



Water and Wastewater Systems Sector-Specific Plan

2015



Homeland
Security



United States
Environmental
Protection Agency

Sector Specific Plan Letter of Endorsement

The 2015 Water and Wastewater Sector-Specific Plan addresses risk-based critical infrastructure protection strategies for drinking water and wastewater utilities, regulatory primacy agencies, and an array of technical assistance partners. The Sector-Specific Plan describes processes and activities to enhance the security and resilience of the Sector's infrastructure.

The Sector-Specific Plan represents the blueprint to be used for enacting the priorities and goals outlined within the "*Roadmap to a Secure and Resilient Water Sector*" and the *2013 National Infrastructure Protection Plan*. This Sector-Specific Plan provides an overarching framework for integrating Water and Wastewater Sector critical infrastructure security and resilience efforts into a unified program.

This letter serves as official endorsement of the 2015 Water and Wastewater Sector-Specific Plan. Through direct collaboration, the Water Sector Coordinating Council and the Water Sector Government Coordinating Council were able to develop a plan to guide and integrate efforts intended to secure and strengthen the resilience of the Sector's infrastructure.

Sincerely,



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2015 Water and Wastewater Sector-Specific Plan

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1. Executive Summary

Drinking water and wastewater treatment are essential to modern life and the Nation's economy. Therefore, it is critical that we enhance the security and resilience of the Nation's drinking water and wastewater infrastructures, collectively known as the *Water and Wastewater Sector* (Sector). The purpose of this 2015 Water and Wastewater Sector-Specific Plan (Water SSP) is to guide and integrate the efforts intended to secure and strengthen the resilience of the Sector's infrastructure. This Water SSP tailors the strategic guidance provided in the *National Infrastructure Protection Plan* (NIPP) 2013 to the unique operating conditions and risk landscape of the Sector.

The Water SSP describes the complexity of the Sector:

- The entities that compose the drinking water and wastewater infrastructures
- The matrix of policy authority pertaining the Sector
- The components in the value chains of the drinking water and wastewater infrastructures
- The partnership mechanisms that represent the myriad stakeholder segments within the Sector
- The federal, state, and local government entities that interact with those partnership mechanisms and their respective roles in contributing to the security and resilience of the Sector
- The risk scenarios that could drive Sector security and resilience activities over the next 5 years

The Water SSP also describes how the Sector, through its voluntary partnership mechanisms, has developed a strategy – the Vision, Mission, Goals, Objectives, and Milestones – to manage the complexity within the Sector in a way that moves it toward realizing its security and resilience goals. This strategic development process is aligned with and relies heavily on the 2013 *Roadmap to a Secure and Resilient Water and Wastewater Sector* (Roadmap). The Roadmap creates a framework that prioritizes the holistic set of activities necessary for the Sector to realize its Vision. The Water SSP describes these priorities and activities. Additional details can be found in Appendix 7.

Finally, the Water SSP describes how the Sector measures the performance of its activities so that progress can be measured and continuously improved. The Water SSP is designed to be a “living document” that not only establishes the strategic framework for achieving the Sector's security and resilience ends, but also encourages tactical flexibility with respect to the means.

2. Introduction

Safe drinking water is a prerequisite for protecting public health and all human activity, and properly treated wastewater is vital for preventing disease and protecting the environment. Ensuring continuity of drinking water and wastewater treatment and service is essential to modern life and the Nation's economy. Therefore, it is critical that we enhance the security and resilience of the Nation's drinking water and wastewater infrastructures—collectively known as the *Water and Wastewater Sector* (Sector). In partnership, public and private drinking water and wastewater utilities; national and state associations; state, local, tribal, and territorial governments; research foundations; and federal agencies have been ensuring the protection and resilience of water services for decades. Water and Wastewater Sector partners collaborate to be better prepared to prevent, detect, respond to, and recover from physical and cyber terrorist attacks, other intentional acts, and natural disasters; otherwise known as the “all-hazards” approach. Throughout the *Water and Wastewater Sector-Specific Plan* (Water SSP), the terms prevention, detection, response, and recovery are used interchangeably with security and resilience activity terminology.

Presidential Policy Directive 21 (PPD-21) identifies 16 critical infrastructure sectors and assigns protection responsibilities to selected federal government agencies and departments or Sector-Specific Agencies (SSA). The U.S. Environmental Protection Agency (EPA or Agency) is the designated SSA for the Water and Wastewater Sector. This designation recognizes many of the ongoing programs in the Agency that support increasing resilience in the Sector, as well as the protection of water quality and drinking water and wastewater infrastructure in an all-hazards context.

The Department of Homeland Security (DHS) developed a framework to protect all critical infrastructure sectors, which is documented in the *National Infrastructure Protection Plan 2013* (NIPP), and is shown in Figure 1. This framework provides the unifying structure for integrating current and future critical infrastructure security and resilience efforts into a single national program to achieve the goal of a safer, more secure Nation. DHS is exercising the NIPP Risk Management Framework at the national cross-sector level, and each sector is applying the framework to its unique circumstances.

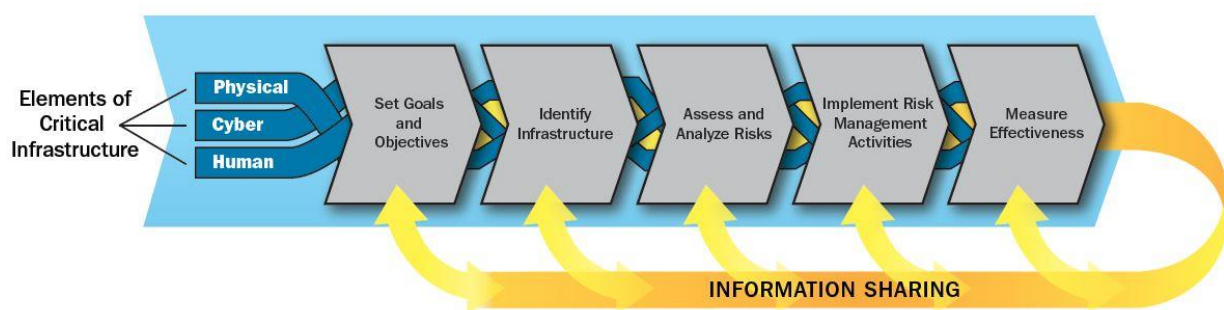


Figure 1: NIPP Risk Management Framework

The Water and Wastewater Sector uses the partnership model, specified in the NIPP, to bring private and public sector participants into the planning and implementation of sector protection. EPA organized a Government Coordinating Council (GCC), including Federal, State, and local entities, and owners and operators of water utilities organized the Water and Wastewater Sector Coordinating Council (SCC). EPA and these Councils work together and are responsible for planning and implementing the Sector's security and resilience activities.

Call to action #2 of the NIPP calls for each sector to update its SSP to address broad-based critical infrastructure security and resilience implementation strategies for utilities, their regulatory primacy agencies, and the array of technical assistance partners. The purpose of this 2015 Water and Wastewater SSP is to guide and integrate the Sector's efforts to secure and strengthen the resilience of critical infrastructure and describe how the Water and Wastewater Sector contributes to national critical infrastructure security and resilience, as set forth in PPD-21. This SSP tailors the strategic guidance provided in the NIPP to the unique operating conditions and risk landscape of the Water and Wastewater Sector.

This SSP represents a collaborative effort among the members of the Water and Wastewater Sector to work toward achieving shared goals and priorities to reduce critical infrastructure risk. It also reflects the maturation of the Water and Wastewater Sector partnership and the progress made by the Sector since the 2010 SSP to address the evolving risk, operating, and policy environments.

3. Sector Overview

Water and Wastewater Sector utility owners and operators have always had to respond to natural disasters. As a result, emergency response planning is inherent to the industry to ensure continuity of operations and to sustain public health and environmental protection.

The Water and Wastewater Sector is a complex sector composed of drinking water and wastewater infrastructure of varying sizes and ownership types. Multiple governing authorities pertaining to the Water and Wastewater Sector provide for public health, environmental protection, and security measures, among others. The sector has its own unique risks including threats, vulnerabilities, and consequences that drive Sector security and resilience activities. Water and Wastewater Sector partners along with EPA, state agencies, and other federal agencies share in the mission to protect public health, the environment, and security and resilience activities.

3.1 Sector Profile

3.1.1 Drinking Water

Safe drinking water is central to the life of an individual and of society; a drinking water contamination incident or the denial of drinking water services would have far-reaching public health, economic, environmental, and psychological impacts across the Nation. Other critical services such as fire protection, healthcare, and heating and cooling processes would also be disrupted by the interruption or cessation of drinking water service, resulting in significant consequences to the national or regional economies.

The federal and state governments have long been active in addressing these risks and threats through regulations, technical assistance, research, and outreach programs. As a result, an extensive system of regulations governing maximum contaminants levels of 90 contaminants, construction and operating standards (principally implemented by state regulatory agencies), monitoring, emergency response planning, training, research, and education have been developed to better secure the Nation's drinking water supply and receiving waters.

There are approximately 153,000 Public Water Systems (PWSs) in the United States. These water systems are categorized according to the number of people they serve, source of water, and whether the same customers are served year-round or on an occasional basis. PWSs provide water for human consumption through pipes or other constructed conveyances to at least 15 service connections, or serve an average of at least 25 people for at least 60 days a year.

Public water systems are defined in three ways: (1) Community Water System (CWS)—a PWS that serves people year-round in their residences; (2) Non-Transient Non-Community Water System (NTNCWS)—a PWS that is not a community water system but still regularly serves at least 25 of the same people more than six (6) months of the year (e.g., schools, factories, office buildings, and hospitals that have their own water systems); and (3) Transient Non-Community Water System (TNCWS)—a PWS that serves transient consumers. Transient consumers represent individuals who have the opportunity to consume water from a water system but who do not fit the definition of a residential or regular consumer, examples include gas stations or campgrounds where people do not remain for long periods of time. There are more than 51,000 CWSs, more than 18,000 NTNCWSs, and approximately 84,000 TNCWSs in the United States.

Figure 2: Number of Community Water Systems and System Size

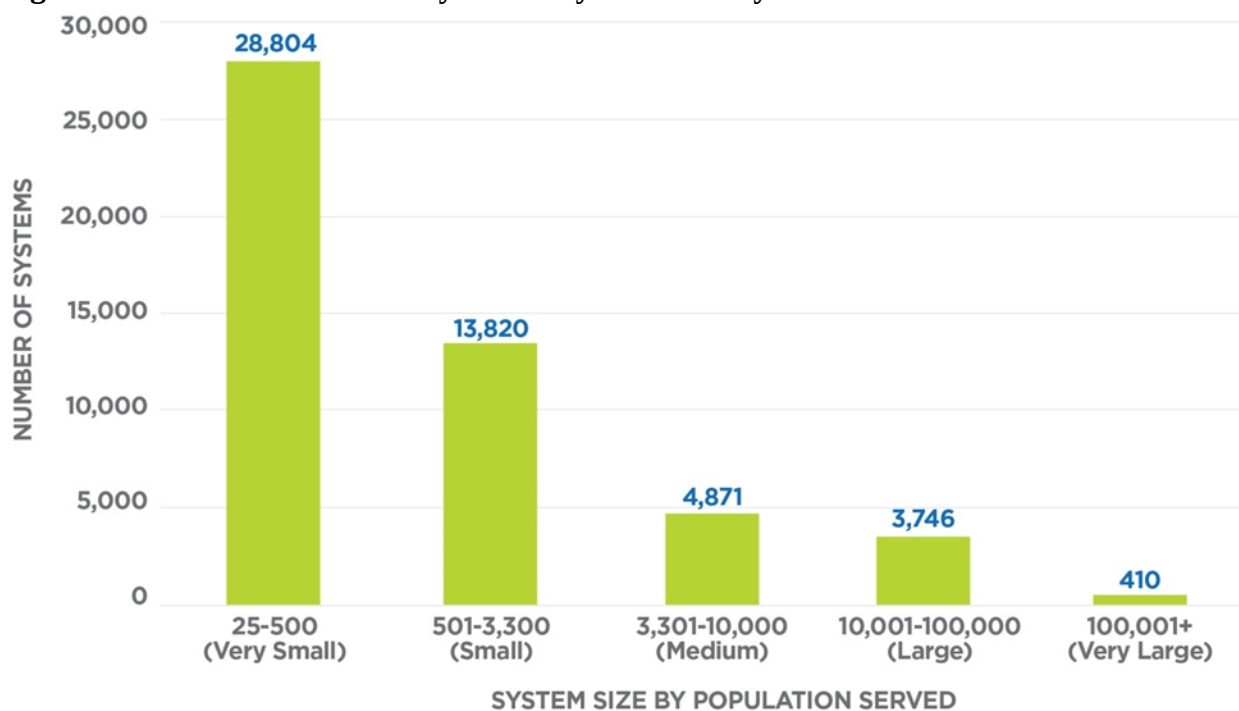


Figure 2 illustrates that 83 percent of CWS are small or very small systems serving eight (8) percent of the population who get their water from a CWS and 17 percent of CWS are very large, large, or medium systems, serving 92 percent of the population who get water from a CWS.

Under the Safe Drinking Water Act (SDWA), states can request primacy for their drinking water programs. Primacy gives a state the authority to oversee the program within its borders. Of the fifty states, the Commonwealth of Puerto Rico, and the Navajo nation have primacy. State agencies that administer drinking water programs are known as primacy agencies. EPA regional offices administer the drinking water program in other entities that do not have primacy including other sovereign tribal nations, Wyoming, the District of Columbia, the Virgin Islands, Guam, American Samoa, and the Commonwealth of Mariana Islands.

Drinking water systems contain many components that are divided into physical, cyber, and human elements, as listed below. Note that resilience to disasters, service interruptions, or other adverse events are often incorporated into these elements to ensure reliable and sustainable supplies and services to customers.

Physical Elements

- **Water source.** This may be ground water, surface water, or a combination of the two. The vast majority of CWSs serving fewer than 10,000 people use ground water as their source. Large CWSs obtain most of their water from surface sources.
- **Conveyance.** To bring water from a remote source to the treatment plant, CWSs may use pipes or open canals; the water may be pumped or gravity-fed.
- **Raw water storage.** Reservoirs or lakes hold water from the source before it is treated; these reservoirs may be in remote or urban areas.
- **Treatment.** A variety of physical and chemical treatments are applied, depending on the contaminants detected in the raw water.
- **Finished water storage.** Treated water is stored before being distributed to customers. In a limited number of cases, treated water is stored in large, uncovered reservoirs that may be vulnerable to attack and contamination.
- **Distribution system.** This network of pipes, tanks, pumps, and valves conveys water to customers. The flow is adjusted so that the proper volume and pressure is delivered when and where needed.
- **Monitoring system.** Most monitoring is conducted for conventional regulated and unregulated contaminants. Some utilities have sensors installed at critical points to monitor a range of physical properties, such as water pressure and water quality.

Cyber Elements

- **Supervisory Control and Data Acquisition (SCADA) system.** Some utilities have electronic networks, often including wireless communication. These networks can link monitoring and control systems for the treatment and distribution to a central display in the operations/control room. These systems may also help to automate a drinking water utility with monitoring-system readouts serving as inputs for control. SCADA systems are part of integrated control systems essential to operation of drinking water utilities.
- **Process systems and operational controls.** These include any electronic control systems related to the operations of the utility and treatment processes that are not controlled by the utility's SCADA system.

- **Enterprise systems.** These are non-operational control systems such as customer billing, email, and other personnel-related applications and tools.

Individual drinking water utilities will differ in the types of components used; some utilities may not have all the components listed above (e.g., small utilities may not have SCADA systems).

Human Elements

- **Employees and contractors.** Drinking water utilities rely on part-time, full-time, and contract employees to manage and operate their facilities. In larger utilities, this may include chemists, engineers, microbiologists, public relations staff, security personnel, and other specialists who are highly trained in their roles individually and as a team. Operators must be appropriately trained and available, typically based on the type, size, and complexity of a utility. Utilities also rely on outside contractors to provide engineering services, laboratory analyses, chemical deliveries, security services, and for some smaller utilities, as operators in responsible charge. Professional positions such as microbiologist or public information officers are less likely to be found at small utilities.

3.1.2 Wastewater

Disruption of a wastewater treatment utility or service can cause loss of life, economic impacts, and severe public health and environmental impacts. If wastewater infrastructure were to be damaged, the lack of redundancy in the Sector might cause denial of service. Regulations, research, and outreach, while extensive, have been aimed mostly at impacts to the environment and public health.

Wastewater is predominantly treated by publicly owned treatment works (POTWs), although there is a small number of private facilities such as industrial plants. The POTWs and privately owned wastewater treatment works that discharge treated effluent into the waters of the United States are subject to regulation under the Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) program. The administering NPDES body is referred to as the permitting authority (e.g., a state agency or EPA). The permitting authority designates uses for all water bodies (e.g., fishing, swimming, and drinking) and then adopts water quality criteria that protect those uses. The permitting authority uses those criteria to set water quality standards for specific bodies of water; it then issues direct discharge permits that limit the concentrations of pollutants in the effluent based on the water quality criteria appropriate to the receiving water body.

There are more than 16,500 POTWs in the United States that collectively provide wastewater service and treatment to more than 227 million people and are generally designed to treat domestic sewage. However, POTWs also receive wastewater from industrial (non-domestic) users; these industrial users discharge effluent into a collection system for subsequent treatment at a POTW and are subject to the national pretreatment program. Many states are authorized to administer this program, which ensures that effluent is compatible with the utility's treatment capabilities or, if not, that the effluent is pretreated before being discharged to the collection system. Major and minor dischargers are defined according to a formula that considers the type of industry, flow rate, types of pollutants, and other factors.

Figure 3: Number of Publicly Owned Treatment Works and System Size

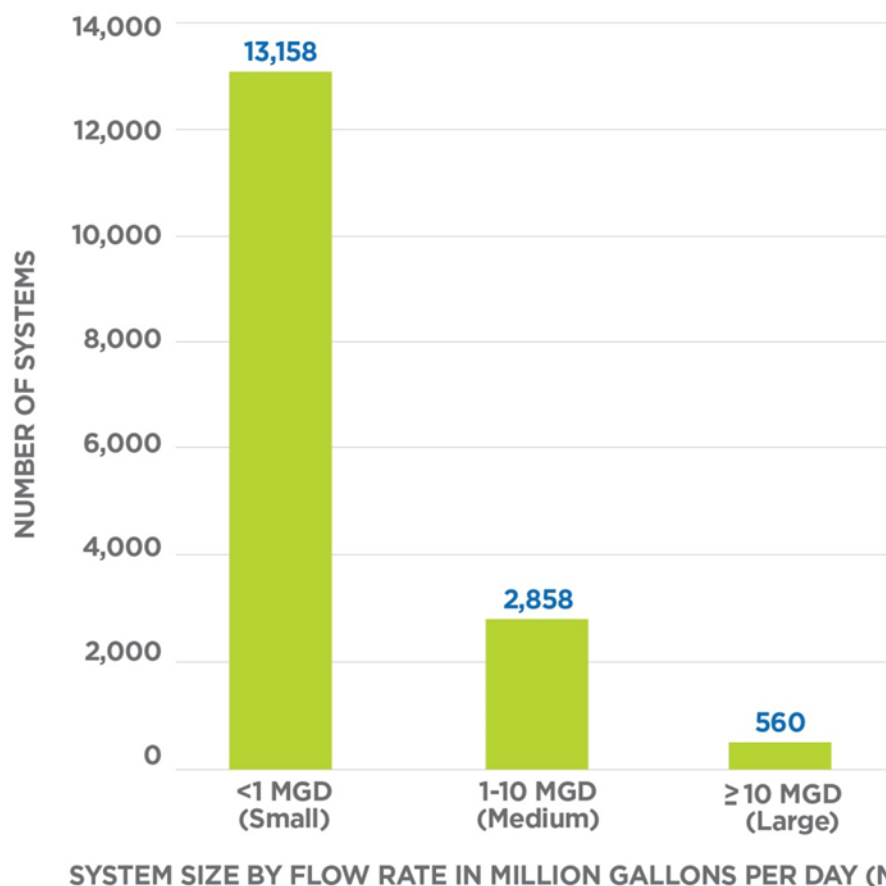


Figure 3 illustrates that 79 percent of utilities treat less than one (1) million gallons per day (MGD) and provide wastewater treatment to less than 23 million people or approximately 10 percent of the population served by POTWs. Utilities that treat more than one MGD provide wastewater treatment to the other 90 percent of the population served or approximately 205 million people.

As with drinking water, there are relatively few very large wastewater utilities as compared to the number of smaller utilities. There are 382 POTWs that service more than 100,000 people; 2,288 POTWs service between 10,001 and 100,000 people; 2,598 POTWs that service populations between 10,000 and 3,301; and 11,050 POTWs that service fewer than 3,301 people. Wastewater utilities contain several components as listed below that are divided into physical, cyber, and human elements. Note that resilience to disasters, service interruptions, or other adverse events is often incorporated into these elements to ensure reliable and sustainable supplies and services to customers.

Physical Element

- **Collection.** A network of pipes, conduits, tunnels, lift stations, equipment, and appurtenances convey and pump wastewater from the source to the treatment plant. There are three principal types of municipal sewers: sanitary sewers, storm sewers, and combined sewers. Treatment plant operations can profoundly differ based on the type of collection.

- **Raw influent storage.** Raw sewage and industrial effluent can be stored in tanks or impoundments, generally for the purposes of flow equalization prior to treatment.
- **Preliminary treatment.** This includes removal of materials (rags, wood, plastic, grit, etc.) that could damage a plant's headworks or impair operations. Means for removal can include chemical addition, pre-aeration, bar racks, screens, shredding equipment, and/or grit chambers. Pretreatment can include coagulation, flocculation, and flotation for particle and solids removal.
- **Treatment.** Primary treatment involves suspended and floating material removal. Secondary treatment provides for the reduction of dissolved and colloidal organic substances and suspended matter. Many secondary treatment processes involve biological treatment. The use of settling tanks to separate the solids from the liquid is common; however, flotation and other methods might be used. Physical and chemical treatment processes are used for oil, grease, heavy metals, solids, and nutrient removal. Advanced wastewater treatment processes (that can include physical, chemical, biological or a combination) are utilized for nutrient and soluble organics reduction and resource recovery.
- **Disinfection.** Disinfection inactivates or destroys pathogenic bacteria, viruses, and protozoan cysts. Chemical disinfection (such as chlorine), ozonation, and ultraviolet irradiation are among the types of processes used.
- **Effluent/discharge.** Treatment plant effluent can be discharged to a body of water or wetlands, to ground water aquifers via percolation (via deep-well injection), land-applied, or re-used for other purposes. Permit requirements and treatment processes can differ based on where effluent will be discharged.
- **Residuals and biosolids.** These treatment processes can encompass the most costly part of wastewater treatment. Some of the solids treatment processes include thickening, stabilization, digestion, chemical, composting, dewatering, incineration, and heat drying equipment. Many facilities are converting the chemical energy in solids to a useable form (heat or fuel) through biological or thermal processes. Solids treatment provides the greatest potential for energy recovery and production. Energy recovery process at treatment facilities can include equipment associated with anaerobic digestion, co-digestion, incineration, gasification, internal combustion engines, combustion gas turbines, microturbines, and thermal hydrolysis, among others.
- **Monitoring system.** Sensors can be installed at critical points to monitor a range of physical properties, such as flow rates and water quality indicators, and to detect levels of contaminants before, during, and after treatment.

Cyber Element

- **SCADA.** An electronic network, often including wireless communication that can link monitoring and control systems for the collection, treatment, and discharge to a central display and operations room. The system may include automated operation of controls based on the monitoring system readouts. A SCADA system may also help to automate control of a wastewater utility, with monitoring system readouts serving as inputs for control. The systems are part of an integrated control system essential to operation of a wastewater utility.
- **Process systems and operational controls.** These include any electronic control systems related to the operations of the utility and treatment processes that are not controlled by the utility's SCADA system.

- **Enterprise systems.** These are non-operational control systems such as customer billing, email, and other personnel-related applications and tools.

Human Element

- **Employees and contractors.** Wastewater utilities rely on part-time, full-time, and contract employees to manage and operate their facilities. Larger utilities also may have chemists, engineers, environmental professionals, systems analysts, microbiologists, public relations people, security personnel, and other specialists who are highly trained in their roles individually and as a team. The training and availability of operators typically is based on the type, size, and complexity of the utility. Wastewater utilities also rely on outside contractors to provide engineering services, laboratory analyses, chemical deliveries, and security services.

Individual wastewater utilities will differ in the types of components used; some utilities may not have all the components listed above.

3.1.3 Key Authorities

A number of governing authorities pertain to the Water and Wastewater Sector. These authorities provide for public health and environmental protection measures; identify and regulate hazardous chemical, radiological, and biological substances; provide for worker safety; ensure that the public receives information about water quality and hazards; and provide enforcement authorities for EPA and state primacy agencies and permitting authorities that implement many of EPA's environmental laws such as the SDWA, CWA, and the Clean Air Act.

Within the context of security, federal partners work with the Water and Wastewater Sector using a voluntary construct known as the partnership model. Federal authorities and directives include the Homeland Security Act of 2002, Homeland Security Presidential Directives 9 and 10, Presidential Policy Directives 8 and 21, Executive Order 13636, and the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Bioterrorism Act). While these authorities further promote information sharing and protection including the conduct of vulnerability assessments, the development of emergency response plans (ERPs), and encourage the development of protective strategies and implementation of protective programs; the sector leverages this voluntary model to advance its mutually agreed upon security objectives. Detailed descriptions of authorities and directives that impact the Sector are presented in Appendix 2. Unless otherwise noted, the identified authorities apply to drinking water and wastewater utilities systems.

Finally, the National Infrastructure Protection Plan (NIPP) and the related Critical Infrastructure Partnership Advisory Council (CIPAC) create the governance construct to allow public and private Water Sector stakeholders to work together to achieve resilience in the Sector. Perhaps the most fundamentally challenging aspect of these partnership-related authorities is that they are voluntary. But this voluntary construct is also absolutely critical to security and resilience: it creates an environment of information sharing and collective effort that not only enhances aspects of the other policy authorities but creates equities that mandatory directives could never accomplish. Said another way, creating momentum within the Sector because entities want to act is more productive than when entities are told to act in a confrontational manner.

3.2 Sector Risks

On March 20, 2013, The Water and Wastewater Sector Strategic Priorities Working Group held a Critical Infrastructure Partnership Advisory Council (CIPAC) Water and Wastewater Sector Priorities Update Meeting in Washington, D.C. During the workshop, 23 representatives from the Water and Wastewater Sector, including Working Group members, owners and operators, state representatives, associations, and subject matter experts, discussed the key concerns that could drive Sector activities and coordination over the next 5 years.

Participants identified the scenarios that create the highest risks to the Water and Wastewater Sector, based on their personal experience and expertise. Participants prioritized the risks into three categories:

- **Most significant risk:** Risks that need the Water and Wastewater Sector's most urgent attention and greatest resources, based on the pervasiveness of the threat or the potential high impact. Priority activities should directly mitigate one or more of these risks.
- **High risk:** Risks that need serious attention and resources and can shape how priority activities for the Sector are identified and implemented, as many activities can reduce the impacts of both most significant and high risks.
- **Medium risk:** Risks that need thoughtful attention and resources, as a disruptive event can escalate the level of risk. Medium risks are considered when identifying and implementing priority activities. A single risk event can cause multiple effects. For example, a hurricane (most significant risk) can cause communication and technology issues (medium risks). However, interoperability issues can escalate to high risk if they inhibit a coordinated response and responders cannot secure backup generation and prevent a loss of system pressure.

Figure 4 identifies risks, including threats, vulnerabilities, and consequences; however, the consequences identified remained threat-neutral. These are general risks, not quantitative risks, for the Sector, and each utility will face different risks with differing priority levels depending on their size, location, and risk profile.

Figure 4: Water and Wastewater Sector Risks



Source: Adapted from the 2013 *Roadmap to a Secure and Resilient Water and Wastewater Sector*

3.3 Critical Infrastructure Partners

Water and Wastewater Sector partners along with EPA, state agencies, and other federal agencies have traditionally shared in the mission to protect public health and the environment. As identified in the NIPP, sector-specific planning and coordination activities are addressed through coordinating councils that are established for each sector. These councils create a structure through which representative groups from all levels of government and the private sector can collaborate or share existing approaches to critical infrastructure security and resilience (CISR) and work together to advance capabilities.

The Water and Wastewater Sector SCC is composed of water utility managers appointed by the following drinking water and wastewater associations: Association of Metropolitan Water Agencies (AMWA); American Water Works Association (AWWA); Water Research Foundation (WRF); National Association of Clean Water Agencies (NACWA); National Association of Water Companies (NAWC); National Rural Water Association (NRWA); Water Environment Federation (WEF); and Water Environment Research Foundation (WERF).

The Water and Wastewater Sector SCC's stated mission is "to serve as a policy, strategy and coordination mechanism and to recommend actions to reduce and eliminate significant critical infrastructure security and resilience vulnerabilities to the Water and Wastewater Systems Sector through interactions with the federal government and other critical infrastructure sectors."

The associations serve as liaisons between the Sector's government partners and the broader Water and Wastewater Sector community. The Water SCC interacts on a wide range of sector-specific strategies, policies, activities, and issues and serves as the principal sector policy coordination and planning entity. The Water SCC relies on the Water Information Sharing and Analysis Center (WaterISAC) as a non-voting member and other information-sharing mechanisms that provide operational and tactical capabilities for information sharing and, in some cases, support for incident response activities. WaterISAC collects, analyzes and disseminates information on potential threats to water and wastewater systems and hosts the most comprehensive library available for water and wastewater systems on mitigation and resilience resources. WaterISAC also provides members with seamless access to propriety and restricted contaminant databases and is a gateway to a wide range of learning opportunities. Its membership comprises thousands of personnel from utilities and local, state, and federal agencies.

The federal government uses the Water SCC as a point-of-entry into the Sector to address the entire range of CISR activities, infrastructure protection planning, and issues for the Sector. Such activities include planning, development of effective security practices, adoption of protective programs and plans, development of requirements for effective sharing of information, research and development (R&D), and cross-sector coordination. The Water SCC meets several times per year.

The Water and Wastewater Sector GCC includes federal and state government representatives. EPA, as the SSA for the Water and Wastewater Sector, is Chair of the GCC, and the DHS Office of Infrastructure Protection (IP) serves as Co-Chair. The GCC is active in coordinating CISR strategies, activities, policy, and communications across government entities within each sector. GCC membership consists of key representatives and influential leaders on water security and resilience issues from federal and state governments. Members of the GCC are director-level or equivalent representatives from the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service; Federal Bureau of Investigation (FBI); U.S. Department of Defense (DOD); U.S. Department of State; U.S. Department of Health and Human Services (HHS); DHS IP; U.S. Department of Interior's (DOI) Bureau of Reclamation; EPA; U.S. Army Corps of Engineers (USACE); National Association of Regulatory Utility Commissioners (NARUC); Association of State Drinking Water Administrators (ASDWA);

Association of State and Territorial Health Officials (ASHTO); Association of Clean Water Administrators (ACWA); National Association of County & City Health Officials (NACCHO); and state governments. State drinking water administrators have provided two designated representatives on the GCC.

Water and Wastewater Sector SCC and GCC work together and have formed many joint working groups under the auspices of the CIPAC. For more information on CIPAC, please see <http://www.dhs.gov/critical-infrastructure-partnership-advisory-council>.

3.3.1 Other Sector-Specific Agencies

The Water and Wastewater Sector shares dependencies and interdependencies with each of the other 15 critical infrastructure sectors, but principally with Chemical, Energy, Food and Agriculture, Healthcare and Public Health, Transportation Systems, Dams, Information Technology, and Emergency Services sectors. EPA is responsible for working with the SSAs for these sectors and their sector partners to identify, define, and address interdependencies and joint vulnerabilities; Appendix 3 and Appendix 4 include more detail on these sector relationships.

3.3.2 Drinking Water and Wastewater Owners and Operators Including Private and Public Entities

The Water and Wastewater Sector is a partnership of public and private (e.g., investor, community, or individually owned) drinking water and wastewater utilities; national and state associations; state, local, and tribal governments; research foundations; and federal agencies that, in concert, have been ensuring the protection and resilience of water services for decades. Partners collaborate to be better prepared to prevent, detect, respond to, and recover from all hazards events. Appendix 3 includes more detail on the entities that form this partnership.

3.3.3 Department of Homeland Security

EPA continually communicates and coordinates with DHS on Water and Wastewater Sector security; the Agency works with DHS in implementing various presidential directives, executive orders, and statutes. To improve these efforts, EPA has designated a liaison to DHS; the liaison helps to coordinate and share information between DHS, EPA, and sector partners as it pertains to drinking water and wastewater utility owners and operators. DHS uses its Office of Infrastructure Protection to serve as the primary portal to communicate and coordinate with EPA and other SSAs on issues involving CISR activities and implementation of the NIPP and the SSPs. The DHS Protective Security Advisors conduct assessments of nationally and regionally significant critical infrastructure through security surveys, site assistance visits, and incident response. DHS also shares information with stakeholders via Fusion Centers at the regional level.

EPA's National Homeland Security Research Center (NHSRC) coordinates regularly with the DHS Science and Technology (S&T) Directorate to exchange information on research needs and to discuss R&D priorities and needs for a wide range of security-related research areas. EPA also coordinates with DHS to provide insight on the vulnerability and consequence issues that directly impact Water and Wastewater Sector utilities. A better understanding of vulnerability and consequence allows DHS to interpret water-related threat information (classified and unclassified) and to develop and distribute timely and accurate threat-warning products that are relevant to the Sector.

3.3.4 Other Federal Agencies and State, Local, Tribal, and Territorial Governments

The Water and Wastewater Sector also interacts with other federal department and agencies regarding Water and Wastewater Sector protection programs including but not limited to (1) the Department of State for cross-border protection issues; (2) DOI for dams, reservoirs, and water quality assessments; and (3) the FBI and the Central Intelligence Agency (CIA) on threat information sharing. Appendix 3 includes more information on these federal governmental relationships.

As noted previously, EPA depends heavily on state drinking water primacy agencies and the wastewater permitting authorities that implement the SDWA and CWA, respectively. Because all but one drinking water and most wastewater programs are delegated to the states, EPA works with them to ensure implementation of programmatic, protection, and resilience-related initiatives.

In addition to federal regulatory responsibilities, states also have their own initiatives and priorities; state programs maintain inventories of drinking water and wastewater facilities, regularly inspect these utilities, provide technical assistance and training, maintain laboratory and operator certification programs, and monitor compliance by reviewing analytical results. States review and approve plans and specifications for new and expanded drinking water and wastewater facilities and may take enforcement actions as needed.

Because of the primacy and permitting relationship with the states, EPA works very closely with the two organizations that represent state drinking water and wastewater programs: (1) ASDWA represents drinking water agencies in the states, District of Columbia, territories, commonwealths, and tribes of the United States; and (2) ACWA represents wastewater programs in the same jurisdictions.

EPA is coordinating its security and resilience efforts and initiatives (recently to include cybersecurity issues) with these state, local, and Tribal governments, through the SLTTGCC or individually, as well as public and private entities that represent the Water and Wastewater Sector. This coordination includes facilitating meetings, seeking input on Sector security concerns and issues, and raising security awareness. Many of these entities are used as conduits to get information and training opportunities to utilities.

EPA communicates with these associations and councils regularly and meets with association members at their annual conferences, meetings, and special events such as security workshops and EPA regional offices frequently communicate with state programs.

Through this extensive network, EPA can communicate quickly and efficiently with state, local, and tribal governments, as well as private and public entities. The broad perspectives and extensive memberships of many of these organizations allow feedback and input on interdependencies, and provide a basis for establishing security priorities in the Water and Wastewater Sector that complement actions taken at the local level. EPA communicates with these organizations through conference calls and meetings, and solicits their input on security policy decisions.

3.3.5 Regional Coalitions

In an effort to coordinate CISR efforts within geographic areas and across jurisdictional boundaries, the Regional Consortium Coordinating Council (RC3) was formed in 2008. The RC3 provides a means for DHS to interact with more than 20 coalitions and partnerships across the country. The mission of the RC3 is to strengthen regional collaborations that enhance protection, response, recovery, and resilience of the Nation's critical infrastructure. The RC3 fosters collaboration among regional consortia so that best practices, lessons learned, and other means of support can be shared; and supports the federal policy process so that protection and resilience efforts take geographic regions and Sector interdependencies into account.

Although the Water and Wastewater Sector is not currently working with the RC3 on any joint protection efforts, due to their cross-sector and regional focus, the Sector is open to participating in future projects with the RC3.

3.3.6 International Organizations and Foreign Countries

Some Water and Wastewater Sector critical infrastructure assets within the United States are interconnected with Mexico's or Canada's infrastructure, supporting the economies on both sides of the border. The NIPP 2013 strategy for international critical infrastructure protection and coordination is focused on instituting effective cooperation with international critical infrastructure partners, as well as high-priority cross-border protective programs. Specific protective actions are developed through the sector planning process and specified in SSPs; they address cross-sector and global issues such as cybersecurity and foreign investment.

The Water and Wastewater Sector recognizes the need to identify international water assets that relate to U.S. assets as well as to establish protocols for sharing information. Efforts are also needed to improve international coordination on CISR activities and understand potential impacts on homeland security. DHS and the State Department serve as the lead agencies that work with the international community on this matter; the Water and Wastewater Sector will continue to support such activities.

3.3.7 Water/Wastewater Agency Response Network (WARN)

WARN is an intrastate network of "utilities helping utilities" that respond to and recover from emergencies by sharing resources with one another. The WARN framework provides a forum for maintaining emergency contacts, providing expedited access to specialized resources, and facilitating training on resource exchange during an emergency.

A major benefit of becoming a member of WARN is that in times of crisis, natural or man-made, water service interruptions can be mitigated quickly by locating specialized resources to reduce costs associated with expedited restoration of service. WARNs provide a tool to access and share specialized resources. Intrastate WARNs are volunteer-based, utility-to-utility networks that prepare for disasters, then help member-utilities respond and recover by getting specialized utility resources such as personnel and equipment, when and where they are needed.

4. Vision, Mission, and Goals

Through a collaborative process, EPA and a joint working group of the Water SCC and GCC have developed a security vision statement and a suite of security goals that provide clear

direction for the Water and Wastewater Sector's critical infrastructure security and resilience (CISR) protection efforts.

4.1 Vision

Water and Wastewater Sector Vision Statement: *A secure and resilient drinking water and wastewater infrastructure that provides clean and safe water as an integral part of daily life – assuring the economic vitality of and public confidence in the Nation's drinking water and wastewater service through a layered defense of effective preparedness and security practices in which physical and cyber critical infrastructure remain secure and resilient, with vulnerabilities reduced, consequences minimized, threats identified and disrupted, and response and recovery hastened.*

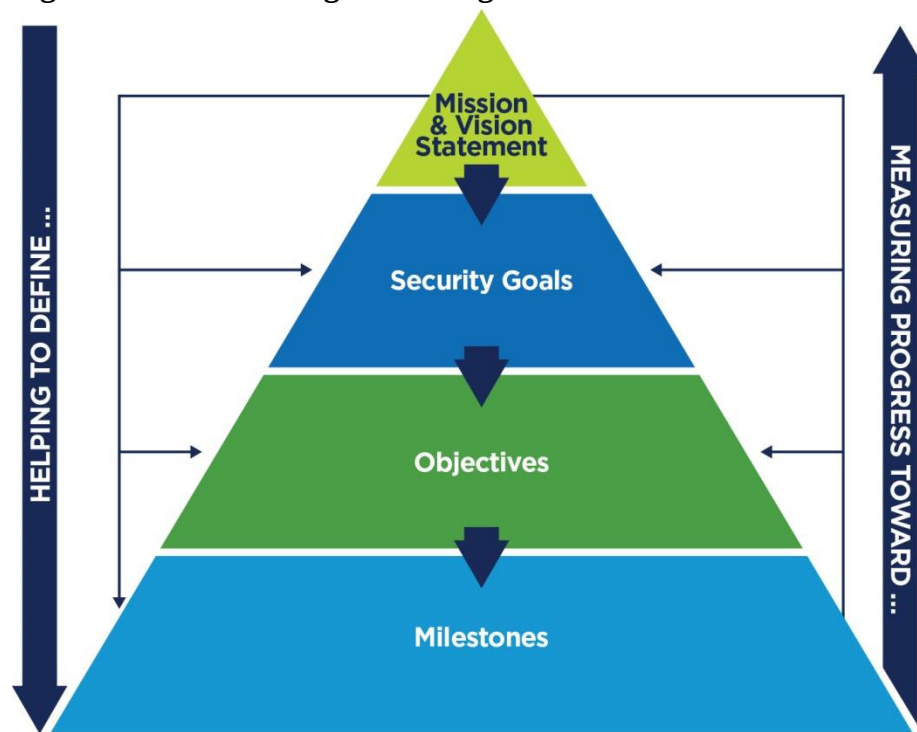
4.2 Mission

EPA's Water Security Mission Statement: *To provide national leadership in developing and promoting programs that enhance the sector's ability to prevent, protect against, mitigate, respond to, and recover from all hazards. Strengthen the security and resilience of the Water and Wastewater Sector by managing physical and cyber risks through the collaborative and integrated efforts of the critical infrastructure community.*

4.3 Goals

The Sector's vision and mission are the foundations for its goals. Figure 5 illustrates how the mission and vision statements support development of goals, objectives, and milestones, ultimately leading to measurement of progress. These elements continue to be used by the Sector to develop and implement security and resilience programs and measure progress as discussed in subsequent chapters of the Water SSP.

Figure 5: Sector Strategic Planning Framework



Security and resilience activities are designed to prevent, detect, respond to, and recover from all hazards. These actions reduce vulnerabilities, minimize consequences, and enable timely, efficient response and restoration following an event. Based on the Water and Wastewater Sector’s vision statement, four overarching strategic goals have been established, as shown in Table 1.

Table 1: Water and Wastewater Sector Goals

SECTOR GOALS	
Goal 1	Sustain protection of public health and the environment.
Goal 2	Recognize and reduce risk.
Goal 3	Maintain a resilient infrastructure.
Goal 4	Increase communication, outreach, and public confidence.

5. Achieving Sector Goals

While there are many activities working toward the Sector’s vision and goals, guiding the immense scale and scope of activities among industry and government has been a significant challenge. The *Roadmap* reflects the Water SCC’s needs and priorities for reducing infrastructure risk. The Water SSP utilizes a collaborative and interactive process for developing Water and Wastewater Sector goals and objectives that included involvement with the Water SCC, Water GCC, DHS, and other Sector partners. That process has continued and matured since the original 2009 Water SSP, with the Water SSC and the Water GCC providing greater detail about Sector priorities and programs to achieve the goals.

5.1 Objectives

The Sector has identified a list of objectives that support each goal; these goals and objectives focus on the concepts of prevention, detection, response, and recovery. They also satisfy the Sector's vision and guide EPA's strategic planning process for Sector security and resilience. The goals and objectives presented in Table 2 are at various stages of planning and implementation.

Table 2: Water and Wastewater Sector Goals and Objectives

Goal 1	Sustain protection of public health and the environment.
The Nation relies on sustained availability of safe drinking water and on treatment of wastewater to maintain public health and environmental protection. To protect public and environmental health better, the Water and Wastewater Sector works to ensure the continuity of both drinking water and wastewater services.	
Objective 1	Encourage integration of both physical and cyber security concepts into daily business operations at utilities to foster a security culture.
Objective 2	Evaluate and develop surveillance, monitoring, warning, and response capabilities to recognize and address all-hazards risks at Water and Wastewater Sector systems that affect public health and economic viability.
Objective 3	Develop a nationwide laboratory network for water quality protection that integrates Federal and state laboratory resources and uses standardized diagnostic protocols and procedures, or develop a supporting laboratory network capable of analyzing threats to water quality.
Goal 2	Recognize and reduce risk.
With an improved understanding of the vulnerabilities, threats, and consequences, owners and operators of utilities can continue to thoroughly examine and implement risk-based approaches to protect, detect, respond to, and recover from all hazards better.	
Objective 1	Improve identification of vulnerabilities based on knowledge and best available information, with the intent of increasing the Sector's overall protection posture.
Objective 2	Improve identification of potential threats through knowledge base and communications—with the intent of increasing overall protection posture of the Sector.
Objective 3	Identify and refine public health and economic impact consequences of manmade or natural incidents to improve utility risk assessments and enhance the Sector's overall protection posture.
Goal 3	Maintain a resilient infrastructure.
The Water and Wastewater Sector will investigate how to optimize continuity of operations to ensure the economic vitality of communities and the utilities that serve them. Response and recovery from an incident in the Sector will be crucial to maintaining public health and confidence.	
Objective 1	Emphasize continuity of drinking water and wastewater services as it pertains to utility emergency preparedness, response, and recovery planning.

Objective 2	Explore and expand implementation of mutual aid agreements/compacts in the Water and Wastewater Sector by encouraging utilities to join their state WARN. The Sector has significantly enhanced its resilience through agreements among utilities and states; increasing the number and scope of these will further enhance resilience.
Objective 3	Identify and implement key response and recovery strategies. Response and recovery from an incident in the Sector will be crucial to maintaining public health and confidence.
Objective 4	Increase understanding of how the Sector is interdependent with other critical infrastructure sectors. Sectors such as Healthcare and Public Health and Emergency Services are largely dependent on the Water and Wastewater Sector for their continuity of operations, while the Water and Wastewater Sector is dependent on sectors such as Chemical or Energy for continuity of its operations.
Goal 4	Increase communication, outreach, and public confidence.
Safe drinking water and water quality are fundamental to everyday life. An incident in the Water and Wastewater Sector could have significant impacts on public confidence. Fostering and enhancing the relationships between utilities, government, and the public can mitigate negative perceptions in the face of an incident.	
Objective 1	Communicate with the public about the level of protection and resilience in the Water and Wastewater Sector and provide outreach to ensure the public's ability to be prepared for and respond to a natural disaster or manmade incident.
Objective 2	Enhance communication and coordination among utilities and federal, state, and local officials and agencies to provide information about threats by utilizing WaterISAC and other information sharing networks.
Objective 3	Improve relationships among all Water and Wastewater Sector partners through a strong public-private partnership characterized by trusted relationships.

5.2 Priorities

In 2009, the Water CIPAC Strategic Priorities Working Group released the first *Roadmap to a Secure & Resilient Water and Wastewater Sector* (hereafter referred to as the *Roadmap*), which was subsequently updated in 2013. The *Roadmap* identifies the joint priority activities needed to improve resilience and meet the Sector's shared vision as identified in the Water SSP.

The *Roadmap* was designed to establish a strategic framework to achieve the following:

- Articulate the priorities of industry and government in the Water and Wastewater Sector to manage and reduce risk
- Produce an actionable path forward for the Water GCC, Water SCC, and other security partners to improve the security and resilience of the Water and Wastewater Sector over the near term (1–2 years) and mid-term (3–5 years)
- Guide Sector partners in developing new products and services
- Create a shared understanding of and collectively advocate Sector priorities, and recognize institutional constraints and different accountabilities
- Encourage extensive engagement among all key stakeholders to strengthen public-private partnerships and accelerate security advances throughout the Water and Wastewater Sector

The *Roadmap* is a living document. By working together to develop this Strategic Roadmap, the Sector has leveraged a broad range of operational and infrastructure protection experience to identify the most pressing Sector needs and prioritize actions that industry and government can take to begin immediately enhancing water security and resilience.

The *Roadmap* was developed using a similar CIPAC process and format as the 2009 Roadmap and identified three (3) new top priority activities. *Roadmap* contributors believe these top priority actions must be pursued to mitigate significant risks in the Water and Wastewater Sector, including natural disasters (e.g., water quality & quantity impacts from floods, hurricanes, earthquakes, ice storms, pandemic events, and other catastrophes depending on geographic location); economic issues from aging infrastructure and limited resources for adequate response planning and resilience investments; cyber events; and current capability deficiencies to manage large-area losses of water. Top Priority Activities for the Water and Wastewater Sector are:

- Advance the development of sector-specific cybersecurity resources.
- Raise awareness of the Water and Wastewater Sector as a lifeline sector and recognize the priority status of its needs and capabilities.
- Support the development and deployment of tools, training, and other assistance to enhance preparedness and resiliency.

The Water and Wastewater Sector has cross-walked these Water and Wastewater Sector top priority activities to the NIPP 2013 Goals and Joint National Priorities; these relationships are illustrated in Appendix 5. While Joint National Priorities are intended to guide the efforts and inform the decisions across the whole critical infrastructure community to enhance security and resilience, the Water and Wastewater Sector will continue to focus its activities and resources on the top priorities identified within the *2013 Roadmap*. As the product of an extensive partnership process between the government and private sectors, the *Roadmap* speaks most directly and pertinently to the perception of risks and priorities for the Water and Wastewater Sector. The complete *Roadmap* can be found in Appendix 7.

5.3 Sector Priority Activities

The Water and Wastewater Sector's goals and objectives provide the framework to develop and implement protective programs. EPA and Sector partner organizations have all taken actions to support the Sector's needs.

Owners and operators are responsible for implementing security and resilience activities at the utility level, which allows protective programs to be tailored to the geography and conditions of that locality, with a focus on the higher-risk situations. Many water and wastewater utilities have conducted risk assessments and spent millions of dollars to reduce identified vulnerabilities and install protective measures. While various critical infrastructure partners may take the lead on any one project, sector-wide collaboration, including the implementation of the NIPP partnership model, continues to provide enhanced communication through information and best practice sharing, resulting in opportunities to minimize duplication of efforts in program development and implementation. This collaborative approach continues to build public trust and confidence through strategic cost sharing-based initiatives.

The Roadmap's three (3) top priority activities including; development of sector-specific cybersecurity resources, elevating awareness and priority status of the Sector as a lifeline sector, supporting tools, training, and other assistance to enhance preparedness and resiliency are intended to mitigate the most significant risks in the Water and Wastewater Sector.

To be successful, each activity needs the support of the Water SCC, Water GCC, and security partners. If achieved, these activities together will strengthen the Sector's ability to plan for effective response and recovery, maintain resilience during a calamitous event, and garner support for both disaster and risk mitigation cost recovery.

The following provides more detailed descriptions of Water and Wastewater Sector top-priority activities identified within the *Roadmap*:

Priority 1: Advance the development of sector-specific cybersecurity resources. This activity aligns with the Water SSP Goal 2: Recognize and reduce risk and Goal 3: Maintain a resilient infrastructure.

Opportunity: Development of cybersecurity resources that enhance Water and Wastewater Sector capabilities, increase cybersecurity education and awareness, build a business case for cybersecurity investments, streamline information sharing between government and industry, and strengthen cybersecurity culture. This increases the potential for better preparedness and resilience of water and wastewater infrastructure during a cyber-event.

Description/Application: Industry and government partners have created a common vision of cybersecurity and a roadmap to get there. This voluntary, collaborative approach has aligned joint resources and capabilities to enhance cybersecurity of the Water and Wastewater Sector. Advancing these efforts will help the Sector achieve its vision: to survive a cyber-event with no loss of critical function. Leveraging existing resources, including the National Institute of Standards and Technology (NIST) Cybersecurity Framework and the AWWA Process Control Guidance document, will facilitate the development of useful products that address the unique performance requirements and operational needs of the Sector.

Efforts to enhance Water and Wastewater Sector cybersecurity practices could include:

Near Term (within 2 years):

- Developing advanced cybersecurity guidance, practices, and tools that are sustainable, effective, and implementable for utilities of all sizes and types
- Enhancing practices and resources to strengthen and maintain a culture of cybersecurity among industry, government, and citizen stakeholder groups
- Enhancing resources to raise the education and awareness of cyber risks and lessons learned from past incidents in the Water and Wastewater Sector
- Improving methods for government to share threat information with industry through WaterISAC and other information sharing networks
- Conducting multi-sector cyber event exercises including the Water and Wastewater Sector

- Engaging vendors, integrators, and other critical sectors to address and develop next-generation cyber and physical tools and practices jointly
- As federal cybersecurity regulations and policies, such as the Executive Order 13636 and PPD-21, evolve, continuing to consider their impact on future efforts

Priority 2: Raise awareness of the lifeline status of the Water and Wastewater Sector and establish its needs and capabilities as priorities. This activity aligns with the Water SSP Goal 3: Maintain a resilient infrastructure and Goal 4: Increase communication, outreach, and public confidence.

Opportunity: Provides the Water and Wastewater Sector as well as local, state, and federal emergency planners, regulators, and ratepayers with an understanding of the benefits of a secure and resilient Water and Wastewater Sector, enabling decision makers to effectively prioritize Water and Wastewater Sector needs as a lifeline Sector in resilience and emergency response planning. This results in expedited community recovery.

Description/Application: Lifeline sectors—including the Water and Wastewater Sector as routinely identified by federal and state/local leadership—ensure the resilience, safety, prosperity, and rapid recovery of the communities they serve, such as credentialing for utility personnel in order to gain access during the recovery phase event. Defined priorities for resource requests from drinking water and wastewater utilities can help mitigate or avoid public health and environmental impacts. For example, the Water/Wastewater Agency Response Network’s (WARN’s) *Superstorm Sandy After-Action Report* found that a clear and recognized priority status among emergency management and the power utilities may have directed greater attention to loss of power at water and wastewater facilities.

Raising awareness of the priority status of the Water and Wastewater Sector could build on existing tools and include:

Near Term (within 2 years):

- Conducting state/local exercises that improve understanding of Water and Wastewater Sector interdependencies and impacts of loss of service during a disaster
- Developing and implementing an education and awareness campaign that helps utilities to communicate the importance of the Water and Wastewater Sector in emergency planning and to describe the costs and benefits of risk reduction investments to states and public commissions using Water and Wastewater Sector risk assessment and consequence analysis tools
- Developing and implementing public messaging to gain consumer support in addition to local, state, and federal support for pre-disaster risk reduction and resilience activities
- Enhancing engagement with utilities during smaller emergencies and planned maintenance to assess emergency response plans
- Determining the applicability of Federal Emergency Management Agency (FEMA) assistance criteria to address Water and Wastewater Sector needs and ensure the criteria are clear and well understood
- Improving engagement with the State, Local, Tribal, and Territorial Government Coordinating Council (SLTTGCC) to raise awareness at the state/local level

Mid Term (within 5 years):

- Developing incentives—through grants, insurance, standards, and certification—to increase investment in Water and Wastewater Sector infrastructure
- Performing after-action analyses after large events that highlight economic implications for the Water and Wastewater Sector
- Conducting tabletop exercises and workshops to improve understanding of interdependencies with other sectors and leverage that reliance to raise awareness of Water and Wastewater Sector criticality
- Developing federal incentives for state drinking water programs and emergency management programs to support hazard mitigation investments

Priority 3: Support the development and deployment of tools, training, and other assistance to enhance preparedness and resilience. This activity aligns with the Water SSP Goal 1: Sustain protection of public health and the environment and Goal 2: Recognize and reduce risk.

Opportunity: Provides development of resources to support the Water and Wastewater Sector in assessing risk; updating and maintaining emergency response and risk management plans; and prioritizing resilience practices and investments. This results in improved resilience and preparedness.

Description/Application: Risk cannot be completely eliminated, but water and wastewater utilities can more effectively use limited resources to manage risks and improve infrastructure resilience with sector-specific decision-making processes. Tools and resources can help the Water and Wastewater Sector to assess risk better, prioritize future activities and investments, update risk management and emergency response plans, and leverage lessons learned from past events to constantly improve their processes.

Decision-making resources to improve resilience could leverage and promote existing tools, training, and other assistance and include:

Near Term (within 2 years):

- Developing a tool consistent with the American National Standards Institute (ANSI)/AWWA J100-10 standard to help utilities update all-hazards risk assessments, and then leverage them to update emergency response and risk management plans; perform after-action analyses; and incorporate lessons learned following an event
- Developing a method to coordinate cyber and physical risk assessment tools to enhance management decision-making
- Integrating Water and Wastewater Sector considerations into emergency response planning to ease access and credentialing issues for water utility personnel during an event
- Communicating the value of existing decision-making resources and promoting their use to avoid duplicating efforts and foster better decision making
- Leveraging tools and best practices from interdependent sectors to understand their potential application to the Water and Wastewater Sector

- Examining climate change adaptation strategies to identify “no regret” measures that offer multiple types of benefits
- Updating the All-Hazards Consequence Management Plan to create a better understanding of current threats and vulnerabilities and strategies to reduce the impacts of an emergency event
- Harnessing existing tools and guidance to develop an overarching tool/resource that defines key actions and procedures to help utilities enhance their preparedness and resilience
- Integrating Water and Wastewater Sector considerations into all-hazards preparedness and response tools designed to support wide-area urban contamination incident response

Mid Term (within 5 years):

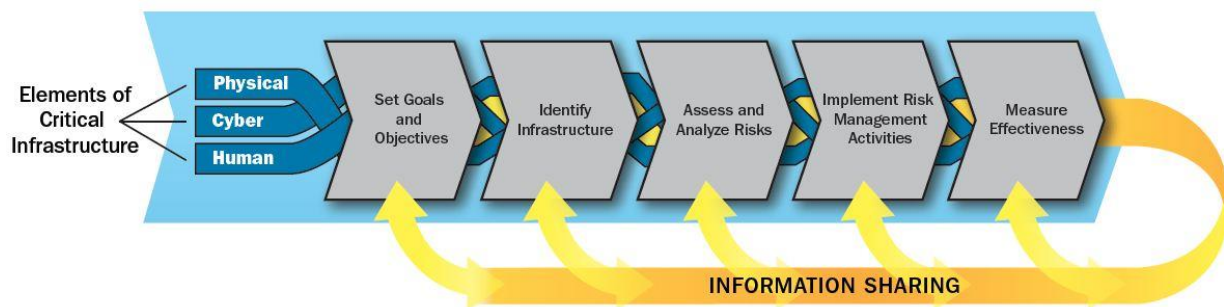
- Periodically assessing available resources, identifying current needs and gaps, and improving existing resources or develop new ones
- Demonstrating the capabilities of existing tools and develop case studies to communicate their success

Appendix 6 contains the many large contributions made by Water and Wastewater Sector partners to the *Water and Wastewater Sector-Specific Plan* goals in the time since the first *Roadmap* was issued.

6. Measuring Effectiveness

The critical infrastructure community evaluates the effectiveness of risk management efforts within sectors and at national, state, local, and regional levels by developing metrics for both direct and indirect indicator measurement. The NIPP Risk Management Framework is shown in **Figure 5**. As the SSA, EPA works with the Water and Wastewater SCC and GCC during the sector-specific planning process to develop attributes that support the national goals and national priorities as well as Water and Wastewater Sector-specific priorities. Such measures inform the risk management efforts of partners throughout the critical infrastructure community and help build a national picture of progress for the National Plan, as well as the National Preparedness Goal.

Figure 5: NIPP Risk Management Framework



6.1 Measurement Approach

Measuring progress is central to continuous improvement of the Water Sector protection program. The Water and Wastewater Sector has established several principles for Water and Wastewater Sector-specific data collection that measures progress at the operational level: (1) participation in a national measurement program should be voluntary; (2) results of national aggregate measures should be presented only in aggregated form, and issues associated with the need for data confidentiality should be resolved before any national measurement program is put in place; (3) measures must help individual utilities better understand their own performance (4) measures should be simple and focus on activities that may be appropriate at some utilities and over time, utilities should strive for measures of program achievement, outcomes, and performance; (5) strict comparability across utilities is not supportable for all measures at this time; (6) clear security policies, plans, and priorities are important precursors to effective measurement; (7) development and tracking of measures should not compromise the security of a utility; (8) measure baselines should not penalize proactive organizations; and (9) measure information should be protected.

National Annual Report data calls held annually by DHS serve as a tool for assessing performance and reporting on progress within the Sector. Information from these data calls informs the National Annual Report as well as accomplishes the following purposes: (1) provides a common vehicle across all sectors to communicate CISR performance and progress to CISR partners and other government entities; (2) establishes a baseline of existing sector-specific CISR programs and initiatives; (3) identifies plans for SSA resource requirements and budget; (4) determines and explains how Sector efforts support the national effort; (5) provides an overall progress report for the Sector; (6) provides feedback to DHS, sectors, and other government entities to illustrate the continuous improvement of CISR activities; and (7) helps identify and share beneficial practices from successful programs.

The Roadmap is a living document that identifies the most pressing Sector needs and prioritizes actions that industry and government can take to enhance water security and resilience. Subsequent updates of the Strategic Roadmap look at progress achieved towards goals and previously identified priorities. Appendix 6 identifies Sector activities that contributed to the achievement of Sector goals and priorities.

6.2 Using Metrics for Continuous Improvement

As traditional stewards of protecting public health and the environment, utility owners and operators have been very proactive in incorporating protection and emergency preparedness initiatives into their operating protocols to establish greater infrastructure resilience. Water and Wastewater Sector partners seek to assist utilities in overcoming the challenges owners and operators may face while trying to implement protective program strategies. EPA and its Sector partners adapt protection efforts to account for progress achieved and changing threats, vulnerabilities, and consequences in the Sector. To provide and protect information that pertains to the Water and Wastewater Sector's all-hazards security posture, the Sector continues to identify and improve upon appropriate mechanisms for sharing sensitive information. By voluntarily developing, deploying, analyzing, and reporting on its security posture, the Water and Wastewater Sector has in effect served to prove the Department's concept; in that sense, the Sector's process and findings reinforce the validity of the DHS partnership model.

Utilities take their responsibility to help protect the communities they serve seriously. While there is always room for improvement, results from the Sector's first round of metrics collection clearly demonstrate an overwhelming commitment to continued security progress.

The Sector also regularly improves upon mechanisms for collecting, verifying, validating, storing, protecting, and tracking Sector priorities and critical infrastructure information, but challenges still remain. Utility owners and operators lack confidence that the federal government can protect their asset vulnerability and consequence data; furthermore, the provisions of the Paperwork Reduction Act impact data collection efforts by federal agencies.

EPA and Sector partners will focus on ways to continually improve the accuracy and usefulness of the information provided under these mechanisms.

Appendix 1: List of Acronyms and Abbreviations

ACWA Association of Clean Water Administrators
AMWA Association of Metropolitan Water Agencies
ANSI American National Standards Institute
APHL Association of Public Health Laboratories
ASDWA Association of State Drinking Water Administrators
ASHTO Association of State and Territorial Health Officials
AWWA American Water Works Association
BLM Bureau of Land Management
CDC Centers for Disease Control and Prevention
CFR Code of Federal Regulations
CIA Central Intelligence Agency
CIPAC Critical Infrastructure Partnership Advisory Council
CISR Critical Infrastructure Security and Resilience
CWA Clean Water Act
CWS Community Water System
DHS U.S. Department of Homeland Security
DOD U.S. Department of Defense
DOE U.S. Department of Energy
DOI U.S. Department of the Interior
DOT U.S. Department of Transportation
DSRC Distribution System Research Consortium
EIS Environmental Impact Statement
EPA U.S. Environmental Protection Agency
ERP Emergency Response Plan
FBI Federal Bureau of Investigation
FDA U.S. Food and Drug Administration
Fed FUNDS Federal Funding for Utilities – Water/Wastewater – in National Disasters
FEMA Federal Emergency Management Agency
FERC Federal Energy Regulatory Commission
GCC Government Coordinating Council
HAZMAT Hazardous Materials
HHS U.S. Department of Health and Human Services
HSPD Homeland Security Presidential Directive
ICS Incident Command System
IP Office of Infrastructure Protection
LRN Laboratory Response Network
MGD Million Gallons per Day
NACCHO National Association of County & City Health Officials
NACWA National Association of Clean Water Agencies
NARUC National Association of Regulatory Utility Commissioners
NAWC National Association of Water Companies
NCIP National Critical Infrastructure Protection
NCSD National Cybersecurity Division
NEPA National Environmental Policy Act

NGA National Governors Association
NHSRC National Homeland Security Research Center
NIPP National Infrastructure Protection Plan
NIST National Institute of Standards and Technology
NPDES National Pollutant Discharge Elimination System
NPS National Park Service
NRWA National Rural Water Association
NTNCWS Non-Transient Non-Community Water System
OCA Off-site Consequence Analysis
POTW Publicly Owned Treatment Works
PPE Personal Protective Equipment
PWS Public Water System
R&D Research and Development
RAMCAP™ Risk Analysis and Management for Critical Asset Protection
RAM–W Risk Assessment Methodology–Water
RC3 Regional Consortium Coordinating Council
RMP Risk Management Plan
S&T Science and Technology Directorate
SCADA Supervisory Control and Data Acquisition
SCC Sector Coordinating Council
SDWA Safe Drinking Water Act
SLTTGCC State, Local, Tribal, and Territorial Government Coordinating Council
SSA Sector-Specific Agency
SSP Sector-Specific Plan
TNCWS Transient Non-Community Water System
U.S.C. United States Code
USACE U.S. Army Corps of Engineers
USDA U.S. Department of Agriculture
USGS U.S. Geological Survey
WARN Water/Wastewater Agency Response Network
Water GCC Water and Wastewater Government Coordinating Council
Water SCC Water and Wastewater Sector Coordinating Council
Water SSP Water and Wastewater Sector-Specific Plan
WaterISAC Water Information Sharing and Analysis Center
WCIT Water Contaminant Information Tool
WEF Water Environment Federation
WERF Water Environment Research Foundation
WRF Water Research Foundation

Appendix 2: Authorities

This appendix breaks out pertinent authorities that impact the Water and Wastewater Sector into several broad categories: (1) presidential directives, (2) general homeland security laws, and (3) a number of environmental laws.

A2.1 Presidential Policy Directive 21, Critical Infrastructure Security and Resilience (February 12, 2013)

PPD-21 supersedes Homeland Security Presidential Directive 7 (HSPD-7) and updates the national approach to protecting critical infrastructure. It defines critical infrastructure broadly, to include cyber and other systems as well as physical structures. PPD-21 also expands the view of critical infrastructure threats from the previous terrorism perspective to an all-hazards approach. PPD-21 advances a national unity of effort to strengthen and maintain secure, functioning, and resilient critical infrastructure across the spectrum of prevention, protection, mitigation, response, and recovery.

A2.2 Executive Order 13636, Improving Critical Infrastructure Cybersecurity (February 12, 2013)

Executive Order 13636 addresses how the federal government will help prevent, mitigate, and respond to the rise of cyber intrusions into the United States' critical infrastructure while, at the same time, maintaining a cyber-infrastructure that protects privacy and confidentiality.

A2.3 Presidential Policy Directive 8, National Preparedness (March 30, 2011)

PPD-8 and its component policies intend to guide how the nation, from the federal level to private citizens, can “prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the security of the Nation.” These threats include terrorist acts, natural disasters, and other man-made incidents. PPD-8 evolves from, and supersedes, HSPD-8 and is intended to meet many requirements of Subtitle C of the Post-Katrina Emergency Reform Act of 2006.

A2.4 Homeland Security Presidential Directive 9, Defense of United States Agriculture and Food (January 30, 2004)

HSPD-9 establishes an integrated national policy for improving intelligence operations, emergency response capabilities, information-sharing mechanisms, mitigation strategies, and Sector vulnerability assessments to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies.

A2.5 Homeland Security Presidential Directive 10, Biodefense for the 21st Century (April 24, 2004)

HSPD-10 outlines the essential pillars of our national biodefense program as (1) threat awareness; (2) prevention and protection; (3) surveillance and detection; and (4) response and recovery. This directive describes these various disciplines in detail and sets forth objectives for further progress under the national biodefense program, highlighting key roles for federal departments and agencies. The Secretary of Homeland Security is responsible for coordinating domestic federal operations to prepare for, respond to, and recover from biological weapons attacks.

A2.6 Safe Drinking Water Act, 42 United States Code (U.S.C.) 300F-300J-26

The general provisions of the SDWA, established in 1974, provide a basis for drinking water security by protecting water quality and underground sources of drinking water. To protect the quality of public drinking water, EPA established regulations for national primary and secondary drinking water standards. Forty-nine of the 50 states have received primacy from EPA to administer the drinking water program. To obtain primacy, states must adopt regulations no less stringent than the federal government's and must meet other conditions. Pertinent conditions include enforcement authority; the ability to conduct sanitary survey inspections of water utilities; and requirements to certify and approve laboratories for sample analysis, maintain an inventory of PWSs (utilities) in the state, and have an adequate plan to provide for safe drinking water during emergencies.

The statute applies to PWSs—systems for provision of water to the public for human consumption through pipes and other constructed conveyances, including such federal facilities as military bases and hospitals, and other sites with their own drinking water systems. Drinking water programs most applicable to water security include wellhead protection and source water protection, protection of underground sources of drinking water, sanitary survey inspections, maintenance of records, and water quality monitoring.

A2.7 Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Bioterrorism Act), Public Law 107-188

Among other provisions, the Bioterrorism Act amends the SDWA by inserting Title IV, Drinking Water Security and Safety, into Title XIV of the Public Health Services Act as sections 1433, 1434, and 1435. Initiatives and accomplishments under the act are as follows: (1) EPA provided the baseline probable threat information required to complete vulnerability assessments; (2) on or before December 31, 2004, each CWS serving more than 3,300 persons conducted a vulnerability assessment, certified its completion, and submitted a copy to EPA; (3) each CWS serving more than 3,300 persons prepared or revised an ERP that incorporated the vulnerability assessment findings, and certified to EPA that the system had completed such a plan within 6 months of completing an assessment; (4) EPA developed a protocol to protect this information; (5) EPA developed vulnerability assessment guidance for systems serving 3,300 or fewer persons; and (6) EPA conducted research studies in prevention, detection, and response to intentional introduction of contaminants into CWSs and their source water; methods and means by which terrorists could disrupt the supply of safe drinking water or act against drinking water infrastructure; and methods and means by which alternative supplies of drinking water could be provided in the event of destruction, impairment, or contamination of CWSs.

It is important to note that the term “vulnerability assessment” is interchangeable with the term “risk assessment” in the Water and Wastewater Sector due to the language of the Bioterrorism Act. Water and Wastewater Sector vulnerability assessments are equivalent to risk assessments since the methodologies developed for the Water and Wastewater Sector consider all the components of risk (threat, vulnerability, and consequence).

A2.8 Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. 1251-1387

The CWA governs the quality of discharges to surface and ground water. It establishes national, technology-based standards for municipal waste treatment and numerous categories of industrial

point-source discharges (e.g., discharges from such fixed sources as pipes and ditches); requires states, and in some cases tribes, to enact and implement water quality standards to attain designated water-body uses; addresses water pollutants; and regulates dredge-and-fill activities and wetlands. The Act provides a number of enforcement authorities for EPA and states that have accepted permitting authority. It also applies these requirements to such federal facilities as military installations and Department of Energy (DOE) sites. Provisions most applicable to security include the prohibition of discharges into waters of the United States, development of pretreatment effluent standards, oil and hazardous substance liability, and imminent and substantial endangerment authorities.

A2.9 Clean Air Act, Section 112(r), 42 U.S.C. 7401-7671q; implementing regulations include EPA Risk Management Plan Regulation (40 Code of Federal Regulations [CFR] Part 68)

Under the authority of section 112(r) of the Clean Air Act, the Chemical Accident Prevention Provisions require facilities that produce, handle, process, distribute, or store certain chemicals in certain threshold amounts (e.g., 2,500 pounds of chlorine) to develop a Risk Management Program, prepare a Risk Management Plan (RMP), and submit the RMP to EPA. Covered facilities were initially required to comply with the rule in 1999, and the rule has been amended on several occasions since 1999, most recently in 2004. The RMP must include an executive summary that provides a brief description of the facility's accidental release prevention and emergency response policies, the regulated substances handled at the facility, the worst-case release scenario(s) and alternative release scenario(s), the 5-year accident history of the facility, the Emergency Response Plan (ERP), and planned changes to improve safety at the facility. The full RMP also includes an Off-site Consequences Analysis (OCA), which provides the estimated extent of a worst-case scenario.

Pursuant to the Chemical Safety Information, Site Security and Fuels Regulatory Relief Act (Public Law 106-40), OCA information is no longer made available to the public via the EPA website. However, under the law, federal reading rooms provide the public with read-only access to paper copies of RMPs, including OCA information submitted by chemical facilities. Other chemicals that may be present at Water and Wastewater Sector utilities, including ammonia, sulfur dioxide, and chlorine dioxide, also trigger RMP regulatory requirements if they exceed certain threshold quantities.

A2.10 National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq)

The National Environmental Policy Act (NEPA) was signed into law on January 1, 1970. The Act establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment and provides a process for implementing these goals within the federal agencies. The Act also establishes the Council on Environmental Quality (CEQ).

NEPA requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.

To meet NEPA requirements federal agencies prepare a detailed statement known as an Environmental Impact Statement (EIS). EPA reviews and comments on EISs prepared by other

federal agencies, maintains a national filing system for all EISs, and ensures that its own actions comply with NEPA.

A2.11 Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121-

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, signed into law November 23, 1988, amended the Disaster Relief Act of 1974. This Act constitutes the statutory authority for most federal disaster response activities especially as they pertain to FEMA and FEMA programs.

The Stafford Act authorizes the delivery of federal technical, financial, logistical, and other assistance to states and localities during declared major disasters or emergencies. FEMA coordinates administration of disaster relief resources and assistance to states. Federal assistance is provided under the Stafford Act if an event is beyond the combined response capabilities of state and local governments.

Appendix 3: Water Sector Critical Infrastructure Partners

Other Pertinent Sectors

The Water and Wastewater Sector is a lifeline sector, and has interdependencies with all other 15 critical infrastructure sectors, as described below.

Chemical Sector. DHS IP is the SSA for the Chemical Sector. EPA coordinates with this office regarding risks associated with the storage, transport, and use of chemicals in water utility operations. Water and Wastewater Sector owners and operators coordinate with federal, state, and local authorities to ensure compliance with chemical safety regulations.

Commercial Facilities Sector. Facilities associated with the Commercial Facilities Sector operate on the principle of open public access, meaning that the general public can move freely throughout these facilities without the deterrent of highly visible security barriers. The majority of the facilities in this Sector are privately owned and operated, with minimal interaction with the federal government and other regulatory entities. Water and wastewater utilities provide services necessary to the operations of commercial facilities. DHS IP is the SSA for the Commercial Facilities Sector.

Communications Sector. Over the last 25 years, the sector has evolved from predominantly a provider of voice services into a diverse, competitive, and interconnected industry using terrestrial, satellite, and wireless transmission systems. The transmission of these services has become interconnected; satellite, wireless, and wireline providers depend on each other to carry and terminate their traffic and companies routinely share facilities and technology to ensure interoperability. During emergency response activities, water and wastewater utilities must ensure communication between responders. DHS is the SSA for the Communications Sector.

Critical Manufacturing Sector. The following industries to serve as the core of the Critical Manufacturing Sector: primary metal manufacturing; machinery manufacturing; electrical equipment, appliance, and component manufacturing; and transportation equipment manufacturing. Water and wastewater utilities provide services necessary to the operations of manufacturing facilities, including a source of water for cooling or other processes. DHS IP is the SSA for the Critical Manufacturing Sector.

Dams Sector. Dams and reservoirs provide water for a large fraction of the population. EPA coordinates with dam owners and operators including DOI that have responsibility for managing the Nation's dams and reservoirs, including pumping plants, canals, and pipelines.. DHS IP is the SSA for the Dams Sector.

Defense Industrial Base Sector. The Defense Industrial Base Sector is the worldwide industrial complex that enables research and development, as well as design, production, delivery, and maintenance of military weapons systems, subsystems, and components or parts, to meet U.S. military requirements. Water and wastewater utilities provide services necessary to the operations of defense facilities. The DOD is the SSA for the Defense Industrial Base Sector.

Emergency Services Sector. DHS IP is the SSA for the Emergency Services Sector. EPA coordinates with this Sector regarding provision of water for emergency response. At the operational level, water utilities ensure that emergency responders have sufficient information to respond effectively to incidents at their facilities.

Energy Sector. DOE is the SSA for the Energy Sector. The primary interdependency with the Energy Sector is the need for a stable and reliable source of energy to power water and wastewater utilities. EPA works closely with several DOE national laboratories, including Argonne, Lawrence Livermore, Los Alamos, and Sandia. These laboratories are represented on EPA's Distribution System Research Consortium (DSRC). The Agency worked with the Sandia laboratory, along with WRF to develop a drinking water risk assessment tool that is used primarily by large drinking water systems to evaluate their threats, vulnerabilities, and consequences. The products of these efforts are tools and guidance for drinking water and wastewater utilities to minimize the likelihood that critical services will be disrupted as a result of cascading and escalating effects of either manmade or natural events. EPA also coordinates with the Federal Energy Regulatory Commission (FERC), which regulates interstate transmission of natural gas, oil, and electricity. EPA's interactions with FERC primarily involve the Water and Wastewater Sector's interdependency with electric power.

Financial Services Sector. This sector includes financial institutions such as federally insured depository institutions; providers of investment products; broker-dealer, investment adviser, and investment company complexes; providers of risk transfer products; and other credit and financing organizations. Water and wastewater utilities often utilize bonds, loans, and grants to fund operational changes and infrastructure upgrades. The Department of Treasury is the SSA for the Financial Services Sector.

Food and Agriculture Sector & Healthcare and Public Health Sector. USDA's Rural Utilities Service provides funding and support for rural America, including small, rural drinking water and wastewater utilities. USDA's Forest Service provides source-water protection initiatives concerning sources of drinking water that are located in or originate on Forest Service lands. The service also operates water utilities (e.g., campgrounds, picnic grounds, and some ranger stations), and there are some CWS sources on National Forest land. With issuance of HSPD-9, USDA expanded its role with the EPA to build upon and increase current monitoring and surveillance programs that provide early detection and awareness of disease, pest, and poisonous agents.

Several agencies within HHS, including the Centers for Disease Control and Prevention (CDC), U.S. Food and Drug Administration (FDA), and Indian Health Service have worked closely with EPA. In particular, CDC and FDA played important roles in helping define biological, chemical, and radiological threats to drinking water. EPA will establish a memorandum of agreement with CDC to leverage resources in the Laboratory Response Network (LRN), which includes private, state, and government laboratories and can mobilize quickly to test for possible terror-related contaminants.

The agreement will acknowledge that significant national laboratory testing capacity derives from use of established laboratory networks such as the LRN, Food Emergency Response Network, National Animal Health Laboratory Network, National Plant Diagnostic Network, and

federal agencies with responsibility and authority for laboratory preparedness and response (collectively referred to as the Networks) and the Environmental Response Laboratory Network. The agreement respects existing relationships, policies, and operating procedures of the Networks or any similar group of laboratories with relationships involving federal funding, direction, or other cooperative arrangements.

Under EPA's Water Security initiative, drinking water contamination warning system pilots are being established in various cities and LRN laboratories are providing critical sample analysis capability and capacity for these pilots. For example, a letter of intent between EPA and an LRN laboratory operated by the Ohio Department of Health enabled the analysis of samples from a drinking water contamination warning system pilot in Cincinnati using the LRN biological threat agent screening protocol and made available the necessary LRN reagents for this analysis.

CDC counterparts are members of EPA's NHSRC DSRC, and FDA regulates bottled drinking water, which may be used as a short-term remedy when PWS service is interrupted. FDA is required to regulate bottled water to standards at least as stringent as those issued by EPA under the SDWA. The Water and Wastewater Sector also shares interdependencies with HHS regarding interstate conveyance carriers (e.g., planes and trains with potable water on board); EPA will establish a memorandum of understanding with FDA to deal with these carriers.

Government Facilities Sector. The Government Facilities Sector includes a wide variety of buildings, located in the United States and overseas, that are owned or leased by federal, state, local, and tribal governments. This sector includes the Education Facilities and National Monuments and Icons Subsectors. Water and wastewater utilities provide services necessary to the operations of government facilities. DHS and the General Services Administration are co-SSAs for the Government Facilities Sector.

Healthcare and Public Health Sector. The Healthcare and Public Health Sector protects all sectors of the economy from hazards such as terrorism, infectious disease outbreaks, and natural disasters. Water and wastewater utilities coordinate with public health agencies during emergency response and other water quality-related events, as well as provide services necessary for the operations of medical and other healthcare facilities. HHS is the SSA for the Healthcare and Public Health Sector.

Information Technology Sector. DHS National Cybersecurity Division (NCSD) is the SSA for the Information Technology Sector. NCSD oversees the protection of IT industry, and also has a cross-sector responsibility regarding the security of industrial control systems that are critical for all sector operations. NCSD provides cybersecurity threat and vulnerability information to benefit EPA and all SSAs.

Nuclear Reactors, Materials, and Waste Sector. This sector includes nuclear power plants; non-nuclear reactors for research, testing, and training; manufacturers; radioactive materials used in medical, industrial, and academic settings; nuclear fuel cycle facilities; decommissioned nuclear power reactors; and transportation, storage, and disposal of nuclear and radioactive waste. Water and wastewater utilities provide services necessary to the operations of nuclear

facilities, including a source of cooling water. DHS is the SSA for the Nuclear Reactors, Materials, and Waste Sector.

Transportation Systems Sector. The Department of Transportation (DOT) is responsible for promoting the safety, efficiency, effectiveness, and economic wellbeing of the Nation's transportation systems. The Water and Wastewater Sector shares several key interdependencies with DOT, including its reliance on the Transportation Systems Sector to provide chemicals, such as gaseous chlorine, and supplies for drinking water and wastewater treatment facilities. Highways and railways can also present vulnerabilities to the Water and Wastewater Sector where they pass near or over sources of drinking water.

CI Associations and Partners

Association of Metropolitan Water Agencies is the voice of the largest publicly owned drinking water systems in the United States. Collectively, member agencies serve 130 million people. AMWA also manages the WaterISAC, which serves as the operational and communications arm of the Sector. WaterISAC is a centralized resource that gathers, analyzes, and disseminates Water and Wastewater Sector centric all-hazards security information. It serves drinking water and wastewater utilities of all sizes and ownership types. It has the most comprehensive and readily available online library that includes contaminant databases and resources about Water and Wastewater Sector vulnerabilities, incidents, and solutions for all hazards.

Association of Public Health Laboratories (APHL) represents the Nation's public health and environmental laboratories. In an effort to strengthen the Nation's laboratory capability and capacity, EPA and APHL have formed a partnership to formulate sound public health and environmental policies, offer training and education, and improve overall laboratory management and practices nationwide.

Association of Clean Water Administrators (ACWA) is a national, nonpartisan professional organization. Members are state, interstate and territorial officials who are responsible for the implementation of surface water protection programs throughout the Nation. ACWA serves as the national voice for state clean water program concerns and policies, and facilitates their communication with the federal government. Through sound policy and education, ACWA strives to protect and restore watersheds to achieve clean water for everyone.

Association of State Drinking Water Administrators represents drinking water agencies in the 50 states, territories, the Navajo Nation, and the District of Columbia. ASDWA's purpose includes supporting states in their efforts to protect public health through the assurance of high quality drinking water, encouraging the interchange of experience among state drinking water programs, and promoting responsible, reasonable, and feasible drinking water programs at the state and federal levels. ASDWA also provides advice, counsel, and expertise to organizations and entities involved in drinking water, including Congress and the EPA.

American Water Works Association represents water utilities of all sizes and ownership types. Its 60,000-plus members represent the full spectrum of the drinking water community, including treatment plant operators and managers, scientists, environmentalists, manufacturers, academics,

engineers, and regulators. Membership includes more than 4,600 utilities that supply water to 180 million North Americans.

Environmental Council of the States (ECOS) is the national non-profit, non-partisan association of state and territorial environmental agency leaders. The purpose of ECOS is to improve the capability of state environmental agencies and their leaders to protect and improve human health and the environment of the United States.

International City/County Management Association is a professional and educational organization composed of 9,000 chief appointed managers, administrators, and assistants in cities, towns, counties, and regional entities in the United States and throughout the world.

National Association of Clean Water Agencies represents the interests of nearly 300 publicly owned wastewater treatment agencies nationwide, serving the majority of the sewered population in the United States. NACWA's mission is to lead its member agencies in the development and implementation of scientifically based, technically sound, and cost-effective environmental programs for protecting public and ecosystem health.

National Association of Water Companies is the only national trade association exclusively representing all aspects of the private water service industry. The range of its members' business includes ownership of regulated drinking water and wastewater utilities, and the many forms of public/private partnerships and management contract arrangements. Every day nearly 73 million Americans—almost one in four—receive water service from a privately owned water utility or a municipal utility operating under a public-private partnership. NAWC members are regulated at the federal level by EPA and at the state level by state health and environment agencies. State public utility commissions economically regulate these members.

National Environmental Training Center for Small Communities helps small communities with populations less than 10,000 by providing training, related information, and referral services in wastewater, drinking water, and solid waste.

The National Governors Association (NGA) is the collective voice of the Nation's governors; its members are the governors of the 50 states, three territories, and two commonwealths. NGA provides governors and their senior staff members with services that range from representing states on key federal issues to developing and implementing innovative solutions to public policy challenges through the NGA Center for Best Practices. NGA also provides management and technical assistance to both new and incumbent governors.

National League of Cities works in partnership with 49 state municipal leagues to represent more than 19,000 cities, villages, and towns. The mission of the National League of Cities is to strengthen and promote cities as centers of opportunity, leadership, and governance.

National Rural Water Association is the largest utility membership association in the country that represents almost 27,000 rural or small communities. Representing the best interests of the community's water and/or wastewater utilities is a core function of the Association. In addition, every year more than 50,000 individual field site investigations or technical assistance are

provided personally to communities' water or wastewater facilities. Combining these personal on-site visits with the more than 30,000 attendees who participate in training classes conducted each year, the organization provides one of the primary means of communication to small and rural communities.

Rural Community Assistance Partnership assists water and wastewater utilities serving populations fewer than 10,000 people. Most activities are carried out in rural areas with populations fewer than 2,500 people, in minority communities, and in underserved rural areas with a high percentage of low-income individuals.

State Homeland Security Advisors form a network of contacts that the Governors of each state have appointed to coordinate homeland security activities.

U.S. Conference of Mayors is a nonpartisan organization of the mayors of 1,201 U.S. cities with populations greater than 30,000.

Water Environment Federation is composed of individual members and member associations representing engineers, public and private plant operators and managers, students, laboratory technicians, wastewater consultants, retired wastewater professionals, and public officials.

Water Environment Research Foundation is dedicated to advancing science and technology that addresses water quality. Subscribers include individuals and organizations from municipal agencies, academia, government laboratories, and industrial and consulting firms.

Water Information Sharing and Analysis Center is designated by the Water and Wastewater Sector Coordinating Council as the information sharing arm of the Water and Wastewater Sector. Its membership comprises thousands of personnel from utilities and local, state and federal agencies. WaterISAC collects, analyzes and disseminates information on potential threats to water and wastewater systems and hosts the most comprehensive library available for water and wastewater systems on mitigation and resilience resources. WaterISAC also provides members with seamless access to propriety and restricted contaminant databases and is a gateway to a wide range of learning opportunities.

Water Research Foundation is a member-supported, international nonprofit organization that sponsors research to enable water utilities, public health agencies, and other professionals to provide affordable drinking water to consumers.

Other Federal Departments

Federal Bureau of Investigation EPA, DHS, and the WaterISAC work closely with the FBI to share intelligence and threat warnings related to physical and cyber attacks and to contamination incidents. The FBI and EPA prepare and update threat information related to drinking water and wastewater. Drinking water and wastewater utilities, as well as states, have been encouraged by EPA to coordinate security activities with local FBI offices nationwide. EPA has also developed tools and outreach documents to educate the law enforcement community about drinking water and wastewater utilities. It has offered Water Security Awareness training to the FBI's Joint

Terrorism Task Force to provide an understanding of water systems, their vulnerabilities and current threats, and response measures.

U.S. Department of Defense (DOD). DOD's primary interaction with EPA is through USACE coordination; USACE is responsible for maintaining the Nation's commercial waterways and operates the dams and locks that facilitate commerce on inland waterways. A number of drinking water systems use dam reservoirs as their primary water sources. Dam safety and protection is a critical issue for the Water and Wastewater Sector; some employees of the USACE Engineering Research and Development Center also sit on the EPA's NHSRC DSRC. Military facilities with their own drinking water and wastewater systems are regulated under the SDWA and CWA and, where applicable, must complete and submit vulnerability assessments to EPA.

U.S. Department of the Interior (DOI). EPA coordinates with DOI on dam security and water quality. Historically, EPA has worked with a number of DOI bureaus, including the National Park Service (NPS), U.S. Bureau of Reclamation, Bureau of Land Management (BLM), U.S. Fish and Wildlife Service, and the U.S. Geological Survey (USGS). USGS serves the Nation as a science agency that collects, monitors, analyzes, and provides scientific understanding of natural resources. In addition, USGS's National Water Quality Assessment program provides periodic assessments that include data for many potentially harmful drinking water contaminants. In part, USGS's monitoring and research programs support EPA's regulatory and research agenda.

Other DOI connections to the Water and Wastewater Sector are that NPS maintains drinking water and wastewater systems that are regulated by the SDWA and CWA. Also, BLM operates a number of TNCWSs (e.g., campgrounds), and plays a large role in managing and protecting the western water supply; some raw drinking water sources may reside on BLM-managed public lands.

U.S. Department of State. In its mission to create a more secure, democratic, and prosperous world, the State Department collaborates with countries, government agencies, nongovernmental organizations, institutions of higher learning, and private sector partners.

It is critical for EPA to continue to communicate and coordinate with the State Department to ensure that water quality and quantity issues are fully understood.

Several major rivers used as sources of drinking water in the United States cross Canada's and Mexico's borders, and a number of Water and Wastewater Sector utilities in the Northwest obtain their treatment chemicals from Canada. It is important that the U.S. continues to work with our neighbors to the north and the south to protect Water and Wastewater Sector infrastructure and water sources from potential terrorist attacks.

U.S. Intelligence Community. The Director of National Intelligence coordinates the Nation's intelligence activities, and correlates, evaluates, and disseminates intelligence that affects national security. The U.S. Intelligence Community, including the FBI and the Central Intelligence Agency, engages in research, development, and deployment of technology for intelligence purposes, and provides an independent source of analysis on national and

international concerns. EPA works directly with the U.S. Intelligence Community to ensure the flow of intelligence in support of homeland defense related to the Water and Wastewater Sector.

Appendix 4: Interdependencies/Dependencies

Interdependencies between drinking water utilities and other critical infrastructure are shown in Table A4-1. The preliminary data gathered for this exhibit are not meant to illustrate an exhaustive list of interdependencies; rather, they capture many of the Sector's broader interdependencies.

Table A4-1. Interdependencies between Sectors and Drinking Water Supply

Sector	Sector Dependency on Drinking Water	Drinking Water Dependency on Sector
Chemical	• Manufacturing operations • Office operations	• Chlorine and other treatment chemicals • Office operations
Commercial Facilities	• Facility operations	• Bottling
Communications	• Equipment cooling • Common rights-of-way	• Emergency communications with responders • General operations • SCADA • Monitoring
Critical Manufacturing	• Water as a product constituent • Equipment cooling	• Operational and process equipment
Dams		• Storage; reservoirs • Flood mitigation
Defense Industrial Base	• Office operations • Equipment cooling	• Production of parts
Emergency Services	• Continuity of operations • Firefighting and hazardous material spill and event responses • Decontamination services • Emergency water supplies • Equipment maintenance	• Special weapons and tactics and tactical operations • Coordination with the Incident Command System (ICS) • Law enforcement • Bomb Explosive Ordnance Disposal • Emergency (medical and firefighting) responders • Hazardous materials (HAZMAT) responders
Energy	• Cooling and scrubbing • Steam generation • Mining operations • Ore processing	• Process power • Pump, wells, treatment, operations • Office operations

Sector	Sector Dependency on Drinking Water	Drinking Water Dependency on Sector
	• Refining • Pollution control • Raw material (e.g., hydrogen production) • Waste management • Common rights-of-way • Office operations	• Common rights-of-way • Repair/recovery operations • Deliver of power materials • Backup power requirements
Financial Services	• Office operations • Equipment cooling	• Facility financial operations, bonds, grants, loans, etc.
Food and Agriculture	• Food processing • Facility cleaning • Restaurant operation • Irrigation • Animal drinking, feeding, and cleaning operations	• Hydroelectric power • Source water quality
Government Facilities	• Office operations • Equipment cooling • Provision of public facilities	• Water rates and spending authority • Research
Healthcare and Public Health	• Laboratory services • Sanitation services • Pharmaceutical, device, and supply manufacturing • Nursing home operations • Hospital and clinic operations • Transportation of equipment and supplies	• Laboratory services • Personal Protective Equipment (PPE) donning and doffing guidance • Conditions for public notice • Information on treatment and response • Vaccination and inoculation • Medical and health clinics
Information Technology	• Common rights-of-way • Equipment cooling • Office operations	• Common rights-of-way • E-communications with emergency responders • Remote monitoring • SCADA • General operations
Nuclear Reactors, Materials, and Waste	• Office operations • Cooling and scrubbing	• Power delivery
Transportation Systems	• Office operations • Equipment maintenance • Common rights-of-way	• Common rights-of-way • Transport of emergency responders and equipment

Sector	Sector Dependency on Drinking Water	Drinking Water Dependency on Sector
		• Company operations • Delivery of components and materials • Delivery of treatment materials • Operations, maintenance, and repair

The table above illustrates that most of the interdependencies other sectors have with drinking water assets are physical in nature; that is, these sectors require water to provide products or services. Geographic interdependencies seen between drinking water (and wastewater) infrastructure and infrastructure of other sectors are due to the practice of placing distribution systems such as networks of piping, electricity lines, and telecommunication lines in common corridors.

Table A4-2 demonstrates the interdependencies between wastewater infrastructure and other critical infrastructure. As is the case with drinking water interdependencies, most of the wastewater interdependencies are physical.

Table A4-2. Interdependencies between Sectors and Wastewater Infrastructure

Sector	Sector Dependency on Wastewater	Wastewater Dependency on Sector
Chemical	• Manufacturing operations • Office operations	• Disinfectants and other critical treatment chemicals
Commercial Facilities	• Facility operations	• Biosolids operations and distribution • Business operations
Communications	• Infrastructure access • General operations • Common rights-of-way • Equipment cooling	• Common rights-of-way • Communication with emergency responders • General operations • SCADA • Remote monitoring • Communication with the public
Critical Manufacturing	• Manufacturing operations • Office operations	• Critical manufactured utility components • Piping and infrastructure
Dams	• Aquifer recharge	• Storage; reservoirs • Flood mitigation
Defense Industrial Base	• Office operations	• Production of parts

Sector	Sector Dependency on Wastewater	Wastewater Dependency on Sector
Emergency Services	• Continuity of operations • Decontamination services • Infrastructure access	• Special weapons and tactics and tactical operations • Coordination with ICS • Law enforcement • Bomb Explosive Ordnance Disposal • Emergency (medical and firefighting) responders • HAZMAT responders
Energy	• Waste management • Common rights-of-way • Methane generation • Cooling and scrubbing • Steam generation • Methane generation • Mining operations • Ore processing • Raw material (e.g., hydrogen, production) • Refining	• Pumps and treatment; operations and repair • Office operations • Common rights-of-way • Repair and recovery operations • Process power • Delivery of components and materials • Back-up power requirements
Financial Services	• Office operations	• Facility financial operations, bonds grants, loans, etc.
Food and Agriculture	• Biosolids (soil amendment/fertilizer) • Irrigation • Restaurant operation • Processing plants • Water reuse	• Biosolids land application • Biomass for energy production
Government Facilities and Commercial Facilities	• Provision of public facilities • Office operations	• Rates and spending authority • Research • Company operations

Sector	Sector Dependency on Wastewater	Wastewater Dependency on Sector
Healthcare and Public Health	• Hospital and clinic operations • Nursing home operations • Pharmaceutical, device, and supply manufacturing • Laboratory services • Transportation of equipment and supplies	• Vaccination and inoculation • Laboratory services • Information on treatment and response • Conditions for public notice • PPE donning and doffing guidance
Information Technology	• Common rights-of-way • Equipment cooling	• Common rights-of-way • E-communications with emergency responders, WARNs, etc. • Monitoring • SCADA • General operations
Nuclear Reactors, Materials, and Waste	• Cooling and scrubbing • Office operations • Reclaimed water	• Power delivery
Transportation Systems	• Office operations • Common rights-of-way	• Delivery of treatment chemicals • Operations, maintenance, and repair • Delivery of components and materials • Company operations • Transport of emergency responders and equipment • Common rights-of-way

Appendix 5: Alignment of Sector Priorities to NIPP Goals and Joint National Priorities

Water and Wastewater Sector Priorities	Joint National Priorities					NIPP Goals
	Strengthen the Management of Cyber and Physical Risks to Critical Infrastructure	Build Capabilities and Coordination for Enhanced Incident Response and Recovery	Strengthen Collaboration Across Sectors, Jurisdictions, & Disciplines	Enhance Effectiveness in Resilience Decision Making	Share Information to Improve Prevention, Protection, Mitigation, Response, and Recovery Activities	
Advance the development of sector-specific cybersecurity resources	X	X	X		X	Secure critical infrastructure against physical, cyber, and human threats through sustainable risk reduction efforts, while considering costs and benefits.
Support the development and deployment of tools, training, and other assistance to enhance preparedness and resiliency	X	X		X		Secure critical infrastructure against physical, cyber, and human threats through sustainable risk reduction efforts, while considering costs and benefits.
						Assess and analyze risks to critical infrastructure (T, V, C) to inform risk management activities.
						Promote learning and adaptation during and after incidents and exercises.

Water and Wastewater Sector Priorities	Joint National Priorities					NIPP Goals
	Strengthen the Management of Cyber and Physical Risks to Critical Infrastructure	Build Capabilities and Coordination for Enhanced Incident Response and Recovery	Strengthen Collaboration Across Sectors, Jurisdictions, & Disciplines	Enhance Effectiveness in Resilience Decision Making	Share Information to Improve Prevention, Protection, Mitigation, Response, and Recovery Activities	
Raise awareness of the Water and Wastewater Sector as a lifeline sector and recognize the priority status of its needs and capabilities			X	X	X	Share information across the critical infrastructure community to build awareness and enable risk-informed decision making.
						Enhance critical infrastructure resilience by minimizing consequences and employing effective response and recovery.

Appendix 6: Key Water and Wastewater Sector Successes (2010–2014)

Water and Wastewater Sector partners have made many large contributions to the *Water and Wastewater Sector-Specific Plan* goals in the time since the 2010 Sector-Specific Plan was issued. Successes are described in Table A6-1.

Table A6-1. Key Water and Wastewater Sector Successes by Sector Partners

Year	Description
2010	<i>ANSI/AWWA J100-10: Risk Analysis and Management for Critical Asset Protection (RAMCAP®) Standard for Risk and Resilience Management of Water and Wastewater Systems.</i>
2010, 2011	Developed and updated the Water Emergency Roundtable Outline for Discussion Guide.
2011	Conducted training workshops in EPA Regions 2 and 5 to educate drinking water utilities on the design and implementation of contamination warning systems, such as those implemented under the Water Security Initiative.
2011	Developed <i>How to Develop a Multi-Year Training and Exercise Plan</i> to assist utilities in creating multi-year plans that can lead to increased emergency preparedness.
2011	CDC and AWWA collaborated to develop the <i>Emergency Water Supply Planning for Hospitals and Healthcare Facilities</i> and the <i>Drinking Water Advisory Communication Toolbox</i> .
2011	<i>ANSI/AWWA G440-11: Emergency Preparedness Practices</i>
2012	SAFETY Act designation granted by DHS for ANSI/AWWA G430-09: Security Practices for Operations and Management and ANSI/AWWA J100-10: Risk Analysis and Management for Critical Asset Protection.
2012	EPA-NHSRC and AWWA collaborated to develop and release <i>Planning for an Emergency Water Supply</i> in response to provisions of the 2002 Bioterrorism Act.
2012	WaterISAC published <i>10 Basic Cybersecurity Measures to Reduce Exploitable Weaknesses and Attacks</i> .
2012	Developed the <i>Bridging the Gap: Coordination between State Primacy Agencies and State Emergency Management Agencies</i> guide.
2012	Developed Federal Funding for Utilities – Water/Wastewater – in National Disasters (Fed FUNDS) tool to provide tailored information to utilities about applicable federal disaster funding programs.
2012	Completed a peer review of the Water Security Initiative, and published the findings in a report, in collaboration with the Water and Wastewater Sector Coordinating Council and Water Government Coordination Council.
2012	Published a report for drinking water utilities: <i>Commissioning Security Systems for Drinking Water Utilities</i> .
2012	Published the report: <i>Need to Know: Anticipating the Public’s Questions during a Water Emergency</i> .
2013	Published guidance for drinking water utilities and laboratories: <i>Guidance for Building Laboratory Capability to Respond to Drinking Water Contamination</i> .

Year	Description
2013	Published a report documenting the findings from an EPA evaluation of commercially available water quality event detection systems.
2013	Completed deployment, commenced analysis, and began publication of results from EPA's five Water Security Initiative pilots, which involved designing and testing contamination warning systems.
2013	Developed the <i>State Drinking Water Program All-Hazard Preparedness, Mitigation, Response, and Recovery Checklist</i> to provide state drinking water programs with internal emergency checklists and best practices.
2013	Published the <i>Weather & Hydrologic Forecasting for Water Utility Incident Preparedness and Response</i> document to provide hazardous weather and forecasting resources for utility awareness and preparedness.
2013	Conducted the Water Laboratory Alliance Security Summit which provided training and professional development activities for water stakeholders across the U.S. who are active participants in laboratory preparedness and emergency response.
2013	Leveraged the CIPAC framework to develop Sector priorities, build partnerships, and increase collaboration among public and private sector stakeholders: • 2013 Roadmap to a Secure & Resilience Water Sector, which represents the Water SCC/GCC priorities • Emergency Preparedness and Response CIPAC Workgroup developed <i>All-Hazard Consequence Management Planning for the Water and Wastewater Sector</i> and a summary report on <i>Projects and Activities to Support a Secure and Resilient Water Sector</i> • Risk Assessment Methodology (RAM)/J100-10 Standard CIPAC Workgroup • Water Sector Cybersecurity Strategy CIPAC Workgroup • Contamination Warning System CIPAC Workgroup
2013	Developed the 2013 <i>Bridging the Gap</i> document, to demonstrate coordination between state primacy, state EMAs, strengthen pre-and post-event collaborative efforts in support of drinking water utilities.
2013	Water Research Foundation, AWWA, and EPA developed <i>Business Continuity Planning for Water Utilities: Guidance Document</i> .
2013	<i>WARN Sandy After Action Report</i> .
2014	Total number of WARNs in the United States reaches 50 (49 states and National Capitol Region) and 2 Canadian provinces. Continued efforts to support operational plans, outreach and communications.
2014	<i>ANSI/AWWA G430-14: Security Practices for Operation and Management</i> , update of first edition issued in 2009.
2014	AWWA released <i>Process Control System Security Guidance for the Water Sector</i> (PDF) and a supporting <i>Use-Case Tool</i> , which aligns with the NIST Cybersecurity Framework.
2014	Updated the 2008 Critical Infrastructure Partnership Advisory Council Sector Report.

Year	Description
2014	Conducted a Full Scale Laboratory exercise in each state located in EPA Region 1.
2014	Developed a fillable Continuity of Operations Plan template for laboratories that support the Water and Wastewater Sector and partnered with ASDWA to promote awareness of the template.
2014	Partnered with APHL to support training opportunities for laboratories sector across the U.S. involved in drinking and wastewater sample analysis.
2014	Conducted a tabletop exercise to assist water and wastewater systems prepare and respond to decontamination scenarios.
2014	Developed the “How Can Water Utilities Obtain Critical Assets to Support Decontamination Activities” fact sheet.
2014	Updated the Water Contamination Information Tool (WCIT) with (11) additional contaminant profiles.
2014	Conducted live remote training sessions to demonstrate user features of WCIT.
2014	Developed an LC-MS Library Document: An Example for Drinking Water Screening. The document also includes a newly developed LC-MS direct-injection procedure for screening 13 noted contaminants of concern.
2014	Hosted live-remote table exercises that provided an opportunity for the Water and Wastewater Sector to practice elements of the Water Laboratory Alliance Response Plan.
2014	Developed the interactive guidance document <i>Flood Resilience: A Basic Guide for Water and Wastewater Utilities</i> to help water utilities know their flooding threat and identify practical mitigation options to protect their critical assets.
2014	Developed the <i>Don't Get Soaked</i> video for utility managers, board members, and elected/appointed officials to help them understand the benefits of investing in preparedness, prevention and mitigation activities.
2014	ASDWA partnered with the National Emergency Management Association (NEMA) to host a webinar on how state primacy and emergency management agencies can work together. The event showcased successful partnerships between state Drinking Water Programs and emergency management agencies in Tennessee, Iowa, and Texas.
2014	ASDWA hosted a webinar to showcase how five states (California, Utah, Texas, New Hampshire, New York, and Florida) support, interact with, and sustain their state's WARN. The webinar explored the different approaches that can be used in support of state WARN programs.

Appendix 7: 2013 Roadmap to a Secure & Resilient Water Sector



Roadmap to a Secure & Resilient Water Sector

Developed by:
Critical Infrastructure Partnership
Advisory Council
Water Sector
Strategic Priorities Working Group

May 2013





Homeland
Security



United States
Environmental
Protection Agency