor is used to provide equipment fuel to JCSUD.
Maintenance plan	If a stationary generator were acquired, a maintenance plan for start-up would need to be developed for generators to ensure each operate when needed. Refer to EOP Annex L – Energy & Utilities and Annex M – Resource Management.
Other	N/A

Emergency Alternate Drinking Water Supplies*	
Item	**Description**
There are multiple water system interconnections that provide redundancy such that the entire water distribution system is backed up with alternate supply sources. In the event of an area-wide power outage similar to the 2021 Winter Storm disaster, alternate water sources will either be obtained through the County Emergency Manager or from alternate sources such as the Salvation Army, the Coca-Cola Distributor, etc.	
Refer to EOP Annex M – Resource Management for descriptions of emergency supplies.	
Refer to EOP Annex O – Human Services for emergency water supplies.	

* Interconnections are listed and described in Section 3.1

Sampling and Analysis	
Item	**Description**
Sampling procedures *Pre-identified sampling locations* *Sampling containers and preservatives* *Sample collection* *Sample transportation* *Laboratory capabilities* *Interpreting results*	The TCEQ regulations are followed in the event of a system pressure drop. Sampling is conducted in accordance with 30 TAC §290.47(e). The sample collection procedures and analytical test methods for the prescribed sampling are conducted in accordance with the JCSUD's TCEQ Public Water System (PWS) Monitoring Plan.
Other	N/A

Local Contract/State/Federal Laboratory Contact List			
Name	**Address**	**Analytes/Methods**	**Phone**
Current NELAP lab is Environmental Monitoring Laboratory	6145 SH 171, Hillsboro 76645	NELAP accredited for Drinking water, non-potable water, solids & chemicals	254-582-2622

Family and Utility Personnel Well Being	
Item	**Description**
Family disaster plan	JCSUD provides flexibility to its staff during an emergency so that the staff may assists its family members during an emergency situation. Refer to EOP Annex O - Human Services for support and supplies necessary to maintain personnel health and well-being during an incident.
Assembly area	Refer to EOP Annex E – Evacuation.
Supplies	Refer to EOP Annex M – Resource Management.
Alternate work and shelter locations	Refer to EOP Annex C – Shelter & Mass Care
Extreme temperatures	Refer to EOP Annex O - Human Services.
Other	N/A

2.2 Incident-Specific Response Procedures

Insert applicable Incident-Specific Response Procedures (ISRPs), specialized procedures tailored to an incident type. Incidents may include, but are not limited to, the following:

- Cybersecurity
- Drought – County Water Conservation and Drought Contingency Plan (not attached herein since long-term strategy rather than incident response)
- Earthquake
- Extreme Cold and Winter Storms
- Extreme Heat
- Flooding
- Harmful Algal Bloom
- ~~Hurricane~~ (Not applicable)
- Tornado
- ~~Tsunami~~ (Not applicable)
- ~~Volcanic Activity~~ (Not applicable)
- Wildfire
- Source Water Contamination
- Distribution System Contamination

EPA's website provides a number of incident action checklists (IACs) that you can use to help develop your own ISRPs. EPA also published the Prepared for Contamination in Your Distribution System? guidance that can help you develop a distribution system contamination ISRP.

Applicable EPA IACs (Cybersecurity, Earthquake, Extreme Cold and Winter Storms, Extreme Heat, Flooding, Harmful Algal Bloom, Tornado, and Wildfire) are attached in Appendix G. The IACs may be utilized to assist during an emergency.

For Source Water Contamination and Distribution System Contamination with no available IAC, the EOP Annex Q.

The JCSUD website directs the public to contact the water emergency hotline at (817) 760-5255, 24 hours a day, seven days a week to report a water emergency. The water emergency may stem from a natural hazard or malevolent act. The call is vetted via a flowchart target to assess the customer call and to dispatch the appropriate staff to evaluate and resolve the issue. A rotating call list of available staff is maintained by the JCSUD for the water emergency hotline to utilize.

Hazardous Materials & Oil Spill Response and/or Annex V – Terrorist Incident Response will be implemented as applicable.

3 MITIGATION ACTIONS

This section contains actions, procedures, and equipment which can obviate or significantly lessen the impact of a malevolent act or natural hazard on the public health and the safety and supply of drinking water provided to your community and individuals, including the development of alternative source water options, relocation of water intakes, and construction of flood protection barriers.

3.1 Alternative Source Water Options and Interconnected Utilities

List information on alternative source water options and interconnected utilities to mitigate impacts during incidents.

Alternative Source Water Options

Type	Location	Comments
As shown in the Water System Schematic in Appendix C, there are two separate treated water sources, JCSUD owns and operates groundwater wells, and there are several PSs and/or interconnections between pressure planes, all of which provide system redundancies. Additional alternative source water options or additional interconnected utilities do not appear warranted.		

Interconnected Utilities

Utility Name	Location	Contact Information	Comments
Brazos Regional Public Utility Agency	5912 Matlock Rd. Granbury, Tx 76049	Stefan Dollins, General Manager Work: 682-500-1690 Mobile: 817-559-7037	Treated Water Provider
City of Mansfield	707 Pleasant Ridge Ct. Mansfield, TX 76063	David Hinshaw, Treatment Plant Manager Direct: 817-728-3674	Treated Water Provider
See the Water System Schematic in Appendix C.			

3.2 Other Mitigation Actions

List any mitigation procedures or projects implemented at your utility, such as raising facilities and controls or constructing berms to protect against flood damage.

Mitigation Actions

Type	Location	Comments
Back-up power generators are being considered for the utility.		

4 DETECTION STRATEGIES

This section contains strategies that can be used to aid in the detection of malevolent acts or natural hazards that threaten the security or resilience of the system.

List the detection strategies and methods your utility uses to aid in the detection of malevolent acts or natural hazards. Also list the corresponding procedure to be used if the threat is detected.

Detection Strategies

Threat	Detection Method	Procedure
Unauthorized entry	• Visual at facility or from remote site cameras	Call 911
Source water contamination	• *National Response Center notifications* • *Notification from 911 for releases resulting from transportation accidents*	Dial 9-1-1 for potential groundwater contamination.
Distribution system contamination	• *Customer complaint surveillance* • *Public health surveillance*	Dial 9-1-1. Refer to EOP Annex Q – Hazardous Materials & Oil Spill Response and/or Annex V – Terrorist Incident Response
Cyber intrusion	• *Automated IT and operation technology (OT) system intrusion detection monitoring* • *Notification from utility staff*	Contact Cybersecurity Contactor. C3Corp at (469) 254-1996 Report incidents: https://www.us-cert.gov/report
Hazardous chemical release	• ~~*Chlorine gas in air monitors*~~ Visual detection	Call 9-1-1 Contact DPC at (817) 641-4712 Refer to EOP Annex Q – Hazardous Materials & Oil Spill Response.
~~*Hurricane*~~ (Not applicable)	• ~~*Weather Service alerts*~~	~~*Hurricane Incident Action Checklist*~~
~~*Flood*~~ (Not applicable)	• ~~*Notification from Army Corp*~~	~~*Flood Incident Action Checklist*~~
Power outage	• *Notification from energy provider* • *Alarm from line power sensor*	See ERP Section 2.1 Power Loss Table.
Other		
Other		

APPENDIX A

ERP Certification

APPENDIX B

Coordination with Local Emergency Planners

From: Zachary Johnson
To: Luci Dunn
Subject: RE: Johnson County SUD Emergency Response for Risk & Resilience (eHT 7654-3)
Date: Friday, June 4, 2021 8:19:43 AM

Hello Ms. Dunn,

It will be fine if you send it over later this month in a completed version. While it's not required for JCSUD to send one over and we do not "approve" or "authorize" the plans in any way, we do appreciate the opportunity to review them so we can be aware of their emergency operations plans if the need arises.

I appreciate you reaching out and look forward to reading the completed report,

Zac Johnson
Johnson County Emergency Management

Emergency Management Planner

810 E. Kilpatrick St., Cleburne, TX 76031

☎ - 817-556-6995

From: Luci Dunn <luci.dunn@e-ht.com>
Sent: Thursday, June 3, 2021 5:02 PM
To: Zachary Johnson <zjohnson@johnsoncountytx.org>
Cc: Danny Armstrong <darmstrong@jcsud.com>; Dana Collier <dcollier@jcsud.com> <dcollier@jcsud.com>; Pete Kampfer (pkampfer@jcsud.com) <pkampfer@jcsud.com>
Subject: RE: Johnson County SUD Emergency Response for Risk & Resilience (eHT 7654-3)

Good Day Zachary,
eHT is working with the Johnson County Special Utility District to finish the Emergency Response Plan (ERP) for its water system. The final version will be ready by the end of the month. Would you prefer to review a draft now or receive the completed ERP later this month? Thanks,

Luci Dunn, PE
Senior Project Manager

Enprotec / Hibbs & Todd, Inc. (eHT)
T (325) 698-5560 I **F** (325) 690-3240 I **M** (817) 694-8382 I **E** luci.dunn@e-ht.com
402 Cedar Street I Abilene, Texas 79601

Enprotec / Hibbs & Todd
PE Firm Registration No. 1151 I PG Firm Registration No. 50103
RPLS Firm Registration No. 10011900
Facebook I Twitter I LinkedIn

From: Zachary Johnson <zjohnson@johnsoncountytx.org>
Sent: Tuesday, January 19, 2021 8:56 AM
To: Luci Dunn <luci.dunn@e-ht.com>
Subject: RE: Johnson County SUD Emergency Response for Risk & Resilience (eHT 7654-3)

Ms. Dunn,

I have attached the Table of Contents for the Johnson County Emergency Plan to this email. Please let me know if I can be of further assistance.

Regards,

Zac Johnson
Johnson County Emergency Management

Emergency Management Planner

810 E. Kilpatrick St., Cleburne, TX 76031

☎ - 817-556-6995

From: Luci Dunn <luci.dunn@e-ht.com>
Sent: Monday, January 18, 2021 8:26 AM
To: Emergency Management Mail Group <EM@johnsoncountytx.org>
Cc: Danny Armstrong <darmstrong@jcsud.com>; Dana Collier <dcollier@jcsud.com> <dcollier@jcsud.com>
Subject: FW: Johnson County SUD Emergency Response for Risk & Resilience (eHT 7654-3)

Good Day Jaime,
The Johnson County Special Utility District (JCSUD) completed and certified its EPA-mandated Risk & Resilience Assessment (RRA) last month. The next step is to prepare the subsequent water system Emergency Response Plan (ERP). I do not need the requested items in the email below related to the RRA since that step is completed. Assumptions were made related to the emergency response in RRA. However, now that the ERP preparation is underway, it would be extremely helpful to receive a copy of the County's Emergency Management (EM) Plan. If the entire EM plan cannot be sent, would you be able to provide me with the EM Table of Contents? If Table of Contents only, I can follow the state plan on the ER website to see the general contents within each section. Would you please let me know by the end of this month?

Please feel free to contact me at your convenience to discuss; I am teleworking and am available on my cell at your convenience. Your assistance is appreciated.

Luci Dunn, PE
Senior Project Manager
Enprotec / Hibbs & Todd, Inc. (eHT)
T (325) 698-5560 l **F** (325) 690-3240 l **M** (817) 694-8382 l **E** luci.dunn@e-ht.com
402 Cedar Street l Abilene, Texas 79601
Enprotec / Hibbs & Todd
PE Firm Registration No. 1151 l PG Firm Registration No. 50103
RPLS Firm Registration No. 10011900
Facebook l Twitter l LinkedIn

From: Luci Dunn
Sent: Tuesday, December 8, 2020 1:52 PM
To: EM@johnsoncountytx.org
Subject: Johnson County SUD Emergency Response for Risk & Resilience (eHT 7654-3)

Good Day Jaime,
Per my voicemail today, I am assisting the Johnson County Special Utility District (JCSUD) with its EPA-mandated Risk & Resilience Assessment (RRA) and the subsequent water system Emergency Response Plan (ERP). There are a few questions & items that would be helpful to discuss with you and to get from you to complete the RRA (due later this month) and to move into development of the water system ERP next year. Please see the attached word document with the overall natural hazard vulnerability rating system (per EPA guidance) and the EPA RRA questions related to Emergency Management.

Feel free to complete the items and return to me or give me a call and we can discuss and I'll mark your answers during our conversation. I will be on calls today from 2-2:30 and again from 3:30-4:30. I'm free all day tomorrow. I am teleworking so please contact my mobile # listed below or

email me.

Would it be possible to receive a copy of the County's Emergency Response plan? If not, would you be able to send me the table of contents? If Table of Contents only, I can follow the state plan on the ER website to see the general contents within each section.

Your assistance is appreciated.

Luci Dunn, PE
Senior Project Manager
Enprotec / Hibbs & Todd, Inc. (eHT)
T (325) 698-5560 l **F** (325) 690-3240 l **M** (817) 694-8382 l **E** luci.dunn@e-ht.com
402 Cedar Street l Abilene, Texas 79601

PE Firm Registration No. 1151 l PG Firm Registration No. 50103
RPLS Firm Registration No. 10011900
Facebook l Twitter l LinkedIn

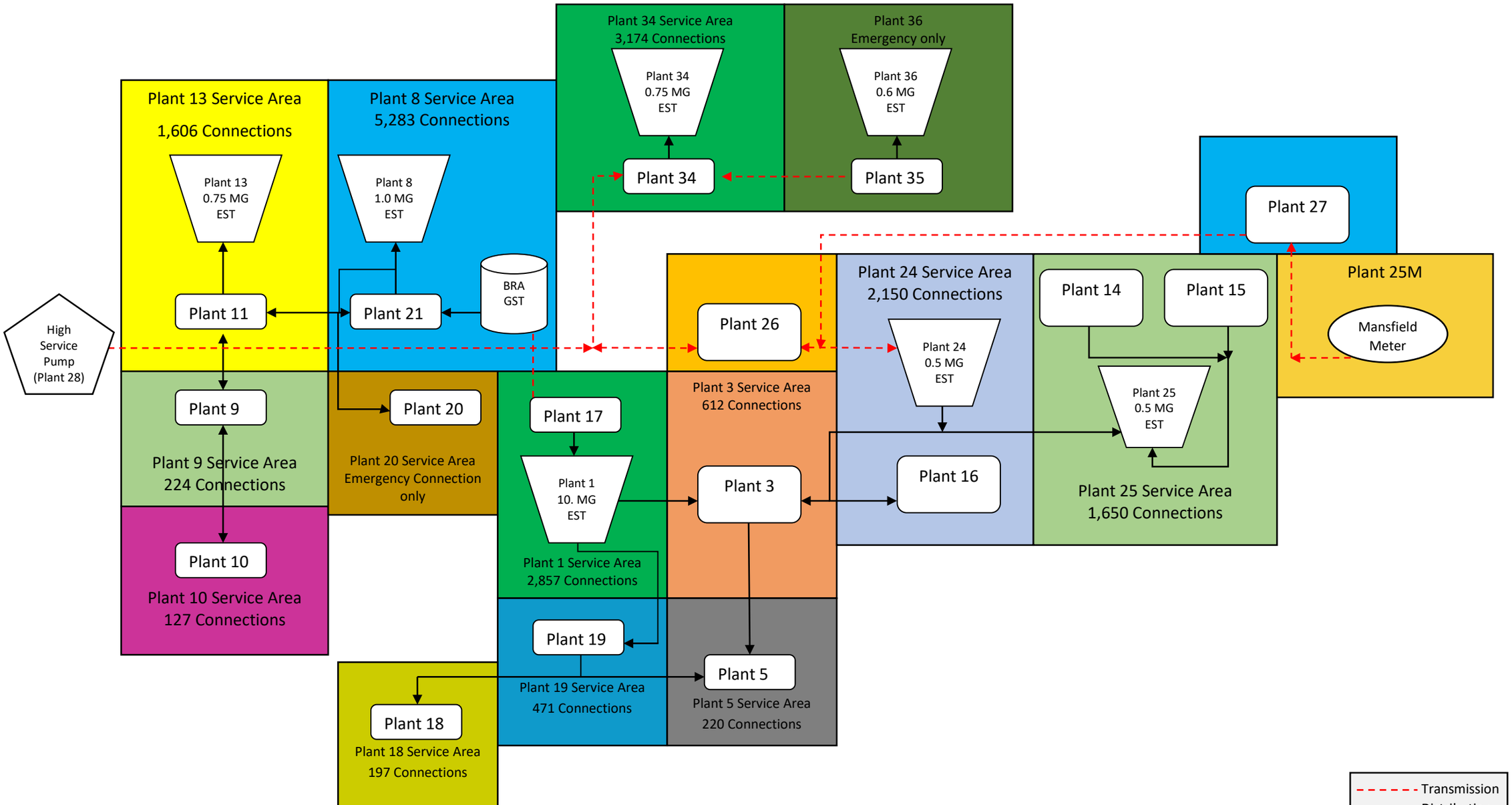
CAUTION: This email originated from outside the organization. Do not click links or open attachments unless you validate the sender and know the content is safe.

APPENDIX C

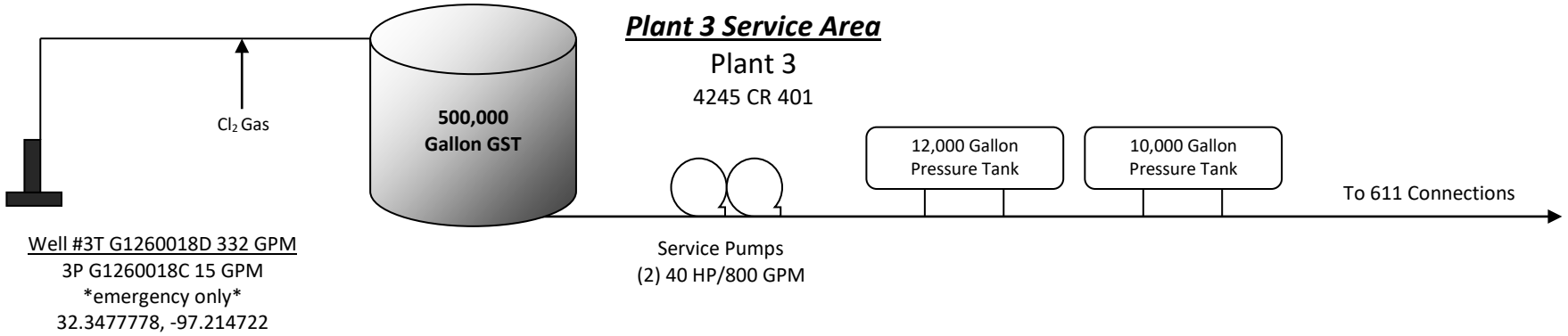
Water System Schematics
and
Asset Location Address List

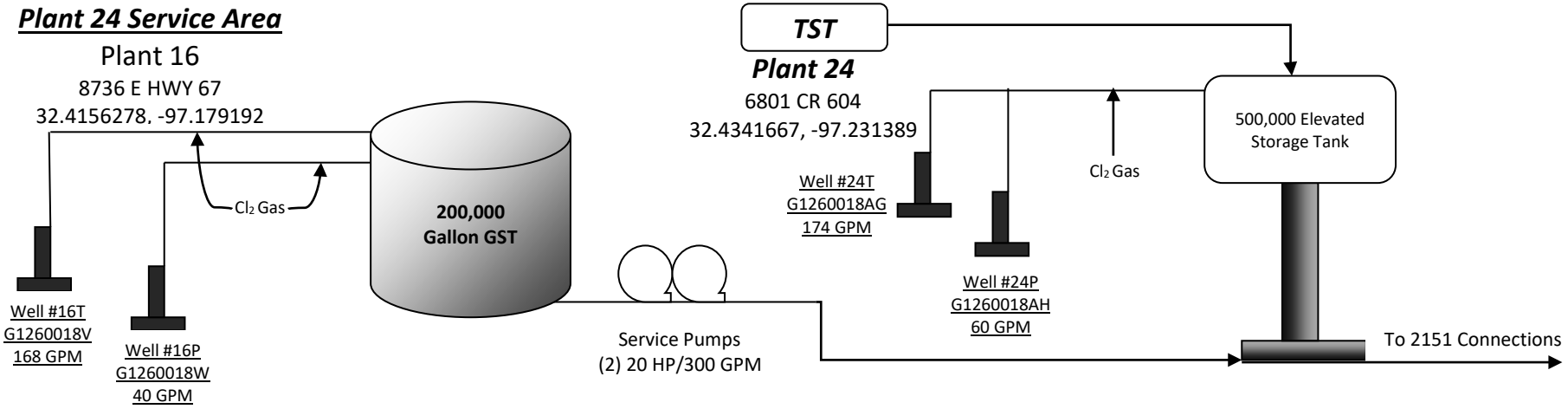
Johnson County Special Utility District

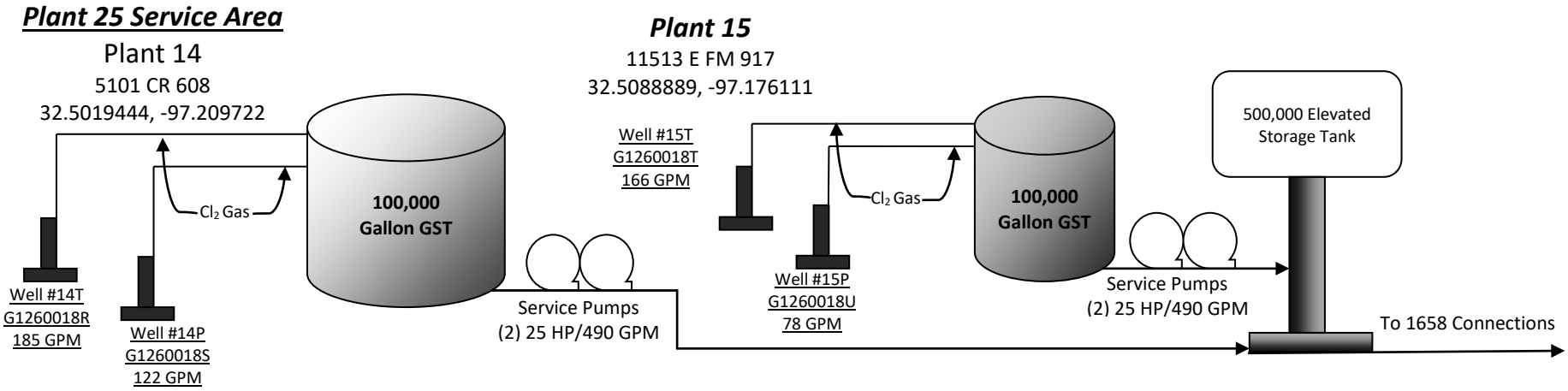
Public Water System Diagram

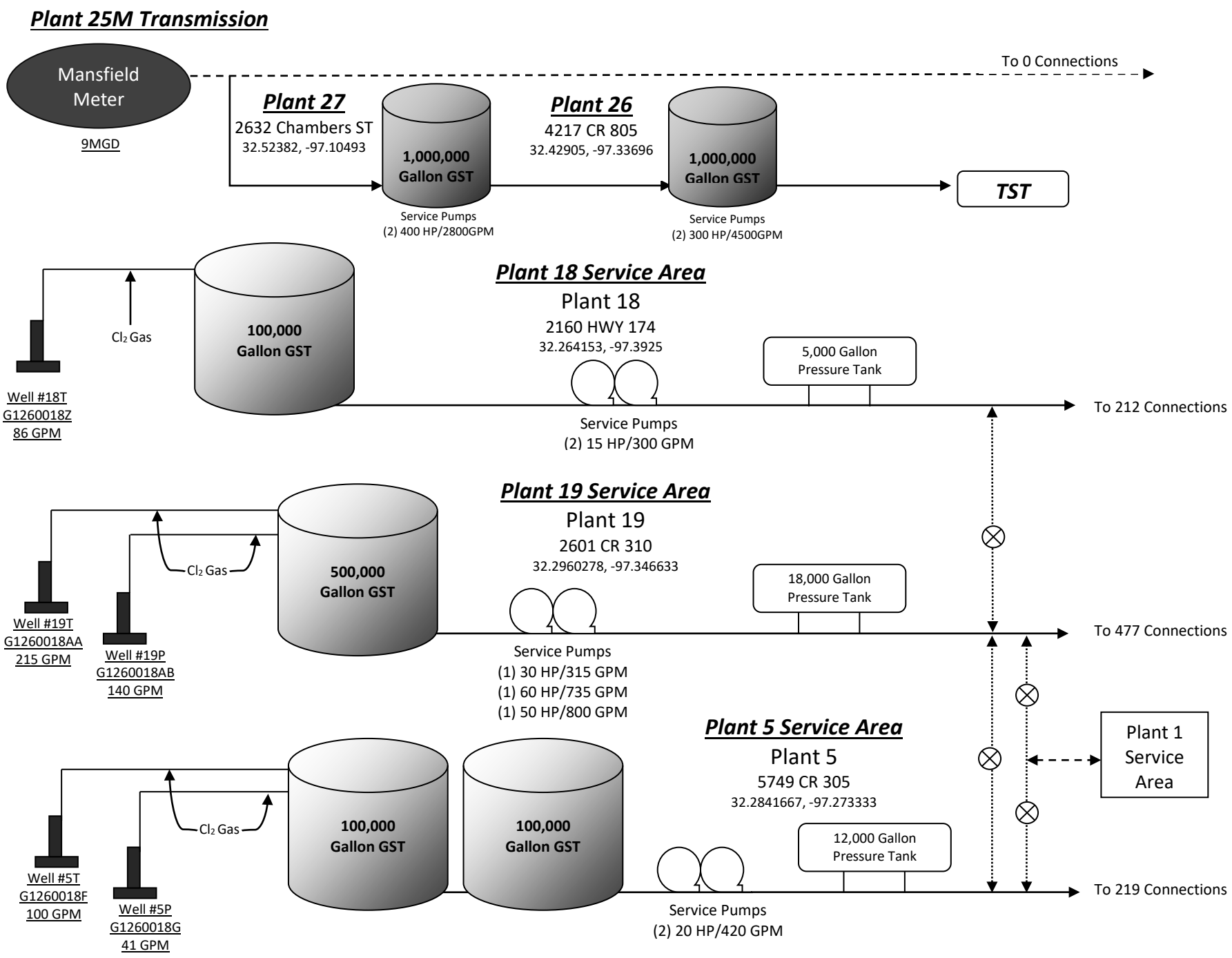


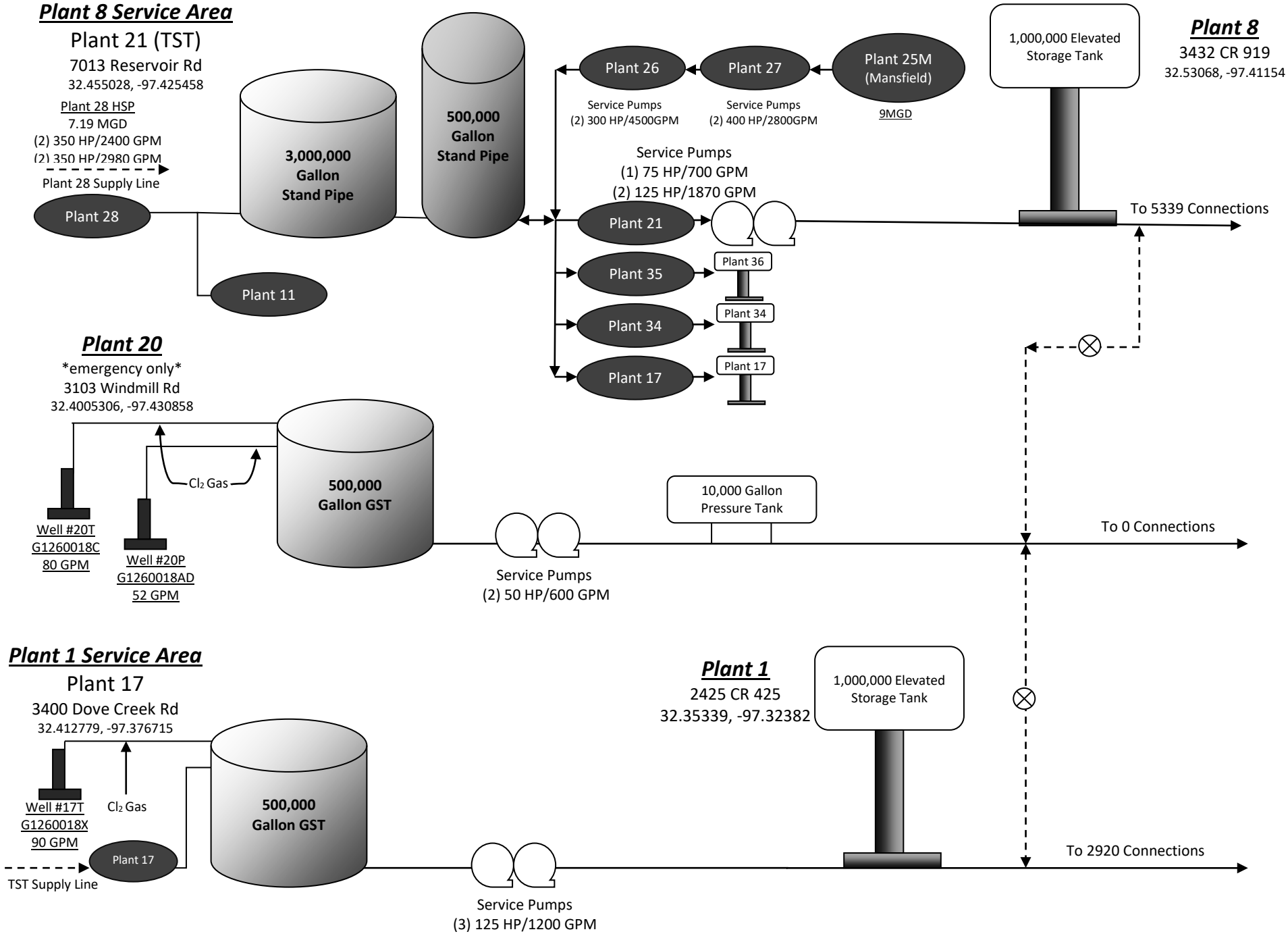
12/16/2020

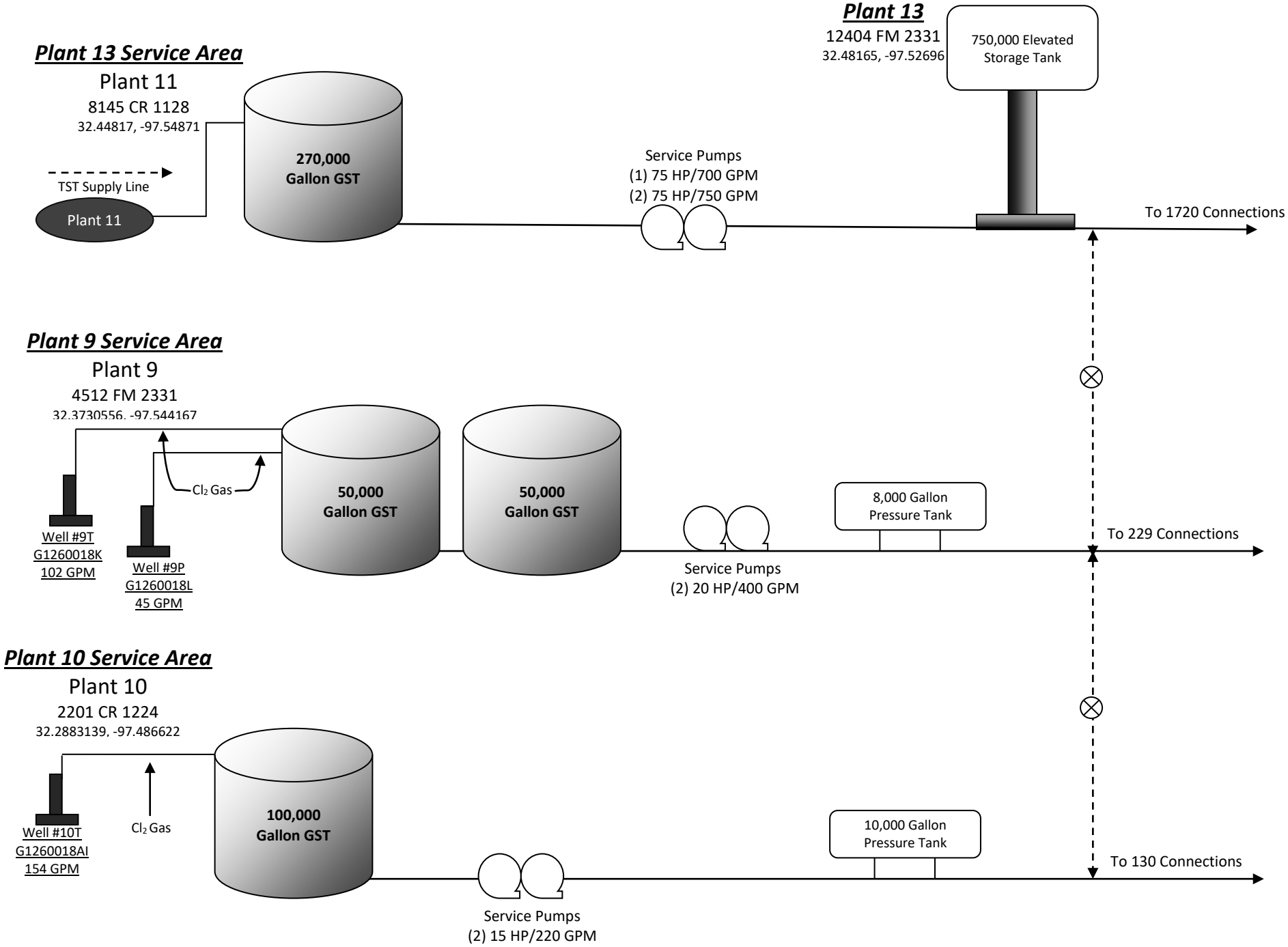

Plant 3 Service Area
Plant 3
4245 CR 401
Cl_2 Gas
500,000 Gallon GST
12,000 Gallon Pressure Tank
10,000 Gallon Pressure Tank
To 611 Connections
Well #3T G1260018D 332 GPM
3P G1260018C 15 GPM
emergency only
32.3477778, -97.214722
Service Pumps
(2) 40 HP/800 GPM

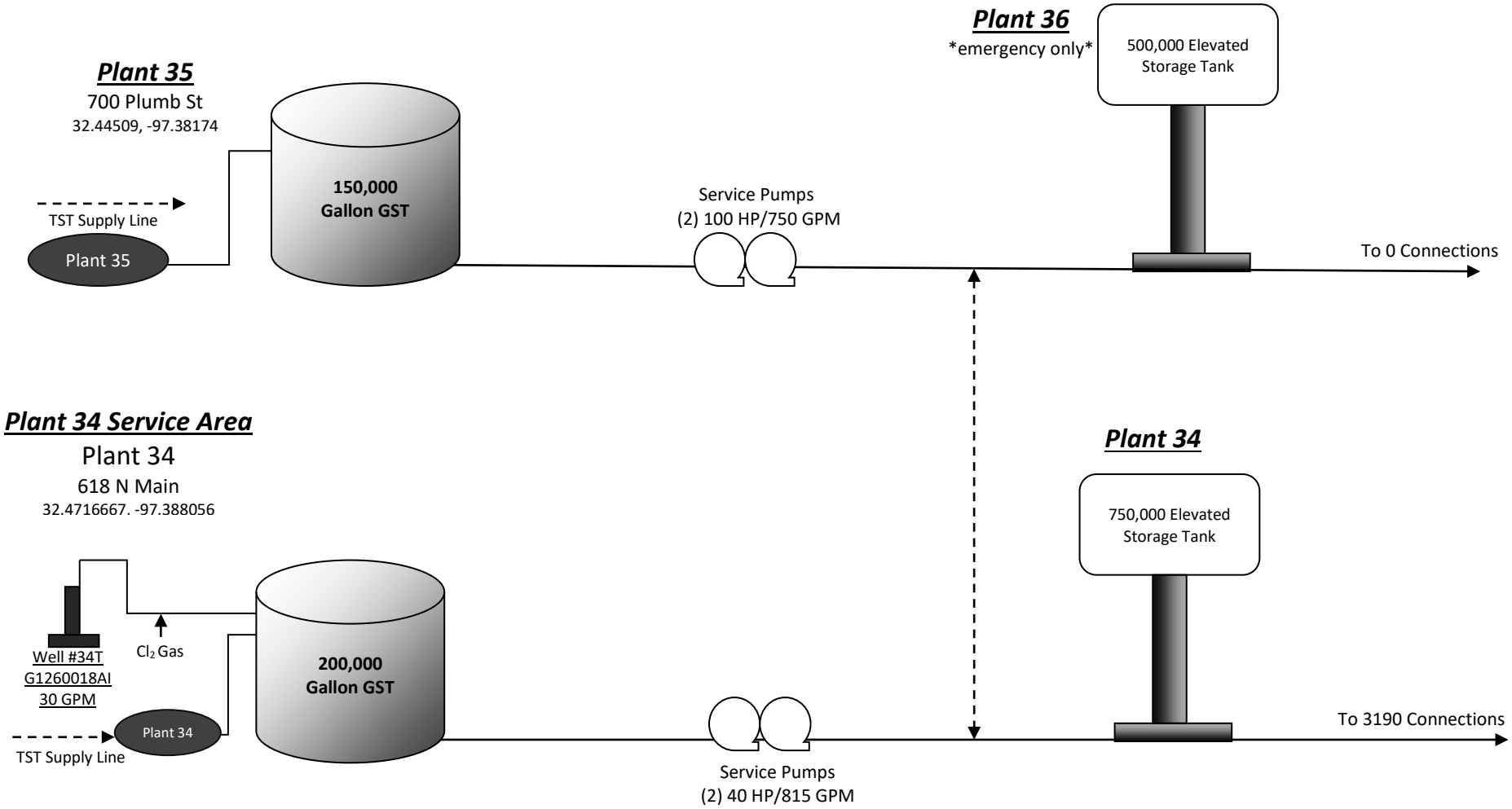

Plant 24 Service Area
Plant 16
8736 E HWY 67
32.4156278, -97.179192
TST
Plant 24
6801 CR 604
32.4341667, -97.231389
Cl_2 Gas
200,000 Gallon GST
500,000 Elevated Storage Tank
Well #24T G1260018AG 174 GPM
Well #24P G1260018AH 60 GPM
Well #16T G1260018V 168 GPM
Well #16P G1260018W 40 GPM
Service Pumps
(2) 20 HP/300 GPM
To 2151 Connections


Plant 25 Service Area
Plant 14
5101 CR 608
32.5019444, -97.209722
Plant 15
11513 E FM 917
32.5088889, -97.176111
Cl_2 Gas
100,000 Gallon GST
500,000 Elevated Storage Tank
Well #15T G1260018T 166 GPM
Well #14T G1260018R 185 GPM
Well #14P G1260018S 122 GPM
Well #15P G1260018U 78 GPM
Service Pumps
(2) 25 HP/490 GPM
To 1658 Connections


Plant 25M Transmission
Mansfield Meter
9MGD
To 0 Connections
Plant 27
2632 Chambers ST
32.52382, -97.10493
1,000,000 Gallon GST
Service Pumps
(2) 400 HP/2800GPM
Plant 26
4217 CR 805
32.42905, -97.33696
1,000,000 Gallon GST
Service Pumps
(2) 300 HP/4500GPM
TST
Plant 18 Service Area
Plant 18
2160 HWY 174
32.264153, -97.3925
Cl2 Gas
100,000 Gallon GST
Well #18T
G1260018Z
86 GPM
5,000 Gallon Pressure Tank
Service Pumps
(2) 15 HP/300 GPM
To 212 Connections
Plant 19 Service Area
Plant 19
2601 CR 310
32.2960278, -97.346633
Cl2 Gas
500,000 Gallon GST
Well #19T
G1260018AA
215 GPM
Well #19P
G1260018AB
140 GPM
18,000 Gallon Pressure Tank
Service Pumps
(1) 30 HP/315 GPM
(1) 60 HP/735 GPM
(1) 50 HP/800 GPM
To 477 Connections
Plant 5 Service Area
Plant 5
5749 CR 305
32.2841667, -97.273333
Cl2 Gas
100,000 Gallon GST
100,000 Gallon GST
Well #5T
G1260018F
100 GPM
Well #5P
G1260018G
41 GPM
12,000 Gallon Pressure Tank
Service Pumps
(2) 20 HP/420 GPM
To 219 Connections
Plant 1 Service Area


Plant 8 Service Area
Plant 21 (TST)
7013 Reservoir Rd
32.455028, -97.425458
Plant 28 HSP
7.19 MGD
(2) 350 HP/2400 GPM
(2) 350 HP/2980 GPM
Plant 28 Supply Line
Plant 28
3,000,000 Gallon Stand Pipe
500,000 Gallon Stand Pipe
Plant 11
Plant 26
Plant 27
Plant 25M (Mansfield)
Service Pumps (2) 300 HP/4500GPM
Service Pumps (2) 400 HP/2800GPM
9MGD
Service Pumps
(1) 75 HP/700 GPM
(2) 125 HP/1870 GPM
Plant 21
Plant 35
Plant 34
Plant 17
Plant 36
Plant 34
Plant 17
1,000,000 Elevated Storage Tank
Plant 8
3432 CR 919
32.53068, -97.41154
To 5339 Connections
Plant 20
emergency only
3103 Windmill Rd
32.4005306, -97.430858
Well #20T
G1260018C
80 GPM
Well #20P
G1260018AD
52 GPM
Cl2 Gas
500,000 Gallon GST
10,000 Gallon Pressure Tank
Service Pumps
(2) 50 HP/600 GPM
To 0 Connections
Plant 1 Service Area
Plant 17
3400 Dove Creek Rd
32.412779, -97.376715
Well #17T
G1260018X
90 GPM
Cl2 Gas
Plant 17
TST Supply Line
500,000 Gallon GST
Service Pumps
(3) 125 HP/1200 GPM
Plant 1
2425 CR 425
32.35339, -97.32382
1,000,000 Elevated Storage Tank
To 2920 Connections


Plant 13 Service Area
Plant 11
8145 CR 1128
32.44817, -97.54871
TST Supply Line
Plant 11
270,000
Gallon GST
Service Pumps
(1) 75 HP/700 GPM
(2) 75 HP/750 GPM
Plant 13
12404 FM 2331
32.48165, -97.52696
750,000 Elevated
Storage Tank
To 1720 Connections
Plant 9 Service Area
Plant 9
4512 FM 2331
32.3730556, -97.544167
Well #9T
G1260018K
102 GPM
Well #9P
G1260018L
45 GPM
Cl2 Gas
50,000
Gallon GST
50,000
Gallon GST
Service Pumps
(2) 20 HP/400 GPM
8,000 Gallon
Pressure Tank
To 229 Connections
Plant 10 Service Area
Plant 10
2201 CR 1224
32.2883139, -97.486622
Well #10T
G1260018AI
154 GPM
Cl2 Gas
100,000
Gallon GST
Service Pumps
(2) 15 HP/220 GPM
10,000 Gallon
Pressure Tank
To 130 Connections


Plant 35
700 Plumb St
32.44509, -97.38174
TST Supply Line
Plant 35
150,000
Gallon GST
Service Pumps
(2) 100 HP/750 GPM
Plant 36
emergency only
500,000 Elevated
Storage Tank
To 0 Connections
Plant 34 Service Area
Plant 34
618 N Main
32.4716667. -97.388056
Well #34T
G1260018AI
30 GPM
Cl2 Gas
Plant 34
TST Supply Line
200,000
Gallon GST
Service Pumps
(2) 40 HP/815 GPM
Plant 34
750,000 Elevated
Storage Tank
To 3190 Connections

Johnson County SUD **PLANT ADDRESSES**

PLANT #1 (Newer) ***Elev Storage***
2425 CR 425
Cleburne, TX 76031
UCS 113-148-745

PLANT #2
3525 CR 424
Cleburne, TX 76031
Meter pulled; Inactive

PLANT #3 ***Well***
4245 CR 401
Alvarado, TX 76009
UCS 078-340-210

PLANT #4
2420 CR 312
Cleburne, TX 76031
Meter pulled; Inactive

PLANT #5 ***Well***
5749 CR 305
Cleburne, TX 76031
UCS 078-340-131

PLANT #6
1912 W. FM 917
Joshua, TX 76058
Meter pulled; Inactive

PLANT #8 (Newer 8) ***Surface***
3432 CR 919
Crowley, TX 76036
UCS 098-150-066

PLANT #9 ***Well***
4512 FM 2331
Godley, TX 76044
UCS 078-340-209

PLANT #10 (New 10) ***Well***
2201 CR 1224
Cleburne, TX 76031
UCS 078-341-190

PLANT #11 (Newer 11) ***Surface***
8145 CR 1128
Godley, TX 76044
UCS 079-641-338

PLANT #12
4409 W. FM 917
Joshua, TX 76058
UCS 078-340-211

PLANT #13 ***Surface***
12404 FM 2331
Godley, TX 76044
UCS 076-173-155

PLANT #14 ***Well***
5101 CR 608
Lillian, TX 76061
UCS 078-339-621

PLANT #15 ***Well***
11513 E. FM 917
Lillian, TX 76061
UCS 078-340-267

PLANT #16 ***Well***
8736 E. Hwy 67
Alvarado, TX 76009
Direct Energy ESI-ID 10443720003155620
Meter # 107274272LG

PLANT #17 ***Well & Surface***
340 Dove Creek Rd. (CR 800)
Cleburne, TX 76031
UCS 078-340-193

PLANT #18 ***Well***
2160 Hwy 174 (near Rio V)
Cleburne, TX 76031
UCS 078-340-186

PLANT #19 ***Well***
2601 CR 310
Cleburne, TX 76031
UCS 078-340-185

PLANT #20 ***Well***
3103 Windmill Rd (CR 1017)
Cleburne, TX 76031
UCS 079-641-347

PLANT #21 ***Surface***
7013 Reservoir Rd.
Joshua, TX 76058 Brushy Nob
UCS 093-519-907 Guard Lights
& UCS 078-340-254

TST Reservoir Rd.
Joshua, TX 76058 Brushy Nob
UCS 098-151-156

PLANT #22
4107 North Main St. (HWY. 174)
Cleburne, TX 76031
UCS 098-150-355

PLANT #23
4721 CR 919
Crowley, TX 76036
Meter pulled; Inactive

PLANT #24 Elev. **2 *Wells***
6801 CR 604
Alvarado, TX 76009
UCS 078-340-000

PLANT #25 Elev. ***Well***
3605 FM 2738
Lillian, TX 76061
UCS 093-524-612

PLANT #26
4217 CR 805
Cleburne, TX 76031
UCS 012-179-000

PLANT # 27
2632 Chambers St.
Venus, TX 76084
UCS 093-105-455

#28 High Service Pumps @ SWATS
BRPUA 5912 Matlock Rd, Granbury
UCS 098-531-825

PLANT #34
618 N. Main, Joshua, TX 76058
Direct Energy ESI-ID 10443720003289354
Meter # 107273423LG Well
Direct Energy ESI-ID 10443720008388141
Meter # 105047538LG Service Ctr
618 N Main Bldg B Vac Truck Bldg
Direct Energy ESI-ID 10443720009633633
Meter # 105047548LG

PLANT #35 Ground Storage Booster
700 Plum St.
UCS 078-340-580

PLANT #36 ***Elev Storage***
314 Bentley Dr. , Joshua
Direct Energy ESI-ID 10443720007253112
Meter # 104040575LG
Meter # 123827803LG

Sewer Plant
Waste Water Treatment Facility
0 STP Rd. *Ph 817-295-7602*
Burleson, TX 76028
UCS 078-339-960

Joshua Meadows Lift Station
5021 Running Brook
Joshua, TX 76058
UCS 078-341-079

Caddo Grove Lift Station
FM 1902
Joshua, TX 76058
UCS 078-423-701

Cooper Valley Lift Station
1001 Stadium Dr.
Joshua, TX 76058
UCS 078-341-281

Gunn Court Lift Station
5713 Gunn Ct.
Joshua, TX 76058
Direct Energy ESI ID 10443720009700464
Meter # 110796577LG

Ranchette Lift Station
228 SW 25th St.
Joshua, TX 76058
Direct Energy ESI-ID 10443720009006356
Meter # 114710567LG

Joshua Station Lift Station
400 Mountainaire Dr.
Joshua, TX 76058
UCS 079-641-194

Cathodic Protection - CCL
2012 CR 705, Joshua
UCS 098-149-430

5300 CR 707, Alvarado
UCS 098-149-607

4118 Redbird Ln, Joshua
UCS 098-149-624

2105 CR 807, Alvarado
UCS 098-149-627

Bell Manor Wholesale Meter
3503 CR 920
Direct Energy ESI # 10443720009247592
Meter # 105035404LG

Sewer Plant ph #	817-295-7602
SCADA #	800-246-8464

Phone #'s to call:

TU Electric	888-313-6862
Lift Stations	800-242-9113
Pathway	817-484-2222
United Co-op	817-558-0010
UCS	817-556-4000

APPENDIX D

Water Utilities Emergency Contact Roster

WATER SUPPLY EMERGENCIES-WHO TO CONTACT

In the event of an imminent or actual water supply emergency due to either a loss of water supply source, system outage, plant failure, etc. inquirers should first seek assistance through:

Johnson County Special Utility District

740 FM 3068

Joshua, TX 76058

Office 817-760-5200

817-760-5255 (emergency after hours service)

Danny Armstrong, Operations Manager	817-240-5870 (mobile)
Pete Kampfer, General Manager	903-669-9889 (mobile)
Harry Shaffer, Board President	817-760-5200 (office)

Johnson County Sheriff	817-556-6060
Cleburne Emergency Management	817-645-0956
Texas Commission on Environmental Quality (Region 4)	817-588-5800
TCEQ, Austin	512-239-6020
TCEQ, Homeland Security Threat 24-hour toll free	888-777-3186
U.S. Environmental Protection Agency	800-424-9346

APPENDIX E

Utility Restoration Priority for Critical Facilities

JCSUD's system has twelve pressure planes. A pressure plane consists of water mains, valves, pumps, tanks, and wells or surface water sources. Pressure planes also include hundreds or maybe even thousands of water consumers. Ever account is important but unfortunately in times of system wide extreme emergencies it may be necessary for The District to assess and implement a critical customer plan. What this means for JCSUD customers is medical facilities, daycares, multi-unit complexes, etc. are viewed at different levels of priority. Due to the complexity, hydraulics, and demographics of JCSUD's district, it works best to prioritize by pressure planes by the number of critical customers they serve. During the event of a localized emergency JCSUD staff will evaluate and prioritize critical customers.

Examples of System Wide Emergency

- Tornadoes
- Winter storm/Blizzard
- Flood
- Earthquake

Examples of Localized Events

- Structural damage to facility infrastructure and equipment
- Water tank damage or collapse
- Water source transmission line realignment or damage
- Damage to distribution lines due to shifting ground and soil liquefaction, resulting in potential water loss, water service interruptions, low pressure, contamination, and sinkholes and/or large pools of water throughout the service area.
- Loss of power and communication infrastructure
- Restricted access to facilities due to debris and damage to roadways

Number of Critical Customers Per Pressure Plains

Tier One

Tier Two

Tier Three (Most Critical)

- Pressure Plane 5
  - i. 0 Medical Facilities
  - ii. 5 Multi-Family Units/Mobile home parks
  - iii. 0 Daycares/Schools
  - iv. 0 Government
- Pressure Plane 9
  - i. 0 Medical Facilities
  - ii. 0 Multi-Family Units/Mobile home parks
  - iii. 0 Daycares/Schools
  - iv. 0 Government
- Pressure Plane 10
  - i. 0 Medical Facilities
  - ii. 1 Multi-Family Units/Mobile home parks
  - iii. 0 Daycares/School
  - iv. 1 Government
- Pressure Plane 18
  - i. 0 Medical Facilities
  - ii. 3 Multi-Family Units/Mobile home parks
  - iii. 0 Daycares/Schools
  - iv. 0 Government
- Pressure Plane 19
  - i. 0 Medical Facilities
  - ii. 7 Multi-Family Units/Mobile home parks
  - iii. 0 Daycares/Schools
  - iv. 0 Government
- Pressure Plane 1
  - i. 0 Medical Facilities
  - ii. 42 Multi-Family Units/Mobile home parks
  - iii. 0 Daycares/Schools
  - iv. 4 Government

- Pressure Plane 3
  - i. 0 Medical Facilities
  - ii. 14 Multi-Family Units/Mobile home parks

iii. 0 Daycares/Schools
iv. 0 Government

- Pressure Plane 13
  i. 0 Medical Facilities
  ii. 14 Multi-Family Units/Mobile home parks
  iii. 4 Daycares/Schools
  iv. 0 Government
- Pressure Plane 24
  i. 0 Medical Facilities
  ii. 12 Multi-Family Units/Mobile home parks
  iii. 2 Daycares/Schools
  iv. 0 Government
- Pressure Plane 25
  i. 0 Medical Facilities
  ii. 16 Multi-Family Units/Mobile home parks
  iii. 1 Daycares/Schools
  iv. 2 Government
- Pressure Plane 8
  i. 7 Medical Facilities
  ii. 34 Multi-Family Units/Mobile home parks
  iii. 4 Daycares/Schools
  iv. 6 Government
- Pressure Plane 34
  i. 1 Medical Facilities
  ii. 37 Multi-Family Units/Mobile home parks
  iii. 21 Daycares/School
  iv. 16 Government

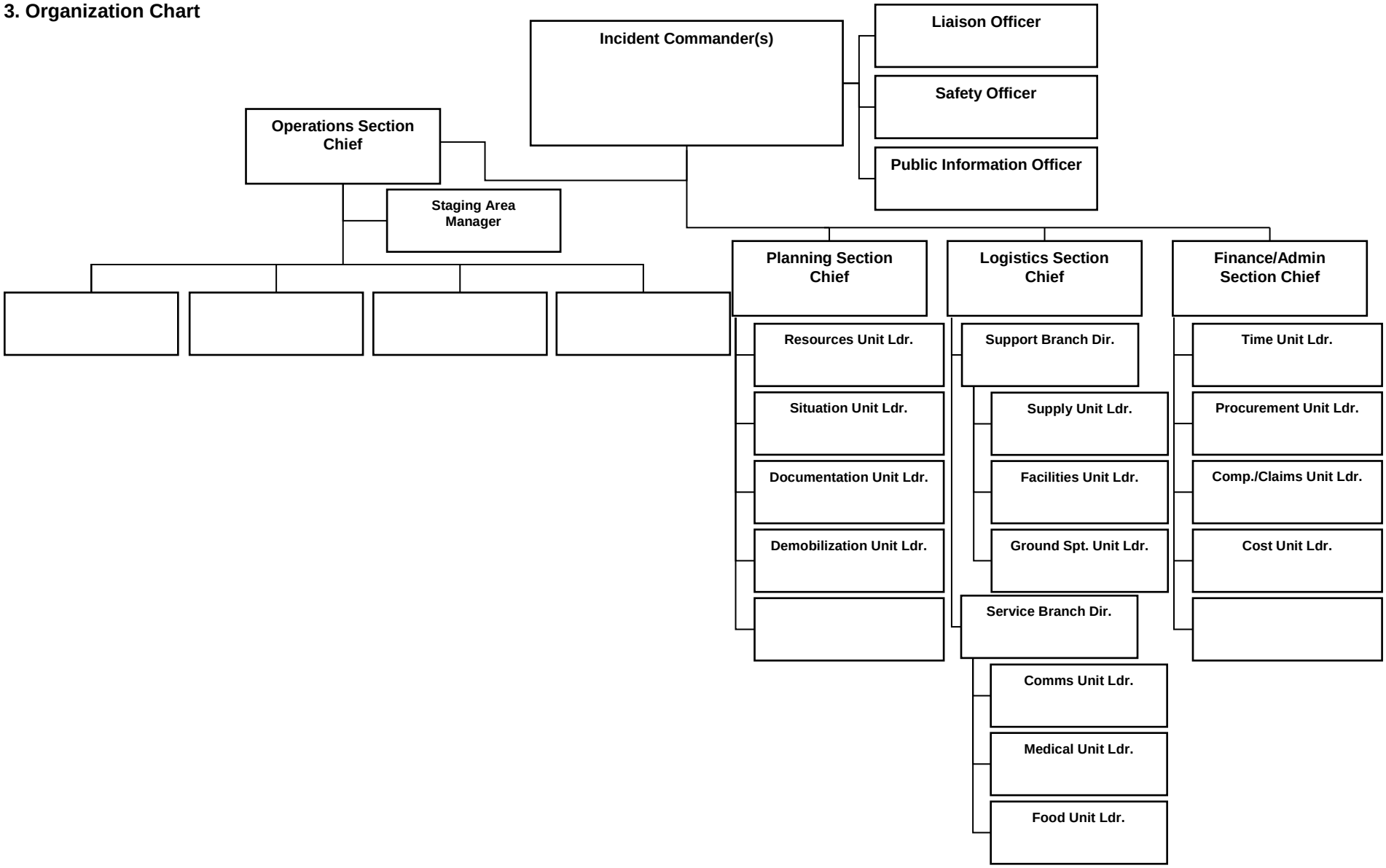
APPENDIX F

ICS Incident Organization Chart
(ICS Form 207)

INCIDENT ORGANIZATION CHART (ICS 207)

1. Incident Name:	2. Operational Period: Date From: Date To: Time From: Time To:

3. Organization Chart



ICS 207	IAP Page ___	4. Prepared by: Name:_____ Position/Title: _____ Signature: _____ Date/Time: _____

ICS 207
Incident Organization Chart

Purpose. The Incident Organization Chart (ICS 207) provides a **visual wall chart** depicting the ICS organization position assignments for the incident. The ICS 207 is used to indicate what ICS organizational elements are currently activated and the names of personnel staffing each element. An actual organization will be event-specific. The size of the organization is dependent on the specifics and magnitude of the incident and is scalable and flexible. Personnel responsible for managing organizational positions are listed in each box as appropriate.

Preparation. The ICS 207 is prepared by the Resources Unit Leader and reviewed by the Incident Commander. Complete only the blocks where positions have been activated, and add additional blocks as needed, especially for Agency Representatives and all Operations Section organizational elements. For detailed information about positions, consult the NIMS ICS Field Operations Guide. The ICS 207 is intended to be used as a wall-size chart and printed on a plotter for better visibility. A chart is completed for each operational period, and updated when organizational changes occur.

Distribution. The ICS 207 is intended to be **wall mounted** at Incident Command Posts and other incident locations as needed, and is not intended to be part of the Incident Action Plan (IAP). All completed original forms must be given to the Documentation Unit.

Notes:

- The ICS 207 is intended to be **wall mounted** (printed on a plotter). Document size can be modified based on individual needs.
- Also available as 8½ x 14 (legal size) chart.
- ICS allows for organizational flexibility, so the Intelligence/Investigative Function can be embedded in several different places within the organizational structure.
- Use additional pages if more than three branches are activated. Additional pages can be added based on individual need (such as to distinguish more Division/Groups and Branches as they are activated).

Block Number	Block Title	Instructions
1	**Incident Name**	Print the name assigned to the incident.
2	**Operational Period** • Date and Time From • Date and Time To	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	**Organization Chart**	• Complete the incident organization chart. • For all individuals, use at least the first initial and last name. • List agency where it is appropriate, such as for Unified Commanders. • If there is a shift change during the specified operational period, list both names, separated by a slash.
4	**Prepared by** • Name • Position/Title • Signature • Date/Time	Enter the name, ICS position, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).

APPENDIX G

EPA Incident Action Checklists

Cybersecurity
Earthquake
Extreme Cold and Winter Storms
Extreme Heat
Flooding
Harmful Algal Bloom
Tornado
Wildfire

Cybersecurity

Incident Action Checklist – Cybersecurity

For on-the-go convenience, the actions in this checklist are divided up into three "rip & run" sections and provide a list of activities that water and wastewater utilities can take to prepare for, respond to and recover from a cyber incident. You can also populate the "My Contacts" section with critical information that your utility may need during an incident.

Cyber Incidents and Water Utilities

Cyberspace and its underlying infrastructure are vulnerable to a wide range of hazards from both physical attacks as well as cyberthreats. Sophisticated cyber actors and nation-states exploit vulnerabilities to steal information and money and are developing capabilities to disrupt, destroy or threaten the delivery of essential services such as drinking water and wastewater.

As with any critical enterprise or corporation, drinking water and wastewater utilities must evaluate and mitigate their vulnerability to a cyber incident and minimize impacts in the event of a successful attack. Impacts to a utility may include, but are not limited to:

- Interruption of treatment, distribution or conveyance processes from opening and closing valves, overriding alarms or disabling pumps or other equipment
- Theft of customers' personal data such as credit card information and social security numbers stored in on-line billing systems
- Defacement of the utility's website or compromise of the email system
- Damage to system components
- Loss of use of industrial control systems (e.g., SCADA system) for remote monitoring of automated treatment and distribution processes

Cyber incidents can compromise the ability of water and wastewater utilities to provide clean and safe water to customers, erode customer confidence and result in financial and legal liabilities. The following sections outline actions drinking water and wastewater utilities can take to prepare for, respond to and recover from cyber incidents.

Actions to Prepare for a Cyber Incident

Utility

- ☐ Identify all mission critical information technology (IT) systems, considering business enterprise, process control and communications. Document the key functions of the mission critical objectives, and identify the personnel or entity responsible for operating and maintaining each IT system.
- ☐ Identify an overall IT security lead to coordinate with each IT system manager and oversee all cyber-related duties.
- ☐ Ensure that IT system managers enforce cybersecurity practices on all business enterprise, process control and communications systems. For example, verify adherence to user authentication, current anti-virus software and installation of security patches.
- ☐ Identify priority points of contact for reporting a cyber incident and requesting assistance with response and recovery. Include any state resources that may be available such as State Police, National Guard Cyber Division or mutual aid programs, as well as the Department of Homeland Security National Cybersecurity and Communications Integration Center (NCCIC) (888-282-0870 or NCCIC@hq.dhs.gov).
- ☐ Review and update the utility's emergency response plan (ERP) to address a cyber incident impacting business enterprise, process control and communications systems. Account for all potential impacts on operations, and ensure emergency contacts are current.
- ☐ Prevent unauthorized physical access to IT systems through security measures such as locks, sensors and alarms. Include workstations and process control systems (e.g., programmable logic controllers or PLCs).
- ☐ Train all essential personnel to perform mission critical functions during a cyber incident that disables business enterprise, process control and communications systems. Include the manual operation of water collection, storage, treatment and conveyance systems.
- ☐ Conduct drills and exercises for responding to a cyber incident that disables critical business enterprise, process control and communications systems.

Actions to Prepare for a Cyber Incident *(continued)*

IT Staff or Vendor

- ☐ Establish a program for maintaining updated anti-virus software on all critical IT systems, along with rapid installation of all security patches.
- ☐ Set up an automatic back-up on critical systems and ensure the process is producing a readable, uncorrupted restore file on a routine basis.
- ☐ Implement rigorous user authentication, including multi-factor authentication where possible. Use individual accounts and unique passwords for each employee, and restrict IT system access privileges to the level needed for a user's duties.
- ☐ Restrict internet access to process control systems unless absolutely necessary.
- ☐ Where possible, separate process control system traffic from business traffic through the use of a firewall. If this is not possible, logically filter traffic through the use of a firewall.
- ☐ Identify all routes of remote access to IT systems. Eliminate remote access where possible, and restrict remaining access (e.g., do not allow persistent remote access to control networks).
- ☐ Assess the use of additional strategies to protect IT systems, such as application whitelisting, network segmentation with restricted communication paths and active monitoring for adversarial system penetration.
- ☐ Conduct a detailed assessment of vulnerabilities in all mission critical IT systems. Consider use of the tools and subject matter experts provided by the DHS Industrial Control System Cyber Emergency Response Team (ICS-CERT) (www.ics-cert.us-cert.gov). Develop an action plan to mitigate all significant vulnerabilities identified in the assessment.

Notes:

Actions to Respond to a Cyber Incident

Utility

- [ ] If possible, disconnect compromised computers from the network to isolate breached components and prevent further damage, such as the spreading of malware. Do not turn off or reboot systems – this preserves evidence and allows for an assessment to be performed.
- [ ] Notify IT personnel and/or IT vendor of the incident and the need for emergency response assistance. In addition, NCCIC can assist with IT system response and recovery (888-282-0870 or NCCIC@hq.dhs.gov).
- [ ] Assess any damage to utility systems and equipment, along with disruptions to utility operations.
- [ ] Execute the utility ERP as needed, including notification of utility personnel, actions to restore operations of mission critical processes (e.g., switch to manual operation if necessary), and public notification (if required).
- [ ] Report the cyber incident as required to law enforcement and regulatory agencies.
- [ ] Notify any external entities (e.g., vendors, other government offices) that may have remote connections to the affected network(s).
- [ ] Document key information on the incident, including any suspicious calls, emails, or messages before or during the incident, damage to utility systems, and steps taken in response to the incident (including dates and times).

IT Staff or Vendor

- [ ] Review system and network logs, and use virus and malware scans to identify affected equipment, systems, accounts and networks.
- [ ] Document which user accounts were or are logged on, which programs and processes were or are running, any remote connections to the affected IT systems or network(s) and all open ports and their associated applications.
- [ ] If possible, take a “forensic image” of the affected IT systems to preserve evidence. Tools to take forensic images include Forensic Tool Kit (FTK) and EnCase.
- [ ] If possible, identify any malware used in the incident, any remote servers to which data may have been sent during the incident, and the origin of the incident. NCCIC can assist with the forensic analysis (888-282-0870 or NCCIC@hq.dhs.gov).
- [ ] Research and identify if any employee or customer personally identifiable information (PII) was compromised.
- [ ] Check the system back-up time stamp to determine if the back-up was compromised during the incident.
- [ ] Document all findings, and avoid modifying or deleting any data that might be attributable to the incident.

Notes:

Actions to Recover from a Cyber Incident

Utility

- [ ] Continue to work with IT staff, vendors and integrators, government partners and others to obtain needed resources and assistance for recovery.
- [ ] Notify affected employees and customers if any PII was compromised.
- [ ] Submit an incident report through WaterISAC (866-H2O-ISAC). Membership is not required to submit a report.
- [ ] Develop a lessons learned document and/or an after action report (AAR) to document utility response activities, successes, and areas for improvement. Create an improvement plan (IP) based on your AAR and use the IP to update your vulnerability assessment, ERP and contingency plans.
- [ ] Register for cybersecurity alerts and advisories from water sector and government partners to be aware of new vulnerabilities and threats. Two sources of cybersecurity alerts are WaterISAC, which has a basic membership that is free, and ICS-CERT (https://ics-cert.us-cert.gov/alerts).

IT Staff or Vendor

- [ ] Remove any malware, corrupted files and other changes made to IT systems by the incident.
- [ ] Restore IT systems as required (e.g., re-image hard drives, reload software). NCCIC can assist with the IT system recovery (888-282-0870 or NCCIC@hq.dhs.gov).
- [ ] Restore compromised files from a system back-up that has not been compromised.
- [ ] Install patches and updates, disable unused services and perform other countermeasures to harden the system against known vulnerabilities that may have been exploited.

Notes:

My Contacts and Resources

CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Law Enforcement	
	IT Staff/Vendor	
	SCADA Staff/Vendor	
	DHS NCCIC	888-282-0870
	Local Laboratory	
	State Primacy Agency	
	Local Emergency Management Agency	
	Local Health Department	
	WARN Chair	
	State Emergency Management Agency	

Resources

- Best Cybersecurity Practices (WaterISAC)
- Cyber Security Evaluation Tool (DHS ICS-CERT)
- Advisories (DHS ICS-CERT)
- Cybersecurity Advisors (DHS)
- National Cybersecurity and Communications Integration Center (NCCIC) (DHS)
- Cybersecurity Guidance and Tool (AWWA)
- Cybersecurity Resource Guide (WaterISAC)
- Cybersecurity Insurance (National Rural Water Association)

Notes:

Earthquake

Incident Action Checklist – Earthquake

The actions in this checklist are divided up into three "rip & run" sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from an earthquake. For on-the-go convenience, you can also populate the "My Contacts" section with critical information that your utility may need during an incident.

Earthquake Impacts on Water and Wastewater Utilities

An earthquake is caused by the shifting of tectonic plates beneath the Earth's surface. Ground shaking from moving geologic plates collapses buildings and bridges, and sometimes triggers landslides, avalanches, flash floods, fires and tsunamis. The strong ground motion of earthquakes has the potential to cause a great deal of damage to drinking water and wastewater utilities, particularly since most utility components are constructed from inflexible materials (e.g., concrete, metal pipes). Earthquakes create many cascading and secondary impacts that may include, but are not limited to:

- Structural damage to facility infrastructure and equipment
- Water tank damage or collapse
- Water source transmission line realignment or damage
- Damage to distribution lines due to shifting ground and soil liquefaction, resulting in potential water loss, water service interruptions, low pressure, contamination and sinkholes and/or large pools of water throughout the service area
- Loss of power and communication infrastructure
- Restricted access to facilities due to debris and damage to roadways

FEMA

The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from an earthquake.

Example of Water Sector Impacts and Response to an Earthquake

East Bay Municipal Utility District Mitigates Earthquake Impacts

Following the 1989 Loma Prieta earthquake, the East Bay Municipal Utility District (EBMUD) in Oakland, California, began developing a comprehensive seismic program to increase their ability to recover from earthquake impacts and reduce water and wastewater service interruptions. Taking a proactive approach, EBMUD was the first US water utility to comprehensively retrofit its service area facilities to address seismic weaknesses.

The utility began by assessing its entire water distribution network to determine areas of improvement. Upgrades included installation of flexible joints and hoses to minimize pipe ruptures and to facilitate rerouting of water around broken pipes. The utility also created alternative transmission routes for pipes that cross fault zones.

EBMUD did a great deal of work to reinforce aqueducts to make them more resilient to earthquake impacts, including strengthening levees at aqueduct crossings and pipe foundations at river crossings, reinforcing pipe joints on buried portions of pipe, and strengthening pipe support structures on elevated portions of the aqueduct. The utility is also designing aqueduct interconnections to create bypasses around damaged segments after a levee failure or earthquake. These bypasses allow the utility to continue providing service to customers while permanent repairs are being made.

Since 1989, EBMUD has invested more than $350 million in their seismic program, which has been primarily funded by bonds that are being repaid through a seismic surcharge on customers' water bill of just over one dollar per month for single-family residential homes.

Source: EBMUD's 2011 "Earthquake Readiness: Protecting Life Safety and Public Health."

My Contacts and Resources

CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Local EMA	
	State EMA	
	State Primacy Agency	
	WARN Chair	
	Power Utility	

Planning

- Incident monitoring:
  - USGS recent earthquake activity map (U.S. Geological Survey [USGS])
  - NOAA National Weather Service tsunami alerts (National Oceanic and Atmospheric Administration [NOAA])
- Earthquake Hazard Mitigation Handbook (Federal Emergency Management Agency [FEMA])
- Earthquake Hazards Program (USGS)
- Earthquake Shaking Maps and Information for California Residents (Association of Bay Area Governments)
- Recent Earthquakes: Implications for U.S. Water Utilities (Water Research Foundation)
- Planning for an Emergency Drinking Water Supply (EPA)
- All-Hazard Consequence Management Planning for the Water Sector (Water Sector Emergency Response Critical Infrastructure Partnership Advisory Council [CIPAC] Workgroup)
- Vulnerability Self Assessment Tool (VSAT) (EPA)
- Tabletop Exercise Tool for Water Systems: Emergency Preparedness, Response, and Climate Resiliency (EPA)
- How to Develop a Multi-Year Training and Exercise (T&E) Plan (EPA)
- Make a Plan (FEMA)

Coordination

- Water/Wastewater Agency Response Network (WARN) (EPA)
- Community Based Water Resiliency (EPA)

Facility and Service Area

- Oregon Earthquake Resiliency Plan (see Chapter 8: Water and Wastewater Systems) (Oregon Seismic Safety Policy Advisory Commission)
- Seismic Guidelines for Water Pipelines (American Lifelines Alliance)

Power, Energy and Fuel

- EPA Region 1 Water/Wastewater System Generator Preparedness Brochure (EPA)

Documentation and Reporting

- Federal Funding for Utilities In National Disasters (Fed FUNDS) (EPA)

Mitigation

- Earthquake Publications: Building Designers, Managers and Regulators (FEMA)
- IS-323: Earthquake Mitigation Basics for Mitigation Staff (FEMA)
- HAZUS: FEMA's Methodology for Estimating Potential Losses from Disasters (FEMA)
- Earthquake Hazard Mitigation for Utility Lifeline Systems (FEMA)

Actions to Prepare for an Earthquake

Planning

- [ ] Review and update your utility's emergency response plan (ERP), and ensure all emergency contacts are current.
- [ ] Conduct briefings, training and exercises to ensure utility staff is aware of all preparedness, response and recovery procedures.
- [ ] Identify priority water customers (e.g., hospitals), obtain their contact information, map their locations and develop a plan to restore those customers first.
- [ ] Develop an emergency drinking water supply plan and establish contacts (potentially through your local emergency management agency [EMA] or mutual aid network) to discuss procedures, which may include bulk water hauling, mobile treatment units or temporary supply lines, as well as storage and distribution.
- [ ] Conduct a hazard vulnerability analysis in which you review historical records to understand the past frequency and intensity of earthquakes and how your utility may have been impacted. Consider taking actions to mitigate seismic impacts to the utility, including those provided in the "Actions to Recover from an Earthquake: Mitigation" section.
- [ ] Complete pre-disaster activities to help apply for federal disaster funding (e.g., contact state/local officials with connections to funding, set up a system to document damage and costs, take photographs of the facility for comparison to post-damage photographs).

Coordination

- [ ] Join your state's Water/Wastewater Agency Response Network (WARN) or other local mutual aid network.
- [ ] Coordinate with WARN members and other neighboring utilities to discuss:
  - Outlining response activities, roles and responsibilities and mutual aid procedures (e.g., how to request and offer assistance)
  - Conducting joint tabletop or full-scale exercises
  - Obtaining resources and assistance, such as equipment, personnel, technical support or water
  - Establishing interconnections between systems and agreements with necessary approvals to activate this alternate source. Equipment, pumping rates and demand on the water sources need to be considered and addressed in the design and operations
  - Establishing communication protocols and equipment to reduce misunderstandings during the incident
- [ ] Coordinate with other key response partners, such as your local EMA, to discuss:
  - How restoring system operations may have higher priority than establishing an alternative water source
  - Potential points of distribution for the delivery of emergency water supply (e.g., bottled water) to the public, as well as who is responsible for distributing the water
- [ ] Understand how the local and utility emergency operations center (EOC) will be activated and what your utility may be called on to do, as well as how local emergency responders and the local EOC can support your utility during a response. If your utility has assets outside of the county EMA's jurisdiction, consider coordination or preparedness efforts that should be done in those areas.
- [ ] Ensure credentials to allow access will be valid during an incident by checking with local law enforcement.

Actions to Prepare for an Earthquake *(continued)*

Communication with Customers

- [ ] Develop outreach materials to provide your customers with information they will need after an earthquake (e.g., clarification about water advisories, instructions for private well and septic system maintenance and information about earthquake mitigation).
- [ ] Review public information protocols with local EMA and public health/primacy agencies. These protocols should include developing water advisory messages (e.g., boil water) and distributing them to customers using appropriate mechanisms, such as reverse 911.

Facility and Service Area

- [ ] Inventory and order extra equipment and supplies, as needed:
  - Motors
  - Fuses
  - Chemicals (ensure at least a two week supply)
  - Cellular phones or other wireless communications device
  - Emergency Supplies
    - Tarps/tape/rope
    - Cots/blankets
    - First aid kits
    - Foul weather gear
    - Plywood
    - Flashlights/flares
    - Sandbags (often, sand must be ordered as well)
    - Bottled water
    - Batteries
    - Non-perishable food
- [ ] Ensure communication equipment (e.g., radios, satellite phones) works and is fully charged.
- [ ] Develop a GIS map of all system components and prepare a list of coordinates for each facility.
- [ ] Document pumping requirements and storage capabilities, as well as critical treatment components and parameters.
- [ ] Establish a seismically hardened or offsite facility to store essential records and equipment.
- [ ] Inspect utility for structural stability and consider implementing actions to improve the utility's ability to withstand damage from earthquakes, such as:
  - Secure fixtures, shelves and equipment
  - Anchor or stabilize utility equipment to withstand earthquake forces and movements
  - Reinforce, secure or improve utility transmission lines and connections to withstand earthquake forces, soil movements and differential settlements
  - Anchor or improve tank structures to withstand earthquake forces and movements

Personnel

- [ ] Identify essential personnel and ensure they are trained to perform critical duties in an emergency (and possibly without communication), including the shut down and start up of the system.
- [ ] Establish communication procedures with essential and non-essential personnel. Ensure all personnel are familiar with emergency evacuation and shelter in place procedures.
- [ ] Pre-identify emergency operations and clean-up crews. Establish alternative transportation strategies if roads are impassable.

Actions to Prepare for an Earthquake *(continued)*

- [ ] Consider how evacuations or limited staffing due to transportation issues (potentially all utility personnel) will impact your response procedures.
- [ ] Identify possible staging areas for mutual aid crews if needed in the response, and the availability of local facilities to house the crews.
- [ ] Encourage personnel, especially those that may be on duty for extended periods of time, to develop family emergency plans.

Power, Energy and Fuel

- [ ] Evaluate condition of electrical panels to accept generators; inspect connections and switches.
- [ ] Document power requirements of the facility; options for doing this may include:
  - Placing a request with the US Army Corps of Engineers 249th Engineer Battalion (Prime Power): http://www.usace.army.mil/249thEngineerBattalion.aspx
  - Using the US Army Corps of Engineers on-line Emergency Power Facility Assessment Tool (EPFAT): http://epfat.swf.usace.army.mil/
- [ ] Confirm and document generator connection type, capacity load and fuel consumption. Test regularly, exercise under load and service backup generators.
- [ ] Contact fuel vendors and inform them of estimated fuel volumes needed if utility is impacted. Determine your ability to establish emergency contract provisions with vendors and your ability to transport fuel if re-fueling contractors are not available. Develop a backup fueling plan and a prioritization list of which generators to fuel in case of a fuel shortage.
- [ ] Collaborate with your local power provider and EOC to ensure that your water utility is on the critical facilities list for priority electrical power restoration, generators and emergency fuel.

FEMA

Notes:

Actions to Respond to an Earthquake

Planning

- [ ] For coastal communities with an increased risk for tsunami activity following an earthquake; review the Tsunami Incident Action Checklist for more information.

Coordination

- [ ] Notify your local EMA and state regulatory/primacy agency of system status.
- [ ] If needed, request or offer assistance (e.g., water buffalos, water sampling teams, generators) through mutual aid networks, such as WARN.
- [ ] Assign a representative of the utility to the incident command post or the community's EOC.

Communication with Customers

- [ ] Notify customers of any water advisories and consider collaborating with local media (television, radio, newspaper, etc.) to distribute the message. If emergency water is being supplied, provide information on the distribution locations.

Facility and Service Area

Overall

- [ ] Conduct damage assessments of the utility to prioritize repairs and other actions.
- [ ] Check that back-up equipment and facility systems, such as controls and pumps, are in working order, and ensure that chemical containers and feeders are intact.

Drinking Water Utilities

- [ ] Inspect the utility and service area for damage. Identify facility components (e.g., valve boxes) and fire hydrants that have been buried, are inaccessible or have been destroyed.
- [ ] Investigate drinking water wells for damage caused by liquefaction. This could result in the loss of storage for groundwater or ground subsidence.
- [ ] Ensure pressure is maintained throughout the system and isolate those sections where it is not.
- [ ] Isolate and control leaks in water transmission and distribution piping.
- [ ] Turn off water meters at destroyed homes and buildings.
- [ ] Monitor water quality, develop a sampling plan and adjust treatment as necessary.
- [ ] Notify regulatory/primacy agency if operations and/or water quality or quantity are affected.
- [ ] Utilize pre-established emergency connections or setup temporary connections to nearby communities, as needed. Alternatively, implement plans to draw emergency water from pre-determined tanks or hydrants. Notify employees of the activated sites.

Notes:

Actions to Respond to an Earthquake *(continued)*

Wastewater Utilities

- [ ] Inspect the utility and service area, including lift stations, for damage, downed trees, and power availability. Inspect the sewer system for debris and assess the operational status of the mechanical bar screen. If necessary, run system in manual operation.
- [ ] Notify regulatory/primacy agency of any changes to the operations or required testing parameters.

Documentation and Reporting

- [ ] Document all damage assessments, mutual aid requests, emergency repair work, equipment used, purchases made, staff hours worked and contractors used during the response to assist in requesting reimbursement and applying for federal disaster funds. When possible, take photographs of damage at each work site (with time and date stamp). Proper documentation is critical to requesting reimbursement.
- [ ] Work with your local EMA on the required paperwork for public assistance requests.

Personnel

- [ ] Account for all personnel and provide emergency care, if needed. Caution personnel about known hazards resulting from earthquakes.
- [ ] Deploy emergency operations and clean-up crews (e.g., securing heavy equipment). Identify key access points and roads for employees to enter the utility and critical infrastructure; coordinate the need for debris clearance with local emergency management or prioritize it for employee operations.

Power, Energy and Fuel

- [ ] Use backup generators, as needed, to supply power to system components.
- [ ] Monitor and plan for additional fuel needs in advance; coordinate fuel deliveries to the generators.
- [ ] Maintain contact with electric provider for power outage duration estimates.

Notes:

Actions to Recover from an Earthquake

Coordination

- [ ] Continue work with response partners to obtain funding, equipment, etc.

Communication with Customers

- [ ] Assign a utility representative to continue to communicate with customers concerning a timeline for recovery and other pertinent information.

Facility and Service Area

- [ ] Complete damage assessments.
- [ ] Complete permanent repairs, replace depleted supplies and return to normal service.

FEMA

Documentation and Reporting

- [ ] Compile damage assessment forms and cost documentation into a single report to facilitate the sharing of information and the completion of state and federal funding applications. Visit EPA's web-based tool, Federal Funding for Utilities—Water/Wastewater—in National Disasters (Fed FUNDS), for tailored information and application forms for various federal disaster funding programs: http://water.epa.gov/infrastructure/watersecurity/funding/fedfunds/
- [ ] Develop a lessons learned document and/or an after action report to keep a record of your response activities. Update your vulnerability assessment, ERP and contingency plans.
- [ ] Revise budget and asset management plans to address increased costs from response-related activities.

Mitigation

- [ ] Identify mitigation and long-term adaptation measures that can prevent damage and increase utility resilience. Consider impacts related to earthquakes when planning for system upgrades (e.g., replacing pipes, wellheads and water tanks to address seismic weaknesses).

Notes:

Extreme Cold and Winter Storms

Incident Action Checklist – Extreme Cold and Winter Storms

The actions in this checklist are divided up into three "rip & run" sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from extreme cold. For on-the-go convenience, you can also populate the "My Contacts" section with critical information that your utility may need during an incident.

Extreme Cold and Winter Storm Impacts on Water and Wastewater Utilities

Cold weather brings with it the potential for freezing temperatures, heavy snowfall and ice incidents that can have multiple impacts on a community. Impacts to drinking water and wastewater utilities may include, but are not limited to:

- Pipe breaks throughout the distribution system, due to freeze/thaw cycles
- Loss of power and communication lines
- Limited access to facilities due to icy roads or debris such as downed tree limbs
- Reduced work force due to unsafe travel conditions throughout the service area
- Source water quality impacts due to increased amount of road salt in stormwater runoff
- Potential flooding risk due to snowpack melt and ice jams (accumulations of ice in rivers or streams)
- Potential surface water supply challenges as ice and frozen slush can block valves and restrict intakes

The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from extreme cold and winter storms.

Example of Water Sector Impacts and Response to a Winter Storm

Kentucky 2009 Ice Storm

Kentucky experienced a severe winter storm in January 2009 that resulted in the largest power outage in the state's history. The storm began as a mixture of snow, followed by sleet and freezing rain coupled with strong winds. Although there was advanced notice of hazardous weather, the storm was more severe than anticipated and significant impacts to the water sector occurred. Ninety water utilities regulated by the Kentucky Public Service Commission (PSC) were impacted by the ice storm, and over 32,000 customers were without water at some point during the storm. One utility, the Hickory Water District in Graves County, Kentucky, lost all service during the storm. Although the Water District had approximately 48 hours of water storage, they were unable to supply water to their customers once that storage was exhausted, as they were without power and had no back-up power source.

A significant number of utilities had service restored the day after the ice storm as a result of prioritization by electric providers. Following the ice storm response, the PSC provided a number of recommendations to water and wastewater utilities on how to better prepare for future incidents. Recommendations included issuing consumer advisories prior to incidents that may result in service disruptions, considering the establishment of interconnections, and joining a mutual aid network, such as WARN.

Source: Kentucky Public Service Commission,

"Ike and Ice: The Kentucky Public Service Commission Report on the September 2008 Wind Storm and the January 2009 Ice Storm."

My Contacts and Resources

CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Local EMA	
	State EMA	
	State Primacy Agency	
	WARN Chair	
	Power Utility	

Planning

- Incident monitoring:
  - Storm Prediction Center (National Oceanic and Atmospheric Administration [NOAA])
  - Winter Weather Safety and Awareness (NOAA)
- Winter Storms: The Deceptive Killers (NOAA)
- Planning for an Emergency Drinking Water Supply (EPA)
- National Weather Service Weather Alerts (NOAA)
- All-Hazard Consequence Management Planning for the Water Sector (Water Sector Emergency Response Critical Infrastructure Partnership Advisory Council [CIPAC] Workgroup)
- Vulnerability Self Assessment Tool (VSAT) (EPA)
- How to Develop a Multi-Year Training and Exercise (T&E) Plan (EPA)
- Preparing for Extreme Weather Events: Workshop Planner for the Water Sector (EPA)
- Tabletop Exercise Tool for Water Systems: Emergency Preparedness, Response, and Climate Resiliency (EPA)
- Make a Plan (FEMA)

Coordination

- Water/Wastewater Agency Response Network (WARN) (EPA)

Communication with Customers

- Salt Pollutes postcard (tips for customers on ways to reduce salt) (Minnesota Pollution Control Agency [MPCA])

Facility and Service Area

- A Fresh Look at Road Salt: Aquatic Toxicity and Water-Quality Impacts on Local, Regional, and National Scales (United States Geological Survey [USGS] and Wisconsin State Laboratory of Hygiene [WSLH])
- The Kentucky Public Service Commission Report on the September 2008 Wind Storm and the January 2009 Ice Storm (Kentucky Public Service Commission [KYPSC])

Power, Energy and Fuel

- EPA Region 1 Water/Wastewater System Generator Preparedness Brochure (EPA)

Documentation and Reporting

- Federal Funding for Utilities In National Disasters (Fed FUNDS) (EPA)

Mitigation

- Climate Resilience Evaluation and Awareness Tool (CREAT)
- Adaptation Strategies Guide (EPA)

Actions to Prepare for Extreme Cold and Winter Storms

Planning

- [ ] Actively monitor weather conditions for inclement weather.
- [ ] Review and update your utility's emergency response plan (ERP), and ensure all emergency contacts are current.
- [ ] Conduct briefings, training and exercises to ensure utility staff is aware of all preparedness, response and recovery procedures.
- [ ] Identify priority water customers (e.g., hospitals), obtain their contact information, map their locations and develop a plan to restore those customers first, in case of water service disruptions.
- [ ] Develop an emergency drinking water supply plan and establish response partner contacts (potentially through your local emergency management agency [EMA] or mutual aid network) to discuss procedures, which may include bulk water hauling, mobile treatment units or temporary supply lines, as well as storage and distribution.
- [ ] Conduct a hazard vulnerability analysis in which you review historical records to understand the past frequency and intensity of winter storms and how your utility may have been impacted. Consider taking actions to mitigate extreme cold, snow and ice storm impacts to your utility, including those provided in the "Actions to Recover from Extreme Cold and Winter Storms: Mitigation" section.
- [ ] Complete pre-disaster activities to help apply for federal disaster funding (e.g., contact state/local officials with connections to funding, set up a system to document damage and costs, take photographs of the facility for comparison to post-damage photographs).

Coordination

- [ ] Join your state's Water/Wastewater Agency Response Network (WARN) or other local mutual aid network.
- [ ] Coordinate with WARN members and other neighboring utilities to discuss:
  - Outlining response activities, roles and responsibilities and mutual aid procedures (e.g., how to request and offer assistance)
  - Conducting joint tabletop or full-scale exercises
  - Obtaining resources and assistance, such as equipment, personnel, technical support or water
  - Establishing interconnections between systems and agreements with necessary approvals to activate this alternate source. Equipment, pumping rates and demand on the water sources need to be considered and addressed in the design and operations
  - Establishing communication protocols and equipment to reduce misunderstandings during the incident
- [ ] Coordinate with other key response partners, such as your local EMA, to discuss:
  - How restoring system operations may have higher priority than establishing an alternative water resource
  - Potential points of distribution for the delivery of emergency water supply (e.g., bottled water) to the public, as well as who is responsible for distributing the water
- [ ] Understand how the local and utility emergency operations center (EOC) will be activated and what your utility may be called on to do, as well as how local emergency responders and the local EOC can support your utility during a response. If your utility has assets outside of the county EMA's jurisdiction, consider coordination or preparedness efforts that should be done in those areas.

Actions to Prepare for Extreme Cold and Winter Storms *(continued)*

- [ ] Work with community partners to ensure the utility is properly prioritized when determining plowing and road salting/sanding operations.
- [ ] Ensure credentials to allow access will be valid during an incident by checking with local law enforcement.
- [ ] Sign up for mobile and/or email alerts from your local EMA, if available.

Communication with Customers

- [ ] Review public information protocols with local EMA and public health/primacy agencies. These protocols should include developing water advisory messages (e.g., boil water, warnings that service disruptions are likely due to extreme winter weather) and distributing them to customers using appropriate mechanisms, such as reverse 911. Keep in mind that the notice may need to be delivered prior to the storm to be effective.
- [ ] Instruct customers on how to prevent pipe breaks in their homes (e.g., insulating outdoor faucets, drip warm water from an indoor faucet) and what to do if a pipe breaks.

Facility and Service Area

- [ ] Inventory and order extra equipment and supplies, as needed:
  - Motors
  - Fuses
  - Chemicals (ensure at least a two week supply)
  - Cellular phones or other wireless communications device
  - Emergency Supplies
    - Salt
    - Shovels/snow blowers
    - Tarps/tape/rope
    - Cots/blankets
    - First aid kits
    - Foul weather gear
    - Plywood
    - Flashlights/flares
    - Bottled water
    - Batteries
    - Non-perishable food
- [ ] Ensure communication equipment (e.g., radios, satellite phones) works and is fully charged.
- [ ] Prepare equipment and vehicles to start and run in cold weather (e.g., tune ups, batteries, engine block heaters).
- [ ] Develop a GIS map of all system components and prepare a list of coordinates for each facility.
- [ ] Document pumping requirements and storage capabilities, as well as critical treatment components and parameters.
- [ ] Prior to a storm, apply road salt/sand as necessary, and pre-stage snowplow equipment.
- [ ] Consider installing wind or snow drift barriers at critical facilities.
- [ ] If surface water systems are equipped with intake heaters, ensure they are maintained and in working order before winter begins.

Personnel

- [ ] Identify essential personnel and ensure they are trained to perform critical duties in an emergency (and possibly without communication), including the shut down and start up of the system.
- [ ] Establish communication procedures with essential and non-essential personnel. Ensure all personnel are familiar with emergency evacuation and shelter in place procedures.
- [ ] Pre-identify emergency operations and clean-up crews. Establish alternative transportation strategies if roads are impassable.

Actions to Prepare for Extreme Cold and Winter Storms *(continued)*

- ☐ Consider how evacuations or limited staffing due to transportation issues (potentially all utility personnel) will impact your response procedures.
- ☐ Identify possible staging areas for mutual aid crews if needed in the response, and the availability of local facilities to house the crews.
- ☐ Encourage personnel, especially those that may be on duty for extended periods of time, to develop family emergency plans.

Power, Energy and Fuel

- ☐ Evaluate condition of electrical panels to accept generators; inspect connections and switches.
- ☐ Document power requirements of the facility; options for doing this may include:
  - Placing a request with the US Army Corps of Engineers 249th Engineer Battalion (Prime Power): http://www.usace.army.mil/249thEngineerBattalion.aspx
  - Using the US Army Corps of Engineers on-line Emergency Power Facility Assessment Tool (EPFAT): http://epfat.swf.usace.army.mil/
- ☐ Confirm and document generator connection type, capacity load and fuel consumption. Test regularly, exercise under load and service backup generators.
- ☐ Fuel vehicles and fill fuel tanks to full capacity and ensure that you have the ability to manually pump gas in the event of a power outage. Ensure this equipment and other hazardous materials are located in a safe zone.
- ☐ Contact fuel vendors and inform them of estimated fuel volumes needed if utility is impacted. Determine your ability to establish emergency contract provisions with vendors and your ability to transport fuel if re-fueling contractors are not available. Develop a backup fueling plan and a prioritization list of which generators to fuel in case of a fuel shortage.
- ☐ Collaborate with your local power provider and EOC to ensure that your water utility is on the critical facilities list for priority electrical power restoration, generators and emergency fuel.

Example of Water Sector Impacts and Response to a Winter Storm

2014 Northern Ohio Winter Water Shortage

In January 2008, ice accumulation on the intake valves for Avon Lake Regional Water severely reduced water production and caused the utility to ask customers to reduce usage. Avon Lake Regional Water's source water is Lake Erie, and it provides water to over 200,000 residential and commercial customers in multiple communities in and around the western Cleveland suburbs. The utility contracted with another company to put six additional pumps into Lake Erie to increase water flow to the plant. This involved workers cutting through ice 300 feet from shore to put new pipes in the water. The utility was forced to deliver two sets of automated phone calls to residents: the first asked them to reduce water use by refraining from washing clothes or taking long showers; the second asked people to stop using water altogether, if possible. Mayors in communities affected by the water shortages worked with their local EMAs to discuss contingency plans in the event of a fire. At least one county declared a State of Emergency in order to free up resources around the state if they were needed.

The City of Cleveland was able to supply water to several communities served by Avon Lake Regional Water Authority through interconnections. Its intakes were not affected, as they are farther out into Lake Erie where the water is deeper.

Source: The Cleveland Plain Dealer, "Water shortage reaching critical point in Avon as utility tries another way to pull water from the frozen lake."

Actions to Respond to Extreme Cold and Winter Storms

Coordination

- [ ] Notify your local EMA and state regulatory/primacy agency of system status.
- [ ] If needed, request or offer assistance (e.g., equipment, personnel) through mutual aid networks, such as WARN.
- [ ] Assign a representative of the utility to the incident command post or the EOC for the community.

Communication with Customers

- [ ] Notify customers of any water advisories and consider collaborating with local media (television, radio, newspaper, etc.) to distribute the message. If emergency water is being supplied, provide information on the distribution locations.

Facility and Service Area

Overall

- [ ] Conduct damage assessments of the utility to prioritize repairs and other actions.
- [ ] Check that back-up equipment and facility systems, such as controls and pumps, are in working order, and ensure that chemical containers and feeders are intact.

Drinking Water Utilities

- [ ] Inspect the utility and service area for damage. Identify facility components (e.g., valve boxes) and fire hydrants that have been buried in snow, frozen in ice or are inaccessible.
- [ ] Systems that utilize surface water should monitor intakes, as ice and frozen slush can block valves and cause restrictions.
- [ ] Ensure pressure is maintained throughout the system and isolate those sections where it is not.
- [ ] Isolate and control leaks in water transmission and distribution piping.
- [ ] Monitor source water quality, develop a sampling plan and adjust treatment as necessary; increased usage of road salt within the service area may be a concern for utilities.
- [ ] Notify regulatory/primacy agency if operations and/or water quality or quantity are affected.
- [ ] Utilize pre-established emergency connections or setup temporary connections to nearby communities, as needed. Alternatively, implement plans to draw emergency water from pre-determined tanks or hydrants. Notify employees of the activated sites.

Wastewater Utilities

- [ ] Inspect the utility and service area, including lift stations, for damage and power availability. Inspect the sewer system for debris and assess the operational status of the mechanical bar screen. If necessary, run system in manual operation.
- [ ] Notify regulatory/primacy agency of any changes to the operations or required testing parameters.
- [ ] Monitor the type and amount of bacteria in the treatment process, as severe cold can affect growth rates.
- [ ] Consider curtailing or ceasing secondary treatment wasting procedures during periods of heavy freezing rain or snowmelt to conserve bacteria and prevent it from washing out of the plant.

Documentation and Reporting

- [ ] Document all damage assessments, mutual aid requests, emergency repair work, equipment used, purchases made, staff hours worked and contractors used during the response to assist in requesting reimbursement and applying for federal disaster funds. When possible, take photographs of damage at each work site (with time and date stamp). Proper documentation is critical to requesting reimbursement.

Actions to Respond to Extreme Cold and Winter Storms *(continued)*

- [ ] Work with your local EMA on the required paperwork for public assistance requests.

Personnel

- [ ] Account for all personnel and provide emergency care, if needed. Caution personnel about known hazards resulting from severe winter weather.
- [ ] Deploy emergency operations and clean-up crews. Identify key access points and roads for employees to enter the utility and critical infrastructure; coordinate the need for snow and ice clearance with local officials and/or emergency management or prioritize it for employee operations.

Power, Energy and Fuel

- [ ] Use backup generators, as needed, to supply power to system components.
- [ ] Monitor and plan for additional fuel needs in advance; coordinate fuel deliveries to generators.
- [ ] Maintain contact with electric provider for power outage duration estimates.

Image by Nick Fillipelli, Northeast Ohio Regional Sewer District

Notes:

Actions to Recover from Extreme Cold and Winter Storms

Coordination

- [ ] Continue work with response partners to obtain funding, equipment, etc.

Communication with Customers

- [ ] Assign a utility representative to continue to communicate with customers concerning a timeline for recovery and other pertinent information.

Facility and Service Area

- [ ] Complete damage assessments.
- [ ] Complete permanent repairs, replace depleted supplies and return to normal service.

FEMA

Documentation and Reporting

- [ ] Compile damage assessment forms and cost documentation into a single report to facilitate the sharing of information and the completion of state and federal funding applications. Visit EPA's web-based tool, Federal Funding for Utilities—Water/Wastewater—in National Disasters (Fed FUNDS), for tailored information and application forms for various federal disaster funding programs: http://water.epa.gov/infrastructure/watersecurity/funding/fedfunds/
- [ ] Develop a lessons learned document and/or an after action report (AAR) to keep a record of your response activities. Update your vulnerability assessment, ERP and corresponding extreme cold and winter storm contingency plans.
- [ ] Revise budget and asset management plans to address increased costs from response-related activities.

Mitigation

- [ ] Identify mitigation and long-term adaptation measures that can prevent damage and increase utility resilience. Consider impacts related to the increased frequency of extreme cold and intense snow and ice storms when planning for system upgrades (e.g., replacing weak pipes to reduce the risk of main breaks, landscaping and tree trimming to minimize debris issues).

Notes:

Extreme Heat

Incident Action Checklist – Extreme Heat

The actions in this checklist are divided up into three "rip & run" sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from extreme heat. For on-the-go convenience, you can also populate the "My Contacts" section with critical information that your utility may need during an incident.

Extreme Heat Impacts on Water and Wastewater Utilities

An extreme heat event or heat wave is a period of abnormally hot and/or humid weather, typically lasting two or more days. Though temperature thresholds that mark extreme heat events can vary by geographic location, these events can be extremely dangerous; in fact, heat is the top weather-related killer in the United States. Extreme heat can impact employee operations and power delivery, and can cause the public to seek relief. Extreme heat or heat wave impacts to water and wastewater utilities may include, but are not limited to:

- Loss of power and communication lines due to increased electricity demand
- Increased water demand due to higher temperatures, which could result in shortages
- Changes in source water quality related to increased water temperatures due to both higher air temperatures and higher temperatures of industrial discharges (e.g., cooling water used at power plants)
- Safety risks for staff working in the field for prolonged periods of time

EPA

The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from an extreme heat event. (Because extreme heat events and drought often coincide, please see the Drought Incident Action Checklist for drought-specific activities.)

Example of Water Sector Impacts and Response to an Extreme Heat Event

Wisconsin Utility Anticipates Potential Water Shortages

Madison, Wisconsin, experienced a heat wave in June and July 2012, which resulted in an increase in water use. Due to the high temperatures and drier-than-normal conditions, the Madison Water Utility anticipated a potential water shortage and issued advisories for their customers to stay hydrated, but otherwise conserve water during the heat wave to reduce the risk of a shortage.

The utility advised customers to water their gardens and lawns only when needed, repair leaks in their homes, install water-saving devices such as aerators and flow regulators and use the most efficient setting for dishwashers and washing machines.

Source: City of Madison News Release, "Use Water Wisely in Heat Wave and Dry Period"
Source: NOAA Report "2012 Wisconsin Yearly Weather Summary"

My Contacts and Resources

CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Local EMA	
	State EMA	
	State Primacy Agency	
	WARN Chair	
	Power Utility	

Planning

- Incident monitoring:
  - U.S. Hazards Assessment (National Oceanic and Atmospheric Administration [NOAA])
  - Mean Heat Index Forecasts (NOAA)
  - Watch, Warning, and Advisory Products for Extreme Heat (NOAA)
  - U.S. Drought Monitor (National Drought Mitigation Center, NOAA, U.S. Department of Agriculture [USDA])
  - U.S. Seasonal Drought Outlook (NOAA)
- Excessive Heat Events Guidebook (EPA)
- Living with Weather: Heat Waves (Midwestern Regional Climate Center [MRCC])
- Ready.gov: Extreme Heat (Federal Emergency Management Agency [FEMA])
- Planning for an Emergency Drinking Water Supply (EPA)
- National Weather Service Weather Alerts (NOAA)
- All-Hazard Consequence Management Planning for the Water Sector (Water Sector Emergency Response Critical Infrastructure Partnership Advisory Council [CIPAC] Workgroup)
- Vulnerability Self Assessment Tool (VSAT) (EPA)
- How to Develop a Multi-Year Training and Exercise (T&E) Plan (EPA)
- Preparing for Extreme Weather Events: Workshop Planner for the Water Sector (EPA)
- Tabletop Exercise Tool for Water Systems: Emergency Preparedness, Response, and Climate Resiliency (EPA)

Coordination

- Water/Wastewater Agency Response Network (WARN) (EPA)

Communication with Customers

- WaterSense (EPA)

Facility and Service Area

- Water Audit Tool (American Water Works Association [AWWA])

Power, Energy and Fuel

- EPA Region 1 Water/Wastewater System Generator Preparedness Brochure (EPA)

Documentation and Reporting

- Federal Funding for Utilities In National Disasters (Fed FUNDS) (EPA)

Mitigation

- Climate Resilience Evaluation and Awareness Tool (CREAT) (EPA)
- Adaptation Strategies Guide (EPA)

Actions to Prepare for Extreme Heat

Planning

- [ ] Actively monitor weather conditions and extended weather forecasts.
- [ ] Review and update your utility's emergency response plan (ERP), and ensure all emergency contacts are current.
- [ ] Conduct briefings, training and exercises to ensure utility staff is aware of all preparedness, response and recovery procedures.
- [ ] Identify priority water customers (e.g., hospitals), obtain their contact information, map their locations and develop a plan to restore those customers first, in case of water service disruptions.
- [ ] Monitor water supply and calculate how long water could be provided if increased demand persists.
    - Actively monitor surface water levels and groundwater well levels, and identify the sustainable withdrawal rate for each
- [ ] Establish "triggers" or "threshold values" for extreme heat conditions that will require action (e.g., if reservoirs fall below a certain level, if water quality measures exceed a specified level).
- [ ] Develop an emergency drinking water supply plan and establish response partner contacts (potentially through your local emergency management agency [EMA] or mutual aid network) to discuss procedures, which may include bulk water hauling, mobile treatment units or temporary supply lines, as well as storage and distribution.
- [ ] Conduct a hazard vulnerability analysis in which you review historical records to understand the past frequency and intensity of extreme heat events and how your utility may have been impacted. Consider taking actions to mitigate drought impacts to the utility, including those provided in the "Actions to Recover from Extreme Heat Events: Mitigation" section.
- [ ] Complete pre-disaster activities to help apply for federal disaster funding (e.g., contact state/local officials with connections to funding, set up a system to document damage and costs).
- [ ] Determine if technical assistance programs are offered by the state, including wellhead protection programs for community water supplies. Assistance may involve:
    - Development and utilization of predictive water use models that assist in locating water for communities
    - Development and utilization of formal groundwater monitoring networks

Coordination

- [ ] Join your state's Water/Wastewater Agency Response Network (WARN) or other local mutual aid network.
- [ ] Coordinate with WARN members and other neighboring utilities to discuss:
    - Outlining response activities, roles and responsibilities and mutual aid procedures (e.g., how to request and offer assistance)
    - Conducting joint tabletop or full-scale exercises
    - Obtaining resources and assistance, such as equipment, personnel, technical support or water
    - Establishing interconnections between systems and agreements with necessary approvals to activate this alternate source. Equipment, pumping rates and demand on the water sources need to be considered and addressed in the design and operations
    - Establishing communication protocols and equipment to reduce misunderstandings during the incident

Actions to Prepare for Extreme Heat *(continued)*

- [ ] Coordinate with other key response partners, such as your local EMA, to identify potential points of distribution for the delivery of emergency water supply (e.g., bottled water) to the public, as well as who is responsible for distributing the water.
- [ ] Understand how the local and utility emergency operations center (EOC) will be activated and what your utility may be called on to do, as well as how local emergency responders and the local EOC can support your utility during a response. If your utility has assets outside of the county EMA's jurisdiction, consider coordination or preparedness efforts that should be done in those areas.
- [ ] Sign up for mobile and/or email alerts from your local EMA, if available.

Communication with Customers

- [ ] Communicate with critical customers, high water users and agricultural customers to discuss seasonal demand, conservation measures and irrigation practices.
- [ ] Review public information protocols with local EMA and public health/primacy agencies. These protocols should include developing water advisory messages (e.g., boil water, warnings that service disruptions are likely) and distributing them to customers using appropriate mechanisms, such as reverse 911.
- [ ] Develop outreach materials for the public (e.g., radio, social media, and bill stuffers) that encourage personal hydration, as well as materials that clearly describe conservation measures and activities.
  - Become a WaterSense partner and download free water efficiency outreach materials to distribute to your customers: http://www.epa.gov/watersense/

Facility and Service Area

- [ ] Document pumping requirements and storage capabilities, as well as critical treatment components and parameters.
- [ ] Maintain a full storage tank to assist with demand should there be a source loss, power failure or fire suppression needs.
- [ ] In the case of a power loss, ensure personnel are trained to shut down and start up the system manually.

Power, Energy and Fuel

- [ ] Evaluate condition of electrical panels to accept generators; inspect connections and switches.
- [ ] Document power requirements of the facility; options for doing this may include:
  - Placing a request with the US Army Corps of Engineers 249th Engineer Battalion (Prime Power): http://www.usace.army.mil/249thEngineerBattalion.aspx
  - Using the US Army Corps of Engineers on-line Emergency Power Facility Assessment Tool (EPFAT): http://epfat.swf.usace.army.mil/
- [ ] Confirm and document generator connection type, capacity load and fuel consumption. Test regularly, exercise under load and service backup generators.
- [ ] Collaborate with your local power provider and EOC to ensure that your water utility is on the critical facilities list for priority electrical power restoration, generators and emergency fuel.

Actions to Respond to Extreme Heat

Planning

- [ ] Work with your regulatory agency to assist in identifying and approving alternate water supplies and operational or design changes.
- [ ] Monitor wildfire conditions and outlooks. See the Wildfire Incident Action Checklist for more information on how to prepare for wildfires.

Coordination

- [ ] Communicate with public health officials, local EMA and other partners to:
  - Discuss issues related to extreme heat emergencies and public health activities
  - Evaluate conditions and water use requirements related to HVAC systems required by hospitals and identify alternative means to supply water if the utility is unable to meet demand
- [ ] If needed, request or offer assistance (e.g., water buffalos, water sampling teams, generators) through mutual aid networks, such as WARN.
- [ ] Work with your local EMA to establish cooling centers for the public.

Communication with Customers

- [ ] Implement mandatory or voluntary water conservation efforts, and conduct regular outreach to customers.
- [ ] If water shortages or outages occur, notify customers of water advisories; consider collaborating with local media (television, radio, newspaper, etc.) to distribute the message. If emergency water is being supplied, provide information on the distribution locations.

Facility and Service Area

- [ ] Utilize pre-established emergency connections or set up temporary connections to nearby communities, as needed. Alternatively, implement plans to draw emergency water from pre-determined tanks or hydrants. Notify employees of the activated sites.
- [ ] Monitor source water quantity (e.g., reservoir levels, stream flows, well levels, groundwater levels).
- [ ] Monitor water quality and adjust treatment, if necessary, as reduced water quantity and increased temperatures could change water chemistry.
- [ ] Notify regulatory/primacy agency if operations and/or water quality or quantity are affected.
- [ ] If possible, run pumps during off-peak hours when there is less demand on power and less risk of a power failure.

Notes:

Actions to Respond to Extreme Heat *(continued)*

Documentation and Reporting

- [ ] Document all damage assessments, mutual aid requests, emergency repair work, equipment used, purchases made, staff hours worked and contractors used during the response to assist in requesting reimbursement and applying for disaster funds. When possible, take photographs that illustrate the extreme heat conditions (with time and date stamp). Proper documentation is critical to requesting reimbursement.

Personnel

- [ ] Ensure all staff working in the field are aware of the risks of extreme heat and that they take actions to avoid health risks and over-exertion (e.g., hydration, sunscreen, taking frequent breaks in the shade, wearing appropriate clothing).

Power, Energy and Fuel

- [ ] Fill vehicles and fuel tanks to full capacity; ensure that you have the ability to manually pump gas in the event of a power outage.
- [ ] Use backup generators, as needed, to supply power to system components.
- [ ] Monitor and plan for additional fuel needs in advance; coordinate fuel deliveries to the generators.
- [ ] Maintain contact with electric provider for power outage duration estimates.

Notes:

Actions to Recover from Extreme Heat Events

Coordination

- [ ] Continue work with response partners to obtain funding, equipment, etc.

Communication with Customers

- [ ] Continue to communicate with customers concerning water conservation measures and practices.

Facility and Service Area

- [ ] Complete permanent repairs, replace depleted supplies and return to normal service.

FEMA

Documentation and Reporting

- [ ] Compile damage assessment forms and cost documentation into a single report to facilitate the sharing of information and the completion of state and federal funding applications. Visit EPA's web-based tool, Federal Funding for Utilities—Water/Wastewater—in National Disasters (Fed FUNDS), for tailored information and application forms for various federal disaster funding programs: http://water.epa.gov/infrastructure/watersecurity/funding/fedfunds/

- [ ] Develop a lessons learned document and/or an after action report (AAR) to keep a record of your response activities. Update your vulnerability assessment, ERP and extreme heat contingency plans.

- [ ] Revise budget and asset management plans to address increased costs from response-related activities.

Mitigation

- [ ] Identify mitigation and long-term adaptation measures that can prevent damage and increase utility resilience. Consider impacts related to the increased frequency of extreme heat waves when planning for system upgrades, such as installing energy efficient pumps/equipment to minimize power demands.

Notes:

Flooding

Incident Action Checklist – Flooding

The actions in this checklist are divided up into three "rip & run" sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from flooding. For on-the-go convenience, you can also populate the "My Contacts" section with critical information that your utility may need during an incident.

Flooding Impacts on Water and Wastewater Utilities

Flooding is common throughout much of the United States and can be caused by heavy precipitation events, storm surge, levee or dam failures or inadequate drainage. These events often occur with little or no notice, and can cause extensive damage to drinking water and wastewater infrastructure. Flooding impacts to utilities often include, but are not limited to:

- Infrastructure damage, possibly resulting in service interruptions
- Pipe breaks due to washouts, which could result in sewage spills or low water pressure throughout the service area
- Debris blockage at an intake or unearthed water and wastewater lines due to falling trees
- Loss of power and communication lines
- Combined sewer overflows (CSOs)
- Water quality changes to source waters and treated effluents, including increased turbidity, increased nutrients and other potential contaminants
- Restricted access to the facility due to debris, flood waters and damage to roadways from washouts and sinkholes
- Loss of water quality testing capability due to restricted facility and laboratory access and damage to utility equipment

The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from floods.

Example of Water Sector Impacts and Response to a Flood

Warwick, Rhode Island Wastewater Treatment Plant Flooding

In March of 2010, a monthly record of nearly 16 inches of rain caused extreme flooding along the Pawtuxet River in the City of Warwick, Rhode Island, and left the Warwick Wastewater Treatment Plant completely flooded. Staff members were forced to move critical mobile equipment to higher ground as flood waters rose and threatened electrical equipment. The flood took the facility and six pumping stations along the Pawtuxet River offline. The Warwick Sewer Authority was forced to purchase five large portable pumps to keep up capacity.

Although the levees in Warwick were built three feet higher than the 100-year flood level, the river reached three feet above the levees during the 2010 flood. Rhode Island Department of Emergency Management (RIDEM) personnel recommended that the wastewater treatment plant be designed to higher flood levels (e.g., 500-year flood) to mitigate future damage from flooding events. Since the flood, the utility moved its Supervisory Control and Data Acquisition (SCADA) system to the second floor from the ground floor of the operations building. The utility has also purchased several new generators and other energy efficient equipment.

Source: Brown University Center for Environmental Studies, "Emergency Management in Rhode Island: A Look at the State's Level of Preparedness and Management of Resources, Communication, and Infrastructure During the March 2010 Floods."

Source: Treatment Plant Operator Magazine, January 2011 Issue, "Managers and operators at two Rhode Island treatment plants report experiences and lessons learned from the severe floods of March 2010."

My Contacts and Resources

CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Local EMA	
	State EMA	
	State Primacy Agency	
	WARN Chair	
	Power Utility	

Planning

- Incident monitoring:
  - Quantitative Precipitation Forecasts (National Oceanic and Atmospheric Administration [NOAA])
  - Excessive Rainfall Forecasts (NOAA)
  - River Observations, Forecasts, and Experimental Long-Range Flood Risk (NOAA)
  - U.S. Spring Flood Risk (NOAA)
  - Flood Inundation Mapper (United States Geological Survey [USGS])
  - WaterNow (USGS)
  - WaterAlert (USGS)
  - WaterWatch (USGS)
- Map Service Center to find flood map by address (Federal Emergency Management Agency [FEMA])
- National Weather Service Weather Alerts (NOAA)
- Planning for an Emergency Drinking Water Supply (EPA)
- All-Hazard Consequence Management Planning for the Water Sector (Water Sector Emergency Response Critical Infrastructure Partnership Advisory Council [CIPAC] Workgroup)
- Vulnerability Self Assessment Tool (VSAT) (EPA)
- Preparing for Extreme Weather Events: Workshop Planner for the Water Sector (EPA)
- Tabletop Exercise Tool for Water Systems: Emergency Preparedness, Response, and Climate Resiliency (EPA)
- How to Develop a Multi-Year Training and Exercise (T&E) Plan (EPA)
- Make a Plan (FEMA)

Coordination

- Water/Wastewater Agency Response Network (WARN) (EPA)
- Community Based Water Resiliency (EPA)

Facility and Service Area

- Emergency Response and Preparedness Florida WARN Best Management Practices for Water and Wastewater Systems (University of Florida Center for Training)
- What to Do After the Flood (EPA)

Mitigation

- Climate Resilience Evaluation and Awareness Tool (CREAT) (EPA)
- Adaptation Strategies Guide (EPA)

Actions to Prepare for a Flood

Planning

- [ ] Monitor weather and stream/river flow conditions to anticipate potential flooding conditions. Sign up for US Geological Survey's (USGS) WaterAlert service to receive an email or text message alert when the river gauges that you have identified surpass specified parameters.
- [ ] Review and update your utility's emergency response plan (ERP), and ensure all emergency contacts are current.
- [ ] Conduct briefings, training and exercises to ensure utility staff is aware of all preparedness, response and recovery procedures.
- [ ] Identify priority water customers (e.g., hospitals), obtain their contact information, map their locations and develop a plan to restore those customers first, in case of water service disruptions.
- [ ] Develop an emergency drinking water supply plan and establish response partner contacts (potentially through your local emergency management agency [EMA] or mutual aid network) to discuss procedures, which may include bulk water hauling, mobile treatment units or temporary supply lines, as well as storage and distribution.
- [ ] Consult Federal Emergency Management Agency (FEMA) flood maps (link provided in the Resources section of this document) to determine which locations in your service area are most vulnerable to flooding.
- [ ] Conduct a hazard vulnerability analysis in which you review historical records to understand the past frequency and intensity of flood events and how your utility may have been impacted; consult USGS's WaterWatch (link provided in the Resources section of this document) to review archived streamflow maps. Consider taking actions to mitigate flood impacts to the utility, including those provided in the "Actions to Recover from a Flood: Mitigation" section.
- [ ] Complete pre-disaster activities to help apply for federal disaster funding (e.g., contact state/local officials with connections to funding, set up a system to document damage and costs, take photographs of the facility for comparison to post-damage photographs).

Coordination

- [ ] Join your state's Water/Wastewater Agency Response Network (WARN) or other local mutual aid network.
- [ ] Coordinate with WARN members and other neighboring utilities to discuss:
  - Outlining response activities, roles and responsibilities and mutual aid procedures (e.g., how to request and offer assistance)
  - Conducting joint tabletop or full-scale exercises
  - Obtaining resources and assistance, such as equipment, personnel, technical support or water
  - Establishing interconnections between systems and agreements with necessary approvals to activate this alternate source. Equipment, pumping rates and demand on the water sources need to be considered and addressed in the design and operations
  - Establishing communication protocols and equipment to reduce misunderstandings during the incident
- [ ] Coordinate with other key response partners, such as your local EMA, to discuss:
  - How restoring system operations may have higher priority than establishing an alternative water source
  - Potential points of distribution for the delivery of emergency water supply (e.g., bottled water) to the public, as well as who is responsible for distributing the water

Actions to Prepare for a Flood *(continued)*

- [ ] Understand how the local and utility emergency operations center (EOC) will be activated and what your utility may be called on to do, as well as how local emergency responders and the local EOC can support your utility during a response. If your utility has assets outside of the county EMA's jurisdiction, consider coordination or preparedness efforts that should be done in those areas.
- [ ] Ensure credentials to allow access will be valid during an incident by checking with local law enforcement.
- [ ] Sign up for mobile and/or email alerts from your local EMA, if available.

Communication with Customers

- [ ] Develop outreach materials to provide your customers with information they will need during a flood (e.g., clarification about water advisories, instructions for private well and septic system maintenance).
- [ ] Review public information protocols with local EMA and public health/primacy agencies. These protocols should include developing water advisory messages (e.g., boil water, warnings that service disruptions are likely) and distributing them to customers using appropriate mechanisms, such as reverse 911. Keep in mind that the notice may need to be delivered prior to the storm to be effective.

Facility and Service Area

- [ ] Inventory and order extra equipment and supplies, as needed:
  - Motors
  - Fuses
  - Chemicals (ensure at least a two week supply)
  - Cellular phones or other wireless communications device
  - Emergency Supplies
    - Tarps/tape/rope
    - Cots/blankets
    - First aid kits
    - Foul weather gear
    - Plywood
    - Flashlights/flares
    - Sandbags (often, sand must be ordered as well)
    - Bottled water
    - Batteries
    - Non-perishable food
- [ ] Ensure communication equipment (e.g., radios, satellite phones) works and is fully charged.
- [ ] Develop a GIS map of all system components and prepare a list of coordinates for each facility.
- [ ] Document pumping requirements and storage capabilities, as well as critical treatment components and parameters.

Notes:

Actions to Prepare for a Flood *(continued)*

Personnel

- ☐ Identify essential personnel and ensure they are trained to perform critical duties in an emergency (and possibly without communication), including the shut down and start up of the system.
- ☐ Establish communication procedures with essential and non-essential personnel. Ensure all personnel are familiar with emergency evacuation and shelter in place procedures.
- ☐ Pre-identify emergency operations and clean-up crews. Establish alternative transportation strategies if roads are impassable.
- ☐ Consider how evacuations or limited staffing due to transportation issues (potentially all utility personnel) will impact your response procedures.
- ☐ Identify possible staging areas for mutual aid crews if needed in the response, and the availability of local facilities to house the crews.
- ☐ Encourage personnel, especially those that may be on duty for extended periods of time, to develop family emergency plans.

Power, Energy and Fuel

- ☐ Evaluate condition of electrical panels to accept generators; inspect connections and switches.
- ☐ Document power requirements of the facility; options for doing this may include:
  - Placing a request with the US Army Corps of Engineers 249th Engineer Battalion (Prime Power): http://www.usace.army.mil/249thEngineerBattalion.aspx
  - Using the US Army Corps of Engineers on-line Emergency Power Facility Assessment Tool (EPFAT): http://epfat.swf.usace.army.mil/
- ☐ Confirm and document generator connection type, capacity load and fuel consumption. Test regularly, exercise under load and service backup generators.
- ☐ Contact fuel vendors and inform them of estimated fuel volumes needed if utility is impacted. Determine your ability to establish emergency contract provisions with vendors and your ability to transport fuel if re-fueling contractors are not available. Develop a backup fueling plan and a prioritization list of which generators to fuel in case of a fuel shortage.
- ☐ Collaborate with your local power provider and EOC to ensure that your water utility is on the critical facilities list for priority electrical power restoration, generators and emergency fuel.

EPA

Actions to Respond to a Flood: With Advance Notice

Facility and Service Area

- [ ] Secure equipment; move electronics, equipment and important data to a water-tight facility or out of flood-prone areas. Determine areas outside of the floodplain where vehicles/equipment can be moved.
- [ ] Clear storm drains and set up sandbags to protect facilities in flood-prone areas. Place sandbags on the top of tanks so that backwash water is directed away from plant structures.
- [ ] Check that back-up equipment and facility systems, such as controls and pumps, are in working order, and ensure that the utility has a two week supply of all chemicals on hand.
- [ ] Protect exposed lines or pipes that may become vulnerable due to streambank erosion.
- [ ] Fill storage tanks to full capacity to maximize storage and fill empty chemical storage tanks with water if a heavy precipitation event is anticipated, to prevent floating.
- [ ] Wastewater utilities should empty holding tanks, ponds and/or lagoons to prepare for an increase in flow and to minimize the chance of a release during heavy weather incidents.

Power, Energy and Fuel

- [ ] Fuel vehicles and fill fuel tanks to full capacity and ensure that you have the ability to manually pump gas in the event of a power outage. Ensure this equipment and other hazardous materials are located in a safe zone.

NOAA

Actions to Respond to a Flood

Coordination

- [ ] Notify your local EMA and state regulatory/primacy agency of system status.
- [ ] If needed, request or offer assistance (e.g., equipment, personnel) through mutual aid networks, such as WARN.
- [ ] Assign a representative of the utility to the incident command post or the community's EOC.

Communication with Customers

- [ ] Notify customers of any water advisories and consider collaborating with local media (television, radio, newspaper, etc.) to distribute the message. If emergency water is being supplied, provide information on the distribution locations.

Facility and Service Area

Overall

- [ ] Conduct damage assessments of the utility to prioritize repairs and other actions.
- [ ] Check that back-up equipment and facility systems, such as controls and pumps, are in working order, and ensure that chemical containers and feeders are intact.
- [ ] If necessary and possible, turn off all utilities associated with your facilities to prevent further damage and minimize electrical and explosive hazards.

Drinking Water Utilities

- [ ] Inspect the utility and service area for damage due to debris, downed trees and floodwaters. Identify facility components (e.g., valve boxes) and fire hydrants that have been buried, are inaccessible or have been destroyed.
- [ ] Ensure pressure is maintained throughout the system and isolate those sections where it is not.
- [ ] Isolate and control leaks in water transmission and distribution piping.
- [ ] Monitor water quality, develop a sampling plan and adjust treatment as necessary.
- [ ] Notify regulatory/primacy agency if operations and/or water quality or quantity are affected.
- [ ] Utilize pre-established emergency connections or setup temporary connections to nearby communities, as needed. Alternatively, implement plans to draw emergency water from pre-determined tanks or hydrants. Notify employees of the activated sites.

Wastewater Utilities

- [ ] Inspect the utility and service area, including lift stations, for damage and power availability. Inspect the sewer system for debris and assess the operational status of the mechanical bar screen. If necessary, run system in manual operation.

Notes:

Actions to Respond to a Flood *(continued)*

- [ ] Inspect all manholes and pipelines in flood-prone areas for inflow and infiltration after the flood waters recede.
- [ ] Consider suspending solid waste processing during periods of high flow to conserve bacteria and prevent it from washing out of the plant.
- [ ] Notify regulatory/primacy agency of any changes to the operations or required testing parameters.

Documentation and Reporting

- [ ] Document all damage assessments, mutual aid requests, emergency repair work, equipment used, purchases made, staff hours worked and contractors used during the response to assist in requesting reimbursement and applying for federal disaster funds. When possible, take photographs of damage at each work site (with time and date stamp). Proper documentation is critical to requesting reimbursement.
- [ ] Work with your local EMA on the required paperwork for public assistance requests.

Personnel

- [ ] Account for all personnel and provide emergency care, if needed. Caution personnel about known hazards resulting from floods.
- [ ] Deploy emergency operations and clean-up crews. Identify key access points and roads for employees to enter the utility and critical infrastructure; coordinate the need for debris clearance with local emergency management or prioritize it for employee operations.

Power, Energy and Fuel

- [ ] Use backup generators, as needed, to supply power to system components.
- [ ] Monitor and plan for additional fuel needs in advance; coordinate fuel deliveries to generators.
- [ ] Maintain contact with electric provider for power outage duration estimates.

Notes:

Actions to Recover from a Flood

Coordination

- [ ] Continue work with response partners to obtain funding, equipment, etc.

Communication with Customers

- [ ] Assign a utility representative to continue to communicate with customers concerning a timeline for recovery and other pertinent information.

Facility and Service Area

- [ ] Complete damage assessments.
- [ ] Complete permanent repairs, replace depleted supplies and return to normal service.

FEMA

Documentation and Reporting

- [ ] Compile damage assessment forms and cost documentation into a single report to facilitate the sharing of information and the completion of state and federal funding applications. Visit EPA's web-based tool, Federal Funding for Utilities—Water/Wastewater—in National Disasters (Fed FUNDS), for tailored information and application forms for various federal disaster funding programs: http://water.epa.gov/infrastructure/watersecurity/funding/fedfunds/
- [ ] Develop a lessons learned document and/or an after action report (AAR) to keep a record of your response activities. Update your vulnerability assessment, ERP and contingency plans.
- [ ] Revise budget and asset management plans to address increased costs from response-related activities.

Mitigation

- [ ] Identify mitigation and long-term adaptation measures that can prevent damage and increase utility resilience. Consider impacts related to the increased frequency of intense flooding when planning for system upgrades (e.g., elevating critical utility assets above projected flood levels, waterproofing building access areas, using flood control methods to modify runoff, managing stormwater through green infrastructure).

Notes:

Harmful Algal Bloom

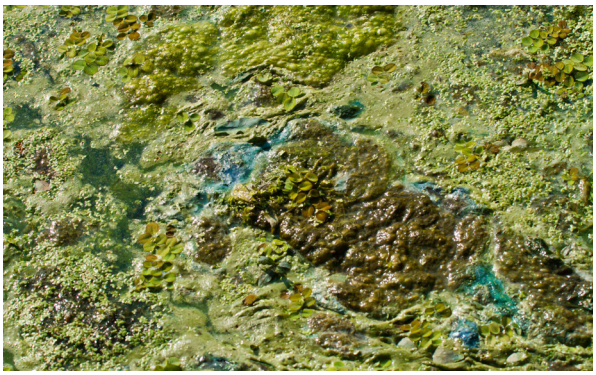
Incident Action Checklist – Harmful Algal Blooms

For on-the-go convenience, the actions in this checklist are divided up into three "rip & run" sections and are examples of activities that surface water utilities can take to: prepare for, respond to and recover from harmful algal bloom (HAB) incidents. You can also populate the "My Contacts" sections with critical information that your utility may need during the HAB incident.

Harmful Algal Bloom Incidents and Water Utilities

Increasingly, utilities face harmful algal bloom or HAB challenges as they try to ensure the delivery of safe drinking water to their customers. HABs can create toxins that are difficult to treat, which can lead to prolonged drinking water outages that can impact both human health and a community's economy. Blue-green algae HABs or cyanobacteria are single-celled microorganisms that live in fresh, brackish and marine surface water. Favorable conditions, such as warm water, elevated levels of nutrients (e.g., nitrogen, phosphorus), slow-moving water and thermal stratification accelerate the growth of cyanobacteria, leading to the creation of a HAB. Some cyanobacterial blooms are capable of producing highly potent cyanotoxins. Despite their increasingly common existence, HABs can be difficult to identify. Their shape, size, location, color and cyanotoxin production can vary bloom by bloom. Tools are available to assist with detecting and monitoring a bloom. Although blooms tend to form during the late summer, seasonal and year-to-year fluctuations in cyanobacteria levels can make predicting their occurrence difficult. Cyanobacterial impacts to drinking water utilities may include, but are not limited to:

- Unpleasant taste and odor, especially earthy and musty tones;
- Interference with water treatment plant operations such as floc formation, filtration and chlorination;
- Increased levels of disinfection by-product (DBP) precursors; and
- Pass through of cyanotoxins into finished drinking water, if not addressed.



If cyanotoxins occur in tap water over the U.S Environmental Protection Agency's (EPA's) national Health Advisory level, people are at risk of various adverse health effects including upset stomach, vomiting and diarrhea as well as liver and kidney damage. The EPA recommends the following Health Advisory levels:

Drinking Water Thresholds	Microcystin (µg/L)	Cylindrospermopsin (µg/L)
Do Not Drink – children under 6	0.3	0.7
Do Not Drink – children 6 and older and adults	1.6	3.0

Table 1: U.S. EPA Recommended Cyanotoxin Thresholds for Drinking Water

Contact your regulatory agency to determine if your state has additional HAB recommendations, standards, regulations or monitoring schedules.

Example of Water System Impacts and Response to a Harmful Algal Bloom Incident

Carroll Township, Ohio

In September 2013, microcystins concentrations at Carroll Township's intake on Lake Erie increased to >5 µg/L, the highest concentration observed in four years of monitoring. A finished water sample collected at the same time had a microcystins concentration of 1.4 µg/L, which exceeded the Ohio Environmental Protection Agency's (EPA's) microcystins threshold of 1 µg/L. After a repeat finished water sample concentration of 3.6 µg/L, Ohio EPA recommended that the water system issue a Do Not Drink Advisory and transition to an emergency connection with a neighboring utility. The advisory impacted over 2,200 people and lasted approximately 48 hours. The water system remained on their emergency connection for several weeks. After the event, the water system spent approximately $250,000 to upgrade the pre-ozonation portion of their conventional surface water treatment process with new ozone generators and concentrators to amplify ozone dosages. In subsequent years, the upgraded and optimized plant was able to effectively treat source water microcystins concentrations of over 50 µg/L, with no finished water detections.

Source: Ohio EPA

Great Lakes Coastal Resilience

Actions to Prepare to Respond to a Harmful Algal Bloom Incident

Planning

- [ ] Identify a HAB lead and team of individuals who would prepare for and respond to a bloom incident.

- [ ] Identify and coordinate with all water systems that utilize the same water source. Upstream systems can be a source of bloom information and downstream systems should be notified as they may also become affected. Be sure to document 24-hour contact information.

- [ ] Develop a list of critical customers who need a continuous source of potable drinking water (e.g., hospitals, nursing homes, dialysis clinics, manufacturers).

- [ ] Review and update all emergency contacts.

- [ ] Develop a cyanotoxin management plan. One resource to help in the development of the plan is "Cyanotoxin Management Plan Template and Example Plans." The plan should consist of the following:

  - o Monitoring plan – EPA does not currently regulate cyanotoxins, so systems are not required to monitor; however, some states do require sampling, so please check with your regulatory agency. Make sure the monitoring plan includes, but is not limited to:

    - When and where to sample (different intakes or depths);
    - Sampling frequency;
    - Sample volume;
    - What to sample
      - indicators of cyanotoxins such as chlorophyll a, phycocyanin or qPCR methods for toxin producing genes;
      - cyanobacterial cells or specific cyanotoxins or both;
    - Which analytical screening test(s) to use (including field parameters and methods for indicators described above);
    - Cyanotoxin analytical methods;
    - Laboratory that can run required analysis during weekdays or weekends;
    - Sampling procedures and safe handling; and
    - Situations when it is necessary to send sample(s) to an identified laboratory for confirmation.

    Refer to "A Summary of Methods Available for Cyanotoxin Detection" to identify a sampling method for your utility.

  - o Treatment Plan – Identify cyanotoxin treatment strategies based on your specific water system's type of treatment. Determine short-term and long-term treatment strategies. Refer to "Water Treatment Optimization for Cyanotoxins"

  - o Communications Plan – As deemed appropriate by the utility or per regulatory agency requirements:

    - Identify the required communication steps and appropriate actions that may be taken to inform customers and the general public if cyanotoxins are detected in raw or finished water;
    - Work with local and state officials regarding public communication requirements - what cyanotoxin levels, what type of drinking water sample (e.g., raw, finished, distribution system) and how many confirmation samples are needed to trigger a public notification;
    - Develop communication templates for scenarios for both cyanotoxins and taste and odor events; and
    - Identify appropriate distribution mechanisms such as reverse 911. Refer to the "Drinking Water Cyanotoxin Risk Communication Toolbox"

Actions to Prepare to Respond to a Harmful Algal Bloom Incident

(continued)

- [ ] Develop an alternate water supply plan that specifies the following:
  - o The quantity of water needed to meet customer demand daily.
  - o The identification of multiple alternate sources of water (both raw and finished) such as bottled water, interconnections, hauling raw water to the treatment plant or hauling treated water to a storage tank.
  - o How the system will obtain and transport identified alternate sources (including any treatment requirements).
  - o Who is responsible for obtaining and distributing the alternate sources.

    This should be done in conjunction with local response partners such as your local emergency management agency (EMA) and local emergency planning committee (LEPC), as well as your regulatory agency. For more information, go to "Planning for an Emergency Drinking Water Supply."
- [ ] Meet with your local EMA, health departments and consecutive systems to share your cyanotoxin management plan and your alternate water supply plan.
- [ ] Conduct internal and external (e.g., EMA, health department, regulatory agency) HAB tabletop exercises regularly.
- [ ] Participate in Incident Command System (ICS) and National Incident Management System (NIMS) training either online or in person with your local emergency management agency.
- [ ] Join your state's Water and Wastewater Agency Response Network (WARN) or other local mutual aid network. In addition, determine if you are included in a statewide mutual aid law.

Facility _____

- [ ] Determine if your utility has the ability to draw raw water from different intakes or different depths.
- [ ] Test all interconnections in preparation for potential use in an emergency and evaluate potential corrosion control issues.
- [ ] Select distribution sampling sites with 24-hour access.
- [ ] Identify areas of the distribution system that could be isolated to limit the number of customers affected.
- [ ] Implement a comprehensive source water monitoring program that involves routine raw water cyanobacteria sampling at multiple depths and locations.
- [ ] Monitor any operational changes (e.g., decreased filter run time, turbidity or pH change, green sludge or filter backwash) that could indicate a potential HAB threat.

Notes:

Actions to Respond to a Harmful Algal Bloom Incident in Raw Water

Notification

- [ ] Notify the state regulatory agency and local EMA of your water system's status.
- [ ] Notify utilities that have interconnections with your utility and those with the same water source.
- [ ] Notify the local health department.
- [ ] Though not required by federal law, it is important to keep customers regularly updated on the situation through local media, social media, a website or other mechanisms. Updates should continue until regular operations resume.

Notes:

Facility

- [ ] Conduct raw water and finished water sampling per your established HAB management plan, including analyzing for intra- and extra-cellular cyanotoxins, or as directed by the state regulatory agency. Exercise proper safety measures when sampling for cyanotoxins to prevent skin exposure. Wash hands after sampling.
- [ ] Adjust water treatment processes. Utilities should confirm the type and concentration of cyanotoxins present in the source water in order to determine the most effective treatment strategy. Applying the wrong treatment process at a specific treatment stage could rupture the cyanobacteria cells and result in the release, rather than removal of, cyanotoxins. Refer to "Water Treatment Optimization for Cyanotoxins"
- [ ] Implement mitigation measures to control blooms that have already occurred in the source water. Remedial measures include physically removing surface scums and applying algaecides and other chemicals (e.g., permanganate, hydrogen peroxide) to control blooms. Each bloom is unique and proper measures need to be considered on a case by case basis. Refer to "Control and Treatment" for examples of control and prevention measures. Control measures must be selected carefully as they can have unintended consequences on water quality and negative impacts on the ecosystem. Refer also to state and primacy agencies as some control measures and source water treatment may have specific requirements or regulations. *Disclaimer: EPA has not conducted an assessment of the effectiveness of any of the listed control and treatment methods.*

Documentation

- [ ] Document all events, timeframes, and resulting impacts, so this information can be used as part of the post-incident investigation.

Actions to Respond to a Harmful Algal Bloom Incident in Drinking Water

Notification

- ☐ Notify the state regulatory agency, local EMA and the local health department of the cyanotoxin sample detection in finished drinking water.
- ☐ Notify utilities that have interconnections with your utility.
- ☐ Determine if any water health advisories need to be issued. Use pre-identified communication mediums (e.g., reverse 911, social media) to notify customers. Refer to the "Drinking Water Cyanotoxin Risk Communication Toolbox."

  o Continue to keep customers updated regularly.

Notes:

Facility

- ☐ Activate the alternate water plan, if necessary. If bottled water is being supplied, provide information to customers on the distribution locations.
- ☐ Continue raw water and finished water sampling as directed by the state regulatory agency.
- ☐ Adjust water treatment processes. Utilities should confirm the type and concentration of cyanotoxins present in the source water in order to determine the most effective treatment strategy. Applying the wrong treatment process at a specific treatment stage could rupture the cyanobacteria cells and result in the release, rather than removal of, cyanotoxins. Refer to "Water Treatment Optimization for Cyanotoxins."
- ☐ Implement mitigation measures to control blooms that have already occurred in the source water. Remedial measures include physically removing surface scums and applying algaecides and other chemicals (e.g., permanganate, hydrogen peroxide) to control blooms. Refer to "Control and Treatment" for examples of control and prevention measures. Control measures must be selected carefully as they can have unintended consequences on water quality and negative impacts on the ecosystem. Refer also to state and primacy agencies as some control measures and source water treatment may have specific requirements or regulations. *Disclaimer: EPA has not conducted an assessment of the effectiveness of any of the listed control and treatment methods.*
- ☐ Use WARN for help in obtaining sampling supplies, additional personnel and HAB technical assistance as needed.

Documentation

- ☐ Document all events, timeframes, and resulting impacts, so this information can be used as part of the post-incident investigation.

Actions to Recover from a Harmful Algal Bloom Incident

- [ ] Lift advisories once you and your state regulatory agency have deemed the situation safe.
- [ ] Assign a utility representative to continue providing updates to customers regarding current mitigation actions as well as preparation for future incidents.
- [ ] Complete damage assessments.
- [ ] Work with vendors and internal departments to return to normal service.
- [ ] Develop a lessons learned document and an after action report (AAR) to document your response activities, including what went well and what did not go well. Create an improvement plan (IP) based on your AAR and use the IP to update your vulnerability assessment, emergency response plan and cyanotoxin management plan. Share the lessons learned with water systems you sell water to, if applicable.
- [ ] Revise budget and asset management plans to address increased costs from response-related activities and follow-up actions.
- [ ] Work with your state regulatory agency to obtain technical assistance to mitigate the circumstances that led to the HAB incident and to reduce the likelihood of reoccurrence.
- [ ] Identify mitigation and long-term adaptation measures with your community that can help prevent HABs in the future and increase utility resilience when they do occur. For example, consider longer-term source water protection strategies that your community can implement (such as green infrastructure) to decrease nutrients in the source watershed. Review impacts related to HABs when planning for system upgrades (e.g., treatment changes).
- [ ] Conduct annual utility-specific HAB awareness training with all employees.

Notes:

My Contacts and Resources

CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Wholesale system	
	System with same source water	
	System with same source water	
	Local Laboratory	
	State Primacy Agency	
	Local EMA	
	Local Health Department	
	WARN Chair	
	State EMA	

Resources

- Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water (EPA)
- Cyanotoxin Management Plan Template and Example Plans (EPA)
- Cyanobacterial Harmful Algal Blooms (EPA)
  - Cyantobacteria Guidelines and Recommendations (EPA and State information)
  - Prevention and Mitigation - Control and Treatment (EPA)
  - Cyanobacteria State Resources and Laboratories (EPA)
  - Drinking Water Cyanotoxin Risk Communication Toolbox (EPA)
- Harmful Algal Blooms: Information for Public Water Systems (Ohio Environmental Protection Agency)
- Technical Assistance in State and Local Response to Harmful Algal Blooms (Centers for Disease Control and Prevention [CDC])
- Water Treatment Optimization for Cyanotoxins (EPA)
- Drinking Water Health Advisory for the Cyanobacterial Microcystin Toxins (EPA)
- Drinking Water Health Advisory for the Cyanobacterial Toxin Cylindrospermopsin (EPA)
- Water/Wastewater Agency Response Network (EPA)
- Planning for an Emergency Drinking Water Supply (AWWA/EPA)
- A Water Utility Manager's Guide to Cyanotoxins (American Water Works Association [AWWA] and Water Research Foundation [WRF])

Tornado

Incident Action Checklist – Tornado

The actions in this checklist are divided up into three "rip & run" sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from a tornado. For on-the-go convenience, you can also populate the "My Contacts" section with critical information that your utility may need during an incident.

Tornado Impacts on Water and Wastewater Utilities

Tornadoes can occur in any location with little to no notice. Tornadoes can have wind gusts from 65 to over 200 miles per hour (mph) and are often accompanied by floods, high straight-line winds up to 140 mph, hail and lightning. About 1,200 tornadoes occur in the United States each year, and they can have devastating impacts to water and wastewater utilities. Impacts may include, but are not limited to:

- Damage to infrastructure (e.g., storage tanks, hydrants, residential plumbing fixtures, distribution system) due to hail, wind, debris and flash flooding, resulting in loss of service and/or reduced pressure throughout the system
- Restricted access to the facility due to debris and damaged roads
- Loss of power and communication lines
- Potential contamination due to chemical leaks from ruptured containers
- Severe water and pressure loss due to ruptured service lines in damaged buildings and broken fire hydrants from airborne debris

NOAA

The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from a tornado.

Example of Water Sector Impacts and Response to a Tornado

Smithville, Mississippi 2011 Tornado

An EF-5 tornado with estimated winds of 205 mph and a half-mile wide base hit Smithville, Mississippi in April 2011, destroying 150 homes and several businesses and city facilities, including the water system. The utility's elevated storage tank was damaged and several pipes were bent due to a car striking the structure. The tornado also tore out appliances and plumbing fixtures from homes and destroyed at least three fire hydrants.

Both the drinking water and wastewater systems lost power immediately after the tornado hit, and half of the town was without water due to damage to infrastructure and the power outage. Generators were coordinated through the Mississippi Rural Water Association to provide temporary power. The drinking water and wastewater utilities conducted damage assessments and teams were quickly deployed to fix leaks, turn off meters in destroyed homes and restore service throughout the systems.

Source: NRWA's "Rural Water assists tornado-ravaged Mississippi"

My Contacts and Resources

CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Local EMA	
	State EMA	
	State Primacy Agency	
	WARN Chair	
	Power Utility	

Planning

- Incident monitoring:
  - Storm Prediction Center (National Oceanic and Atmospheric Administration [NOAA])
- U.S. Tornado Climatology (NOAA)
- Enhanced F Scale for Tornado Damage (NOAA)
- Severe Weather 101: Tornado Basics (NOAA)
- National Weather Service Weather Alerts (NOAA)
- Planning for an Emergency Drinking Water Supply (EPA)
- All-Hazard Consequence Management Planning for the Water Sector (Water Sector Emergency Response Critical Infrastructure Partnership Advisory Council [CIPAC] Workgroup)
- Vulnerability Self Assessment Tool (VSAT) (EPA)
- Preparing for Extreme Weather Events: Workshop Planner for the Water Sector (EPA)
- Tabletop Exercise Tool for Water Systems: Emergency Preparedness, Response, and Climate Resiliency (EPA)
- How to Develop a Multi-Year Training and Exercise (T&E) Plan (EPA)
- Make a Plan (FEMA)

Coordination

- Water/Wastewater Agency Response Network (WARN) (EPA)
- Community Based Water Resiliency (EPA)

Facility and Service Area

- Emergency Response and Preparedness Florida WARN Best Management Practices for Water and Wastewater Systems (University of Florida Center for Training)
- Water Agencies Respond to Tornadoes (Florida Rural Water Association and Florida WARN)

Documentation and Reporting

- Federal Funding for Utilities In National Disasters (Fed FUNDS) (EPA)

Power, Energy and Fuel

- EPA Region 1 Water/Wastewater System Generator Preparedness Brochure (EPA)

Mitigation

- Climate Resilience Evaluation and Awareness Tool (CREAT) (EPA)
- Adaptation Strategies Guide (EPA)

Actions to Prepare for a Tornado

Planning

- [ ] Review and update your utility's emergency response plan (ERP), and ensure all emergency contacts are current.
- [ ] Conduct briefings, training and exercises to ensure utility staff is aware of all preparedness, response and recovery procedures.
- [ ] Identify priority water customers (e.g., hospitals), obtain their contact information, map their locations and develop a plan to restore those customers first.
- [ ] Develop an emergency drinking water supply plan and establish contacts (potentially through your local emergency management agency [EMA] or mutual aid network) to discuss procedures, which may include bulk water hauling, mobile treatment units or temporary supply lines, as well as storage and distribution.
- [ ] Conduct a hazard vulnerability analysis in which you review historical records to understand the past frequency and intensity of tornado events and how your utility may have been impacted. Consider taking actions to mitigate tornado impacts to the utility, including those provided in the "Actions to Recover from a Tornado: Mitigation" section.
- [ ] Complete pre-disaster activities to help apply for federal disaster funding (e.g., contact state/local officials with connections to funding, set up a system to document damage and costs, take photographs of the facility for comparison to post-damage photographs).

Coordination

- [ ] Join your state's Water/Wastewater Agency Response Network (WARN) or other local mutual aid network.
- [ ] Coordinate with WARN members and other neighboring utilities to discuss:
  - Outlining response activities, roles and responsibilities and mutual aid procedures (e.g., how to request and offer assistance)
  - Conducting joint tabletop or full-scale exercises
  - Obtaining resources and assistance, such as equipment, personnel, technical support or water
  - Establishing interconnections between systems and agreements with necessary approvals to activate this alternate source. Equipment, pumping rates and demand on the water sources need to be considered and addressed in the design and operations
  - Establishing communication protocols and equipment to reduce misunderstandings during the incident
- [ ] Coordinate with other key response partners, such as your local EMA, to discuss:
  - How restoring system operations may have higher priority than establishing an alternative water source
  - Potential points of distribution for the delivery of emergency water supply (e.g., bottled water) to the public, as well as who is responsible for distributing the water
- [ ] Understand how the local and utility emergency operations center (EOC) will be activated and what your utility may be called on to do, as well as how local emergency responders and the local EOC can support your utility during a response. If your utility has assets outside of the county EMA's jurisdiction, consider coordination or preparedness efforts that should be done in those areas.
- [ ] Ensure credentials to allow access will be valid during an incident by checking with local law enforcement.
- [ ] Sign up for mobile and/or email alerts from your local EMA, if available.

Actions to Prepare for a Tornado *(continued)*

Communication with Customers

- [ ] Develop outreach materials to provide your customers with information they will need after a tornado (e.g., clarification about water advisories, instructions for private well and septic system maintenance and information about tornado mitigation).
- [ ] Review public information protocols with local EMA and public health/primacy agencies. These protocols should include developing water advisory messages (e.g., boil water) and distributing them to customers using appropriate mechanisms, such as reverse 911.

Facility and Service Area

- [ ] Inventory and order extra equipment and supplies, as needed:
  - Motors
  - Fuses
  - Chemicals (ensure at least a two week supply)
  - Cellular phones or other wireless communications device
  - Emergency Supplies
    - Tarps/tape/rope
    - Cots/blankets
    - First aid kits
    - Foul weather gear
    - Plywood
    - Flashlights/flares
    - Sandbags (often, sand must be ordered as well)
    - Bottled water
    - Batteries
    - Non-perishable food
- [ ] Ensure communication equipment (e.g., radios, satellite phones) works and is fully charged.
- [ ] Develop a GIS map of all system components and prepare a list of coordinates for each facility.
- [ ] Document pumping requirements and storage capabilities, as well as critical treatment components and parameters.

Personnel

- [ ] Identify essential personnel and ensure they are trained to perform critical duties in an emergency (and possibly without communication), including the shut down and start up of the system.
- [ ] Establish communication procedures with essential and non-essential personnel. Ensure all personnel are familiar with emergency evacuation and shelter in place procedures.
- [ ] Pre-identify emergency operations and clean-up crews. Establish alternative transportation strategies if roads are impassable.
- [ ] Consider how evacuations or limited staffing due to transportation issues (potentially all utility personnel) will impact your response procedures.
- [ ] Identify possible staging areas for mutual aid crews if needed in the response, and the availability of local facilities to house the crews.
- [ ] Encourage personnel, especially those that may be on duty for extended periods of time, to develop family emergency plans.

Actions to Prepare for a Tornado *(continued)*

Power, Energy and Fuel

- [ ] Evaluate condition of electrical panels to accept generators; inspect connections and switches.
- [ ] Document power requirements of the facility; options for doing this may include:
  - Placing a request with the US Army Corps of Engineers 249th Engineer Battalion (Prime Power): http://www.usace.army.mil/249thEngineerBattalion.aspx
  - Using the US Army Corps of Engineers on-line Emergency Power Facility Assessment Tool (EPFAT): http://epfat.swf.usace.army.mil/
- [ ] Confirm and document generator connection type, capacity load and fuel consumption. Test regularly, exercise under load and service backup generators.
- [ ] Fill fuel tanks to full capacity and ensure that you have the ability to manually pump gas in the event of a power outage. Ensure this equipment and other hazardous materials are located in a safe zone.
- [ ] Contact fuel vendors and inform them of estimated fuel volumes needed if utility is impacted. Determine your ability to establish emergency contract provisions with vendors and your ability to transport fuel if re-fueling contractors are not available. Develop a backup fueling plan and a prioritization list of which generators to fuel in case of a fuel shortage.
- [ ] Collaborate with your local power provider and EOC to ensure that your water utility is on the critical facilities list for priority electrical power restoration, generators and emergency fuel.

FEMA

Notes:

Actions to Respond to a Tornado

Coordination

- [ ] Notify your local EMA and state regulatory/primacy agency of system status.
- [ ] If needed, request or offer assistance (e.g., water buffalos, water sampling teams, generators) through mutual aid networks, such as WARN.
- [ ] Assign a representative of the utility to the incident command post or the community's EOC.

Communication with Customers

- [ ] Notify customers of any water advisories and consider collaborating with local media (television, radio, newspaper, etc.) to distribute the message. If emergency water is being supplied, provide information on the distribution locations.

Facility and Service Area

Overall

- [ ] Conduct damage assessments of the utility to prioritize repairs and other actions.
- [ ] Check that back-up equipment and facility systems, such as controls and pumps, are in working order, and ensure that chemical containers and feeders are intact.

Drinking Water Utilities

- [ ] Inspect the utility and service area for damage. Identify facility components (e.g., valve boxes) and fire hydrants that have been buried, are inaccessible or have been destroyed.
- [ ] Ensure pressure is maintained throughout the system and isolate those sections where it is not.
- [ ] Isolate and control leaks in water transmission and distribution piping.
- [ ] Turn off water meters at destroyed homes and buildings.
- [ ] Monitor water quality, develop a sampling plan and adjust treatment as necessary.
- [ ] Notify regulatory/primacy agency if operations and/or water quality or quantity are affected.
- [ ] Utilize pre-established emergency connections or setup temporary connections to nearby communities, as needed. Alternatively, implement plans to draw emergency water from pre-determined tanks or hydrants. Notify employees of the activated sites.

Wastewater Utilities

- [ ] Inspect the utility and service area, including lift stations, for damage, downed trees and power availability. Inspect the sewer system for debris and assess the operational status of the mechanical bar screen. If necessary, run system in manual operation.
- [ ] Notify regulatory/primacy agency of any changes to the operations or required testing parameters.

Notes:

Actions to Respond to a Tornado *(continued)*

Documentation and Reporting

- [ ] Document all damage assessments, mutual aid requests, emergency repair work, equipment used, purchases made, staff hours worked and contractors used during the response to assist in requesting reimbursement and applying for federal disaster funds. When possible, take photographs of damage at each work site (with time and date stamp). Proper documentation is critical to requesting reimbursement.
- [ ] Work with your local EMA on the required paperwork for public assistance requests.

Personnel

- [ ] Account for all personnel and provide emergency care, if needed. Caution personnel about known hazards resulting from tornadoes.
- [ ] Deploy emergency operations and clean-up crews (e.g., securing heavy equipment). Identify key access points and roads for employees to enter the utility and critical infrastructure; coordinate the need for debris clearance with local emergency management or prioritize it for employee operations.
- [ ] Ensure personnel are aware of potential hazards and delays while traveling within the affected service area (i.e., flat tires caused by debris, navigation issues caused by uprooted/missing street signs).

Power, Energy and Fuel

- [ ] Use backup generators, as needed, to supply power to system components.
- [ ] Monitor and plan for additional fuel needs in advance; coordinate fuel deliveries to the generators.
- [ ] Maintain contact with electric provider for power outage duration estimates.

Notes:

Actions to Recover from a Tornado

Coordination

- [ ] Continue work with response partners to obtain funding, equipment, etc.

Communication with Customers

- [ ] Assign a utility representative to continue to communicate with customers concerning a timeline for recovery and other pertinent information.

Facility and Service Area

- [ ] Complete damage assessments.
- [ ] Complete permanent repairs, replace depleted supplies and return to normal service.

FEMA

Documentation and Reporting

- [ ] Compile damage assessment forms and cost documentation into a single report to facilitate the sharing of information and the completion of state and federal funding applications. Visit EPA's web-based tool, Federal Funding for Utilities—Water/Wastewater—in National Disasters (Fed FUNDS), for tailored information and application forms for various federal disaster funding programs: http://water.epa.gov/infrastructure/watersecurity/funding/fedfunds/
- [ ] Develop a lessons learned document and/or an after action report to keep a record of your response activities. Update your vulnerability assessment, ERP and contingency plans.
- [ ] Revise budget and asset management plans to address increased costs from response-related activities.

Mitigation

- [ ] Identify mitigation and long-term adaptation measures that can prevent damage and increase utility resilience. Consider impacts related to the increased frequency and intensity of tornadoes when planning for system upgrades (e.g., ensure adequate backup power supply for key assets, pursue interconnections with neighboring utilities).

Notes:

Wildfire

Incident Action Checklist – Wildfire

The actions in this checklist are divided up into three "rip & run" sections and are examples of activities that water and wastewater utilities can take to: prepare for, respond to and recover from wildfires. For on-the-go convenience, you can also populate the "My Contacts" section with critical information that your utility may need during an incident.

Wildfire Impacts on Water and Wastewater Utilities

A wildfire is any instance of uncontrolled burning in grasslands, brush or woodlands. Wildfires can be caused by lightning, human carelessness or arson. Wildfires often begin unnoticed spread quickly and present a direct risk to property and infrastructure, in addition to potential degradation of the water supply. In some cases, source water quality issues can persist for 5-10 years following a wildfire. Areas that have experienced a wildfire are also at an increased risk of flash flooding and mudslides because the ground where vegetation has burned away cannot effectively absorb rainwater. Often, post-fire impacts (including those impacts resulting from flash floods) are more detrimental to drinking water and wastewater systems than the fire itself. Specific impacts to drinking water and wastewater utilities may include, but are not limited to:

- Infrastructure damage to the facility or distribution system due to proximity to the fire or firefighting activities
- Loss of water quantity due to increased withdrawals for firefighting activities
- Source water quality changes due to increased nutrients and other pollutants, which can result in higher turbidity, algal blooms, potential odor and taste issues, and subsequent higher treatment costs
- Increased sediment in reservoirs as a result of runoff and flash floods from burned areas, which can affect water quality, and reduced reservoir capacity and effective service lifespan
- Increased sediment and debris in stormwater runoff following flash floods, impacting water quality and treatment processes
- Decreased water supply downstream, as loss of forest canopy can lead to increased evaporation and reduction in the amount of water stored in snowpack

The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from wildfires.

Examples of Water Sector Impacts and Response to a Wildfire

Denver Water responds to impacts from wildfire and flooding

On May 18, 1996, the 11,900-acre Buffalo Creek fire occurred on a tributary to the upper South Platte River, the main source of Denver, Colorado's water supply. While Buffalo Creek itself contributes a very small share of Denver's water supply, it is located directly upstream of the Strontia Springs Reservoir, the intake point for the Foothills Treatment Plant – a facility that handles approximately 80% of Denver's water.

Two months after the Buffalo Creek fire, heavy thunderstorms occurred directly over the burned area, causing a flash flood that washed more sediment into the reservoir than had accumulated over the previous 13 years, resulting in an estimated loss of 30 years of the reservoir's planned 50-year life.

The emergency cleanup costs totaled nearly $1 million. Chronic cleanup costs due to increased turbidity totaled $250,000 in water treatment costs per year, and dredging was estimated to cost $15 to $20 million over 10 years.

To mitigate future damage, the utility installed sensors upstream of the reservoir to monitor the amount of debris and sediment coming down the river, allowing the utility to shut down its treatment plant before flash floods could cause damage. Denver Water and the US Forest Service Rocky Mountain Region are also investing $33 million over a 5-year period for mechanical thinning, fuel reduction, creating fire breaks, erosion control, decommissioning roads and reforestation.

Source: EPA "Adaptation Strategies Guide for Water Utilities, 2012"

My Contacts and Resources

CONTACT NAME	UTILITY/ORGANIZATION NAME	PHONE NUMBER
	Local EMA	
	State EMA	
	State Primacy Agency	
	WARN Chair	
	Power Utility	

Planning

- Fire mapping and outlooks:
  - Active Fire Mapping Program (U.S. Forest Service [USFS])
  - National Significant Wildland Fire Potential Outlooks (National Interagency Coordination Center [NICC])
  - NOAA National Weather Service – Fire Weather (National Oceanic and Atmospheric Administration [NOAA])
  - Fire Weather Outlooks and Forecasting Tools (National Weather Service [NWS])
  - Incident Information System (InciWeb)
  - Geospatial Multi-Agency Coordination (GeoMAC) Group Wildland Fire Support application (U.S. Geological Survey [USGS])
  - Fire Forecast (National Public Radio)
  - Wildfire Assessment System (USFS)
- National Interagency Fire Center (NIFC)
- NIFC Burned Area Emergency Response (BAER)
- Firewise Communities (National Fire Protection Association [NFPA])
- Ready.gov Wildfire Preparedness (Federal Emergency Management Agency [FEMA])
- Fire Management Planning for Public Water Systems (CoWARN)
- Best Management Practices for Fire Preparedness and Response (Florida Rural Water Association [FRWA])
- U.S. Drought Portal (National Integrated Drought Information System [NIDIS])
- Wildfire Impacts on Water Quality (Southwest Hydrology)
- All-Hazard Consequence Management Planning for the Water Sector (Water Sector Emergency Response Critical Infrastructure Partnership Advisory Council (CIPAC) Workgroup)
- Preparing for Extreme Weather Events: Workshop Planner for the Water Sector (EPA)
- Tabletop Exercise Tool for Water Systems: Emergency Preparedness, Response, and Climate Resiliency (EPA)

Coordination

- Water/Wastewater Agency Response Network (WARN) (EPA)
- Community Based Water Resiliency (EPA)

Facility and Service Area

- Defensible Space Guidance (CAL FIRE)
- Private Wells after the Fire: A private well owner's guide to protecting your drinking water source (Arizona Department of Environmental Quality [ADEQ])
- Firewise Landscaping and Plant Lists (NFPA)
- Firewise Guide to Landscape and Construction (NFPA)
- Post-Fire Rehabilitation Techniques (Colorado State University)
- Recovery Assistance for Water Utilities Dealing with the Effects of Wildfire (CoWARN)
- Water Quality Concerns Fact Sheet (ADEQ)
- Municipal Water Supply Systems and Evaluation Methods for Fire Protection (FEMA)

Power, Energy and Fuel

- EPA Region 1 Water/Wastewater System Generator Preparedness Brochure (EPA)

Documentation and Reporting

- Federal Funding for Utilities in National Disasters (Fed FUNDS) (EPA)

Mitigation

- Burned Area Emergency Response (BAER) Treatment Catalog (USFS)
- Plants for Wildfire Protection and Restoration (USDA)
- Land Rehabilitation FAQ: Lower North Fork Fire (Jefferson Conservation District)
- Climate Resilience Evaluation and Awareness Tool (CREAT)
- Adaptation Strategies Guide (EPA)

Actions to Prepare for a Wildfire

Planning

- [ ] Actively monitor fire and weather conditions and be aware of regional wildfires.
- [ ] Review and update your utility's emergency response plan (ERP), and ensure all emergency contacts are current.
- [ ] Conduct briefings, training and exercises to ensure utility staff is aware of all preparedness, response and recovery procedures.
- [ ] Identify priority water customers (e.g., hospitals), obtain their contact information, map their locations and develop a plan to restore those customers first, in case of water service disruptions.
- [ ] Develop an emergency drinking water supply plan and establish response partner contacts (potentially through your local emergency management agency [EMA] or mutual aid network) to discuss procedures, which may include bulk water hauling, mobile treatment units or temporary supply lines, as well as storage and distribution.
- [ ] Review and update fire management plans, including contingency plans for system operation if critical facilities are impacted by wildfire and access is limited or not possible.
- [ ] Conduct a hazard vulnerability analysis in which you review historical records to understand the past frequency and intensity of wildfires and how your utility may have been impacted. Consider taking actions to mitigate wildfire impacts to the utility, including those provided in the "Actions to Recover from a Wildfire: Mitigation" section.
- [ ] Complete pre-disaster activities to help apply for federal disaster funding (e.g., contact state/local officials with connections to funding, set up a system to document damage and costs, take photographs of the facility for comparison to post-damage photographs).
- [ ] Ensure proper safety gear is available for field employees.

Coordination

- [ ] Join your state's Water/Wastewater Agency Response Network (WARN) or other local mutual aid network.
- [ ] Coordinate with WARN members and other neighboring utilities to discuss:
  - Outlining response activities, roles and responsibilities and mutual aid procedures (e.g., how to request and offer assistance)
  - Conducting joint tabletop or full-scale exercises
  - Obtaining resources and assistance, such as equipment, personnel, technical support or water
  - Establishing interconnections between systems and agreements with necessary approvals to activate this alternate source. Equipment, pumping rates and demand on the water sources need to be considered and addressed in the design and operations
  - Establishing communication protocols and equipment to reduce misunderstandings during the incident
- [ ] Coordinate with other key response partners, such as your local EMA, to discuss:
  - How restoring system operations may have higher priority than establishing an alternative water source
  - Potential points of distribution for the delivery of emergency water supply (e.g., bottled water) to the public, as well as who is responsible for distributing the water
- [ ] Understand how the local and utility emergency operations center (EOC) will be activated and what your utility may be called on to do, as well as how local emergency responders and the local EOC can support your utility during a response. If your utility has assets outside of the county EMA's jurisdiction, consider coordination or preparedness efforts that should be done in those areas.

Actions to Prepare for a Wildfire *(continued)*

- [ ] Meet with the fire agency with authority in your utility's area. This could include a local fire department, state conservation and forestry offices, and/or the US Forest Service. Review plans, discuss response activities (e.g., fire suppression chemical use) and identify hazards and vulnerabilities at your utility.

- [ ] Ensure credentials to allow access will be valid during an incident by checking with local law enforcement.

- [ ] Sign up for mobile and/or email alerts from your local EMA, if available.

Communication with Customers

- [ ] Develop outreach materials to provide your customers with information they will need during a wildfire (e.g., clarification about water advisories, instructions for private well and septic system maintenance, and information about fire prevention and mitigation).

- [ ] Review public information protocols with local EMA and public health/primacy agencies. These protocols should include developing water advisory messages (e.g., boil water) and distributing them to customers using appropriate mechanisms, such as reverse 911.

Facility and Service Area

- [ ] Inventory and order extra equipment and supplies, as needed:
  - Motors
  - Fuses
  - Chemicals (ensure at least a two week supply)
  - Cellular phones or other wireless communications device
  - Emergency Supplies
    - Tarps/tape/rope
    - Cots/blankets
    - First aid kits
    - Foul weather gear
    - Plywood
    - Flashlights/flares
    - Sandbags (often, sand must be ordered as well)
    - Bottled water
    - Batteries
    - Non-perishable food

- [ ] Ensure communication equipment (e.g., radios, satellite phones) works and is fully charged.

- [ ] Develop a GIS map of all system components and prepare a list of coordinates for each facility.

- [ ] Practice mechanical thinning, weed control, selective harvesting, controlled burns and creation of fire breaks on utility managed property, and encourage these practices on property that may directly impact the utility, its water supply and/or water quality.

Notes:

Actions to Prepare for a Wildfire *(continued)*

- [ ] Address and, if possible, remove vegetation from around facilities located in medium to high fire danger zones. Consider replacing flammable vegetation with fire-resistant landscaping.
- [ ] Create a zone of defensible space of approximately 50-100 feet for utility equipment and facilities (e.g., wellheads, structures, supports to wires and transformers). Consult with your local fire department for specific recommendations or requirements.
- [ ] Install manual or automatic irrigation systems to provide wetting of components and groundcover for vulnerable areas (e.g., chlorine storage, control equipment buildings).
- [ ] Assess the possibility of and procedures for using reclaimed water for fire suppression (prepare public notice and talking points).
- [ ] Document pumping requirements and storage capabilities, as well as critical treatment components and parameters.
- [ ] Back-up essential records and data, and store in a fireproof safe or offsite facility.

Personnel

- [ ] Identify essential personnel and ensure they are trained to perform critical duties in an emergency (and possibly without communication), including the shut down and start up of the system.
- [ ] Establish communication procedures with essential and non-essential personnel. Ensure all personnel are familiar with emergency evacuation and shelter in place procedures.
- [ ] Pre-identify emergency operations and clean-up crews. Establish alternative transportation strategies if roads are impassable.
- [ ] Consider how evacuations or limited staffing due to transportation issues (potentially all utility personnel) will impact your response procedures.
- [ ] Identify possible staging areas for mutual aid crews if needed in the response, and the availability of local facilities to house the crews.
- [ ] Encourage personnel, especially those that may be on duty for extended periods of time, to develop family emergency plans.

Power, Energy and Fuel

- [ ] Evaluate condition of electrical panels to accept generators; inspect connections and switches.
- [ ] Document power requirements of the facility; options for doing this may include:
  - Placing a request with the US Army Corps of Engineers 249th Engineer Battalion (Prime Power): http://www.usace.army.mil/249thEngineerBattalion.aspx
  - Using the US Army Corps of Engineers on-line Emergency Power Facility Assessment Tool (EPFAT): http://epfat.swf.usace.army.mil/
- [ ] Confirm and document generator connection type, capacity load and fuel consumption. Test regularly, exercise under load and service backup generators.
- [ ] Fill fuel tanks to full capacity and ensure that you have the ability to manually pump gas in the event of a power outage. Ensure this equipment and other hazardous materials are located in a safe zone.
- [ ] Contact fuel vendors and inform them of estimated fuel volumes needed if utility is impacted. Determine your ability to establish emergency contract provisions with vendors and your ability to transport fuel if re-fueling contractors are not available. Develop a backup fueling plan and a prioritization list of which generators to fuel in case of a fuel shortage.
- [ ] Collaborate with your local power provider and EOC to ensure that your water utility is on the critical facilities list for priority electrical power restoration, generators and emergency fuel.

Actions to Respond to a Wildfire

Planning

- [ ] Identify possible alternate water supplies and operational changes to assist in mitigating demand and water quality concerns.

Coordination

- [ ] Once the wildfire is about 40% contained, reach out to your local EMA, the incident's Public Information Officer (PIO) and the Burned Area Emergency Response (BAER) team to maintain awareness of the situation and, if possible, to lend assistance as resource advisors or observers.
- [ ] Notify your local EMA and state regulatory/primacy agency of system status.
- [ ] If needed, request or offer assistance (e.g., equipment, personnel) through mutual aid networks, such as WARN.
- [ ] Assign a representative of the utility to the incident command post or the community's EOC.

Communication with Customers

- [ ] Notify customers of any water advisories and consider collaborating with local media (television, radio, newspaper, etc.) to distribute the message. If emergency water is being supplied, provide information on the distribution locations.

Facility and Service Area

Overall

- [ ] Conduct damage assessments of the utility to prioritize repairs and other actions.
- [ ] Check that back-up equipment and facility systems, such as controls and pumps, are in working order, and ensure that chemical containers and feeders are intact.

Drinking Water Utilities

- [ ] If possible, refill storage tanks each day to ensure maximum storage for demand, including fire suppression.
- [ ] Work with the local EMA to identify passable access roads and to ensure that utility facilities in forest areas are clearly identified.
- [ ] Keep intakes and access hatches clear of debris.
- [ ] Monitor raw water quality, develop a sampling plan and adjust treatment as necessary.
- [ ] Notify regulatory/primacy agency if operations and/or water quality or quantity are affected.
- [ ] Utilize pre-established emergency connections or setup temporary connections to nearby communities, as needed. Alternatively, implement plans to draw emergency water from pre-determined tanks or hydrants. Notify employees of the activated sites.

Notes:

Actions to Respond to a Wildfire *(continued)*

- [ ] Prepare and deploy equipment as needed to support firefighting operations, such as tanker trucks and related pumping equipment, as well as bulldozers for the construction of firebreaks.
- [ ] Conduct sediment removal activities, such as installing permanent or temporary debris basins.

Wastewater Utilities

- [ ] Inspect the utility and service area, including lift stations, for damage and power availability. Inspect the sewer system for debris and assess the operational status of the mechanical bar screen. If necessary, run system in manual operation.
- [ ] Notify regulatory/primacy agency of any changes to the operations or required testing parameters.

Documentation and Reporting

- [ ] Document all damage assessments, mutual aid requests, emergency repair work, equipment used, purchases made, staff hours worked and contractors used during the response to assist in requesting reimbursement and applying for federal disaster funds. When possible, take photographs (with time and date stamp). Proper documentation is critical to requesting reimbursement.
- [ ] Work with your local EMA on the required paperwork for public assistance requests.

Personnel

- [ ] Account for all personnel and provide emergency care, if needed. If personnel are in the field, communicate with the National Weather Service (NWS) on local wind conditions in the fire area so staff are aware of how quickly winds are shifting and if evacuation from facilities is required.
- [ ] Deploy emergency operations and clean-up crews. Identify key access points and roads for employees to enter the utility and critical infrastructure; coordinate the need for debris clearing with local emergency management or prioritize it for employee operations.

Power, Energy and Fuel

- [ ] Use backup generators, as needed, to supply power to system components.
- [ ] Monitor and plan for additional fuel needs in advance; coordinate fuel deliveries to generators.
- [ ] Maintain contact with electric provider for power outage duration estimates.

EPA

Notes:

Actions to Recover from a Wildfire

Coordination

- [ ] Continue work with response partners to obtain funding, equipment, etc.
- [ ] Coordinate with land owners and other partners to restore and treat burned areas.

Communication with Customers

- [ ] Assign a utility representative to continue to communicate with customers concerning a timeline for recovery and other pertinent information.

Facility and Service Area

- [ ] Complete damage assessments.
- [ ] Complete permanent repairs, replace depleted supplies and return to service.

Documentation and Reporting

- [ ] Compile damage assessment forms and cost documentation into a single report to facilitate the sharing of information and the completion of state and federal funding applications. Visit EPA's web-based tool, Federal Funding for Utilities—Water/Wastewater—in National Disasters (Fed FUNDS), for tailored information and application forms for various federal disaster funding programs: http://water.epa.gov/infrastructure/watersecurity/funding/fedfunds/
- [ ] Develop a lessons learned document and/or an after action report (AAR) to keep a record of your response activities. Update your vulnerability assessment, ERP, fire models and fire management plans.
- [ ] Revise budget and asset management plans to address increased costs from response-related activities.

Mitigation

- [ ] Identify mitigation and long-term adaptation measures that can prevent damage and increase utility resilience. Consider impacts related to future climate conditions and the increased frequency of wildfires when planning for system upgrades (e.g., installing buffer strips, removing hazardous fuels).
- [ ] Consider implementing the following mitigation measures to prepare for possible flash flooding events following a wildfire:
  - Monitor the watershed, as conditions may be different post-fire. Identify potential failure points within your service area: ensure culverts can handle increased flow, and determine runoff points and areas where water will now collect
  - Install a rain gauge upstream of intake for early warning of heavy precipitation that could lead to high turbidity water and sensors to monitor the amount of debris and sediment coming downstream
  - Consider instituting erosion control measures to protect against runoff and sediment concerns that occur during suppression and precipitation

Notes: