# Sammamish Plateau Water and Sewer District Plan Annex

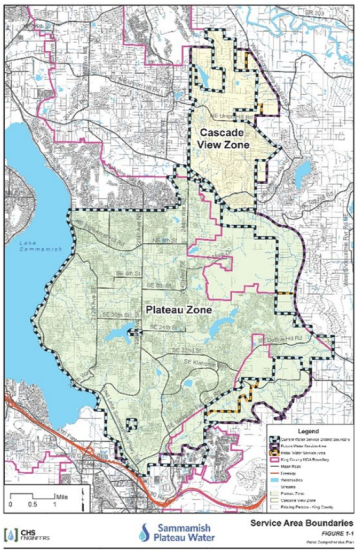
## Introduction

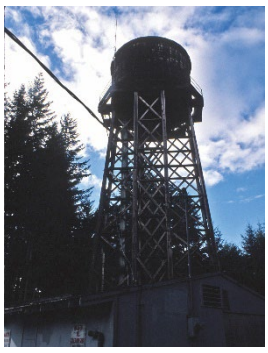
The Sammamish Plateau Water and Sewer District ("District") is a special purpose district created in 1948 under RCW Title 57. The District provides water and sewer service to portions of the cities of Sammamish and Issaquah, and areas of unincorporated King County. A five member Board of Commissioners governs the District. Funding sources come primarily through rates and revenue bonds.

The following is a summary of key information about the jurisdiction (as of December 31, 2019):

- **Water connections:** 19,246
- **Sewer connections:** 12,885
- **Population Served:** 64,879
- **Land Area Served:** 29 square miles
- **Total Value of Area Served:** The estimated value of the area served by the District, including both land value and improvements value, is $17,987,486,356.
- **Land Area Owned:** 44 acres

Sammamish Plateau Water and Sewer District



*Sammamish Plateau Water built its second water tank at its headquarters site in 1956. The District replaced this tank with the 2 million gallon tank in 1977. The District upgraded the tank with retrofits to enhance tank stability during seismic events in 2019.*


Jurisdiction Point of Contact and Plan Prepared by:

Name: Janet Sailer
Title: Planning and Outreach Coordinator
Entity: Sammamish Plateau Water & Sewer District
Phone: (425) 392-6256

**Current and Anticipated Service Trends:** Approximately 92% of the District's service territory consists of single-family residential customers. Another 2% are multi-family customers, and the remaining 6% include non-residential customers. The District anticipates a 1.37% growth rate per year for the next five years.

**Response to development changes.** Development is slated to continue throughout the District's service territory. The development density and locations are determined through land use agency (city and county) plans and ordinances. The land use agencies regulations may limit some development locations based on natural hazards, it is clear that new construction may occur within seismic, landslide and flood zones. District facilities, existing and proposed, are sized and constructed to accommodate the growth projected by the land use agencies. In response, the District designs new facilities to standards required to mitigate known hazards, and has mitigation projects included in the capital program to reduce risk at existing facilities. For example, the District has completed two seismic retrofit projects since the last 2015 Hazard Mitigation Plan, to the 297 and the 2 MG water storage tanks. These projects will reduce the risk vulnerability to existing and current District customers.

## *Hazard Risk and Vulnerability Summary*

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| **Avalanche** | The District is not located within any avalanche areas. | N/A | N/A |
| **Earthquake** | The District identified earthquakes as one of its top three scores during the 2014 hazard risk ranking process.<br><br>The February 2001 Nisqually Earthquake (magnitude 6.8) was widely felt throughout the region. There was minimal damage to District systems, but the event highlighted the need for enhanced earthquake planning. The District conducted a seismic study in 2013, a Seismic Pipeline Study in 2017 and a Seismic Pipeline from Well 9 to 650 Zone Project Study in 2019.<br><br>The 2013 study determined that the District is located between two major earthquake faults, the Seattle Fault (SF) and the South Whidbey Island Fault (SWIF). In addition, | **Water:** The District's water system will generally continue to function following each of the three scenarios due to the structural integrity of individual facilities and the system hydraulic design that includes a significant level of redundancy. The District's well and pump station buildings are all resistant to earthquakes. Emergency generators are either installed or available for all facilities. District storage tanks would be operable following a CSZ event, but certain tanks would be impacted by the low-probability SWIF and SF events. Wells and pipelines in the liquefaction area would be damaged, including the transmission mains from the Issaquah Valley wells and regional water connection to the Plateau Zone. In addition, the Cascade Water Alliance (CWA) owns the Bellevue-Issaquah Pipeline (BIP) that provides regional water to the Plateau Zone of the District also passes through liquefaction | **Water:** Estimated number of main breaks include up to 67 breaks during a CSZ incident, 156 during a SWIF incident, and 210 during the SF incident, based on the earthquake type. The shaking of the wells may result in increased turbidity in the water system in the days following an earthquake. Specific thresholds of turbidity may require a boil water order. Estimated time to return to service is 30-60 days. All of the scenarios will result in varying levels of damage to Wells 7 and 8, and all of the buried pipelines in the liquefiable area along the southwestern side of the District. While the Well 9 facility itself should be operable because of its special foundation design, there will be damage to the connecting piping.<br>***CSZ Scenario:*** In the CSZ event, the most likely |

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| | the Cascadia Subduction Zone (CSZ) has the potential to affect much of the west coast. The recurrence intervals used in the three scenarios include the following: SF – 5,000 years, SWIF –2,700 years, and CSZ – 500 years. The SF and SWIF scenarios are very low probability events with long return periods. The study identified liquefaction areas along the southwestern side of the District. | areas. **Sewer:** The sewage collection system on the Plateau should remain generally operable following all three scenarios. Three sewer lift stations (Freegard, Alexander's and Mallard Bay) are located in the liquefaction area. All of the District's sewage connects to and flows through the regional transmission mains in this same liquefaction area.<br><br>**Both Water and Sewer:** Adequate staffing during an earthquake event will be a critical vulnerability due to the District's small staff and the considerable distance most staff have to drive to get to work, especially if there is road damage and debris affecting their travel. | scenario, all of the District's storage tanks should remain operable. ***SWIF Scenario:*** Storage facilities in the Cascade View Zone will be inoperable. The 7 MG tank will be damaged in the SWIF event, but the 2 MG tank would only see slight damage and provide redundancy in the 650 Zone.<br>***SF Scenario:*** The 2 MG and the 7 MG tanks will be inoperable. **Sewer:** Three sewage lift stations (Freegard, Mallard Bay and Alexanders) will be impacted by liquefaction in the southwestern edge of the District. Damage will range from moderate to complete. Sewage force mains and gravity sewers will also be heavily damaged in the same area, with the possibility of sewer overflows into Lake Sammamish.<br>***SF Scenario:*** The Control Structure is expected to be heavily damaged; however, a bypass exists, but in the future, it may not have the capacity to handle all of the flow. If damage occurs to the Control Structure, raw sewage will overflow into local drainages and creeks and ultimately flow into Lake Sammamish. |
| **Flood** | A portion of the District's southwest service area is located in the FEMA preliminary 100-year floodplain near Issaquah Creek and Lake Sammamish. There has been no historical flooding | **Water:** Wells 7 and 8 sit on the edge of the 100-year flood plain. Neither well has flooded in the past. Sewer: Two sewer lift stations, Mallard Bay, and Alexanders, are in the Lake Sammamish 100-year flood plain. The Freegard Lift Station is | **Water:** Flood impacts could damage water infrastructure and create water contamination issues. **Sewer:** Flood impacts could include damage to the lift stations, sewer overflows, and spills of raw sewage |

*Hazard Risk and Vulnerability Summary*

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| | of District water or sewer facilities. | located just east of the Issaquah Creek 100-year flood plain delineation. These facilities may be susceptible to severe flooding, although they have not flooded in the past. | from the stations into the adjacent waterways. Affected customers would not have sewer service until the District repairs lift stations or establishes temporary pumping facilities. However, the customers may not be aware that a downstream facility is inoperable, and continue to use their facilities, adding to the downstream problems. The District has obtained a portable bypass pump system to use in situations where a lift station is inoperable, or when a section of main must be bypassed. |
| **Landslide** | Sammamish Plateau Water is located in the foothills of the Cascades on top of a plateau. There are steep slopes throughout the area, especially in areas descending from the top of the plateau to the valleys and Lake Sammamish. | **Water:** In the Cascade View Zone, there are limited water facilities in the potential landslide hazard areas as identified by King County's GIS maps. In the Plateau Zone, there are water mains in the potential landslide hazard area. The majority of these mains are in roadways, but there are some mains that traverse steep slopes. They are located in areas that are not part of an improved corridor.<br>**Sewer:** There are sewer mains in the identified potential landslide areas. Some are in improved roads, but there are six instances where mains carry flow from the top of the plateau down to lower elevations, traversing the landslide hazard area in unimproved corridors. One of these is a main that carries the flow from more than half of the District's sewer customers, built into an old railroad grade. | **Both Water and Sewer:** Landslides in certain areas of the District may damage District facilities or affect our ability to access our water and sewer sites. Since the landslide areas are usually associated with slopes, it is possible for damage to occur below the break point from flows from broken mains. |

## Hazard Risk and Vulnerability Summary

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| **Severe Weather** | In the 2014 Hazard Mitigation Plan update, the District identified severe weather as one of its top three scores during the hazard risk ranking process. **Water:** ***Drought:*** During a drought event, the District may activate its Water Shortage Response Plan, which consists of four stages including mandatory restrictions if needed to protect the drinking water supply. Climate change could exacerbate drought conditions affecting the water supply. **Sewer:** ***Drought:*** The sewer system is minimally affected by drought. **Both Water and Sewer:** ***Wind Events and Severe Storms:*** The number and size of trees in the District means there is a high likelihood of downed power lines in a windstorm. The District's ability to provide water and sewer service would be affected due to loss of power supply and access to facilities due to downed trees and power lines. | **Water:** ***Drought:*** The District' entire water service area is vulnerable to drought events that may reduce the amount of groundwater and regional surface water supply available. Drought usually occurs during the summer months, when the District's water system and storage is already heavily impacted by the need to meet peak season demand. Sewer: Customers reduce water usage during droughts and produce less wastewater that moves into the conveyance system. There will also be less inflow and infiltration (I & I) entering the sanitary sewer through manholes. **Both Water and Sewer:** ***Wind Events and Severe Storms:*** The District is heavily dependent on electrical power to operate its facilities. During power outages caused by severe storms, the District must use backup generators to continue water and sewer service delivery. After both the Inauguration Day Storm in January 1993 and the Hanukkah Eve windstorm in December 2006, the District spent many hours fueling generators to keep the water and sewer system operating. | **Water:** ***Drought:*** The District invoked its Water Shortage Response Plan to Stage 3 mandatory restrictions District-wide in 2001; Stage 2 conservation measures in Cascade View in 2003, Stage 3 mandatory restrictions in Cascade View in 2004, and District-wide Stage 1 advisory stage in 2005 and 2015. Sewer: The sewer system may experience minimal impacts during drought. **Both Water and Sewer:** ***Wind Events and Severe Storms:*** Wind events and severe storms occur annually. Damage can occur to District wells and lift stations due to falling trees. Obtaining fuel for generators during prolonged outage events can be a challenge. The District constructed its own onsite fueling facility in 2014 to enhance fuel supply during extended power outages, including a 6,000-gallon tank for unleaded gasoline and an 8,000-gallon diesel tank. |
| **Severe Winter Weather** | In the 2014 Hazard Mitigation Plan update, the District identified severe winter weather as one of its top three scores during the risk ranking process. The February 2019 Snowstorm event that paralyzed east King County highlighted the need for enhanced | **Both Water and Sewer:** The District is heavily dependent on electrical power to operate its facilities. During power outages caused by winter weather, the District must use backup generators to continue water and sewer service delivery. Adequate staffing during a severe winter event will be a critical | **Both Water and Sewer:** The District has one truck-mounted snowplow to use for emergency snow clearing, and a backhoe to clear the office parking areas. The District relies on the local cities and King County for snow removal in order to |

*Hazard Risk and Vulnerability Summary*

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| | planning efforts for snow events. The District is a hilly area with limited roads for accessing the higher plateaus. Getting to the District office site and facilities can be challenging. Heavy snows can impact the provision of power if trees or branches lean onto or fall over power lines. The District's ability to provide water and sewer service would be effected due to loss of power supply and access to facilities due to downed trees and power lines. | vulnerability due to the District's small staff and the considerable distance they have to drive to get to work. There are also safety concerns around traveling on snow-covered roads. | reach the water and sewer facilities. |
| **Tsunami** | There are no tsunami hazards within the District, although Lake Sammamish could be affected by a seiche during a seismic event. | **Water:** No seiche hazards noted to water facilities. **Sewer:** Mallard Bay, Alexanders and Freegard lift stations could be vulnerable if a seiche were to occur on Lake Sammamish. | **Water:** No impacts noted. **Sewer:** Flood impacts from a seiche could include damage to the lift stations, resulting in sewer overflows of raw sewage from the stations into the adjacent waterways. Affected customers would not have sewer service until the lift stations are repaired. However, the customers may not be aware that a downstream facility is inoperable, and continue to use their facilities, adding to the downstream problems. |
| **Volcano** | The District is not located in any volcanic hazard areas for debris flowers, lahars, lava or pyroclastic flows but could be subjected to ash falls depending on wind direction. | **Both Water and Sewer:** Depending on the extent and direction of the ash fall, water and wastewater facilities, District buildings, vehicles and personnel could be affected. Ash can infiltrate and abrade moving vehicle parts and can lead to engine failure. There are negative health effects to people breathing air laden with ash. | **Both Water and Sewer:** Ash fallout could damage buildings, vehicles, water and wastewater facilities, power supply, communications equipment, as well as cause health impacts to humans. This could disrupt our provision of water and sewer services. The District has stockpiled N95 dust masks to distribute to staff to reduce particle inhalation |

*Hazard Risk and Vulnerability Summary*

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| | | | and help minimize health risks. |
| **Wildfire** | The District includes a mix of urban and rural areas. Although not officially designated a wildland-urban interface, the potential exists for wildfires to occur in the District's service territory. | **Both Water and Sewer:** Some incorporated areas of Issaquah and Sammamish are heavily forested, primarily greenbelts, parks and nature preserves. The rural area has larger, contiguous forested areas. These areas could be susceptible to wildfires that are human or naturally caused. In addition, structure fires occurring on these interface areas could lead to a wildland fire. | **Water:** District facilities in wooded areas could be impacted by area wildfires, most notably the two 4 million gallon water storage tanks and the booster pumping station adjacent to Soaring Eagle Park. Above ground facilities may be impacted by fires, but the buried pipelines are less vulnerable. The water system's redundancy would help the continued provision of service if a facility were impacted by a wildfire. **Sewer:** Impacted sewer facilities, such as lift stations, would be more difficult to cover, since they provide service to a unique area not served by other sewer facilities. If a lift station were impacted, it would likely be difficult to utilize a bypass pumping system until the fire was controlled. |
| **Civil Disturbance** | Although civil disturbances may have occurred in our service territory, to date, there has been no damage to District facilities or harm to District staff due to any sort of a civil disturbance. | **Both Water and Sewer:** The cities of Issaquah and Sammamish, both served by the District, generally have low crime rate. Both cities have been near the top of various lists as some of the safest cities in Washington state. With the exception of a few schools, the unincorporated area served by the District does not have areas normally used for large gatherings. | **Both Water and Sewer:** There is the potential for a loss of District assets or harm to personnel or residents due to a civil disturbance. |
| **Cyber Attack** | A cyber-attack could paralyze District operations for months. Recent attacks on Alderwood Water and Wastewater District, the City of Sammamish and the City of Baltimore, MD has | **Both Water and Sewer:** The District computer use includes a District website, staff access to the internet, staff use of remote access, Supervisory Control and Data Acquisition (SCADA) systems. These are all potential | **Both Water and Sewer:** To minimize the likelihood of a cyber-attack, the District is committed to providing resources to prevent cyberattacks from occurring, including ongoing staff |

*Hazard Risk and Vulnerability Summary*

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| | shown that agencies can be crippled by a Ransomware attack for many months afterward, limiting the ability to operate effectively. | points where a cyber-criminal could attempt to access one of the District's computer systems. | training to recognize cyber threats and prevent them from happening. The District reduces the probability of non-permissible access to its network by using firewall protection, virus and spyware software, VPN access software and windows authentication. The District has a three-tiered approach to filter incoming email, a common attack vector. The District's SCADA (Supervisory Control and Data Acquisition) system is designed with alarms to alert personnel when desired levels of production are outside of the normal range. It is monitored 24/7/365. It can store historical data trends over time to observe potential issues with specific equipment. It allows assigned users the ability to issue commands remotely to each facility to effectively manage existing equipment for maintenance or production related issues. The District's anti-virus/anti-malware software offers further protection against network-based attacks, as well as shielding against activity initiated by the end user (clicking on a malicious website, for instance). If a malicious email somehow makes it past the District's Firewall and Server levels of defense, the anti-malware software can mitigate the problem at the user's workstation. |

*Hazard Risk and Vulnerability Summary*

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| **Dam Failure** | There are no dams within the District's service territory. Seattle's regional water supply has dams within the Cedar and Tolt River Watersheds | Seattle Public Utilities owns, operates and maintains the regional water supply dams. | Failure of one or both dams would affect the region's water supply. Since only 10-20% of the District's water supply comes from the regional system, the District would rely upon its groundwater resources during a dam failure incident. |
| **Hazardous Materials Incident** | A hazardous materials incident has the potential to affect the District water operations if there is a spill in the areas that recharge the District's wells. Hazardous materials may also enter the water system through a backflow incident. The sewer system may be impacted if hazardous materials are discharged through a customer's plumbing system, or through an illicit connection to a manhole. | **Water:** Commercial and industrial development in the Issaquah Valley increases the potential for a hazardous material spill that could affect the aquifer tapped by District wells. Hazardous materials are also transported on major highways that traverse the aquifer recharge area, There is an increased potential for aquifer contamination following an earthquake due to the potential failure of hazardous materials containment facilities within aquifer recharge areas. **Sewer:** Spills entering the sewer system would be from a more direct, intentional connection, such as a person dumping hazardous chemicals into a home sink drain. | **Both Water and Sewer:** The District maintains a Well Head Protection Program that contains an inventory of potential groundwater contaminant sites and outlines the risk of contamination of the various aquifers used by the District for drinking water supply. Depending upon the material, contamination of the aquifer during a hazardous materials spill could lead to a potential threat to public health. Due to its system redundancy, the District can make operational alterations during a contamination incident, by changing the drinking water wells in use, or increasing the use of the regional surface water supply. The District would work with the Washington State Departments of Health and Ecology during cleanup efforts and public notification. |
| **Public Health Emergency** | A public health emergency would include risks to both District employees and customers. Customers that provide health services may have increased demands on the system. Research shows a public health emergency such as a pandemic could | **Both Water and Sewer:** A pandemic outbreak could jeopardize our provision of essential water and sewer services if essential staff are not available to perform basic operational functions. Staff members that contract the illness could be out of work for an extended period. | **Both Water and Sewer:** The District developed a Health Advisory Plan in 2015 to help District staff identify how to continue operations during a pandemic or public health emergency. It included the identification of essential |

*Hazard Risk and Vulnerability Summary*

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| | last for weeks and possibly months. | The District work force could be reduced by 30%, including sick employees and those caring for affected family members. The duration of the reduced staff situation could last six months or longer. There could also be a fiscal impact if sick customers cannot pay for these services due to their own personal illnesses. There are several medical clinics in the District's service area, but only one facility that provides care to admitted patients. | tasks and positions assigned to accomplish these tasks during continuity of operations throughout the incident. |
| **Structure Fire** | Structure fires occasionally occur within our service territory. There is a chance that a structure fire could ignite a wildfire if the necessary fuel and weather conditions exist. | **Both Water and Sewer:** A structure fire at a District facility would impact the service provided by that facility. A fire at the District office headquarters, a wood frame building, could have a significant impact on District operations. The headquarters vehicle storage building is a metal building, and less susceptible to fire itself, but housing vehicles that could pose a large fire hazard. Both the office and vehicle storage buildings have fire sprinklers. The water and sewer sites all have the potential to be negatively affected by structure fires in the facilities, but most are concrete block construction, which is less susceptible to fire. | **Both Water and Sewer:** A structure fire at the District's headquarters would force the District to move to one of its designated alternate Emergency Operations Center (EOC) facilities to continue operations. The District's secondary EOC is in the vehicle storage building at the headquarters site, which also houses the District's backup computer servers. Administrative operations would be limited until work spaces, computer and communication facilities could be re-established. Due to its water system's redundancy, the District can make operational alterations during a fire incident at one site. Fire at a sewer site would more likely require work to move the sewage around the impacted facility, utilizing a bypass pumping system. |
| **Terrorism** | A terrorist attack targeting contamination of the District's water supply could have extreme consequences for District staff and its customers, | **Both Water and Sewer:** All District water facilities have potential to be targeted with an intentional water contamination act. Water and sewer facilities in more remote or wooded areas of | **Both Water and Sewer:** An intentional contamination act could overwhelm the District's small staff and require mutual aid assistance, including involvement from |

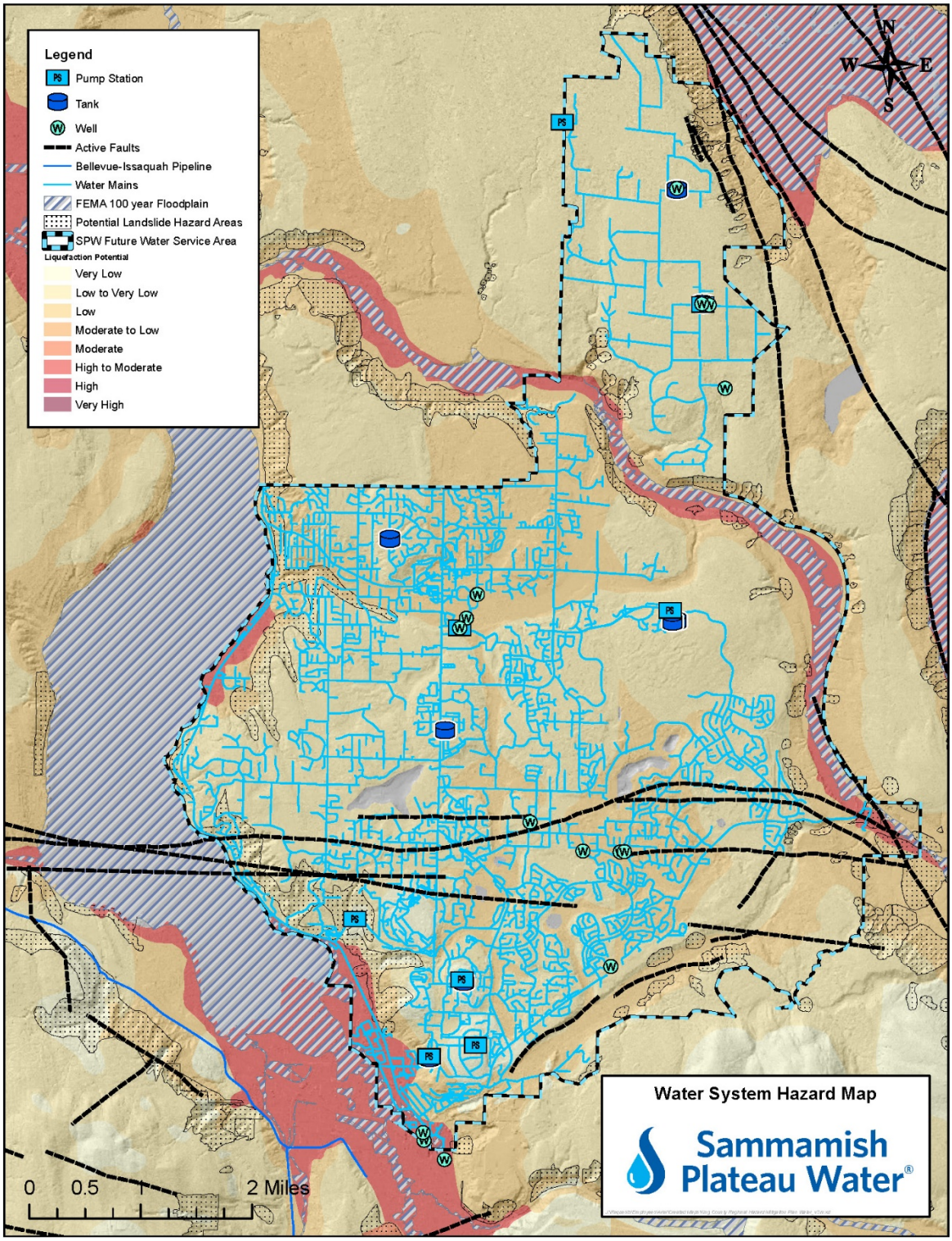
*Hazard Risk and Vulnerability Summary*

| HAZARD | RISK SUMMARY | VULNERABILITY SUMMARY | IMPACT SUMMARY |
|---|---|---|---|
| | including the potential for illness or loss of life. | the District tend to be more susceptible to trespassing or graffiti incidents. The District makes ongoing investments in security enhancement, including employee badging, signing in and badging all visitors, fencing, building security alarms at all facilities, lighting, signage, and security cameras. | city, county state and federal agencies. It would require a significant public notification effort. The District has made ongoing investments in facility security. District staff members document all security incidents. The District completed a vulnerability assessment in 2003, and certain recommendations from the assessment have been implemented. The District will complete a 2020 Risk and Resiliency Assessment (2020 RRA) as part of America's Water Infrastructure Act (AWIA). |

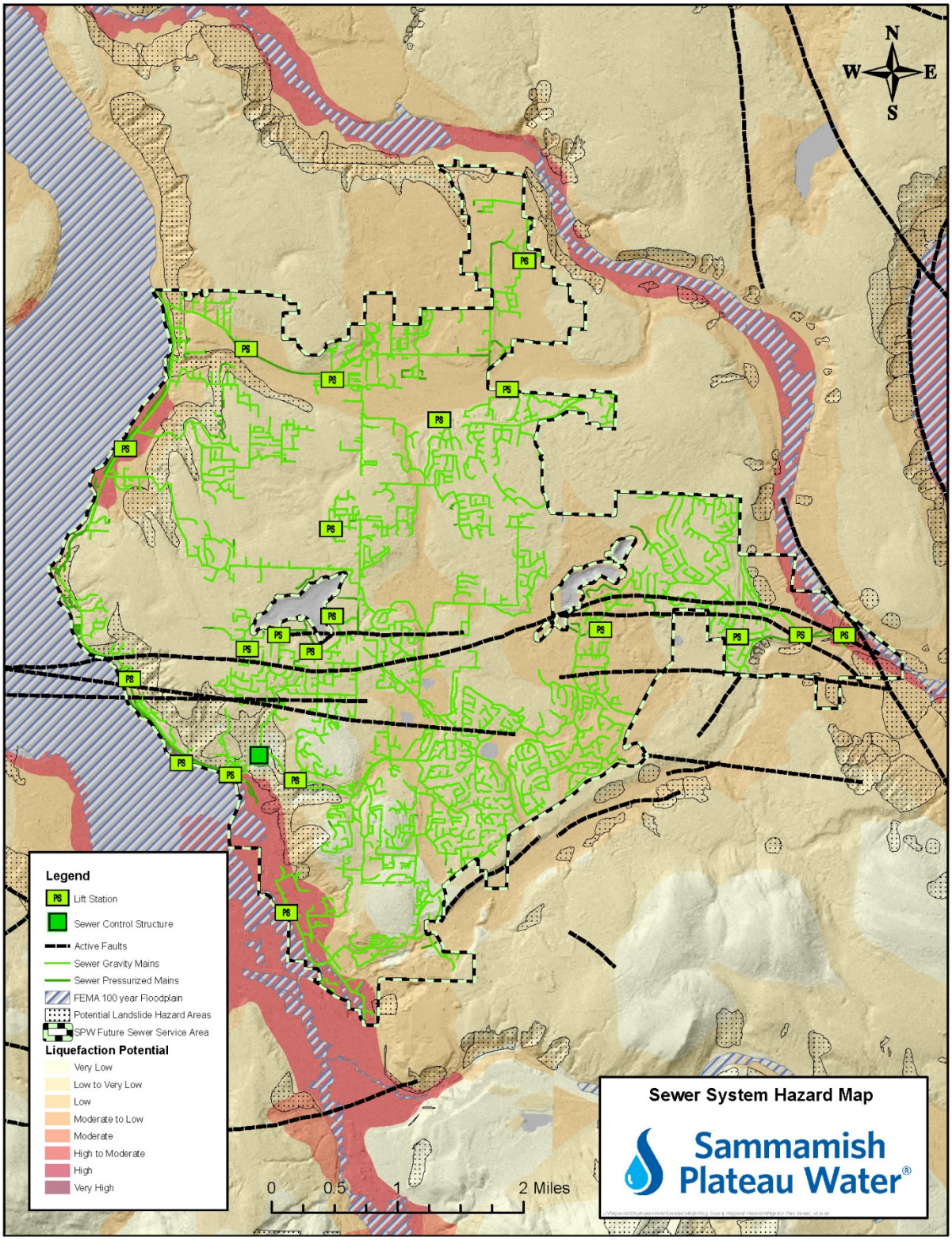
2019: The District installed steel stiffeners inside the 2 MG tank to provide stability during seismic events. Note the size of the workers for scale.

2019: American Water Works Association Young Professionals take a tour of the 2 MG tank seismic retrofits. The contractors conducted all work through a large access point cut into the wall of the steel tank.

## Hazard and Asset Overview Maps – Water System



## Hazard and Asset Overview Maps – Sewer System



## Assets at Risk[1] *For a detailed analysis of risks and vulnerabilities please see the "Hazard Risk and Vulnerability Summary" section of this annex.*

| ASSET | 2019 REPLACEMENT VALUE ($) | RISK SUMMARY: Where is the potential for damage, loss or other impacts? | VULNERABILITY SUMMARY: What are the weaknesses that make these assets vulnerable? | IMPACT SUMMARY: What are the impacts if the assets are lost? |
|---|---|---|---|---|
| **WATER OPERATIONS** | | | | |
| **303 miles of Water Mains** | $675,723,979 | Potential for earthquake damage to water and sewer infrastructure, particularly those on the Seattle Fault. | Pipe composition, pipes located in fault zones or liquefaction areas, type of event, magnitude and duration. | Unable to provide water to customers, potential water contamination |
| **46 Pressure Reducing Valves** | $7,016,441 | Potential for earthquake damage to water and sewer infrastructure. | Access may be affected during an earthquake. | Pressure variances throughout the water system. |
| **18,655 Water Meters** | $6,550,684 | Potential for earthquake damage to water and sewer infrastructure, automated metering infrastructure vulnerable to cyber-attack, severe weather can cause power outages that will affect meters, and heavy snow can bury meters. | Loss of power, communications and internet, access during incidents. | Loss of remote meter reads with automated meter infrastructure may require manual meter reading. Billing issues during long power outages may result in potential loss of revenue. |
| **12 Wells** | $21,159,899 | Potential for earthquake damage to water and sewer infrastructure, extended power outages may require generator use and fueling, terrorists can intentionally contaminate the water supply. | Loss of power, communications and internet, site access, storage of treatment chemicals onsite, site security issues. | Ability to provide water to customers, damage to water treatment facilities, potential water contamination by terrorists. |
| **8 Reservoirs** | $32,176,124 | Potential for earthquake damage to water and sewer infrastructure, | Loss of power, communications and internet, some reservoirs located in | Ability to provide water to customers, potential water contamination by |

*Assets at Risk*[1] *For a detailed analysis of risks and vulnerabilities please see the "Hazard Risk and Vulnerability Summary" section of this annex.*

| ASSET | 2019 REPLACEMENT VALUE ($) | RISK SUMMARY: Where is the potential for damage, loss or other impacts? | VULNERABILITY SUMMARY: What are the weaknesses that make these assets vulnerable? | IMPACT SUMMARY: What are the impacts if the assets are lost? |
|---|---|---|---|---|
| | | terrorists can intentionally contaminate the water supply. | wooded areas, site security. | terrorists, property damage if tanks fail during an earthquake. |
| **Reservoir Coatings** | $12,285,611 | Vandals can damage the coatings during graffiti incidents. | Site security, some reservoirs located in wooded areas. | Cost to District to repair/replace coatings. |
| **8 Booster Stations** | $4,090,121 | Potential for earthquake damage to water and sewer infrastructure, extended power outages may require generator use and fueling. | Loss of power, communications and internet, site security. | Ability to supply water to customers due to District topography. |
| **SEWER OPERATIONS** | | | | |
| **187 miles of Sewer Mains** | $364,877,297 | Potential for earthquake damage to water and sewer infrastructure, particularly those on the Seattle Fault. | Pipe composition, pipes located in fault zones or liquefaction areas, type of event, magnitude and duration. | Unable to provide sewer to customers, sewer flows could cause property or environmental damage |
| **20 Lift Stations** | $12,135,642 | Potential for earthquake damage to water and sewer infrastructure, extended power outages may require generator use and fueling. | Loss of power and communications Located in areas close lakes, wetlands and flood plains. | Inability to pump sewage to downstream facilities, sewer flows from damaged facilities could cause property or environmental damage |
| **DISTRICT BUILDINGS AND EQUIPMENT** | | | | |
| **District Headquarters** | $13,194,960 | Potential for earthquake damage to water and sewer infrastructure, extended power outages may require generator use and | Loss of power, communications and internet, storage of treatment chemicals onsite, staffing issues, relocation for | All District operations would be compromised, especially if facility relocation is necessary for |

*Assets at Risk*[1] *For a detailed analysis of risks and vulnerabilities please see the "Hazard Risk and Vulnerability Summary" section of this annex.*

| ASSET | 2019 REPLACEMENT VALUE ($) | RISK SUMMARY: Where is the potential for damage, loss or other impacts? | VULNERABILITY SUMMARY: What are the weaknesses that make these assets vulnerable? | IMPACT SUMMARY: What are the impacts if the assets are lost? |
|---|---|---|---|---|
| | | fueling, terrorists/cyber terrorists could target the headquarters building to disrupt water and sewer operations, a structure fire would require relocation, a public health emergency could limit staffing options. | continuity of operations | continuity of operations |
| **Technology Hardware and Software** | $4,663,845 | Potential for earthquake damage to water and sewer infrastructure, extended power outages may require generator use and fueling, terrorists/cyber terrorists could target the headquarters building to disrupt water and sewer operations, a structure fire would require relocation, a public health emergency could limit staffing options. | Loss of power, communications and internet, lack of redundancy in IT staffing, staff training on IT topics | District workflow could be compromised for weeks or months |
| **Vehicles** | $3,859,000 | Vehicle damage can occur during earthquakes, severe storms and structure fires. | Vehicles could be damaged and unavailable during various emergency incidents | Difficulties and delays for workers to complete tasks. |
| **Equipment** | $1,482,000 | Equipment damage can occur during earthquakes, severe storms and structure fires. | Equipment could be damaged and unavailable during various emergency incidents | Difficulties and delays for workers to complete tasks. |

## Assets at Risk[1] *For a detailed analysis of risks and vulnerabilities please see the "Hazard Risk and Vulnerability Summary" section of this annex.*

| ASSET | 2019 REPLACEMENT VALUE ($) | RISK SUMMARY: Where is the potential for damage, loss or other impacts? | VULNERABILITY SUMMARY: What are the weaknesses that make these assets vulnerable? | IMPACT SUMMARY: What are the impacts if the assets are lost? |
|---|---|---|---|---|
| **GRAND TOTAL** | **$1,159,216,000** | | | |

[1] *Data source: Sammamish Plateau Water and Sewer District's Asset Management Plan. Totals updated July 2019.*

District staff discussed the Regional Hazard Mitigation Plan annex at the Sammamish Disaster Fair, held on September 7, 2019 at the Central Washington University campus. This was one of two outreach events conducted by the District.

Staff gave a PowerPoint presentation discussing the various hazards affecting Sammamish and described the hazard mitigation planning process.

Staff displayed maps of hazards affecting the water and sewer systems at the District booth throughout the six-hour event. The maps were quite popular and raised awareness of the various area hazards. Giveaways included three-quart water storage containers, brochures and booklets.

Over 800 residents attended the fair, which was advertised in local papers and on the District's social media sites.

## Plan Update Process

### *Jurisdiction Planning Team*

| NAME | TITLE | ORGANIZATION | CONTRIBUTION |
|---|---|---|---|
| **Janet Sailer** | Planning and Outreach Coordinator | Sammamish Plateau Water & Sewer District | Primary Hazard Mitigation Plan Author |
| **Jay Regenstreif** | Planning Engineer | Sammamish Plateau Water & Sewer District | Managed HMP process completion |
| **Kyle Wong** | Engineering Manager | Sammamish Plateau Water & Sewer District | Capital Projects Program Manager |
| **Jim Konigsfeld** | Senior Engineer | Sammamish Plateau Water & Sewer District | Developed capital projects for HMP |
| **Rich Henry** | Information Technology Manager | Sammamish Plateau Water & Sewer District | Cybersecurity information |
| **Kevin DeRouen** | Information Systems Manager | Sammamish Plateau Water & Sewer District | IS/GIS Manager |
| **Brett Angel** | Database Analyst | Sammamish Plateau Water & Sewer District | GIS Map Supervision |
| **Ariel Davidson** | Data Technician | Sammamish Plateau Water & Sewer District | GIS Maps |
| **Andy Tuchscherer** | Operations Manager | Sammamish Plateau Water & Sewer District | Responsible for water and sewer system operations and maintenance. |
| **Tammy Whipple** | Assistant to the General Manager for Fiscal & Project Management | Sammamish Plateau Water & Sewer District | Asset Management Program Manager |
| **Angel Barton** | Finance Manager | Sammamish Plateau Water & Sewer District | Financial information |

### *Plan Update Timeline*

| PLANNING ACTIVITY | DATE(S) | SUMMARY | ATTENDEES |
|---|---|---|---|
| **King County Regional Hazard Mitigation Planning Workshop** | December 13, 2018 | Risk Assessments | Multiple agencies represented |
| **Document Review** | March – October 2019 | Review District's planning documents | Planning and Outreach Coordinator |
| **Engagement with other local agencies** | March 4, 2019 | Review plan annex document. | SPWSD staff, King County HMP staff, City of Sammamish staff, NE Sammamish Sewer and Water District staff |
| **Identify critical assets and replacement value** | March – July 2019 | Gather information about critical assets | Planning and Outreach Coordinator |

### Plan Update Timeline

| Planning Activity | Date(s) | Summary | Attendees |
|---|---|---|---|
| **King County Regional Hazard Mitigation Planning Workshop** | June 27, 2019 | Updates on public process, risk assessment process and mitigation plan annex template review | Planning and Outreach Coordinator |
| **King County Regional Hazard Mitigation Planning Workshop** | July 25, 2019 | Mitigation strategy workshop (via email updates) | Planning and Outreach Coordinator |
| **Create hazard maps** | August 2019 | Create hazard map with District facilities identified. | GIS Analyst, Data Technician |
| **Create draft report** | March – September 2019 | Complete hazard mitigation plan annex document | Planning and Outreach Coordinator |
| **Team review** | August 21, 2019 | Emergency Planning Committee team review | Emergency Planning Committee team |
| **King County Regional Hazard Mitigation Planning Workshop** | August 22, 2019 | Mitigation funding | Planning and Outreach Coordinator, Engineering Manager, Engineering Assistant, Executive Assistant |
| **Board of Commissioners review of draft plan** | November 2019 | Review draft plan | Planning and Outreach Coordinator, Planning Engineer, Board of Commissioners, General Manager |
| **Board of Commissioners final plan approval** | May 2020 | Final approval for incorporation into KCHMP | Planning and Outreach Coordinator, Planning Engineer, Board of Commissioners, General Manager |

## Public Outreach

### Public Outreach Events

| Event | Date | Summary | Attendees |
|---|---|---|---|
| **Sammamish Disaster Preparedness Fair** | September 7, 2019 | Hazard mitigation plan presentation with residents, displayed hazard maps. | 800 estimated in attendance. |
| **Board Commissioners Open Public meeting** | November 11, 2019 | Present and discuss draft Hazard Mitigation Plan Board adoption of Final Hazard Mitigation Plan. | Five District Board of Commissioners, meeting attendees |

## Sammamish Plateau Water & Sewer District Hazard Mitigation Program

The Sammamish Plateau Water and Sewer District's mission is to provide safe, efficient and reliable water and sewer service by being a leader in the planning and practice of fiscal and environmental stewardship.

The District's Annex to King County's Regional Hazard Mitigation Plan is the road map to understanding the hazards in the District's service area and finding ways to protect water and sewer infrastructure and reduce potential losses from future disasters.

*2019: Seismic retrofits at the District's 2 million gallon tank included the pouring of a concrete pad and installing steel stiffeners on the inside walls.*

Using guidance materials provided by King County, Sammamish Plateau Water met with an internal planning team to identify hazards affecting the service area and mitigation strategies and projects to enhance the water and sewer systems' resiliency.

**Dealing with Climate Change:** District staff closely monitors rainfall conditions and groundwater resources through our SCADA system. We regularly review hydrographs monitoring aquifer depth.

The District has experienced drought conditions in the past. In 2017, the District updated its Water Shortage Response Plan, which provides systematic responses and methods to reduce customer water demand due to a water supply shortage from an emergency, drought event, or operational situation. The Water Shortage Response Plan establishes actions and procedures for evaluating supply options and managing water demand during a water supply shortage.

**Equity and Social Justice:** The District is located in one of the wealthiest areas in Washington State. The median household income in 2018 was $153, 253, compared to the state average of $62,848. Race demographics: 74% of the population is white, 19% Asian, 3% Hispanic, and less than 1% is African American. Repair of water and sewer pipes and facilities affects all ratepayer populations equally, including vulnerable populations. All ratepayers contribute to District funding for repair, maintenance and capital projects.

Research has indicated that only 2.5 % of the customers in our service area live below the poverty line. For those customers, Sammamish Plateau Water offers a Low Income Discount Program. The Low Income Discount Program provides a 45% water rate discount and a 30% sewer rate discount for qualifying customers. The District currently has 54 households participating in this program.

**Asset Management:** The District is an asset-intensive business. Delivery of water and sewer services greatly relies on the operation, maintenance, and addition or replacement of infrastructure. The District emphasizes planning for future capital replacement, and actively funds reserves for future infrastructure replacement. The Asset Management Plan (AMT) identifies more than 45,000 water assets and 17,500 sewer assets. The asset registry consists of data housed in databases residing in the District's geographic information system (GIS) and computerized maintenance management system (CMMS). The AMT examined useful life, condition assessment, life cycle and replacement costs, levels of service, criticality ratings and preventative maintenance strategies. The District reviewed its facilities and considered various "consequnce of failure" scenarios. For each facility reviewed, the District identified potential options to restore the asset to working condition, including whether there were backup facilities or redunancy throughout the system which could sustain service until the failed facility was restored.

Upon completing the assessment of which assets are critical to sustaining service delivery, it was found that the criticality of any one asset in the District's water system is relatively low due to system redundancy, planned for and built throughout development of the water system. The criticality of the District's sewer system is generally low, except for lift stations and force mains that could have higher flow volumes resulting in higher criticality ratings. Water and sewer assets can typically be isolated or bypassed, limiting the number of customers affected and decreasing overall risk to the District.

**Plan Monitoring, Implementation, Integration and Future Updates**

King County leads the mitigation plan monitoring and update process. The county will schedule the annual partner progress reports on their plans, and agencies will provide mitigation strategy updates for inclusion in the countywide annual report. The District's internal planning team will meet annually to review the progress on hazard mitigation strategies and to update the plan.

King County Emergency Management will inform planning partners of any federal notices of funding opportunity for the Hazard Mitigation Assistance Grant Program and will assess proposals from partners according the process identified in this plan. The county will support those partners submitting grant proposals where possible.

The next County plan update is expected to be due in April 2025. All jurisdictions will submit letters of intent by 2023, at least two years prior to plan expiration. The county will lead the next regional planning effort, beginning at least 18 months before the expiration of the 2020 plan.

**Plan Integration Strategy**

The District integrates the Hazard Mitigation Plan into several Plans and Programs. All Plans are listed in the Plans and Programs, Policies and Processes tables. The key to implementation of the Hazard Mitigation Plan is how these myriad of Plans and Programs are integrated.

- **Emergency Program Plans**: The Emergency Response Plan, Health Advisory Plan, 2014 Seismic Vulnerability Assessment Report and subsequent 2017 Seismic Pipeline Study, and the 2015 KCRHMP Annex all identify risks faced by the District and recommend projects and actions to reduce those risks.
- **Comprehensive Plans**: The Water Comprehensive Plan and Wastewater Comprehensive Plan both include long-term capital improvement programs that coordinate projects identified through analyses, studies and plans, including the Emergency Program Plans.
- **Financial Program**: The Asset Management Plan, 5-year Capital Program and associated 2-year Capital Plan and the Annual Budget are the financial program plans. The District's Capital Plan brings in projects from both the Emergency Program Plans and Comprehensive Plans. The funding sources and resource requirements are fed directly from the plans and programs that identify projects required to reduce the District's risk and address identified hazards. These requirements are tied into the Annual Budget, as is the funding required to support the Asset Management Plan. As plans and programs are updated, the financial program is as well.

The Hazard Mitigation Plan is incorporated throughout the Comprehensive Plans and Capital Program, and the funding needs identified through those plans and programs are integrated into the District budget.

**Continued Public Participation**

The District's outreach team will work with media and other agency partners to publicize mitigation success stories and help explain how the District is addressing vulnerabilities. The District may conduct public tours of mitigation projects

to allow community members to see successful mitigation in action. The District will use outreach events, social media, website posts, and customer surveys to engage our customers in the mitigation strategy.

## Hazard Mitigation Authorities, Responsibilities, and Capabilities

### *Plans*

| Plan Title | Responsible Agency | Point of Contact | Relationship to Hazard Mitigation Plan |
|---|---|---|---|
| **2018 Water Comprehensive Plan** | Sammamish Plateau Water. Plan adopted by Resolution 4959 on 5/11/2020 | Jay Regenstreif, Planning Engineer | Considers all aspects of the provision of water service, including emergency management. |
| **2013 Wastewater Comprehensive Plan** | Sammamish Plateau Water. Adopted by Resolution 4518 on August 10, 2015 | Jay Regenstreif, Planning Engineer | Considers all aspects of the provision of sewer service, including emergency management. |
| **Emergency Response Plan 2014** | Sammamish Plateau Water. Adopted by Resolution 4316 on 2/3/2014. | Janet Sailer, Planning and Outreach Coordinator | Describes the District's ability to prepare for, respond to and recover from emergency incidents. |
| **2020-2021 Capital Plan as part of 2020-2025 Capital Program** | Sammamish Plateau Water, 2018 | Kyle Wong, Engineering Manager | Includes proposed capital projects for the 2020-2021 period and forecasts projects into 2025. |
| **Asset Management Plan 2016** | Sammamish Plateau Water, 2016. Adopted by Resolution 4571 on 4/4/2016 | Tammy Whipple, Assistant to the General Manager for Fiscal and Project Management | Includes asset registry, performance and failure modes, residual life, life cycle and replacement costs, target levels of service, asset criticality, operations and maintenance assessment, capital investment and funding strategy. |
| **SPW Annual Budget** | Sammamish Plateau Water. Adopted by Resolution 4923 on 12/2/2019. | Angel Barton, Finance Manager | Includes operating budget and capital project costs. |
| **Seismic Vulnerability Assessment Report 2014** | Sammamish Plateau Water, 2014 | Kyle Wong, Engineering Manager | Overall risk assessment of vulnerability of District assets to earthquakes. |
| **Seismic Pipeline Study from Well 9 to 650 Zone - 2017** | Sammamish Plateau Water. Approved by Resolution 4771 on 2/12/2018. | Kyle Wong, Engineering Manager | Identified infrastructure improvements, project options and cost estimates for the area |

| | | | |
|---|---|---|---|
| | | | between Well 9 and the 650 water pressure zone. |
| **Health Advisory Plan - 2015** | Sammamish Plateau Water. Adopted by Resolution 4540 on December 7, 2015. | Jay Regenstreif, Planning Engineer | Describes continuity of operations during a pandemic incident. |
| **King County Regional Hazard Mitigation Plan Annex - 2015** | In partnership with King County. Last revision: 2015, Adopted by Resolution 4453 on January 5, 2015 | Janet Sailer, Planning and Outreach Coordinator | The plan assesses the agency's risks and vulnerabilities to hazards and develops strategies to reduce hazard risk. |

### *Programs, Policies, and Processes*

| PROGRAM/POLICY | RESPONSIBLE AGENCY | POINT OF CONTACT | RELATIONSHIP TO HAZARD MITIGATION PLAN |
|---|---|---|---|
| **Emergency Management Program** | Sammamish Plateau Water & Sewer District | Janet Sailer, Planning and Outreach Coordinator | Hazard plan information will be incorporated into emergency response plan. |
| **Capital Program** | Sammamish Plateau Water & Sewer District | Kyle Wong, Engineering Manager | Hazard mitigation plan will drive selected capital projects. |

### *Entities Responsible for Hazard Mitigation*

| AGENCY/ORGANIZATION | POINT OF CONTACT | RESPONSIBILITY(S) |
|---|---|---|
| **Sammamish Plateau Water & Sewer District** | Janet Sailer, Planning and Outreach Coordinator | Write and maintain hazard mitigation plan |

## National Flood Insurance Program

### *National Flood Insurance Program Compliance*

| | |
|---|---|
| What department is responsible for floodplain management in your community? | We are a special purpose drinking water and sewer service provider and do not have jurisdiction regarding stormwater or flood issues. |

## *2015 Hazard Mitigation Strategy Status*

| STRATEGY | DESCRIPTION | PRIORITY | STATUS |
|---|---|---|---|
| **SP-1: Continue to support county-wide initiatives** | The District has a link to King County's "Make it Through" page on its website. | Low priority | Completed |
| **SP-2: Provide progress reports as requested** | The District updated the progress of its strategy through annual reports to King County. | Low priority | Completed |
| **SP-3: Replace existing ductile iron pipe through liquefiable soils with seismic resistant transmission system from Well 9 to the 650 Zone** | Action taken: 2017: Consultant completed study to evaluate pipeline routes and operating alternatives to move water from Well 9 to the 650 Zone. June 2019 – Hired Consultant to complete a land acquisition study for the Well 9 to 650 Zone project. | High priority | Ongoing |
| **SP-4: Seismically upgrade the 297 tank anchorage and the 297 site retaining wall** | Action taken: The District completed the 297 Tank Seismic Retrofit Project with improved anchorage designed for ground accelerations from a 975-year (statistical return period) seismic event. Final cost: $145,825 | Complete | Completed |
| **SP-5: Seismically upgrade the 7 MG tank anchorage.** | Action taken: District installed an earthquake valve in 2018 to isolate tank storage during a seismic event. | High priority | Ongoing |
| **SP-6: Complete seismic retrofits and upgrades of Well 12 Tank.** | The District changed the prioritization of this project. The 2014 District Seismic Vulnerability Assessment report indicated that it was difficult to economically justify mitigation for this project. | This project has been removed from consideration since mitigation was not economically feasible. | Removed |
| **SP-7: Complete seismic retrofits and upgrades of the sewer control structure** | Action taken: District retained a consultant to review the control structure site. | This project has been removed from consideration since a consultant's review indicated that mitigation could be delayed to an undetermined time in the future. | Removed |

## *2020 Hazard Mitigation Strategies*

| STRATEGY | LEAD AGENCY/POC | TIMELINE | PRIORITY |
|---|---|---|---|
| **SP-3: Complete Well 9 to 650 zone transmission system project to replace existing ductile iron pipe through liquefiable soils with seismic resistant transmission system** | Sammamish Plateau Water & Sewer District.<br>POC: Engineering Manager | **Planned Actions:** 2019-2021: Identify and acquire land and/or easements for booster pump station and transmission main. Construction project is anticipated for 2028-2037. | Ongoing |
| **SP-5: Complete 7 million gallon (MG) tank anchorage seismic retrofit project** | Sammamish Plateau Water & Sewer District.<br>POC: Engineering Manager | Action taken: District installed an earthquake valve in 2018 to isolate tank storage during a seismic event. District consultant has prepared plans for the 7 MG Tank Seismic Retrofit Project. Planned Actions: Complete the retrofit project in 2020-2021. | Ongoing |
| **SP-8: Complete 2 million gallon (MG) tank anchorage seismic retrofits** | Sammamish Plateau Water & Sewer District.<br>POC: Engineering Manager | Action taken: District hired consultant who prepared plans to reconfigure tank pipe and improve tank resilience for ground acceleration from a 975-year (statistical return period) seismic event. District hired a contractor to do the construction project work, which was completed in 2019. | Completed |

## Hazard Mitigation Strategy

| SPW-3: Complete Well 9 to 650 zone transmission system project | | | |
|---|---|---|---|
| **Lead Points of Contact (Title):** Engineering Manager | **Partner Points of Contact (Title):** Engineering Manager | **Hazards Mitigated / Goals Addressed:** Earthquake, liquefaction | **Funding Sources and Estimated Costs:** SP Water CP funds, cost range is $8 - $32 million. May seek grant funding. |

**Strategy Vision/Objective:**
Construct a redundant and seismically resilient water transmission structure in the area between Well 9 and the 650 pressure zone, which is SP Water's largest pressure zone. This supports the District's goal of having as much of the water system as operational as possible following a seismic event. Using King County's Project Prioritization Comparison Tool, this project scores 12 and is the District's 3rd priority.

**Mitigation Strategy:**
The District completed a Seismic Vulnerability Assessment Report in 2014 that recommended a detailed Seismic Vulnerability Assessment in 2017 of the area between Well 9 and the 650 pressure zone in the Issaquah Valley. The transmission line through this area is currently located in highly liquefiable soils. The 2017 report affirmed the value of the recommended infrastructure improvements. The 2017 Report also concluded that, given the District's current average daily demand in the 650 Zone and the supply capacity available outside of the Lower Issaquah Valley due to the redundancy of the District's water system in this area, the District could delay construction of these infrastructure improvements. The District has the ability to meet levels of service in this area during a seismic event.

| **2-Year Objectives:** | **5-Year Objectives:** | **Long-Term Objectives:** |
|---|---|---|
| Identify and acquire easement and property for booster pump station. | Complete acquisition of easement property for booster pump station. | 2028-2037: Construct transmission main and booster pump station. |

**Implementation Plan/Actions:**
Planned actions 2019-2021: Identify and acquire booster pump station property for easement.
Planned Actions 2028-2037: Construct transmission main and booster pump station.

**Performance Measures:**
Monitor performance of completed facilities during future seismic incidents.

| SP-5: Complete 7 Million Gallon (MG) Tank Anchorage Seismic Retrofit Project | | | |
|---|---|---|---|
| **Lead Points of Contact (Title):** Engineering Manager | **Partner Points of Contact (Title):** Engineering Manager | **Hazards Mitigated / Goals Addressed:** Earthquake | **Funding Sources and Estimated Costs:** SP Water Capital Project funds, $664,000. |

**Strategy Vision/Objective:**
The District completed a Seismic Vulnerability Assessment Report in 2014. The report determined that the 7 Million Gallon (MG) Tank is vulnerable to anchorage failure during a 1,000-year return seismic event. Using King County's Project Prioritization Comparison Tool, this project scores 16 and is the District's 2nd priority.

**Mitigation Strategy:**
The District installed an earthquake valve in 2018 to isolate the 7 MG tank storage during a seismic event. The District's consultant has prepared plans for the 7 MG Tank Seismic Retrofit Project. This project will improve tank anchorage for ground acceleration from a 975-year (statistical return period) seismic event. The project will also include ladder safety improvements and the replacement of reservoir coatings. The District estimates completion of this project in 2020.

While the 7 MG tank is redundant with the 2-MG Tank, both tanks are vulnerable during larger seismic events. Failure of both the 7 MG and 2 MG tanks would result in a loss of water storage in the 650 pressure zone.

In addition to the operational impacts, retrofits to the 7 MG tank would reduce the risk of potential damage that would otherwise occur to the surrounding hillsides, the local businesses, local utilities (including communications, fiber optic and power), residential structures, and major arterial roadways due to a complete failure to the tank and the loss of stored water.

| 2-Year Objective: | 5-Year Objectives: | Long-Term Objectives: |
|---|---|---|
| Complete project in 2020. | Monitor performance during future seismic events. | Monitor performance during future seismic events. |

**Implementation Plan/Actions:**
Project planning is currently underway.

**Performance Measures:**
Monitor tank performance during future seismic incidents.

| SP-8: Complete 2 Million Gallon (MG) Tank Anchorage Seismic Retrofits | | | |
|---|---|---|---|
| **Lead Points of Contact (Title):** Engineering Manager | **Partner Points of Contact (Title):** Engineering Manager | **Hazards Mitigated / Goals Addressed**: Earthquake | **Funding Sources and Estimated Costs:** SP Water Capital Project funds. Cost estimate to date: $1,659,026. |

**Strategy Vision/Objective:**
According to the 2014 Seismic Vulnerability Assessment Report, the 2 MG Tank was vulnerable to anchorage failure during a 1,000- year return seismic event. Failure of the 2 MG tank would result in a loss of water storage in the 650 pressure zone. Using King County's Project Prioritization Comparison Tool, this project scores 17 points and is the District's 1st priority.

**Mitigation Strategy:**
The project was completed in 2019. The project included seismic evaluation and upgrades, improvements for water system circulation, tank safety improvements including anchorage attachments for fall safety, vent replacements, replacement of protective coatings and a new mural.

The District's consultant prepared plans to reconfigure the tank pipe and improve tank anchorage for ground acceleration from a 975-year (statistical return period) seismic event. Contractors placed rebar and poured a 4-foot deep concrete mat slab for ballast in the bottom of the tank. The workers attached steel stiffeners to the inside of the tank walls for additional stability.

In addition to the operational impacts, retrofits to the 2 MG tank will reduce the risk of potential damage that would otherwise occur to the surrounding hillsides, the local businesses, local utilities (including communications, fiber optic and power), residential structures, and major arterial roadways due to a complete failure of the tank and the loss of stored water.

| 2-Year Objectives: | 5-Year Objectives: | Long-Term Objectives: |
|---|---|---|
| Project completion. | Monitor performance during future seismic events. | Monitor performance during future seismic events. |

**Implementation Plan/Actions:**
Project was completed in 2019.

**Performance Measures:** Monitor tank performance during future seismic events.