

CONCEPTUAL MITIGATION PLAN

for the

Grandis Pond Planned Unit Development Blaine, Washington

Prepared for:

GRANDIS POND, LLC
P.O. Box 30647
Bellingham, WA 98228-2647

BLMT0000-0004

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EXECUTIVE SUMMARY

Grandis Pond LLC is proposing a planned unit development located on 22 parcels on the eastern edge of the City of Blaine and is approximately 440 acres in size. The proposed development is designed to include single-family lots, cottage homes, duplex/paired housing units, and multi-family housing units, for a total of approximately 1,030 residential units. In addition to residential development, approximately 48,000 square feet of commercial building space is proposed. The development is anticipated to be constructed in five phases over a period of 20 years. Low Impact Development (LID) techniques will be used as much as practicable for managing the site's stormwater.

Wetlands are located across the project site and include numerous drainages, linear wetland assemblages, and a large central pond surrounded by wetland. The project has been designed to avoid and minimize wetland and buffer impacts to the greatest degree possible. However, in order to access the project site for development it is necessary to impact some on site wetlands and drainages. Impacts are primarily from access road and include 19,815 square feet (0.45 acre) of wetland/ stream fill and 111,189 square feet (2.6 acres) of lost buffer.

Mitigation is proposed at several potential locations within the project site to compensate for these impacts. These include wetland creation at a ratio of 1.5 to 1 (creation to impact) in the amount of 29,723 square feet (0.68 acre) at up to four locations and wetland enhancement at a ratio of 2 to 1 (enhancement to impact) in the amount of 39,630 square feet (0.91 acre) at up to four locations in existing disturbed wetlands adjacent to the proposed wetland creation areas. Other mitigation measures include the replacement of lost buffer via buffer averaging at a ratio of 1 to 1 or greater (minimum of 111,189 square feet) of new buffer, reforestation of disturbed buffers across the project site, and the implementation of LID strategies within the project design. LID strategies include reduced road and sidewalk standards, rain gardens/bioswales, and residential-lot roof-runoff dispersion trenches.

Mitigation goals and objectives include improving wildlife habitat and replacing lost hydrologic and water quality functions. The mitigation area will be monitored and maintained for a period of five years following the guidelines within the approved mitigation plan.

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1.0 PROPOSED PROJECT

1.1 PROJECT LOCATION

The Grandis Pond Planned Unit Development (PUD) (Project) is located on twenty-two parcels on the eastern edge of the City of Blaine, Whatcom County, Washington. The site is bound between H Street Road to the south and the Canadian border to the north. The nearest cross streets are Harvey Road to the west and W. 31st Place to the east. The Blaine city center is located approximately 2.5 miles to the west of the site and the Blaine Truck Crossing at the U.S./Canadian Border is approximately 2 miles from the site. The site is approximately 2.7 miles east of Interstate 5, within Sections 33 and 34 of Township 41 North and Range 1 East (Figure 1). The property is located within the City of Blaine Urban Growth Area and is zoned Urban Residential 4 Units/Acre.

The Project is located within Water Resource Inventory Area 1, located in northwest Washington and within the Little Campbell River watershed and the Dakota Creek sub-basin.

Figure 1. Vicinity Map



1.2 PROJECT DESCRIPTION

The project consists of residential and commercial development and is approximately 440 acres of property. It is designed to include single-family lots, cottage homes, duplex/paired housing units, and multi-family housing units, for a total of approximately 1,030 residential units. Appendix A includes plan sheets with the existing conditions, proposed development, impacts and mitigation.

In addition to residential development, approximately 48,000 square feet of commercial building space is proposed. The development is anticipated to be constructed in phases. Along with the houses and other buildings, the development is proposed to include paved roadways with sidewalks, recreation trails and pocket parks, water and sanitary sewer mains, dry utilities, stormwater management facilities and open space/environmentally sensitive areas. LID techniques will be used as much as practicable for managing the site stormwater.

The Project is anticipated to be constructed in phases with full build out taking as long as 20 years and will be completed in five separate phases as follows:

- Development Area 1 includes residential neighborhoods in the southwestern portion of the project, the creation of a hiking trail around and the preservation of Grandis Pond, and the allocation of the parcel to be set-aside for a fire/police public safety facility.
- Development Area 2 includes the development of residential neighborhoods in the south central portion of the project.
- Development Area 3 includes the development of residential neighborhoods located on the eastern portion of the site.
- Development Area 4 includes the development of one neighborhood located on the northeastern portion of the site.
- Development Area 5 includes the development of two residential neighborhoods located in the northwestern portion of the site.

2.0 EXISTING SITE DESCRIPTION

2.1 PROJECT VICINITY

Land use in the project vicinity is a mix of undeveloped areas, low density rural residential, medium to high density residential, and agriculture areas. Undeveloped forest is present along the western and eastern property lines of the site, agricultural and low density residential areas are located mostly to the south but also to the east and west, and medium to high density residential development is located north of the site in British Columbia, Canada.

The development site is located within the Dakota Creek and Little Campbell Creek sub-basins of the Drayton Harbor watershed. The Drayton Harbor Watershed drains approximately 35,102 acres of land and extends from Drayton Harbor approximately 8.5 miles to the east and from the U.S. Canadian border to approximately 7 miles to the south. It includes both the California and Dakota Creek basins and their tributaries.

The Little Campbell River watershed drains approximately 15,539 acres of land and extends from the upper reaches of Little Campbell River, west approximately 16 miles downstream to White Rock, British Columbia and Semiahmoo Bay. Water, originating on the project site, flows northwest within Jacobson Creek for approximately 3.6 miles before joining the Little Campbell River. The Little Campbell River then proceeds another 2.4 miles west before emptying into Semiahmoo Bay, just south of White Rock.

2.2 PROJECT SITE

The site is currently wooded with a network of old logging roads. Historically, the northeastern portion of the site was used for gravel mining. The eastern and southwestern portions of the site were logged within the last ten years, and vegetation in these areas is representative of a regenerating clear-cut left with sparse standing evergreen and deciduous trees. The central and northwestern portions of the site are forested, with evidence of less-recent logging activity throughout, in the form of remnant roadbeds, machinery ruts, and stands dominated by red alder, paper birch, black cottonwood, quacking aspen with a salmonberry dominated understory. More diverse and mature mixed evergreen/deciduous forest plant communities remain within and around wetlands that were protected during past logging.

Topography in the eastern and central portion of the site is sloped towards the center on all sides comprising a bowl-shaped headwaters to Jacobson Creek to the northwest. Water draining the slopes through an extensive network of wetlands and ephemeral streams is detained in an approximately 16 acre shallow pond located on flat topography prior to discharging to Jacobson Creek situated in a distinct ravine to the northwest of the pond.

The western portion of the property is separated from the Little Campbell River drainage to the east by a minor ridge. Topography slopes generally to the west and south with some relatively flat areas and minor depressions. This portion of the site is a headwater contributing basin to the Dakota Creek portion of the Drayton Harbor watershed.

The site contains 52 wetlands totaling approximately 94.5 acres, varying in size from approximately 487 square feet (0.01 acre) to approximately 2,389,035 square feet (54.8 acres). The large wetland covering 54.8 acres includes a 16-acre shallow pond. Although many of the wetlands are connected by hydrology or hydric soils to other wetlands or drainages, they were separated according to their differing characteristics. Each wetland is individually described in the Wetland Delineation Report prepared by Cantrell and Associates, Inc. (CAi) (October 2006). Some wetlands were found to lack surficial hydrologic connections to streams or other wetlands. In places, streams and wetlands follow, or overflow into, remnant roadbeds. Please refer to the CAi *Wetland Delineation Report* for details of individual wetlands.

3.0 IMPACT ASSESSMENT

3.1 WETLANDS

The project has been designed to avoid and minimize wetland and stream impacts to the greatest extent possible. On the 440-acre site, direct wetland and stream impacts have been limited to 19,815 square feet (0.45 acre). Table 1 includes an impact summary for wetlands and buffers on the project site. Impacts to category two wetlands and buffers (as defined by Blaine Municipal Code) include 8,059 square feet of wetland impact and 80,069 square feet of buffer impact. Impacts to category three wetlands (as defined by Blaine Municipal Code) include 946 square feet of wetland impact and 25,484 square feet of buffer impact. Impacts to wetlands not regulated under the Blaine Municipal Code include 10,090 square feet. Additionally, 720 square feet of stream channel impact and 5,636 square feet of stream buffer impact will occur. Impacts to wetlands and streams are primarily limited to road construction activities in order to allow for connectivity throughout the development. The location of impact areas are shown in Appendix A.

Additionally, the proposed development consists of five phases that will be built out separately over a 20-year period. The phases will be built consecutively with wetland and buffer impacts occurring as they are built. Table 2 provides a breakdown of wetland and buffer impacts that would occur within each development phase.

Table 1. Summary of Wetland and Buffer Impacts

Wetland	City of Blaine Regulatory Status	Permanent Wetland Impact (Sq ft)	Permanent Buffer Impact (Sq ft)
A	Category 2	4,122	33,491
B	Category 2	-	5,014
E	Category 3	-	1,502
F	Category 3	-	1,567
G	Category 3	-	752
H	Not regulated	490	-
J	Category 3	-	1,484
K	Category 3	-	295
L	Category 2	-	4,402
N	Category 2	570	8,741
P	Category 2	-	209
Q	Not regulated	269	-
S	Category 3	-	471
X	Not regulated	7,463	-
Y	Not regulated	1,868	-
Z	Category 2	-	3,781
AA	Category 2	-	1,190
CC	Category 2	163	-
FF	Category 3	641	7,658
HH	Category 2	-	874
KK	Category 2	-	4,148
OO	Category 3	-	518
QQ	Category 3	-	2,698
RR	Category 3	-	2,205
SS	Category 3	-	992
TT	Category 2	2,128	6,309
WW	Category 2	457	4,005
ZZ	Category 3	305	5,342
DR-1	COB Stream	600	-
DR-3	COB Stream	120	5,636
Total		19,815	111,189

Table 2. Wetland and Buffer Impacts by Project Phase

Development Area Phase	Permanent Wetland Impact (Sq ft)	Permanent Buffer Impact (Sq ft)
Development Area 1	1,757	9,028
Development Area 2	15,650	59,369
Development Area 3	1,131	18,342
Development Area 4	972	14,205
Development Area 5	305	10,245
Total Impact	19,815	111,189

3.2 FUNCTIONAL ANALYSIS

The following analysis considers the functions currently provided by the wetlands, the contribution of wetland buffers to the maintenance of those functions, and the potential impacts of the project associated with each function. The functional analysis is based on the Washington State Department of Transportation “Wetland Functions Characterization Tool for Linear Projects,” (June 2000), the Washington State Department of Ecology (Ecology) Wetlands in Washington State; Volume 1: A Synthesis of Science (2005), and Methods for Assessing Wetland Functions (1999), and the consulting ecologist’s best professional judgment. The intent of the analysis is to derive mitigation goals to assure maintenance of the existing wetland functions.

3.2.1 Water Quality Improvements

Water quality improvements are assessed by characterizing the amount and type of vegetation present within the wetland. Plants enhance sedimentation by acting like a filter, causing sediment particles to drop to the wetland surface. Other variables include the average slope within slope wetlands, outlet type, and amount of seasonal ponding within depressional wetlands. Additionally, the opportunity to improve water quality is important. This is based on the presence of potential pollutants coming into the wetland (i.e. stormwater discharge, grazing, residential, etc.) that would otherwise reduce water quality in streams, lakes or groundwater down-gradient from the wetland.

Relatively clean water from rain and groundwater sources is routed as surface water in small drainages through a series of depressional wetland areas with standing water and sloped wetlands with saturated soils.

Removal of Nutrients

The complex system of depressional and sloped wetlands on site allows for ample capacity for nutrient removal. Upland vegetation immediately adjacent to wetlands and

drainages also has the capacity to remove nutrients. Some nutrients may be trapped by adsorption onto soil particles in contact with ground and surface water.

Removal of Metals and Toxic Organics

On-site depressional wetland areas with long-term standing water and anaerobic conditions have the capacity to precipitate metals and trap toxic organics. Metals and toxic organics may be trapped by adsorption onto soil particles in contact with contaminated ground and surface water routed through buffer areas throughout the project site.

Removal of Sediment

On-site depressional wetland areas have the capacity to remove sediments. The upland soils and vegetation within the buffer areas also have the capacity to trap sediments.

Impacts

Potential impacts include future nutrient loading from lawns, gardens, and pet sources. There is a potential for future sources of metals and organics from road, driveways, and parking areas and a potential for future sources of sediments, especially during construction phases.

Proposed Mitigation Measures

Mitigation would include planting well vegetated buffers between residences and wetlands and streams and providing information to homeowners encouraging green building practices including reducing or eliminating fertilizers and incorporating filter strips in driveways, roads and parking areas. Best management practices for erosion control during all construction phases would prevent overloading of wetlands and their with sediment.

3.2.2 Functions Associated with Water Quantity

Wetlands have the ability to reduce flooding and stream erosion in downstream areas. This is accomplished through the entrainment, storage, and slow release of water which acts to moderate flood pulses following storm events. Characteristics of this function include the vegetation characteristics (reduction of water velocity in slope wetlands), outlet type, and depth of storage for depressional wetlands. Additionally, the opportunity to reduce flooding and erosion is important. The wetland must be in a location in the watershed where the flood storage or reduction in water velocity it provides helps protect downstream property and aquatic resources.

Reduction in Peak Flows and Decrease in Downstream Erosion

The numerous impoundments, both natural and artificial, serve to reduce peak flows to drainages that flow off-site. The on-site buffers do not appear to contribute to reduction in peak flows except as a source of topographical containment for depressions.

Maintenance of Low Flows during Dry Season

The large central pond serves to maintain a longer season of flow to the outlet stream than if the pond were not present. The outlet stream drains to Canada and is not fish-bearing in US waters. The on-site buffers do not appear to contribute to maintenance of low flows to streams during dry season.

Ground water and Aquifer Recharge

Water sources for the on-site wetlands appear to be caused by rainfall and discharge of groundwater. The water may infiltrate in areas of vertical lenses of course grained soils and gravels. Most of those areas would be expected to be either charged during the wet season or uplands. The wetland buffers may contribute to groundwater infiltration in areas where deep course grained soils and gravel are present, especially when associated with upland depressions.

Impacts

Reductions in capacity to detain or retain water would likely result in less capacity to reduce peak flows. Reductions in capacity to detain or retain water in the pond would likely result in a reduced capacity to maintain low flows to streams during a dry season. Reduction in any buffer or wetland areas of course grained soils and gravels could reduce the capacity for groundwater and aquifer recharge.

Proposed Mitigation Measures

Wetland fill should be avoided where feasible. Unavoidable losses to wetland areas should be compensated for by wetland creation to assure no net loss in water detention and retention capacity. Impervious surfaces should be reduced to the minimum. Rainwater infiltration and dispersion strategies should be incorporated into stormwater management planning to assure no net loss of groundwater and aquifer recharge capacity.

3.2.3 Functions Associated with Habitat

Wetlands can provide habitat value to wildlife species by providing a variety of habitat types, water regimes, habitat features (such as snags and downed logs), and plant species. Additionally, the wetlands opportunity to provide habitat is important as characterized by buffer condition, corridors and connections, position in the landscape, and proximity to other priority habitats.

Habitat for Plant Communities

Plant species in the wetlands were typical of second and third growth mixed forest habitat. The pond contained aquatic species typical of shallow, warm water ponds. No rare plants are reported by the Department of Natural Resources or were observed on site. Some weeds were present. Plant species in the wetlands were typical of second and third growth mixed forest habitat. Some weedy species were present.

Invertebrate Species Habitat

The permanently ponded area and its outlet stream have the best on-site capacity to produce invertebrates. The production is somewhat limited in the pond by warm water and likely depleted oxygen levels in the summer. The outlet stream is limited by lack of year-round flow. The wetlands and uplands surrounding the pond serve as a substantial buffer to the pond and outlet.

Fish Habitat

Native fish populations are not likely to occur within the study area.

Mammal Habitat

The on-site forested wetlands serve as habitat for mammals typical of local forest habitat. The pond supports beaver. The on-site buffers serve as habitat for mammals typical of local forest habitat.

Bird Habitat

The on-site forested wetlands and buffers provide habitat for owls, hawks, woodpeckers, and songbirds. The pond provides habitat for waterfowl including Bufflehead, Canada goose, Common golden eye and lesser scaup. The pond in the central portion of the study area and adjacent forest is listed with Washington Department of Fish and Wildlife as Priority Habitat for cavity-nesting ducks. Priority bird species were not observed within the study area or vicinity during site visits.

Reptile and Amphibian Habitat

Bullfrogs are numerous in the ponded wetland areas. Pacific chorus frog and garter snakes were also fairly common in the forested wetlands. Red-legged frog, rough-skinned newt, western red-backed salamander, northwestern salamander, and western toad may also be present. Buffer areas may support Pacific chorus frogs, garter snakes, red-legged frogs, rough-skinned newts, western red-backed salamanders, northwestern salamanders, and western toads. These species were not observed on the site.

Impacts

Factors that affect water quality have the potential to reduce invertebrate species production. Reductions in wetland and buffer habitat area will result in mammalian habitat loss. Reductions in wetland and buffer habitat area will result in avian habitat loss. Reductions in wetland and buffer habitat area will result in reptile and amphibian habitat loss.

Proposed Mitigation Measures

Avoid wetland fill where feasible. Assure no net loss of wetland habitat. Assure no net loss of buffer habitat. Maintain high water quality in wetlands and streams by assuring well vegetated buffers between residences and wetlands and streams. Provide language to homeowners encouraging green building practices and the reduction or elimination of fertilizers. Incorporate filter strips in driveways, roads and parking areas. Maintain

wildlife corridors between habitat preserve areas where feasible. Provide additional habitat features such as snags, brush piles, and nest boxes. Provide signs indicating the presence of protected critical areas. Provide supplemental planting of native evergreen and deciduous trees to fill gaps in the forest canopy. Establish conservation easements to assure continued protection of preserved habitat features.

4.0 REGULATORY COMPLIANCE

This plan was designed pursuant to the City of Blaine Municipal Code (City), Critical Areas Management, Chapter 17.83.

4.1 CLEAN WATER ACT

Pursuant to Section 404 of the CWA, the U.S. Army Corps of Engineers (Corps) regulates the discharge of dredged and/or fill material into waters of the United States, including wetlands. Projects with minor discharges (generally less than .50 acre) may qualify for the use of a nationwide permit. The Grandis Pond PUD will have less than .50 acre of wetland impact. Total wetland impacts for the proposed development are 0.45 acre of impact.

Ecology is the state agency responsible for administering the CWA Section 401 Water Quality Certification program. Wetlands requiring a Corps permit under Section 404 of the CWA are also subject to the provisions of Section 401. Corps regulations require that a 401 Certification or waiver thereof be issued by the responsible state agency prior to issuing a 404 permit.

4.2 CITY OF BLAINE

The City of Blaine regulates Wetlands through the Blaine Municipal Code, Chapter 17.83 Wetland Management. Section 17.83.210 of the Wetland Management Chapter states the following for regulation of category two wetlands:

Category two wetlands shall have a minimum 50-foot buffer. However, the buffer requirement may be increased and/or averaged where it is demonstrated by a city-approved wetland consultant that certain portions of the wetland are more sensitive to disturbance than others.

Projects shall require full mitigation for losses of wetland functions and values. The determination as to the public interest test shall be made by the city council.

Section 17.83.210 of the Wetland Management Chapter states the following for regulation of category three wetlands:

Category three wetlands shall have a 25-foot setback for impervious structures. No other specific buffer is required. Regulated activities are permitted provided the applicant replaces the function of the wetland through such measures as storm water retention and water quality treatment.

Section 17.83.210 of the Wetland Management Chapter states the following in regards to mitigation for wetland impacts:

Replacement of the impacted wetland will be the preferred alternative for mitigation efforts. All mitigation or creation of wetlands shall be done within the same watershed as the proposed activity.

Impacts to all wetlands and buffers affected by the project will be fully mitigated for and there will be no net loss of wetland functions and values on site. Compensation for impacts to wetlands and buffers for the Grandis Pond PUD will be done through, wetland creation, wetland enhancement, buffer averaging, buffer reforestation, and low impact development.

5.0 MITIGATION

The project has been designed to avoid and minimize critical areas impacts as much as practicable. However, in order to allow for the applicant to build to the urban growth area density and to allow for road connectivity within the development, some impacts are unavoidable.

A combination of wetland creation, wetland enhancement, buffer averaging, buffer reforestation, and low impact development is proposed for compensation of lost wetland and buffer function on the project site. Total permanent wetland and stream impacts will be 19,815 square feet (0.45 acre) and total permanent buffer impact will be 111,189 square feet (2.6 acres). To compensate for these impacts wetlands will be created and enhanced in up to three different areas (both creation and enhancement) within Development Areas 2 and 3.

One of the potential creation and enhancement areas is located at the western edge of Development Area 2 and could be constructed with the Development Area 1 portion of the project. Wetlands will be created at a 1.5 to 1 creation to impact ratio at three possible locations including areas adjacent to Wetlands TT, P, J, and K within Development Area 2. Potential wetland enhancement could be placed within Development Area 3 adjacent to Wetland D. Wetland enhancement will occur within adjacent wetland areas that are disturbed and have the potential for enhancement. Buffer averaging will occur across the project site to enhance and protect existing wetland and buffer functions. Buffer reforestation will be conducted throughout the project site wherever buffer areas have gaps or are disturbed. Impact areas and proposed mitigation are included below in Table 3.

Finally, LID strategies would include reduced road and sidewalk standards, rain gardens/bioswales, and residential lot roof runoff dispersion trenches.

Table 3. Wetland Impacts and Proposed Mitigation

Impact Type	Impact Area (sq ft)	Proposed Mitigation Ratio	Mitigation Area (sq ft)
Wetland Fill	19,815	1.5 : 1 creation 2 : 1 enhancement	29,723 creation 39,630 enhancement
Buffer Impact	111,189	1 : 1	111,189 buffer averaging

Due to the planned phased construction, mitigation areas are located across the project site. The mitigation (wetland creation and enhancement portion) planned for Development Area 1 (at the edge of Development Area 2) will compensate above the level of impacts planned for the phase. Mitigation (wetland creation and enhancement portion) planned within Development Areas 2 or 3 will account for the remaining impacts on the project site. Buffer averaging, buffer restoration, and low impact development will occur across the project site.

5.1 MITIGATION APPROACH

In accordance with the State Environmental Policy Act, the project design went through a series of steps (Chapter 197-11-768 WAC) which are described as follows:

- 1 **Avoid and Minimize.** Throughout all steps of the design process, attempts were made to avoid wetland impacts where possible. Complete avoidance of wetland impacts is not feasible as linear wetland and stream corridors are located across the site. Several design iterations were completed locating roadways and residential lots away from wetland and buffer areas.
- 2 **Minimize.** Throughout all steps of the design process, attempts were made to minimize wetland impacts where possible. This includes the reduction of road widths and lot locations where possible. Several design iterations were completed locating roadways and residential lots away from wetland and buffer areas.
- 3 **Rectify.** If any temporary construction impacts occur to wetlands or their buffers they will be restored to pre-disturbance grades and planted with appropriate native vegetation.
- 4 **Reduce or Eliminate.** During construction, contamination spills and pollution will be reduced by maintaining construction vehicles in good working condition. A Stormwater Pollution Prevention Plan will be developed and implemented.
- 5 **Compensate.** All impacts to wetlands and buffers will be compensated for by establishing, enhancing, and preserving critical areas.
- 6 **Monitor.** The mitigation area will be monitored for a period of five years to determine if the site meets the goals and objectives outlined in this mitigation report. If the site fails to meet its goals and objectives, corrective actions will be taken.

5.2 TYPE AND LOCATION OF MITIGATION

5.2.1 Wetland Creation

Approximately 29,723 square feet of wetland will be created. Created wetland will be a mixture of palustrine scrub/shrub and forested with a seasonally flooded hydrologic regime. The creation areas will be excavated to the elevation of the surrounding wetland to allow existing hydrology to inundate the area. Native trees and shrubs will be installed and habitat features will be added to the area.

5.2.2 Wetland Enhancement

Approximately 39,630 square feet of low quality wetland areas will be enhanced with the installation of native shrubs and trees. Habitat features will be added to the area.

5.2.3 Buffer Averaging

To compensate for lost buffer areas, upland areas adjacent to existing wetland buffers will be included as new buffer within the preserved native growth protection area (NGPA).

5.2.4 Buffer Reforestation

To improve buffer function and improve habitat value, buffers will be reforested as necessary throughout the project site. This will include plantings of native tree species within gaps and disturbed buffer areas.

5.2.5 Low Impact Development

LID strategies that will be included within the proposed development design include the following:

- Roads designed to minimize pavement width with sidewalks on only one side of the street
- Bioretention rain gardens located adjacent to roads within the road right-of-way to reduce conveyance structures, infiltrate stormwater, and slowly convey storm flows
- Dispersion trenches placed behind residential lots to infiltrate roof runoff
- Driveway impervious surface amounts limited by placing two-track pervious strips (grass, gravel, dirt)
- Rain gardens placed around parking areas where possible
- Educational materials provided to the homeowners association to reduce or eliminate outdoor chemical use (pesticides, herbicides, fertilizers) and encourage green building
- Road alignments located parallel with the existing site topography, minimizing site disturbance due to grading

5.3 MITIGATION GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

This mitigation plan has been designed to replace lost wetland functions and area associated with this project. During monitoring activities, performance standards will be measured to ensure the site is meeting the goals and objectives of the mitigation plan. These standards are the primary factors that will be used to judge the success of the mitigation project. While specific performance criteria provide important benchmarks and will help to direct maintenance and contingency efforts, the mitigation goals must also be considered when evaluating mitigation success.

5.3.1 Wetland Creation

(A) **Goal:** *Replace lost water quality and hydrology functions from 19,815 square feet of wetland impact.*

Objective A.1: Create 29,723 square feet of seasonally flooded wetland by excavating and planting native trees and shrubs.

Performance Standard A.1.a: Soils will be inundated or saturated to the surface for at least 10 percent of the growing season, defined as April through mid-October.

Performance Standard A.1.b: Soils within the wetland creation area shall exhibit a minimum of one primary hydric soil indicator or two secondary indicators, as measured at two locations.

Performance Standard A.1.c: Water levels will be sufficient to support facultative or wetter plant species.

(B) **Goal:** *Improve wildlife habitat within the project corridor to create a Category two wetland.*

Objective B.1: Create a native community of scrub-shrub and forest vegetation within 5 years of plant installation.

Performance Standard B.1.a: Invasive species shall not cover more than 5 percent, 10 percent, 15 percent, 20 percent, and 20 percent by the end of Years 1, 2, 3, and 5, respectively, in each vegetation layer.

Performance Standard B.1.b: At least four native shrub species and four native emergent species will dominate the wetland creation area by Year 5.

Performance Standard B.1.c: There will be at least 20, 30, 60, and 80 percent cover of shrub species (excluding cover by invasive species) in the wetland creation area by the end of Years 1, 2, 3, and 5 respectively.

Performance Standard B.1.e: Percent survival of plant species shall be at 100 percent at the end of Year 1. All dead plants will be replaced after the first year.

Objective B.2: Provide habitat features for wildlife, amphibians, fish species, and insects.

Performance Standard B.2.a: A minimum of four logs or root wads will be present within each wetland creation area. Logs will be a minimum of 18 inches in diameter and 10 feet long.

5.3.2 Wetland Enhancement

(A) **Goal:** *Improve fish and wildlife habitat on the site.*

Objective A.1: Improve the functioning of 39,630 square feet of existing disturbed wetland by planting native trees and shrubs.

Performance Standard A.1.a: Invasive species shall not cover more than 5 percent, 10 percent, 15 percent, 20 percent, and 20 percent by the end of Years 1, 2, 3, and 5 respectively, in each vegetation layer.

Performance Standard A.1.b: At least five native shrub species and three native tree species will dominate the enhancement area by Year 5.

Performance Standard A.1.c: There will be at least 20, 40, 60, and 80 percent cover of native tree and shrub species (excluding cover by

invasive species) in the enhancement area by the end of Years 1, 2, 3, and 5 respectively.

Performance Standard A.1.d: Percent survival of plant species shall be at 100 percent at the end of Year 1. All dead plants will be replaced after the first year.

Objective B.2: Provide habitat features for wildlife, amphibians, fish species, and insects.

Performance Standard B.2.a: A minimum of six logs or root wads, three snags, and eight brush piles will be present within the enhancement areas. Logs will be a minimum of 18 inches in diameter and 10 feet long. Snags will be a minimum of 18 inches in diameter and 20 feet tall.

(C) Goal: Provide buffer area around existing wetlands and buffers.

Objective C.1: Designate a 111,189 square foot area of upland area as wetland buffer and include it within the NGPA area.

Performance Standard C.1: A copy of the recorded easement will be provided prior to final plat approval.

(D) Goal: Increase Buffer Function.

Objective D.1: Plant native trees in any buffer area that is un-forested or disturbed. Native tree plantings may include: Western hemlock (*Tsuga heterophylla*), Douglas fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), Sitka spruce (*Picea sitchensis*), Western redcedar (*Thuja plicata*), red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus balsamifera*), birch (*Betula papyrifera*), and bitter cherry (*Prunus emarginata*).

Performance Standard D.1: Disturbed buffer areas and un-forested gaps will contain native tree coverage by the end of the monitoring period. This will be assessed visually and with photographic documentation.

(E) Goal: Implement Low Impact Development.

Objective E.1: Implement low impact development designs within the project design and construction, including reduced road and sidewalk standards and the construction of advanced stormwater treatment on site.

Performance Standard E.1: A copy of the as-built plans would be submitted to the City of Blaine as required.

5.4 MITIGATION INSTALLATION

5.4.1 Mitigation Boundary Flagging

Prior to commencement of any construction-related activities, the boundary of the mitigation area shall be staked in the field. Patches of trees and shrubs shall be flagged for preservation and shall not be disturbed by construction equipment.

5.4.2 Biological Supervision

A restoration biologist will be retained to coordinate implementation of the restoration plan, and will serve as liaison between the property owner, the landscape contractor, and the City of Blaine. It will be the responsibility of the restoration biologist to oversee, monitor, and document the implementation of the mitigation plan, based on field

conditions and unforeseen circumstances. All deviations from this plan shall be reported to the restoration biologist.

5.4.3 Site Preparation and Removal of Invasive Species

Site preparation shall consist of controlling invasive plants; grading and vegetation removal in wetland creation areas; removing trash and debris; and doing any other work necessary to prepare the area for planting.

5.4.4 Mulch

Apply at least four inches of wood chip mulch over the entire wetland creation and enhancement area. Applying the mulch prior to planting will be less labor intensive because the area will be recently cleared and tilled. Separate the mulch from the plant stem by at least three inches. Wood chip mulch shall consist of medium texture (1-3/4 inch maximum dimension), aged for a minimum of one year, free of weeds, weed seed, deleterious materials and foreign materials such as resin, tannin or other compounds harmful to plant life. Wood chip mulch may consist of tree trunks, bark, limbs, branches, and rootwads.

5.4.5 Habitat Features

Habitat features (snags, downed logs/rootwads, and brush piles) shall be installed after mulch application and prior to planting. Logs will be a minimum of 18 inches in diameter and 10 feet long and shall be dispersed randomly throughout the specified areas, as directed by the restoration biologist. Snags will be a minimum of 18 inches in diameter and 20 feet tall. Brush piles shall consist of small and large branches and shall be approximately 10 feet in diameter and six feet tall.

5.4.6 Planting Plan

Planting shall consist of installing plants, installing plant protection devices, and applying mulch. No planting shall be done in any area until the area concerned has been prepared in accordance with the plans and presents an appearance satisfactory to the restoration biologist. The restoration biologist shall be on site periodically during plant installation.

5.4.7 Source of Plant Materials

All plant materials used at the mitigation site shall be grown in the Puget Sound lowlands and obtained from a reputable native plant nursery. The landscape contractor shall provide proof of the plants' source location to the restoration biologist.

5.4.8 Planting Method

Preferably, plants shall be installed between late fall to early spring. If summer installation is proposed, weekly watering shall be required between June and September. No water is available on site.

Container and Bare Root Plants

Container stock and bare root plants shall be thoroughly watered the day before planting. All plants shall be planted in a hole measuring at least twice the diameter of the root ball and twice the depth. Roughen the sides of the hole by hand or with a shovel in the wetland. For container plants, lightly press the sides of the container by hand and roll the container on the ground to loosen the roots. Upend the container into the palm of the hand to avoid damage to the root structure. Carefully separate the roots to encourage outward growth in the soil pit. Root-bound container plants shall be rejected. For bare root plants, after preparing a planting hole, add soil in the shape of a cone up to the middle of the hole. Place the plant over the cone and spread the roots around the cone so that none of the roots are curled or bent. For both bare root plants and container plants, backfill the pit with native soil half-way and water the pit to soak the soil. The top of the root ball shall be set one inch above finish grade. Fill the remainder of the hole and press down firmly on the soil by hand to close any air holes.

Live Stakes

Live stakes may be used only for those plants specified on the Plant Schedule (Tables 4 and 5). Use live stakes only in areas where the soil is saturated at least within 10 inches of the surface. Drive live stakes into the ground with a mallet, leaving at least the top two nodes above the ground.

5.4.9 Plant Protection

Staking of trees is to be avoided unless determined necessary by the restoration biologist. All stakes shall be removed after one year. All stakes shall be removed by the contractor and disposed of off-site in a legal manner.

Vole protectors shall be installed on all tree and shrub plantings. Vole protectors shall consist of a minimum of 1-foot-length spiral tree wrap or approved alternate by the restoration biologist.

5.4.10 Planting Schedules

The following tables provide possible plant lists for each mitigation area. Plants listed may be substituted for plants with similar environmental requirements if approved by the restoration biologist.

Table 4: Wetland Creation

Botanical Name	Common Name	On-Center Spacing	Size/Condition ¹
<i>Lonicera involucrata</i>	Black twinberry	4 ft	1-2 Gal or BR
<i>Salix hookeriana</i>	Hooker willow	4 ft	1-2 Gal or BR or Live Stake
<i>Salix sitchensis</i>	Sitka willow	4 ft	1-2 Gal or BR or Live Stake
<i>Physocarpus capitatus</i>	Pacific ninebark	4 ft	1-2 Gal or BR
<i>Cornus sericea</i>	Red-osier dogwood	4 ft	1-2 Gal or BR
<i>Rosa pisocarpa</i>	Peafruit rose	4 ft	1-2 Gal or BR

Table 5: Wetland Enhancement

Botanical Name	Common Name	On-Center Spacing	Size/Condition
<i>Lonicera involucrata</i>	Black twinberry	4 ft	1-2 Gal or BR
<i>Rubus spectabilis</i>	Salmonberry	4 ft	1-2 Gal or BR
<i>Physocarpus capitatus</i>	Pacific ninebark	4 ft	1-2 Gal or BR
<i>Salix sitchensis</i>	Sitka willow	4 ft	1-2 Gal or BR or Live Stake
<i>Salix hookeriana</i>	Hooker willow	4 ft	1-2 Gal or BR or Live Stake
<i>Salix lucida</i>	Pacific willow	4 ft	1-2 Gal or BR or Live Stake
<i>Salix piperi</i>	Piper willow	4 ft	1-2 Gal or BR or Live Stake
<i>Cornus sericea</i>	Red-osier dogwood	4 ft	1-2 Gal or BR
<i>Rosa pisocarpa</i>	Peafruit rose	4 ft	1-2 Gal or BR
<i>Rosa nutkana</i>	Nootka rose	4 ft	1-2 Gal or BR
<i>Spirea douglasii</i>	Douglas spirea	4 ft	1-2 Gal or BR
<i>Thuja plicata</i>	Western red-cedar	15 ft	1-2 Gal
<i>Populus balsamifera</i>	Black cottonwood	10 ft	1-2 Gal or BR or Live Stake
<i>Picea sitchensis</i>	Sitka spruce	15 ft	1-2 Gal or BR
<i>Populus tremuloides</i>	Quaking aspen	10 ft	1-2 Gal or BR or Live Stake
<i>Betula papyrifera</i>	Paper birch	10 ft	1-2 Gal or BR

¹ If live stakes are selected, the number of stakes installed shall be four times as dense as specified on this table (i.e. four times as many stakes must be installed, compared to the quantity required for containerized or bare root stock).

5.4.11 Post-Construction Meeting

A post-construction review of the completed work shall be conducted with a representative from the City of Blaine, the landscape contractor, Applicant, and restoration biologist to confirm the plan was properly implemented.

5.4.12 Plant Establishment Plan

The landscape contractor shall submit a Plant Establishment Plan for review and approval within 30 days of the post-construction meeting. The Plant Establishment Plan will mark the beginning of the first year warranty period. The Plan shall show the proposed scheduling of activities, materials, and equipment to be utilized for the first year warranty period. Invasive species control schedule shall be defined in the Plan.

5.4.13 Substantial Completion Memorandum and As-Built Drawings

If the restoration biologist deems the project complete, the restoration biologists shall prepare a Substantial Completion Memorandum and attach the as-built drawings and submit them to the City of Blaine. The landscape contractor shall prepare the as-built drawings. Any deviations from the approved mitigation plan shall be hand-drawn over the plan and noted. The landscape contractor shall provide the as-built drawings to the restoration biologist within 45 days after completion of construction for submittal to the City of Blaine with the Final Completion Memorandum.

5.4.14 Mitigation Area Protection

The wetland creation and wetland enhancement mitigation areas will be placed under a conservation easement to prevent future development in these areas. Critical areas signage will be installed in areas visible to the public and will indicate that the area is a critical area and should not be disturbed. A copy of the conservation easement shall be submitted to the City of Blaine after the mitigation plan is installed.

5.5 MONITORING AND MAINTENANCE

5.5.1 Monitoring Activities

The mitigation areas shall be monitored for five years, following the completion of mitigation installation. Annual monitoring reports shall be submitted to the City of Blaine in years 1, 2, 3, and 5. The Year 1 report shall document mitigation site conditions after the mitigation site has been installed and the site has been in existence for one year. Reports shall be due by December 31 of the monitoring year.

Qualified habitat restoration specialists, biologists, or horticulturists with appropriate credentials and experience in native habitat restoration shall perform monitoring and

prepare annual reports. Continuity within the personnel and methodology of monitoring shall be maintained insofar as possible to ensure comparable assessments.

5.5.2 Monitoring Reports

At the end of each of the six monitoring period growing seasons, for the duration of the monitoring period, an annual report will be prepared for submittal to the City of Blaine. Since planting may not occur when planned, monitoring shall be tied to the actual implementation date (e.g., the first annual report shall be delivered by December 31 of the year following the first growing season after planting). These reports will assess both attainment of yearly target success criteria and progress toward final success criteria. These reports shall include the survival and/or replacement of tree and shrub container stock, percent cover of native vegetation, native plant recruitment, and diversity data, as outlined in the Performance Standards. Although not a specific performance standard, the restoration biologist will record wildlife observations within the mitigation area. These reports will also include the following:

- Name and contact information of the permittee and the consultant who is preparing the report
- A summary paragraph defining the purpose of the approved project, acreage, type of aquatic, resources impacted, and mitigation acreage
- Written description of the location of the mitigation project including information to locate the site perimeter
- Dates compensatory mitigation commenced and/or was completed
- Vicinity map indicating location of the mitigation site
- Mitigation site map identifying habitat types, transect locations, photo station locations, etc. as appropriate
- Copies of monitoring panoramic photographs
- Analysis of all qualitative and quantitative monitoring data
- Short statement on whether the performance standards are being met
- Dates of any recent corrective or maintenance activities conducted since the previous report submission
- Specific recommendations for any additional corrective or remedial actions

5.5.3 Monitoring Methods

During the first year, randomly located transects will be marked in the field with stakes and flagging at the end of each transect. The following transects shall be established during the first monitoring year:

- Two 100-foot-long transects shall be established in each wetland creation area.

- Two 100-foot-long transects shall be established in each wetland enhancement area.

Hydrology monitoring locations will also be established and staked in the field during the first monitoring year. Two hydrology monitoring locations shall be identified within the wetland creation area. Transects and hydrology monitoring locations shall be identified on annual monitoring report maps.

Vegetative Cover Sampling Technique

Plant data shall be collected in the summer or early fall of each monitoring year. Percent vegetative coverage measurements will be based on native species only; non-native plant species will be recorded but not counted as cover relative to the performance standards. If the survival and cover requirements have not been met, Whatcom County Public Works is responsible for replacement plantings to achieve these requirements.

Percent canopy cover of the mitigation plantings will be measured by using the line intercept sampling method along 100-foot (or 50-foot) transects. All vegetation that intercepts the transect will be tallied. The results for each plant species and total native coverage (including planted species and native recruits) will be averaged for all transects and compared to the performance standard.

Percent vegetative coverage measurements will be based on native species only; non-native plant species will be recorded but not counted as cover relative to the performance standards. If the survival and cover requirements have not been met, Whatcom County Public Works is responsible for replacement plantings to achieve these requirements.

Hydrology and Soils Monitoring

Hydrology and soils monitoring will be conducted during each annual monitoring visit. Hydrology monitoring will be conducted in the spring (March to May) to allow evaluation of the growing season water table. A minimum of two soil pits will be dug in each wetland creation area to observe hydrology and soils.

Habitat Features

During the first monitoring visit, the mitigation area will be inspected for specified habitat features, identified in the project goals and objectives.

Photo-Documentation

Permanent stations for photo-documentation will be established prior to or during the first annual monitoring event. Panoramic photos will be taken at the permanent stations and included in annual reports. Two photo points will be established in each wetland enhancement area and one in each wetland creation area.

5.6 MAINTENANCE ACTIVITIES

The purpose of this program is to ensure the success of the mitigation plantings. Maintenance will occur over the ten-year life of the required monitoring. The restoration biologist will monitor all aspects of the revegetation in an effort to detect any problems at an early state. Potential problems could arise from vandalism, competition from invasive species, and unacceptable levels of disease and predation. Native plant species that must be removed are listed in Table 6 below.

Table 6: Non-native, Invasive Species that Must Be Removed

Botanical Name	Common Name
<i>Cirsium arvense</i>	Canadian thistle
<i>Clematis vitalba</i>	Travelers Joy
<i>Conium maculatum</i>	Poison hemlock
<i>Convolvulus sepium</i>	Hedge bindweed
<i>Cytisus scoparius</i>	Scotch broom
<i>Hedera helix</i>	English Ivy
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Phalaris arundinacea</i>	Reed canarygrass
<i>Polygonum cuspidatum</i>	Japanese knotweed
<i>Rubus laciniatus</i>	Cutleaf blackberry
<i>Rubus procerus</i>	Himalayan blackberry
<i>Senecio jacobaea</i>	Tansy ragwort
<i>Dipsacus fullorum</i>	Teasel

These maintenance guidelines are specifically tailored for native plant establishment. The maintenance personnel will be fully informed regarding the habitat establishment program so they understand the goals of the effort and the maintenance requirements. A landscape contractor with experience and knowledge in native plant habitat restoration is recommended to perform all mitigation maintenance.

Damage to plants occurring as a result of unusual weather or vandalism will be repaired or replaced immediately.

5.6.1 First Year Warranty Period

The landscape contractor shall warrant all plants to remain healthy and alive for a period of one year after project completion. The landscape contractor shall replace all dead or unhealthy plants, per plans and specifications, which are identified as requiring replacement by the restoration biologist during the one-year warranty inspection.

The landscape contractor shall perform maintenance within the mitigation areas for the first-year warranty period. The landscape contractor shall provide written notification to the Applicant seven days prior to maintenance activities. The landscape contractor shall

also be responsible of removing tree stakes and ties, picking up trash in mitigation areas, and watering newly installed plants the first year.

5.6.2 Maintenance Schedule

Maintenance of the mitigation site shall be conducted on a yearly basis following the annual monitoring event. The Applicant is responsible for hiring a qualified landscape contractor to maintain the mitigation site after the first-year warranty period ends. The restoration biologist shall provide maintenance recommendations to the Applicant and landscape contractor based on the results of the monitoring visit in the monitoring reports.

5.7 COMPLETION OF MITIGATION

5.7.1 Notification of Completion

The Applicant shall notify the City of Blaine in writing when the monitoring period is complete and the agency-approved success criteria have been met. If the City of Blaine determines that the project meets all success criteria at the end of the ten-year monitoring period, the mitigation plan will be considered a success. If not, the City of Blaine will be consulted and must approve contingency measures prior to implementing changes to the plan. Only those areas that fail to meet the success criteria will require additional monitoring. This process will continue until all performance standards are met or until the City determine that other revegetation measures are appropriate.

Should the revegetation effort meet all goals prior to the end of the five-year monitoring period, the City may, at their discretion, terminate the monitoring effort. At that time the Applicant will be released from further maintenance and monitoring requirements of the mitigation area.

If, during the monitoring period, a destructive natural occurrence does occur which damages or destroys the mitigation planting, and if the mitigation planting was documented to have been proceeding well toward establishment, then reconstruction and replanting will not be required.

5.7.2 Agency Confirmation

Following receipt of the final annual monitoring report, the City will contact the Applicant as soon as possible to schedule a site visit to confirm the completion of the compensatory mitigation effort.

5.7.3 Contingency Plan

If a performance standard is not met for all or any portion of the mitigation project in any year, or if the approved success criteria are not met, the restoration biologist will prepare an analysis of the cause(s) of failure and, if determined necessary by the City, propose remedial actions for approval. If the compensatory mitigation site has not met one or

more of the success criteria or performance standards, the Applicant's maintenance and monitoring obligations shall continue until the agencies give final approval the mitigation obligations have been satisfied..

The contingency plan will provide for the remediation of aspects of the mitigation that have prevented the achievement of mitigation goals. If the desired mitigation goals, as measured by the monitoring program and compared against the performance standards, have not been met and cannot be achieved through routine maintenance, then the agencies and the Applicant will make a joint determination on a suitable contingency plan. If the contingency plan is substantial, the agencies could extend the monitoring period. The City will approve contingency measures prior to implementing changes to the plan.

6.0 REFERENCES

- Cantrell and Associates, Inc. 2006. Critical Areas Assessment Report: Wetland Delineation. Bellingham, WA.
- Hruby, T. 2004. Washington State Wetland Rating System for Western Washington - Revised. Washington State Department of Ecology Publication No. 04-06-025. Olympia, WA.
- Washington State Department of Ecology, U.S. Army Corps of Engineers Seattle District, and U.S. Environmental Protection Agency Region 10. March 2006. Wetland Mitigation in Washington State- Part 2: Developing Mitigation Plans (Version 1). Washington State Department of Ecology Publication No. 06-06-011b. Olympia, WA.
- Washington State Department of Ecology. 2005. Stormwater Management Manual for Western Washington. Washington State Department of Ecology Publication No. 05-10-029. Olympia, WA.
- Washington State Department of Ecology. 1997. Washington State Wetland Identification and Delineation Manual. Washington State Department of Ecology Publication No. 96-94. Olympia, WA.

APPENDICES

Appendix A
Conceptual Mitigation Plan Sheets