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Lake Whatcom Watershed Land Acquisition Project: environmental impact assessment

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Lake Whatcom Watershed Land Acquisition Project

**Environmental Impact Assessment
Huxley College of the Environment
Western Washington University
ESCI 436/536 (Winter 2010)**

Environmental Impact Assessment
Huxley College of the Environment

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Date 3/16/2010

DEAR CONCERNED CITIZENS

Dear Concerned Citizens,

Lake Whatcom water quality has been declining due to increased development in the watershed surrounding the lake. Lake Whatcom is the sole drinking water source for more than 96,000 Whatcom County residents, including those in the City of Bellingham. Lake Whatcom itself covers 5,000 acres and the Lake Whatcom Watershed consists of 31,127 acres. In 1998 Lake Whatcom was listed for failing to meet water quality standards for dissolved oxygen under the Clean Water Act. This is due to the increase of phosphorus entering the lake, which increases the algae growth. In 2004, Lake Whatcom was also listed for failing to meet phosphorous, mercury, polychloride biphenyls, and dieldrin standards. Factors such as bank erosion around the lake and its tributaries, exposed soils from construction sites, fertilizers, pesticides, pet waste, and septic systems all contribute to the declining water quality. The increase in development has also had a negative impact on wildlife, plants, soil nutrients, air quality, and natural resources within the Lake Whatcom Watershed. This environmental impact assessment presents two actions to help reduce the effects that an increase in development will have on the watershed and lake.

The proposed action is to use the money collected from taxes implemented on residents' water bills to purchase land for sale in the watershed to prevent further development. This land will be preserved in its natural state. The acquired land will also benefit wildlife and plants that depend on the watershed for their habitat. By preventing further

development within the watershed phosphorus levels from construction sites and housing units will also be reduced.

The alternative plan is to double the fees that are already implemented on residents' water bills to purchase land at a faster rate. As land around the watershed becomes scarcer, the prices will go up. The additional funding will ensure the city is able to purchase as much land as possible as well as helping with conservation, outreach, and recreational projects. These projects will help reduce the effects that current residents have on the lake.

If no action is taken to address the problems at hand the condition of the Lake Whatcom Watershed will continue to deteriorate. If these conditions worsen it will not only have a negative effect on the environment but will also make it difficult to provide Whatcom County residents with clean drinking water.

Sincerely,

Lake Whatcom Watershed Land Acquisition Working Group

TITLE PAGE

Lake Whatcom Watershed Land Acquisition Project
Environmental Impact Assessment
Bellingham, Washington

PREPARED FOR:

Environmental Science 436/536
Professor Leo Bodensteiner
Western Washington University
Huxley College of the Environment

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U Cheng Chan
Ann Christianson
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John King

“This report represents a class project that was carried out by students of Western Washington University, Huxley College of the Environment. It has not been undertaken at the request of any persons representing local governments or private individuals, nor does it necessarily represent the opinion or position of individuals from government or the private sector.”

FACT SHEET

TITLE: The City of Bellingham's Lake Whatcom Watershed Property Acquisition Program

DESCRIPTION OF PROJECT: A \$6 fee is added to the water bill from the City each month to generate funds for land acquisition for preservation around the City's source of drinking water.

LEGAL DESCRIPTION OF LOCATION:

Lake Whatcom Watershed, Whatcom County Washington
Lake Whatcom Watershed Advisory Board
Public Works Department / Engineering (Property Management Section)
210 Lottie Street
Bellingham, WA 98225

PROPOSER: City of Bellingham City Council

LEAD AGENCY: Leo Bodensteiner

PERMITS: No applicable permits

CONTRIBUTIONS BY EACH OF THE AUTHORS:

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INTRODUCTION

Lake Whatcom is a large natural lake in Whatcom County, Washington which is popular for recreation. In recent years the area around the lake has also become a desirable place to live. The Lake Whatcom Reservoir is the source of drinking water to 96,000 people in Whatcom

County including the 82,000 served by the City of Bellingham. The health of this reservoir is vital to the surrounding area, and it is declining at a pace faster than expected. Development of the watershed and the resulting land disturbances including loss of forest cover, urbanization, increased impervious surfaces, and contaminants from daily activities are all causing water quality to decline. At the current rate of construction—about 270 homes per year—the remaining developable land in



Figure 1: Lake Whatcom Watershed

the watershed will be fully built out in about 12 years (Kooy, K 2007). In 1998, Lake Whatcom failed to meet state standards for dissolved oxygen. This put the lake on the state's 303(d) list of impaired water bodies.

The Lake Whatcom Watershed spans 31,127 acres and includes 4,007 developed acres (Figure 1). Currently, there is the potential for development on 5,552 acres of land, which could

hold 3,208 single-family housing units. Commercial Forestry Land makes up 18,329 acres, which is about 59% of the Watershed. The efforts of the City of Bellingham, its partners, and individuals have protected 2,519 acres (around 8% of the total watershed land) from development through land acquisitions, conservation easements and covenants. The City of Bellingham estimates that these protections are preventing construction of about 1,273 housing units in the watershed (Kooy, K 2007).

In addition to Lake Whatcom, 11 tributaries flowing into the lake have fecal coliform levels that are too high according to state standards. Phosphorus is a main contributor to algae growth and the low-oxygen environment in Lake Whatcom and is increasingly added to the lake through human activities. Other sources of pollution include the operations of boat and personal watercraft engines. The U.S. Environmental Protection Agency (EPA) has determined that boat engines contribute hydrocarbon (HC) and oxides of nitrogen (NO_x) emissions which affect ground-level ozone and acid rain (Hood, S).

EXECUTIVE SUMMARY

The purpose of this report is to reexamine and reevaluate the environmental impacts of the Lake Whatcom Watershed Land Acquisition Ordinance, (Ordinance 2000-09-058) which was passed by the City of Bellingham in the fall of 2000. The ordinance placed a \$6.00 fee on the monthly drinking water bill of customers.

“The water rate increase provided for in 15.08.250 (D) (1), (2) and (3) shall be used to fund land acquisition and other land preservation measures in the Lake Whatcom Watershed...Land preservation measures include, but are not limited to, items such as purchases of transfer of development rights, conservation easements, access/use rights, and their associated maintenance and administration expenses...”

Ordinance 2000-09-058

In the past nine years since the ordinance was enacted, the City of Bellingham, its partners, and individuals have protected 2,519 acres (around 8% of the total watershed land) from development through land acquisitions, conservation easements, and covenants (Figure 2). The City of Bellingham estimates that these protections are preventing construction of about 1,273 housing units in the watershed (Kooy, K). The overall goal of the ordinance is to protect the water quality of Lake Whatcom from pollutants associated with development. Development of the watershed and the resulting land disturbances, loss of forest cover, urbanization, increased impervious surfaces, and contaminants from daily activities are all causing water quality to decline. At the current rate of construction—about 270 homes per year—the remaining developable land in the watershed will be fully built out in about 12 years. (Kooy, K 2007)

This Environmental Impact Statement (EIA) examines the current state of the Lake Whatcom Watershed and how the land acquisition ordinance can be altered to be more effective. Elements of the natural and built environments are considered in the analysis. Natural elements of the environment that are the most significant are the earth including soils and erosion, water, natural resources, and habitat. The most significant elements of the built environment are housing and development, as well as storm water management and public services. The main emphasis is placed on how the land acquisition will affect the declining water quality of Lake Whatcom.

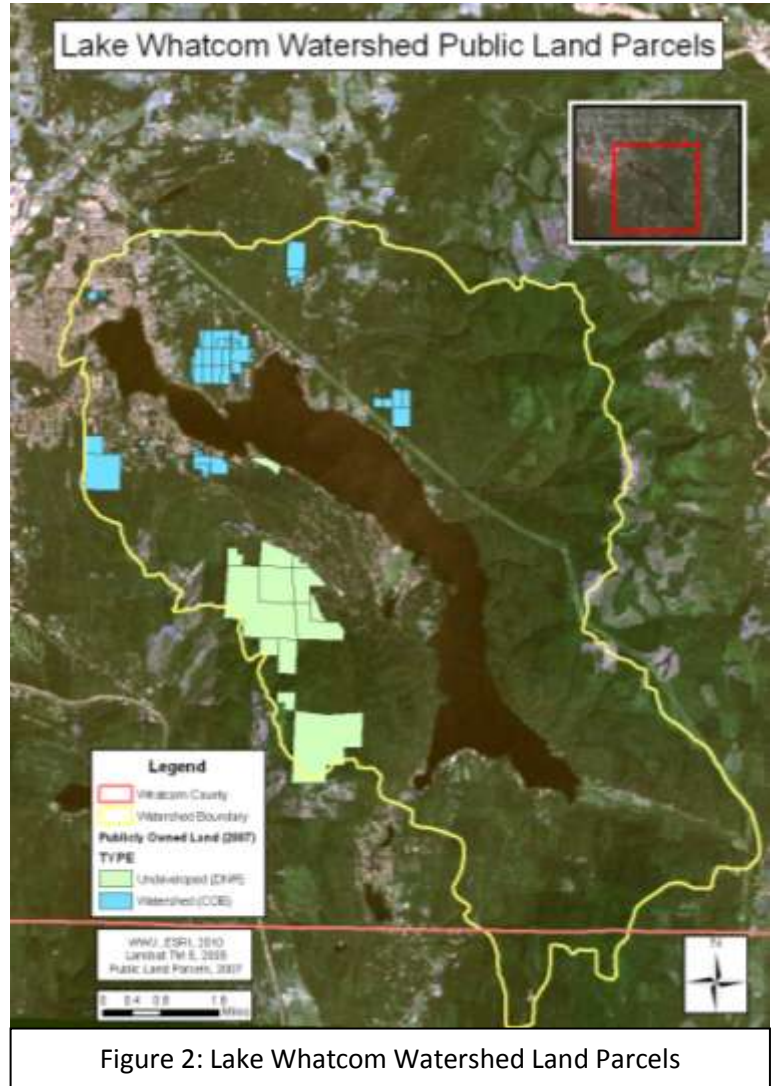


Figure 2: Lake Whatcom Watershed Land Parcels

PROPOSED ACTION:

Science indicates that the best way to protect Lake Whatcom is the prevention of future development. The watershed is a finely balanced system, with its canopy of trees, shrubs and groundcover; it can slow rainwater and filter pollutants. The City of Bellingham began a program to purchase land in the Lake Whatcom Watershed in 2001. This was to protect the

drinking water source for the surrounding area. The funds were generated by imposing a \$6 fee for City residents on their monthly water bill (Kooy, K 2007).

It is estimated that the watershed’s remaining land available for construction will be developed in 12 years. By imposing a fee on City residents, the Land Acquisition Program will protect some of the remaining acreage and prevent construction. As of March 1, 2007 the program has been involved in buying approximately 1,309 acres of the total 2,519 acres that are protected. These purchases totaled \$20.3 million dollars (Table 1). As land becomes increasingly scarce around the watershed, prices of undeveloped land will rise, resulting in higher costs to the City. (Kooy, K 2007)

Progress Report (2001-2009)

Action	Total	Per year (averages)
Land Protected	1,473 acres	184 acres
Land acquired through purchases	1,309 acres	163 acres
Land protected through other methods	164 acres	20.5 acres
Cost of purchases	\$20.3 million	\$2,537,500
Cost per acre	\$15,508	

Table 1

PREFERRED ALTERNATIVE:

An alternative to the proposed action is doubling the fee imposed on the City of Bellingham to \$12 a month on the customer’s city water bill. The doubling of the fee would be in place for ten years and would double the amount of money generated for land preservation

through property acquisition. At the current rate of 270 homes built per year, it is estimated that the remaining developable land will be bought up in 12 years. As the land in the area becomes scarce, prices on the undeveloped land will become more valuable which will require the City to pay more to prevent development. The increase in the fee on residents will accommodate the increase in prices as well as future unexpected costs.

Excess money generated by the fee will go to educating the public and cleaning up the already polluted areas of Lake Whatcom. A Stewardship Program will be implemented to educate residents about watershed issues, such as roads, hazardous waste, forestry, and streams. Through education, the current residents of the lake will understand how their actions, like boating, contribute to the degradation of their drinking water. (Kooy, K 2007)

NO ACTION ALTERNATIVE

Without regulations, the phosphorous levels in the lake will continue to rise to well above acceptable levels. Phosphorous feeds algae growth which leads to bacteria consuming the dying algae resulting in a depletion of oxygen that fish and other aquatic life need to survive. When oxygen levels are low, phosphorous is released from lake sediment and re-enters the water, perpetuating the cycle. Dissolved oxygen levels in Lake Whatcom already fail to meet state water quality standards, and without action they have the potential to get much worse making it even harder and more expensive to clean up.

Further development around Lake Whatcom will increase human activity on and around the lake. As a result, pollution to the lake will increase causing higher clean-up costs. Increased development and additional construction will lead to soil exposure, increased runoff, and increased human waste around the lake. Lake Whatcom's high potential to be degraded further

have made it a priority for a state water quality improvement program; also known as a Total Maximum Daily Load (TMDL) study. (Hood, S 2009)

CONCLUSION

Our favored action is the alternative of doubling the fee. This option provides increased funds so that more action from the city can take place. The increased funds will ensure that the necessary actions needed to protect Lake Whatcom will occur. Although this option costs more, it will be more effective in the future due to all of the necessary parts that factor into keeping the drinking water in Lake Whatcom safe and healthy for years to come.

DECISION MATRIX

	No Action	Proposed Action	Preferred Alternative
Earth	-	+	++
Air	-	+	++
Water	-	+	++
Plants	-	+	++
Animals	-	+	++
Natural Resources	-	+	++
Land and shoreline use	-	+	++
Housing	0	-	--
Aesthetics	-	+	++
Recreation	-	+	++
Transportation	0	0	0
Public Utilities and services			
Parks and recreational	0	+	++
All other utilities	0	0	0

Table 2

Key

Significant positive

impact=++

Minor positive impact=+

Significant negative

impact=-

Minor negative impact=- -

Neutral or no impact =0

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GLOSSARY

ALGAE- Photosynthetic organisms lacking true stems, roots, and leaves, this includes both eukaryotic and prokaryotic organisms.

ANAEROBIC: An organism, such as a bacterium, that can live in the absence of atmospheric oxygen.

ATMOSPHERIC DEPOSITION: A process whereby pollutants are transported from a ground-based source and through atmospheric processes are deposited on a distant land or water surface.

BASIN- A depression of the earth's surface which often contains a lake at the bottom of it.

BEST MANAGEMENT PRACTICES (BMPs): Conservation practices or systems of practices and management measures that control soil loss and reduce water quality degradation caused by nutrients, animal wastes, toxics, and sediment. Agricultural BMPs include strip cropping, terracing, contour stripping, grass waterways, animal waste structures, ponds, minimal tillage, grass and naturally vegetated filter strips, and proper nutrient application measures.

CARCINOGEN: A substance that can induce cancer; carcinogenesis is the process of induction of cancer.

CHUCKANUT SANDSTONE: A sedimentary rock type found in Whatcom County and the Chuckanut Mountains area.

COAL: A rock that is made up of organic carbon from the remains of dead plants.

CONGLOMERATE: A rock consisting of larger individual particles within a finer-grained collection that have become cemented together.

DEPARTMENT OF NATURAL RESOURCES (DNR): A government agency which manages state owned lands.

DIELDRIN- An organically produced cyclodiene insecticide.

DISSOLVED OXYGEN (DO): Amount of oxygen dissolved (and hence available to sustain marine life) in a body of water such as a lake, river, or stream. DO is the most important indicator of the health of a water body and its capacity to support a balanced aquatic ecosystem of plants and animals. Wastewater containing organic (oxygen consuming) pollutants depletes the dissolved oxygen and may lead to the death of marine organisms. This measurement is usually expressed in parts per million (ppm) or percent saturation.

ENVIRONMENTAL PROTECTION AGENCY (EPA): An independent federal agency established to coordinate programs aimed at reducing pollution and protecting the environment

EROSION: A gravity driven process that moves solids (sediment, soil, rock and other particles) in the natural environment from their source and deposits them elsewhere.

FECAL COLIFORM: A sub-group of total coliform bacteria. They appear in great quantities in the intestines and feces of people and animals. The presence of fecal coliform in a drinking water sample often indicates recent fecal contamination, meaning that there is a greater risk that pathogens are present than if only total coliform bacteria is detected.

FOREST MANAGEMENT: The protection, manipulation, and utilization of the forest to provide multiple benefits, such as timber harvesting, water transpiration, wildlife habitat, etc.

GLACIALLY DERIVED SAND/GRAVEL: Sand and gravel that is exposed on the earth's surface due to glacial movement.

GROUNDWATER- Water located beneath the earth's surface.

HYDROLOGIC SOIL: Soil that is classified based on its potential for runoff. The four Hydrologic Soils Groups are A, B, C and D where A has the smallest runoff potential and D has the greatest.

IMPERVIOUS SURFACE: An area covered with solid material or that is compacted to the point where water cannot infiltrate underlying soils (e.g. parking lots, roads, houses, patios, swimming pools, tennis courts, etc.). Stormwater runoff velocity and volume can increase in areas covered by impervious surfaces.

LANDSLIDE: The sliding of a large mass of rock material, soil, etc, down the side of a mountain or cliff. They can be triggered by events such as oversaturated soil, earthquakes, and over steepening of slopes by erosion.

MASS WASTING: The process by which soil and rock moves downslope under the force of gravity.

MERCURY- A metal element.

METAMORPHIC ROCK: A type of rock that is the result of the transformation of an existing rock type. Transformation can be from heat and pressure, causing physical or chemical changes.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES): Created under the Clean Water Act, NPDES is a permit program that controls water pollution by regulating pollution sources that discharge pollutants into water.

OPEN SPACE: Land and water areas retained in an essentially undeveloped state.

PARCEL: A lot or contiguous group of lots in single ownership or under single control, and usually considered a unit for purposes of development.

PERMEABLE SURFACES: Areas characterized by materials that allow stormwater to infiltrate the underlying soils (e.g., soil covered or vegetated areas)

PHOSPHORUS- A nonmetal element in the nitrogen family that occurs in inorganic phosphate rocks and in all living cells.

PHYLLITE: A type of pressed metamorphic rock primarily composed of the minerals quartz, silicate mica, and chlorite.

POLLUTANT: Any substance that harms or negatively affects the air, soil, water, or other natural resources.

POLYCHLORINATED BIPHENYLS (PCBs)- A class of organic compounds mainly used in the electrical supply industry and mining.

RESERVOIR: An artificial lake where water is collected and kept in quantity for use.

RESTRICTIVE COVENANTS: Deed restrictions that apply to a group of homes or lots in a specific development or 'subdivision.' They are normally drafted and put in place by the original developer, and can vary significantly.

RUNOFF - Runoff is the water that flows on the earth's surface that occurs when the soil is infiltrated with water to its full capacity.

SANDSTONE: A sedimentary rock composed mainly of sand-sized minerals or rock grains which are cemented together to form sandstone.

SANITARY SEWER: An underground system for transporting sewage from houses or industry to treatment or disposal. They most often carry domestic and industrial wastewater.

SEDIMENTARY ROCK: A type of rock that is formed by cementation of sediments and material at the Earth's surface and within bodies of water.

SEPTIC SYSTEM: An on-site system designed to treat and dispose of domestic sewage. A typical system consists of a septic tank and a drain field that connect to the drain lines in a building.

SHALE: A fine-grained, sedimentary rock composed of mud, which is a mix of flakes of clay minerals and tiny fragments (silt-sized particles) of other minerals, especially quartz and calcite.

STEWARDSHIP: The concept of land as a resource, our responsibility to wisely manage that resource, and our responsibility to future generations for the condition of that resource when we leave it.

STORMWATER: Water that originates during precipitation events, also includes runoff from other sources over impervious surfaces.

SQUALICUM – CHUCKANUT – NATI SERIES SOIL: A soil type with a seasonally high water table and moderate depth to the bedrock. Slopes range from 3-60%.

SURFACE WATER- Water on the surface of the earth which includes rivers, lakes, streams, and oceans.

TRANSFERABLE DEVELOPMENT RIGHT (TDR): Type of zoning ordinance that allows owners of property zoned for low-density development or conservation use to sell development rights to other property owners. For example, suppose two adjacent landowners, A and B, are each allowed to build a ten-story office building on their own property. Using TDRs, landowner A could sell his development rights to landowner B, allowing B to build twenty stories high provided that A leaves his land undeveloped.

UNCONSOLIDATED SOIL: Soil that is not sorted or compacted. In its natural state, soil is unconsolidated.

WATERSHED: A large region of uplands where the slope of the topography contributes stormwater runoff to an adjacent waterbody or network of waterbodies.

ELEMENTS OF THE NATURAL ENVIRONMENT



ELEMENTS OF THE ENVIRONMENT

1. NATURAL ENVIRONMENT

1. EARTH

a. EXISTING CONDITIONS

i. Geology

The Lake Whatcom watershed is comprised of sedimentary Chuckanut sandstone and metamorphic phyllite. Glacially derived sand and gravel are exposed at the south end of the lake. The Chuckanut sandstone includes layers of sandstone, conglomerate, shale, and coal.

ii. Soils

The watershed is comprised of unconsolidated soil that is prone to landslides. The gravelly soils are unstable and erode when disturbed. The Squalicum – Chuckanut – Nati series soil is common (Figure 3).

iii. Erosion

The steep slopes in the Lake Whatcom watershed are prone to erosion especially with the high amounts of rainfall in the Pacific Northwest climate. The watershed receives approximately 30 to 80 inches of precipitation per year.

b. PROPOSED ACTION

The natural state of the land will be preserved on lands that are acquired; the undisturbed geology will promote greater slope stability. Undisturbed soils will minimize the landslide risk as well as serving as an important part of the water cycle and

promoting water quality through filtration of pollutants. The Austin and South Bay sub-basins have a high potential for mass wasting and erosion, due to extensive steep slopes and hydrologic soil types that have slow infiltration rates. By purchasing land, low levels of erosion will continue to exist in the watershed through reduction of the amount of land available for development.

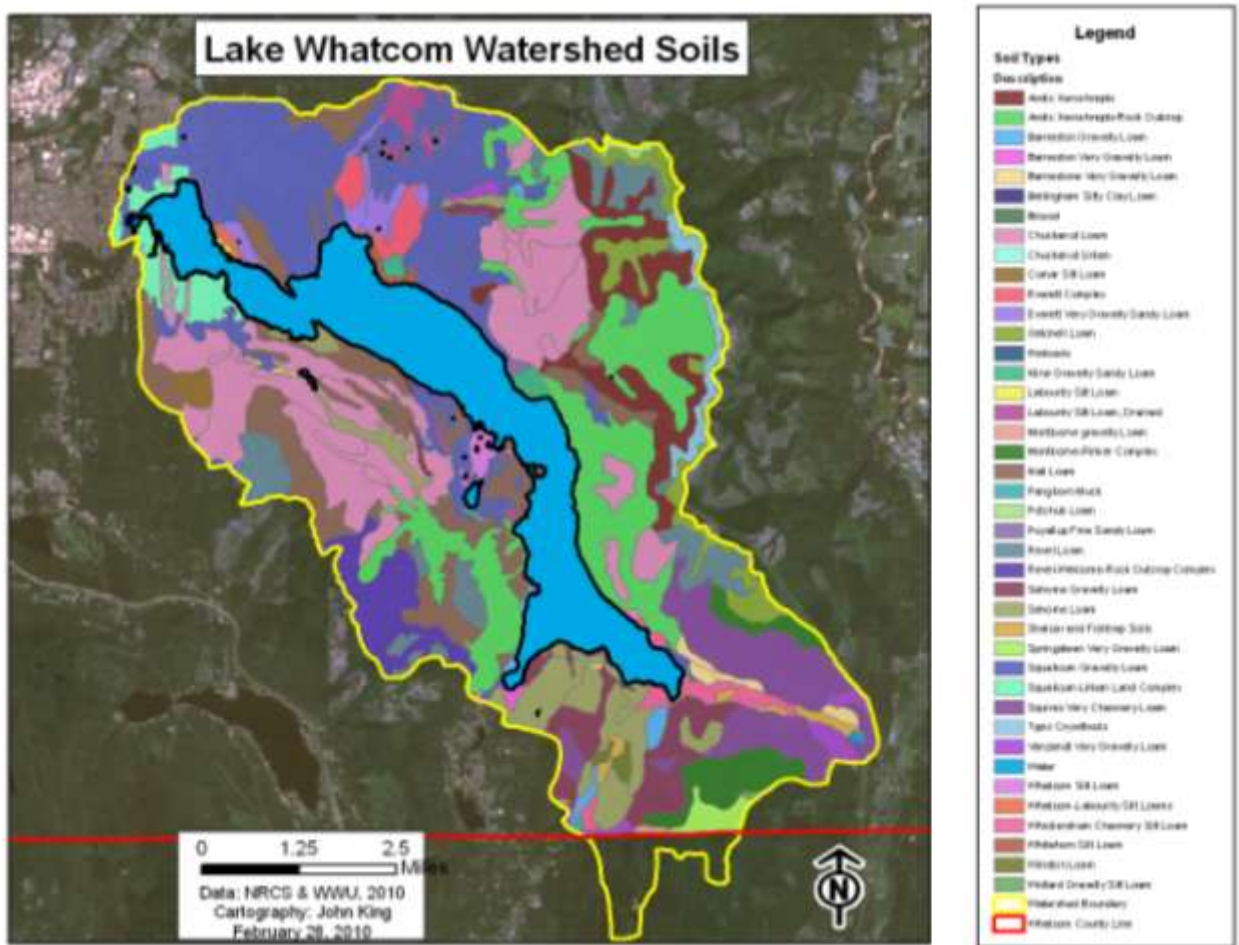


Figure 3: Lake Whatcom Watershed Soil Map

C. PREFERRED ALTERNATIVE

Land will be acquired more quickly which will ensure that as much land as possible will be kept in a natural state. Slopes and soils will be protected from disturbances that

could make them unstable and prone to landslides. The undisturbed land will filter pollutants naturally and residents will be aware of the impact that soils have on the watershed. Compacted soil from previous development on recently purchased lands will be restored to its natural unconsolidated state. Public education will inform residents of the affects of altering steep slopes and causing erosion.

d. NO ACTION ALTERNATIVE

Residential construction will cause disturbances in the glacially derived landscape. The resulting increase in construction and impervious surfaces will result in soil compaction. Development of the land will also cause increased stormwater runoff into the stormwater system as well as limit the water filtration which can occur naturally. Land uses such as timber harvest, forest road building and usage, residential development, and utility installation and maintenance will cause a disruption in the soil and increase the natural rates and timing of sediment movement. An increased rate of erosion and sediment movement has negative effects on stream and lake water quality, fish and fish habitat, and human health and safety.

2. AIR

a. EXISTING CONDITIONS

The air quality in Lake Whatcom is affected by a number of human activities. Daily car trips taken by residents located near the lake contribute to air pollution. Atmospheric deposition of phosphorus carried on car exhaust particulates, other urban air pollution, and dust and windblown soil contribute excess amounts of phosphorus to Lake Whatcom (Lake Whatcom Comprehensive Stormwater Plan 2008).

The City of Bellingham allows for the operations of boat and personal watercraft (PWC) engines which contribute further to the degradation of air quality in the area. Boat engines are a significant pollution problem for the lake. There are three primary groups of petroleum compounds associated with motorized watercraft including BTEX, OAH, and MTBE, all of which may pollute the lake (Pollutants). Gas-powered boat engines have not been subjected to the same pollution standards that car engines have. Consequently, most boat engines have no emission controls and contribute significant amounts of air pollution. The U.S. Environmental Protection Agency (EPA) has determined that boat engines contribute hydrocarbon (HC) and oxides of nitrogen (NOx) emissions which affect ground-level ozone and acid rain (Baumgarten, K 2006). Boat sewage is another contributor to air quality degradation. Although discharging sewage from a boat is illegal (RCW 90.48.080), people continue to do so (Pollutants 2010).

b. PROPOSED ACTION

When the City acquires property around the lake and does not allow for development, less space is available for homes to be built which means fewer residents on the lake. With fewer residents on the lake, there will be fewer car trips and fewer gas-powered engines active on the lake. All of this results in better air quality for the surrounding area.

c. PREFERRED ALTERNATIVE

Doubling the tax placed on residents will increase the amount of money available to acquire land. The land may be acquired at a faster rate than it would be under the proposed action which would decrease the potential for some air degradation.

d. NO ACTION ALTERNATIVE

If the land is not acquired through the City of Bellingham's land acquisition proposal, Lake Whatcom air quality faces severe consequences. Methyl tertiary butyl ether (MTBE) is a fuel oxygenate that is used in areas with poor air quality to allow gasoline to burn cleaner. However this fuel oxygenate has been tentatively classified by the Environmental Protection Agency (EPA) as a possible human carcinogen. MTBE is also known to be a groundwater contaminant. Although MTBE is not currently used in Whatcom County and has not been detected in the lake, if the air quality continues to degrade at a fast rate, it may be introduced.

If land is not purchased and preserved around the lake, more urban development will occur around the lake. With urban development come more humans and with more humans comes more boating. Increased boating on the lake will increase pollution from gas-powered engines contributing hydrocarbon (HC) and oxides of nitrogen (NOx) emissions. To put this into a perspective a 100-horse, conventional two-stroke PWC, operated for seven hours, emits more smog-forming emissions than a 1998 car driven more than 100,000 miles (Baumgarten, K 2006).

3. WATER

a. EXISTING CONDITIONS

i. Surface Water

The Lake Whatcom Watershed covers 31,000 acres; 5,000 of those acres are occupied by Lake Whatcom. The lake is composed of three basins. Basins One and Two are small and shallow and are primarily surrounded by developed land. The third basin is larger than the other two and contains 90% of the lake's total volume of water with an average depth of 150 ft (Figure 4). Basin Three is also unique in that 80% of the land surrounding it is forested land. There are 36 creeks that discharge into Lake Whatcom. The water from Lake Whatcom eventually drains into Bellingham Bay through Whatcom creek (Lake Whatcom Management, 2007).

In 1998 Lake Whatcom was listed for failing to meet water quality standards for dissolved oxygen set by the Clean Water Act. Lake Whatcom's dissolved oxygen have been declining due to an increase in algae growth. In 2004 Lake Whatcom was listed for failing to meet mercury, phosphorus, polychlorinated biphenyls, and dieldrin standards in addition to its low dissolved oxygen (Hood, S 2009).

Monitoring surveys were conducted in 2002-2003 to find the total daily maximum load for both phosphorous and fecal coliform in Lake Whatcom. The total daily maximum load, or TDML, is calculated to identify the amount of phosphorous and fecal coliform that can enter the lake and still meet the Clean Water Act standards for phosphorous and fecal coliform. The TMDL calculated for phosphorous was 14.15 kg/L. The total amount of reduction of human caused phosphorous needed to meet this standard was calculated by reduction in development. These calculations found that there would need to be an 85.5% reduction of 2003 developed acres according to the base scenario and a 94.6% reduction according to full bailout scenario. Strategies

to go about accomplishing this goal include pollution control efforts that could filter 1.6 inches of precipitation through soil to remove 90% of the phosphorous. If these strategies were used on new and existing development only 10% of the land would count as developed land. The TDML for fecal coliform was no more than 10% of 50 samples could exceed 100cfu/100ml. To stay within this limit there would need to be a 92% reduction of fecal coliform in the dry season and a 37 to 96% reduction in the wet season (Department of Ecology, 2008).



Figure 4: Lake Bathymetric Map and Profile

ii. Runoff/Absorption

The increase in algae growth, which corresponds to decreased dissolved oxygen, is due to the increase in phosphorus. Phosphorus is deposited into the lake through storm water runoff that results from stream bank erosion, exposed soil from

construction sites, landscaping, fertilizer, leaves, grass clippings, pesticides, pets, wildlife waste, septic systems, and soaps (Lake Whatcom Water Quality, 2009). The waters alongside the developed land (Basins One and Two) have historically been subjected to the most pollution. Currently, Basin Three, which historically had the best water quality, has had increasing algae growth and decreasing dissolved oxygen to the point where its water quality is just as degraded as the other sections of the lake (Markiewicz,2002).

iii. Flooding

Increasing development in the Lake Whatcom Watershed has resulted in a larger amount of impervious surfaces, such as roads. This surface reduces the amount of water that can infiltrate the ground, which increases the amount of storm water runoff and the flooding potential of Lake Whatcom.

iv. Ground Water

Ground water constantly drains into Lake Whatcom. When groundwater percolates through the soil, phosphorous from the rocks and soil is dissolved into it. Phosphorus is finding its way into the ground water that eventually ends up in Lake Whatcom from materials such as fertilizers and pesticides (Nutrients, 2010).

v. Public Water Supply

In Whatcom County, Lake Whatcom is the sole source of drinking water for more than 96,000 residents. City of Bellingham, Whatcom County water District #10 and Whatcom Falls Fish Hatchery all use Lake Whatcom as a water source (Protect Your Drinking Water, 2010).

b. PROPOSED ACTION

By acquiring land in the watershed, Lakes Whatcom's water quality would be protected from an increase of phosphorous and fecal coliform levels due to development. By keeping natural vegetation and not developing the land around the lake, the vegetation will continue to help slow and filter stormwater runoff.

c. PREFERRED ALTERNATIVE

The additional money generated by doubling the fee placed on residents' water bill will provide money for education, rehabilitation, and cleanup projects along with acquiring land

d. NO ACTION ALTERNATIVE

If no action is taken then, the potential land available, which is 18% of the watershed, could be developed. An increase of development will result in more impervious surface that will not absorb water, raising the risk of flooding. Additionally, phosphorus and fecal coliform levels will increase as development also increases.

4. PLANTS AND ANIMALS

a. EXISTING CONDITIONS

i. Habitat and Diversity of Species

Lake Whatcom Watershed is heavily forested. The diverse plant population provides habitat for a wide range of wildlife in addition to cooling streams, stabilizing slopes and absorbing precipitation. There are 49 species of mammals, 125 bird species, 2 reptile species, and 10 amphibian species that live within the watershed. Lake

Whatcom is also home to 13 fish species (Washington Department of Fish and Wildlife, 2010).

There are a variety of native and non-native plant species growing in the watershed. Of the native species, sword fern and huckleberries are dominant. Non-native species include Himalayan blackberry, horsehair, and morning glory. The most common trees are Douglas-fir, western hemlock, and western red cedar (Washington Department of Fish and Wildlife, 2010).

ii. Unique Species

There are a number of wildlife species of concern that are being monitored by the state and federal governments within the Lake Whatcom Watershed. The peregrine falcon is on the State Endangered Species List. Other unique species include marbled murrelet, bald eagle, osprey, and tailed frog.

Lake Whatcom contains two native species of the salmonid family. The kokanee and the cutthroat trout, both part of the salmonid family, can be found in Lake Whatcom. In addition, the rainbow trout is a non-native species in the lake (Washington Department of Fish and Wildlife, 2010).

Lake Whatcom is one of the few places in the United States which provides habitat for the Salish sucker. The Salish sucker population is declining due to decreases in habitat. Salish suckers are listed as an endangered species in Canada (Lake Whatcom Preserve, 2010). The kokanee salmon population in Lake Whatcom is enhanced through hatchery operations on the lake. The eggs generated from the hatchery are used to stock lakes across the United States (Facts about Kokanee, 2003)

iii. Fish or Wildlife Migration Routes

Additional culverts and roads built in the Lake Whatcom watershed, due to an increase in urbanization, create barriers for salmon migration (Lake Whatcom, 2010).

Culverts can be especially problematic for fish, if the water levels are too low fish frequently are unable to jump into the culvert.

b. **PROPOSED ACTION**

The proposed action would benefit the plants and animals of the Lake Whatcom Watershed by minimizing future development that would destroy habitat. Furthermore, limiting additional development allows existing natural vegetation to continue to occupy the land. By protecting the land from development, water quality will also be protected which is essential for fish living within the lake.

c. **PREFERRED ALTERNATIVE**

The preferred alternative would improve the health of plant and animal life around the lake in the same way as the proposed action. Habitat would be maintained, and the destabilization of slopes would be reduced in the future.

d. **NO ACTION ALTERNATIVE**

Following the no action alternative would result in further development in the Lake Whatcom Watershed. Essential habitat for plants and animals would be destroyed, slopes would continue to become less stable if development were to continue. The resulting mudslides and stormwater runoff would contribute large quantities of pollution to the lake that would decrease the living environment for aquatic species.

This would be devastating for species living in the watershed.

5. NATURAL RESOURCES AND ENERGY

a. EXISTING CONDITIONS

Water is the most important natural resource in Lake Whatcom. It provides drinking water for approximately 96,000 people in the county. Over 20,798 acres of timberland is located in the watershed which is 67% of the total area in the watershed (Peterson 2007) . According to Washington Department of Fish and Wildlife, the forests are home to marbled murrelets, bald eagle, osprey, tailed frog, and Salish sucker (a small native fish). They are all valuable natural resources of a healthy ecosystem and sign of its biodiversity (Washington Department of Fish and Wildlife)

The north shore of Lake Whatcom contains beautiful, old growth forests on its steep slopes. The area has frequent rainfall, so logging and road building in this area is increasing the risk of landslides (Conservation Northwest).

b. PROPOSED ACTION

The proposed action would allow the City to manage natural resources in the areas that are slated for development.

c. PREFERRED ALTERNATIVE

The preferred alternative would have the same benefits as the proposed action.

d. NO ACTION ALTERNATIVE

By not purchasing additional land, continuing degradation of the land is likely to occur. Destruction of the land for development will result in the removal of trees and plants that provide habitat and slope stability. Additional impervious surfaces, including homes, will result in more stormwater runoff that will adversely affect the water quality.

ELEMENTS OF THE BUILT ENVIRONMENT



2. BUILT ENVIRONMENT

1. LAND AND SHORELINE USE

a. EXISTING CONDITIONS

i. Housing

The County Comprehensive Plan sets out policies to reduce housing densities as well as to adopt best management practices to protect the watershed. As of March 2007, there were approximately 6,500 housing units located within the Lake Whatcom watershed, with the potential for about 3,200 more. As of spring 2007, 980 of those lots were located in Sudden Valley. Most of land located around the watershed is privately owned by middle to high income residents (Kooy, K 2007).

The County currently restricts development by purchasing lots, agreeing to covenants permanently restricting residential development, watershed down-zoning, lot line consolidations, exchanging transferable restrictive covenants for permanent restrictive covenants, and targeting priority parcels for water quality protection. The City of Bellingham also assists the Sudden Valley Community Association with density reduction programs through joint purchase of parcels with restrictive covenants. Over the last several years the County, City, and Sudden Valley have worked together to obtain lots through tax foreclosure and tax title. The number of lots available through these mechanisms has become more limited (City of Bellingham 2000-2004).

Other accomplishments for preserving the Lake Whatcom Watershed by the City of Bellingham have been closing joint acquisitions, which are properties jointly purchased by the City and County. In 2001 the Silver Beach Ordinance was enacted.

The Ordinance was put in place to limit impervious surfaces, retain native vegetation, and establish seasonal clearing restrictions in the watershed except for subareas 11 and 15. These regulations included a decrease in allowable impervious areas, cluster subdivision requirements, on-site stormwater requirements, phased clearing, establishment of tree canopy area retention, and establishment of seasonal restrictions on clearing activity (City of Bellingham 2000-2004).

ii. Aesthetics

The aesthetics of Lake Whatcom are highly valued throughout Whatcom County. The natural habitat is home to native wildlife and plant species. Lake aesthetics are more commonly reported as taste and odor of drinking water and lake appearance. The City of Bellingham monitors the aesthetics of the lake by the taste and odor complaints it receives from the customers. Typical sources of taste and odor problems in surface water supplies include certain species of algae and bacteria, and the anaerobic conditions at the bottom of reservoir.

iii. Recreation

In the Lake Whatcom Watershed there are six parks covering 1,060 acres of land. The lake and watershed are used for boating, fishing, swimming, and hiking. Recreational activities, such as boating, are another cause for declining water quality in Lake Whatcom. If water quality were to continue declining, eventually it could reach the point where the water quality is too poor for recreational activities such as swimming or fishing (Lake Whatcom, 2010).

b. PROPOSED ACTION

The proposed alternative would allow the City to purchase lots around the watershed that would otherwise be used for housing development. While it would not completely stop development, it would slow it down and minimize the amount of land that could ultimately be developed, which will serve to protect the water.

c. PREFERRED ALTERNATIVE

With land being purchased at an increased rate, more lots could be purchased which would lead to less construction. This would ultimately lead to less erosion from new homes and human activities which leads to less phosphorous pollution in the drinking water. Scarcity and price increases would become less of a threat for the program because the tax increase would double the amount of lots being purchased in a specific time period. A quicker acquisition of land would also prevent greater clean-up costs in the future.

d. NO ACTION ALTERNATIVE

The remaining land could hold approximately 3,200 homes. As land is continually purchased through private ownership, this increases scarcity around the area which drives up prices. If no action is taken now, the lots will continue to increase in price to the point where the County and City cannot afford to purchase the land for public ownership in the future. The additional development around the lake will have a negative impact on the water and aesthetic qualities of the watershed.

2. TRANSPORTATION

a. EXISTING CONDITIONS

i. Vehicles

There are several main roads along the shoreline of Lake Whatcom. Lake Whatcom Boulevard goes along the west side of the lake and changes to South Bay Drive on the southern side of the lake, then goes around and connects to Blue Canyon Road. North Shore Drive goes along the east side of the Lake, and ends in the middle of the shoreline. There is also bus service provided by Whatcom Transportation Authority. Bus 540 goes to Silver Beach and Bus 512 goes along the main route of the west side of the lake. However, stops are limited for both routes (Whatcom Transit Authority).

ii. Parking

Western Washington University's Lakewood Water sports Facility, Bloedel Donovan Park, Lake Whatcom Park (0.25 miles farther towards the lake from the main parking area) and Silver Beach are some public accesses located along the Lake Whatcom shoreline. Most of these locations provide at least 15 to 20 parking spaces (City of Bellingham).

b. **PROPOSED ACTION**

Lake Whatcom Watershed acquisition will not have a significant impact on the current transportation uses around the watershed. However, minimizing future development means that there should not be a significant increase in traffic in the future.

c. **PREFERRED ALTERNATIVE**

The preferred alternative would have the same effects as the proposed action.

d. **NO ACTION ALTERNATIVE**

If development is allowed to continue, additional roads and public transportation will be needed to handle the increased amount of traffic on roads surrounding the watershed.

3. PUBLIC SERVICES AND UTILITIES

a. EXISTING CONDITIONS

ii. Fire

The Lake Whatcom Watershed is served by fire Districts 2, 4, and 18. There are a total of four fire stations, one on each side of the lake. The watershed has a lower density of fire stations than inside the Bellingham city limits due to the smaller population.

iii. Schools

Students in the watershed can attend schools within the Bellingham school district including Geneva or Silver Beach Elementary Schools, Kulshan or Whatcom Middle Schools and Bellingham or Squalicum High Schools.

iv. Parks/Recreational Facilities

Sudden Valley Golf and Country Club, Blodel Donovan Park, and Euclid Park are established public and private facilities. Much of the Department of Natural Resources owned land in the watershed is available for recreation.

v. Maintenance

Land is maintained by the owner, and roads are maintained by the County.

vi. Water/Storm Water

Stormwater is a major cause of pollution in the lake. Runoff from impervious surfaces accumulates debris, chemicals, sediments, and other pollutants as it flows over the ground. Stormwater systems for impervious surfaces pipe water directly into nearby streams, wetlands, or Lake Whatcom. National Pollutant Discharge Elimination System (NPDES) Phase 2 stormwater requirements are currently being implemented.

These regulations require all public entities to reduce the discharge of pollutants through public education, illicit discharge elimination, and public participation. Most of these regulations relate to zoning and require cooperation between multiple departments in the city.

Service for water and stormwater is provided by the Lake Whatcom Water & Sewer District for all areas of the watershed outside of the Bellingham city limits. The north end of the watershed inside Bellingham city limits is on the city's stormwater and water systems.

vii. Sewer/Solid Waste

The Lake Whatcom Water & Sewer District provides services for areas outside the Bellingham city limits. All areas in the district can receive sewer service; however, remote housing typically depends on a septic system. For the north end of lake, City of Bellingham utilities' city-wide sanitary sewer system provides water treatment.

viii. Utilities

Electricity, natural gas, water, refuse service, telephone, and sanitary sewer utilities are available in select areas of the watershed.

a. **PROPOSED ACTION**

The proposed alternative would not affect fire stations, schools or utilities. Much of the purchased land could be converted into park or trail facilities that would be available to the public but would require monitoring and maintenance. Additional sewer/solid waste and storm water management would not be needed due to the lack of new development.

b. **PREFERRED ALTERNATIVE**

The preferred alternative would have the same effects as the proposed action.

c. **NO ACTION ALTERNATIVE**

If development was permitted to continue, additional services would be needed including fire, utilities, storm water and waste management. Expanding these systems would involve further degradation of the environment. If the population of the watershed increased, additional schools may be warranted.

APPENDIXES

City of Bellingham Land Ordinance No. 2000-09-058 Page 45

List of Animals Page 50

List of Plants..... Page 54

ORDINANCE NO. 2000-09-058

AN ORDINANCE AMENDING BELLINGHAM MUNICIPAL CODE SECTION 15.08.250 RELATING TO WATER USE RATES AND INCREASING THE RATE UP TO \$5.00 PER MONTH FOR UNMETERED SINGLE-FAMILY USERS AND A PROPORTIONATE AMOUNT FOR METERED USERS TO FUND LAND ACQUISITION AND OTHER LAND PRESERVATION MEASURES IN THE LAKE WHATCOM WATERSHED AND AUTHORIZING ESTABLISHMENT OF AN ADVISORY BOARD TO GUIDE THE ACQUISITION PROCESS.

WHEREAS, the protection of the Lake Whatcom Reservoir, the drinking water source for the City of Bellingham and others, is of utmost public health importance to the citizens of Bellingham and others who obtain water from the lake; and

WHEREAS, the City, County, and Water District 10 Joint Resolution No. 92-68, signed in 1992, recognized the importance of protecting Lake Whatcom and its watershed as a reservoir and the major drinking source for the County; and

WHEREAS, the Lake Whatcom Reservoir Management Program for 2000 places a high priority on and outlines tasks that will further the implementation of an acquisition program;

WHEREAS, the City's Comprehensive Plan requires that before-the-fact prevention take precedence over after-the-fact mitigation or treatment; and

WHEREAS, a Citizen's Task Force of the Lake Whatcom Reservoir Management Program is currently developing criteria to prioritize land for preservation, determining options for preserving and enhancing high priority lands, and mechanisms for integrating these options with identified priority areas; and

WHEREAS, recognizing that a truly comprehensive program of education, land use regulation and enforcement, monitoring, and review as well as land acquisition and preservation is essential to preserving water quality in the Lake Whatcom Reservoir, and the City Council will continue its active support and encouragement of the Lake Whatcom Reservoir Management Program with Whatcom County and Water District 10; and

WHEREAS, an increase in the water use rate is an appropriate funding source for the acquisition of land and other land preservation measures within the Lake Whatcom Watershed; and

WHEREAS, an Advisory Board will need to be established to provide citizen input, advice, and oversight regarding the potential acquisition of land within the watershed,

NOW, THEREFORE, THE CITY OF BELLINGHAM DOES ORDAIN:

City of Bellingham
CITY ATTORNEY
210 Lottie Street
Bellingham, Washington 98225
Telephone (360) 676-6903

Section 1. Section 15.08.250 of the Bellingham Municipal Code shall be amended to read as follows:

15.08.250 Water Rates and Charges

A. The rates charged for each shut-off or turn-on are:

- (1) During normal work hours: \$15.00 each; and
- (2) After normal work hours: \$50.00 each.

B. The hydrant fee assessed for each lineal foot of main extension or portion thereof is: \$3.00.

C. Demand charges are as follows:

(1) For a new or exchanged service:

<u>Type of Service</u>	<u>Charge</u>
Residential	\$300
¼" meter	\$500
1" meter	\$833
1-1/2" meter	\$1,667
2" meter	\$2,667
3" meter	\$5,000
4" meter	\$8,333
5" meter	\$16,667
6" meter	\$26,667

(2) A charge of 16 cents per square foot is imposed on all buildings where new or additional floor space is constructed.

(3) For all services located outside the corporate limits of the City, the demand charge is computed in the same fashion, except that an additional surcharge of 50% is imposed.

D. Water use rates are:

(1) Flat rate, single family residences:

2000 \$18.00 per month
2001 \$23.00 per month

(2) Flat rate, unmetered duplexes:

2000 \$36.00 per month
2001 \$46.00 per month

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(3) Metered:

- 2000 \$18.00 per month plus \$0.95 per 100 cubic feet of water consumed in excess of 1,200 cubic feet; and
2001 \$23.00 per month plus \$1.22 per 100 cubic feet of water consumed in excess of 1200 cubic feet;

(4) Industrial Water

- a. For consumption of the first 40,000 hundred cubic feet (ccf) per day the charge shall be \$0.095 per ccf.
- b. For consumption between 40,001 and 42,000 ccf the charge shall be \$0.10 per ccf.
- c. For consumption between 42,001 and 44,000 ccf the charge shall be \$0.105 per ccf.
- d. For consumption between 44,001 and 46,000 ccf the charge shall be \$0.11 per ccf.
- e. For consumption between 46,001 and 48,000 ccf the charge shall be \$0.115 per ccf.
- f. For consumption between 48,001 and 50,000 ccf the charge shall be \$0.120 per ccf.
- g. For consumption between 50,001 and 52,000 ccf the charge shall be \$0.125 per ccf.
- h. For consumption between 52,001 and 54,000 ccf the charge shall be \$0.13 per ccf.
- i. For consumption between 54,001 and 56,000 ccf the charge shall be \$0.135 per ccf.
- j. For consumption between 56,001 and 58,000 ccf the charge shall be \$0.14 per ccf.
- k. For consumption between 58,001 and 60,000 ccf the charge shall be \$0.145 per ccf.
- l. For consumption between 60,001 and 62,000 ccf the charge shall be \$0.15 per ccf.

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- m. For consumption between 62,001 and 64,000 ccf the charge shall be \$0.155 per ccf.
- n. For consumption between 64,001 and 66,000 ccf the charge shall be \$0.16 per ccf.
- o. For consumption between 66,001 and 68,000 ccf the charge shall be \$0.165 per ccf.
- p. For consumption between 68,001 and 70,000 ccf the charge shall be \$0.17 per ccf.

(5) The late-payment penalty is \$1.00 or 1% per month of the amount owing, whichever is greater.

- E. The standby fire protection service rate is \$25.00 per year.
- F. The tampering fee is \$50.00 per occurrence.
- G. Water rates and charges for services outside the City limits are 150% of the aforementioned rates and charges, except the cost reimbursable installation fee described by this Chapter.
- H. The water rate increase provided for in 15.08.250 (D) (1), (2) and (3) shall be used to fund land acquisition and other land preservation measures in the Lake Whatcom Watershed. Acquisitions and other land preservation measures and prioritization of such, and allowed uses and improvements to acquired property shall be determined by the City Council. Land preservation measures include, but are not limited to, items such as purchases of transfer of development rights, conservation easements, access/use rights, and their associated maintenance and administration expenses. Funds generated by the water rate increase may also be used for repayment and debt service on bonds or other financing instruments used to further the stated objectives of watershed land acquisition and other land preservation measures.

Section 2. A new Chapter 2.90 shall be added to Title 2 – Administration of the Bellingham Municipal Code to read as follows:

2.90.010 Watershed Advisory Board Authorized

- A. There is authorized a Watershed Advisory Board (the “Board”) to provide citizen advice and oversight regarding potential land acquisition and preservation measures within the watershed to protect and improve the quality of the City’s water supply.
- B. The Board shall be constituted by joint legislative action of the City, Whatcom County, and Water District 10. The number of Board members shall be established in such joint legislative action.

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2.90.020 Terms of Appointment

Each member shall serve for a period of three years, provided that the initial members shall be assigned staggered terms. Members may serve no more than two consecutive terms. Any vacancy in the membership of the Board shall be filled in the same manner as the original appointment, with the replacement serving the remainder of the unexpired terms.

2.90.030 Compensation – Conflicts of Interest

Board members shall serve without compensation from the City, or from any trust, donation or legacy to the city for their services as such members; but this limitation shall not preclude a member or his/her firm receiving compensation from the city under contract or otherwise for services rendered outside his/her duties as a Board Member; provided, that any Board member having an interest or who contemplates acquiring an interest in any particular transaction, contract, or project must disqualify himself/herself from any official action contributing towards an official recommendation to the City on that subject.

2.90.040 Authority and Duties

A. The Board shall advise the City, Whatcom County and Water District 10 regarding recommended land acquisition and land preservation measures.

B. The board shall undertake its functions based upon the selection criteria adopted by the City, Whatcom County, and Water District 10, which is anticipated to occur in early 2001.

PASSED by Council this 18TH day of SEPTEMBER, 2000.




Council President

APPROVED by me this 25th day of Sept., 2000.



Mayor

ATTEST:



Finance Director

APPROVED AS TO FORM:



Office of the City Attorney

Published: 9/22/00

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ANIMALS

AMPHIBIANS:

- Bullfrog (*Rana catesbeiana*)
- Northwestern Salamander (*Ambystoma gracile*)
- Oregon Ensatina (*Ensatina eschscholtzi oregonensis*)
- Pacific Giant Salamander (*Dicamptodon ensatus*)
- Pacific Tree Frog (*Hyla regilla*)
- Red-Legged Frog (*Rana aurora*)
- Roughskin Newt (*Taricha granulosa*)
- Tailed Frog (*Ascaphus truei*)
- Western Redback Salamander (*Plethodon vehiculum*)
- Western Toad (*Bufo boreas*)

BIRDS

- American Coot (*Fulica americana*)
- American Crow (*Corvus brachyrhynchos*)
- American Dipper (*Cinclus mexicanus*)
- American Goldfinch (*Carduelis tristis*)
- American Kestrel (*Falco sparverius*)
- American Robin (*Turdus migratorius*)
- American Wigeon (*Anas americana*)
- Bald Eagle (*Haliaeetus leucocephalus*)
- Band-Tailed Pigeon (*Columba fasciata*)
- Barn Swallow (*Hirundo rustica*)
- Barred Owl (*Strix varia*)
- Belted Kingfisher (*Ceryle alcyon*)
- Bewick's Wren (*Thryomanes bewickii*)
- Black-Capped Chickadee (*Parus atricapillus*)
- Black-Headed Grosbeak (*Pheucticus melanocephalus*)
- Black Swift (*Cypseloides niger*)
- Black-Throated Gray Warbler (*Dendroica nigrescens*)
- Blue Grouse (*Dendragapus obscurus*)
- Brewer's Blackbird (*Euphagus cyanocephalus*)
- Brown Creeper (*Certhia americana*)
- Brown-Headed Cowbird (*Molothrus ater*)
- Bufflehead (*Bucephala albeola*)
- Bushtit (*Psaltriparus minimus*)
- Canada Goose (*Branta canadensis*)
- Cedar Waxwing (*Bombycillia cedrorum*)
- Chestnut-Backed Chickadee (*Parus rufescens*)
- Chipping Sparrow (*Spizella passerine*)
- Common Barn Owl (*Tyto alba*)
- Common Goldeneye (*Bucephala clangula*)
- Common Loon (*Gavia immer*)
- Common Merganser (*Mergus merganser*)
- Common Nighthawk (*Chordeiles minor*)
- Common Raven (*Corvus corax*)
- Common Snipe (*Gallinago gallinago*)
- Common Yellowthroat (*Geothlypis trichas*)
- Cooper's Hawk (*Accipiter cooperii*)
- Double-Crested Cormorant (*Phalacrocorax auritus*)
- Dark-Eyed Junco (*Junco hyemalis*)
- Downy Woodpecker (*Picoides pubescens*)
- Eared Grebe (*Podiceps nigricollis*)

- European Starling (*Sturnus vulgarus*)
- Evening Grosbeak (*Coccothraustes vespertinus*)
- Fox Sparrow (*Passerella iliaca*)
- Gadwall (*Anas strepera*)
- Glaucous-Winged Gull (*Larus glaucescens*)
- Golden-Crowned Kinglet (*Regulus satrapa*)
- Golden-Crowned Sparrow (*Zonotrichia atricapilla*)
- Golden Eagle (*Aquila chrysaetos*)
- Gray Jay (*Perisoreus canadensis*)
- Great Blue Heron (*Ardea herodias*)
- Great Horned Owl (*Bubo virginianus*)
- Green-Backed Heron (*Butorides striatus*)
- Green-Winged Teal (*Anas crecca*)
- Gyrfalcon (*Falco rusticolus*)
- Hairy Woodpecker (*Picoides villosus*)
- Hooded Merganser (*Lophodytes cucullatus*)
- House Finch (*Carpodacus mexicanus*)
- House Wren (*Troglodytes aedon*)
- Hutton's Vireo (*Vireo huttoni*)
- Killdeer (*Charadrius vociferus*)
- Lesser Scaup (*Aythya affinis*)
- Long-Eared Owl (*Asio otus*)
- MacGillivray's Warbler (*Oporornis tolmiei*)
- Mallard (*Anas platyrhynchos*)
- Marsh Wren (*Cistothorus palustris*)
- Merlin (*Falco columbarius*)
- Mourning Dove (*Senaida macroura*)
- Nashville Warbler (*Vermivora ruficapilla*)
- Northern Flicker (*Colaptes auratus*)
- Northern Goshawk (*Accipiter gentilis*)
- Northern Harrier (*Circus cyaneus*)
- Northern Pintail (*Anas acuta*)
- Northern Pygmy Owl (*Glaucidium gnoma*)
- Northern Rough-Winged Swallow (*Stelgidopteryx serripennis*)
- Northern Saw-Whet Owl (*Aegolius acadicus*)
- Northern Shrike (*Lanius excubitor*)
- Olive-sided flycatcher (*Contopus borealis*)
- Orange-Crowned Warbler (*Vermivora celata*)
- Osprey (*Pandion haliaetus*)
- Pacific Slope Flycatcher (*Empidonax difficilis*)
- Peregrine Falcon (*Falco peregrinus*)
- Pied-billed Grebe (*Podilymbus podiceps*)
- Pileated woodpecker (*Dryocopus pileatus*)
- Pine Siskin (*Carduelis pinus*)
- Purple Finch (*Carpodacus purpureus*)
- Purple Martin (*Progne subis*)
- Red-Breasted Nuthatch (*Sitta canadensis*)
- Red Crossbill (*Loxia curvirostra*)
- Red-Breasted Sapsucker (*Sphyrapicus ruber*)
- Red-Tailed Hawk (*Buteo jamaicensis*)
- Ring-Billed Gull (*Larus delawarensis*)
- Ring-Necked Duck (*Aythya collaris*)
- Red-Winged Blackbird (*Agelaius phoeniceus*)
- Rock Dove (*Columba livia*)

- Ruby-Crowned Kinglet (*Regulus calendula*)
- Ruffed Grouse (*Bonasa umbellus*)
- Rufous Hummingbird (*Selasphorus rufus*)
- Sharp-Shinned Hawk (*Accipiter striatus*)
- Sora Rail (*Porzana carolina*)
- Snowy Owl (*Nyctea scandiaca*)
- Solitary Vireo (*Vireo solitarius*)
- Song Sparrow (*Melospiza melodia*)
- Spotted Sandpiper (*Actitis macularia*)
- Spotted Towhee (*Pipilo erythrophthalmus*)
- Stellar's Jay (*Cyanocitta stelleri*)
- Warbling Vireo (*Vireo gilvus*)
- Western Screech Owl (*Otis kennicottii*)
- Western Tanager (*Piranga ludoviciana*)
- Western Wood-Pewee (*Contopus sordidulus*)
- Wilson's Warbler (*Wilsonia pusilla*)
- Winter Wren (*Troglodytes troglodytes*)
- Swainson's Thrush (*Catharus ustulatus*)
- Townsend's Solitaire (*Myadestes townsendi*)
- Townsend's Warbler (*Dendroica townsendi*)
- Tree Swallow (*Tachycineta bicolor*)
- Turkey Vulture (*Cathartes aura*)
- Varied Thrush (*Ixoreus naevius*)
- Vaux's Swift (*Chaetura vauxi*)
- Violet-Green Swallow (*Tachycineta thalassina*)
- Virginia Rail (*Rallus limicola*)
- Western Grebe (*Aechmophorus occidentalis*)
- White-Crowned Sparrow (*Zonotrichia leucophrys*)
- Wood Duck (*Aix sponsa*)
- Yellow Warbler (*Dendroica petechia*)
- Yellow-Rumped Warbler (*Dendroica coronata*)

FISH

- Brown Bullhead (*Ictalurus nebulosis*)
- Blue Gill (*Lepomis macrochirus*)
- Cutthroat Trout (*Oncorhynchus clarkii*)
- Kokanee (*Oncorhynchus nerka*)
- Largemouth Bass (*Micropterus salmoides*)
- Longnose Sucker (*Catostomus catostomus*)
- Peamouth Chub (*Mylocheilus caurinus*)
- Pumpkinseed Sunfish (*Lepomis gibbosus*)
- Rainbow Trout (*Oncorhynchus mykiss*)
- Sculpin (*Cottus spp*)
- Smallmouth Bass (*Micropterus dolomieu*)
- Three-Spine Stickleback (*Gasterosteus aculeatus*)
- Yellow Perch (*Perca flavescens*)

MACROINVERTEBRATES

- Beetles (Coleoptera)
- Caddisfly Family (Trichoptera)

- Mayfly Family (Ephemeroptera)
- Stonefly Family (Plecoptera)

MAMMALS

- Beaver (*Castor canadensis*)
- Big Brown Bat (*Eptesicus fuscus*)
- Black Bear (*Ursus americanus*)
- Black-Tailed Deer (*Odocoileus hemionus columbianus*)
- Bobcat (*Lynx rufus*)
- Bushy-Tailed Woodrat (*Neotoma cinerea*)
- California Myotis (*Myotis californicus*)
- Coyote (*Canis latrans*)
- Deer Mouse (*Peromyscus maniculatus*)
- Douglas' Squirrel (*Tamiasciurus douglasii*)
- Eastern Cottontail (*Sylvilagus floridanus*)
- Ermine (*Mustela erminea*)
- Hoary Bat (*Lasiurus cinereus*)
- House Mouse (*Mus musculus*)
- Little Brown Myotis (*Myotis lucifugus*)
- Long-Eared Myotis (*Myotis evotis*)
- Long-Legged Myotis (*Myotis volans*)
- Long-Tailed Vole (*Microtus longicaudus*)
- Spotted Skunk (*Spilogale putorius*)
- Townsend's Big-Eared Bat (*Plecotus townsendii*)
- Townsend's Chipmunk (*Tamias townsendii*)
- Townsend's Mole (*Scapanus townsendii*)
- Trowbridge's Shrew (*Sorex trowbridgii*)
- Water Shrew (*Sorex palustris*)
- True Flies (Diptera)
- Long-Tailed Weasel (*Mustela frenata*)
- Mink (*Mustela vison*)
- Mountain Beaver (*Aplodontia rufa*)
- Mountain Lion (*Felis concolor*)
- Muskrat (*Ondatra zibethicus*)
- Northern Flying Squirrel (*Glaucomys sabrinus*)
- Norway Rat (*Rattus norvegicus*)
- Oregon Vole (*Microtus oregoni*)
- Pacific Jumping Mouse (*Zapus trinotatus*)
- Pacific Mole (*Scapanus orarius*)
- Pacific Water Shrew (*Sorex bendirii*)
- Pika (*Ochotona princeps*)
- Porcupine (*Erethizon dorsatum*)
- Raccoon (*Procyon lotor*)
- Red Fox (*Vulpes vulpes*)
- River Otter (*Lutra canadensis*)
- Shrew-Mole (*Neurotrichus gibbsii*)
- Silver-Haired Bat (*Lasionycteris noctivagans*)
- Southern Red-Backed Vole (*Clethrionomys gapperi*)
- Snowshoe Hare (*Lepus americanus*)
- Striped Skunk (*Mephitis mephitis*)
- Townsend's Vole (*Microtus townsendii*)
- Vagrant Shrew (*Sorex vagrans*)
- Virginia Opossum (*Didelphis virginiana*)
- Yuma Myotis (*Myotis yumanensis*)

REPTILES

- Common Garter Snake (*Thamnophis sirtalis*)

- Northwestern Garter Snake (*Thamnophis ordinoides*)

PLANTS

- Black Cottonwood (*Populus trichocarpa*)
- Big-Leaf Maple (*Acer macrophyllum*).
- Douglas-Fir (*Pseudotsuga menziesii*)
- Dwarf Oregon Grape (*Berberis nervosa*)
- Eurasian Milfoil
- Himalayan Blackberry
- Horsehair

- Huckleberries (*Vaccinium spp.*)
- Japanese Knotweed
- Morning Glory
- Red Alder (*Alnus rubra*)
- Western Hemlock (*Tsuga heterophylla*)
- Western Red Cedar (*Thuja plicata*)
- Salmonberry (*Rubus spectabilis*)
- Sword Fern (*Polystichum munitum*)

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