CHAPTER 3: NATURAL SYSTEMS - EXISTING CONDITIONS, ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

3.1 EARTH

3.1.1. Earth – Existing conditions

3.1.1.1. Geology

The planning area lies within the southeast portion of the Georgia Depression (Fraser-Lowland) and northeast of the Puget Lowland, an elongate trough extending north south between the Cascade Mountains to the east and the mountains of Vancouver Island and the Olympic Peninsula to the west. The bedrock underlying the planning area is composed of folded and faulted beds of sandstone, mudstone and coal known as the Chuckanut and Huntingdon formations. Outcrops of the Huntingdon formation can be found north of East Bakerview Road on King and Queen Mountain, and on the north slope of Squalicum Mountain north of Toad Lake. Chuckanut formation bedrock appears on Squalicum Mountain, Galbraith Mountain, in the Geneva area, and in the "A*dditional Review Area*" east of Lake Padden adjacent to the southeast corner of the Bellingham city limits (See Figure 3.1.1.1.).

Coal deposits underlie a large portion of the planning area between Bellingham Bay and Interstate 5 and from the Bellingham city limits north as far as Slater Road. Over 1,300 acres of the area's coal reserves were mined between 1918 and 1955 using the room and pillar underground mining method. Most of the abandoned workings of this mine are under Bellingham's Birchwood neighborhood, with a small area just outside the city limits in the Alderwood area. An older, less extensive abandoned coal mine is under Railroad and State Streets in downtown Bellingham. Exploratory coal mining has occurred in the Geneva area south of Lakeview Street. Abandoned underground mine areas present a land subsidence hazard and are considered geologically hazardous areas under the Whatcom County Critical Areas Ordinance (CAO).

Overlying the bedrock in most lowland areas are glacially derived surficial deposits of various thicknesses that were deposited by continental ice sheets. The thickness and stratigraphy of these deposits vary greatly due to the changing conditions associated with the periodic advance and retreat of glaciers over the area. They include marine terrace deposits, glaciomarine drift and glacial outwash deposits.

- *Marine terrace deposits* are composed of silt, clay and sand. These deposits lie adjacent to the alluvial deposits of the Nooksack River floodplain in the western portion of the planning area.

- *Glaciomarine drift deposits*, consisting of unsorted and unstratified pebbly and sandy silty clay, overlie most of the planning area with the exception of localized areas containing the other geologic units described in this section.

- *Glacial outwash deposits* consist of sorted, stratified pebble-sized gravel with some

sand. These deposits are found in the Squalicum Creek drainage including the Dewey Valley area.

In some places, recent sediments overlie the bedrock and glacial deposits. These include alluvial deposits and peat.

- *Alluvial deposits*, composed of fine textured silt and sand are found in the floodplains of the Nooksack River and Squalicum Creek, in the western part of the planning area.

- *Peat* consists of decomposing organic matter (usually vegetation), which has accumulated in former streambeds, lakes, or ponds. The only sizable peat deposits in the planning area are in the Silver Creek drainage, east of Aldrich Road and south of Smith Road.

3.1.1.2. Topography and Slopes

The topography of the planning area is generally slightly rolling except for some beaches, a high bank marine coastline, some deeply incised stream corridors, freshwater lakes, and the uplands of Sehome Hill, Squalicum, King, Queen and Galbraith Mountains. Elevations range from sea level between Chuckanut Bay and the mouth of the Nooksack River to over 1,000 feet above sea level on the south and west slopes of Squalicum Mountain. The higher elevations in the area provide excellent views and natural backdrops. Sehome Hill, King and Queen Mountains, and Squalicum Mountain are four significant topographic features within the planning area that rise above the undulating lowlands to 625, 554, 433, and 1,085 feet above sea level respectively.

The Whatcom County CAO identifies landslide hazard areas on slopes between 15% and 35% where adverse geologic conditions exist and on all slopes greater than 35%. Slopes in the 15% to 35% range occur along the bluffs of Bellingham Bay; along streams draining to Bellingham Bay (including Little Squalicum Creek); along the Spring Creek, Baker Creek and Squalicum Creek corridors; on King and Queen Mountains; scattered throughout the Squalicum Mountain area including the Hillsdale/Toad Lake Road/Academy Road area; and on the slopes of Galbraith Mountain including part of the Geneva area, areas east of Yew Street Road and the “additional review area” east of Lake Padden adjacent to the southeast corner of the Bellingham city limits (See Figure 3.1.1.2.).

Areas with slopes greater than 35% are along the bluffs of Bellingham Bay; in the Squalicum Creek corridor; on the east slope of King and Queen Mountains; on the north slope of Squalicum Mountain; around Toad Lake; above the Yew Street and Geneva areas; and immediately above Interstate 5, in the southern part of the “*additional review area*” east of the southeast corner of the Bellingham city limits.

3.1.1.3. Soils

Near the ground surface (except for rock outcrops) the glacial deposits and underlying geologic units have weathered to soil. The *soil survey of Whatcom County area,*

Washington, 1992, published by the U. S, Department of Agriculture, Soil Conservation Service identifies over 40 different soil types in the planning area. For each soil type the survey identifies soil limitations for various types of construction and development and soil suitability for agriculture and forestry.

Soil characteristics are a function of the underlying parent material, climate, slope, drainage, depth to groundwater, vegetation, degree of disturbance and historical land use. Specific site conditions should be verified by on-site analysis and testing, due to the potential for irregular or small-scale inclusions of dissimilar soil types and the likelihood of previous disturbance such as grading, excavation and/or fill.

3.1.1.4. Marine Nearshore Shoreforms

The planning area includes approximately 15 miles of marine shoreline on Bellingham Bay, which are subject to City of Bellingham and Whatcom County Shoreline Master Program (SMP) regulations. Most of this shoreline is inside the Bellingham city limits including Chuckanut Bay, Clark's Point, Post Point, Post Point Lagoon, Marine Park, Padden Creek Estuary, bluffs and beaches below South Hill, Boulevard Park, the Log Pond restoration site, Cornwall Landfill, Whatcom Creek Estuary and Federal Waterway, industrial and marina areas, Squalicum Creek Estuary, Squalicum Beach, and the Park at the mouth of Little Squalicum Creek. Several eelgrass beds are located in the nearshore area. Pocket beaches are scattered throughout the shoreline with several between Post Point and Boulevard Park. Others are found on the Cornwall landfill, at the end of Cornwall Avenue, at the end of "C" Street, at the head of the "I" and "J" Waterway and in the Squalicum Creek Estuary/Waterway. Nearly all of the marine nearshore between Squalicum Beach and Post Point has been modified by fill for railroad beds or other land development activities.

In the Urban Fringe Subarea the Fort Bellingham Reach of the shoreline extends from the Bellingham city limits on the east to the delta of the Nooksack River on the west. The eastern half of the reach has high banks, narrow backshores and sandy beaches. The western half is also high bank, but with a wide accreted beach due to wave cutting and expansion of the Nooksack Delta. Approximately 35% of the shoreline within the Bellingham UGA is covered with riprap, bulkheads or fill. Upland slopes range from nearly level to moderate, with the exception of two ravines.

Water Quality in the Marine Nearshore is impacted by stormwater runoff from automobiles, and other urban land use practices. Water Quality is also impacted by water dependent uses and the placement of treated pilings. There are over 15,000 creosote pilings in Bellingham Bay within the Planning area.

3.1.1.5. Unique Physical Features

Unique physical features in the planning area include the foothills and forested backdrops; marine coastline and bluffs of Bellingham Bay; Lake Whatcom; Toad Lake; Whatcom Creek Gorge; Squalicum Creek; Padden Creek Estuary; Chuckanut Creek and other streams and wetlands; Chuckanut, King, Queen, Squalicum and Galbraith Mountains; and viewscapes of the San Juan Islands, Mount Baker and the Canadian

Coastal Mountains. Coal deposits and abandoned coal mine workings underlie parts of Bellingham and extend past the northwest city limits in an area north of Alderwood Avenue. The Whatcom County CAO Maps identify this area above the abandoned coalmine as a Mine Hazard Area.

3.1.1.6. Erosion/Accretion

Erosion is the removal and down gradient transport of natural earth materials from a site due to the action of running water, freeze/thaw conditions, wind, chemical dissolution or mechanical means. There have been a limited number of severe erosional events of landslide magnitude in the planning area. Minor rock fall is a common occurrence along Interstate 5 as it approaches the City of Bellingham from the south. Bluffs and embankments along stream and marine shorelines are typically the most active erosional areas (See Figure 3.2, Geological Hazards Map).

The 2002 Whatcom County Marine Shoreline Map Folio indicates the presence of erosional bluffs along most of the Bellingham Bay shoreline between the Nooksack River Delta and the Bellingham city limits. These erosional bluffs are often a source of important beach building sediments. Where the bluffs contribute sediment to accretion shoreforms they are commonly referred to as “feeder bluffs”. The instability of these features is caused by a combination of upland drainage and wave cut erosion at the toe of the bluffs. Attempts to stabilize eroding bluffs for the purpose of protecting development on the bluffs usually interferes with the natural habitat forming functions of these marine nearshore landforms. Other erosional areas include the slopes of King, Queen and Squalicum Mountains. Construction sites and logging activities are other sources of erosional events. Implementation of Best Management Practices (BMPs) has reduced the frequency of nuisance complaints associated with construction and logging.

Accretion is the deposition and buildup of sediment due to river, stream and wave action typically occurring near river mouths or along a beach or headland. Accretion shoreforms are often located where valuable geohydraulic and biological processes are occurring and are sensitive to interference. The Nooksack River, in the western part of the planning area, has a potential for accretion due to the volume of water and sediment load that it carries to Bellingham Bay. The part of the planning area adjacent to the Nooksack Delta has experienced a substantial amount of land accretion. The 2002 Whatcom County Marine Shoreline Map Folio indicates natural accretion shores adjacent to Little Squalicum Creek, near Mount Baker Plywood and near the western boundary of the present Bellingham Urban Growth Area approximately 2 miles west of the Bellingham city limits.

3.1.2. Earth – Impacts

New construction, road improvements and utility installation involving land clearing, fill, excavation, grading and alteration of drainage characteristics may potentially affect the earth environment in a variety of ways.

Alternative 1 – No Action

The No Action alternative (and any alternative that does not provide sufficient land and

densities in the City and the UGA to accommodate projected population growth) is expected to push growth and the impacts of growth to the rural areas of the County and to the Urban Growth Areas of other cities in the County.

Alternative 2 – Infill
This alternative would focus development and impacts in the existing City and UGA and would be expected to result in the least amount of land impacted by development .

Alternative 3 – Adjusted UGA Boundary
This would expand the existing low-density development pattern of the UGA and would be expected to create the most significant and widespread impacts to the earth.

Alternative 4 – Infill and Adjusted UGA
Under this alternative new growth would be directed into the existing City and Urban Growth Area, but would require a minor expansion of the UGA. This alternative would be expected to result in a moderate area of land that is presently designated as rural being developed for urban land uses.

Steep slopes and rock outcrops in some areas such as King and Queen Mountains and Galbraith Mountain may affect the ability to attain maximum residential densities and increase costs of development. These factors could limit the potential for infill development in some areas under the No Action and Infill alternatives and could also limit the ability of areas added to the UGA to absorb efficient levels of density under the Adjusted UGA, and Infill and Adjusted UGA alternatives.

The removal of vegetation may decrease habitat value, reduce wind buffering, alter light and glare, increase surface temperature fluctuations, diminish rainwater storage, change hydrologic characteristics, require burning or other disposal, reduce oxygen production, affect soil stability and structure and generally accelerate erosional processes.

Placement of earth fill may alter topography, compact subsurface soils, reduce infiltration of water, cause differential settling, alter subsurface and surface drainage patterns, destabilize hill slopes, result in methane gas production, create borrow pits, compress and damage vegetative root systems, create a safety hazard if left steeply sloped and unconsolidated, and accelerate erosion. Fill materials may also be subject to liquefaction during seismic events.

Excavation may alter topography, create unstable side slopes, destabilize hill slopes, alter subsurface and surface drainage, create ponding, contaminate groundwater, create borrow pits, damage root systems, require disposal sites, require blasting, cause liquefaction of soil and subsoil due to vigorous motion, disrupt the archaeological record, destroy the soil column and accelerate erosion.

Grading may result in a combination of impacts typical of earth fills and excavation depending on the degree of cut and/or fill, but will always disrupt the soil surface and therefore likely result in increased erosion potential.

Altered drainage from land disturbance activity, unless intentionally corrective may result in a destabilized drainage network. Accelerated runoff or diversion of drainage from one system to another, may result in the temporary or prolonged overburdening of channel carrying capacity, causing scouring of stream banks, possible flooding and downstream sediment deposition. Altered drainage may also wash away topsoil, preventing the reestablishment of vegetation, thus continuing the erosional cycle. Impacts may be from single projects, or result from cumulative actions.

3.1.3. Earth – Mitigating Measures

For all four alternatives: No Action, Infill, Adjusted UGA, and Infill and Adjusted UGA, a variety of management actions will reduce negative impacts to the earth environment. These may be grouped into the following categories:

3.1.3.1. Zoning Mechanisms

Zoning mechanisms include land use designations (industrial, commercial, residential etc.) that are most appropriate for the physical setting, based on elements of environmental sensitivity and existing development patterns. Density and cluster provisions, and planned unit developments provide site design flexibility. Transfer of development rights (TDR) programs, such as the Lake Whatcom TDR program, allow for the preservation of valuable natural resources while focusing development where existing infrastructure and development capacity exist. Lot coverage limitations, setback requirements, impervious surface limitations and structural size limitations can limit environmental impacts. Density bonus incentives for projects with substantial community benefit, modification of variance criteria due to environmental elements and other strategies should be considered outside of the Lake Whatcom Watershed.

3.1.3.2. Environmental Ordinances

Environmental ordinances are regulatory tools that address development standards in environmentally sensitive areas such as wetlands and streams, shoreline areas, geologic hazard areas (steep slopes etc.), critical wildlife habitat and areas of local habitat significance, frequently flooded areas, and critical aquifer recharge areas. They tend to emphasize avoidance, alternatives analysis, minimization and mitigation based on functional parameters.

Bellingham utilizes the SMP to regulate development in the city on the shorelines of Lake Whatcom, Lake Padden, four major streams and the 12.5 miles of marine shoreline along Bellingham Bay within the City limits. The City's Wetland and Stream Regulatory chapter of the SMP also addresses development along shorelines of nearly all streams within the City and all wetlands that meet the minimum size thresholds. The Land Clearing Chapter of the city's development code regulates all land clearing activity requiring site planning, construction access, erosion controls, drainage plans and site restoration. The Silver Beach ordinance is a special set of conditions that protect water

quality from development in the city portion of the Lake Whatcom watershed.

In unincorporated Whatcom County the Critical Areas Ordinance addresses development within geologically hazardous areas, critical aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas, streams and stream buffers, and wetlands that meet the minimum size thresholds and their associated buffers. Additionally, approximately 2.8 miles of Bellingham Bay shoreline, approximately 2.5 miles of shoreline along Lake Whatcom, approximately 1.3 miles of shoreline along Toad Lake, and approximately 0.5 miles of shoreline along Squalicum Creek and their associated wetlands are protected through the Whatcom County SMP.

Geologic hazards, wildlife habitat and other natural features are also regulated through the SEPA process and specific prerequisites within the comprehensive plan.

3.1.3.3. Development Regulations

The Bellingham Municipal Code and Land Use Development Ordinance regulate all land clearing and grading activity requiring site planning, construction access, erosion controls, drainage plans, and site restoration or mitigation in the City. The Land Clearing Chapter of the County's zoning code and Chapter 33 of the Uniform Building Code (UBC) regulate all land clearing and grading activity requiring site planning, construction access, erosion controls, drainage plans and site restoration. Land disturbance and clearing activities within the Lake Whatcom Watershed are also subject to the requirements of the Water Resource Protection Overlay District, and the Stormwater Special District Standards which provide for additional restrictions such as phased clearing, tree retention, and seasonal clearing limitations.

3.1.3.4. Best Management Practices

BMPs are specific techniques of construction design, methodology and timing developed to minimize known impacts on the environment. The following are examples of BMPs: preventing in-water construction during fish migration, avoiding or minimizing land disturbance or construction on sensitive soils during the wet season, erosion and sedimentation control methods, minimization of cleared areas and retention of native vegetation.

3.1.3.5. Low Impact Development

Low Impact Development (LID) is an innovative approach to development, which accommodates community growth while reducing impacts to natural resources through the use of many alternative BMPs designed to minimize the environmental impacts of development activities. LID practices include, but are not limited to, control of stormwater at the source through the use of micro-scale controls, water reuse and conservation measures, minimizing impervious surfaces, phased clearing and retention of native vegetation. Prevention of clearing, land disturbance, and other pre-construction activities until all permits are issued could reduce erosion and sedimentation as well as other impacts associated with development activities, especially when discretionary permits are involved.

3.1.3.6. Site Characterization

Environmental site characterization addresses informational requirements prior to permitting and site disturbance. The following are examples of environmental site characterization: slope stability analysis, drainage conveyance capacity investigation, wetland delineation, habitat survey, seismic analysis, soil suitability study, hydrogeologic assessment, site history, hazardous materials audit, alternatives analysis and so forth.

3.1.3.7. Preservation Strategies

Preservation strategies include such techniques as conservation easements, Greenways acquisition, Lake Whatcom land acquisition, open space tax incentives, public dedication of reserve tracts, rezones for public purpose, and TDR and purchase of development rights (PDR) programs.

3.1.3.8. Redevelopment of Existing Buildings and Infrastructure

Redevelopment could involve a variety of actions which might include renovation of existing buildings and creation of incentives to increase occupancy, allowance of mixed uses within a single building, permitting accessory dwelling units within existing residential neighborhoods, density minimums to insure buildout efficiency, increasing height limits in built out areas where appropriate, requiring underground or rooftop parking where feasible, upgrading existing utility corridors to handle added density, eliminating bottlenecks in traffic circulation systems and improving the attractiveness and function of existing parks and public property to increase redevelopment potential. All of these efforts would reduce the demand for new construction on previously undeveloped sites and improve efficiency within existing footprints. For example, a ten-story building has the same amount of impervious surface as a single story building on the same footprint.

3.2 AGRICULTURAL CROPS

3.2.1. Agricultural Crops – Existing Conditions

The City of Bellingham does not designate land for agricultural use and Whatcom County does not apply the agricultural designation to land in the Bellingham Urban Growth Area. There are several agricultural/horticultural nurseries and small individual farms, such as Joe's Gardens, in Bellingham and the UGA, but there are no large commercial farms.

The Urban Fringe Subarea includes 1,485 acres of land designated Agriculture and 11,765 acres designated Rural in the Whatcom County Comprehensive Plan. Fifty percent of the parcels in the Agriculture and 24 percent in the Rural designations are in Open Space Agriculture taxation. Approximately 7,206 acres of the Subarea is covered by Agricultural Protection Overlay (APO) Soils (the local county list of "prime soils"). About 40 percent of the Rural zoned land within the Subarea is comprised of APO soils. In general, soils within this area are secondary prime soils. They typically are undulating to nearly level and were formed on upland till. Many of the soils tend to have a high

seasonal water table that can be prone to dry down by mid point in the growing season. Water availability can also be spotty in this area. A prime exception would be in the Nooksack Floodplain portion of the Subarea, which tends to have high quality fluvial soils and generally has access to water, although there may not be existing water rights for all parcels.

The land designated Agriculture is located at the very western extent of the subarea outside of the Bellingham UGA, and is bisected by the Nooksack River. Property east of the Nooksack is largely owned by Washington State Department of Fish and Wildlife and is in a protected status. The major landowner west of the Nooksack is Pacific Poplar. This area is mainly devoted to trees and pasture. The area consists of approximately 50 percent APO soils. The Rural zone is characterized mainly by subdivided lots ranging in size between five and 20 acres. An area of over 500 acres north of the existing Bellingham UGA is zoned R10A, the remainder of the Rural zone is zoned R5A.

Agricultural activity in the Rural zone is comprised of dairy, horticulture, beef cattle, poultry, heifer replacement operations and forage/pastureland. Over time, commercial agriculture has given way to more “hobby farms” or more typically “rural estates”.

Recent aerial photographs (2001 DNR Orthophotos) reveal numerous small lot hay and pasturelands. Major areas of forage/pastureland are located in the following areas: 1, 160 acres north and south of Country Lane and east of Hoff Road; 2, Lands east, west and south of the North Bellingham Golf Course owned by Caitac USA; 3, The Dewey Valley; and 4,The northeast and central section of Township 39N Range 3E Section 3 (east of Noon Road, south of Smith Road).

There is one moderately sized dairy operation located west of Noon Road and north and south of Kelly Road. Another dairy farm just outside the Subarea leases land south of East Smith Road for their operation. One of the larger dairy heifer replacement operations in the Subarea, is located northwest of the intersection of Noon and Van Wyck Road.

Several beef cattle operations exist within the subarea. The southern portion of one operation straddling East Smith Road, east of Mission Road is located in the Subarea. Another operation is located off Hannegan Road, north of Van Wyck Road. One small poultry operation is located south of Smith Road, east of Hannegan Road.

Several horticulture operations exist in the Subarea, the largest of which is probably Smith Gardens on Marine Drive in the western portion of the Subarea.

The Rural zoned portion of the Subarea has been extensively developed into 5-acre density subdivisions. The APO Ordinance requires clustering of developed lots on 25 percent of the parcel, which leaves the remainder for agricultural use. Properties with 50 percent or more of the parcel in Agricultural Open Space Taxation or containing 50 percent or more APO soils and which are 20 acres or more in size are regulated under

the APO. Only 52 parcels or 1,676 acres out of 11,765 acres (14%) of Rural zoned land are of sufficient size (20 acres or larger) to require cluster subdivisions. Only one parcel is larger than 80 acres, the majority (45) are between 20 and 40 acres with only 6 parcels in the 40 to 80 acre range.

3.2.2. Agricultural Crops - Impacts

The existing agricultural activity in the Subarea is a remnant of historical land use. A comparison of the agriculture component on the Existing Land Use Map (Urban Fringe Subarea Background Document, January 1982) with current agricultural activity shows a significant loss of farming in the past 21 years. Agricultural land will continue to be converted to large lot (5 and 10 acre) subdivisions within the Subarea as long as undeveloped acreage remains available. Proximity to jobs in Bellingham makes the Rural zoned land in the Subarea attractive to homebuyers looking for acreage close to town. Whether or not there is adequate or even excessive capacity added to the City of Bellingham's UGA, and even if intensive infill occurs, agriculture will continue to decline in this area. The County's Rural zoning designation does not protect farmland and Agricultural Protection Overlay regulations to date have had little impact on saving farmland. Under all alternatives, it is likely that without additional farmland protection measures; valuable farmland will continue to be lost to development.

An important consideration is the impact that both rural and urban development have on adjacent and neighboring agricultural activities. Agriculture normally involves activities that generate noise, dust, smoke, odors and airborne chemicals. As homes for people not involved in agriculture come closer to agricultural operations, the potential for complaints and even lawsuits against farmers increases. Such complaints bring increasing pressure on the farmers to abandon farming and develop their land for more rural homes.

Another impact of rural home development in this area is the loss of future opportunities for urban development. Large lot zoning where homes are often centered in the middle of the lot makes redevelopment at urban densities difficult. If the future use for some or all of the current Rural zoned land is urban development at some point in the future, serious consideration should be given to the types of development patterns permitted within the rural designated zones. Yet another impact of the conversion of farmland to large lot subdivisions is the proliferation of exempt wells in areas closed to surface water withdrawals. Because of the connection between groundwater based wells and surface water flows exempt wells pose a growing concern for fish and wildlife habitat dependent on minimum instream flows.

<u>Alternative 1 – No Action</u>

Under the existing plans and regulations, the current pattern of loss of farmland due to development in the Urban Fringe Subarea would be expected to continue.

Alternative 2 : Infill
This alternative would be likely to create the least amount of impact to farmland, but without additional farmland protection measures, the County would continue to experience loss of farmland over time.

Alternative 3 – Adjusted UGA Boundary
Adjusting the UGA boundary would be expected to create the most significant loss of farmland and impacts to agricultural crops as well as increased potential for conflict between farms and residences.

Alternative 4 – Infill and Adjusted UGA
This alternative would be expected to continue farmland loss similar to alternative 2, and may possibly have greater impacts than alternative 2, similar to Alternative 3.

3.2.3. Agricultural Crops – Mitigating Measures

Farmland protection mitigating measures should include the development of better cluster development siting requirements. These would require analysis of adjacent land use as well as the development site's features, to determine where to site the cluster development (revise APO Ordinance). Siting requirements could also be developed for the placement of individual residential structures and accessory buildings in Rural areas to allow for agricultural use of the remaining parcel acreage and neighboring acreages (houses could be required to be located closer to the road or adjacent to other existing homes, driveways could be shared, access permits issued by the County could be limited to one per two lots as a minimum).

Areas of long-term agricultural viability should be targeted for Purchase of Development Rights (PDR) or Transfer of Development Rights (TDR) programs. Potential development density could be permanently removed. Upon conversion of Rural zoned land to a higher density use – urban residential, commercial or industrial or other high value use, mitigation should be required for lost Rural land. A payment in lieu of actual development rights purchase could be offered. Funds collected from this payment could be used to purchase conservation easements on identified high value farm and resource lands within the subarea. City/County programs could be developed that purchase term based easements that would restrict development on the easement properties for a specified period (tied to the long-range development plan (20-40 year easements).

To reduce conversion of large lot Rural zoned properties, extension of public water services into the rural areas should be limited to areas with existing health concerns due to contaminated water sources. In areas closed to further surface water withdrawals exempt wells should also be regulated to insure sufficient instream flows. A recent Washington State Supreme Court Decision identified the requirement to obtain water rights for developments that exceed the 5,000 gallons per day per project (exempt well). This ruling results in Rural zoned parcels receiving a maximum of 6 lots (800/gal/day * 6 equals approx 5,000/gal/day).

3.3 AIR QUALITY

3.3.1. Air Quality – Existing Conditions

3.3.1.1. Climate

One of the variables that influence air quality is climate. Weather does not cause high pollutant levels, but sometimes, under stable conditions, air pollutants may not disperse. The coastal area of Whatcom County has a mild maritime climate, which is typified by cool summers and mild rainy winters. Temperatures on the coast are moderate due to influences of the ocean. Mean annual temperature is 48.9°F (9.4°C) with a maximum range of -4°F (-20°C) to 97°F (36°C). The coldest months of the year are December and January. The warmest months are June and July.

Average precipitation is 34 inches (86.4 cm.) per year with an historical range of approximately 20 inches (50.8 cm) to 49 inches (124.5 cm). Average snowfall during the three winter months is approximately three inches per month. Prevailing winds are from the southwest in the winter and from the west and southwest during the remainder of the year. Winds rarely exceed 20 miles per hour for extended periods. Fog is most frequent in Spring and Fall.

3.3.1.2. Air Quality

Air Quality in Whatcom County (including Bellingham and its UGA) is monitored by the Northwest Air Pollution authority (NWAPA) and regulated under local, state and federal laws. The planning area is located in the Fraser River “airshed” and is subject to air quality influences of the greater Vancouver B.C. area. Within the planning area, topographical differences create areas with varying air quality due to differences in dispersal of pollutants and air mixing. Air quality in the area is generally good. Proximity to low density rural and forested areas and open marine waters, and the lack of topographical barriers relative to prevailing wind patterns insure low pollutant loading and thorough air mixing with cleaner air. For similar reasons, the air in the Bellingham vicinity is also fairly free from noxious odors for an urban community.

There are two ambient air monitoring stations in Whatcom County operated by the NWAPA. At the base of Alabama Hill in Bellingham there is a station that measures fine particulate matter (PM-10 and PM-2.5). There is a station in the Custer area that measures fine particulate (PM-10 and PM-2.5), seasonal ozone, and, more recently, oxides of nitrogen. The monitoring results from both stations show mostly good air quality for the region. A carbon monoxide station was operated from 1988 to 1990. It generated data well below the ambient standards.

Federal ambient air pollution standards exist for the following criteria pollutants: Particulate matter less than 10 microns in size (PM10), sulfur dioxide, oxides of nitrogen, ozone, carbon monoxide, and lead. Emissions of these and other pollutants such as toxic air pollutants and hydrocarbons are regulated under the Federal Clean Air Act (CAA).

The principal sources of air pollutants in the Bellingham vicinity are local industries, wood smoke, vehicular traffic and construction activities.

3.3.1.3. Local Industries

Larger industries in this region include an aluminum plant, two oil refineries, four fossil fuel-fired electric power plants, and a natural gas pipeline compressor station. Pollutants may be in the form of stack discharges or odors from indirect sources. There are numerous smaller industries in the area that may occasionally release air pollution in the form of noxious odors, such as from fiberglass laminating, fish processing or wood preservative treatment. Sewage treatment and composting are also potential sources of odors.

Currently all pulp mills and aluminum plants are regulated by the Department of Ecology. The Northwest Air Pollution Authority regulates all other air pollution sources, except mobile sources. The pulp mill operated by Georgia Pacific West shut down the pulp operations in late 2002. There are a variety of small to medium sources of air pollution located throughout the greater Bellingham area. Some emit odorous compounds as well as criteria air pollutants.

3.3.1.4. Wood Smoke

Primary sources of wood smoke are timber harvesting, residential outdoor burning, fireplaces, and wood stoves. Wood smoke is composed of fine particulates. Since 1992, only certified wood stoves may be sold and installed. NWAPA has a wood stove containment program in place. If pollutant levels get too high, NWAPA has the authority to curtail wood stove use and outdoor burning. Outdoor burning is banned in Bellingham and its surrounding urban growth area. Outdoor burning of natural vegetation is allowed in certain unincorporated areas of Whatcom County.

3.3.1.5. Motor Vehicles

Motor vehicles are a primary source of urban air pollution. Combustion products include carbon monoxide, oxides of nitrogen, fine particulates, and sulfur oxides. Diesel vehicles emit high levels of particulates. Some diesel fleets have added exhaust retrofits to reduce harmful pollutants. There will be new standards for gasoline and diesel in the next few years that will also reduce vehicle emissions. Although vehicle emission standards continue to tighten and combustion efficiency improves, the number of vehicles on the road continues to grow as well, offsetting improved vehicle performance. Major transportation corridors such as Interstate 5 and primary arterials have the greatest air pollution impact. The most heavily traveled corridors include Interstate 5, Sunset Drive, Guide Meridian, and Lakeway Drive. Air pollution from traffic is most evident over Bellingham's downtown core and is readily visible from any of the nearby hilltops on a calm or still day.

3.3.1.6. Construction

Construction generates particulate dust as a result of grading, truck traffic on dirt surfaces, demolition work, sand blasting, spray painting and outdoor burning of clearing debris and wood waste.

3.3.2. Air Quality - Impacts

All four alternatives will increase discharges to the air from industrial, outdoor and wood heat burning, vehicular and construction related sources. Motor vehicles will likely have the most significant long-term effect, as suspended particulates, ozone and carbon monoxide content will increase as automobile traffic increases.

Alternative 1 – No Action

This alternative is expected to push development farther from the City thus increasing vehicle trips generated, vehicle miles traveled, traffic congestion, vehicle emissions, and air pollution.

Alternative 2 – Infill

The Infill alternative could create more opportunities for non-auto-dependent land uses thereby minimizing vehicle trips generated, vehicle miles traveled, traffic congestion and vehicle emissions, and could possibly have the least significant impact to the air.

Alternative 3 – Adjusted UGA Boundary

This alternative is expected to increase auto-dependent land uses, vehicle trips generated, vehicle miles traveled, traffic congestion, and vehicle emissions. This alternative could create the most significant impacts to the air.

Alternative 4 – Infill and Adjusted UGA

This alternative would have effects similar to those of alternative 2 with slightly more impact to air quality than alternative 2. Increased population density in the city and its UGA is likely to result in greater numbers of air quality complaints. This is particularly the case when density increases are in an area adjacent to industry with the potential to generate nuisance odors.

3.3.3. Air Quality – Mitigating Measures

At the local level, mitigating measures may include actions such as discouraging industries with moderate to high pollution discharge, ensuring industry Best Management Practices (BMP's) are strictly followed, locating new industries with air pollution discharges away from residential and high occupancy commercial and business areas and limiting future road improvements for single occupancy vehicle (SOV) use. Continuing education is required to address residential home heating with wood burning appliances to optimize energy efficiency and cleanliness. Prohibition of wood burning appliances in high-density areas may be appropriate. Zoning regulations that encourage creating mixed-use pedestrian and transit-oriented neighborhoods with residential, employment and shopping areas in close proximity may help reduce reliance on vehicles. Transportation Demand Management (TDM) strategies promoting multi-modal and alternative transportation options, such as walking, bicycling, riding transit, carpooling, and working from home can be implemented to enhance the capacity of the transportation network and reduce vehicle emissions. Ongoing demand analysis for public transportation may also help. Construction impacts may be reduced with the requirement for dust suppression in the forms of containment via suspended

plastic sheeting, watering dry dirt roads and work areas, and suspending work during windy or extremely dry periods.

3.4 WATER RESOURCES

3.4.1. Water Resources – Existing Conditions

(Note: this Water Resources Section has been extensively documented. A footnoted version of this section is on file for public review at the Whatcom County Planning Department)

3.4.1.1. Watersheds and Drainage

The planning area wholly or partially overlies twelve watersheds, each of which includes one or more drainage basins (See Figure 3.4.1.1; Figure 3.4.1.2.; and Figure 3.4.2.2.). Each watershed and sub-basin includes one or more year-round or seasonal streams. All drainage basins in the planning area ultimately discharge into Bellingham Bay. The watersheds, drainage basins and streams are discussed in geographic order, beginning in the northwest and moving south and east in a clockwise direction. These include:

A. LUMMI BAY WATERSHED
    Lummi Peninsula West Drainage Basin
B. SILVER/NOOKSACK CHANNEL AND DELTA WATERSHED
    Silver Creek Drainage Basin
C. BARRETT LAKE WATERSHED
    1. Deer Creek Drainage Basin
    2. Tenmile Creek Drainage Basin
D. ANDERSON WATERSHED
    Lower Anderson Creek Drainage Basin
E. SQUALICUM WATERSHED
    1. Spring Creek Drainage Basin
    2. Baker Creek Drainage Basin
    3. McCormick Creek Drainage Basin
    4. Upper Squalicum Creek Drainage Basin
    5. Toad Creek Drainage Basin
    6. Lower Squalicum Creek Drainage Basin
F. LAKE WHATCOM WATERSHED
    1. Silver Beach Drainage Basin
    2. Hillsdale Drainage Basin
    3. Academy Drainage Basin
    4. Oriental Drainage Basin
    5. Bloedel Donovan
    6. Geneva Drainage Basin
    7. Cable Drainage Basin
    8. Strawberry Drainage Basin

G. WHATCOM CREEK WATERSHED
H. PADDEN CREEK WATERSHED
I. BELLINGHAM BAY WATERSHED
    1. Fort Bellingham Drainage Basin
    2. Little Squalicum Creek Drainage Basin
    3. South Bellingham Bay Drainage Basin
J. CHUCKANUT WATERSHED
    Chuckanut Creek Drainage Basin

A. LUMMI BAY WATERSHED

Drainage

Approximately 500 acres in the extreme northwest corner of the Urban Fringe Subarea lies within the Lummi Peninsula West Drainage Basin of the Lummi Bay Watershed. Most of the remainder of this 6,300-acre watershed drains Lummi Reservation land.

Land Use

The portion of the watershed that lies in the planning area is used entirely for agriculture with associated residential uses. This watershed also provides wildlife habitat, recreation, fishing, crabbing and shellfish harvest although the latter two do not occur within the planning area. The Whatcom County SMP designation for the portion of the lower Nooksack River (south of Slater Road) that flows through the planning area is Rural.

Water Quality

Lummi aquaculture and fish habitat enhancement programs in both the broader watershed and the planning area depend on high water quality. Groundwater contamination and saltwater intrusion are specific concerns for the Lummi Reservation with the latter concern applying on the Lummi Bay side of the watershed. Potential threats to this watershed include failing septic systems, stormwater runoff from roads and residential development and illegal dumping. Additional non-point source threats include agricultural chemicals, agricultural nutrients (i.e. manure effluent) and potential chemical use (e.g. fertilizers and pesticides) related to hybrid poplar plantations west of the Nooksack River. Cultivation of hybrid poplars is considered an agricultural activity unless the rotation extends beyond ten years in which case tree harvest would be regulated in accordance with the Washington State Forest Practices Act (FPA).

Wetlands

No large wetlands have been mapped in the planning area portion of this watershed. A two and a half mile stretch of the Nooksack River runs through the planning area east of Ferndale Road and parallel to Silver and Tennant Creeks. A wetlands restoration project is being implemented on Washington Department of Fish and Wildlife property in the Marietta Slough area. This property includes the area between the lower Nooksack River and Silver Creek just north of Marine Drive. The intent of this project is to restore floodplain wetlands and their associated habitat functions for fish and wildlife.

Flooding

This portion of the watershed is entirely in a Federal Emergency Management Act (FEMA) Zone AE (designated 100-year floodplain). The Nooksack River's broad floodplain extends approximately three miles west of the river in places and approximately three-quarters of a mile to the east. Both banks of the river are levied in this reach.

B. SILVER/NOOKSACK CHANNEL AND DELTA WATERSHED

Drainage

The Silver/Nooksack Channel and Delta Watershed includes approximately 10,100 acres, of which approximately 1,700 acres of the Silver Creek Drainage Basin are in the northwestern portion of the planning area. Major streams within this basin include Silver Creek (with seven unnamed tributaries draining into it), Tennant Creek (with four unnamed tributaries draining into it) and Bear Creek (with three unnamed tributaries draining into it). The basin also includes Lost Lake, located northeast of the airport. One channelized drainage and a network of sloughs are located to the west of Silver Creek, southwest of Rural Avenue.

Land Use

Land uses in this drainage include the North Bellingham Golf Course (Caitac 5-year review area), the north half of Bellingham International Airport, most of the Cordata Planned Unit Development in Bellingham and low-density rural and agricultural uses. In the area between I-5 and Northwest Drive, rural residential land uses are interspersed with commercial and industrial development. This drainage also provides fish and wildlife habitat, recreation and livestock water supply.

Water Quality

A large portion of Silver Creek is on the Washington State Department of Ecology proposed 303(d) proposed list of degraded waters for dissolved oxygen and fecal coliform based on data collected by Western Washington University. The airport is responsible for maintaining drainage systems for water quality according to their National Pollution Discharge Elimination System (NPDES) permit.

Agricultural, industrial and residential land uses have contributed to water quality degradation in the Silver Creek basin. Contributing factors include removal of riparian vegetation, erosion and destabilization of stream banks, increased delivery of sediment to streams resulting in siltation of streambeds and the introduction and encroachment of invasive and non-native plants (e.g., reed canary grass). The presence of invasive or non-native vegetation can result in reduced concentrations of dissolved oxygen, an important water quality parameter, due to decaying plant matter and associated high stream water temperatures that result from a loss of riparian vegetation that would otherwise provide stream shading. The establishment of large areas of reed canary grass will inhibit re-establishment of a fully functional riparian zone along a stream and can result in reduced flow velocities. Reduced flow velocities can result in accumulations of fine sediment and organic materials that can increase the concentrations of nutrients and pollutants

including fecal coliforms from livestock. Most of the functional riparian vegetative cover in this watershed has been removed. Canopy cover is important in maintaining cool water temperatures that riparian wildlife need to survive. The removal of this canopy has led to degradation of water quality and riparian and fish habitats.

Further water quality threats include stormwater runoff from Interstate 5, agricultural runoff (pesticides, fertilizers and animal wastes) and failing septic systems. Fish habitat within the Silver Creek watershed may be degraded by contaminants from industry. High fecal coliform levels in Silver Creek (located in the Portage Bay Shellfish Protection District) may adversely affect the tribal shellfish growing areas in Portage Bay, many of which are currently restricted for harvest.

The Nooksack Salmon Enhancement Association (NSEA) and the Whatcom County Public Works Department have nearly a dozen ongoing riparian habitat restoration, instream and preservation projects within the planning area portion of the Silver Creek basin. These include projects near Smith Road, Horton Road, Aldrich Road, Slater Road and Shady Lane. The Whatcom Conservation District has worked with several landowners in this drainage basin to develop farm plans.

Wetlands

Approximately 400 acres of wetlands have been identified in this portion of the planning area. There are four complexes of significant size. The largest, approximately 120 acres, is located on the Bellingham International Airport property. Half of this wetland is in the Fort Bellingham drainage and half is in the Silver Creek drainage. Three additional complexes of significant size are an approximately 100 acre wetland located in the Pacific Highway/Northwest Road Area, an approximately 70 acre wetland located in the Interstate 5/Northwest Road Industrial Area and an approximately 50 acre wetland located in the URMX zone of the Northwest Road/Aldrich Residential Area.

Northwest Ecological Services, LLC (NES), under contract with Whatcom County and the City of Bellingham, conducted a wetland inventory in June and July 2003 for six priority areas. The NES inventory confirmed that the stream-wetland complex in the Silver and Bear Creek area is a connected drainage system. This complex was identified as being the highest quality wetland system of all the priority areas inventoried. Beaver activity was identified in all areas of the complex with ponding occurring due to this activity.

Flooding

The area between Silver Creek, Tennant Creek and the lower Nooksack River lies within a FEMA Zone A3 (100-year floodplain). There is also a narrow 100-year floodplain along Silver Creek, which extends outside the planning area north and east almost to Northwest Drive, north of Slater Road.

C. BARRETT LAKE WATERSHED

Drainage

The Barrett Lake Watershed includes approximately 26,300 acres, of which approximately 1,700 acres are in the planning area. Deer Creek, Ten Mile Creek, Four Mile Creek and several unnamed streams are in this watershed. Only the Deer Creek and Ten Mile Creek sub-basins drain the planning area.

1. Deer Creek Drainage Basin

This drainage includes approximately 4,300 acres, of which 407 acres are in the planning area (south of Smith road).

2. Tenmile Creek Drainage Basin

This drainage includes approximately 11,800 acres. About 500 acres in the northeast corner of the planning area are in this basin, south of Smith Road. There is a scattering of small wetlands in this area as well.

Land Use

The primary land use in the Barrett Lake Watershed is agriculture, most of which is north of Smith Road and outside the planning area. Residential land uses are scattered throughout this watershed, which is also used for domestic and agricultural water supply and fish and wildlife habitat.

Water Quality

In the past, the water quality of this watershed has been threatened by several persistent elements. These include high levels of fecal coliforms, high turbidity, low dissolved oxygen, high levels of nitrogen, manure runoff, erosion of stream banks due to livestock access and failing septic systems. Fifty percent of farms in this area depend on streams for their primary water source. Farms that depend on surface water for livestock production have experienced increased risk of disease where cattle drink affected water. Shellfish beds in the Portage Bay area have been threatened by bacterial contamination from runoff in the Barrett Lake Watershed and other areas of the Nooksack Watershed.

Recent efforts have been made to protect this watershed from these identified threats. The Whatcom Conservation District has worked with several landowners to develop farm plans. There are a number of other efforts underway, such as the Tenmile Creek Riparian Restoration Project. In addition, this area falls under the requirements of the NPDES Phase II Stormwater Permit.

Wetlands

In the Deer Creek drainage basin, NWI maps show a scattering of small wetlands in the planning area south of Smith Road.

Flooding

No flooding concerns have been identified for this area.

D. ANDERSON WATERSHED

Drainage.
The Anderson watershed is approximately 5,700 acres in size. Approximately 180 acres of the Lower Anderson Drainage Basin in this watershed are in the northeast corner of the planning area. The Lower Anderson Drainage includes Lower Anderson Creek and some unnamed drainages, all of which are outside the planning area.

Land Use
The primary land uses in this watershed are rural residential and rural forestry practices. Anderson Creek also provides fish and wildlife habitat as well as recreational uses.

Water Quality
No information was found.

Wetlands
No wetlands of significant size were identified.

Flooding
The portion of Anderson Creek that lies at the intersection of Smith Road and Sand Road (one mile outside the eastern boundary of the Urban Fringe Subarea) has been designated as a FEMA Zone A (area of 100-year flood). The portion of Anderson Creek south of this point (also outside the Subarea) has been designated as a FEMA Zone C (area outside a 100-year flood plain).

E. SQUALICUM WATERSHED

Drainage
The Squalicum Watershed drains a total of 15,800 acres, of which approximately 4,700 acres are in the northern part of the planning area, including Baker Creek, Spring Creek, McCormick Creek, Toad Creek, Upper Squalicum Creek, Squalicum Creek and additional unnamed streams.

1. Spring Creek Drainage Basin
The Spring Creek basin drains approximately 3,000 acres in the central part of the Urban Fringe Subarea and the Guide Meridian corridor in the City of Bellingham, generally north of the Bellis Faire mall. There are several lakes within this drainage basin and there is a network of unnamed tributaries draining into Squalicum Creek. Channelization and culverts have altered Spring Creek.

2. Baker Creek Drainage Basin
This sub-basin drains the land area generally lying between the Spring Creek Drainage Basin, the Lower Squalicum Creek Drainage Basin, and a narrow stretch along Baker Creek between Interstate 5 and Northwest Avenue. At least two unnamed tributaries flow into Squalicum Creek from this drainage basin. Portions of these tributaries have

been channelized and culverted. Stormwater detention structures have been constructed at Cordata and along several tributaries to Baker Creek.

3. McCormick Creek Drainage Basin
This 3,600 acre basin drains most of the northeast part of the Urban Fringe Subarea and lies generally west of Mission Road and east of Dewey Valley between E. Smith Road on the north and Mount Baker Highway to the south.

4. Upper Squalicum Creek Drainage Basin
The Upper Squalicum basin is generally bounded by Squalicum Creek to the north and the crest of Toad Mountain to the south, east of the Lower Squalicum Creek Drainage Basin. The basin includes the headwaters and upper portion of Squalicum Creek.

5. Toad Creek Drainage Basin
This basin is approximately 1,300 acres and drains an area generally lying between the Lake Whatcom watershed, McGrath Road, the ridge of Toad Mountain, and the eastern boundary of the planning area. Toad Lake lies within this sub-basin and forms the headwaters of Toad Creek, which flows to Squalicum Creek. Three unnamed streams enter Toad Lake.

6. Lower Squalicum Creek Drainage Basin
This basin drains approximately 3,000 acres generally lying southwest of Dewey Valley. Sunset Drive and Squalicum Parkway run through this basin, which contains the main stem of Squalicum Creek as it flows into Bellingham Bay.

Land Use
Mixed land use characterizes this watershed. Uses include forestry, agriculture, residential, commercial and industrial. Other significant uses include recreation, scenic areas and fish and wildlife habitat. There is significant residential development around Toad Lake, the headwaters of Toad Creek. Toad Lake, Toad Creek, and the upper stretch of Squalicum Creek are within the jurisdiction of the Whatcom County SMP and are designated Rural. About a half mile below its confluence with Toad Creek, Squalicum Creek is within the jurisdiction of the Bellingham SMP and is designated Conservancy 1.

Water Quality
Water quality problems in the Squalicum Watershed include bacterial contamination, low dissolved oxygen, high temperatures, excessive channel erosion, sedimentation, visible oil and scum, turbidity during storms and a decline in fish populations and habitat. Sources of nonpoint pollution consist of urban and industrial runoff as well as septic systems. In Spring Creek, stormwater runoff has increased, groundwater infiltration has decreased and wetlands have been filled or altered resulting in deterioration of water quality, alteration in the hydro period and disruption of migrating fish habitat.

The public has initiated several programs in the watershed, including fish enhancement activities, stream rehabilitation and the creation of a park near the mouth of the creek.

NSEA has initiated an instream restoration project on the portion of Squalicum Creek that lies within the McCormick Creek drainage basin located west of Noon Road. NSEA has also initiated several riparian habitat restoration projects on the portion of Lower Squalicum Creek that lies within the planning area north of Dewey Road.

Wetlands

Approximately 130 acres of wetlands have been identified in this watershed. There are three complexes of significant size in this area. The complex located in the Baker Creek drainage basin is approximately 60 acres and is located in the East Bakerview/James Street Residential Area. Two wetlands complexes are located in the McCormick Creek drainage basin. One is north of Kelly Road and west of Noon Road. The other is north of Kelly Road, west of Mission Road and east of Wahl Road. Both of these complexes are connected to fish-bearing portions of the Squalicum Creek drainage system.

A 1993 field study determined that, nine wetlands are hydrologically connected to Baker Creek and its tributary. Due to the large size of this area and predominantly wet-meadow characteristics, the wetland located north of McLeod Road, west of James Street and south of Telegraph Road has potential for use as a future wetland mitigation bank. This complex was also identified in the 2003 NES wetlands inventory. These wetlands make up the remainder of a wetland corridor that connects the King Mountain drainage system to Squalicum Creek. Baker Creek and several unnamed streams are part of this system.

Flooding

The portion of Squalicum Creek extending upstream to the intersection of Dewey Road and Van Wyck Road has been designated as a FEMA Zone A (area of 100-year flood).

F. LAKE WHATCOM WATERSHED

The Lake Whatcom watershed is a multi use watershed and is the drinking water reservoir for the City of Bellingham and the Lake Whatcom Water and Sewer District, which, combined, serve approximately one-half of the population of Whatcom County. Lake Whatcom and its watershed have been studied for over 40 years. These studies recognize the impact of development on the watershed, but are inconclusive on the level of development that can occur before the Lake's water supply function is compromised.

In November/December 1992, the Bellingham City Council, Whatcom County Council and Water District 10 Commissioners passed a joint resolution, which reaffirmed this position with six general goal statements and a set of specific goal statements in various categories. The specific goal statements for urbanization are:

- Prevent water quality degradation associated with development within the watershed.
- Review and recommend changes in zoning and development potential that are compatible with a drinking-water reservoir environment.

- In addition to zoning, identify and promote other actions to minimize potential for increased development in the watershed (i.e. land trust, development rights, cost incentives, etc.)
- Develop specific standards to reduce the impacts of urbanization, such as minimal lot clearing, clustered development to reduce infrastructure and collection and treatment of stormwater before entering the lake.
- Develop appropriate interlocal agreements with governing agencies to prohibit the potential for additional development once an agreed upon level is set.

The joint resolution includes goals for watershed management that extend beyond urbanization. Goals are included for stormwater management, on-site waste systems, conservation, forest management, spill response, hazardous materials transport and handling, data/information management, education/public involvement and other topics.

In 1998, Bellingham, Whatcom County and Water District 10 (now Lake Whatcom Water and Sewer District) formalized their joint commitment to protect and manage the lake through the joint adoption of an interlocal agreement and allocation of funding toward protection and management efforts in the watershed. In 2000, a five-year program plan was adopted for ten program areas. Specific priority was placed on activities related to watershed ownership, stormwater management and urbanization/land development. The Reservoir Management Plan will be updated by 2005.

There are four urban areas in the watershed: the City of Bellingham, which straddles the upper portion of the northernmost basin of the lake; Geneva, which is immediately south and east of Bellingham's city limits and is part of the city's UGA; Hillsdale, which is immediately north and east of Bellingham's city limits and is also part of the city's UGA; and the Sudden Valley Provisional UGA. In addition, it includes a variety of other zones, including resource, rural and suburban zones. Over 75 percent of the watershed is in Forestry zoning and more than 83 percent of the current land use is forestry.

In 2002, there were over 2,000 developed lots in the Lake Whatcom watershed located outside of the Bellingham UGA. Under the interim zoning adopted in June 2002, the total potential build-out in this area is 7,627 lots. This indicates that, even under the more restrictive interim zoning, there could be a significant amount of new development in the watershed.

The Lake Whatcom Water and Sewer District provides water and sewer services in parts of the watershed. Capacity problems in the District's sewer line, which serves Geneva and Sudden Valley, have caused overflows into the lake in the past. An aggressive program to preclude stormwater infiltration has greatly reduced the overflows. In addition, the District has a contractually limited flow capacity to Bellingham. The Lake Louise Road sewage interceptor was completed in January 2003 to carry wastewater from Sudden Valley and Geneva. It serves as a complement to the Lake Whatcom Boulevard trunk line. The interceptor was designed to service full build-out of Sudden Valley and Geneva. Properties with septic tanks are required to connect to the sewer system within five years of completion of the project.

Drainage

The Lake Whatcom watershed includes approximately 35,435 acres. The 970-acre Geneva UGA is entirely within the Lake Whatcom watershed, as well as 310 acres in the Hillsdale/Britton Road area. Lake Whatcom is divided into three large basins separated by underwater sills: Basin I, Basin II, and Basin III, each of which has its own drainage basin. All of the Lake Whatcom Watershed inside the Bellingham city limits and most of the watershed area in the UGA drain to Basin I. A small portion of the Geneva UGA drains to Basin II. The City of Bellingham's water supply intake is in Basin II and the Lake Whatcom Water and Sewer District draws its water from Basin III.

1. Silver Beach Drainage Basin

A sliver of the north end of this 400-acre drainage is in the UGA. The remainder is inside the Bellingham city limits. Silver Beach Creek, under City and County jurisdiction, drains this basin into Lake Whatcom.

2. Hillsdale Drainage Basin

This drainage is approximately 700 acres in size. Less than half of this lies in the planning area and UGA. One unnamed stream drains into Lake Whatcom in this basin.

3. Academy Drainage Basin

A small corner of this 780-acre drainage is in the planning area and UGA.

4. Oriental Drainage Basin

This drainage is approximately 600 acres, two thirds of which are in the Geneva UGA. One unnamed stream drains this basin into Lake Whatcom.

5. Geneva Drainage Basin

This drainage is approximately 200 acres in size, of which, about two thirds are in the Geneva UGA. At least two unnamed streams are in the UGA portion of this basin.

6. Cable Drainage Basin

This drainage is approximately 100 acres in size and lies entirely within the Geneva UGA.

7. Strawberry Drainage Basin

This drainage, which drains to Basin II, is approximately 800 acres in size. At least two unnamed streams are in the planning area portion of this basin.

Land Use

The primary land use in the Lake Whatcom watershed is forestry (approximately 83 percent). Secondary uses include urban, residential, park space, commercial and agricultural. The lake serves as a reservoir and source of domestic water supply for over 85,000 people. Other uses include a fish hatchery, flood control, fish and wildlife habitat, crayfish fishery, swimming, fishing, boating and scenic resource. The City of Bellingham SMP designation for the Lake Whatcom shoreline is Urban 1.

Water Quality

The most urbanized basin, Basin, I is located at the northwest end of the lake and holds approximately 2% of the lake's volume. This basin exhibits the most significant impacts to water quality, primarily on a seasonal basis during the spring and summer when the lake is stratified.

Lake Whatcom is on the State proposed 303d list for impaired water bodies for dissolved oxygen, total phosphorus, total PCBs, mercury and dieldrin. Silver Beach Creek, a tributary draining to Basin I, is on the proposed 303d proposed list for fecal coliform. Austin Creek, a tributary to Basin #3, is on the list for dissolved oxygen.

The main water quality concern in Lake Whatcom is pollutant loading from its tributaries, related to urban and residential runoff (fecal coliform, nutrients, metals, etc.). Potential threats to this watershed include sedimentation, automobile generated pollutants, lawn chemicals, forest practices, motorized boats, and septic system failures.

Wetlands

NWI maps show approximately 30 acres of wetlands in the UGA portion of this drainage basin. The complex of wetlands most significant in size, approximately 20 acres, is located in the Britton/Hillsdale Residential Area (north of Hillsdale Road and east of Britton Road). In addition, two wetlands are located in the Silver Beach Drainage Basin. These include Scudder and Big Rock Ponds and their surrounding wetlands.

Flooding

The portion of Lake Whatcom that lies in the planning area has been designated as a FEMA Zone A (area of 100-year floods).

G. WHATCOM CREEK DRAINAGE WATERSHED

Drainage

Whatcom Creek is the outlet for Lake Whatcom. Four smaller streams flow into Whatcom Creek. Of these, Lincoln Creek, Cemetery Creek (East and West Forks) and Hannah Creek emanate from the Yew Street Road/Samish Hill/Galbraith Mountain area. Whatcom Creek serves as a major channel for Bellingham's stormwater drainage system. The north half of the Yew Street Road UGA drains to the Whatcom Creek Drainage Basin.

The Whatcom Creek Gorge Sub-Basin drains the area adjacent to the eastern half of Whatcom Creek between Lake Whatcom and the freeway interchange at Ohio Street and Interstate 5. This stretch of Whatcom Creek includes the headwaters flowing from the Lake and the cascading waterfalls in Whatcom Falls Park.

The Fever Creek sub-basin drains the area bounded by Sunset Drive, Interstate 5, and the Lake Whatcom watershed.

The Hannah Creek sub-basin drains an elongated area, oriented north-south, generally located in the east half of the Whatcom Falls Neighborhood bounded by Electric Avenue, the Lake Whatcom watershed and Kulshan Middle School.

The Cemetery Creek sub-basin drains an area generally including the western half of the Whatcom Falls Neighborhood, the eastern half of the Puget Neighborhood, and is generally bounded by Fraser Street and the Whatcom County Fire District #10 station on Yew Street.

The Lincoln Creek sub-basin drains an area generally including the western half of the Puget Neighborhood and lying between Interstate 5, Fielding Avenue, and the Cemetery Creek sub-basin.

The Lower Whatcom Creek sub-basin drains the land area generally lying west of Interstate 5 and between Sunset Drive, Broadway Avenue, Sehome Hill Arboretum, and Holly Street. This stretch of Whatcom Creek flows through Maritime Heritage Park and the industrial Whatcom Creek Waterway and empties into Bellingham Bay.

Land Use

Whatcom Creek is the most visible and highly urbanized stream system within Bellingham, flowing through the industrial, commercial and government centers. Primary land uses in the drainage basin include residential, commercial, industrial and institutional. Secondary uses include parks and recreation. This basin also provides water for two fish hatcheries and provides scenery and fish and wildlife habitat. City SMP designations vary along Whatcom Creek as follows: Urban 1 between Bellingham Bay and Interstate 5; Conservancy 1 from Interstate 5 to the Whatcom Falls Park boundary; Natural from the park boundary to the falls; Conservancy through the Whatcom Creek Gorge; and Natural from the Gorge to the headwaters at Bloedel Donovan Park.

Water Quality

The stream has been affected by major channelization and flood control projects, vegetation removal and pollution from urban runoff. There is little flushing action where the stream enters Bellingham Bay, so contaminants in sediments and water negatively affect shellfish and other estuary wildlife. Abandoned landfills also have some bearing on estuary water quality.

This drainage basin has experienced chronic turbidity, oil and effluents in the water, several major fish kills and a consequent decline in fish populations. Persistent threats include urban and industrial runoff, increased residential development (especially in the Alabama Hill area of Bellingham), forest conversion to urban use and old inactive landfills near the mouth of Whatcom Creek. The 2002-2004 proposed State Water Quality Assessment List (303d list) recognizes Lincoln Creek, Fever Creek and Cemetery Creek for poor water quality due to fecal coliform, temperature and dissolved oxygen problems. Fever Creek is also listed for zinc, copper and pentachlorophenol. Whatcom Creek is listed for fecal coliform, temperature and dissolved oxygen. The

Whatcom Creek watershed is the subject of a joint City of Bellingham Department of Ecology Total Maximum Daily Load study that will identify the actions needed to cleanup the watershed.

Since 2000 Whatcom Creek has benefited from a full time Washington Conservation Corps restoration crew sponsored by the City. Building on early work by NSEA near the mouth of the stream the crew has worked steadily upstream restoring native vegetation. The crew has also worked extensively in the area burned by the 1999 gas line explosion and fire. The middle gorge area of Whatcom Falls Park, heavily damaged during the fire was replanted with over 30,000 trees partly for the purpose of controlling expected erosion and sedimentation. The riparian restoration work helps filter stormwater pollutants, reduce water temperatures and prevent erosion. The lower reaches of Whatcom Creek have been planted with native vegetation and a fish ladder has been placed over a sewer line crossing that has prevented fish passage to the middle reach. The middle reach continues to be problematic. This section has been modified for flood mitigation. It is a continuous riffle with no refuge for juvenile salmonids. Also, a city trail project has led to land acquisitions from Bellingham Bay to Whatcom Falls Park on upper Whatcom Creek.

Wetlands

The NES wetland inventory identified an approximately 18-acre complex of wetlands that is connected to the Cemetery Creek drainage system east of Yew Street. These wetlands form the headwaters of Cemetery Creek and help protect the integrity of the creek. This complex also has high habitat value.

Flooding

To control flooding Whatcom Creek has been dredged and gabbioned for much of its length after leaving the gorge. Filling of an extensive wetland complex adjacent to the mouths of Fever, Cemetery and Lincoln creeks caused significant flooding for years. The Creek is now managed to reduce the impact of flooding along Iowa Street.

H. PADDEN CREEK WATERSHED

This watershed of approximately 3,900 acres drains an area including the south half of the Yew Street Road UGA, westward past Interstate 5 to include much of the Fairhaven Neighborhood of Bellingham. The Basin includes the Lake Padden, Connelly Creek, and Padden Creek sub-basins. Padden Creek, Connelly Creek, one unnamed stream, Lake Padden and one unnamed lake lie within this basin.

Drainage

The Lake Padden sub-basin drains the land area generally lying between the Douglas Avenue/Yew Street intersection, the ridge of Galbraith Mountain, the Galbraith Lane/South Samish Way intersection, the Lake Padden cliffs above Interstate 5, and 40th Street. The south half of this sub-basin lies within the City of Bellingham's Lake Padden Park.

The Connelly Creek sub-basin drains the area generally lying between the City limits, 40th Street, South Samish Way, Old Fairhaven Parkway, Happy Valley Park, Sehome High School, the Sehome Hill Arboretum, and North Samish Way.

The Padden Creek sub-basin drains the area generally lying between the headwaters and outflow from Lake Padden, South Samish Way, Old Fairhaven Parkway, Sehome High School, the Sehome Hill Arboretum, Lowell Elementary School, Viewcrest Drive, Fieldston Road, and the inter-tidal Padden Lagoon.

Land Use

The primary land use in this drainage is residential. Secondary land uses include forestry, commercial, Fairhaven Park, Lake Padden Park and small-scale agriculture. This drainage is also used for fish and wildlife habitat, recreation, swimming, fishing, boating and scenery. The Lake Padden shoreline is designated as Conservancy 2 under the Bellingham SMP.

Water Quality

Urban runoff, septic tank leakage and fertilizer/pesticide runoff have degraded Padden Creek and Lake Padden water quality. In recent years there have been consistent high fecal coliform counts, turbidity and visible oil sheen. Water quality in Lake Padden has improved with the extension of sewer service to the vicinity, but still suffers late in the summer due to reduced flushing, increased urbanization and growing waterfowl populations. Lake Padden occasionally experiences periods of high water temperature and low dissolved oxygen. Potential threats to this watershed include urban, industrial and commercial runoff, industrial expansion and increased urban development. The proposed 2002-2004 State Water Quality Assessment List (303d list) cites both Padden and Connelly Creeks for poor water quality due to temperature, dissolved oxygen and fecal coliform. Lake Padden is listed for total PCBs.

NSEA has initiated five instream and riparian habitat restoration and watershed protection projects for this area. These projects include the construction of fish ladders, fish planting, habitat restoration and public education projects.

Wetlands

NWI maps show approximately 7 acres of wetlands in this drainage. This complex is located in the Governor-Samish South Residential Area. Several wetland areas were identified during a 1992 field survey; however, the majority of this area's wetlands have been filled.

The NES wetlands study identified an approximately six-acre complex of fragmented wetlands north of the Mahonia Place and South Hills Drive residential developments in the Padden drainage basin. The main function of this complex is seasonal drainage into Lake Padden.

Flooding
The portion of this drainage that lies in the planning area has been designated as a FEMA Zone C (area outside a 500-year flood).

I. BELLINGHAM BAY WATERSHED

The Bellingham Bay Watershed, for purposes of this discussion, includes the full length of the narrow interface between terrestrial and marine environments within the planning area, with the exception of the Squalicum Watershed, which is discussed separately. In some places, the watershed captures only drainage below the benches and bluffs that mark the former, natural coastline of Bellingham Bay, but in many places this watershed also captures drainage from larger upland areas such as the Whatcom Drainage Basin.

1. Fort Bellingham Drainage Basin

Drainage
The Fort Bellingham Drainage Basin includes approximately 3,200 acres. This basin drains the land area generally lying between the Silver Creek watershed, Interstate 5, the western half of the Alderwood area, the Nooksack River Delta, and Bellingham Bay. The Marine Drive/Cliffside Residential Area drains through local stormwater systems directly to Bellingham Bay. The Bennett Drive Mixed Use/Alderwood Residential Area drains into the Little Squalicum Creek sub-basin that drains to Bellingham Bay. Airport Creek, and two small unnamed drainages in this watershed, one of which is inside the city limits, also flow into Bellingham Bay. There are also two small unnamed lakes in this area.

Land Use
The southern half of the Bellingham International Airport dominates land use in this drainage. The remaining area is used primarily for residential and light industrial purposes. The Whatcom County SMP designates most of the marine shoreline in this portion of the watershed as Conservancy. A small section of Tribal designated shoreline (as defined by the SM P) is at the westernmost end of the marine shoreline. There is a small area of Urban designated shoreline at the eastern end near the Mount Baker Plywood plant. Areas waterward of the Ordinary High Water Mark are designated Aquatic (as defined by the County SMP). These areas provide freshwater and marine fish and wildlife habitats and recreation. Little Squalicum Creek provides fish and wildlife habitat as well as recreational uses. The Bellingham SMP designates this portion of the shoreline as Urban Maritime.

Water Quality
In 1994, NSEA initiated instream and riparian habitat restoration projects on Airport Creek. These projects are located on the portion of the creek that lies south of Country Lane, east of Griffith Road and north of Marine Drive. These projects are ongoing and are intended to improve riparian shading to reduce high stream temperatures and to improve instream habitat complexity and diversity for aquatic species. The Little Squalicum sub-basin includes an EPA Superfund cleanup site in the industrial area.

Wetlands

There are two major wetlands complexes in this drainage basin. Approximately 140 acres of these wetlands lie within the planning area, as indicated by the U. S. Fish and Wildlife Service NWI maps. One complex, approximately 20 acres of tidelands/wetlands, is located along the shoreline between Bellingham Bay and Marine Drive (northwest of Bennett Drive). A second complex, approximately 120 acres of wetlands, is located on the Bellingham International Airport property, north of Country Lane. Half of this wetland drains into the Fort Bellingham drainage and half drains into the Silver Creek drainage.

Flooding

The Fort Bellingham Reach of the marine shoreline is designated as a FEMA Zone V (coastal flood zone with velocity hazard/wave action) on the shoreline west of Jones Lane. The remaining portion of the Reach, east of Jones Lane, is designated as a FEMA Zone A (areas of 100-year flood with wave height less than three feet).

2. Little Squalicum Creek Drainage Basin

Little Squalicum Creek has been the subject of considerable clean-up efforts by community organizations and the portion of the creek inside Little Squalicum Park is the subject of an EPA brownfields assessment grant for hazardous substances with concern for contamination from creosote and pentachlorophenol (PCP). The sensitivity of this creek and adjacent shorelands require particular attention to water quality to prevent any further degradation and to promote recovery to meet water quality standards.

3. South Bellingham Drainage Basin

This basin extends from the north side of Squalicum Harbor south along the shoreline to Clark's Point. The basin includes the Squalicum Harbor, Central Bellingham Bay and South Bellingham Bay sub-basins.

The Squalicum Harbor sub-basin drains the land area generally lying between West Illinois Avenue, Broadway Park, Jaeger Street, Eldridge Avenue, the mouth of Little Squalicum Creek, and the Whatcom Creek Waterway along Bellingham Bay. The Central Bellingham Bay sub-basin drains the land area generally lying between the Whatcom Creek Waterway, Holly Street, Indian Street, the Sehome Hill Arboretum, Lowell Elementary School, the Fairhaven Village Green, and the intertidal lagoon of Padden Creek along the Bellingham Bay shoreline. The South Bellingham sub-basin drains the land area generally lying between the intertidal lagoon of Padden Creek, the western half of the Edgemoor Neighborhood, and Chuckanut Bay south of Bellingham.

Land Use

The primary land uses in the upland portion of the Squalicum Harbor sub-basin are urban residential in the upland Columbia Neighborhood of Bellingham and a mix of residential, commercial, and industrial along Holly Street in the Old Town area. The primary land uses on the lowlands and reclaimed land are marine-oriented commercial and industrial along Roeder Avenue in Bellingham. Prominent uses include the Burlington Northern and Santa Fe Railroad yards, the Squalicum Harbor Marina and commercial complex,

and the Georgia Pacific Tissue Warehouse and settling pond. The Bellingham SMP designates this area as Urban Maritime.

The primary land uses in the upland portion of the Central Bellingham sub-basin are urban residential and institutional. The primary land uses below the bluffs of Bellingham Bay include heavy industrial at the former Georgia Pacific pulp mill, public recreation along Boulevard Park and the South Bay Trail system, and marine industrial on the northeast side of the lagoon. Prominent landmarks include the former Georgia Pacific pulp mill, Boulevard Park, and the Chrysalis Inn and Spa. The shoreline between the Georgia Pacific tissue plant and Boulevard Park has an Urban Maritime shoreline designation. The shoreline between Boulevard Park and the Fairhaven Shipyards has a Conservancy 2 designation.

The primary land uses in the upland portion of the South Bellingham Bay sub-basin are exclusively urban residential. The primary land uses along the shoreline of Bellingham Bay include marine commercial and industrial in Fairhaven and public recreation at Marine Park and north of Post Point. Prominent landmarks include the Bellingham Cruise Terminal, which accommodates the Alaska Marine Ferry, the Fairhaven Shipyards, Marine Park, and the Bellingham Sewage Treatment Plant. The shoreline between the old Reid Boiler Works and Padden Lagoon is designated Urban 1 and Urban Maritime between Padden Lagoon and Marine Park.

J. CHUCKANUT WATERSHED

Drainage

The portion of the planning area in the Chuckanut Watershed includes the approximately 4,700-acre Chuckanut Creek Drainage Basin, which includes numerous small drainages emanating from Galbraith Mountain to the northeast and from Chuckanut Mountain to the south. This drainage is steeply sloped, mostly forested and drains to Chuckanut Bay.

The Chuckanut Creek Drainage Basin drains the land area generally lying between the Lake Whatcom watershed, the Lake Padden cliffs above Interstate 5, and the ridge of Chuckanut Crest Drive. This drainage includes Chuckanut Creek, as well as four unnamed streams that flow into Chuckanut Creek. This drainage is steeply sloped and mostly forested.

Land Use

Forestry is the primary land use in this area. Secondary uses include residential, commercial and park space. This basin is also used for recreation, fishing, shellfish harvest, scenery and fish and wildlife habitat.

Water Quality

The proposed 2002-2004 State Water Quality Assessment List (303d list) cites Chuckanut Creek for water quality problems due to Fecal Coliform and Dissolved Oxygen. Chuckanut Creek experiences seasonal periods of high turbidity and suspended

solids during summer and low rainfall periods. These factors negatively affect fish spawning beds and the habitat composition for bottom dwelling species. Suspended solids can interfere with fish respiration as well. Potential water quality threats include forest practices, septic systems, runoff from I-5 and residential development. NSEA has initiated three instream and riparian habitat restoration projects on the portion of Chuckanut Creek that intersects Chuckanut Drive (outside the planning area).

Wetlands

There are significant wetlands on the shelf above Chuckanut Creek in Bellingham, along the inter-urban trail.

Flooding

The portion of this drainage that lies in the planning area has been designated as a FEMA Zone C (area outside a 500-year flood).

3.4.1.2. Groundwater – Existing Conditions

Groundwater is a major source of water supply for portions of Whatcom County although the majority of the population derives drinking water from surface water sources. The largest water purveyors in the county are the City of Bellingham, Public Utility District No. 1, Lake Whatcom Water and Sewer District, and the cities of Ferndale and Lynden; all of which draw from surface water sources. The largest users of groundwater in the Subarea are the Deer Creek Water Association and private individual wells. Historically, the Tilbury Cement plant has used significant amounts of groundwater. Considerable care must be taken in planning for adequate supplies and special attention is required in maintaining groundwater quality in view of the potential for increased development and pollution. Once contaminated, public water supplies can be unsafe for decades. Cleanup is often difficult, prohibitively expensive, and can require years to complete. Comprehensive analysis of groundwater quantity and quality is lacking for the planning area.

The presence of groundwater in an area is primarily determined by the underlying geology. Post-glacial and alluvium, marine terrace and glacial outwash deposits often have the greatest potential for producing groundwater. Seasonal variations in precipitation can impact the quantity of water available from these geologic units. Glacial drift is not considered a good groundwater source due to its low permeability related to the high silt and clay content of many strata and discontinuous nature of water-bearing layers. Perched water tables may exist within this unit and are associated with permeable layers of sand and gravel between silt or clay layers. Likewise, sandstone formations also have low potential for groundwater.

The quantity of water available for use within a watershed depends on the flow of water into and out of its aquifers. Under natural conditions, aquifers are in a state of dynamic equilibrium among recharge, leakage to other aquifers, and discharge to streams or marine waters. In developed areas, impermeable surfaces divert water that would normally be absorbed to recharge the aquifer. Well water withdrawals may also deplete stream flows where the well is in direct hydraulic connection with the stream. Aquifer recharge is also reduced by urban drainage systems where runoff is channeled into

outlets and is lost as a source of recharge. Stream channelization also diminishes an aquifer's storage capacity by locally lowering the water table and by more rapidly conveying runoff downstream.

A regional water table will generally conform to topography. As the land slopes towards the Nooksack River or other streams the water table becomes closer to the surface. Wetlands are often closely linked to groundwater. Water from precipitation and surface runoff percolates back to the groundwater through wetland soils in some cases, especially in small wetlands. Groundwater frequently moves to the surface in wetlands via seeps and springs, or the wetland or stream may simply be the local expression of the water table.

3.4.2. Water Resources - Impacts

All four alternatives have the potential to negatively impact surface water, groundwater, and wetlands. These impacts can be reduced through pollution prevention, wetland protection, wetland enhancement, and stormwater management plans.

Alternative 1 – No Action

The No Action alternative (and any alternative that does not provide sufficient land and densities in the City and UGA to accommodate projected population growth) is expected to push growth and the impacts of growth to the rural areas of the County and to the Urban Growth Areas of other cities in the County. Increased development outside of cities and UGAs, where inadequate stormwater management facilities exist is likely to increase impacts to surface water, groundwater, and wetlands.

Alternative 2 – Infill

This would concentrate urban development into compact areas and would be expected to have the least significant impacts to surface water, groundwater, and wetlands.

Alternative 3 – Adjusted UGA Boundary

This would expand the existing low-density UGA development pattern and would be expected to have the most significant and widespread impacts to surface water, groundwater, and wetlands.

Alternative 4 – Infill and Adjusted UGA

This alternative, would be expected to have similar effects as alternative 2, but would create slightly more impact to surface water, groundwater, and wetlands than alternative 2.

3.4.2.1. Surface Water and Stormwater - Impacts

Surface water concerns focus on two major types of impacts: non-point source pollution, such as parking lot runoff, and the alteration of hydrological functions. Non-point source pollution, which is transported by stormwater runoff, may degrade the water quality of receiving waters, affect aquatic and riparian plant and animal life and create public health concerns. These concerns are especially significant in the Lake Whatcom

watershed, which is the source of the drinking water supply for people living in and around Bellingham.

Watershed management concerns include managing stormwater runoff, conversion of forested land, preserving and restoring water quality, reducing the potential for flood damage to property, changes to stream processes that may result from increased stream flow; stream bank erosion and sedimentation; and removal of shoreline, wetlands and stream riparian vegetation. Land uses that are potential sources of non-point source pollution include agriculture, residential, industrial, commercial, mining, public facilities; and road construction, use and maintenance.

Changes in the intensity of development and urbanization may impact water resources in several ways. Physical alterations to the land surface change the hydrologic functioning of aquifer recharge areas, drainages and receiving waters. Urbanization can affect the rate and amount of stormwater runoff, which could impact streams that receive the runoff. The degree of impact is dependent on impervious surface coverage associated with various types of land use.

When development occurs, peak flow discharges and storm flow durations may increase. Changes in overall hydrology will result in physical changes in stream and lake morphology. For example, increased stream discharge will increase scouring, lateral movement, channel enlargement and sediment transport as well as delta development where a stream enters a larger body of water. Physical changes that result from scouring can affect the quality and quantity of habitat that a stream provides. This may decrease species diversity and could adversely affect the ecosystem functions of a stream. Habitat alteration and destruction also result in increased colonization of more adaptive, competitive or invasive species.

Urban lifestyles introduce a variety of pollutants to waterways resulting from activities such as construction, transportation systems, processing of raw materials, commercial and industrial discharges, residential use of pesticides and herbicides, energy consumption, waste disposal and recreational activities. Pollutants transported in stormwater runoff may degrade the water quality of receiving waters, affect aquatic and riparian plant and animal life and create public health concerns. These concerns are especially significant in the Lake Whatcom watershed, the reservoir for Bellingham's water supply, which currently serves approximately 87,000 people in the planning area.

The impact on humans is both direct and indirect. Expenses to offset environmental degradation may increase, thereby affecting other aspects of the economy and social structure.

Development in the planning area will increase impervious surface area resulting in increased quantities of stormwater runoff that could potentially have negative impacts on the planning area's water resources. The Fort Bellingham and Silver Creek drainage basins and the Squalicum and Lake Whatcom watersheds are especially at risk.

3.4.2.2. Wetlands

The filling of wetlands or the alteration of wetland hydrology by surface water diversion could result in the loss of wetland functions and could produce a corresponding increase in stormwater peak flows and corresponding decrease in water quality. Wetland habitat loss is also a concern.

3.4.2.3. Groundwater

The alteration of hydrological functions is also of great concern. Urbanization can affect the rate and amount of stormwater runoff, which could impact streams that receive the runoff. Groundwater concerns focus on pollution caused by hazardous household wastes, solid waste disposal and increased impervious surface runoff that result from increased urban development. Wetland concerns focus on the alteration of wetland hydrology that results when wetlands are filled and/or built around. It is important to maintain adequate riparian buffers when building around wetlands.

Most groundwater recharge is accomplished through direct precipitation. Infiltration of septic tank leachates, urban runoff and other waterborne pollutants may pollute groundwater. A form of groundwater pollution that is a public health concern is excess nitrates originating from the effluent of faulty septic systems and application of, or runoff from, animal wastes. Additional areas of concern due to urban development are inadequate disposal of industrial wastes, accidental spills, agricultural pesticides, hazardous household wastes, solid waste disposal (landfills, illegal dumping, wood wastes, etc.) and increased impervious surface runoff.

3.4.3. Water Resources-Mitigating Measures

3.4.3.1. General

Water resource impacts may be mitigated through a variety of actions. A fundamental starting point is to inventory existing water resources and establish a current conditions baseline for comparison when determining trends. This would include mapping and a hydrological and functional needs assessment.

Adopting and implementing site design and stormwater management standards, as well as using best management practices for the treatment and control of stormwater runoff, are important mitigation procedures. The City of Bellingham and Whatcom County have implemented Stormwater Management Plans in anticipation of the National Pollutant Discharge Elimination System (NPDES) Phase II permit requirements as yet undesignated by the State. This requires small municipal, separate storm sewer system operators to follow six minimum control measures to meet the NPDES requirements. The six minimum control measures include: public education and outreach, public participation/involvement, discharge detection and elimination, construction site run-off control, post-construction run-off control and pollution prevention/good housekeeping.

City and County zoning regulations and critical areas standards currently provide programmatic mitigation of impacts to water resources. Site design standards that include building setbacks required open space, impervious surface limitations and

dimensional standards can encourage compact development patterns. Flexible standards can allow property owners to achieve development goals while minimizing impacts of development on wetlands, streams and critical areas. Stormwater management standards that require on-site stormwater control and treatment limit post-development stormwater peak flows. This can reduce impacts to surface water quality and stream channels.

County and City critical areas ordinances successfully preserve wetlands and riparian zones if properly implemented and enforced. Critical areas regulations place limits on wetland fill and require buffers around wetlands. These reduce impacts to streams and wetlands and help maintain valuable wildlife habitat.

Federal and State regulatory measures also protect wetlands and streams. The National Pollution Discharge Elimination System (NPDES) restricts the type and amount of pollutants that can be discharged to surface waters. Federal wetlands regulations limit the amount and type of activities that can take place around wetlands. Through the Hydraulics Approval process, the state regulates activities such as stormwater discharges that may affect fish habitat.

Measures to mitigate impacts on surface water can also be effective in mitigating groundwater impacts. Limitations on impervious surfaces can help preserve aquifer recharge capacity. Regulations that limit pollutant discharges to surface waters also protect groundwater as do State groundwater protection regulations.

3.4.3.2. Specific Watersheds and Drainages

Development or redevelopment of areas within watersheds that drain to Bellingham Bay and Chuckanut Bay should include mitigation for water quality (treatment) and quantity (retention and detention) to meet both City and County standards. Retrofitting existing stormwater systems in these areas should be explored to mitigate for existing water quality discharge problems.

Stormwater management and water quality are important to all surface waters within the planning area to protect all beneficial uses including the recovery of salmon populations. Retention of remaining wetlands in these areas is important to maintaining flow levels in these streams. Wetlands protection also helps alleviate flooding and filter pollutants.

The Marine Drive/Cliffside Residential Area drainage should be maintained in an open state. The Cliffside development area contains many existing homes that utilize on-site sewage facilities. This area should be monitored regularly for the presence of fecal contaminants in surface runoff. Strong consideration should be given to this area to be connected to municipal sewerage. Development or redevelopment of this area will require stormwater mitigation meeting City and County standards.

The East Bakerview/James Street Residential Area drains to Squalicum Creek via Baker Creek, Spring Creek and their tributaries. This area has several large stream ravines that should be protected to maintain slope stability and stream shading.

The Britton/Hillsdale Residential Area drains to Lake Whatcom Basin I via stormwater drainage systems and Silver Beach Creek. Development that generates contaminated stormwater should be discouraged in this area. Any development that does occur is subject to special regulations for nutrient sensitive water bodies. Infiltration of stormwater runoff to prevent nutrient loading should be strongly encouraged. Septic sources that contribute to fecal contamination should be sought out and removed or mitigated. Special attention should be given to erosion controls to prevent nutrient rich soil from reaching the lake.

The Geneva Area drains to Lake Whatcom Basin II via storm drainage systems and tributary streams. Development that generates contaminated stormwater should be discouraged in this area. Any development that does occur is subject to special regulations for nutrient sensitive water bodies. Infiltration of stormwater runoff to prevent nutrient loading should be strongly encouraged. Septic sources that contribute to fecal contamination should be sought out and removed or mitigated. Special attention should be given to erosion controls to prevent nutrient rich soil from reaching the Lake.

Drainage from the southeast UGA is captured by both the Cemetery Creek sub-basin of the Whatcom Creek drainage basin and the Lake Padden sub-basin of the Padden Creek drainage basin. Both Whatcom Creek and Padden Creek are important salmon rearing and spawning habitat and should be protected from pollutants and excess stormwater runoff as urban development occurs throughout the southeast UGA. With the exception of homes adjacent to Yew Street, most residential units within the southeast Urban Growth Area currently rely on individual septic systems. Existing septic systems should be converted to public sewer and urban storm drainage systems should be required for all new development throughout the southeast UGA.

3.5 PLANTS AND ANIMALS

3.5.1 Plants and Animals – Existing Conditions

Population growth, urbanization and associated activities pose the greatest threat to plants, wildlife and the habitat they depend on. Permanent removal or alteration of habitat is the result of converting land to industrial, commercial or residential use. Urbanization, industrial development, agriculture, and logging have reduced the number of native plants and animals previously found in and around the City of Bellingham and its UGA. Problems associated with development include vegetation alteration or removal, fragmentation and loss of open space and natural corridors, introduction of non-native plant species, dredging, land filling, impervious surfaces, pesticide and fertilizer application and contaminant runoff. These create a cumulative effect adversely impacting wildlife populations, diversity and health.

The purpose of analyzing plants in the planning area is to determine if there are rare or endangered plant species and to discuss the relationship between these plants and their surrounding environment and natural systems. The purpose of analyzing animals in the planning area is to determine their general habitat requirements and to identify

the presence of rare or endangered species. When species or habitats are determined to be significant, appropriate land use policies should be applied which will augment conservation. The overall health of the plants and animals that make up an ecosystem is an indicator of the suitability of that system for human habitation and the quality of life that is enjoyed there.

The planning area is characterized by a diverse variety of wildlife habitats including forested lots, wetlands, marine and freshwater riparian habitat, bedrock outcrops, lakes and developed lands, which dissect and isolate other habitat types while providing some areas of limited value edge habitat. Identified habitat zones in the planning area are forest, field-and-thicket, disturbed land, wetlands, riparian woodland, saltwater shoreline, deltaic, and fresh-water aquatic.

3.5.1.1. Wildlife Habitat And Diversity

3.5.1.1.1. Forest

Forest coverage in the planning area is scattered and fragmented due to residential and commercial development. There are several large publicly owned and protected forested areas within the City of Bellingham, including Lake Padden Park, Sehome Arboretum, Whatcom Falls Park, and areas along the Interurban Trail system in the south portion of the City. In recent years, the City of Bellingham has also purchased approximately 800 acres of undeveloped land within the Lake Whatcom watershed for the express purpose of protecting the watershed from further development. A sizable area of uninterrupted forest cover still exists between Northwest Avenue and Interstate 5 in the northwest UGA. The forested area north of Stuart Road and south of Horton Road has recently been cleared, but is intended for replanting. Other significant forested areas are between the east side of Aldrich Road and the Cordata development in the northwest UGA; in the Geneva UGA and the southeast UGA on either side of Yew Street; on the west side of the Bellingham Airport property; and in scattered portions of the northeast Urban Fringe Subarea.

The original western hemlock and western red cedar forests of the area have been replaced by second and third growth stands of mixed coniferous and deciduous trees. Western red cedar, black cottonwood, red alder, devil's club, vine maple and members of the huckleberry family dominate these very moist locations. Typical herbs of this habitat include ferns, wild ginger, vanilla leaf, Solomon's plume, skunk cabbage and stinging nettles. The forest habitat is host to a diversity of mammals. Typical mammals include the coast mole, Yuma myotis, big brown bat, Townsend's chipmunk, common deer mouse, bushytailed wood rat, western red-backed mouse and the short-tailed weasel. Some mammals in the analysis area may be found in more than one habitat. The common opossum, striped skunk and black-tailed deer are found in both cleared land and forest habitats. Keen myotis may be found in both waterline and forest habitats. Some bats may be found in both riparian and forest habitats.

3.5.1.1.2. Field and Thicket

The field and thicket habitat includes farmlands, pastures, yards, hedgerows, roadside thickets and dense underbrush. This habitat occurs throughout the planning area where forest has been cleared for farming. Significant field and thicket areas are scattered throughout the planning area and include the agricultural area associated with the Nooksack River floodplain.

Typical field and thicket flora include Himalayan blackberries, English ivy, Scotch broom, matrimony vine, wild rose, salmonberry, and red elderberry. Mammals include opossums, moles, cottontails, Townsend's chipmunks, raccoons, weasels, skunks, coyotes, fox, and black-tailed deer. Reptiles include lizards and garter snakes. Amphibians include salamanders, toads and frogs. Common birds include, but are not limited to swallows, flickers, woodpeckers, chickadees, bushtits, wrens, wood warblers, brown-headed cowbirds, rufous-sided towhees, juncos and sparrows.

3.5.1.1.3. Disturbed Land

This habitat can be characterized as land that has been converted from a natural state (such as forest or wetland) to residential, commercial or industrial developments. In many of these areas the natural vegetation and soils have been altered or replaced by non-native vegetation, soils and landscaping. A variety of plants and animals adapt to these environments. Cleared and disturbed lands are subject to being overtaken by native and non-native and invasive plants such as chickweed, mustard, poison hemlock, tansy ragwort, wild carrot, wild morning glory, foxglove, mullein and various composites. A variety of mammals inhabit disturbed land such as cottontails, fox, rats, mice, and coyotes. Birds favoring disturbed land include gulls, hummingbirds, kingfishers, swallows, jays, ravens, crows, blackbirds, cowbirds, grosbeaks, towhees, hawks and songbirds. This habitat is predominant in developed areas in and adjacent to the Bellingham city limits and along major arterial roads and streets.

3.5.1.1.4. Edge Habitat

Edge habitat occurs where two different habitats abut and overlap, providing a wider range of food and cover than what one habitat can provide. The greatest diversity of animal species occurs in edge habitats. Many species of animals, particularly birds and large mammals, utilize several types of habitat that edge areas offer. A species may forage for food in lowland clearings and return to forested areas for shelter. The planning area provides many edge habitat zones in areas scattered with wooded lots, wetlands and developed lands.

The edge area between forest and cleared or developed land is a particularly productive habitat for birds. Typical birds in this habitat include hawks, jays, grouse, kestrels, doves, barn owls, hummingbirds, flycatchers, kingbirds, swallows, bushtits, wrens, blackbirds, finches, nuthatches, wrens, thrushes, kinglets, wood warblers, woodpeckers and sparrows.

3.5.1.1.5. Wetlands

Wetlands and aquatic areas provide the most productive of all habitat types. Wetland habitats in the planning area can be classified as Riverine, Palustrine, Lacustrine or Estuarine. Wetlands serve as natural catchment basins for precipitation, augment groundwater recharge, reduce surface runoff intensity and reduce soil erosion. They also provide excellent habitat and food for a multitude of plants and animals.

Shallow ponds and swamps contain pondweed, duckweed, pond lilies, milfoil, elodea, and algae. Cattails, watercress, horsetails, nightshade, quackgrass, rushes, and sedges grow on lands surrounding these shallow ponds and swamps. Wetlands and surrounding riparian woodlands attract mammals that prefer to reside adjacent to freshwater, including shrews, beaver, muskrats, raccoons, weasels, minks, and otters. Reptiles include painted turtles and garter snakes. Amphibians include newts, salamanders, toads, and frogs. Typical wetland birds are loons, grebes, swans, geese, ducks, hawks, coots, shorebirds, swallows, crows, marsh wrens, common snipes, yellowthroats and blackbirds.

3.5.1.1.6. Riparian Woodland

Riparian woodland habitat zones are areas located adjacent to ponds, streams and wetlands. Riparian woodland habitat has many wildlife species in common with wetland and aquatic habitats. Trees commonly found in riparian habitat include red alder, paper birch, black cottonwood, willow and western red cedar. Common shrubs include salmonberry, thimbleberry, evergreen blackberry, Himalayan blackberry, snowberry, elderberry, spirea and nightshade. Common herbs include bentgrass, sedges, soft rush, buttercups, reed canary grass, sword fern, cattail and nettles.

Animals commonly found in riparian habitat include opossums, shrews, moles, bats, beaver, mice, muskrats, black bears, weasels, river otters, red foxes, deer and elk. Salamanders, newts, toads and frogs are the amphibians common to this habitat. Garter snakes and painted turtles are common reptiles. Birds typically found in riparian habitat are kestrels, heron, snipes, grouse, owls, hummingbirds, flickers, woodpeckers, kinglets, water pipits, blackbirds, cedar waxwings, starlings, vireos, wood warblers, western meadowlarks, Bullock's orioles, brown-headed cowbirds, black-headed grosbeaks, finches, pine siskin, American goldfinches, rufous-sided towhees, juncos and sparrows.

3.5.1.1.7. Saltwater Shoreline

The saltwater shoreline habitat includes all beaches on Bellingham Bay and associated tidelands, mudflats and estuarine wetlands. Although the shoreline has been significantly altered with bulkheads, riprap, filling, dredging and other human activities, Bellingham Bay is one of the most species-rich estuarine and nearshore habitats in Whatcom County and provides shelter and feeding areas for birds and spawning areas for forage fish. Harbor seals and California sea lions are the predominant marine mammals along the shoreline.

The approximately 2,000 acres of eelgrass beds within Bellingham Bay provide habitat for crabs, herring, starry flounder, salmonids, clams, snails, starfish shrimp and many more vertebrate and invertebrate species. Sand lance and surf smelt spawning sites exist along the shoreline.

Specially adapted saltwater vegetation abounds. Lichens and surfgrass typically grow on the marine shorelines in the planning area. Various species of green and brown algae are also found, including sea lettuce, sea staghorn, rockweed, bull kelp and sea moss. The sea grasses and algae are vital parts of the marine food cycle

The extensive inter-tidal mudflat in Bellingham Bay is foraging habitat for migrating and wintering birds. It is host to 40 species of shore birds, 63 species of water birds and 23 species of raptors, which hunt the bay, shoreline and upland areas. Species of birds include Canada geese, western and red-necked grebe, dunlin, bufflehead, greater scaup, Arctic loon, canvasback, goldeneye, surf scoter, double-crested cormorant, common merganser, red-breasted merganser harlequin duck, whistling and trumpeter swans and great blue heron. The diversity of gulls include glaucous-winged, Bonaparte's, mew and ring-billed. Ospreys and bald eagles are less common.

3.5.1.1.8. Deltaic

Deltas form as subaerial/subaqueous, fan shaped and relatively low profile alluvial deposits where creeks, streams or rivers enter a large body of water such as a lake or marine shoreline. Two significant deltas, the Nooksack River delta and the Squalicum Creek delta, can be found in or near the planning area. The Nooksack River has formed an extensive delta that extends approximately 2 miles south of Marine Drive and is one of the most significant wildlife features of the bay. Deltas provide unique and significant plant and animal habitat due to the elevation ranges and associated plant communities and habitat types that result from the unique characteristics of the delta formation in an environment where freshwater mixes with saltwater and is subject to both river flooding and tidal and wave action.

3.5.1.1.9. Freshwater Aquatic

Fish thrive in the stream systems of the planning area. These systems include the Nooksack River, Silver Creek, and Squalicum Creek and its tributaries. The Nooksack River is the primary migration route for all salmon into its upper reaches and tributaries and contains spawning and rearing habitat for Chinook, pink, Coho, chum and sockeye salmon. Other Nooksack River salmonids include sea-run and resident cutthroat trout, steelhead and cutthroat trout and Dolly Varden and bull trout (native char). Chinook salmon and bull trout are both listed under the Federal endangered species Act (ESA) as "threatened" with extinction. Coho salmon are a candidate species being considered for listing under the ESA. Silver Creek and Squalicum Creek contain spawning areas for Coho, pink and chum salmon and possibly foraging areas for bull trout. Toad Lake contains rainbow trout, which are stocked and used for sport fishing. Lake Whatcom contains native populations of cutthroat trout and Kokanee, a landlocked form of sockeye salmon.

Many species of animals depend on wetland or riparian habitats at some point in their life cycle. Aquatic areas attract a variety of mammals such as opossums, shrews, moles, bats, mice, voles, beaver, muskrats, raccoons, weasels, mink, otters, skunks, coyote and deer. Aquatic type birds found in the planning area include geese, ducks, eagles, falcons, osprey, marsh hawks, Heron, plovers, killdeer, snipes, kingfishers, swallows, marsh wrens and blackbirds. Salmon and other fish are dependent on complex and diverse stream habitats to provide food, spawning and rearing areas as well as other functions.

3.5.1.1.10. Migration Routes and Wildlife Corridors

The entire planning area is located within the Pacific Flyway, which is an area of ecological importance for north-south migrating waterfowl. The Pacific Flyway is a major migratory route for birds extending westward from the crest of the Cascade Mountains to the Pacific Ocean and from British Columbia, Canada southward to northern California. As noted earlier, the Nooksack River and the majority of the streams in the study area also serve as migration corridors for the salmonids using the drainage systems.

Remnant contiguous tracts of forested lands and stream riparian zones provide important wildlife corridors. Corridors promote migration which may help maintain biodiversity, increase population sizes, provide increased foraging areas for wide-ranging species, provide predator escape cover and provide a mix of habitats for species that require a range of habitats through the different stages of their life cycles. Several parts of the planning area are important for wildlife habitat, particularly with respect to their function as corridors or linkages between various habitat types, especially within the western portion of the UGA. Areas with corridors include the East Bakerview/James Street area south to Squalicum Creek and from the shoreline north of the airport linking up to wetland systems. An important wildlife corridor exists within the southeast portion of the UGA, from the Denke Watershed South Planning Area to the Governor-Samish South Planning Area, connecting habitat areas between the Cascades and the Chuckanut mountains. A habitat area of great significance in the planning area is the Squalicum Creek corridor. The corridor along the Nooksack River is an important feeding and roosting area for eagles and peregrine falcons. Other important areas, which provide habitat for a diversity of species, have the potential to be stabilized as wildlife corridors and are potentially threatened by development pressures. These include King and Queen Mountain areas and the area between Northwest Avenue and Interstate 5.

3.5.1.2. Priority, Threatened and Endangered Species and Habitats

3.5.1.2.1. Endangered Species

The Revised Code of Washington defines an endangered species as any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state. Species that are listed by the State as endangered and have been found or could have habitat in the planning area include the upland sandpiper, Mardon skipper, sea otter, western pond

turtle and Oregon spotted frog. Two species of resident fish native to the Nooksack River, the Nooksack dace and the Salish sucker, are currently listed as endangered in Canada. Small, isolated populations of these two species have been found in the headwater areas of Bertrand and Fishtrap Creeks and in the Sumas River system.

3.5.1.2.2. Threatened Species

Threatened is defined by the Washington Administrative Code as any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats. Federal and state threatened species include the bald eagle, marbled murrelet and ferruginous hawk. Threatened populations of Chinook salmon and bull trout are found in the Nooksack River and its tributaries. Chinook salmon are found in the lower reaches of Whatcom Creek and possibly Padden Creek.

3.5.1.2.3. Priority and Sensitive Species

The Washington Administrative Code defines sensitive species as a species that is native to the state of Washington and is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats. A priority species is fish or wildlife that requires protective measures and/or management guidelines to ensure perpetuation. Sensitive species are determined to be in danger of failing or declining or are vulnerable due to factors such as limited numbers, disease, predation, exploitation or habitat loss or change. These include listed species, vulnerable species, recreationally important species and species of local importance.

Some of the priority animal species that may be found in the planning area are listed below:

Peregrine falcon	Red legged frog	Van Dyke's salamander
Brown pelican	Cascades frog	Townsend's big-eared bat
Marbled murrelet	Cassin's auklet	Fender's soliperian stonefly
Cormorant	Rhinoceros auklet	Lynn's clubtail
Grebe	Common loon	Puget blue
Common murre	Pigeon guillemot	Golden hairstreak
Caspian tern	Tufted puffin	Stellar sea lion
Black brant	Harlequin duck	California sea lion
Snow goose	Trumpeter swan	Pacific harbor porpoise
Tundra swan	Wood duck	Dall's porpoise
Barrow's goldeneye	Common goldeneye	Gray whale
Bufflehead	Hooded merganser	Harbor seal
Plovers	Sandpipers	Killer whale
Phalarope	Oystercatcher	Northern spotted owl
Spotted sandpiper	Sandhill crane	Pileated woodpecker
Black crowned night heron	Great blue heron	Purple martin
Bald eagle	Golden eagle	Western bluebird
Northern goshawk	Osprey	Turkey vulture
Peregrine falcon	Red-tailed hawk	Band-tailed pigeon
		Lewis' woodpecker

Protection measures for threatened and endangered species aim toward restoring their populations to self-sustaining levels.

3.5.1.3. Plants

Rare plants that may be found in the planning area are identified in *Rare Plants in Bellingham and Whatcom County Wetlands*, Florence Caplow, 1991 (available at the Planning and Community Development Department, Bellingham City Hall). A complete list of listed species, species of local importance and non-native plants that may be found in the planning area are compiled in the Whatcom County Critical Areas Ordinance Chapter 16.16 WCC.

3.5.1.3.1. Priority Habitats

Priority habitats may possess habitat elements such as shorelines, caves or snags that have high value to fish and wildlife. Priority habitats may also possess a unique vegetation type, or be dominated by a plant species that is of primary importance to fish and wildlife. Priority habitats may also have elements with which a given species has a

primary association, and which, if altered may reduce the likelihood that the species may flourish over time. Priority habitats have one or more of the following attributes:

- Relatively high fish and wildlife density.
- High fish and wildlife species diversity.
- Significant breeding habitat.
- Contains unique or dependent species.
- Has a high vulnerability to habitat alteration and degradation.
- Is an important fish and wildlife movement corridor.
- Limited distribution of the habitat type.
- Habitats that serve as seasonal range.

The following areas are considered Priority Habitat Areas in Whatcom County:

- Caves (at least one foot in diameter and three feet deep).
- Cliffs (at least 25 feet high and 5,000 feet elevation).
- Talus (dislodged rock fragments that accumulate at the base of steep slopes or cliffs).
- Old-Growth/Mature Forest (stands of trees commonly over 200 years).
- Snag-Rich Areas (important structural components in most habitats).
- Riparian Areas (the transition area between aquatic and terrestrial habitats).
- Freshwater Wetlands and Deepwater Habitats.

3.5.1.4. Fisheries

3.5.1.4.1. Existing Fish Species

Drainages within the planning area have a variety of habitats that support several species of salmonids, chars, trout, green sturgeon, bass, Bluegill crappie and catfish as well as several other species of warm-water, non-native game fish. Several of the significant fish species within the planning area are described below:

Chinook Salmon

Spring, and fall runs of Chinook populate the Nooksack drainage basin. Spring Chinook enter the river in late March and run until August, then move onto spawning riffles in late August spawning through late September. Fall run fish enter the river beginning approximately in July and spawn in October through late November.

Spring Chinook are the most sensitive race because of their long holding period in the main stem and North, Middle and Middle Forks of the Nooksack River during summer low-flow periods. There are two stocks of spring Chinook in the Nooksack, the Middle/North fork stock and the south fork stock. These two stocks make up two of the

five genetic diversity units in the ESA listing area for the Puget Sound. Both stocks are considered essential for recovery of Chinook salmon within the Puget Sound region. The loss of deep holding pools with complex woody debris for cover, suitable spawning substrate and estuary rearing areas (combined with historic over fishing) has depressed this race to a threatened status.

Coho Salmon

Nearly all accessible streams in the Nooksack basin and associated drainages are utilized by Coho. Tributary streams are their primary spawning habitat. Coho begin upstream migration in July and continue running through mid-November. Spawning lasts from October to January. During the winter, juvenile Coho seek off-channel wetlands along tributary streams. In summer they can be found in beaver ponds, small tributary pools and wetlands.

Coho are sensitive to the destruction of over-wintering areas in wetlands, beaver ponds and side sloughs. They are significantly affected by low summer flows and poor land use practices that affect water quality such as increased water temperatures and siltation.

Chum Salmon

Chum utilize most independent drainages in the project area as well as the main stem and side channels of the Nooksack River with the highest concentrations of spawning occurring in the North fork. Chum salmon migrate into the system starting in July. Spawning begins in October and continues through January. Chum prefer slow, side channels with water upwelling through the gravel. Chum will be found predominately in the lower reaches of the river system because they are poor jumpers and are especially sensitive to culvert blockages.

Pink Salmon

Pink salmon utilize the Nooksack River to spawn on odd numbered years, generally between mid August and late September. There is also a small population that spawn on even numbered years. Juvenile pink salmon do not rear in freshwater and move directly out to saltwater after emerging in March and April and spend an extended period of time in the nearshore marine environment before moving offshore.

Sockeye Salmon

Most sockeye salmon utilize river systems that have suitable lakes for spawning and rearing, however, there are small populations that utilize only rivers. The Nooksack River is host to one of the river type sockeye. Sockeye migrate into the river beginning in April and spawn from August through early November. The juvenile sockeye reside for up to two years in the river prior to out-migration.

Steelhead

There are two distinct races of Steelhead: winter run and summer run. Winter run are augmented by a hatchery stock that has a different migration and spawning timetable than the natural stock. Wild winter-run Steelhead enter the main stem and tributaries in

the late fall and may spawn from approximately December through the end of June. Summer-run Steelhead enter the Nooksack in April and remain in deep pools until fall rains allow upstream passage into spawning areas. Spawning begins in February and runs through April. Summer-run Steelhead are the most sensitive of the steelhead because of their dependence on deep holding pools. Forest practices of the past century have led to a decrease in the number and distribution of suitable holding pools and has reduced or eliminated the riparian trees of sufficient size to provide habitat once recruited to the stream.

Sea-Run and Resident Cutthroat Trout

Cutthroat trout utilize almost every accessible stream in the planning area. Spawning occurs from mid-January to mid-June. Cutthroat trout utilize wetlands and beaver ponds for over winter rearing and spend low-flow summer periods in small tributary pools and mainstream side-channels and pools. Cutthroat trout are sensitive to the destruction of wetlands and beaver ponds necessary for rearing. Since cutthroat trout spawning habitat is located in the most highly accessible portions of the watersheds, they are especially sensitive to habitat and water quality disturbance of headwater areas that result from agricultural practices, forestry practices and development.

Lake Whatcom Cutthroat Trout

A unique strain of Cutthroat has evolved in Lake Whatcom. These fish inhabit lower reaches of tributary streams in the lake basin for spawning and rearing. Cutthroat begin spawning in mid-January and continue through May.

Several of the streams utilized by Lake Whatcom cutthroat are near prime building sites. The spawning and rearing cycles of these fish are very sensitive to disturbances in these areas. This habitat is considered to be threatened.

Dolly Varden and Bull Trout

Dolly Varden and Bull trout are anadromous char, a type of salmonid, native to the Nooksack basin and can be found throughout the river system and have a complex life history. The bull trout, closely related char but distinct from Dolly Varden, is listed as a threatened species under the Federal ESA. Special protections are in place for bull trout and a management plan is pending from the United States Fish and Wildlife Service. Since these two char are hard to distinguish in the field, they are managed as the same species by the Washington Department of Fish and Wildlife. Spawning occurs from August through December.

These two char are dependent on very cold and clean streams, for spawning and incubation, typically in the upper reaches of the watershed, and will not spawn successfully if the water is too warm. Bull trout will spawn multiple times over many years. However, adult and sub-adult bull trout may spend considerable time utilizing habitats throughout the watershed foraging for food and may enter and re-enter freshwater multiple times.

Kokanee

Kokanee, also known as land-locked sockeye, are the descendents of sockeye salmon that inhabited Lake Whatcom when it was still a fjord connected to marine waters after the last Ice Age. These Kokanee have developed unique genetic characteristics specific to lifecycles in Lake Whatcom. They are locally important fish because of their genetic uniqueness and for the commercial value as seed stock. The Washington Department of Fish and Wildlife provides seed stock for Kokanee that have been planted in lakes around the world. Due to spawning habitat destruction and possible limitations of food supply in the lake, most Kokanee reproduction takes place at the State Department of Fish and Wildlife Brannian Creek Hatchery at South Bay. Kokanee spawn from September through mid-January. Prime spawning habitat has been destroyed over the past several decades through development practices and as the result of both natural and forest management induced landslides originating in forest lands in the headwaters. Spawning gravel has been buried by silt and sand or scoured from the system. Debris flood events originating from forest land, and impacts from housing and road development pose the biggest threat to Kokanee spawning habitat.

Shellfish

Shellfish, including but not limited to clams, oysters and crabs are an important cultural, economic and recreational marine resource. The health of shellfish populations depend water quality. Shellfish tidelands and beds are susceptible to contamination from certain types of agricultural practices, stormwater runoff and failing septic systems.

Baitfish

Baitfish are small pelagic fish that are important in the food chain. These fish feed primarily on zooplankton and are important forage for predatory fish, including salmon. Baitfish that spawn along the shoreline or in Bellingham Bay include herring, sand lance, surf smelt and longfin smelt.

Longfin Smelt

Longfin smelt, also known as hooligans, are an anadromous forage fish that inhabit the Nooksack River and Bellingham Bay. They spend the majority of their lives in saltwater, not farther than twenty miles from the Nooksack River estuary. The first run of longfin smelt begin spawning in October and the second shortly after. Bellingham Bay is a major smelt spawning area. Both runs spawn through March. Hatching occurs from November through April. Longfin smelt are sensitive to silt and substrate disturbance during the incubation portion of their lifecycle. These fish have adhesive eggs that attach to the substrate so they require clean, well-oxygenated, coarse sand. These eggs can be easily smothered by silt buildup and dislodged by substrate disturbance.

Surf Smelt

Surf smelt live in the nearshore habitat of Bellingham Bay. Surf smelt spawn along shoreline areas by depositing their eggs in the uppermost intertidal zone at high tides of ten feet or more, on small sized gravel. Because surf smelt depend on certain kinds of beach gravel to lay their eggs on, they can be impacted by shoreline construction such as armoring and bulkheads and bluff stabilization activities. The spawned eggs require

cool moist conditions to prevent desiccation, which emphasizes the importance of shading from shoreline vegetation in spawning areas.

Sand Lance
Sand lance are somewhat unique in their generalized diurnal behavior pattern, feeding in the open water during the day and burrowing into the sand at night to avoid predation. Sand lance have similar spawning requirements as the surf smelt and are subject to the same impacts of shoreline construction and bluff stabilization activities.

Herring
Pacific herring spawn along shallow subtidal and intertidal zones. Herring migrate from their coastal feeding areas to the inland marine waters to deposit their eggs on eelgrass upon which they are also dependent for forage and protection from predators. There appears to be two distinct herring populations involved in the annual spawning cycle, separated by two to three weeks of inactivity in late March and early April.

3.5.1.5. Fish Habitat

Several characteristics make up ideal fish habitat. Although the habitat needs of each fish species vary according to age and activity, the basic components of stream and lake habitats include the following features:

- Adequate water depth and velocity for spawning, rearing, and holding.
- Cool temperatures for spawning, rearing, and holding (45-60 degrees F).
- Abundance of bank and in-stream structures to provide cover, dissipate stream energy, and stabilize banks and beds.
- Appropriate substrates for spawning and embryonic development. For freshwater salmonids and chars, substrates range from gravel to cobbles (0.5-6.0 inches in diameter) that are relatively stable and free of fine sand and silt.
- Presence of adequate riparian vegetation, which provides habitat for aquatic and terrestrial insects that fish rely on for food. Overhanging vegetation also provides shade that moderates stream temperatures and large woody debris for in-stream fish cover.

There are several watersheds and drainage basins that provide fish habitat within the planning area.

Table 3.5.1.5. Fish Habitat

	Chinook	Coho	Chum	Pink	Sockeye	Char	Steelhead	Cutthroat	Kokanee
Nooksack River	X	X	X	X	X	X	X	X	
Whatcom Creek	X	X	X	X			X	X	
Lake Whatcom								X	X
Padden Creek	X	X	X				X		
Padden Lake							X	X	X
Squalicum Creek	X	X	X	X			X	X	
Baker Creek		X	X				X	X	
Silver Creek		X						X	
Bear Creek		X						X	
Chuckanut Creek		X	X				X	X	
Airport Creek		X						X	

3.5.2. Plants and Animals - Impacts

The greatest threat to plants and animals is the conversion of land to urban uses, causing fragmentation, degradation and loss of habitat. The loss of open space, fragmented landscapes and degradation of habitat, in conjunction with associated urban impacts such as pesticide and herbicide use, air and noise pollution, domestic animals and night lighting create a cumulative effect, impacting diversity and health of plant and wildlife populations. .

The ecological value of a habitat partially depends on the quantity, diversity and distribution of plants. Disturbance of plant communities will result in the removal of plants and alteration of the habitat affecting the diversity, distribution and quantity of plants. Ground disturbance and removal of vegetation often result in the establishment of invasive or more aggressive plant species, preventing the reestablishment of native species and reducing ecological value. Removal of vegetation allows the underlying habitat to receive additional light and moisture, which may alter the habitat of the plant and animal species that utilize the vegetative cover. Vegetation removal may allow for increased erosion and runoff, resulting in increased sedimentation and scouring of streams. Vegetation removal along waterways will result in a loss of riparian cover, affecting water temperature and quality.

Habitat value is dependent on biodiversity and availability of food, water and cover. Complete loss of habitat will displace the species that inhabit the site and cause them to migrate to other suitable habitats. Displacement may result in exceeding the carrying capacity of the receiving area, resulting in the loss or reduction of the local population

and crowding and increased stress on other species. Alteration of a habitat may result in the introduction of more adaptable species that may displace existing populations. Habitat disruption during breeding, nesting and rearing seasons can adversely impact a local population.

Many species of animals depend on wetland or riparian habitats at some point in their life cycle. The alteration, degradation or disruption of wetland or riparian habitats and their associated buffers may have a significant effect on a larger number of species than the disruption of a grass, shrub or forested habitat alone.

Under all four of the alternatives, development will occur in response to the increase in population, resulting in immediate impacts as well as cumulative impacts as outlined above. The area within the City of Bellingham and the existing UGA have experienced some degree of habitat degradation due to existing land use patterns that limit effective mitigation efforts. Although open space areas with suitable habitat and connecting corridors can be set aside or created, the cumulative effects of urban encroachment will continue to stress and place pressure on plant and wildlife populations. The alternatives that require enlarging the UGA will have the highest impacts on habitat. Concentrating development in areas that have already been significantly impacted by development will have the least impact on habitat.

Alternative 1 – No Action
The No Action alternative (and any alternative that does not provide sufficient land and densities in the City and the UGA to accommodate projected population growth) is expected to push growth and the impacts of growth to the rural areas of the County and to the urban Growth Areas of other cities in the County.

Alternative 2 – Infill
This alternative would focus development and impacts in the existing City and UGA and would be expected to increase impervious surfaces and storm water runoff in urban areas, but have the least significant impacts to plants and wildlife.

Alternative 3 – Adjusted UGA Boundary
This would expand the low-density development pattern of the UGA and would be expected to have the most significant and widespread impacts to plants and animals.

Alternative 4 – Infill and Adjusted UGA
Under this alternative, new growth would be directed into the existing City and Urban Growth Area but would require a minor expansion of the UGA. This alternative would be expected to have similar effects as alternative 2, but would require additional land that is presently designated as Rural being developed for urban land uses, and would thus create slightly more impact to plants and animals than alternative 2.

3.5.3. Plants and Animals- Mitigating Measures

Mitigating measures to minimize the effects of development primarily focus on reducing the destruction and alteration of the habitats plants and animals depend on to survive. Mitigation measures include:

- Identify priority habitats (woodlands, grasslands, streams and wetlands) of local importance based on best available science.
- Develop and revise critical area regulations based on best available science that prevents or avoids impacts to priority habitats, require mitigation for impacts that a development may have on habitats, provide adequate buffers so that the habitat's functions and values are not degraded and encourage restoration of properly functioning habitat conditions where feasible.
- Develop and utilize programs that will educate the public about practices (toxic disposal, pesticide and herbicide use etc.) that can alter habitat or harm animals and plants. Provide educational materials regarding invasive plant species and on improving and designing landscapes that benefit wildlife and stream corridors.
- Develop a program to remove invasive or noxious plant species on public land.
- Promote low impact development techniques and the reduction of impervious surfaces where possible.
- Adopt stormwater management techniques that adequately treat stormwater runoff of toxic substances and releases stormwater runoff at pre-development rates.
- Develop programs to improve or restore habitat functions through planting native plant species or other appropriate means.
- Habitat restoration and improvement programs should focus on improving biodiversity rather than focus on single species protection.
- Identify obstacles to fish passage and develop a program to remove them.
- Utilize best management practices to prevent if possible, or reduce the amount of erosion affecting priority habitats and reduce the amount of sediments entering streams and wetlands.
- Develop a wildlife corridor plan on a landscape scale that connects open space, parks and priority habitats utilizing stream corridors, wetlands, drainages, greenways, greenbelts and buffers.
- Protect sensitive habitats with low impact land use designations and provide adequate buffers.
- Encourage through incentives or development regulations, high density, compact or clustered development that will minimize the amount of land needed to accommodate growth.
- Continue to implement and develop various financial incentives to preserve open space areas, including but not limited to tax benefits, purchase or donation of conservation easements and the purchase or transfer of development rights.
- Continue to utilize grants, donations and other funding sources to acquire open space in order to preserve habitat and wildlife corridors.

- Collaborate with private and public organizations to identify, acquire preserve, operate and maintain open space areas in order to preserve habitat and habitat connectivity.
- Require habitat conservation plans for development proposals that include tracts of land set aside as open space or habitat.
- Establish a mitigation-monitoring program to ensure that mitigation measures achieve goals and continue to be effective by utilizing adaptive management techniques.
- Require a habitat assessment and appropriate mitigation measures to reduce impacts for development proposals on large parcels and on properties where priority habitat is known to exist.

3.6 NATURAL RESOURCES

3.6.1. Mineral Resources

3.6.1.1. Mineral Resources - Existing Conditions

According to State Department of Natural Resources Information Circular 91 entitled *Reconnaissance Investigation of Sand, Gravel, and Quarried Bedrock Resources in the Bellingham 1:100,000 Quadrangle, Washington* (January, 2001), there are no significant mineral resources in Bellingham, the Urban Growth Area, or the Urban Fringe Subarea. Additionally, there are no Mineral Resource Land designations in these areas.

3.6.1.2. Mineral Resources -Impacts

It does not appear that development in the planning area will impact significant mineral resources.

3.6.1.3. Mineral Resources - Mitigating Measures

- None Proposed

3.6.2. Forest Resources

3.6.2.1 Forest Resources-Existing Conditions

Forest coverage in the planning area is scattered and fragmented due to historical agricultural practices and residential and commercial development. There are several large publicly owned and protected forested areas within the City of Bellingham, including Lake Padden Park, Sehome Arboretum, Whatcom Falls Park, and areas along the Interurban Trail system in the south portion of the City. In recent years, the City of Bellingham has also purchased approximately 800 acres of undeveloped land within the Lake Whatcom watershed for the express purpose of protecting the watershed from further development.

A sizable area of mostly uninterrupted forest cover still exists between Northwest Avenue and Interstate 5 in the northwest UGA. The forested area north of Stuart Road and south of Horton Road has recently been cleared, but is intended for replanting. Other significant forested areas are between the east side of Aldrich Road and the

Cordata development in the northwest UGA; in the Geneva UGA and the southeast UGA on either side of Yew Street; on the west side of the Bellingham Airport property; and in scattered portions of the northeast Urban Fringe Subarea.

Many of these forested areas are interlaced with wetlands making them difficult to develop. The original forested area, if it has not been permanently converted to other uses, has been replaced by second and third growth stands of mixed coniferous and deciduous trees and other native and non-native plants. The remaining forested areas serve as wildlife habitat, wildlife corridors, and greenbelts and are considered an aesthetic resource in an urbanized area.

There are no properties that have Rural Forestry or Commercial Forestry land use designations within the planning area. There are areas that have these land use designations adjacent to the Subarea, east of Yew Street, within the Lake Whatcom Watershed, and east of Toad Lake.

To preserve agricultural, forestry, and open space land, Washington State law permits qualifying parcels to be taxed on the basis of their current use value rather than the usual assessment practice of using highest and best use market value. There are four current use tax programs established by RCW 84.34 , 1) Open Space Open Space, 2) Open Space Timber and 3) Open Space Agriculture; and RCW 84.33. 4), Designated and Classified Forest Land. Current use tax deferments can provide considerable property tax savings for the landowner, thereby fostering the continuation of the use. Although the current use tax programs are intended to promote long-term commitment to the current use and there is a liability for back taxes plus interest when withdrawn from this status, often, economic conditions in terms of higher property values for development outweigh these liabilities. Thus, current use taxation frequently is used as a holding pattern until it becomes economical to withdraw from the program and develop the property.

There are approximately 646 acres in Designated Forest Land and 427 acres in Open Space-Timber. Open Space Timber properties must be devoted primarily to the growth and harvest of forest crops, have a timber management plan and be five or more acres in size. Designated Forest Lands must be 20 acres or larger in size and be managed for timber harvest. The majority of the land classified as Designated Forest Land and Open Space Timber Land is scattered in the northeast and northern portions of the Subarea. One notable area of Designated Forest Land and Open Space Timber Land is located east of Guide Meridian and west of King Mountain, adjacent to the current UGA and City limits.

3.6.2.2. Forest Resources-Impacts

Any conversion of forest land to urbanized uses will result in the permanent loss of the resource. With the conversion of forest lands there will be a loss of wildlife habitat, a decrease in aesthetic value, increases in stormwater runoff and possibly increases in the rate of erosion. Urban uses typically do not mix well with forestry operations. Forest operations can be a source of nuisance complaints by neighbors. In addition,

the encroachment of urban growth can raise the value of forested land, making it more likely that the properties will convert to urban uses.

The forest resources within the City and UGA have already been heavily impacted by land conversion activity and, with few exceptions; those that remain are publicly owned and protected from development. Forest resources in the Urban Fringe have also been impacted by land clearing activity. A few large forest stands remain intact, but are likely to be associated with critical area features, such as streams and wetlands, that will provide some protection from development activity. Natural forest resource impacts vary under each growth management alternative considered and depend on associated critical areas features.

Alternative 1 – No Action
The No Action alternative (and any alternative that does not provide sufficient land and densities in the City and the UGA to accommodate projected population growth) is expected to push growth and land clearing activity to the rural areas of the County and to the Urban Growth Areas of other cities in the county
.
Alternative 2 – Infill
This alternative would focus development and impacts into the existing City and UGA and would be expected to result in the least amount of land clearing in the UGA and Urban Fringe Subarea.

Alternative 3 – Adjusted UGA Boundary
This would expand the existing low-density development pattern of the UGA and would be expected to create the most significant and widespread land clearing impacts to the remaining forest resources.

Alternative 4 – Infill and Adjusted UGA
Under this alternative, new growth would be directed into the existing City and Urban Growth Area, but would require a minor expansion of the UGA. This alternative would be expected to result in moderate land clearing impacts.

3.6.2.3. Forest Resources-Mitigating Measures

Because conversion of timber land is permanent, the majority of mitigation measures entail reducing urban development near the forest lands or preserving the properties as forestry, natural, habitat or open space areas. Some of these mitigation measures include:

- Preserve existing forest lands by encouraging development regulations that promote clustered, mixed use, high-density development.
- Utilize appropriate land use designations to minimize development pressure on properties that have a high forestry, habitat or open space value.
- Encourage through incentives or development regulations, high density, compact or clustered development that will minimize the amount of land needed to accommodate growth.

- In accordance with RCW 36.70A.160, the Urban Fringe Subarea Plan should identify forest lands that may be appropriate for habitat and open space in relation to environmentally sensitive land and areas with increased density.
- In order to retain existing Designated Timber and Open Space Timber Lands that may be included in an expanded UGA, develop a transfer or purchase of development rights program for these properties as stipulated in RCW 36.70A.160(4).
- Identify and preserve forest lands that may have habitat or critical areas such as stream corridors to establish links between opens spaces and parks.
- The City of Bellingham and Whatcom County should coordinate planning and acquisition efforts in order to maximize opportunities.
- Utilize existing funding sources such as conservation futures and explore new funding sources such as bonds to acquire forest lands.
- Continue to implement and develop various financial incentives to preserve open space areas, including but not limited to tax benefits, purchase or donation of conservation easements and the purchase or transfer of development rights.

3.7 SCENIC RESOURCES

3.7.1. Scenic Resources – Existing Conditions

Scenic is defined as a pleasing view of natural features. Bellingham and the surrounding area have an abundance of scenic natural resources that contribute to the quality of life and draw visitors to the area. Scenic opportunities range from broad viewsheds, narrow view corridors and scenic vistas to open space areas. Greenbelts, parks, and open space, such as Whatcom Falls Park, offer scenic resources within Bellingham's urbanized area. Rural areas to the west, north, and east of Bellingham, within the Urban Fringe Subarea, offer a pastoral scenic resource.

Bellingham, UGA, and Urban Fringe Subarea local scenic natural resources include:

North: King and Queen Mountains;
East: Toad, Squalicum, and Stewart Mountains; Alabama Hill; Lake Whatcom;
South: Galbraith and Lookout Mountains; Puget, Sehome and Samish Hills; Chuckanut Bay; Lake Padden; and the I-5 corridor south of Bellingham; and
West: Bellingham Bay; Eliza, Portage, Lummi, and Orcas Islands; Sehome Hill.

Bellingham, UGA, and Urban Fringe regional scenic natural resources include:

North: Canadian Coast Mountains;
East: Mount Baker, The Twin Sisters, and North Cascade Mountains;
South: Chuckanut Mountains; and
West: San Juan Islands; Canadian Gulf Islands; and Vancouver Island.

Scenic View Preservation

Trees and significant stands of vegetation are considered a scenic resource by some people, but can also be considered undesirable to people concerned about views being obscured from residential properties. The Bellingham Comprehensive Plan contains several goals and policies that encourage the preservation of views from existing residential neighborhoods; however, specific regulations to identify and protect specific view corridors have not been developed. Bellingham does have design review of multi-family projects that can take views into consideration. The Whatcom County Comprehensive Plan and Natural Heritage Plan support and advocate identifying and protecting scenic resources including visual access to shorelines. Whatcom County does not have any regulations that protect views within the UGA or Urban Fringe Subarea. Effective implementation of wireless communication and sign regulations, by both the County and City, can help keep scenic views from being degraded.

3.7.2. Scenic Resources – Impacts

Scenic resources can be highly impacted by the built environment. Scenic resources can be obscured by new structures and developments or degraded with the placement of signs, telecommunication facilities, bright or flashing lights, and utility lines. Scenic resources can also be directly altered by development and grading.

The changing urban built environment throughout the planning area will affect scenic resources and views of the natural environment. Scenic resources that have protected status are not likely to change, but views of these scenic resources could change depending on a number of factors, including regional air pollution and atmospheric haze, as well as taller buildings within compact urban areas.

Alternative 1 – No Action

The No Action alternative (and any alternative that does not provide sufficient land and densities in the City and the UGA to accommodate projected population growth) is expected to push growth and the impacts of growth to the rural areas of the County and to the Urban Growth Areas of other cities in the County, thus increasing vehicle emissions, air pollution, and atmospheric haze.

Alternative 2 – Infill

This alternative would focus new growth in the existing City and Urban Growth Area and would be expected to minimize vehicle emissions, air pollution, and atmospheric haze. This alternative would also be expected to result in the construction of taller buildings in the compact urban area, which could block views of scenic resources.

Alternative 3 – Adjusted UGA Boundary

This would expand the existing low-density development pattern in the UGA and would be expected to increase vehicle emissions, air pollution, and atmospheric haze.

Alternative 4 – Infill and Adjusted UGA

Under this alternative, new growth would be directed into the existing City and Urban

Growth Area, but would require a minor expansion of the UGA. This alternative would be expected to have similar effects as alternative 2, but would have slightly more impact to air pollution and atmospheric haze than alternative 2.

3.7.3. Scenic Resources – Mitigating Measures

- Develop and implement view protection regulations that require analysis of viewsheds in relation to the mass and height of a development proposal.
- The City of Bellingham and Whatcom County should coordinate planning and acquisition efforts in order to maximize opportunities in the purchase or preservation of properties with high scenic value.
- Preserve existing sensitive areas to utilize as open space by encouraging development regulations that promote clustered, mixed use high-density development. Require all development to consider impacts on viewsheds and view corridors and apply mitigation measures to protect views.
- Continue to implement and update the adopted goals and policies regarding scenic resources and views, identified in the Whatcom County Natural Heritage Plan, the Whatcom County Comprehensive Parks and Recreation Open Space Plan, the and the City of Bellingham's Comprehensive Plan, along with the appropriate capital facilities plans.
- Utilize appropriate land use designations to minimize development pressure on properties that have a high scenic resource value.
- Continue to implement and update vegetation retention and re-vegetation on properties with high scenic value.
- Continue to implement and develop various financial incentives to preserve open space and agricultural areas that possess scenic resources, including but not limited to tax benefits, purchase or donation of conservation easements and the purchase or transfer of development rights.
- Collaborate with private and public organizations to identify, acquire preserve, operate and maintain park and open space areas that have scenic resources
- Utilize existing funding sources such as conservation futures and explore new funding sources such as bonds to acquire parks and open space areas that have scenic resources.
- Develop and implement sign and lighting and utility regulations that minimize the effects on views.
- Scenic transportation routes should be identified and adjacent property owners should be encouraged to protect scenic values.