Appendix E: Natural Environment

Natural Environment

Air Quality

Three agencies have jurisdiction over the ambient air quality in the Puget Sound area: the U.S. Environmental Protection Agency (EPA), the State of Washington Department of Ecology (Ecology), and the Puget Sound Clean Air Agency (PSCAA). These agencies establish regulations that govern both the allowable concentrations of pollutants in the outdoor air (i.e., ambient air) and allowable contaminant emissions from air pollution sources. Although their regulations are similar in terms of stringency, each agency has established its own standards.

Unless the state or local jurisdiction has adopted more stringent standards, the EPA standards apply.

Table E-1: National and State of Washington Ambient Air Quality Standards

	National (EPA)		
Pollutant	Primary	Secondary	Washington State
Carbon Monoxide			
8-hour average	9 ppm	9 ppm	9 ppm
1-hour average	35 ppm	35 ppm	35 ppm
Particulate Matter			
PM10			
Annual average	50 µg/m3	50 µg/m3	50 µg/m3
24-hour average	150 µg/m3	150 µg/m3	150 µg/m3
PM2.5			
Annual average	15 µg/m3	15 µg/m3	15 µg/m3
24-hour average	65 µg/m3	65 µg/m3	65 µg/m3
Lead			
Quarterly average	1.5 µg/m3	1.5 µg/m3	1.5 µg/m3
Sulfur Dioxide			
Annual average	0.03 ppm	No standard	0.02 ppm
24-hour average	0.14 ppm	No standard	0.10 ppm
3-hour average	No standard	0.50 ppm	No standard
1-hour average	No standard	No standard	0.40 ppm[a]
Ozone			
8-hour average[b]	0.08 ppm	0.08 ppm	0.08 ppm
Nitrogen Dioxide			
Annual average	0.05 ppm	0.05 ppm	0.05 ppm

Table E-1 lists the national ambient air quality standards (NAAQS) as adopted by EPA and Ecology. The NAAQS consist of primary standards designed to protect public health and secondary standards designed to protect public welfare (e.g., preventing air pollution damage to vegetation). The more stringent secondary standards are used to regulate air quality.

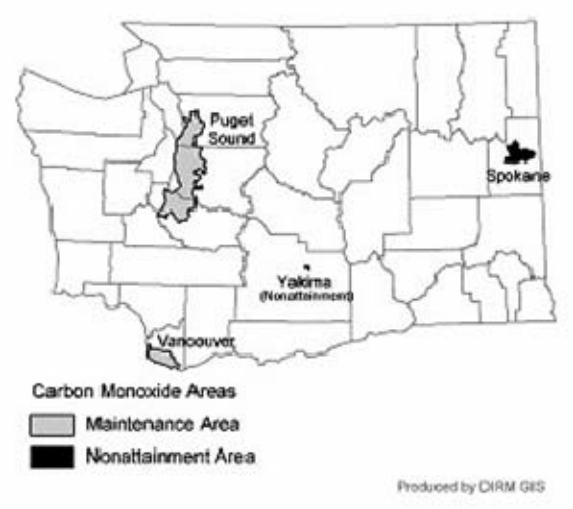
Notes:

- Annual standards never to be exceeded. Short-term standards not to be exceeded more than once per year unless noted.
- ppm = parts per million
- PM10 = particles 10 microns or less in size
- PM2.5 = particles 2.5 microns or less in size
- µg/m3 = micrograms per cubic meter
- [a] = 0.25 ppm not to be exceeded more than two times in 7 consecutive days.
- [b] = Not to be exceeded on more than 1 day per calendar year as determined under the conditions indicated in Chapter 173-475 WAC.

Ecology and PSCAA operate ambient air quality monitors throughout the Puget Sound region. Most of the monitors have intentionally been placed at locations most likely to experience degraded air quality (e.g., near industrial facilities or at heavily-congested downtown areas). A few monitors have been operated in outlying areas to measure ambient concentrations in typical suburban or rural settings where concentrations are acknowledged to be low.

The Puget Sound Clean Air Agency (PSCAA) monitors air quality. The entire UGA falls just within the northeastern boundary of the Non-Attainment Area. According to that agency's available documents air quality in the Arlington area is generally good, though there are some localized concerns. Their data shows that the largest emission sources include U.S. Marine (boat building), Subert & Walker Pre-Finishing (wood kitchen cabinets), 23 gasoline stations, two auto body shops, and the airport and support industries. In addition, diesel combustion sources such as school buses, trucks and heavy equipment appear to emit air toxics of the greatest risk for harming human health in the region.

While no specific data exists for the immediate Arlington area, one can assume that air quality is better than in the areas that are monitored. The Puget Sound region has only had non-attainment days for three of the six major pollutants common to industrialized societies. These are:



Carbon Monoxide (CO)

Carbon monoxide is a colorless, odorless, toxic gas commonly formed when carbon-containing fuel is not completely burned. It chemically combines with the hemoglobin in the red blood cells to decrease the oxygen-carrying capacity of the blood. It also weakens the contractions of the heart, thus reducing the amount of blood pumped through the body. Additionally it can affect the functioning of the lungs and brain. People with heart disease and pregnant women are particularly at risk. In the Puget Sound region, motor vehicles are the principal source of carbon monoxide. Highest levels occur mainly during autumn and winter months, and usually around congested transportation routes and other concentrations of motor vehicles (e.g., shopping centers). The monitor for CO is located in Everett near Broadway and Hewitt Avenue. Federal standards for CO (9 ppm averaged over 8 hours) have not been exceed since the 1989-90 monitoring year, when the standard was exceeded on two days. In 1991, the federal standard was exceeded on one occurrence (10.2 ppm); however, one exception is allowed under Federal policy. In 1992, there were no exceptions.

Particulate Matter (PM^{10})

Particulate Matter^{10} includes small ($\leq$ 10 µm) particles of solid or aerosol particles of dust, soot, organic matter and compounds containing sulfur, nitrogen, and metals. Particulates enter the air directly from industrial operations, motor vehicles (automobiles, buses, and trucks), fuel combustion (woodstoves and fireplaces), construction, and other sources. Particulates measuring $\leq$ 1 µm are especially associated with a variety of adverse effects on public health and welfare. The small particles can be breathed deeply into the lungs, producing injury by itself or in conjunction with gases. The elderly, those suffering from respiratory illness, and young children are especially prone to the deleterious effects of particulates. Soiling of buildings and other property, and reduced visibility are other results of high particulate matter levels. Ambient levels change daily due to variances in weather and activity level. PM^{10} is monitored in Marysville at the Junior High School. The Federal standard for PM^{10} is 150 µg/m^3 for a 24-hour average and 50 µg/m^3 for an annual arithmetic mean. The highest PM^{10} levels where measured in 1991, when the

monitoring station registered 123 µg/m^3 in a 24-hour period. In both 1992 and 1993 the level has hovered around 100 µg/m^3.

Ozone (O3)

Ozone is a pungent smelling, colorless gas produced in the atmosphere when nitrogen oxides and volatile organic compounds chemically react under the effect of strong sunlight. It is a pulmonary irritant that affects lung tissues and respiratory functions. Ozone impairs the normal function of the lung and, at concentration between 0.15 and 0.25 ppm, causes lung tightness, coughing, and wheezing. Other oxidants that often accompany ozone cause eye irritation. Persons with chronic respiratory problems, such as asthma, seem most sensitive to increases in ozone concentration. Ironically, ozone is beneficial when it occurs very high in the atmosphere, miles above the earth, where it protects us from harmful ultraviolet radiation. The highest levels are measured on hot days from mid-May to mid-September, and because of weather patterns the highest ozone values normally occur south to southeast of the major cities or source areas. There are no monitoring stations in Snohomish County; the closest are in Blaine and Beacon Hill (Seattle). In 1987 the Puget Sound Region attained the ozone standard (0.12 ppm/hour/3 year average), but in 1990 the region was once again out of compliance. In 1991 the region again fell below the standard. The Arlington area, however, is in compliance. Nevertheless, Arlington is in PSRC's designated "Ozone Maintenance Area."

Attainment Status for Snohomish County

Based on measured ambient air quality data from the agencies' network of air quality monitors, EPA and Ecology designate all portions of the state as either "attainment" or "nonattainment" with respect to the NAAQS standards. Areas designated as nonattainment have exceeded NAAQS standards for those pollutants. If, as is the case of most of Washington State, the measured concentrations in a nonattainment area improve so they are consistently below the NAAQS standards, Ecology and EPA can reclassify the nonattainment area to a "maintenance area." In that case, Ecology and the regional planning agencies are required to implement a "maintenance plan" to ensure ongoing emission reductions and continuous compliance with the NAAQS standards. Typical emission reduction requirements specified in maintenance plans include continuation of motor vehicle inspection and maintenance programs that were originally established while the area was designated as nonattainment.

In 1978, the central Puget Sound region (including much of Snohomish County) was classified as a nonattainment area by the EPA for CO and O3. In 1987, the industrial areas of the Seattle Duwamish River, Kent Valley, and Tacoma Tide flats were classified as nonattainment areas for PM10. None of those PM10 nonattainment areas affect Snohomish County.

In 1996, having met the federal standards for several years, the region (including Snohomish County) was re-designated by the EPA as a maintenance area for CO and O3. As required by the EPA, the Puget Sound region has a maintenance plan for the CO and O3 maintenance areas. The EPA has approved all of these plans.

Approval of the CO maintenance plan occurred on October 11, 1996; approval for the O3 maintenance plan occurred on November 25, 1996. The three previous PM10 nonattainment areas within the Puget Sound region (none were in affected Snohomish County) were also re-designated as maintenance areas. See the Puget Sound Regional Council (PSRC) map of Designated Maintenance Areas for Criteria Pollutants Carbon Monoxide, O3, and Particulate Matter at www.psrc.org/datapubs/maps/index.htm. The map shows the location of the maintenance area boundaries.

Air Quality Permitting Requirements for Snohomish County

This section describes air quality permitting requirements for proposed new public and private sector projects in the County.

Air Quality Permitting for Stationary Air Emission Sources

Stationary air pollutant sources are regulated by either PSCAA or Ecology. New "minor sources" (facilities that emit less than 100 tons per year of any single listed air pollutant are required to apply for a Notice of Construction (NOC) air quality permit issued by PSCAA.

The application for an NOC permit requires the facility to install Best Available Control Technology (BACT) to reduce emissions, to conduct computer modeling to demonstrate that the facility's emissions will not cause ambient concentrations to exceed the NAAQS limits, and to minimize the impacts of odors and toxic air pollutants.

New "major sources" (facilities that emit more than 100 tons per year of any single air pollutant) are required to obtain a Prevention of Significant Deterioration (PSD) permit and an Air Operating Permit from Ecology. The requirements for a PSD permit are more stringent than for an NOC permit. Facilities with a PSD permit must comply with lower ambient air quality limits, and must demonstrate they will not cause visibility or acid deposition problems at national parks and wilderness areas in the region.

Conformity Analyses for State or Federally Funded Transportation Projects

Cars and trucks on public roads are the largest single source of emissions in Snohomish County and the Puget Sound region. However, until the early 1990s there were no air quality regulations applicable to public roadway projects. In 1990, EPA and the Washington legislature enacted new regulations requiring federally- or state-funded highway projects to evaluate their local and regional air quality impacts. Transportation projects proposed for construction within nonattainment areas or maintenance areas are subject to the Transportation Conformity regulations specified under federal regulations (40 CFR Part 93) and state regulations (Chapter 173-420 WAC). The permitting agency must demonstrate conformity by the following steps:

- Confirm that the project is included in the regional Transportation Improvement Plan (TIP).
- Confirm that the regional emissions (including the proposed project) described in the TIP are within the allowable emission budget specified by Ecology.
- Use an EPA-approved air quality dispersion model to assess CO concentrations at the most heavily congested intersections.

Countywide and Puget Sound Regional Emissions

Table E-2 lists estimated Countywide and regional air pollutant emissions from various source categories for the year 1996. The emission estimates demonstrate trends characteristic of the suburban and rural nature of the County. Cars and trucks on public roads are major sources of NOx and hydrocarbons, which are the precursors to regional O3 impacts. Industrial point sources might impact air quality adjacent to each facility, but overall they are relatively small contributors to emissions within the County. During the winter residential wood stoves and fireplaces are major contributors to PM10 and PM2.5 emissions.

Table E-2: Air Pollutant Emissions in Snohomish County (tons per year)

Category	PM10	PM2.5	SO2	NOx	VOC	CO
Architectural Surface Coating	0	0	0	0	926	0
Natural Biogenic Sources	0	0	0	487	22,892	0
Recreational Boats	65	65	13	154	1,576	4,719
Consumer/Commercial Solvents	0	0	0	0	2,101	0
Prescribed Burning	325	299	4	99	173	2,770
Non-road Mobile	260	251	206	2,447	3,147	26,397
On-road Mobile	630	498	643	18,017	12,504	117,593
Road Dust - Paved	1,977	184	0	0	0	0
Point Sources	89	80	508	1,727	1,409	738
Ships	101	98	738	1,900	163	1,114
Soil Ammonia Emissions	0	0	0	0	0	0
Agricultural Tilling	311	63	0	0	0	0
Road Dust - Unpaved	880	132	0	0	0	0
Woodstoves and Fireplaces	2,409	2,332	36	226	6,108	17,946
Snohomish County Totals, tons per year	7,047	4,002	2,148	25,057	50,999	171,277
Puget Sound Regional Totals, tons per year	43,583	23,633	13,625	134,553	220,098	943,924

Source: PSAPCA 1996

Biological Resources

Wildlife

The Arlington area supports moderate numbers of numerous species of fish, birds, amphibians, reptiles, and insects and other invertebrates, some of which are state and federal listed. Please refer to Table E-3: WDFW Region 4 Species of Concern (including Arlington) for a listing of all such species that the Washington Department of Fish and Wildlife knows of in Region 4, which includes Arlington, that are state endangered, state threatened, state sensitive, state candidate, or species of concern, as well as species listed or proposed for listing by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. This list does not include insects or mollusks.

Most species on this list do not live in Arlington, and there is low probability of finding them here. However, some may have a relationship with the ecological functions affected by actions in Arlington, such as feeding on salmon from our local streams.

Some sensitive species have been observed but are not on the DFW database, probably due to the historical lack of reporting of such species.

Endangered species (listed under the Endangered Species Act), Threatened and other notable species that are known to exist in the UGA include:

Bald Eagle (*Haliæetus leucocephalus*) – (federal and state threatened) Formerly an Endangered Species, the Bald Eagle was removed from the ESA threatened list in 2007. It is still protected by the Bald and Golden Eagle Protection Act which does not create a land use restriction but prohibits posession or harm to it.

Nests are known to exist at various locations on the main, south fork and north fork Stillaguamish. Several are found along the north shore of the Stillaguamish River near the Dike Road. The Department of Wildlife has developed Bald Eagle Site Management Guidelines for use when reviewing proposed

development projects. Property owners are responsible for preparing and implementing a habitat and nest management plan when a project falls within a management area.

Bull trout (Salvelinus confluentis) – A federally listed threatened species under the Endangered Species Act, bull trout have been identified using Arlington's streams. These streams are identified on the Snohomish County ESA maps[1] as "presumed habitat." The presumed use would be only rearing or refuge, as Bull trout spawning is believed to occur in the upper reaches of the Stillaguamish watershed in the cooler headwater streams.

Chinook Salmon (Oncorhynchus tschawytscha) – Chinook are considered to use the Stillaguamish River, larger streams, side channels and riverine wetlands rather than the smaller streams traveling through Arlington. Therefore, the areas of town that lay alongside the main stem and south fork Stillaguamish River are considered areas of Chinook usage. The majority of Chinook spawning occurs in the upstream areas but there are normally occasional redds found in lower areas of the river. A majority of the juvenile population travel downriver during the spring high flows to spend time growing in the highly productive estuary. A small percentage (5-8%) of the juveniles are considered riverine and will over-winter to head for the estuary as a one-year old smolt. The current population of Chinook is around 1,400 annually returning adults[2].

Steelhead (Onchorhynchus mykiss) – May 7, 2007 Puget Sound Steelhead were listed as Threatened under the Endangered Species Act. Steelhead are considered to use the Stillaguamish River, larger streams, side channels and potentially the streams in Arlington's City Limits. National Marine Fisheries Service is beginning the development of a Steelhead Recovery Plan that will provide guidance to jurisdictions on how to participate in the recovery of the species. Steelhead are different that salmon in that they can return multiple times to spawn and move from freshwater to saltwater multiple times throughout their life span. Similar to bull trout due to physical ability and habits a steelhead may travel anywhere a coho salmon will travel.

Table E-3: WDFW Region 4 Species of Concern (including Arlington)

Common Name	Status	
	State	Federal
FOUND IN ARLINGTON		
Bald Eagle	T	T
Bull Trout	C	T
Chinook Salmon	C	T
Steelhead		T
A SMALL CHANCE OF BEING FOUND IN ARLINGTON		
Harlequin Duck		SC
Larch Mountain Salamander	C	SC
Northern Goshawk	C	SC
Peregrine Falcon	E	SC
Purple Martin	C	
River Lamprey	C	SC
Townsend's Big-Eared Bat	C	SC
Western Pond Turtle	E	SC
Western Toad	C	SC

[1] Based on Washington Department of Fish and Wildlife data.

[2] Technical Assessment and Recommendations for Chinook Salmon Recovery in the Stillaguamish Watershed, Stillaguamish Technical Advisory Group, September 2000.

Common Name	Status	
	State	Federal
LITTLE TO NO CHANCE OF BEING FOUND IN ARLINGTON		
Black Rockfish	C	
Bococcio Rockfish	C	
Brant's Cormorant	C	
Brown Rockfish	C	
Canary Rockfish	C	
China Rockfish	C	
Columbia Spotted Frog	C	SC
Common Loon	S	
Common Murre	C	
Copper Rockfish	C	
Golden Eagle	C	
Gray Whale	S	
Gray Wolf	E	E
Green Striped Rockfish	C	
Grizzly Bear	E	T
Lynx	T	T
Marbled Murrelet	T	T
Merlin	C	
Olympic Mud Minnow	S	
Orca Whale	C	
Oregon Vesper Sparrow	C	SC
Pacific Cod	C	
Pacific Hake	C	
Pacific Harbor Porpoise	C	
Pacific Herring	C	
Pileated Woodpecker	C	
Pygmy Whitefish	S	
Quillback Rockfish	C	
Red Striped Rockfish	C	
Roosting Concentrations of Myotis Bats (Keen's)	C	
Sandhill Crane	E	
Spotted Owl	E	T
Steller Sea Lion	T	T
Streaked, Horned Lark	C	C
Tiger Rockfish	C	
Tufted Puffin	C	SC
Vaux's Swift	C	
Walleye Pollock	C	
West Slope Cutthroat		SC
Widow Rockfish	C	
Wolverine	C	SC
Yellow Eye Rockfish	C	
Yellow-Billed Cuckoo	C	C
Yellowtail Rockfish	C	

Key: E = Endangered, T = Threatened, C = Candidate, P = Proposed, S = Sensitive, SC = Species of Concern

Vegetation and Habitat

Disturbance of ecological communities and division into isolated habitats are the major causes for the decline in animal and plant species. Conserving viable ecological habitats in an interconnected system is the most effective way of conserving vegetation and wildlife. Many habitats that are conserved for environmental or scenic reasons cannot survive division into small isolated land parcels. The concept of managing wildlife habitat on a regional scale is one of the precepts on which the Growth Management Act is based. The theory is that by concentrating growth within urbanized UGAs where significant habitat no longer exists or is difficult to maintain due to the effects of growth, large, regionally significant habitats and wildlife corridors would be protected by limiting development in the County.

The City and UGA supports deciduous and coniferous trees (Douglas fir, spruce, hemlock, cedar, alder, cottonwood, and maple) as well as native shrubs, herbs, grasses, and wetland plants. Large and medium animals such as deer, coyotes, skunks, opossums, beaver, and bald eagles are still found occasionally within the City limits, but more frequently in some of the rural areas outside of the UGA. The riverine habitat and streams support seasonal and year-round fish and waterfowl. Even though many of the habitat areas had been greatly impacted by humans, many of our stream corridors (riparian areas) are healing through the maturing of past stream and wetland restoration projects. It is important to minimize further impacts, and review for potential impacts to wildlife and habitat is performed at the time of development permit application review through the SEPA process. Additionally, the City's Environmentally Critical Areas regulations are intended to protect wildlife and habitat.

The Washington Department of Wildlife has identified fourteen priority habitat types, two of which are found in Arlington planning area. These are:

Wetlands – Wetlands are fragile ecosystems that assist in the reduction of erosion, flooding, and ground and surface water pollution. Wetlands also provide an important habitat for wildlife, plants, and fisheries. Numerous wetlands have been identified in Arlington and the UGA – some on a very general basis from aerial mapping, some are shown by the soil survey of Snohomish County, and others have been precisely mapped where development has occurred over the past few years. The City also utilized the 1997 DOE Wetland Characterization of the Stillaguamish Watershed for inventory and ESA planning. Generally, as properties develop the wetlands are more accurately delineated and mapped.

Review for potential impacts to wetlands is performed at the time of development permit application review through the SEPA process. Additionally, the City's Environmentally Sensitive Areas Ordinance protects wetlands and their buffers. Wetlands in the City of Arlington are protected because they are part of an important natural biological/flood prevention/water provision system that should not be irreversibly altered. Further, the wet soil severely limits structural development. Because of the specificity used in defining wetlands and the quality of available maps, site-specific evaluations performed at the time of project application are necessary for the evaluation of specific parcels per the Critical Areas Regulations. Arlington will continue to restore or re-create wetlands to mitigate for those that were lost during the early years of development.

Urban Natural Open Space – Land within an urban or urbanizing area that supports a priority species, functions as a wildlife corridor, or is an isolated remnant of natural habitat larger than 10 acres is considered an urban natural open space by the State Department of Fisheries and Wildlife. There are a few such areas remaining in the City of Arlington or its UGA. Such areas would be appropriate for public purchase as natural parks or protected habitat. Care should be taken when development projects are proposed on such properties. Any areas determined to be wildlife corridors or habitat are subject to the City's Environmentally Critical Areas regulations. It is important to recognize that there are distinct differences between lands that have been identified as wildlife habitat open space and recreational open space.

Water Resources

Ground Water

Ground water is derived from precipitation and surface water filtering through the ground to aquifers. The ground where this filtering process takes place is called an aquifer recharge area. The quality of recharge areas and surface waters needs to be protected to ensure the quality of the ground water used in the immediate area, as well as the quality of water for users down gradient from the recharge zone. Ground water pollution is very difficult, often impossible to clean. One of the functions of wetlands is to recharge aquifers and purify the water running through them. Aquifer recharge areas can be found in areas other than wetlands. The surficial geologies made up of recessional outwash found in areas around Arlington provide excellent aquifer recharge and storage areas. (See Table E-4: Arlington Aquifers.)

Most drinking water in the UGA is provided by Arlington. Some of this water is derived from wells (see Chapter 9 – Capital Facilities and Public Services Element, for a description of this system.) The Haller well supplies approximately 92%, while the airport well is 2%, and Snohomish County PUD provides 6%. Additionally, some residents use wells as their main source of drinking water. The aquifer for the City wells is found in the central portion of the UGA, mostly under the airport and adjacent to the Stillaguamish River at Haller Park (see Figure 2-1: Aquifer Recharge Area and City Wells). The depth of the shallow aquifer is approximately 50 feet; however the deep aquifer is 150 feet[3] (the airport well is 150' and Haller wells are 35 – 40' deep) and most uses should not affect the water quality if best management practices are used. The water quality is good if not overdrawn (whereupon iron may become a problem) and for most of the year would not require chlorination were it not a state requirement to retain mandatory residual chlorine levels.

Review for potential groundwater contamination is performed at the time of development permit application review through the SEPA process. Additionally, the City's Environmentally Critical Areas regulations protect wetlands and aquifer recharge zones providing groundwater replenishment and filtration. And the WCP has a watershed and wellhead protection plan.

For a description of groundwater resources at the County level, please refer to the *Final EIS for Snohomish County GMA Comprehensive Plan 10-Year Update*[4].

Surface Water

Rivers, streams, lakes, and other surface waters may be important means of transportation or valuable environmental, recreational, and/or scenic areas. The quality of water is important to the entire area's habitat value. Reduction in water quality will not only reduce the environmental and recreational value of the area, but it may also threaten the groundwater that is connected to the surface water system. (See Table E-5: Arlington Streams and Table E-6: Arlington Wetlands.)

The most important body of surface water in the UGA is the Stillaguamish River. It is an important regional habitat for various piscine, mammalian, reptilian, amphibian, and avian fauna and aquatic flora. The Stillaguamish River and its conditions are directly linked to the upland uses that modify the historic hydrological cycles. The river is also very important to the economic vitality of the City through the associated outdoor recreation activities. The river is used by boaters and fisherman throughout the year who utilize the entire Stillaguamish Valley, with Arlington being a key hub for those activities.

Other important bodies of water in the area include: Portage Creek, Prairie Creek, Kruger Creek, Quilceda Creek, Eagle Creek, and March Creek (See Figure 2-16: Major Water Bodies and Drainage Basins). There are also bodies of water outside of the UGA but with which the City is concerned as land

[3]The Ground-Water System and Ground-Water Quality in Western Snohomish County, Washington; U.S. Geological Survey-Water Resources Investigations Report 96-4312.

[4] Still being developed at the time of writing of this document.

uses in their vicinity may have impacts on the UGA. These include upstream and downstream reaches of the tributaries listed above and their associated drainage basins and wetlands. There are also numerous perennial and seasonal wetlands in the UGA (whose importance is discussed above under "Wetlands"). As with the Stillaguamish River, all of these waterways provide important social, economic, and natural functions that contribute to a healthy living environment and high quality of life.

Such water systems can be delineated into drainage basins. The Arlington UGA encompasses four major sub-basins: the Portage Creek sub-basin, the Quilceda Creek sub-basin, the Eagle Creek sub-basin, and the March Creek sub-basin. These are in turn comprised of many minor basins. For instance, emptying into the Portage sub-basin are the Prairie Creek and Kruger Creek sub-basins. The Edgecomb Creek sub-basin drains in to the Quilceda Creek sub-basin of the Snohomish river system. A small tributary locally referred to as Indian Creek drains in to the Eagle creek sub-basin. The remnant portions of March creek that remain exist outside of the UGA down in the Stillaguamish floodplain. The approximate boundaries of these drainage basins are also shown in Figure 2-20: Floodways & Floodplains. All waters within the UGA eventually drain into Puget Sound, either draining directly into the Stillaguamish River or via Quilceda Creek then into the Snohomish River Estuary.

In Arlington the surface water quality and quantity of riverine and riparian habitats are in a state of recovery. Nevertheless, it is obviously of paramount importance that the river and other waterways be protected and managed to improve listed species population status and recover their functionality. Any development must be designed to minimize impacts to the quality and quantity of the water or in-stream aquatic habitats. This includes preservation of the land that constitutes the waterways themselves and their associated buffers, and management of the quality of the water that enters them. Future development must consider point source discharges, non-point source discharges, and soil erosion, as well as development that reduces the instream habitat or changes the flow of the water in ways which damage the viability of the ecological system.

Regulatory Environment

There are a number of established laws with which the City of Arlington must comply when making land use decisions that could influence surface water resources. Table E-7: Federal and State Laws and City of Arlington Codes Affecting Land Use Decision Making Regarding Surface Water Resources identifies some of these laws and describes consistency requirements.

Table E-4: Arlington Aquifers

Sub-Basin	Reach	In or Outside UGA	Planning Sub-Area	Private or Public	Fish bearing	Salmon bearing	Type or Class per AMC 20.88	Length or Area	Unit
Alluvial Northfork Stillaguamish	Trafton upstream to Darrington	out	N/A	pub					acres
Vashon Recessional Outwash Bryant		out	N/A	pub					acres
Vashon Recessional Outwash Marysville trough (Airport Aquifer)		in	A/I	pub					acres
Vashon Recessional Outwash Arlington		out	N/A	pub					acres

Heights					
Vashon Advance Outwash Bryant		out	N/A	pub	acres
Vashon Advance Outwash Getchell		out	N/A	pub	acres
TOTAL					0 acres

Table E-5: Arlington Streams

Sub-Basin	Reach	In or Outside UGA	Planning Sub-Area	Private or Public	Fish bearing	Salmon bearing	Type of Class per AMC 20.88	Length or Area	Unit	Riparian Condition	Instream Habitat	Fish Blockages	Water Quality	Water Quantity	CAPE in place?
Portage Creek	186th - 204th	in		pvt	Yes	Yes	2	8,000	lin ft	PF	PF	PF	AR		yes
Portage Creek	204th - Highway 9	in	Kent Prairie	both	Yes	Yes	2	1,800	lin ft	PF	AR	AR	AR		yes
Portage Creek	Highway 9 - Sweetwater	in	A/I, Arl Bluf	pvt	Yes	Yes	2	3,000	lin ft	PF	PF	PF	AR		no
Portage Creek	Sweetwater - Rivercrest	in	Arl Bluff	pvt	Yes	Yes	2	1,200	lin ft	PF	PF	PF	AR		no
Portage Creek	Rivercrest - City Boundary	in	Arl Bluff	pub	Yes	Yes	2	2,000	lin ft	PF	PF	PF	AR		yes
Praire Creek west	Deones - 172nd	in	Hilltop	pvt				1,400	lin ft	NP	NP	NP	AR		no
Praire Creek west	172nd - Jensen Bus. Park	in	Hilltop, A/I	pvt	Yes	Yes/no	2	12,000	lin ft	AR	AR	NP	AR		both
Praire Creek west	Jensen Bus. Park - Newell Machine	in	A/I	pub	Yes	Yes	2	2,400	lin ft	AR	PF	PF	AR		yes
Praire Creek west	Newell Machince - Confluence w/Portage	in	A/I	pvt	Yes	Yes	2	1,800	lin ft	AR	AR	AR	AR		no
Praire Creek east	172nd - Crown Ridge Blvd	in	Hilltop	pvt	Yes		2/3	2,000	lin ft	AR	AR	?	AR		
Praire Creek east	Crownridge Blvd - Highway 9 east	in	Hilltop	pub	Yes	No	3	2,000	lin ft	AR	PF	NP	AR		no
Praire Creek east	Highway 9 west - AVL confluence	in	Hilltop, A/I	both	Yes	Yes	2	2,700	lin ft	AR	NP	NP	AR		no
Kruger Creek	Alternacare - Portage street	in	Kent Prairie	both	Yes	Yes	2	1,000	lin ft	AR	AR	PF	AR		no
Kruger Creek	Portage Street - 79th Ave NE	in	Kent Prairie	pvt	Yes	Yes	2	1,400	lin ft	AR	NP	PF	AR		yes
Kruger Creek	79th Ave NE - Confluence w/Portage	in	Kent Prairie	pub	Yes	Yes	2	1,400	lin ft	PF	PF	PF	AR		yes
Eagle Creek	Brekhus/Beach addition	in	Burn Hill, Southfork	pvt	Yes	Yes/no	2	21,800	lin ft	AR	AR	NP	AR		no
Eagle Creek	Graafstra	in	Southfork, OT	pvt	Yes	Yes	2	6,200	lin ft	AR	NP	AR	AR		no
Edgecomb Creek	Deones addition east tributary	in	Hilltop	pvt	no	no	4	1,900	lin ft	NP	NP	NP	NP		no
Edgecomb Creek	Deones addition west tributary	in	Hilltop	pvt	Yes	Yes	2	3,000	lin ft	AR	AR	AR	AR		no
Edgecomb Creek	Arlington Square - Copart east	in	SP/SR531	pvt	Yes	Yes	2	4,500	lin ft	NP	NP	NP	NP		both
Shoultes Tributary	Copart west	in	SP/SR531	pvt	Yes	Yes	3	650	lin ft	NP	NP	NP	NP		yes
Smokey Point Tributary	Country Manor	in	SP/SR531		Yes		3	2,900	lin ft	NP	NP		NP		
Stillaguamish, Southfork	Graafstra - Centennial trail	in	Old Town	both	Yes	Yes	1	2,800	lin ft	NP	NP	PF	NP		no
Stillaguamish, Mainstem	Centennial trail - Haller park	in	Old Town	both	Yes	Yes	1	350	lin ft	NP	NP	PF	NP		no
Stillaguamish, Northfork		out	N/A	all					lin ft	x			x	x	
Eagle creek		out	N/A						lin ft	x	x	x	x	x	

Edgecomb	out	N/A						lin ft	x	x	x	x	x	
Kruger Creek	out	N/A						lin ft	x			x	x	
March Creek	out	N/A						lin ft	x			x		x
Portage Creek	out	N/A						lin ft	x	x	x	x	x	
Prairie Creek	out	N/A						lin ft	x			x	x	
TOTAL							88,200	lin ft						

Table E-6: Arlington Wetlands

Sub-Basin	Reach	In or Outside UGA	Planning Sub-Area	Private or Public	Fish bearing	Salmon bearing	Type or Class per AMC 20.88	Length or Area	Unit	Riparian Condition	Instream Habitat	Fish Blockages	Water Quality	Water Quantity	CAPE in place?
Portage Creek	High School Mitigation Wetlands	in		pub	No	Good		3.0	acres	PF					yes
Portage Creek	Crown Ridge stair Climb	in		pub		Good		8.1	acres	PF			AR		yes
Portage Creek	Hecla	in		pvt	Yes	Good	2	4.3	acres	PF	AR	AR	AR		no
Portage Creek	Pioneer Ponds	in		pvt	Yes	Good	2	2.0	acres	AR	PF	PF	AR		no
Portage Creek	Klein farm	in		both	Yes	Good	2	173.2	acres	NP	AR	PF	AR		yes
Prairie Creek	Chilelli - Magnolia Meadows-Gleneagle	in		pvt	Yes	Good	2/3	18.0	acres	NP	NP	AR	AR		no
Prairie Creek	Arlington Valley Land EPA wetland	in		both	No	Good		7.5	acres	PF					yes
Prairie Creek	Anderson Hunter	in		pvt			2	5.3	acres	AR	AR	AR	AR		no
Prairie Creek	Jensen Bus. Park created wetland	in		pub	Yes		2	1.0	acres	PF	PF	PF	AR		yes
Kruger Creek	Wallace Ponds	in		pvt	Yes		2	12.1	acres	AR	AR	PF	AR		no
Eagle Creek	Beach floodplain property	in		pvt	Yes		2	84.4	acres	NP	NP	AR	AR		no
Eagle Creek	Post Middle School Clay Cliff Ponds	in		pub	Yes		2	50.0	acres	PF	PF	PF	PF		no
Eagle Creek	Graafstra	in		pvt	Yes		2	97.0	acres	NP	NP	AR	AR		no
Edgecomb Creek	Incline-Attonement Lutheran-Arl. Square	in		pvt				2.0	acres	AR			AR		no
Edgecomb Creek	Crown Distributing land	in		pvt	Yes		2	29.0	acres	NP	NP	NP	NP		both
Shoultes Tributary	Copart west	in		pvt	No			8.0	acres	AR			AR		yes
Smokey Point Tributary	Crown Manor	in					2/3		acres	NP			NP		
Portage/upstream	Wetland # 1247 per DOE Inventory	out	N/A	pvt				28.7	acres						
Portage/upstream	Wetland # 1561 per DOE inventory	out	N/A	pvt	Yes	Yes		26.5	acres	AR	PF	AR	AR		

Portage/downstream	Wetland # 1051 per DOE inventory	out	N/A	pvt	Yes	Yes		140	acres	NP	NP	AR	AR		No
Prairie/upstream	Wetland # 1144 per DOE inventory	out	N/A	pvt	Yes			8.3	acres	PF	PF	AR	AR		
March/downstream	Valley Gem Farms	out	N/A	pvt				70.8	acres	NP	NP		NP		No
TOTAL								779.2	acres						

Type or Class subject to change as identified by most recent delineation and wetland assessment.

Table E-7: Federal and State Laws and City of Arlington Codes Affecting Land Use Decision Making Regarding Surface Water Resources

Law or Policy	Jurisdiction	Effect on Comprehensive Plan Land Use Decisions
Growth Management Act	State	Reduce sprawl by concentrating development within urban growth boundaries; protect natural resource within boundaries to extent feasible by requiring the designation and protection of open spaces and critical areas.
Shoreline Management Act	State	Requires incorporation of goals and policies into comprehensive plans that guide development regulations for specific shoreline uses including measures for conservation, economic development, recreation, housing, and others.
Endangered Species Act	Federal	Restricts activities that would significantly affect listed species and their habitats. Activities that alter patterns of run-off, alter water quality, or that physically alter streams or riparian corridors are assumed to have harmful effects on fish. Provides 4(d) rule to assure local governments that activities it authorizes or conducts are legally permissible and consistent with the conservation of listed species. In Snohomish County, the species protection that most impacts development activities are Chinook and Bull Trout.
National Pollutant Discharge Elimination System (NPDES)	Federal/State	The City has applied for and will soon operate under Phase II NPDES permit requirements. Permit requirements include stormwater quantity and quality controls; public education and outreach; illicit discharge detection and elimination; construction site runoff; post construction runoff; and pollution prevention/good housekeeping practices.
Clean Water Act	Federal/State	Directs establishment of State surface water quality standards (SWQS), established the NPDES program, and identifies impaired water bodies (303d list) and procedures for restoring them (Total Maximum Daily Loads, TMDLs).
Puget Sound Water Quality Management Plan	Federal/State/ Tribal/Local	Develops coordinated set of intergovernmental actions to restore and protect the health of Puget Sound. Requires every municipality to develop and implement a comprehensive stormwater management plan.
City Critical Areas Regulations	City of Arlington	Provides local regulatory control of streams, wetlands, lakes, fish and wildlife habitat, and erosion-prone and geologically hazardous areas. Defines resource values, buffers and setback requirements, and other appropriate protective measures. AMC 20.88.
City Drainage Regulations	City of Arlington	Governs design and construction of drainage facilities for new development and redevelopment in order to prevent or minimize impacts to the City's waters. AMC Title 16.
City Grading Regulations	City of Arlington	Controls soil movement originating on developing land to prevent or minimize degradation of water quality, and to control the sedimentation of streams, rivers, lakes, wetlands, and other surface water. AMC 20.48.
Total Maximum Daily Loading Requirements	State	Establishes the maximum levels of discharge to water bodies from all uses within a watershed.

To ensure high water quality within the City, a number of mechanisms have already been implemented to provide this service. The City and Snohomish County manage the drainage basins within the Arlington UGA. Additionally, watershed managers including the Tribes meet regularly at Stillaguamish Watershed

Council meetings to implement basin wide recovery and protection strategies. These managers share scientific inventories of watershed conditions, fish populations, water quality and other Stillaguamish specific information that can help us all provide efficient solutions. There have also been active riparian restoration projects occurring since 1995. In fact, there are very few stream reaches left in the Arlington City limits that require planting. Maintenance of those buffers will be ongoing for a number of years until the vegetation is sufficiently established. Enforcement of the Critical Areas regulations will then be the limiting factor to success.

Development proposals within the City must also comply with AMC Chapter 20.64, Floodways, Floodplains, Drainage and Erosion and 20.28 Stormwater Utility. These codes regulate the manner in which stormwater is stored, released, and treated on-site before it enters the City's drainage system. The City's Critical Areas regulations also require 25-150 (average is 50) foot buffers around all waterways and wetlands so that any run-off entering the systems is filtered through vegetation (biofiltration). The City has been implementing a program of placing watershed identification signs throughout the City. The naming of these basins has helped with citizens being able to inform City staff with sub-basin reported activities. The restoration partnerships with the Stillaguamish Tribe of Indians and Sound Salmon Solutions are stretching available restoration dollars by utilizing local expertise and fisheries information.

The City is implementing regulations that allow the use of Low Impact Design (LID) for the management of stormwater run-off. The LID Best Management Practices are a combination of preferred designs based on site specific landscape characteristics, and optional types of LID system a landowner can implement to provide additional treatment of their on-site stormwater. The City has implemented LID projects such as rain gardens and the large old-town Stormwater Wetland as pilot projects that landowners can visit to consider if that may work for their project.

The City recently developed a Geo-Spatial tool that using GIS allows a user to identify a parcel and the tool will prescribe a LID practice that would best fit the site conditions. The tool incorporate GIS layers that can include soils, surficial geology, slope, groundwater depth, proximity to wells, proximity to springs, proximity to polluted sites, proximity to streams, proximity to wetlands and other characteristics that help guide a landowner LID options with high likelihood of functioning in harmony with the natural hydrology.

Noise

By urban standards, Arlington is relatively quiet, and this is one of the amenities mentioned when people talk about why they have moved here. Unfortunately, we have no measurements of ambient noise levels within the City limits, or the means to conduct them. The most noise is generated by traffic, especially along the federal and state highways and major arterials. This is particularly true along I-5 in Smokey Point, where more houses have been built along the freeway and traffic has increased. Other noise is generated by industrial uses within the industrial zone. Lastly, there are somewhat frequent sounds of airplanes using the airport, including a few corporate jets. None of these noise sources has been a major issue up to this point. However, it is anticipated that as more residential development occurs adjacent to the highways or around the border of the industrial zone noise will become a greater concern (see Table E-8: Origins of Most Frequent Noise Complaints). Additionally, we would expect that as the airport receives more traffic and the areas surrounding develop airplane noise would become a bigger issue. The land use plan should take into account any potential noise problems generated by incompatible land uses and appropriate designators should be placed on subjected properties.

Table E-8: Origins of Most Frequent Noise Complaints

Area Complaints Received From	Apparent Noise Source
Gleneagle	StellaJones/McFarland Cascade
Highland View Estates	Arlington Municipal Airport
Kona Crest and Jensen Street	67th Avenue NE and Pro-build Lumber

Source: City's Code Compliance Officer

Climate and Weather

Climate and weather, while not critical to land use planning, is a consideration in design and engineering. For example, the condition of roadways, public transit, and pedestrian/bicycle pathways is affected by the climate. Temperature variations are significant factors in the level of energy usage, and annual precipitation provides a source of water. The climate also influences economic activity, most notably agricultural production.

Summers in Arlington are mild and warm (average daytime temperature in the 70's) and winters are comparatively mild (average daytime temperature in the mid-40's). The frost-free period for the City generally begins in April and ends near the first of October. Precipitation is in the form of rain and snow, averaging 46.86 inches annually (average low of 1.68 inches in July to an average high of 6.23 inches in December)[5] (see Figure E-2: Arlington Rainfall, Yearly Totals and Figure E-3: Arlington Rainfall, Average Monthly totals). Relative humidity is fairly high due to the water influences. The prevailing wind is westerly or northwesterly most of the year.

Climate Change

The City of Arlington is lucky in the various scenarios that are presented as to the potential impacts of Climate Change. A 2014 study completed by NOAA Fisheries titled Influence of climate and land cover on river discharge in the North Fork Stillaguamish River (http://www.stillaguamishwatershed.org/Documents/Stillaguamish%20Flow%20Analysis%202014%20final%20report-%20NOAA.pdf) displays how the current impacts are already impacting the watershed. The records used go back to 1928 in providing documentation that precipitation levels and peak flows are increasing, while at the same time snow levels in Darrington are reducing. Simply put the City of Arlington can expect peak flood levels and storm intensities to continue to increase in to the future.

The City will continue to access any information that is relevant to the Stillaguamish and immediate region. The City will implement actions and land use regulations that can help with the adaptation to climate change. The City will seek grants and assistance from organizations like the University of Washington Climate Impacts Group as the risks and impacts of climate change become better understood. Examples of regulations that should allow for adaptive management tools include flood, stormwater, landslide, vegetation species selection and wildfire or Firewise programs.

[5] Arlington Utilities

Figure 1: 1-day maximum flow by water year, with linear regression trend line.

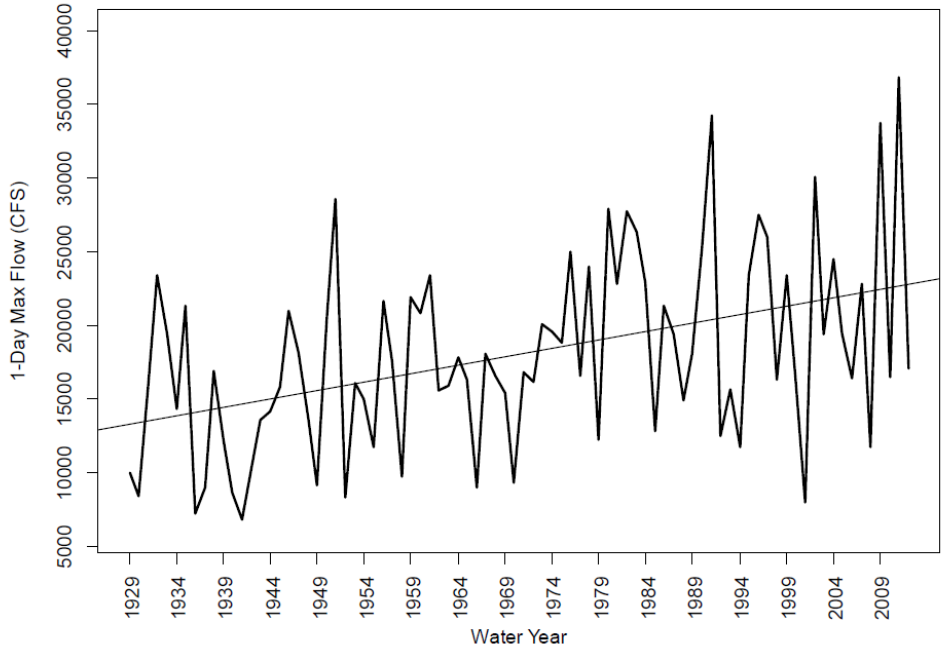


Figure 4: Total annual precipitation at Arlington, WA by water year, with linear regression trend line.

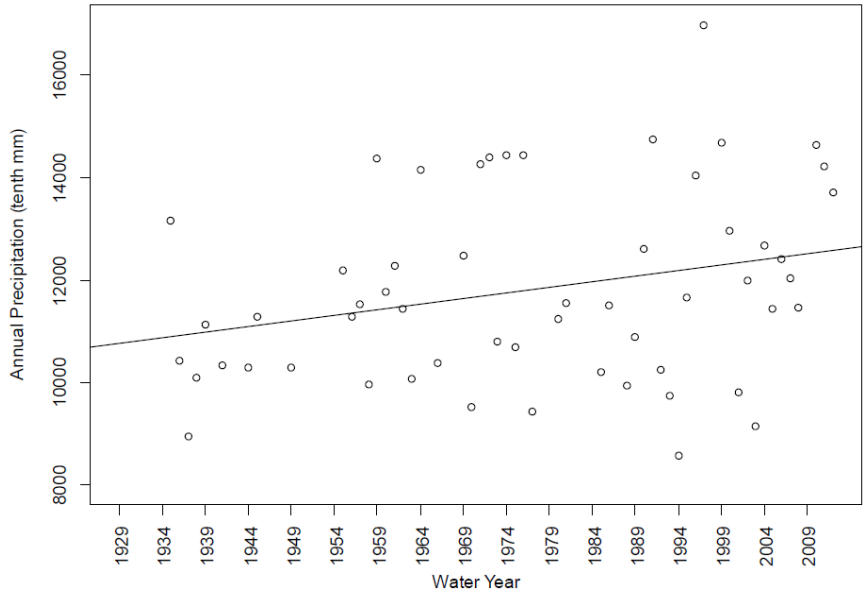
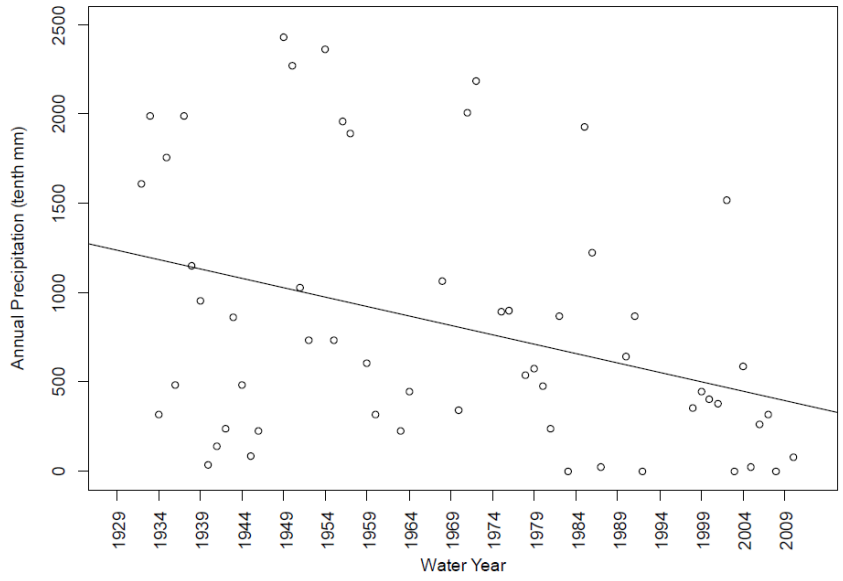


Figure 5: Total annual snowfall at Darrington, WA by water year, with linear regression trend line.



Land Form, Topography, Geology, and Soils

The Arlington UGA occupies a Pleistocene glacial terrace or glacial outwash lobe from the Cordilleran ice sheet recession, rising southeast from the flood plain of the Stillaguamish River and is in the foothills of the north range of the Cascades. It is on a relatively level series of stepped terraces, rising first from the Stillaguamish floodplain and then again east from the Quilceda-Allen drainage basin[6]. There are portions of the City that exist in the floodplain, as well as the burn hill area which provides for some higher elevation glacial till with steep slope topography. (Please refer to GIS maps for more accurate elevations.)

The load-bearing capacity of soil, the hydric properties, erosion potential, and characteristics with respect to shrink-swell potential all play a significant role in development of land. In particular, the hydric properties determine the potential for stormwater infiltration (LID) usage, indicate the existence of wetlands, and signal the potential for other environmental concerns.

The Soil Survey conducted by the U.S. Soil Conservation Service includes detailed soil maps that can be used for site selection and planning. The survey explains in great detail each soil's suitability for uses such as agricultural, residential, sanitary facilities (septic), recreational, woodland wildlife habitat and other land uses.

The general soil types in the Arlington area are classified as Everett gravelly sandy loam and Tokul-Pastik. These general soil types are moderately to very deep, moderately well to excessively drained, and level to very steep. Such soils are generally found on till plains and terraces. This soil classification is composed of various primary soils, each with various characteristics and limitations. The primary soils found in the Arlington UGA are displayed in Figure 2-15: U.S. Soil Conservation Soil Survey Map, and listed in Table E-9: Soil Types in the Arlington UGA, page E-21. Note that while development limitations

[6] Which was at one time the route of the Stillaguamish River. The South fork Stilly and Pilchuck were connected.

are listed, these are not considered reasons for denying development permits, only that certain precautions must be taken. Such issues are reviewed through the SEPA process during the development permit application process. The Environmentally Critical Areas regulations also regulate development on steep slopes, seismic areas, and other geologically hazardous areas. Site Potential Tree height, indicating potential stream buffer width considerations, are provided in the soil survey. In addition, soil suitability is used in determining the potential for development. The survey conducted by the U.S. Soil Conservation Service provides data that is specific enough to be used to determine site development constraints for particular parcels.

Figure E-2: Arlington Rainfall, Yearly Totals

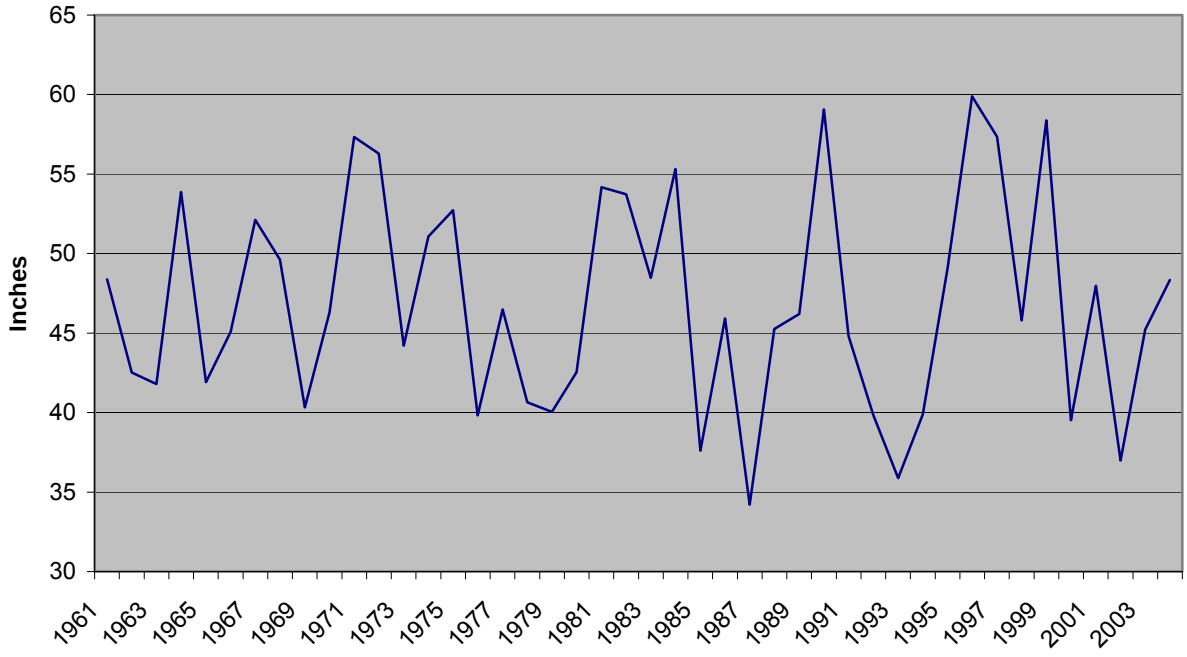


Figure E-3: Arlington Rainfall, Average Monthly totals

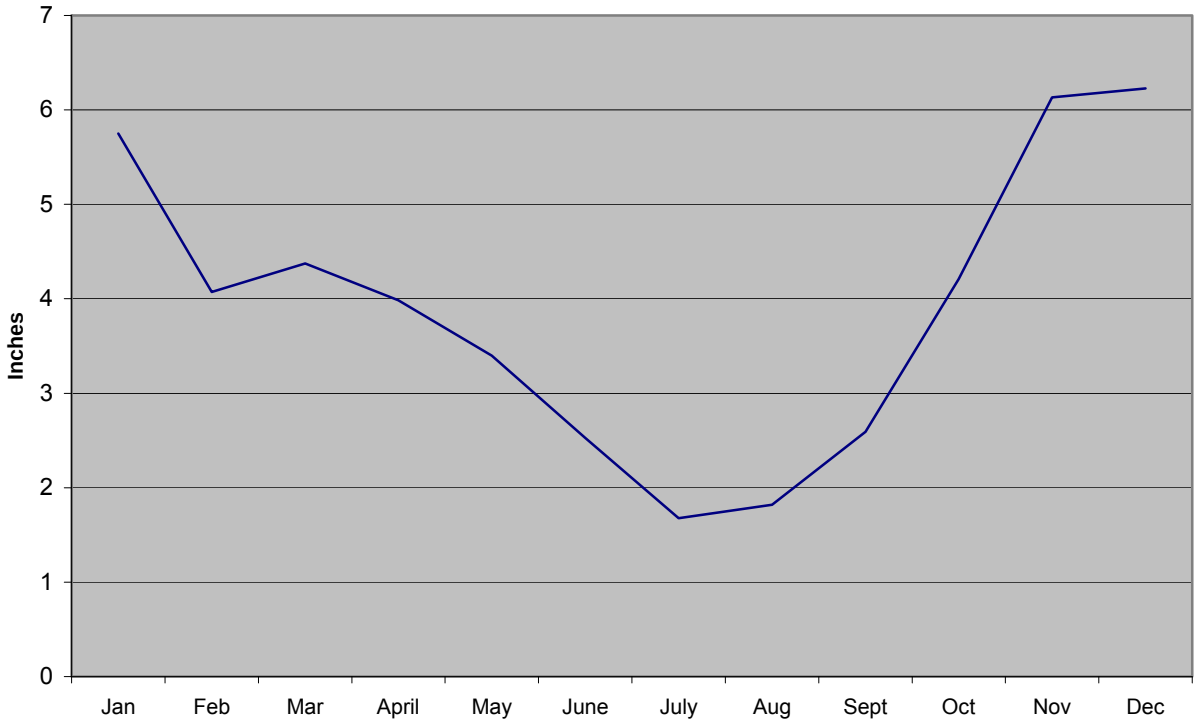


Table E-9: Soil Types in the Arlington UGA

Soil Classification	Soil Characteristics					
(% Slopes)	Depth	Drainage	Vegetation	Elevation (ft)	Permeability	Development Limitations
72 – Tokul gravelly loam (0-8)	Moderate	Moderately well	Conifers, subject to windthrow	200-800	Moderate to hardpan, very slow through	Wetness, reduced w/ drain tile; septic systems often fail
4 – Alderwood-Everett gravelly sandy loam (25-70)	Moderate to Very deep	Moderately well to excessive	Coniferous Forest	0-550	Alderwood - Moderate to hardpan, very slow through Everett - Rapid	Steepness; seasonal perched water table; drainage needed for basements, crawlspaces; sewer needed to prevent water contamination; soils need to be seeded after grading
13 – Custer fine sandy loam (0-2)	Very deep	Poor	Conifers & hardwoods	0-150	Moderate to hardpan, very slow through	Seasonal high water table; ponding, moderate permeability for septic; cutbacks subject to caving in
34 – Mukilteo muck	Very deep	Very poor	Sedges & rushes	20-1,000	Moderate	Not suitable; ponding & low soil strength; septic fails
30 – Lynnwood loamy sand (0-3)	Very deep	Excessive	Conifers	50-500	Rapid	Septic seepage; cutbacks subject to caving in
55 – Puget silty clay loam (0-2)	Very deep	Poor (must be artificially drained)	Hardwoods	0-650	Slow	Flood hazard and seasonal wetness
77 – Tokul-Winston gravelly loams (25-65)	Moderate to very deep	Moderately well to excessive	Conifers, subject to windthrow	200-900	Moderate to hardpan, slow through	Run-off rapid; erosion high
17 – Everett gravelly sandy loam (0-8)	Very deep	Excessive	Conifers	0-500	Rapid	None
19 – Everett gravelly sandy loam (8-15)	Very deep	Excessive	Conifers	0-500	Rapid	Steepness of slope
39 – Norma loam (0-3)	Very deep	Poor	Hardwood	20-600	Moderately rapid	Not suitable; subject to ponding
32 – McKenna gravelly silt loam (0-8)	Moderate	Poor	Conifers	100-800	Slow	Ponding; drainage needed; septic needs long absorption lines
57 – Ragnar fine sandy loam (0-8)	Very deep	Well	None (duff only)	300-1,000	Moderately rapid	Few limitations, though septic seepage can be a problem
48 – Pastic silt loam (8-25)	Very deep	Moderately well	Conifers	200-800	Slow	Seasonal high water table, wetness, reduced w/ drain tile; steep slopes; erosion
49 – Pastic silt loam (25-50)	Very deep	Moderately well	Conifers	200-800	Slow	Seasonal high water table, wetness, reduced w/ drain tile; steep slopes; erosion

Natural Hazards

The City of Arlington must be prepared for a significant emergency or region-wide disaster and be able to respond using only those resources located within the City in the most efficient manner. A disaster or emergency could cause the City to be isolated for a period of several days and exist solely on its own resources. Because of this possibility, the City has adopted a disaster plan, which addresses roles, responsibilities, and procedures to be followed in the case of an emergency (either natural or social).

Unlike in many other parts of the United States, the risk of natural disasters is relatively low in the Arlington area. Tornados, hurricanes, extreme freezes, blizzards, locust infestation, debilitating heat waves and pestilence are unknown in the region. However, the below listed natural events do have various probabilities of occurring.

Earthquakes

The City of Arlington and its residence should be prepared for the occurrence of an earthquake, which the area has experienced as recently as 2001 (6.8 on the Richter scale). Today's building code considers this risk in its requirements. Every household should have in place and practice an earthquake response plan.

High Winds

Another exception might be the occurrence of high winds (~80 mph), which the region experienced in 1993, and which we will undoubtedly experience again. Typically with such events we experience some minor building damage (e.g., roofs, awnings, etc.) and downed trees, which in turn causes short-term power outages and road blockages.

Volcanic Explosion/Debris Flow

The last exception would be a volcanic explosion on Glacier Peak, which could send a huge mudflow/flood (lahar) down the Stillaguamish Valley. (See USGS's Volcanic-Hazard Zonation for Glacier Peak Volcano.) Glacier Peak, at 10,541 feet, is located roughly 45 air miles east of Arlington. It's most recent rumblings were about 6,000 years ago. During its most eruptive periods between 6,000 - 13,000 years ago, the debris caused by the eruptions flowed down the Stillaguamish channel to at least Arlington and I-5. Its biggest explosion was about 12,500 years ago, when it discharged debris four to five times as massive as the Mount St. Helens eruption in 1980. In fact, a debris dam created by the eruption caused the White Chuck and Suiattle rivers to change course from the Stillaguamish to the Sauk at Darrington.

Flood Hazards

The Federal Emergency Management Agency (FEMA) has defined areas showing the extent of the 100-year flood boundary in order to establish actuarial flood insurance rates and assist communities in efforts to promote sound flood plain management. Development on flood plains retards their ability to absorb water, restricts the flow of water, and causes hazards downstream by causing higher water and creating flood debris.

FEMA's Flood Insurance Rate Maps (FIRM) show only one 100-year flood plain within the City, that being along the Stillaguamish River and generally defined by the toe of the slope of the plateau surrounding the Stillaguamish Valley (though there are some areas of the valley that are high enough to be out of the floodplain. Generally only small portions of the City limits extend into this area, as they are parts of parcels mainly on the upper plateau. There is a large 110 acre portion referred to as Island Crossing that is located in the 100-year floodplain. A copy of the FIRM is located at City Hall. However, the FEMA maps though providing our regulatory flood elevations may be outdated and a new mapping exercise is anticipated to reflect more up to date data on anticipated flood elevations and impacts of Climate change. The City may require landowners to perform additional modeling of anticipated flood impacts for project proposals in the floodplain.

Not being listed on the FIRM does not mean that some of the smaller creeks running through town couldn't also experience flooding during 100-year (or lesser or greater) storm events: FEMA just doesn't

map these smaller areas. All development permits are reviewed for potential flooding hazards at the time of development permit application review. Additionally, the City's Environmentally Critical Area regulations and flood prevention regulations (found in the land use code) prohibit most types of development within the 100-year floodway, allowing only those types of uses that are non-impactive.

Geologically Hazardous Areas

Arlington does contain areas of steep slopes, most notably along the two steps rising from the Stillaguamish floodplain (see Figure 2-19: Geological Hazardous Area Map). We also have areas subject to liquefaction. Everything within the floodplain of the Stillaguamish River (including Island Crossing) is rated as high potential, and everything on the 2nd geologic tier (on which the airport and most of Arlington sits) is rated as moderate potential[7]. (Figure E-4: Liquefaction Potential)

Due to instability, visual impacts, and fire hazard, areas of steep slopes or unstable soils are not recommended for development without specific measures being taken to reduce or eliminate these potential impacts. AMC §20.88 contains restrictions on development in these areas.

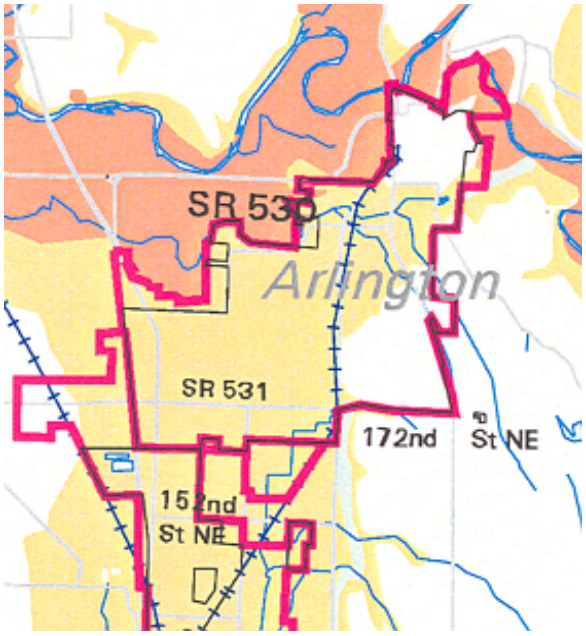


Figure E-4: Liquefaction Potential

5.1.1.1 Tsunamis

The Snohomish County Department of Emergency Management has an identified Tsunami Risk Zone. Based upon input from NOAA's Pacific Marine Environmental Lab, a seventy-foot tsunami was used as the worst-case event likely to affect Snohomish County. The potentially flooded areas would thus be most of the land below the 70-foot elevation contour line (Figure E-6: SnoCo DEM Tsunami Hazard Areas). This estimate was based on projections from both NOAA and Washington State Department of Natural Resources. Under this scenario, the inundation zone would essentially be all of the Stillaguamish Valley downstream of Arlington and the northern part of downtown Arlington. However, this estimate is now considered excessive and would most likely not be as severe as originally projected.[8]

[7] Draft EIS for Snohomish County GMA Comprehensive Plan 10-Year Update, May 2004
[8] Michael A. McCallister, Coordinator - Plans and Operations, Snohomish County Department of Emergency Management

Figure E-5: SnoCo DEM Tsunami Hazard Areas