



Northeast Sammamish Sewer & Water District Plan Annex

Introduction

Northeast Sammamish Sewer & Water District is a special purpose district created as the Sahalee Sewer District on February 4, 1969 with the purpose of providing sanitary sewer services to the Sahalee area. As adjacent properties began to be developed, the District expanded to serve these additional areas. In 1982, the Sahalee Sewer District assumed ownership of the Sahalee Water Company, a water system which served the Sahalee area as well as the adjacent developments. As the District grew, it changed its name to Northeast Sammamish Sewer & Water District to more accurately reflect its service area. The District is governed by a three-member board of commissioners.

The existing sewer corporate boundary consists of 12 wastewater collection basins serving approximately 3,375 acres with 63 miles of sewer pipe, 9 sewage lift stations and force mains, and approximately 1,540 manholes. Wastewater is discharged to the King County Metro interceptor in Redmond near the intersection of SR202 and East Lake Sammamish Parkway from which it is conveyed to and treated by King County. The sewer system encompasses an area of approximately 5.25 square miles and provides service to more than 4,810 customers.

The water system is segregated into five pressure zones with eight pressure reducing stations, two booster pump station and 44.6 miles of water main. The District's water supply is provided by five groundwater wells. Three are located in a well field in the Evans Creek Valley. The other two are located on the Sammamish Plateau. The District has two operating interties with Sammamish Plateau Water to allow water supply to flow to and from a jointly owned 3.0-MG reservoir located in the Sammamish Plateau Water system. The District has two emergency interties with Sammamish Plateau Water and one with the City of Redmond. The District also has a unidirectional intertie to provide water to Union Hill Water Association if requested. Water storage is provided by three reservoirs: a 3.0-MG reservoir jointly owned (50 percent interest) with Sammamish Plateau and two 0.5-MG reservoirs. The District's water supply is not disinfected but the District has a treatment plant at the Crest reservoir to filter out arsenic and hydrogen sulfide. No chemicals are added to the water.

Jurisdiction Point of Contact:

Name: Laura Keough
Title: General Manager
Entity: Northeast Sammamish Sewer & Water District
Phone: 425-868-1144
Email: Laura@nesswd.org

Northeast Sammamish Sewer & Water District





In 2018, the District became the first utility in the Pacific Northwest to pilot the Shake-Alert earthquake early warning system. The system is currently integrated into the Crest Reservoir and Booster Pump Station allowing for automatic pump shutdown in the event of an earthquake. The District plans on continuing implementation of this technology throughout the system to mitigate water loss and equipment damage in the event of an earthquake.

Development Trends

The District consists primarily of single-family residential customers with only two multifamily complexes. The District serves four elementary schools, two commercial buildings, two daycare facilities, and one adult care facility. In regard to future growth, the District is essentially built out with less than ten new connections per year.



Jurisdiction Risk Summary

Hazard Risk and Vulnerability Summary

HAZARD	RISK SUMMARY	VULNERABILITY SUMMARY	IMPACT SUMMARY
Avalanche	N/A	N/A	N/A
Earthquake	<p>King County is located in an area known as the Pacific Ring of Fire, a distinctive zone marked by the prevalence of earthquake and volcanic activity. Washington State is framed by the Pacific, North American, and Juan de Fuca plates, which are segments of the Earth's crust. King County also has numerous fault lines - cracks in the crust - that are active and expected to create large magnitude earthquakes. On an annual basis, thousands of minor earthquakes happen in the greater Puget Sound. Most of these earthquakes go unnoticed.</p>	<p>The greatest concentrations of earthquakes in Washington occur in the Puget Sound lowlands and the western Cascade Range and from Olympia to the Canadian borders. All of King County is included in this area. Therefore, all parts of the District are vulnerable to the earthquakes that occur in the Pacific Northwest. The U.S. Geological Service has reported it is probable that seismic activity with a magnitude greater than "8" on the Richter Scale could occur in the Puget Sound Area. An earthquake of this magnitude could cause damage to every major facility and transmission pipeline in the District.</p>	<p>Effects of a major earthquake in the Puget Sound basin area could be catastrophic, causing major property damage and costing lives. Thousands of people can be killed and tens of thousands injured or left homeless. The effects of an earthquake may vary from not even being felt by the local citizens to near total destruction of the physical and economic infrastructure of the society. The effects are highly variable depending on the magnitude, proximity to the population centers, depth, types of soil on which structures are located, local building codes, age and type of structure, time of day and countless other factors. Possible effects to the sewer system would include: structural failure of lift stations, broken collection and transmission mains and their appurtenances, and fire at lift stations. Possible effects to the water system would include: structural</p>



			<p>failure of water reservoirs and facility enclosures, broken pipelines, valves and well casings, and damages to pumping and pressure reducing stations. In addition, considerable damage to communication and power lines could result in prolonged outages to large areas of the District and mobility could be restricted due to collapsed bridges and debris in the roadways.</p>
<p>Flood</p>	<p>On average, major floods in King County occur every two to five years. In past floods, water depths above grade have exceeded 6 feet in some residential areas. To date, major river flooding in King County has infrequently contributed to injury or loss of life; more typically, it results in property damage. There has been one documented flood-related fatality since 2006. Major flood events in King County have resulted in significant property damage. The following table lists severe flood events in King County. The January 1990 event is considered to be the flood of record for most of the county except along the Lower Snoqualmie and Tolt Rivers.</p>	<p>The District borders along the Evans Creek Valley and Lake Sammamish. It has one lift station and three well facilities in the valley which could be impacted by the flooding of Evans Creek, especially in the winter or early spring during high rainfall periods. The District has water and sewer mains along East Lake Sammamish Parkway which could be affected if Lake Sammamish flooded and caused erosion. Most other sewer and water system facilities would not be affected by a flood. However, access to these facilities would probably be affected. Other problems commonly associated with floods include limited access to facilities in flooded area, inflow and infiltration, and communication and power outages, which could affect several facilities not necessarily in the flood zone.</p>	<p>Floods can cause loss of life and great damage to structures; crops; land resources; flood control structures; roads; and utilities. These impacts result primarily from two types of hazards created by floods: inundation and bank erosion. Inundation is defined as floodwater and debris flowing through an area. It can cause minor to severe damage depending on the velocity of flows, the quantity of logs and other debris they carry, and the amount and type of development in the floodwater's path. Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that</p>



			<p>often accompany these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Bank erosion can threaten areas that are not inundated by floods. For example, a home on a high bank above flood levels can be undermined by the flood's erosive flows. The amount of erosion at a site depends on its location on the channel, flow velocities, the pattern of debris and sediment accumulation in the channel, and a bank's susceptibility to erosion. Some rivers, such as the Tolt River, experience sudden and dramatic patterns of bank erosion that can create major course changes during a single flood event.</p>
<p>Landslide</p>	<p>Over the past decade, more than 200 landslides occurred along the Seattle to Everett coastline, and more than 800 trains have been canceled since 2009 as a result of landslide events (Washington State Department of Transportation, 2014). Between December 2012 and January 2013, coastline rail service disruption due to landslide events occurred at record levels.</p>	<p>King County is vulnerable to landslides due to our region's geography. In a landslide, large masses of rock, soil, and other debris move quickly down a slope. They can flow quickly and occur with little or no notice. Landslides can also travel many miles from their source, growing in size as they pick up more mud and debris. The District's pipes and critical facilities are vulnerable to damage in the event of a landslide.</p>	<p>Typical effects include, but are not limited to, damage to or destruction of portions of roads and railroads, sewer and water lines, and homes and public buildings. Disruption of shipping and travel routes results in losses to commerce. Clean up costs may include debris clearance from streets, drains, streams, and reservoirs; new or renewed support for road and rail embankments and</p>



			<p>slopes; minor vehicle and building damage; personal injury; livestock, timber, crop and fencing losses; and damaged utility systems.</p>
<p>Severe Weather</p>	<p>King County is vulnerable to high winds and is likely to experience at least one high wind event per year. Only two instances of extreme heat events are listed for the county between 1996 and 2013; however, this data likely underestimates the occurrence of such events. Extreme heat events can occur several times per year, especially in the summer.</p>	<p>All critical facilities are likely exposed to severe weather. Facilities on higher ground may be exposed to damage from falling trees. The most common problems associated with severe winter weather are loss of utilities. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water and sewer systems may not function. High demand for fuel during long duration power outages could pose a risk to the District’s ability to keep emergency generators operational.</p>	<p>Five of nine sewer lift stations have automatic emergency backup generator power on-site. The district has two portable generators that can be towed to sewer lift stations to pump effluent. Currently one well and the one treatment plant/ booster station have automatic back up generator power on site that can distribute water to customers. Historically, the District has been able to maintain pressure and meet demand using existing storage for short power outages.</p>
<p>Severe Winter Weather</p>	<p>Severe winter weather generally causes power outages at sewer lift stations and well sites. Due to the topography of the district, icy roads can severely impact our ability to gain access to sewer lift stations that require pumping.</p>	<p>The district currently has four sewer lift station that do not have back-up generator power and require the use of a tow-behind unit to supply power. If roadways are inaccessible, the risk of spilling raw sewage exists.</p>	<p>Severe winter weather includes the same impacts as other severe weather scenarios with an added element of icy road conditions. Given that District employees must tow a trailer generator to lift stations that are without power in winter road conditions, there is a greater risk to employees and bystanders. The District is currently addressing this concern by budgeting and</p>



			planning to install automatic emergency generators at all of its lift stations.
Tsunami	N/A	N/A	N/A
Volcano	Ash fall accumulation of less than one-half inch is capable of creating temporary disruptions of transportation operations and sewage disposal and water treatment systems. Highways and roads could be closed for hours, days, or weeks afterwards. The gritty ash can cause substantial problems for internal-combustion engines and other mechanical and electrical equipment. The ash can contaminate oil systems, clog air filters, and scratch moving surfaces. Fine ash can also cause short circuits in electrical transformers, which in turn cause power blackouts.	All of King County would be exposed to tephra from volcanic eruptions in the Cascade Range to some degree. The location of the event as well as the prevailing wind direction would influence the extent of this impact. Only the southern portion of the county along the White River is considered to be exposed to lahar flows from Mt. Rainier.	The series of eruptions at Mount St. Helens in 1980 caused Interstate 90 from Seattle to Spokane to close for a week. The impact of the ash fall caused the Seattle and Portland International Airports to close for a few days.
Wildfire	The U.S. Department of the Interior maintains a database of federal agency records for 677,000 fires that occurred from 1980 through 2012 (USGS, 2013). There are 332 events listed that occurred in King County. Of these 332 events, 86 percent were attributed to human causes. Only six of the King County fires burned 10 acres or more.	According to the Washington State Emergency Management Division, the wildland fire season in Washington State typically begins in early July and lasts until late September. Climatic conditions such as drought, snowpack and localized weather can expand the length of the fire season. In July through early September, lightning strikes are the cause of most wildland fires in Washington State. Human-caused fires are more prevalent at the beginning and end of the fire season. Only 30 percent of fires in the state are in Western	Potential losses from wildfire include human life, structures and other improvements, and natural resources. The effects of wildfires vary with intensity, area and time of year. The greatest short-term loss is the complete destruction of valuable resources, such as timber, wildlife habitat, recreation areas, and watersheds. In addition, wildfire can lead to ancillary impacts such as landslides in steep ravine areas and flooding due to the impacts of silt in local



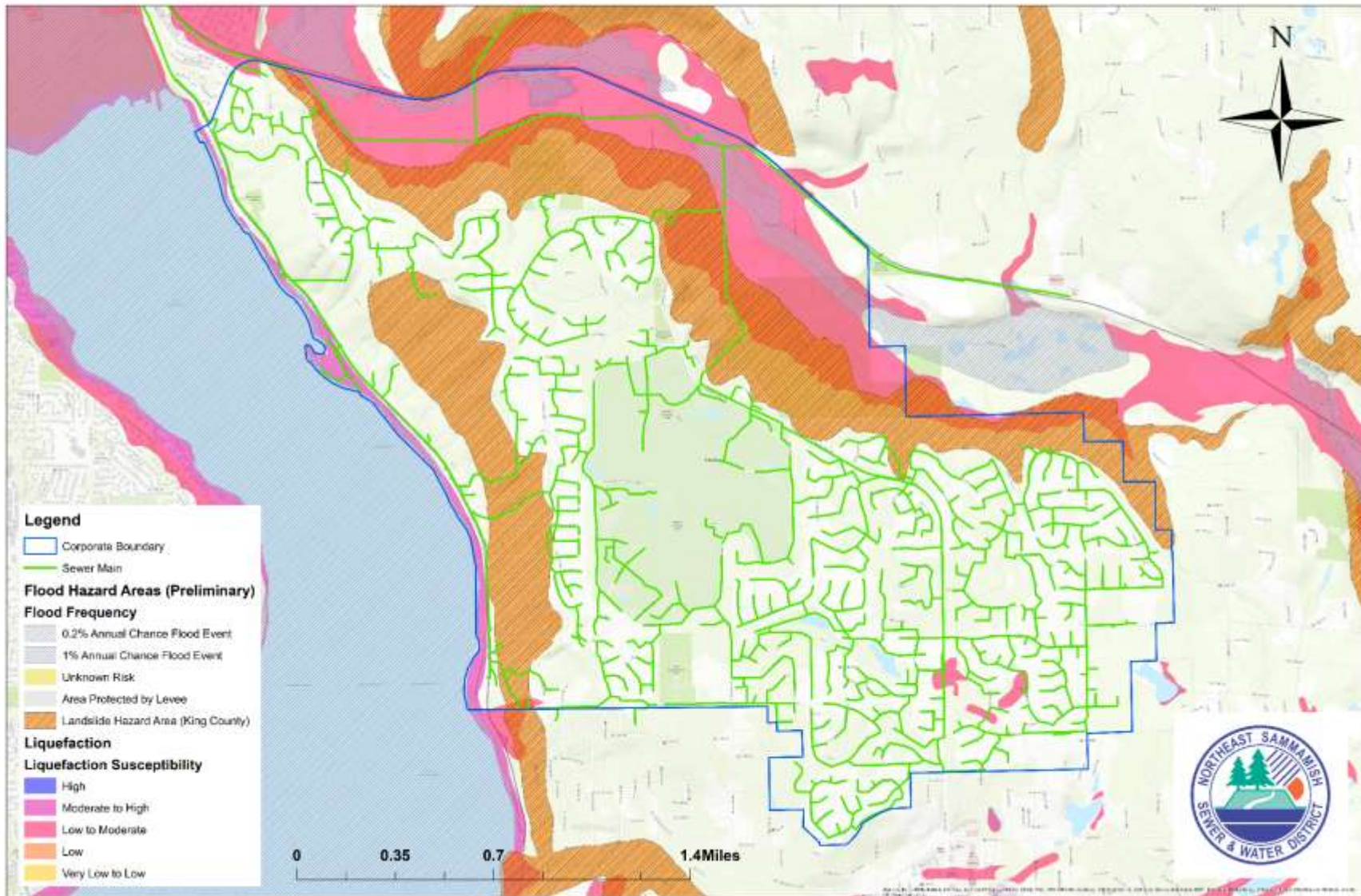
		Washington (EMD, 2013). None of the significant wildland fires since 1900 noted by the Washington State Emergency Management Division have occurred in King County.	watersheds. Severe fires producing high soil temperatures create a water-repellent layer below the soil surface. The soil above this layer becomes highly prone to erosion, often resulting in mudslides.
Civil Disturbance	King County does not have an extensive history of civil disorders. Most of the events that have occurred in the county have occurred in Seattle, particularly since most civil disorders occur in larger cities. Civil disorders or riots due to political protests, work stoppages, vandalism or public unrest could have a major impact on District operations depending on size, location and severity of the civil disturbance. However, the probability of this event is remote given the residential nature of the District.	King County is vulnerable to civil disorders, so the City of Sammamish and the District are vulnerable to civil disorders. The county is vulnerable to disorders resulting from a controversial arrest or verdicts or from rioting and looting in response to a Seattle sports team winning a championship. The District is vulnerable to civil disorders but not to the extent that Seattle is.	Looting is the most common activity associated with civil disorders. Fire setting is also quite common and can quickly spread due to slow response times of overwhelmed fire departments. Transportation routes can become blocked, making it difficult for non-rioters to leave the area and for emergency response personnel to arrive. Seattle's experience with civil disorders indicates violence focused on property rather than on people, but this pattern may not continue.
Cyber Attack	Corruption or exposure to ransomware on accounting and billing systems. Unauthorized access to telemetry software.	The strength of the firewalls and keeping separate servers diminishes the risk of a cyber-attack. Employee education and awareness is also a key factor in limiting risk to cyber-attacks.	A cyber-attack could prevent us from operating billing systems; responding to customers; damage to or disabling of key facilities.
Dam Failure	N/A	N/A	N/A
Hazardous Materials Incident	Hazardous materials are materials, which, because of their chemical, physical, or biological nature, pose a potential risk to life, health, or property when released. A release may occur by spilling, leaking, emitting toxic vapors, or any other	The possibility of an acute spill impacting the District's wells or sewer system is remote given the depth of the wells and the likelihood of an industrial or commercial carrier accident occurring within the District's service area.	The effects from contamination of a well or the aquifer would severely impact the District's capability to supply water system demands. Depending on the type and extent of the contamination

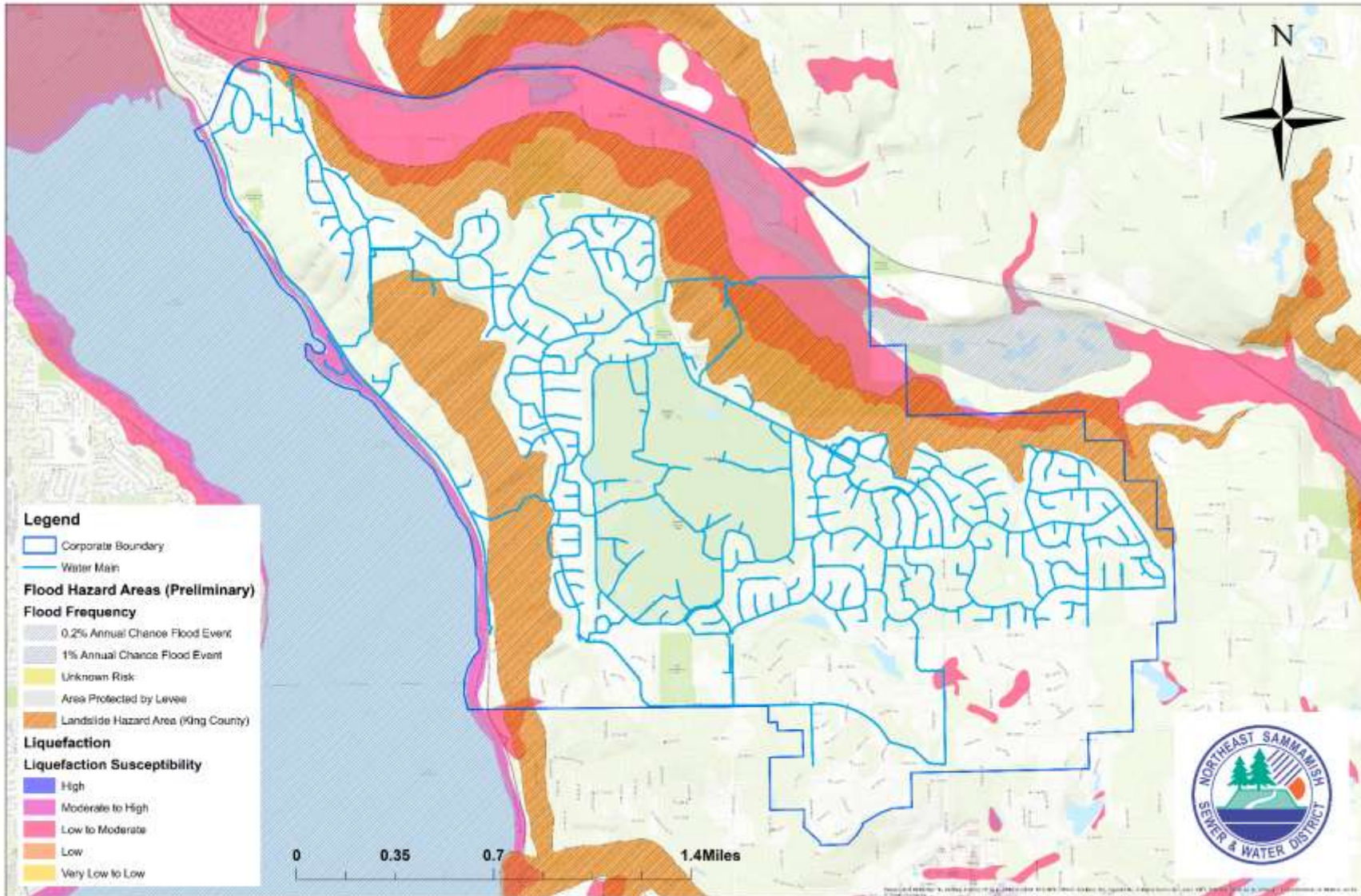


	<p>process that enables the material to escape its container, enter the environment, and create a potential hazard. The hazard can be explosive, flammable, combustible, corrosive, reactive, poisonous, toxic, biological agent, or radioactive.</p>	<p>Sahalee Way is within the ten-year capture zone for Well 3, five-year capture zone for Wells 2R, 6 and 7 and within the one-year capture zone of Well 4. The analysis indicated that there was a low calculated potential risk to groundwater from spills on Sahalee Way.</p>	<p>the District may need to either activate alternative sources of water supply with the City of Redmond or Sammamish Plateau Water and Sewer District, or institute water conservation measures. The effects of a contaminated sewer system are to increase the risk of explosion and increase the risk of injury to District personnel from harmful gasses.</p>
<p>Public Health Emergency</p>	<p>A public health emergency could significantly impact the public and District staff. If such an emergency were to last several days or weeks, the ability to normally operate District facilities would be compromised.</p>	<p>Given the District's limited staff, a public health emergency causing employee absence would have an impact on normal operations.</p>	<p>In a widespread public health outbreak, it is unlikely the District could look to neighboring entities for staffing and operations support. The District's sewer and water facilities can generally operate autonomously for relatively short periods of time without needing staff to maintain equipment. In such an event, it is likely the District will be working with other state and local agencies to coordinate a solution.</p>
<p>Structure Fire</p>	<p>The largest conflagration (large multi-structure fire) in King County history is the 1889 Seattle fire which is estimated to have consumed 60 acres of downtown. This was not the only occurrence, however. In 1992 an arsonist started a series of fires in North</p>	<p>Factors affecting the degree of risk of fires include the density of development; the nature, type and size of buildings; and, the proximity of combustible material to buildings. In addition to the typical methods of occurrence, structure fires are a potential secondary</p>	<p>Injuries and casualties to the occupants of a structure are a primary concern. These events can also cause the release of hazardous</p>



	Seattle which eventually resulted in 76 fires causing \$22 million in damages.	hazard of earthquakes and civil disorders. One study estimated that 80 to 100 fires would occur from a large earthquake in the Seattle area. Building codes requiring fire detectors and sprinkler systems are in effect for most large structures, reducing vulnerability.	materials and disconnect utility lines. Given the immediate response times to reported fires, the likelihood of injuries and casualties is minimal.
Terrorism	The greatest terrorist threat the District faces is the intentional contamination of its water supply.	An Intentional contamination of the District's water supply could have adverse health and psychological effects to both staff and residents. It would require District staff to work around the clock to monitor and address the issue until it is resolved.	The District has mitigated terrorist attacks on facilities by means of physical barriers, redundant locks, and intrusion alarms on all facilities. In addition, the District is currently working on implementing an emergency chlorination component to the Crest Treatment Plant and is exploring additional locations to increase the efficiency of disinfection. The District has a detailed response plan laid out in its Emergency Response Plan for employees to follow in the case of a potential contamination event.







Assets at Risk

ASSET	VALUE (\$)	RISK SUMMARY	VULNERABILITY SUMMARY	IMPACT SUMMARY
700 Zone Joint 3.0 MG Reservoir	\$ 4,258,363 (50%)	This asset is at risk for both earthquakes and acts of terrorism.	While there are mitigation devices such as physical barriers, locks, retracted access ladders, and intrusion alarms, the risk of terrorism still exists to a small degree. The lack of earthquake resilient construction could cause severe structural damage to the reservoir in the event of any one of the major earthquakes our region is susceptible to.	If this reservoir became contaminated, the contaminant could potentially spread throughout our water system and we would be forced to isolate it from our system. While the impact of losing this reservoir would have short term impacts, our water system is able to operate on a “closed zone”. Meaning we can completely isolate ourselves and be sustainably self-sufficient if other major assets remain operational.
300 Zone 196th Ave. 0.5 MG Reservoir	\$ 1,974,905	This asset is at risk for both earthquakes and acts of terrorism.	While there are mitigation devices such as physical barriers, locks, and intrusion alarms, the risk of terrorism still exists to a small degree. The lack of earthquake resilient construction could cause severe structural damage to the reservoir in the event of any one of the major earthquakes our region is susceptible to.	If this reservoir became contaminated, fewer residents would be impacted as this reservoir feeds only a portion of the district under normal operation. In the event that we lost this facility, we have other means of providing water to residents through alternative pressure reducing stations.
300 Zone 196th Ave. Booster Station	\$ 309,852	This asset is at risk of damage from earthquake events.	If the pumps were running during an earthquake event, it is possible that mechanical damage or fire could occur.	When the Crest Booster Pump Station was built, this station became a redundant back up to maintain system pressure if we needed to operate on a closed system. The likelihood of these pumps running at this station at any point in time is very low, so the risk of the pumps running during an earthquake event is very unlikely.
700 Zone Crest 0.5 MG Reservoir,	\$ 4,258,363	The Crest facility is susceptible to earthquakes,	The Crest facility is located near a steep slope that has the potential to give way in	The loss of the Crest in a catastrophic event could prevent us from keeping



Booster Station, & Water Treatment Plant		landslides, severe storms, public health emergencies, wildfire, terrorism, civil disturbance, and hazardous material incidents.	the event of a major earthquake. Given that the facility stores and distributes drinking water, concern for contamination from intentional and unintentional events is always a concern.	adequate pressures and water availability to fight fires and distribute potable water. The District has implemented ShakeAlert at the Crest facility. In the event of an earthquake the pumps would shut down prior to the damaging wave and the water in the reservoir would be preserved.
District Office	\$ 969,178	The District Office is susceptible to earthquakes, landslides, severe storms, wildfire, terrorism, civil disturbance, and hazardous material incidents.	The District Office is located near a steep slope that has the potential to give way in the event of a major earthquake. The office is also surrounded by heavily forested areas which increases the risk of building loss or damage due to wildfires and severe storms.	The loss of the District Office would cause a total loss to our current telemetry system. This would prevent employees from accessing information and controlling critical facilities.
District Shop	\$ 538,786	The District Shop is susceptible to earthquakes, severe storms, public health emergencies, wildfire, terrorism, civil disturbance, and hazardous material incidents.	The District Shop is located near a steep slope that has the potential to give way in the event of a major earthquake.	The District Shop houses the district's fleet and all the required tools and equipment to repair pipe breaks and facilities. The loss of this equipment would inhibit our ability to repair damaged assets.
L/S 3	\$ 4,769,169	Lift Station 3 is susceptible to earthquakes, low level flooding, and low to moderate liquefaction.	Lift Station 3 is the only asset in the 1% annual chance flood zone and is estimated to be low to moderate. The biggest concern is the ability to access this site due to access road flooding which occurs year-round based on empirical evidence. GIS data shows that this site is also susceptible to low to moderate liquefaction, which is concerning given this is an	Damage to, or the loss of, L/S 3 would prohibit the District from discharging the majority of its effluent to King County treatment facilities as all except one lift station eventually feeds into L/S 3. This is the District's busiest lift station and the impairment or loss would impact the majority of the District. The amount of raw sewage spilled in this scenario has the potential to be great if normal typical



			underground sewer lift station.	amounts of effluent were still flowing to the station.
L/S 5	\$ 1,687,359	Lift Station 5 is susceptible to earthquakes.	A severe earthquake event has the potential of causing physical damage to dry wells, wet wells, pumps, generators, and telemetry.	Damage to Lift Station 5 would affect our ability to take the majority of our effluent off of the Sammamish Plateau as lift stations 6, 8, 9, and 13 feed into Lift Station 5. Lift station 5 feeds into Lift Station 3 and is the District's second busiest lift station. The risk of spilling raw sewage exists.
L/S 6	\$ 256,826	Lift Station 6 is susceptible to earthquake events, and landslides.	Given the proximity of this asset to a steep slope, there is a risk of serious damage to pumps, the wet well, the dry well, and control room exists in the event of an earthquake or landslide.	Lift Station 6 receives the effluent from Lift Station 9 meaning that the impacts of losing the station would affect multiple neighborhoods causing loss of normal sewer service. Also, the risk of spilling raw sewage exists.
L/S 8	\$ 205,922	Lift Station 8 is susceptible to earthquake events.	In the event of an earthquake, Lift Station 8 is susceptible to structural damage of the wet well, dry well, pumps, and telemetry.	Lift Station 8 is one of the least busy stations and losing this station would have minimal impacts compared to other lift stations. The risk of spilling raw sewage exists and several homes would be impacted.
L/S 9	\$ 275,020	Lift Station 9 is susceptible to earthquake events, and landslides.	Given the proximity of this asset to a steep slope, the risk of serious damage to pumps, the wet well, and the dry well exists in the event of an earthquake or landslide.	The impairment or loss of Lift Station 9 would have minimal impacts to the overall sewer system compared to other lift stations. However, the risk of spilling raw sewage exists and several homes would be without normal sewer service.
L/S 10	\$ 147,860	Lift Station 10 is susceptible to earthquake events.	In the event of an earthquake, Lift Station 10 is susceptible to structural damage of the wet well, dry well, pumps, and telemetry.	The impairment or loss of Lift Station 10 would have minimal impacts to the overall sewer system compared to other lift



				stations. However, the risk of spilling raw sewage exists and several homes would be without normal sewer service.
L/S 13	\$ 208,996	Lift Station 13 is susceptible to earthquake events.	In the event of a severe earthquake, Lift Station 13 could sustain damage to the drywell, wet well, control room, pumps, and telemetry system.	The primary inflow to Lift Station 13 comes from an elementary school. The impairment or loss of this lift station would affect sanitary sewer service to this school. The risk of spilling raw sewage exists.
L/S 14	\$ 620,595	Lift Station 14 is susceptible to earthquake events.	In the event of a severe earthquake, Lift Station 13 could sustain damage to the drywell, wet well, control panels, pumps, and telemetry system.	This station is one of two lift stations to discharge the Districts effluent to King County for treatment. It is also one of the busiest stations and is located along Lake Sammamish making its operation critical. The loss or impairment of this station would cause several customers to lose normal sewer service. The risk of spilling raw sewage exists.
L/S 15	\$ 190,232	Lift Station 15 is susceptible to earthquake events.	Due to the construction and surrounding area of this lift station, the biggest concern for damage to the normal operation of this facility is likely damage to the discharge force main that runs along highway 202. The above ground and simple telemetry panel and relatively small wet well make this site relatively resilient compared to other stations throughout the district.	Only three commercial facilities discharge effluent into this facility and the demand is relatively low. The biggest concern with this station is gaining access to it from the District's shop during winter weather as it is at the bottom of a steep hill and is without on-site emergency power. The District has invested in a smaller generator that can be transported in the back of a four-wheel drive pickup to avoid towing a trailer down these steep hills. The District also plans on installing an on-site automatic generator at this site in 2020.



<p>Wells 2R, 6, & 7</p>	<p>\$ 909,485</p>	<p>Wells 2R, 6, & 7 are susceptible to earthquake events, landslides, liquefaction, and acts of terrorism.</p>	<p>The loss or contamination of Wells 2R, 6, or 7 would hinder our ability to provide potable drinking water to our customers.</p>	<p>Our system is currently configured in a way that Wells 2R, 6, and 7 deliver water directly to the 700 zone and flow to lower zones through pressure reducing stations. This means the District can sustain a loss to one or two wells without being severely impacted. However, Wells 2R, 6, and 7 are all located in close proximity to one another and it is likely that if we lost one in an emergency event such as a land slide, we would lose all three. Additionally, all three wells use the same segment of mainline to distribute water to the system, meaning if we lost that section of pipe, all three wells would be rendered useless until the main was fixed. In this scenario, Wells 3 and 4 could be used in conjunction with the Crest Treatment Plant to provide water to the system. In the first quarter of 2020, the District will be upgrading its telemetry and implementing Shake-Alert pump protection at all well sites. We will also be installing transfer switches at the Evans Creek well field and purchasing a portable generator to be stored in the well field.</p>
<p>Well 3</p>	<p>\$ 102,079</p>	<p>Well 3 is susceptible to earthquake events and acts of terrorism.</p>	<p>A severe earthquake event could potentially cause physical damage to the pumphouse and/or distribution main to the Crest Treatment Plant.</p>	<p>Well 3 is one of two wells that provide water to the Crest Treatment Plant to be treated, stored, and distributed to the 700 zone. If we lose one of these wells, the other could still provide adequate flow to</p>



				<p>the Crest to maintain levels under normal conditions. In the event that all wells became inoperable, the district has emergency interties with the City of Redmond and Sammamish Plateau Water that could be utilized to provide water to residents.</p> <p>In the first quarter of 2020, the District will be upgrading its telemetry and implementing Shake-Alert pump protection in all well sites.</p>
Well 4	\$ 209,251	Well 4 is susceptible to earthquake events and acts of terrorism.	A severe earthquake event could potentially cause physical damage to the pumphouse and/or distribution main to the Crest Treatment Plant.	<p>Well 4 is one of two wells that provide water to the Crest Treatment Plant to be treated, stored, and distributed to the 700 zone. If we lose one of these wells, the other could still provide adequate flow to the Crest to maintain levels under normal conditions. In the event that all wells became inoperable, the district has emergency interties with the City of Redmond and Sammamish Plateau Water that could be utilized to provide water to residents.</p> <p>Well 4 is the only well that currently has emergency generator backup power which makes it a critical facility in a long-term power outage. In 2020 the district will be installing transfer switches at all wells and purchasing a portable generator capable of powering all well sites that will be kept at the well field to provide emergency backup power.</p>



				In the first quarter of 2020, the District will be upgrading its telemetry and implementing Shake-Alert pump protection at all well sites.
216th Intertie w/ SPW	\$ 20, 779	The 216 th Intertie is susceptible to damage from earthquake events.	In the event of an earthquake, the valve can become broken or damaged, rendering it useless or requiring isolation of the system further upstream.	The 216 th Intertie is the primary intertie in which the District supplies and receives water to/from the joint 3 MG reservoir share with Sammamish Plateau Water. The loss of this intertie would require the district to either operate on a closed system or open the 226 th or 211 th interties to continue utilizing the 3 MG joint reservoir. This is assuming that these are still operational. The District is working on installing automatic earthquake valves at this site that utilize the Shake-Alert early earthquake warning system. This would help mitigate water loss in the event of catastrophic main breaks until District employees could assess damages.
226th Intertie w/ SPW	\$ 20,779	The 226 th intertie is susceptible to damage from earthquake events.	In the event of an earthquake, valves or piping can become broken or damaged, rendering it useless or requiring isolation of the system further upstream.	The 226 th intertie is the secondary intertie that connects the District's water system to the 3 MG joint reservoir. While this intertie only sees intermittent use at the moment, it has been fully utilized in the past. In a severe earthquake event, this intertie could be useful in directing water to specific areas of the District.
211th Intertie w/ SPW	\$26,046	The 211 th Emergency Intertie with Sammamish	In the event of an earthquake, valves or piping can become broken	This intertie would allow us to distribute water from the 3 MG reservoir to the



		Plateau Water is susceptible to earthquake events.	or damaged, rendering it useless or requiring isolation of the system further upstream.	southeastern portion of our district which could provide water to customers who might otherwise be isolated due to main breaks following an earthquake event. This also serves as the third option of providing water to the 700 zone from the 3 MG joint reservoir.
Union Hill Intertie	\$819,543	The Union Hill Intertie is susceptible to damage from earthquake events.	In the event of an earthquake, valves or piping can become broken or damaged, rendering it useless or requiring isolation of the system further upstream.	The primary purpose of this intertie is to provide water to Union Hill Water Association so if it became inoperable, we would be unable to in case of an emergency.
Parkway Emergency Intertie W/SPW		The emergency intertie with Sammamish Plateau Water on East Lake Sammamish Parkway is susceptible to earthquakes, landslides, and liquefaction.	In the event of an earthquake, valves or piping can become broken or damaged, rendering it useless or requiring isolation of the system farther upstream leaving some residents without water. In the event of a landslide, the valve can become buried, rendering it useless.	This intertie is beneficial in the event that we lose the 300/500 zone reservoir and/or our PRV stations along East Lake Sammamish Parkway. The District could also use this to feed the southern residents along East Lake Sammamish Parkway if a water main break occurred somewhere along the Parkway.
Redmond Emergency Intertie	\$52,693	The emergency intertie with the City of Redmond is susceptible to earthquakes and liquefaction.	In the event of an earthquake, valves or piping can become broken or damaged, rendering it useless or requiring isolation of the system farther upstream leaving some residents without water.	The emergency intertie with the City of Redmond would allow the district to provide water to the Northeastern corner of the district and the 300 zone in the event of massive main breaks, pump failure, or pressure reducing station failures following an earthquake event.



Plan Update Process

Jurisdiction Planning Team

NAME	TITLE	ORGANIZATION	CONTRIBUTION
Laura Keough	General Manager	NESSWD	Managed Process/Plan Editor
Steven Neubauer	GIS/Field Tech	NESSWD	GIS/Plan Compilation

Plan Update Timeline

PLANNING ACTIVITY	DATE	SUMMARY	ATTENDEES
Regional Hazard Mitigation Kick-off Meeting	November 28, 2018	Planning Process Purpose & Overview	Multiple Agencies
Regional Hazard Mitigation Planning Workshop	December 13, 2019	Risk Assessments	Multiple Agencies
Local Agency Meeting	February 25, 2019	Planning update, Q & A, public outreach planning	City of Sammamish, Sammamish Plateau Water, Derrick Hiebert
Regional Hazard Mitigation Planning Workshop	July 27, 2019	Updates on planning and outreach process, annex template review.	Multiple Agencies
Regional Hazard Mitigation Planning Workshop	August 22, 2019	Funding process and overview.	Multiple Agencies

Public Outreach

Public Outreach Events

EVENT	DATE	SUMMARY	ATTENDEES
Sammamish Disaster Preparedness Fair	September 7, 2019	Presented interactive Shake-Alert and hazard mitigation maps for residents to use and discuss.	Estimated 800 attendees from Sammamish and the surrounding region.
Sammamish Farmer's Market	September 18, 2019	Presented interactive Shake-Alert and hazard mitigation maps for residents to use and discuss.	Sammamish and residents from the surrounding region.

Insert pictures here for final:



Jurisdiction Hazard Mitigation Program

Hazard mitigation strategies were developed through a two-step process. Each jurisdiction met with an internal planning team to identify a comprehensive range of mitigation strategies. These strategies were then prioritized using a process established at the county level and documented in the base plan.

Hazard mitigation strategies in Northeast Sammamish Sewer & Water District were prioritized using the fourteen plan goals outlined with an emphasis on public health and safety. The District's primary focus is to retain and distribute potable water to the community by continuing to invest in our assets. Due to the high probability and impact of earthquake events in our area, further incorporation and development of the Shake Alert early earthquake warning system is a priority. This will mitigate the damage to wells and pump stations during an earthquake event by automatically turning off pumps as soon as an earthquake with destructive potential is detected, increasing the probability the District will be able to provide potable water to the community in the event of an earthquake. The District has also prioritized mitigation strategies in earthquake resilient structural improvements to critical facilities including the District Office, the District Shop, and water distribution sites. The District is currently upgrading and improving its telemetry system to give operators and management the ability to better monitor and control critical facilities remotely and creating redundancy within the telemetry system was identified as a priority. This will increase the probability that District employees will be able to utilize the telemetry system if our primary telemetry site is lost in a disaster. The District is continually investing in equipment and materials that will enable staff to repair damaged pipelines more efficiently and is currently in the process of constructing an emergency chlorination system to expedite water disinfection in the event of contamination. Preventive measures are currently in place and are continually reviewed to mitigate the vulnerability to terrorism and unintentional contamination of our water system. This includes cyber-security measures as well as physical barriers and alarms at all facilities. The implementation of these strategies is ongoing as part of the District's capital improvement planning and budgeting process. These improvements are primarily funded by revenues and the District continually explores grant and loan opportunities.

Plan Monitoring, Implementation, and Future Updates

King County leads the mitigation plan monitoring and update process and schedules the annual plan check-ins and bi-annual mitigation strategy updates. Updates on mitigation projects are solicited by the county for inclusion in the countywide annual report. As part of participating in the 2020 update to the Regional Hazard Mitigation Plan, every jurisdiction agrees to convene their internal planning team at least annually to review their progress on hazard mitigation strategies and to update the plan based on new data or recent disasters.

Plan Goals

1. Access to Affordable, Healthy Food
2. Access to Health and Human Services
3. Access to Parks and Natural Resources
4. Access to Safe and Efficient Transportation
5. Affordable, Safe, Quality Housing
6. Community and Public Safety
7. Early Childhood Development
8. Economic Development
9. Equitable Law and Justice System
10. Equity in Government Practices
11. Family Wage Jobs and Job Training
12. Healthy Built and Natural Environments
13. Quality Education
14. Strong, Vibrant, Neighborhoods



As part of leading a countywide planning effort, King County Emergency Management will send to planning partner any federal notices of funding opportunity for the Hazard Mitigation Assistance Grant Program. Proposals from partners will be assessed according to the prioritization process identified in this plan and the county will, where possible, support those partners submitting grant proposals. This will be a key strategy to implement the plan.

The next 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.

Continued Public Participation

King County and its partner cities already maintain substantial public outreach capabilities, focusing on personal preparedness and education. Information on ongoing progress in implementing the hazard mitigation plan will be integrated into public outreach efforts. This will provide King County residents, already engaged in personal preparedness efforts, with context and the opportunity to provide feedback on the county’s progress and priorities in large-scale mitigation. In the vertical integration of risk-reduction activities from personal to local to state and federal, it is important that the public understand how its activities support, and are supported by, larger-scale efforts.

The outreach and mitigation teams will also continue to work with media and other agency partners to publicize mitigation success stories and help explain how vulnerabilities are being fixed. When possible, public tours of mitigation projects will be organized to allow community members to see successful mitigation in action.

Hazard Mitigation Authorities, Responsibilities, and Capabilities

Plans

PLAN TITLE	RESPONSIBLE AGENCY	POINT OF CONTACT	RELATIONSHIP TO HAZARD MITIGATION PLAN
Comprehensive Plans	Northeast Sammamish Sewer & Water District	Laura Keough, General Manager	Partner and participant
Emergency Response Plan	Northeast Sammamish Sewer & Water District	Laura Keough, General Manager	Partner and participant
Capital Improvement Plan	Northeast Sammamish Sewer & Water District	Laura Keough, General Manager	Partner and participant

Programs, Policies, and Processes

PROGRAM/POLICY	RESPONSIBLE AGENCY	POINT OF CONTACT	RELATIONSHIP TO HAZARD MITIGATION PLAN
Building Codes	City of Sammamish; King County		Permitting for structural retrofits; ROW permits
Emergency Management Program	Northeast Sammamish Sewer & Water; City of Sammamish; King County	Laura Keough; Andrew Stevens; Derrick Hiebert	Coordination



--	--	--	--

Entities Responsible for Hazard Mitigation

AGENCY/ORGANIZATION	POINT OF CONTACT	RESPONSIBILITY(S)
Public Works	Northeast Sammamish Sewer & Water; City of Sammamish; King County	Sewer collection and water distribution; Stormwater collection, road maintenance, and ROW ownership.
Community Development	City of Sammamish; King County	Coordination with citizens.
Office of the Mayor	City of Sammamish	Declare state of emergency.

National Flood Insurance Program

Northeast Sammamish Sewer & Water is not a participant in the National Flood Insurance Program.

Hazard Mitigation Strategies

2020 Hazard Mitigation Strategies

STRATEGY	LEAD AGENCY/POC	TIMELINE	PRIORITY
Water Well Site Disaster Resilience	NESSWD	2020-2022	High/Ongoing
Earthquake Automatic Valve Retrofit at Intertie	NESSWD	2020-2022	High
Telemetry System Redundancy	NESSWD	2020-2022	High
District Shop Disaster Resilience	NESSWD	2020-2025	Medium/High
District Office Disaster Resilience	NESSWD	2020-2025	Medium/High
Reservoir Resilience	NESSWD	2020-2025	Medium
Sewer Lift Station Disaster Resilience	NESSWD	2020-2030	Medium/Ongoing



Telemetry System Redundancy

Lead POC Laura Keough, General Manager	Partner Points of Contact RH2 Engineering Verizon Wireless Frontier	Hazards Mitigated / Goals Addressed <ul style="list-style-type: none"> • Earthquake • Landslide 	Funding Sources and Estimated Costs <ul style="list-style-type: none"> • Grants • Revenues
Strategy Vision/Objective Fortify our telemetry system to ensure employees and managers can access information and control critical remote facilities. Our telemetry system automatically controls essential system functions, including an automatic earthquake protection system, that would severely impact the operation of our water and sewer system.			
Mitigation Strategy The construction of a back-up telemetry system in an area less susceptible to numerous natural disasters would create redundancy in our ability to remotely control and access			
2-Year Objectives Finance, plan, and construct a back-up telemetry system.	5-Year Objectives N/A	Long-Term Objectives N/A	
Implementation Plan/Actions <ul style="list-style-type: none"> • Finance and budget for project • Develop a contract with RH2 for design • Send out to bid • Select contractor • Begin Construction • Complete Construction • Conduct regular testing and maintenance 			
Performance Measures Have a back-up telemetry system installed within a two-year period.			



Reservoir Resilience

<p>Lead POC Laura Keough General Manager</p>	<p>Partner Points of Contact Sammamish Plateau Water Jay Krauss, General Manager RH2 Engineering Doug Schlepp, PE</p>	<p>Hazards Mitigated / Goals Addressed</p> <ul style="list-style-type: none"> • Earthquake 	<p>Funding Sources and Estimated Costs</p> <ul style="list-style-type: none"> • Joint Tank Fund • Grants
<p>Strategy Vision/Objective Ensure that the reservoir remains intact and in service in the event of a major earthquake while maintaining system pressures.</p>			
<p>Mitigation Strategy</p> <ul style="list-style-type: none"> • Retrofit the existing 3-million-gallon reservoir, .5 million-gallon 300-500 Zone Reservoir, and .6-million-gallon Crest Reservoir with earthquake resilient equipment. • Implement early earthquake warning system at all reservoirs. 			
<p>2-Year Objectives</p> <ul style="list-style-type: none"> • Have Shake Alert early warning system operational. 	<p>5-Year Objectives</p> <ul style="list-style-type: none"> • Determine necessary improvements to assure reservoirs are resilient to earthquakes through structural improvements. 	<p>Long-Term Objectives</p> <ul style="list-style-type: none"> • Complete earthquake resilience retrofit at all reservoirs. 	
<p>Implementation Plan/Actions</p> <p>Structural Retrofit</p> <ul style="list-style-type: none"> • Work with Sammamish Plateau Water on process to retrofit the 3-million-gallon reservoir. • Finance and budget for project. • Develop a contract for design. • Send out to bid • Select contractor • Begin Construction • Complete Construction <p>Shake Alert Implementation</p> <ul style="list-style-type: none"> • Install automated isolation valves to communicate with SCADA. • Program SCADA to receive shake alert early earthquake warning data. • Conduct regular testing and maintenance on Shake Alert system. 			
<p>Performance Measures Have 2 valves and the Shake Alert early warning system installed within a two-year period.</p>			



Earthquake Automatic Valve Retrofit at Intertie

Lead POC Laura Keough General Manager	Partner Points of Contact RH2 Engineering Doug Schlepp, PE	Hazards Mitigated / Goals Addressed <ul style="list-style-type: none"> • Earthquake 	Funding Sources and Estimated Costs <ul style="list-style-type: none"> • Grants • Revenues
Strategy Vision/Objective Maintain system water pressure in the event of an earthquake.			
Mitigation Strategy <ul style="list-style-type: none"> • Retrofit the existing 216th Ave NE intertie with earthquake with automatic isolation valves. • Implement early earthquake warning system at intertie to communicate with telemetry. 			
2-Year Objectives <ul style="list-style-type: none"> • Complete installation of the automatic isolation valves and Shake Alert system. 	5-Year Objectives N/A	Long-Term Objectives N/A	
Implementation Plan/Actions <ul style="list-style-type: none"> • Finance and budget for project • Work with RH2 on design • Send out to bid • Select contractor • Begin Construction • Complete Construction • Conduct regular testing and maintenance 			
Performance Measures To have project completed and operational in two years.			



District Office Disaster Resilience

Lead POC Laura Keough, General Manager	Partner Points of Contact RH2 Engineering King County	Hazards Mitigated / Goals Addressed <ul style="list-style-type: none"> • Earthquake • Landslide • Wildfire 	Funding Sources and Estimated Costs <ul style="list-style-type: none"> • Grants • Revenues
Strategy Vision/Objective To ensure that our employees have a place to perform district operations and that critical equipment remains functional and accessible.			
Mitigation Strategy <ul style="list-style-type: none"> • Anchoring various equipment and furniture to prevent loss or injury during an earthquake. • Research ways to make the district office more landslide resistant. • Have alternative EOC locations. • Remove trees that are close in proximity to the office building. 			
2-Year Objectives <ul style="list-style-type: none"> • Address simple, low cost issues. • Research landslide resilience methods for office retrofit. • 	5-Year Objectives <ul style="list-style-type: none"> • If retrofit is feasible, obtain funding and start project design. 	Long-Term Objectives <ul style="list-style-type: none"> • If retrofit is feasible, complete construction 	
Implementation Plan/Actions <ul style="list-style-type: none"> • Identify and address potential hazards by anchoring. • Research potential options for landslide resilience. • Finance and budget for project • Work with RH2 on design • Send out to bid • Select contractor • Begin Construction • Complete Construction 			
Performance Measures Within 2 years have all furniture and equipment anchored and have researched possible landslide mitigation solutions.			



District Shop Disaster Resilience

Lead POC Laura Keough, General Manager	Partner Points of Contact RH2 Engineering King County	Hazards Mitigated / Goals Addressed <ul style="list-style-type: none"> • Earthquake • Severe Storms • Wildfire 	Funding Sources and Estimated Costs <ul style="list-style-type: none"> • Grants • Revenues
Strategy Vision/Objective Minimize the effects of falling debris and ensure our equipment is accessible to respond in the event of an earthquake.			
Mitigation Strategy <ul style="list-style-type: none"> • Anchor down toolboxes, material racks, and assess overall layout of shop to minimize collateral damage from falling heavy debris. • Ensure the means are available to operate or open the shop doors in the event of a power or structural failure. • Remove trees that are close in proximity to the building. 			
2-Year Objectives <ul style="list-style-type: none"> • Address simple falling hazards in the building. • Implement a plan to continue safe storage practices. • Create buffer zone by clearing trees. 	5-Year Objectives <ul style="list-style-type: none"> • Purchase alternative storage methods to house tools and repair parts more securely. 	Long-Term Objectives N/A	
Implementation Plan/Actions <ul style="list-style-type: none"> • Identify and address potential hazards by anchoring. Tree Removal <ul style="list-style-type: none"> • Acquire permit • Send out to bid • Select contractor • Begin Construction • Complete Construction 			
Performance Measures Have all materials and tools safely stored and accessible in 2 years. Begin work on tree removal within 2 years.			



Sewer Lift Station Disaster Resilience

Lead POC Laura Keough, General Manager	Partner Points of Contact RH2 Engineering	Hazards Mitigated / Goals Addressed <ul style="list-style-type: none"> • Earthquakes • Landslides • Erosion • Flooding • Liquefaction • Severe Storms 	Funding Sources and Estimated Costs <ul style="list-style-type: none"> • Grants • Revenues
Strategy Vision/Objective To ensure lift stations stay operational to prevent spilling of raw sewage in sensitive areas.			
Mitigation Strategy Earthquake/Liquefaction <ul style="list-style-type: none"> • Implement Shake Alert early warning system to prevent pump damage during earthquake. Landslides/Erosion <ul style="list-style-type: none"> • Explore options to retrofit buildings for landslide resiliency. Flooding <ul style="list-style-type: none"> • Encourage King County to maintain existing roads so we can access our facilities • Acquire marine vehicle to access lift station in event of severe flood. Severe Storms <ul style="list-style-type: none"> • Have on-site generators at all sewer lift stations. 			
2-Year Objectives <ul style="list-style-type: none"> • Communicate with King County on maintaining roads. • Purchase marine vehicle • Research landslide resilience methods for retrofit. • Install on-site generators at 2 sewer lift stations. 	5-Year Objectives <ul style="list-style-type: none"> • Implement Shake Alert system for pump protection. • If retrofit is feasible, obtain funding and start project design. • Install on-site generators at all sewer lift stations. 	Long-Term Objectives <ul style="list-style-type: none"> • If retrofit is feasible, complete construction 	
Implementation Plan/Actions Flooding <ul style="list-style-type: none"> • Write a letter to King County about road maintenance. • Research and acquire a marine vehicle. Landslide <ul style="list-style-type: none"> • Research potential options for landslide resilience. • Finance and budget for project • Work with RH2 on design • Send out to bid • Select contractor • Begin Construction • Complete Construction 			



Performance Measures

Establish communication with King County within 2 years.

Research possible landslide mitigation solutions within 2 years.

Acquire marine vehicle within 2 years.



Water Well Site Disaster Resilience

Lead POC Laura Keough, General Manager	Partner Points of Contact RH2 Engineering	Hazards Mitigated / Goals Addressed <ul style="list-style-type: none"> • Earthquakes • Landslide 	Funding Sources and Estimated Costs <ul style="list-style-type: none"> • Grants • Revenues
Strategy Vision/Objective Ensure system pressure is maintained and customers have access to drinking water in the event of an earthquake.			
Mitigation Strategy <ul style="list-style-type: none"> • In the event of wells 2R, 6, and 7 being buried in a landslide, we would rely more heavily on wells 3, 4, and The Crest Booster Station. We would also need to be able to access and open emergency interties. • Ensure water transmission line between wells 3, 4, and The Crest remain intact. • Stockpile materials and purchase vacuum excavation truck to repair water transmission mains. • Implement Shake Alert early warning system to protect pumps and preserve water. 			
2-Year Objectives <ul style="list-style-type: none"> • Shake Alert installed at all well sites and booster pump stations. • Acquire vac-truck to be able to quickly repair water transmission mains. • Increase amount of stockpiled pipe for transmission mains. 	5-Year Objectives N/A	Long-Term Objectives N/A	
Implementation Plan/Actions <ul style="list-style-type: none"> • As SCADA and communications are upgraded at well sites, implement Shake Alert system. Vac-Truck Purchase <ul style="list-style-type: none"> • Acquire funding • Develop specifications • Send out to bid • Award and purchase. 			
Performance Measures Have Shake-Alert installed at all wells and booster stations within 2 years and tested regularly. Purchase vacuum excavation truck.			