LAKE WHATCOM WATER AND SEWER DISTRICT

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Approving Authority	**Board of Commissioners** Lake Whatcom Water and Sewer District 1220 Lakeway Drive Bellingham, WA 98229 360.734.9224

Planning Process

The Lake Whatcom Water and Sewer District completed an update to the District-specific content contained in the prior (2016) Plan through District department head review and formal adoption by the Board of Commissioners. In addition, District staff participated in all coordination meetings hosted by the Whatcom County Sheriff's Office Division of Emergency Management, updated the District's critical facility information based upon facilities constructed or improved since 2016, and incorporated a 2020 asset valuation conducted on all District-owned facilities. The District performed public outreach throughout the planning process through routine staff updates on the revision progress during regularly scheduled Board meetings, inviting public participation through the District's social media accounts, and ultimately through resolution adoption by the District Board during a regularly scheduled public meeting.

Key Contributor List

- Justin Clary, General Manager
- Bill Hunter, District Engineer/Assist. General Manager
- Rich Munson, Safety Officer

The information contained in the Natural Hazards Mitigation Plan update regarding hazards, risks, vulnerability, and potential mitigation is based on the best available science and technology currently available. This information and related data on natural hazards potentially impacting the Lake Whatcom Water and Sewer District will be used as a tool when the District

updates other plans and programs, such as the following:

- Emergency Response Plan
- Comprehensive Sewer Plan
- Water System Comprehensive Plan
- Water and Sewer Utility Capital Improvement Programs

As additional information becomes available from other planning sources that can enhance this Plan, that information will be incorporated through the periodic update process.

Plan Maintenance for Lake Whatcom Water & Sewer District

For each Whatcom County-led Plan revision, the District will review and revise District-specific content, perform public outreach via applicable avenues, and undergo formal Board of Commissioner adoption of the revised Plan during a regularly scheduled public meeting.

Public Outreach and Education

Program	Yes/No, Year Adopted	Description
Nonprofit organizations or local residents groups focused on hazard mitigation, emergency preparedness, vulnerable populations, etc.	No	not applicable
Ongoing public education or information programs	Yes	Periodic posts to District Facebook and web pages providing emergency preparedness information; periodic presentation to Sudden Valley Community Assoc. board regarding capital project and operational information
School-related programs for natural hazard safety	No	not applicable
Public education or information program	Yes	Water conservation education to limit system capacity impacts; semi-annual utility bill inserts on emergency and winter weather preparedness

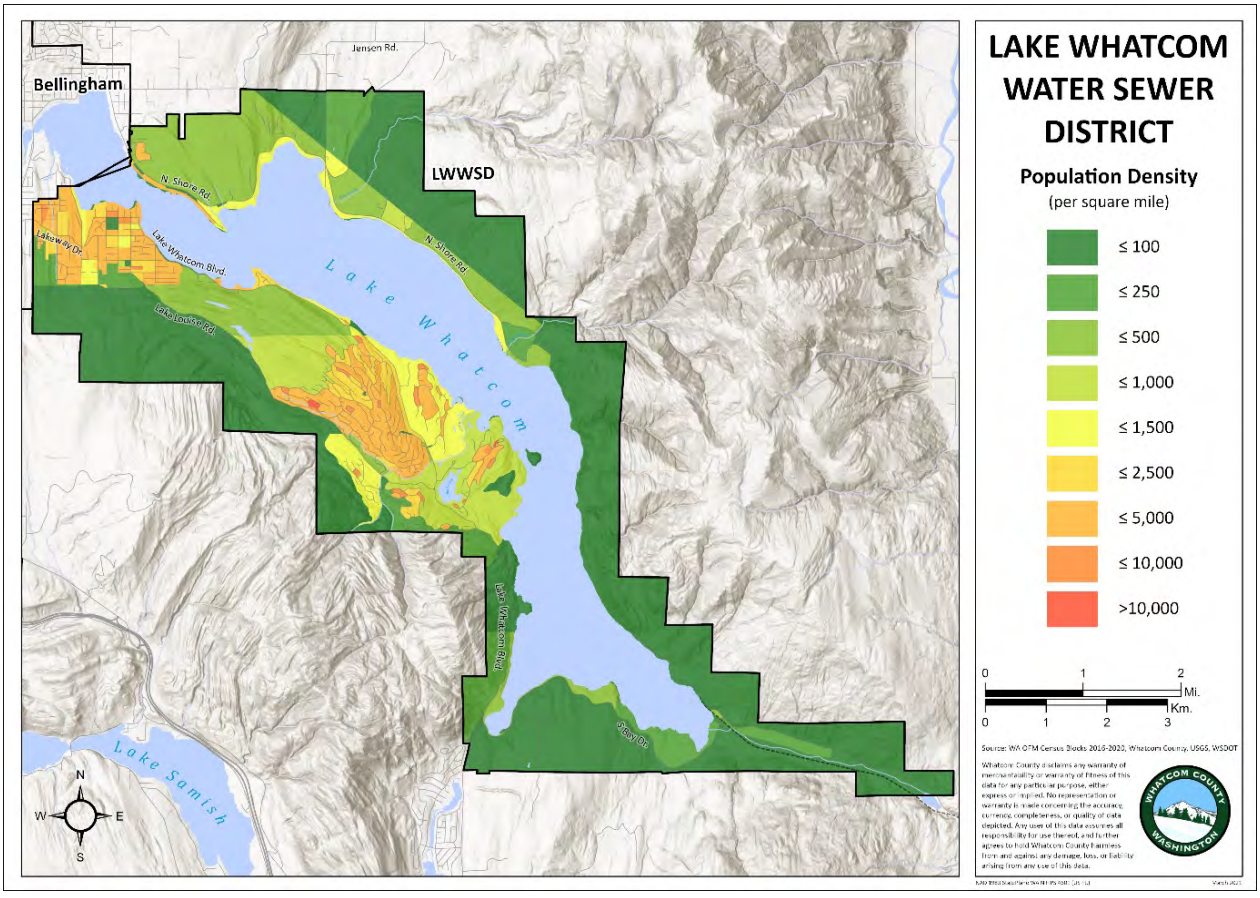
StormReady certification	No	not applicable
Firewise Community certification	No	not applicable
Public-Private Partnership initiatives addressing disaster-related issues	No	not applicable
Other	none	not applicable

Overview of Lake Whatcom Water & Sewer District, Hazards, and Assets

Geography of Lake Whatcom Water & Sewer District

District Population	12,000 (2020 estimate)
Total area	18 sq. mi.

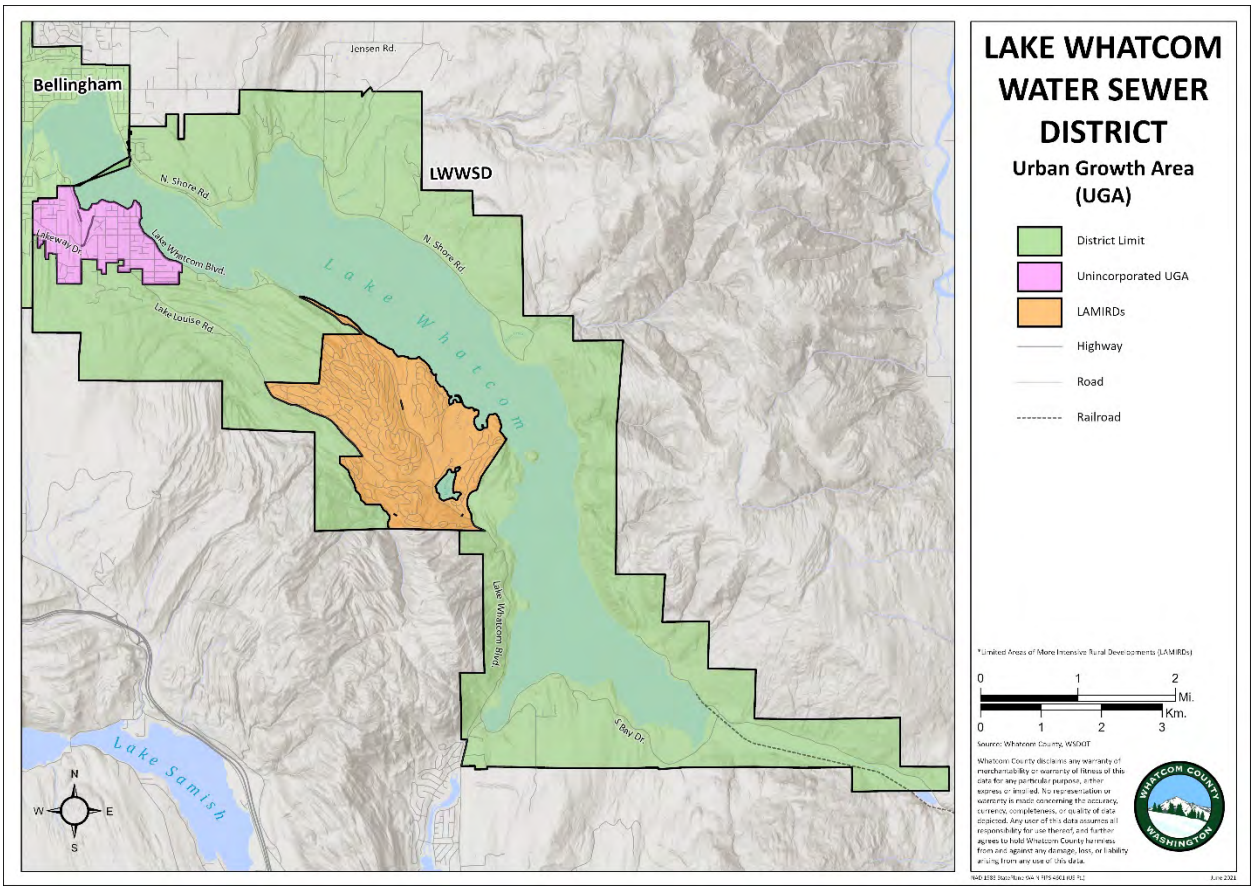
This map displays the service area for the Lake Whatcom Water and Sewer District, as defined in the resolution adopted by the Whatcom County Board of Commissioners on November 21, 1968, that created the District.



Washington State Office of Financial Management (OFM) 2020 population and housing estimates for 2010-2020 census block data. This map uses the 2016-2020 average population to show population density per square mile.

Growth Trends

The District's service area includes the City of Bellingham's Geneva Urban Growth Area, as well as the Sudden Valley LAMIRD (limited area of more intense rural development land use designation in Whatcom County Code). The majority of growth within the District since the last Plan update, as well as future growth projections, occurs in these two areas.



Presence of Hazards and their Impacts in the Lake Whatcom Water & Sewer District

Throughout its over 50-year existence, the District has had limited impact to its services and/or infrastructure caused by natural hazard-related events, with those that have occurred being landslide and riverine flooding caused by severe storm events. Of those events that have impacted District services, all have been ephemeral, lasting no more than a couple days, with most having services restored within 24 hours.

With the District wholly located within the environmentally sensitive Lake Whatcom Watershed, land use restrictions have been adopted within the Whatcom County Comprehensive Plan and Whatcom County Code to limit further development within the watershed. As a result, the District has witnessed relative low growth since issuance of the 2016 Plan, with much of the growth that has occurred being in the Sudden Valley LAMIRD (limited area of more intense rural development land use designation) and Geneva UGA. While the topography of Sudden Valley is largely comprised of lands classified as steep slopes (greater than 15%), all development has occurred on previously existing parcels served by existing District infrastructure. As a result, there has been limited need for infrastructure expansion projects that required incorporation of natural hazard-resilient measures.

In the table below is a list of the major hazards that affect Whatcom County. The second column provides the percentage of the Lake Whatcom Water and Sewer District's total area that is exposed to each hazard. The third column indicates the severity of anticipated impacts to community function, considering the credible worst-case hazard scenario. Severity of anticipated impacts considers effects on basic community function such as shelter, transportation, utilities, commerce, industry, agriculture, education, health, recreation, and cultural identity. Severity ranges from none to extreme, as shown in the key below the table. Finally, the last column of the table describes where the hazard impacts the community and which services the hazard would most significantly impact.

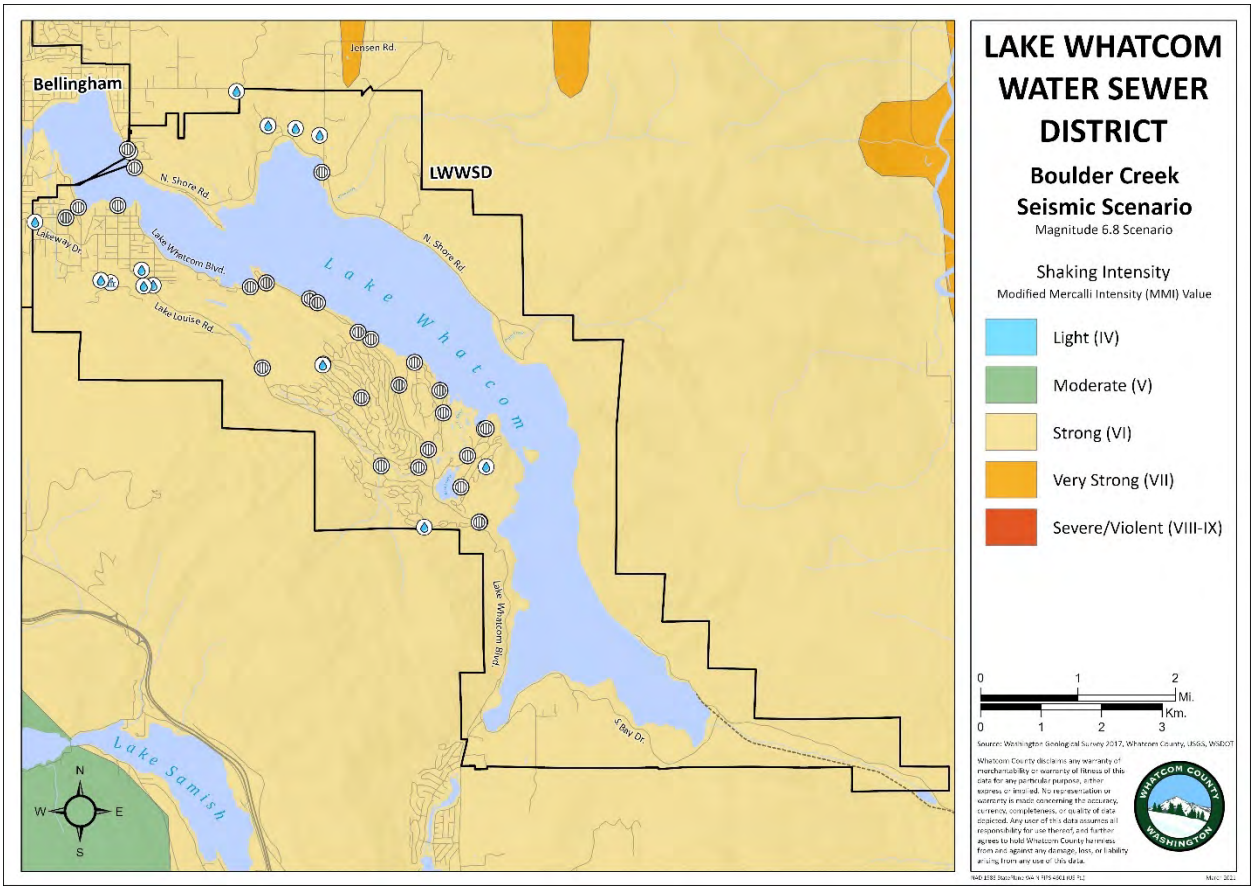
	Hazard	% area Exposed	Severity of Anticipated Impacts	Hazard Descriptions
Geological	**Earthquake**	100%	High	All land susceptible to seismic shaking. Anticipated loss of water/sewage systems for weeks to months, with potential for release of untreated sewage to Lake Whatcom.
	Liquefaction	13.5%	Mod	Areas susceptible to liquefaction are primarily limited to the areas immediately surrounding the mouths of Austin, Carpenter, Olson and Smith creeks (alluvial deposits). Infrastructure in these areas is relatively limited (water/sewer pipelines and 5 sewer lift stations), all of which could be damaged, resulting in a loss of service to some customers.
	Landslide	11.1%	Mod	Areas susceptible to landslide are primarily limited to the Sudden Valley area where slopes are predominately 15% or greater. Landslides could impact (or access to) critical infrastructure, including water/sewer pipelines, water pump stations and reservoirs, and sewer lift stations.
	Volcano	0%	Low	Unlikely that a lahar from a major eruption would enter service area; however, ash fallout could impact lake water quality (drinking water source).
	Tsunami	0%	None	Not within a tsunami inundation zone.
	Mine Hazards	0.8%	None	No known mines are located within the service area.
Hydro-logical	**Flooding**	34.1%	Mod	Prolonged periods of precipitation may create significant flows in Austin, Beaver, Carpenter, Olson and Smith creeks that could impact (or access to) infrastructure. An example includes the 1983 flood event

				that resulted in Austin Creek washing out bridges and a District water main.
Meteorological	**Wildfire**	44.3%	Mod	Much of service area is forested, including areas of development. As is indicated in the Wildland-Urban Interface map, much of the District's critical infrastructure could be impacted by wildfires.

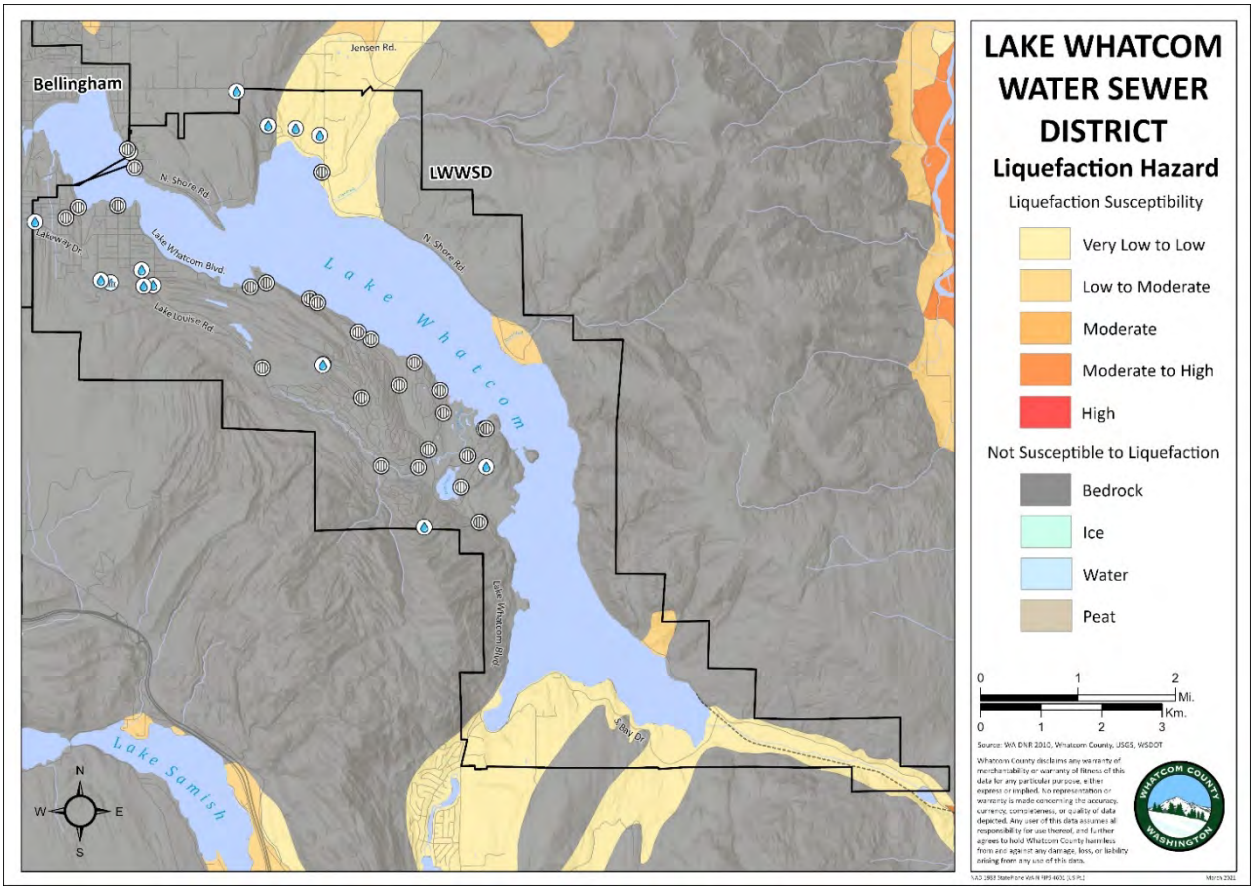
Severity Scale: **None** = no impact to community function
Low = minor degradation of community functions, not widespread
Moderate = moderate degradation over multiple weeks or widespread
High =degradation or loss over many weeks, widespread

Natural Hazard Maps

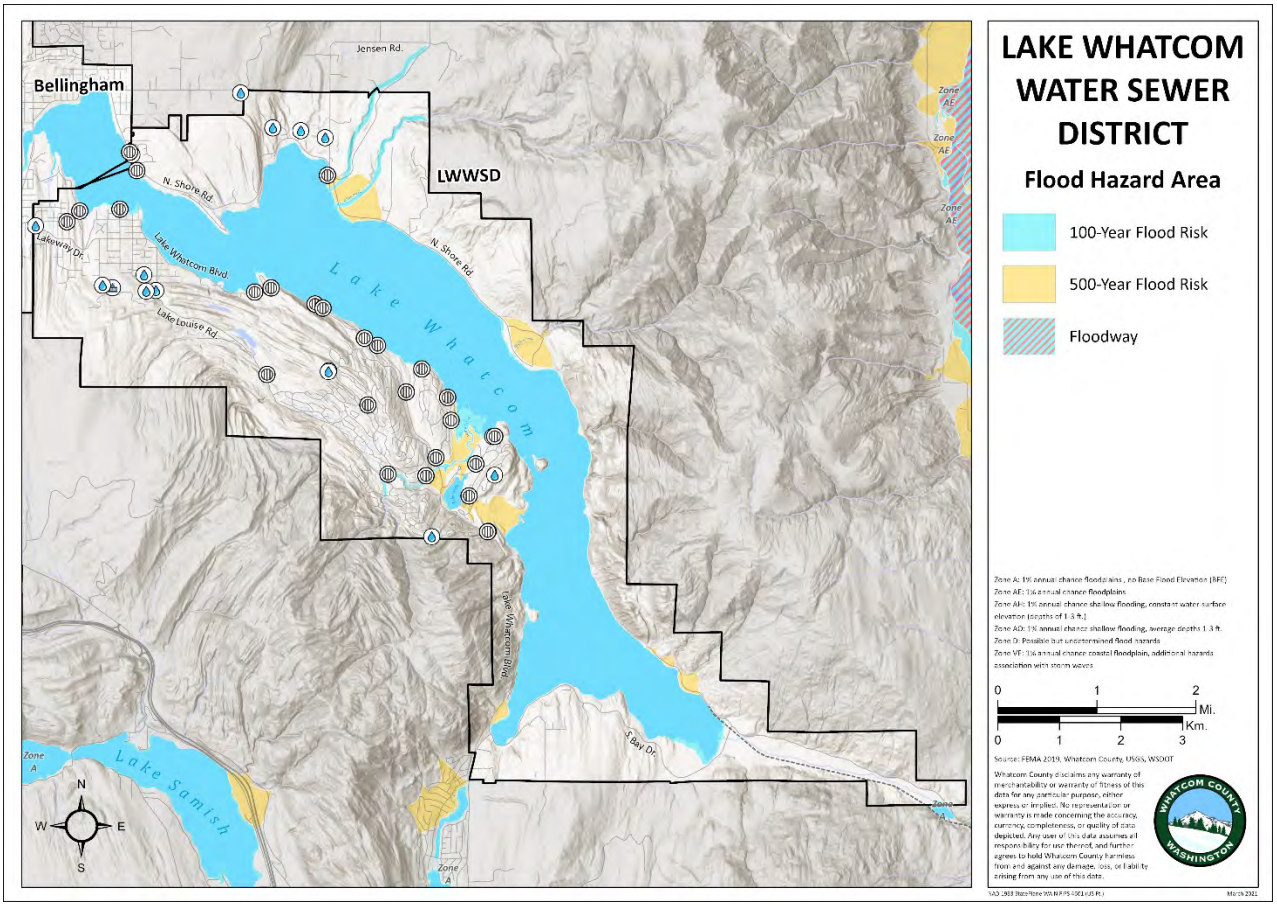
The following figures depict the natural hazards present within the jurisdiction.



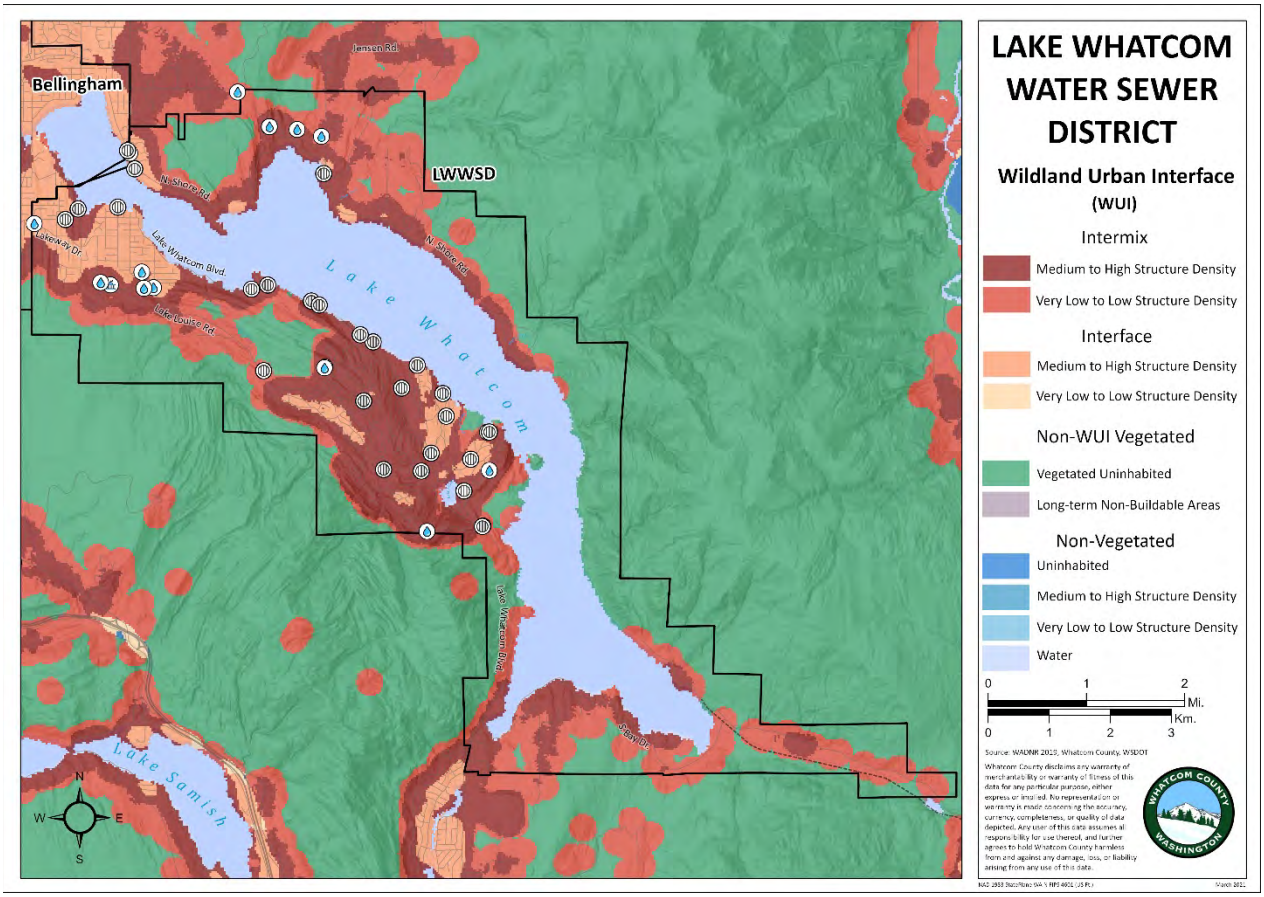
Washington Department of Natural Resources (WA DNR) 2017 Boulder Creek Fault Zone seismic scenario of magnitude 6.8 data. Displays extent and severity of the modeled earthquake in the Modified Mercalli Intensity (MMI) scale.



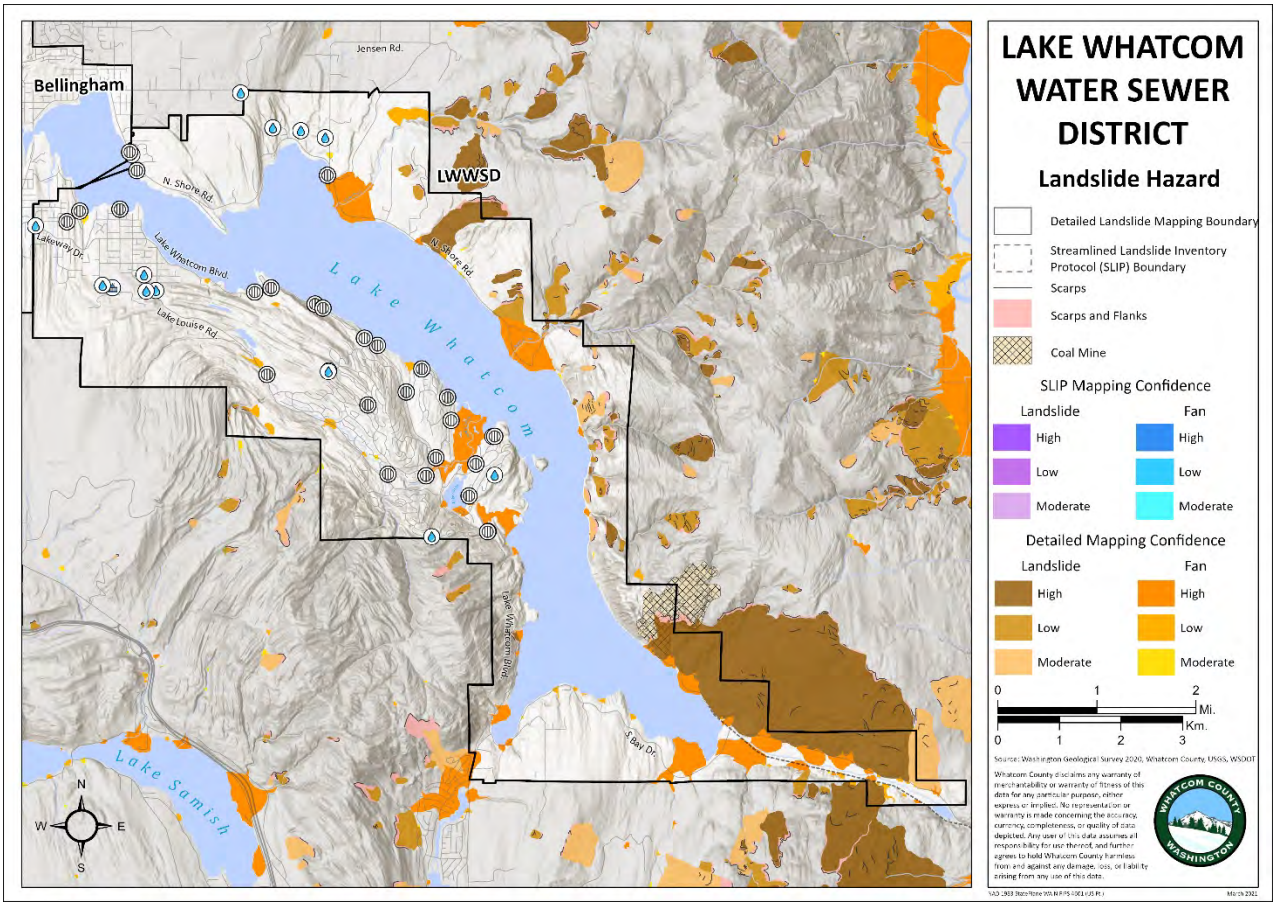
Washington Department of Natural Resources (WA DNR) 2010 liquefaction susceptibility data. This feature class is part of a geodatabase that contains statewide ground response data for Washington State.



FEMA 2019 flood hazard data showing 100-year flooding, 500-year flooding, floodways, and flood zones. FEMA flood data includes both riverine and coastal flooding.



Washington Department of Natural Resources (WA DNR) 2019 mapped data of Washington's Wildland Urban Interface (WUI). The WUI displays areas of WA where structures and wildland overlap with specific structure densities.



Washington Geological Survey (WGS) 2020 Washington landslide inventory data compiled following streamline landslide mapping protocol (SLIP). SLIP was developed by the WGS's Landslide Hazards Program to help geologists rapidly map landslide landforms from lidar. This data shows both detailed mapping and SLIP landslide data.

Lake Whatcom Water & Sewer District Critical Facility List

Facility Name	Facility Type	Signi-ficance	Location	Assessed Dollar Value (2020)	Notes
Administration Building	EF	1	1220 Lakeway Dr, Bellingham, WA	$964,000	Functions as District headquarters and EOC; located outside District
Post Point Wastewater Treatment Plant	EF	3	200 McKenzie Ave, Bellingham, WA	$6,254,284	City of Bellingham-owned facility that treats District-generated wastewater under an interlocal agreement
Maintenance Facility	EF	2	1010 Lakeview St, Bellingham, WA	$1,271,800	Stores all equipment, materials and spare parts, serves as backup EOC
Sudden Valley Water Treatment Plant/Chlorine Contact Reservoir	EF	3	26 Morning Beach Dr, Bellingham, WA	$3,194,700	Produces drinking water for South Shore System (3,880 connections)
Sudden Valley WTP Booster Station	EF	3	26 Morning Beach Dr, Bellingham, WA	$1,327,200	Pumps treated water from SVWTP to South Shore System
Agate Heights Water Treatment Plant/Well Site	EF	3	3320 Sunny Cove Ct, Bellingham, WA	$365,200	Produces drinking water for Agate Heights System (50 connections)
Johnson Well Site	EF	1	3471 Agate Bay Ln, Bellingham, WA	$139,200	Drinking water source for 2 connections
Eagleridge Booster Station	EF	1	1708 Northshore Rd, Bellingham, WA	$423,500	Intertie with City of Bellingham providing drinking water to Eagleridge System (70 connections)
Coronado Booster Station	EF	1	4826 Lookout St, Bellingham, WA	$58,300	Drinking water pump station

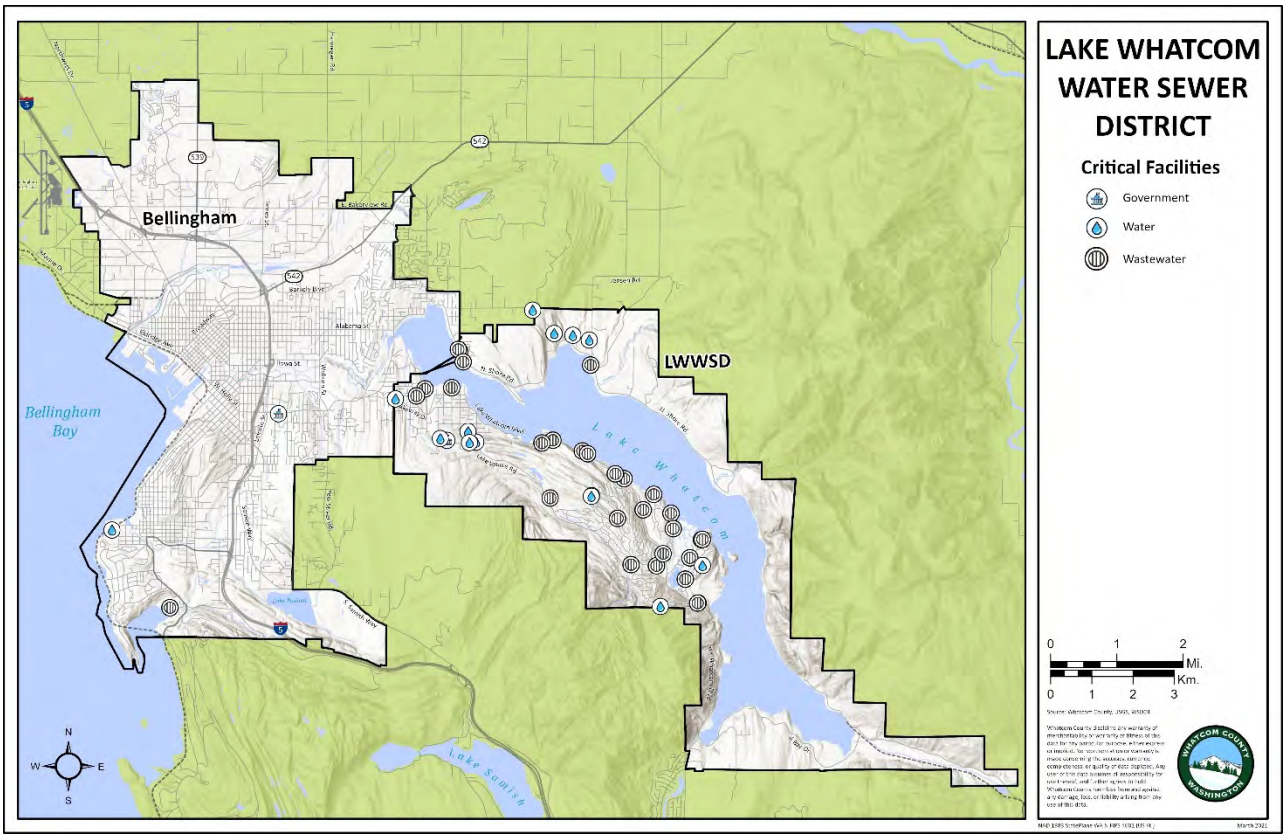
Geneva Intertie	EF	3	3914 Lakeway Dr, Bellingham, WA	$116,100	Intertie with City of Bellingham for emergency water supply
Agate Heights Booster Station	EF	2	3363 Opal Terrace, Bellingham, WA	$119,900	Drinking water pump station
Beecher Booster Station	EF	1	4748 Columbus Ave, Bellingham, WA	$69,300	Drinking water pump station
South Geneva Booster Station	EF	1	1765 Lake Louise Rd, Bellingham, WA	$109,100	Drinking water pump station
Division 30 Booster Station	EF	3	1744 Lake Whatcom Blvd, Bellingham, WA	$294,400	Drinking water pump station
Agate Heights Reservoir	EF	3	3363 Opal Terrace, Bellingham, WA	$383,200	0.08 MG water reservoir
LWRTC Reservoir	EF	3	2145 Academy Rd, Bellingham, WA	$544,800	0.1 MG water reservoir
Division 7 Reservoir	EF	3	3 Grand View Circle, Bellingham, WA	$1,448,300	1.0 MG water reservoir
Division 22 Reservoir No. 1	EF	3	10 Water Tower Ct, Bellingham, WA	$965,200	0.5 MG water reservoir
Division 22 Reservoir No. 2	EF	3	10 Water Tower Ct, Bellingham, WA	$1,074,500	0.6 MG water reservoir
Division 30 Reservoir	EF	3	30 Loganberry Ln, Bellingham, WA	$640,600	0.15 MG water reservoir
Geneva Reservoir	EF	3	1010 Lakeview St, Bellingham, WA	$937,100	0.5 MG water reservoir
Afternoon Beach Lift Station	EF	3	22 Morning Beach Dr, Bellingham, WA	$393,000	Sewer pump station with backup generator
Agate Bay Lift Station	EF	3	3187 Agate Bay Ln, Bellingham, WA	$240,200	Sewer pump station with backup generator

Airport Lift Station	EF	2	2316 Lake Whatcom Blvd, Bellingham, WA	$173,900	Sewer pump station with backup generator
Austin Lift Station	EF	1	8 Acorn Pl, Bellingham, WA	$125,200	Sewer pump station with backup generator
Beaver Lift Station	EF	3	2271 Lake Louise Rd, Bellingham, WA	$930,600	Sewer pump station with backup generator
Boulevard Lift Station	EF	1	2586 Lake Whatcom Blvd, Bellingham, WA	$172,600	Sewer pump station
Cable Street Lift Station	EF	3	2900 Lake Whatcom Blvd, Bellingham, WA	$818,700	Sewer pump station with backup generator
Camp Firwood Lift Station	EF	1	1744 Lake Whatcom Blvd, Bellingham, WA	$190,400	Sewer pump station
Dellesta Lift Station	EF	1	2127 Northshore Dr, Bellingham, WA	$94,300	Sewer pump station
Edgewater Lift Station	EF	1	1725 Edgewater Ln, Bellingham, WA	$85,200	Sewer pump station
Euclid Lift Station	EF	2	1602 Euclid Ave, Bellingham, WA	$207,200	Sewer pump station
Flat Car Lift Station	EF	3	2800 Lake Louise Rd, Bellingham, WA	$920,700	Sewer pump station with backup generator
Geneva Lift Station	EF	2	1545 Geneva St, Bellingham, WA	$476,100	Sewer pump station with backup generator
Lakewood Lift Station	EF	1	2462 Lake Whatcom Blvd, Bellingham, WA	$147,500	Sewer pump station
Lake Louise Lift Station	EF	2	7 Larkspur Park Dr, Bellingham, WA	$138,600	Sewer pump station with backup generator
Lowe Lift Station	EF	1	1525 Lowe Ave, Bellingham, WA	$98,700	Sewer pump station
Marina Lift Station	EF	2	2 Marina Circle, Bellingham, WA	$146,800	Sewer pump station with backup generator
North Point Lift Station	EF	3	10 Clear Lake Ct, Bellingham, WA	$531,000	Sewer pump station with backup generator

Par Lift Station	EF	1	18 Park Ln, Bellingham, WA	$229,100	Sewer pump station
Plum Lift Station	EF	2	15 Autumn Vista Pl, Bellingham, WA	$164,700	Sewer pump station
Ranch House Lift Station	EF	3	10 Marigold Dr, Bellingham, WA	$630,500	Sewer pump station with backup generator
Rocky Ridge Lift Station	EF	1	2566 Woodcliff Ln, Bellingham, WA	$108,300	Sewer pump station
Strawberry Canyon Lift Station	EF	2	12 Strawberry Canyon Ct, Bellingham, WA	$218,600	Sewer pump station with backup generator
Strawberry Point Lift Station	EF	1	2642 Lake Whatcom Blvd, Bellingham, WA	$208,000	Sewer pump station
Sudden Valley Lift Station	EF	3	2018 Lake Whatcom Blvd, Bellingham, WA	$2,651,700	Sewer pump station with backup generator and sewage detention basin
Tomb Lift Station	EF	1	16 Marina Ct, Bellingham, WA	$219,000	Sewer pump station with backup generator

Facility Type: **EF** = Essential Facility; **HMF** = Hazardous Materials Facility; **HPL** = High Potential Loss; **LUS** = Lifeline Utility System

Significance to community function: **1**=Moderate; **2**= High; **3** =Very High



Map of critical facilities identified by the Lake Whatcom Water & Sewer District. Across Whatcom County, critical facilities fell into 15 categories. Unique categories developed for this plan update include mass shelter, assisted living, and recovery resources. Mass shelter includes facilities such as fairgrounds and community centers. Recovery resources are facilities that are required post-hazard event, for example public works and private construction companies. Not all judications identified or included critical facilities in each category.

Critical Facility Rankings for the Lake Whatcom Water & Sewer District

The table below indicates whether each critical facility falls within known hazard zones for earthquake, liquefaction, landslide, tsunami, volcano, riverine flooding, coastal flooding and wildfire zones. A rank assessment in the last column indicates how the relative risk of community impact. This ranking considers the significance of the facility to the community and the number of hazard zones the facility is within. The frequency of each hazard is also considered, such that being in a low frequency hazard zone would receive a lower ranking than that same facility being in a high frequency hazard zone. Ranking is on a scale of 1 to 10, with 1 being the facility with the highest-ranking score, and 10 being a facility with the lowest ranking score in the jurisdiction.

$$\text{Rank} = \text{Significance} * \left[\frac{\text{EQ\_Zone}}{\text{EQ\_Freq}} + \frac{\text{LQ\_Zone}}{\text{LQ\_Freq}} + \frac{\text{LS\_Zone}}{\text{LS\_Freq}} + \ldots + \frac{\text{WF\_Zone}}{\text{WF\_Freq}} \right]$$

Significance: 1=moderate; 2=high; 3=very high, as assessed in the critical facilities list in the previous section

Zone: 0=facility not in hazard zone; 1 = facility in the hazard zone

Frequency (e.g. EQ_Freq, LQ_Freq) is the most difficult variable to which to assign a value. Frequency varies based upon the magnitude of a hazard event and varies from one place to another. It was not possible within the time constraints to assess frequency of hazard at each critical facility location. Instead, a qualitative assessment of the hazard frequency across the entire county was made, as shown in the chart below.

Description	Freq Value used in formula	Hazards
Frequent, occurring on the order of decades	3	Riverine flooding (FL); Coastal flooding (COA)
Rare, occurring on the order of centuries	2	Earthquake (EQ); Liquefaction (LQ); Landslide (LS); Wildfire (WF)
Very rare, occurring on the order of millennia	1	Tsunami (TSU); Volcano (VOL)

Note: Severe storm, a very frequent hazard, was omitted because it is ubiquitous and because no hazard map of storm severity was available.

Critical Facilities Ranking Table

Facility Name	Facility Type	Signi-ficance	EQ	LQ	LS	TSU	VOL	FL	COA	WF	Rank Assessment
Administration Building	EF	1	1	1	0	0	0	0	0	1	0.21
Post Point Wastewater Treatment Plant	EF	3	1	0	0	0	0	0	0	1	0.43
Maintenance Facility	EF	2	1	0	0	0	0	0	0	1	0.29
Sudden Valley Water Treatment Plant/Chlorine Contact Reservoir	EF	3	1	0	0	0	0	1	0	0	0.36
Sudden Valley WTP Booster Station	EF	3	1	0	0	0	0	1	0	0	0.36
Agate Heights Water Treatment Plant/Well Site	EF	3	1	1	0	0	0	0	0	1	0.64
Johnson Well Site	EF	1	1	1	0	0	0	0	0	1	0.21
Eagleridge Booster Station	EF	1	1	0	0	0	0	0	0	1	0.14
Coronado Booster Station	EF	1	1	0	0	0	0	0	0	1	0.14
Geneva Intertie	EF	3	1	0	0	0	0	0	0	1	0.43
Agate Heights Booster Station	EF	2	1	0	0	0	0	0	0	1	0.29
Beecher	EF	1	1	0	0	0	0	0	0	1	0.14

Booster Station											
South Geneva Booster Station	EF	1	1	0	0	0	0	0	0	1	0.14
Division 30 Booster Station	EF	3	1	0	0	0	0	0	0	1	0.43
Agate Heights Reservoir	EF	3	1	0	0	0	0	0	0	0	0.21
LWRTC Reservoir	EF	3	1	0	0	0	0	0	0	1	0.43
Division 7 Reservoir	EF	3	1	0	0	0	0	0	0	1	0.43
Division 22 Reservoir No. 1	EF	3	1	0	0	0	0	0	0	1	0.43
Division 22 Reservoir No. 2	EF	3	1	0	0	0	0	0	0	1	0.43
Division 30 Reservoir	EF	3	1	0	0	0	0	0	0	1	0.43
Geneva Reservoir	EF	3	1	0	0	0	0	0	0	1	0.43
Afternoon Beach Lift Station	EF	3	1	0	0	0	0	0	0	1	0.43
Agate Bay Lift Station	EF	3	1	1	1	0	0	1	0	1	1
Airport Lift Station	EF	2	1	0	0	0	0	0	0	1	0.29
Austin Lift Station	EF	1	1	0	0	0	0	0	0	1	0.14
Beaver Lift Station	EF	3	1	0	0	0	0	0	0	1	0.43
Boulevard Lift Station	EF	1	1	0	0	0	0	1	0	0	0.12
Cable Street Lift Station	EF	3	1	0	0	0	0	0	0	1	0.43
Camp Firwood Lift Station	EF	1	1	0	0	0	0	0	0	1	0.14

Dellesta Lift Station	EF	1	1	0	0	0	0	0	0	1	0.14
Edgewater Lift Station	EF	1	1	0	0	0	0	0	0	1	0.14
Euclid Lift Station	EF	2	1	0	0	0	0	0	0	1	0.29
Flat Car Lift Station	EF	3	1	0	0	0	0	0	0	1	0.43
Geneva Lift Station	EF	2	1	0	0	0	0	0	0	1	0.29
Lakewood Lift Station	EF	1	1	0	0	0	0	0	0	1	0.14
Lake Louise Lift Station	EF	2	1	0	0	0	0	0	0	1	0.29
Lowe Lift Station	EF	1	1	0	0	0	0	0	0	1	0.14
Marina Lift Station	EF	2	1	0	0	0	0	0	0	1	0.29
North Point Lift Station	EF	3	1	0	0	0	0	0	0	1	0.43
Par Lift Station	EF	1	1	1	0	0	0	0	0	1	0.21
Plum Lift Station	EF	2	1	0	0	0	0	0	0	1	0.29
Ranch House Lift Station	EF	3	1	0	0	0	0	0	0	1	0.43
Rocky Ridge Lift Station	EF	1	1	0	0	0	0	0	0	0	0.07
Strawberry Canyon Lift Station	EF	2	1	0	0	0	0	0	0	1	0.29
Strawberry Point Lift Station	EF	1	1	0	0	0	0	1	0	0	0.12
Sudden Valley Lift Station	EF	3	1	0	0	0	0	0	0	1	0.43
Tomb Lift Station	EF	1	1	0	0	0	0	0	0	1	0.14

Notes: **EQ** = Earthquake; **LQ** =Liquefaction; **LS** = Landslide; **TSUN** = Tsunami; **VOL** = Volcano; **FL** = Riverine Flooding; **COA** = Coastal Flooding; **WF** = Wildland Fire

Areas and Assets Exposed, Per Hazard

	Lake Whatcom Water & Sewer District Exposure to Natural Hazards					
	Hazard Susceptibility	**Asset County (% of Total)**				**Critical Facilities Appraised Value (Million)**
		Area (sq.mi.)	**Population**	**Parcels**	**Critical Facilities**	
Geological Hazards	**Earthquake**, Shaking Intensity					
	MMI V	-	-	-	2.1%	$0.2 [1]
	MMI VI	100%	99.9%	99.9%	97.9%	$31 [1]
	MMI VII	-	-	-	-	-
	MMI VIII - IX	-	-	-	-	-
	TOTAL	100%	99.9%	99.9%	100%	$31.2
	Liquefaction					
	Very Low to Low	12.4%	5.8%	8.9%	8.5%	$2 [1]
	Low to Moderate	1%	0.5%	1%	-	-
	Moderate	-	-	-	-	-
	Moderate to High	-	-	-	2.1%	$0.2 [1]
	High	-	-	-	-	-
	TOTAL	13.5%	6.3%	9.9%	10.6%	$2.2
	Landslide					
	Landslide Low	0.6%	0.1%	0.04%	-	-
	Landslide Moderate	0.6%	0.1%	0.1%	-	-
	Landslide High	4.9%	0.3%	0.7%	-	-
	Fan Low	0.1%	0.2%	0.2%	-	-
	Fan Moderate	0.5%	0.3%	0.3%	-	-

	Fan High	4.4%	4%	4.8%	2.1%	$0.2 [1]
	Mine Hazard	0.8%	0.02%	0.03%	-	-
	TOTAL	11.9%	5.02%	6.17%	2.1%	$0.2
	Volcanic Eruption					
	Case 1 Debris Flows	-	-	-	-	-
	Case 2 Debris Flows	-	-	-	-	-
	Case M Flows	-	-	-	-	-
	Pyroclastic Flows, Lava Flows, and Ballistic Debris	-	-	-	-	-
	Lateral Blast Hazard Zone	-	-	-	-	-
	TOTAL	-	-	-	-	-
	Tsunami, Inundation Zone					
	Low to Moderate Inundation Potential	-	-	-	2.1%	$0.2 [1]
	Moderate to High Inundation Potential	-	-	-	-	-
	High Inundation Potential	-	-	-	2.1%	$6 [1]
	TOTAL	-	-	-	4.2%	$6.2
Hydrological	**Flooding**					
	100-year Flood	31.4%	5.1%	6.4%	12.8%	$5 [1]
	500-year Flood	2.7%	3.2%	4.3%	4.3%	$0.4 [1]
	Floodway	-	-	-	-	-
	Undetermined (Zone D)	-	-	-	-	-
	TOTAL	34.1%	8.3%	10.7%	17.1%	$5.4
Mete	**Wildfire Zones**					
	Interface Very Low-Low Structure Density	-	-	0.2%	-	-

	Interface Medium-High Structure Density	5.5%	32.2%	25.1%	25.5%	$12 [1]
	Intermix Very Low-Low Structure Density	16.9%	5.8%	3.7%	8.5%	$2 [1]
	Intermix Medium-High Structure Density	21.9%	48.4%	65.5%	55.3%	$12 [1]
	TOTAL	44.3%	86.4%	94.5%	89.3%	$26

[1] Shows the assessed dollar value provided by the community in their critical facilities list. Does not include the appraised total value.

Status of Lake Whatcom Water & Sewer District's 2016-2020 and Ongoing Hazard Mitigation Actions

This section describes the status of mitigation actions that were proposed in the 2016 Mitigation Plan and are now 1) currently being implemented and are ongoing, 2) are now completed, or 3) are now discontinued because they are no longer needed. The actions are organized by hazard and indicate the lead agency, funding source, and status.

Lead Agency	May be more than one lead agency indicating shared responsibility and coordination
Funding Source	Local; State; FEMA; Private; Other
Current Status	Action Discontinued / Action Completed / Action ongoing and expected completion date

General: All Hazards

G-a. Emergency Plan Updates – The Lake Whatcom Water and Sewer District updated a prior (2008) revision to its Emergency Management Plan in 2019. A subsequent revision that meets the requirements of the federal America's Water Infrastructure Act of 2018 (AWIA) is underway with anticipated adoption by the Board of Commissioners by the December 31, 2021 deadline.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local
Current Status	Ongoing

G-b. Provide for an increased level of protection for public infrastructure – As owner/operator of water and sewer systems providing essential public services, the Lake Whatcom Water and Sewer District annually allocates funding toward system reinvestment projects that enhance system resiliency and/or redundancy in preparation for unforeseen events. Improvements completed since issuance of the 2016 Plan include: construction of new Division 22 reservoir meeting current seismic standards and outfitted with the ShakeAlert earthquake early detection system, installing an emergency water intertie with the City of Bellingham's system in Geneva, and installation of standby generators at three sewer lift stations.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local sources, and state and federal grants
Current Status	Perpetual

Education and Outreach

EO-a. Utility bill inserts – On a semi-annual basis, the District includes educational materials related to emergency preparedness and winter-weather preparedness within bi-monthly utility bills.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local
Current Status	Annual

Drought/heat wave

D-a. Monitor water supply – As required under its water system operating permits, the Lake Whatcom Water and Sewer District daily records volumes of water treated, distributed, consumed and lost within each of its three Group A water systems.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local
Current Status	Perpetual

D-b. Educate residents on water saving techniques – The District maintains water conservation tips on its website, and regularly provides water conservation information via posts to its social media account, messages on the District office reader board, and via utility bill inserts. The District is an active member of the Whatcom Water Alliance, whose mission is to promote standardized water conservation messaging countywide.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local
Current Status	Perpetual

Earthquake

EQ-a. Seismic retrofit of critical infrastructure – seismic retrofit of the District's Maintenance Office.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local sources
Current Status	Complete

EQ-b. Protect critical facilities and infrastructure – complete minor improvements to various

facilities and infrastructure.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local sources, other
Current Status	Complete

EQ-c. Seismic resistant water reservoirs – Constructed 0.6 MG water reservoir in 2018 (Div. 22 No. 2) and planning replacement of existing Division 7 water reservoir with two reservoirs that meet current seismic standards.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local and Federal, including FEMA
Current Status	Ongoing

EQ-d. Seismic vulnerability assessment – In 2016, the District hired a consultant to assess the seismic vulnerability of all of its water reservoirs and develop a prioritization plan for retrofit/replacement.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local
Current Status	Complete

EQ-e. Seismic resilient reservoir system – Constructed a second reservoir adjacent to original Division 22 water reservoir in 2018 (including ShakeAlert system), and plan to replace existing single Division 7 reservoir with two reservoirs that will have ShakeAlert-controlled valving to shut it off during high seismic shaking (to preserve water from loss due to anticipated main breaks).

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local and Federal, including FEMA
Current Status	Ongoing

Extreme Temp

No actions ongoing, discontinued, or completed for this hazard.

Flooding

No actions ongoing, discontinued, or completed for this hazard.

Landslide/erosion

ER-a. Vulnerability assessment – Mapped and assessed the vulnerability of system elements to landslide/erosion events.

Lead Agency	Lake Whatcom Water and Sewer District
Funding Source	Local sources
Current Status	Ongoing

Landslide Subsidence

No actions ongoing, discontinued, or completed for this hazard.

Lightening

No actions ongoing, discontinued, or completed for this hazard.

Severe Storm

No actions ongoing, discontinued, or completed for this hazard.

Severe Wind

No actions ongoing, discontinued, or completed for this hazard.

Tornadoes

No actions ongoing, discontinued, or completed for this hazard

Tsunami

No actions ongoing, discontinued, or completed for this hazard.

Wildfire

No actions ongoing, discontinued, or completed for this hazard.

Winter storms/Freezes

No actions ongoing, discontinued, or completed for this hazard.

Multiple Hazards

No actions ongoing, discontinued, or completed for this hazard.

Lake Whatcom Water & Sewer District 2021-2025 Hazard Mitigation Strategy

Whatcom County Hazard Mitigation Goals

Whatcom County has identified five overarching hazard mitigation goals, which represent what a community seeks to achieve through mitigation actions.

Goal 1. Protect Life, Property and Public Welfare

Goal 2. Increase Public Awareness

Goal 3. Preserve and Enhance Natural Systems

Goal 4. Encourage Partnership for Implementation

Goal 5. Ensure Continuity of Emergency Services

These countywide goals help guide any prioritization and implementation of mitigation actions, ensuring that the actions contribute to a community's vision for the future.

Lake Whatcom Water & Sewer District-Specific Hazard Mitigation Goals

Lake Whatcom Water and Sewer District adds to these county-wide goals, the following community-specific mitigation planning goals:

LWWSD Goal A: Ensure continuity of water and sewer services

LWWSD Goal B: Harden infrastructure to mitigate impact from seismic hazards

Mitigation Action Options

Appendix E of the Whatcom County Natural Hazard Mitigation Plan provides a list of mitigation options. Lake Whatcom Water and Sewer District considered mitigation options related to earthquake, liquefaction, landslide, volcanic, riverine flooding, and wildfire hazards, especially those related to earthquakes because this hazard has the potential to cause the greatest loss and damage. Not all mitigation options in Appendix E were relevant or a strong priority for the District. Some options have already been implemented or are ongoing in the District, as documented in the section above on the status of 2016-2020 and ongoing hazard mitigation actions.

Mitigation Action Prioritization

The mitigation actions in this section are new actions that the Lake Whatcom Water and Sewer District has prioritized for the 2021-2025 planning period and beyond. Mitigation options were prioritized based upon review of the following two criteria: 1) The action's Overall Feasibility based on engineering, environmental, financial and political considerations, 2) The Criticality of the action, based upon a consideration of which actions had the greatest potential to protect life, property and public welfare. The District is working in cooperation with the County and other participating communities and special districts to develop a systematic methodology that would use multiple evaluation criteria to determine mitigation action prioritization. This new methodology will be used in future updates of this Plan.

In the following Identified Mitigation Actions 2021-2025 table, each priority action is listed by hazard. Each action is followed by planning goals, lead agency, the priority evaluation, timeline, funding source and estimated cost, where such information is available. This information can be used by local decision makers in pursuing strategies for implementation.

Goals	Indicates the hazard mitigation planning goal or goals this action addresses; countywide and/or community-specific
Lead Agency	May be more than one lead agency indicating shared responsibility and coordination
Priority:	H (High); M (Medium); L (Low)
Timeline:	Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing
Funding Source:	Local; State; FEMA; Private; Other
Estimated Cost:	Actual; Estimated

Lake Whatcom Water & Sewer District Identified Mitigation Actions 2021-2025

Lake Whatcom Water & Sewer District IDENTIFIED MITIGATION ACTIONS 2021-2025							
MITIGATION ACTIONS		**(1) Goals**	**(2) Lead Responsibility for Carrying out Measure**	**(3) Priority**	**(4) Timeline**	**(5) Funding Source**	**(6) Estimated Cost**
Hazard	**Action Items**						
GENERAL: ALL HAZARDS Education and Awareness Actions	These are actions that inform and educate citizens, elected officials, and property owners about hazards and ways to mitigate them.						
	G-a. Emergency Plan Updates	1	Lake Whatcom Water and Sewer District	M	O	Local	
	G-b. Provide for an increased level of protection for public infrastructure	1	Lake Whatcom Water and Sewer District	M	O	Local, State, Federal	
Education and Outreach	***EO-a Ongoing -- Utility bill inserts***	1, 2	Lake Whatcom Water and Sewer District	M	O	Local	
Hazard Specific	Actions communities should consider to identify and evaluate a range of potential mitigation actions for reducing risk to natural hazards and disasters.						
Dam/Levee Failures (See: Flooding)	No applicable action items	-	-	-	-	-	-
Droughts/Heat	***D-a Ongoing -- Monitor water supply***	1	Lake Whatcom Water and Sewer	M	O	Local	

Priority:	Timeline:	Funding Source:	Estimated Cost:
H (High); M (Medium); L (Low)	Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Local; State; FEMA; Private; Other	Actual; Estimated

Lake Whatcom Water & Sewer District IDENTIFIED MITIGATION ACTIONS 2021-2025							
MITIGATION ACTIONS		**(1) Goals**	**(2) Lead Responsibility for Carrying out Measure**	**(3) Priority**	**(4) Timeline**	**(5) Funding Source**	**(6) Estimated Cost**
Hazard	**Action Items**						
Waves			District				
	D-b Ongoing -- Educate residents on water saving techniques	2	LWWSD	M	O	Local	
	D-1 Require water conservation during drought conditions	3, A	LWWSD	L	O	Local	$10,000
	D-2 Raw water bypass for low reservoir level	1, A	LWWSD	L	L	Local, State, FEMA, Other	$200,000
Earthquakes	***EQ-c Ongoing -- Seismic resistant water reservoirs***	1	LWWSD	L	O	Local, Federal, FEMA	
	EQ-e Ongoing -- Seismic resilient reservoir system	1	LWWSD	L	O	Local, Federal, FEMA	
	EQ-1 Seismic retrofit of existing water reservoirs	1, 5, A, B	LWWSD	H	O	Local, State, FEMA, Other	$8,000,000
	EQ-2 Replace water mains with seismically resistant piping	1, 5, A, B	LWWSD	L	L	Local, State, FEMA, Other	$50,000,000
	EQ-3 Seismic retrofit of existing pumping stations; install ShakeAlert system controls	1, 5, A, B	LWWSD	H	S	Local, State, FEMA, Other	$1,500,000

Priority:	Timeline:	Funding Source:	Estimated Cost:
H (High); M (Medium); L (Low)	Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Local; State; FEMA; Private; Other	Actual; Estimated

Lake Whatcom Water & Sewer District IDENTIFIED MITIGATION ACTIONS 2021-2025							
MITIGATION ACTIONS		**(1) Goals**	**(2) Lead Responsibility for Carrying out Measure**	**(3) Priority**	**(4) Timeline**	**(5) Funding Source**	**(6) Estimated Cost**
Hazard	**Action Items**						
	EQ-4 Anchorage of critical facilities: pumps, electronics, communications	1, 5, A, B	LWWSD	H	M	Local, State, FEMA, Other	$3,000,000
Extreme Temperatures	No applicable action items	-	-	-	-	-	-
Flooding	**F-1 Protect Infrastructure** Harden infrastructure at bridge and dam crossings	1, 5, A	LWWSD	L	L	Local, State, FEMA, Other	$1,000,000
	F-2 Protect Critical Facilities Dry proof pumping stations	1, 5, A	LWWSD	L	L	State, FEMA	$150,000
Landslide/Erosion	***ER-a Ongoing -- Vulnerability assessment***	1	LWWSD	L	O	Local	
	ER-1 Protect Division 30 Reservoir	1, 5, A, B	LWWSD	L	L	Local, State, FEMA, Other	$1,000,000
Land Subsidence	**LS-1 Protect Critical Facilities**	1, 5, A	LWWSD	L	L	Local, State, FEMA, Other	$2,000,000
Lightning	No applicable action items	-	-	-	-	-	-
Severe Storms	**SS-1 Install backup generators at**	1, 5, A	LWWSD	H	O	Local, State,	$2,000,000

Priority:	Timeline:	Funding Source:	Estimated Cost:
H (High); M (Medium); L (Low)	Short-Range (less than 2 years); Mid-Range (2-5 years); Long-Range (more than 5 years); Ongoing	Local; State; FEMA; Private; Other	Actual; Estimated

Lake Whatcom Water & Sewer District IDENTIFIED MITIGATION ACTIONS 2021-2025							
MITIGATION ACTIONS		**(1) Goals**	**(2) Lead Responsibility for Carrying out Measure**	**(3) Priority**	**(4) Timeline**	**(5) Funding Source**	**(6) Estimated Cost**
Hazard	**Action Items**						
	facilities					FEMA, Other	
Severe Wind	No applicable action items	-	-	-	-	-	-
Tornadoes	No applicable action items	-	-	-	-	-	-
Tsunami	No applicable action items	-	-	-	-	-	-
Wildfires	**WF-1 Firewise critical facilities**	1, 5, A	LWWSD	M	M	Local, State, FEMA, Other	$1,000,000
Winter Storms/ Freezes (Severe Winter Weather)	**WS-1 Install backup generators at facilities**	1, 5, A	LWWSD	H	O	Local, State, FEMA, Other	$2,000,000
Multiple Hazards	No applicable action items	-	-	-	-	-	-
Advanced Mitigation Projects (Dream List)	No applicable action items	-	-	-	-	-	-

Lake Whatcom Water & Sewer District Annual Review and Progress for Hazard-Specific Mitigation Actions 2021-2025

Progress monitoring means tracking the implementation of the hazard specific mitigation actions over time. Each jurisdiction must identify how, when, and by whom action items will be monitored. The responsible agency assigned to each mitigation action is responsible for tracking and reporting on each of their actions.

Annual review and progress reporting includes the following:

Step One: Identify mitigation actions that your planning team has identified for the annual review. The planning team has the option to address ALL action items, or only those that should be acted on during each review cycle.

Step Two: Use the table below to track annual progress. For each action item selected for annual review insert the appropriate letter that indicates the status of that action item.

Step Three: Complete a progress report form as illustrated in Appendix G for each mitigation action item selected for annual review

Step Four: Submit the completed form(s) to the Whatcom County DEM.

Lake Whatcom Water and Sewer District Hazard-Specific Action Items 2021-2025 – Annual Review and Progress						
Action Items	**Status** *(Choose One & **Enter Letter**):* **A.** Completed; **B.** In Progress (on schedule); **C.** In Progress (delayed); **D.** Delayed Until Funding Available; **E.** Canceled					
	2021	**2022**	**2023**	**2024**	**2025**	**Notes on yearly progress**
GENERAL: ALL HAZARDS						
G-a. Update District-specific emergency response plan	B					Plan updated in 2019 and is on track for update in compliance with AWIA-requirements in 2021.
G-b. Provide for an increased level of protection for public infrastructure	B					Six-year water/sewer capital improvement plans includes projects each year assoc. with this task.
Add Additional Actions as Needed						
EDUCATION AND OUTREACH						
EO-a. Utility bill inserts	B					Completed annually.
Add Additional Actions as Needed						
DAM/LEVEE FAILURES						
none	-	-	-	-	-	
DROUGHTS/HEAT WAVES						
D-a. Monitor water supply	B					Conduct daily.
D-b. Educate residents on water saving techniques	B					Conduct via utility bill fact sheets, social media posts, and Lakeway Drive reader board messages.
D-1 Require water conservation during drought conditions	B					To be implemented, if necessary.
D-2 Install raw water bypass for low lake level conditions	D					Improvement planned beyond current planning horizon.
Add Additional Actions as Needed						
EARTHQUAKES						
EQ-c. Seismic resistant water reservoirs	B					Replacement of existing Div. 7 reservoir planned for 2023.
EQ-e. Seismic resilient reservoir system	B					Installation of ShakeAlert controls on water system components planned for

Lake Whatcom Water and Sewer District Hazard-Specific Action Items 2021-2025 – Annual Review and Progress						
Action Items	**Status** *(Choose One & **Enter Letter**):* **A.** Completed; **B.** In Progress (on schedule); **C.** In Progress (delayed); **D.** Delayed Until Funding Available; **E.** Canceled					
	2021	**2022**	**2023**	**2024**	**2025**	**Notes on yearly progress**
						2023.
EQ-1 Seismic retrofit of existing water reservoirs	D					Improvements dependent upon external funding.
EQ-2 Replace water mains with seismically resistant piping	D					Improvements dependent upon external funding.
EQ-3 Seismic retrofit of existing pumping stations; install ShakeAlert system controls	D					Improvements dependent upon external funding.
EQ-4 Anchorage of critical facilities: pumps, electronics, communications	D					Improvements dependent upon external funding.
Add Additional Actions as Needed						
FLOODING						
F-1 Protect infrastructure (harden infrastructure at bridge and dam crossings)	D					Improvements dependent upon external funding.
F-2 Protect critical facilities (dry proof pumping stations)	D					Improvements dependent upon external funding.
Add Additional Actions as Needed						
LANDSLIDES/EROSION						
ER-1 Protect Division 30 reservoir	D					Improvements dependent upon external funding.
Add Additional Actions as Needed						
LAND SUBSIDENCE						
LS-1 Protect Critical Facilities	D	-	-	-	-	Improvements dependent upon external funding.
Add Additional Actions as Needed						

Lake Whatcom Water and Sewer District Hazard-Specific Action Items 2021-2025 – Annual Review and Progress						
Action Items	**Status** *(Choose One & **Enter Letter**):* **A.** Completed; **B.** In Progress (on schedule); **C.** In Progress (delayed); **D.** Delayed Until Funding Available; **E.** Canceled					
	2021	**2022**	**2023**	**2024**	**2025**	**Notes on yearly progress**
TORNADOES						
none	-	-	-	-	-	
TSUNAMI						
none	-	-	-	-	-	
WILDFIRES						
WF-1 Firewise critical facilities	D					Improvements dependent upon external funding.
Add Additional Actions as Needed						
WINTER STORMS/FREEZES (SEVERE WINTER WEATHER)						
WS-1 Power generation at critical facilities	B					Completed per current capital improvement plan.
Add Additional Actions as Needed						
EXTREME TEMPERATURES						
none	-	-	-	-	-	
LIGHTNING						
none	-	-	-	-	-	
SEVERE WIND						
none	-	-	-	-	-	
MULTIPLE HAZARDS						
none	-	-	-	-	-	

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