



**Wetland Buffer Averaging and
Enhancement Plan**

for

**Green Mountain PRD Phase 2
City of Camas, Washington**

Prepared for:

CLB Washington Options Solutions, LLC
2817 NE Ingle Road
Vancouver, Washington 98607
(714) 296-5326

Prepared by:

Ecological Land Services, Inc.
1157 3rd Avenue, Suite 220A
Longview, Washington 98632
(360) 578-1371
ELS #2415.01

November 17, 2016

SIGNATURES

The information and data in this report was compiled and prepared by the undersigned:



Lacey Hoffmann
Biologist



Mara McGrath, PWS
Senior Ecologist

TABLE OF CONTENTS

INTRODUCTION.....	1
PROJECT DESCRIPTION.....	1
WETLAND BUFFER AVERAGING	1
WETLAND BUFFER ENHANCEMENT	1
STORMWATER OUTFALL ENHANCEMENT	2
15-FOOT PROPOSED SANITARY SEWER EASEMENT TO CITY OF CAMAS	2
ASSESSMENT OF IMPACTS IN THE PROJECT AREA.....	3
LOCAL REGULATORY AUTHORITY	3
AVOIDANCE AND MINIMIZATION	3
COMPENSATION MEASURES	3
SITE DESCRIPTION.....	6
METHODS	7
ENHANCMENT PLAN DESCRIPTION.....	8
AVOIDANCE MEASURES	8
MINIMIZATION MEASURES	9
COMPENSATION MEASURES	9
GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS	10
Vegetative Structure	10
Habitat Structure	11
Trail Removal.....	12
Long-term Protection	12
RESPONSIBLE PARTIES	12
FUNCTIONAL ASSESSMENT	13
EXISTING CONDITIONS	13
Vegetation.....	13
Soils	14
Hydrology	14
Habitat.....	15
PROPOSED CONDITIONS	16
Vegetation.....	16
Soils	16
Hydrology	16
Habitat.....	16
WILDLIFE ANALYSIS	16
IMPLEMENTATION PLAN	17
PLANTING SCHEDULE AND EQUIPMENT	17
SPECIFICATIONS FOR SITE PREPARATION, PLANTING, AND MAINTENANCE	18

Prepare Wetland Enhancement Area	18
Install Large Woody Material	18
Remove Golf Cart Path at Wetland J.....	18
Install Natural Barriers and Critical Area Signs	18
General Plant Specifications.....	19
Plant Bareroot/Containerized Trees and Shrubs.....	19
Install Bird Boxes	19
Maintain Wetland Buffer Enhancement Areas.....	19
MONITORING PLAN	20
MONITORING PLOTS	20
Vegetation.....	20
Fauna	21
Soils and Hydrology	21
MONITORING REPORT.....	21
ADAPTIVE MANAGEMENT PLAN	22
REFERENCES	23

LIST OF TABLES

Table 1. Inner Wetland Buffer Impacts and Proposed Mitigation	2
Table 2. Wetland Buffer Averaging.....	2
Table 3. Existing Oak Mitigation Area Impacts and Proposed Mitigation	2
Table 4. Critical Area Wetland Summary	7
Table 5. Critical Area Stream Summary	7
Table 6. Performance Standards for Vegetation by Monitored Year	11
Table 7. Plant Specifications	17
Table 8. Plant Specifications for Stormwater Outfall	18

FIGURES

Figure 1	Vicinity Map
Figure 2	Critical Areas Map
Figure 3	Proposed Conditions Map
Figure 4	Wetlands B & D Buffer Mitigation Plan
Figure 5	Wetland J Buffer Mitigation Plan
Figure 6	Cross Section A-A'
Figure 7	Planting Details

INTRODUCTION

Ecological Land Services, Inc. (ELS) was contracted by CLB Washington Options Solutions to prepare this mitigation plan for Phase 2 of the Green Mountain Planned Residential Development (PRD) into single-family residential lots with parks, trails, and open space (City File No. SUB14-02). Phase 2 includes constructing single-family residences, a road, and a stormwater outfall within wetland buffers.

Parcels involved with this mitigation plan include portions of Clark County Parcel Numbers 173178000, 986037307, 172555000, and 172557000. The project area falls within portions of Sections 17, 20, and 21, Township 2 North, Range 3 East of the Willamette Meridian (Figure 1). This report describes mitigation activities in accordance with the *City of Camas Municipal Code (CMC) Wetlands Chapter 16.53* and *Sensitive Areas and Open Space Chapter 18.31*. Mitigation activities associated with a road crossing and a pedestrian trail within a Type Np stream buffer have been discussed in accordance with *CMC Fish and Wildlife Habitat Conservation Areas Chapter 16.61*, within the *Stream Buffer Averaging and Enhancement Plan*, prepared for the *Green Mountain PRD Phase 2* (ELS 2016b).

PROJECT DESCRIPTION

Phase 2 of the Green Mountain PRD development includes constructing 230 single-family residential lots with parks, trails, and open space. Access to the northwestern portion of Phase 2 of the PRD will be accomplished through constructing a road, to be installed within the buffers of two Category III wetlands. Portions of residential lots are proposed within the outer wetland buffer of both Category III wetlands. This road and three residential lots also occur within an oak establishment/understory enhancement area from the *Oregon White Oak Mitigation Plan for Green Mountain Mixed Use PRD – Phase 1* (City File No. SAB14-02) and an addendum (ELS 2016d; Table 3). Additionally, one stormwater outfall is proposed within the inner buffer of one Category III wetland, and one 15-foot sanitary sewer easement for the City of Camas is proposed within the buffer of one Category III wetland.

WETLAND BUFFER AVERAGING

A total of 13,732 square feet of outer wetland buffer will be averaged-out (removed from buffer), and this 13,732 square feet will be averaged-in (added to existing buffer) to the existing wetland buffers at a 1:1 ratio (Table 2). Buffer averaging is proposed on Wetlands B, D, and J.

WETLAND BUFFER ENHANCEMENT

To compensate for the 3,943 square feet of impacts to the inner 60 feet of the wetland buffers for installing the road, a total of 11,829 square feet of the buffer addition areas will be enhanced with native tree and shrub species and habitat features, for an overall enhancement ratio of 3:1 (Table1). Wetland buffer enhancement is proposed on Wetlands B and D.

STORMWATER OUTFALL ENHANCEMENT

One stormwater outfall is proposed within the inner buffer of Wetland G, with up to 250 square feet of impact (Table 2). The design of this outfall is preliminary and the location will be determined with the final engineering design. All stormwater will be treated prior to release from the stormwater facility.

15-FOOT PROPOSED SANITARY SEWER EASEMENT TO CITY OF CAMAS

A 15-foot sanitary sewer easement to the City of Camas is proposed within the buffer of Wetland J. No engineering designs are available at this time, however underground facilities are allowed within wetland buffers per *CMC 16.53.050(D)(7)*, therefore no mitigation is proposed with this utility, and bare soils will be seeded with a native seed mix or mulched after work is complete.

Table 1. Inner Wetland Buffer Impacts and Proposed Mitigation

Critical Area	Category	Impact Area (sq. ft.)	Mitigation			
			Type	Ratio	Location	Area (sq. ft.)
Road Installation						
Wetland B Buffer	III	2,739	Enhancement	3:1	Wetland B buffer	8,217
Wetland D Buffer	III	1,204	Enhancement	3:1	Wetland D buffer	3,612
Total Impact		3,943	Total Buffer Enhancement			11,829
Stormwater Outfall						
Wetland G Buffer	III	250	Enhancement	1:1	Release point of treated water at outfall	250
Total Buffer Enhancement						250

Table 2. Wetland Buffer Averaging

Critical Area	Category	Wetland Buffer Averaging (sq. ft.)		Overall Ratio (average-out : average-in)
		Average-out	Average-in	
Wetland B Buffer	III	4,520	4,520	1:1
Wetland D Buffer	III	5,555	5,555	
Wetland J Buffer	III	3,657	3,657	
Total		13,732	13,732	

Table 3. Existing Oak Mitigation Area Impacts and Proposed Mitigation

Critical Area	Location	Impact Area (sq. ft.)	Mitigation			
			Type	Ratio	Location	Area (sq. ft.)
Oak Mitigation Area	Wetland D SW buffer	1,816	Replacing oak establishment/enhancement area	1:1	Wetland D NE buffer	1,816
Total						1,816¹

¹ Details on oak mitigation area replacement/enhancement are provided in an addendum to the *Oregon White Oak Mitigation Plan for Green Mountain Mixed Use PRD – Phase 1* (ELS 2016d).

ASSESSMENT OF IMPACTS IN THE PROJECT AREA

Impacts associated with road installation within the inner 50 percent (inner 60 feet) of the buffers on Wetlands B and D will be permanent due to the new impervious surface coverage. Indirect impacts include a decrease of surface runoff to the wetlands through the loss of 2,739 square feet of Wetland B buffer and 1,204 square feet of Wetland D buffer. This surface runoff from the road will be directed to a stormwater facility for treatment. Areas proposed for road construction consist of former golf course which continues to be mowed, so there will be minimal impacts from vegetation removal. Due to the redirection of a minimal amount of surface runoff, hydrology to the wetland will not be adversely impacted.

LOCAL REGULATORY AUTHORITY

Per *CMC Chapter 16.53, Wetlands*, wetlands constitute important natural resources which provide significant environmental functions, and require the establishment of wetland buffers to protect these functions. The wetland buffer impacts and need for buffer averaging associated with this project include:

- Installing one road for access to the northwest portion of Phase 2,
- constructing single-family residential lots, and
- installing/constructing a stormwater outfall.

Wetland buffer averaging and buffer enhancement are proposed to mitigate for these impacts. This wetland buffer averaging and enhancement plan meets the general mitigation sequencing and performance standards as required in *CMC 16.51.050* as applicable to the project (in italics) as follows:

Per *CMC 16.51.170, General Provisions - Mitigation Sequencing*:

Applicants shall demonstrate that reasonable efforts have been examined with the intent to mitigate impacts to critical areas. When an alteration to a critical area is proposed, mitigation can be accomplished through a variety of methods. Generally, avoiding the impact altogether is the preferred option. Methods to reduce impacts and mitigate for them should follow a series of steps taken in sequential order:

AVOIDANCE AND MINIMIZATION

Avoiding the critical areas and regulated buffers was a primary consideration when designing the PRD. All wetlands have been avoided, and wetland buffer impacts or buffer averaging have been limited to a single road crossing, less than 10 residential lots of the 230 lots proposed, and one stormwater outfall. The pedestrian trails have been placed on existing golf cart paths.

COMPENSATION MEASURES

Buffer averaging and mitigation in the form of buffer enhancement within wetland buffers is proposed for Phase 2 of the PRD. The goal of the enhancement plan is to ensure no net loss of ecological function of wetland buffers within the project area by improving the functions of the remaining portion of the buffer and buffer average-in areas through planting native trees and shrubs. The following standards are set forth

and required according to CMC 16.53.050, *Wetland Permits*. Sections of the CMC which are applicable to the proposed project are only included within this discussion.

1. CMC 16.53.050(C)(2)(a through d) - *Buffer Averaging*. Averaging buffers is allowed in conjunction with any of the other provisions for reductions in buffer width (listed in subsection (C)(1) of this section) provided that minimum buffer widths listed in subsection (C)(1)(c) of this section are adhered to. The community development department shall have the authority to average buffer widths on a case-by-case basis, where a qualified wetlands professional demonstrates, as part of a critical area report, that all of the following criteria are met:

- a. *The total area contained in the buffer after averaging is no less than that contained within the buffer prior to averaging;*

The table below documents the square footage of each wetland buffer proposed for average-out, versus the square footage of average-in, demonstrating the total area contained in the buffer after averaging is the same as contained within the buffer prior to averaging.

Wetland Buffer	Wetland Buffer Averaging (sq. ft.)		Overall Ratio (average-in : average-out)
	Average-out	Average-in	
Wetland B	4,520	4,520	1:1
Wetland D	5,555	5,555	
Wetland J	3,657	3,657	
Total	13,732	13,732	

- b. *Decreases in width are generally located where wetland functions may be less sensitive to adjacent land uses, and increases are generally located where wetland functions may be more sensitive to adjacent land uses, to achieve no net loss or a net gain in functions;*

Areas proposed for average-out along Wetland B consist of mostly former golf course which continues to be mowed, with a small portion of forested area. The installed lots along the average-out areas will have fences along the wetland buffer to protect the wetland from human disturbances. Areas proposed for average-in are mainly forested areas which are more sensitive to adjacent land uses, therefore replacing the average-out areas with the average-in areas will result in no net loss of wetland functions, and conversely there will be a slight gain. Areas proposed for average-out along Wetlands D and J consists of mostly former golf course. Averaging-in sections contiguous with the existing buffer which are former golf course will result in no net loss of wetland functions. Additionally, an existing golf cart path along the northern buffer of wetland J will be decommissioned, and the compacted gravel will be removed. This will result in buffer averaging-in areas which will be completely contiguous with the existing buffer. This will also provide a larger area of protection for the wetland where the buffer was functionally isolated due to the compacted gravel golf cart path (Figure 5).

- c. *The averaged buffer, at its narrowest point, shall not result in a width less than seventy-five percent of the required width, provided that minimum buffer widths shall never be less than fifty feet for all Category I, Category II, and Category III wetlands, and twenty-five feet for all Category IV wetlands; and*

The designated buffer on Category III Wetlands B and D is 80 feet. Seventy-five percent of this base buffer width is 60 feet, and buffer averaging-out is not proposed any closer than 60 feet from these wetlands. Any impacts within 60 feet of Wetlands B and D have been quantified and mitigated for through buffer addition and enhancement. The designated buffer width on Category III Wetland J is 135 feet. Seventy-five percent of this base buffer width is 101.25 feet, and averaging-out is not proposed any closer than 101.25 feet from the wetland. The minimum buffer widths proposed will not be less than 50 feet, as required for Category III wetlands.

- d. *Effect of Mitigation. If wetland mitigation occurs such that the rating of the wetland changes, the requirements for the category of the wetland after mitigation shall apply.*

Enhancement within the buffer average-in areas will not result in an increase in wetland rating. The scores according to the wetland rating system may slightly increase due to the enhancement within the buffers, however the category of the wetlands will not because no direct wetland enhancement is proposed.

2. *CMC 16.53.050(C)(3)(i) - Stormwater Facilities. Stormwater facilities are only allowed in buffers of wetlands with low habitat function (less than four points on the habitat section of the rating system form); provided, the facilities shall be built on the outer edge of the buffer and not degrade the existing buffer function, and are designed to blend with the natural landscape. Unless determined otherwise by the responsible official, the following activities shall be considered to degrade a wetland buffer when they are associated with the construction of a stormwater facility:*

- i. *The placement of rock and/or riprap, except for the construction of flow spreaders, or the protection of pipe outfalls and overflow spillways; provided that buffer functions for areas covered in rock and/or riprap are replaced.*

A stormwater facility associated with Phase 1 of the PRD has been approved and is being prepped for installation within the buffer of Wetland G (ELS 2014). This stormwater facility is to be shared between Phases 1 and 2; however a stormwater outfall, with up to 250 square feet of impact, is proposed within the inner buffer of Wetland G that was not covered within the Phase 1 mitigation. The design of the stormwater outfall is preliminary, and the location will be determined with the final engineering. To mitigate for up to 250 square feet of permanent impacts associated with installing the riprap outfall, 20 shrubs will be planted where treated stormwater is to be released. Shrub installation will help to impede erosion, filter out sediments, and shade the water. Digging the trench for the underground pipe will include only temporary impacts, and bare soils

will be seeded with a native upland seed mix or mulched to prevent erosion. By installing the native shrubs, the buffer functions for areas covered in riprap will be replaced, and may promote the spread of volunteer native shrubs within the wetland buffer.

3. *CMC 16.53.050©(4)(a and b) - Road and Utility Crossings. Crossing buffers with new roads and utilities is allowed provided all the following conditions are met:*

a. Buffer functions, as they pertain to protection of the adjacent wetland and its functions, are replaced

A road is proposed to cross the buffers of Wetlands B and D. This road was designed to match the alignment of an existing road from Phase 1 of the PRD, and has been placed so as to minimize impacts to the buffer. Natural barriers, critical area signs, and large woody material will be placed along this road crossing to deter entrance into the wetland buffers. The lost functions from the road crossing will be replaced through buffer enhancement to the buffer average-in areas at an overall enhancement ratio of 3:1 (Figure 4). Enhancing the average-in areas will help to provide better habitat diversity and create a buffer which will provide additional protection to the wetland which exceeds current conditions.

b. Impacts to the buffer and wetland are minimized.

Impacts to the buffers and wetlands were minimized to the greatest extent possible. If this road were to not be installed, a total of 13 lots would be inaccessible. The layout of the road was carefully examined and placed in the area that would have the least amount of impacts to vegetation within the wetland buffers, while avoiding all direct wetland fills.

SITE DESCRIPTION

The majority of the study area is located north of NE Goodwin Road, south of NE 48th Circle (on the southwest slope of Green Mountain), and east of NE Ingles Road (Figures 1 and 2). The former Green Mountain Golf Course, which closed in February 2016, encompasses a large portion of the PRD. The northwestern corner of the PRD is an undeveloped mixed deciduous-coniferous forest. Topography slopes generally to the south and southwest, with the lowest elevation being in the southern corner of the site. Surrounding land use includes residential and forested areas to the north and east, and residential and agricultural uses to the south and west.

Approximately 65 Oregon white oak trees (*Quercus garryana*) were inventoried within the PRD Phase 2 boundaries, outside of the Phase 1 development. Most of the Oregon white oak trees within Phase 2 are located within a riparian corridor. Two streams and seven wetlands are located within the Phase 2 boundaries (Tables 4 and 5).

Table 4. Critical Area Wetland Summary

Wetland Name (size)	Cowardin Classification ¹ /HGM	State/Local Classification ²	Habitat Score ²	Proposed Land Use Intensity ³	Standard Buffer Width ⁴ (feet)
Wetland B (4.48 acres onsite)	FO, SS, EM/slope	Category III ⁷	21	High	80 ⁵
Wetland D (0.99 acres)	SS & EM/depressional	Category III ⁷	18	High	80 ⁵
Wetland G (1.94 acres)	SS & EM/slope	Category III ⁷	16	High	80 ⁵
Wetland J (0.61 acres)	SS & EM/slope	Category III	6	High	135
Wetland L (0.07 acres)	SS & EM/slope	Category III	5	High	120
Wetland M (0.07 acres)	FO & SS/slope	Category III	6	High	135
Wetland O (0.02 acres)	SS & EM/slope	Category IV ⁷	13	High	50 ⁵

¹Cowardin *et al.* 1979

²According to Hruby 2014 and Hruby 2004

³According to *CMC Table 16.53.040-4*

⁴According to *CMC Table 16.53.040-1* and *Table 16.53.040-3*

⁵See the *Critical Areas Report for Green Mountain PRD Phase 2*, for buffer designations on vested wetlands B, D, G, and O.

The buffers for Wetlands B, D, G and O were vested by the City of Camas in December 2014, under municipal code active at the time of the approval for Phase 1 of the Green Mountain PRD (City File No. SUB14-02) as they involved critical areas analyses. Also add: Wetlands buffers for Wetland J were not vested with Phase 1 approvals, and therefore follow the most recent regulations contained within *CMC Chapter 16.53 Wetlands*.

Table 5. Critical Area Stream Summary

Stream Name	DNR Stream Type	Stream Buffer Width ¹ (feet)
Stream A	Type Np (non-fish, perennial)	50
Stream B	Type Ns (non-fish, seasonal)	25

¹According to *CMC 16.61.040(D)*, stream buffer widths shall be measured outward, on the horizontal plane, from the ordinary high water mark. This determination is preliminary until reviewed, modified and/or approved by the City of Camas.

METHODS

ELS methodology follows the U.S. Army Corps of Engineers Routine Determination Method described in the Wetland Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual:

Western Mountains, Valleys, and Coast Region (Version 2.0) (U.S. Army Corps of Engineers 2010). For regulatory purposes under the Clean Water Act (Section 404), the Environmental Protection Agency (EPA) defines wetlands as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (EPA 2014). Wetlands are regulated as “Waters of the United States” by the U.S. Army Corps of Engineers (Corps), as “Waters of the State” by the Washington Department of Ecology (Ecology), and locally by the City of Camas.

ELS biologists conducted site visits on February 29, 2016 and March 1, 2016 to collect vegetation, soils, and hydrology data, and to make determinations about the presence or absence of critical areas onsite. We identified and delineated seven wetlands onsite. ELS biologists flagged wetland boundaries with consecutively numbered pin flagging or tape flagging labeled “WETLAND BOUNDARY”. Vegetation, hydrology, and soil data were collected from thirteen test plots to determine presence or absence of positive wetland indicators (Appendix A). Topographical changes were also utilized to assist wetland boundary delineation. Test plot locations were recorded by ELS using a hand-held Trimble GPS unit capable of sub-meter accuracy. Olson Engineering, Inc. surveyed the wetland boundaries.

ENHANCEMENT PLAN DESCRIPTION

This plan describes a series of measures that will be implemented to avoid, minimize, and compensate for inner buffer impacts to Wetlands B and D, as well as inner buffer impacts to Wetland G from installing the stormwater outfall. Allowed uses and activities within wetland buffers per *CMC* discussed in the *Mitigation* section of this report include:

- Inner buffer impacts to Wetlands B and D resulting from installing a road for access to residential lots north of the wetlands.
- Inner buffer impacts to Wetland G for installing a stormwater outfall.
- Buffer averaging to Wetlands B, D, and J from constructing residential lots within the outer portions of the buffers.

AVOIDANCE MEASURES

Avoiding impacts to critical areas, including Oregon white oaks, wetlands, wetland buffers, streams, and stream buffers, were the primary consideration when designing Phase 2 of the PRD. The project has been re-engineered multiple times to develop a plat design that would enable the economic viability of the site, while avoiding critical areas to every extent practicable. The proposed plat avoids all but 3,943 square feet of inner wetland buffer impacts from a road crossing (an allowed activity per the *CMC*). Impacts to the stream buffer and proposed stream buffer averaging, as well as impacts to Oregon white oaks are addressed in separate mitigation plans (ELS 2016b, 2016c). To avoid additional impacts to the wetlands and their buffers during construction, the following avoidance measures will be implemented:

- Clearing limits will be demarcated with silt fencing or similar erosion control measures.

- Construction access and staging areas will avoid all critical areas onsite and located within uplands.
- Best management practices, including silt fencing or similar measures will be utilized to control sedimentation and general ground disturbance.

MINIMIZATION MEASURES

In addition to the avoidance measures made possible by the preliminary plat redesign, the following minimization measures will further reduce impacts to the wetland buffer and minimize habitat disruption beyond the extent required to undertake the proposal. The minimization measures are as follows:

1. Install temporary construction fencing as needed around the mitigation and construction areas.
2. Design site grading to avoid construction activity within the wetland buffer average-in and wetland buffer enhancement areas to every extent practicable.

COMPENSATION MEASURES

Wetland Buffer Averaging - A total of 13,732 square feet of outer wetland buffer will be averaged-out and commensurate area averaged-in for no net loss of wetland buffer area, as allowed per *CMC 16.53.050(C)(2)* (Figures 4 and 5).

Wetland Buffer Enhancement - A total of 3,943 square feet of inner wetland buffer will be impacted and 11,829 square feet of wetland buffer will be enhanced with native trees and shrubs for a total enhancement ratio of 3:1 (Figure 4).

Stormwater Outfall Enhancement - One stormwater outfall with 250 square feet of impact is proposed within the inner buffer of Wetland G, as allowed by *CMC 16.53.050(C)(3)(i)* (Figure 5). Once the location of the outfall is known, 250 square feet downslope of the outfall will be enhanced with 20 native shrubs (Figure 7). Shrub installation will help to impede erosion, filter out sediments, and shade the water replacing impacted buffer functions.

15-foot Proposed Sanitary Sewer Easement to City of Camas - One 15-foot sanitary sewer easement to the City of Camas is proposed crossing the Buffer of Wetland J within Phase 2 (Figure 5). No engineering designs are available at this time, however underground facilities are allowed within wetland buffers per *CMC 16.53.050(D)(7)*, provided that the following conditions are met:

- a. The activity does not result in a decrease in wetland acreage or classification;*
Installing a sanitary sewer line within the buffer of Wetland J will not result in a decrease in wetland acreage or classification. Vegetation to be removed to dig the trench consists of mowed grasses, and any bare soils after the pipes are installed will be seeded with a native grass mix or mulched to prevent erosion.

- b. *The activity results in no more than a short-term six-month decrease in wetland functions; and*

The activity will not adversely affect wetland functions. A slight decrease in water filtration will occur within the wetland buffer due to bare soils exposed after the trench is backfilled, however immediate seeding or mulching in these areas will ensure vegetation is replaced in a timely manner, resulting in no decrease in wetland functions overall.

- c. *Impacts to the wetland are minimized.*

Impacts to the wetland will be minimized to the greatest extent possible, and minimization measures include installing temporary construction fencing around the areas for trench digging, limiting staging areas outside of the wetland buffer, and limiting construction access to the buffer as much as possible.

GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

The goal of this wetland buffer averaging and enhancement plan is to replace any lost functions of the wetland buffers due to road, residential lot, and stormwater outfall construction. To accomplish this, the following objectives and performance standards are appropriate to ensure the success of the onsite mitigation.

Vegetative Structure

Wetland Buffer Enhancement Areas

Objective 1. Establish a multi strata wetland buffer consisting of native shrubs and trees to compensate for impacts to the existing wetland buffer and to enhance vegetative structure and habitat functions.

Performance Standard 1a. Planted native trees and shrubs in the enhancement areas will achieve at least 90 percent survival in Year 1. Dead plants will be replaced if this performance standard is not met.

Performance Standard 1b. Planted native trees and shrubs in the enhancement areas will achieve at least 80 percent survival in Year 2. Dead plants will be replaced if this performance standard is not met.

Performance Standard 1c. Planted native trees and shrubs in the enhancement areas will achieve at least 75 percent survival in Year 3. Dead plants will be replaced if this performance standard is not met.

Performance Standard 1d. By Year 5, the enhanced wetland buffer will have a minimum 25 percent cover by native trees and 10 percent cover by native shrubs. Dead plants will be replaced if this performance standard is not met.

Performance Standard 1e. By Year 7, the enhanced wetland buffer will have a minimum 35 percent cover by native trees and 15 percent cover by native shrubs. Dead plants will be replaced if this performance standard is not met.

Performance Standard 1f. By Year 10, the enhanced wetland buffer will have a minimum 50 percent cover by native trees and 30 percent cover by shrubs. Dead plants will be replaced if this performance standard is not met.

Performance Standard 1g. In all years, non-native invasive plant species, except for reed canarygrass, will not exceed 10 percent cover within the wetland buffer enhancement area.

Performance Standard 1h. In all years, non-native invasive plant species infestations covering 200 square feet or more, but not sampled as a part of the monitoring methods, will be documented by species and location, and control measures will be implemented.

Performance Standard 1i. In all years, state-listed Class A noxious weeds, non-native knotweeds (*Polygonum cuspidatum*, *P. polystachyum*, *P. sachalinense*, and *P. bohemicum*), and English ivy (*Hedera helix*) will be eradicated from the wetland buffer enhancement area.

Habitat Structure

Objective 2. Install habitat features to favor small mammals and birds to improve habitat functions.

Performance Standard 2a. Place a minimum of 3 horizontal logs, at least 12 inches DBH and 10 feet long, within the enhancement areas. The performance standard is completed when the horizontal logs are installed and documented in the first annual monitoring report. The horizontal specifications are in the *Implementation Plan*.

Performance Standard 2b. Install a minimum of 3 bird boxes within the enhancement areas. This performance standard is completed when the bird boxes are installed and documented in the first annual monitoring report.

Table 6. Performance Standards for Vegetation by Monitored Year

	Percent Survival and Cover					
	Year 1	Year 2	Year 3	Year 5	Year 7	Year 10
Tree Strata						
Survival	90%	80%	75%	--	--	--
Cover ¹	--	--	--	25%	35%	50%
Shrub Strata						
Survival	90%	80%	75%	--	--	--
Cover ¹	--	--	--	10%	15%	30%
Invasive Plants						
Cover of non-native, invasive plants, excluding reed canarygrass	<10%	<10%	<10%	<10%	<10%	<10%

¹ Includes naturally recruited species.

Trail Removal

Objective 3. Provide contiguous buffer average-in at the northern buffer of Wetland J through removal of the compact gravel cart path.

Performance Standard 3a. Remove the compacted gravel and tear or rip up native soils. Seed the exposed soils with a native upland seed mix. This performance standard is complete when photo documentation within the Year 0 as-built demonstrates the trail has been removed.

Long-term Protection

Objective 4. Provide signage between the development and the critical area buffers.

Performance Standard 4a. Install signs on metal or wood posts at minimum of 100-foot intervals or 1 per lot along the boundary of the critical areas bordering the development. The signs will state language similar to the following: “critical area buffer” and “please respect native plants and wildlife, protection of this natural area is in your care.” This performance standard is completed when signs are installed and documented in the first annual monitoring report.

Performance Standard 4b. Install natural barriers where needed around the boundary of the critical areas bordering the development. This performance standard is completed when the natural barriers are installed and documented in the first annual monitoring report.

Objective 5. Provide legally binding protection for the wetland buffer averaging and enhancement areas.

Performance Standard 5a. A conservation covenant or similar legal mechanism will be executed and recorded for the mitigation areas. The covenant, absent amendment by mutual agreement between the grantor and the City, will prohibit development of the area identified in the covenant, but will allow for maintenance and further mitigation opportunities. This performance standard shall be considered satisfied upon administrative approval of the covenant by the City, execution of the covenant by the grantor, and the covenant’s recording in Clark County.

Performance Standard 5b. The covenant referenced in Performance Standard 3a shall be referenced in the project’s Covenants, Codes, and Restrictions.

RESPONSIBLE PARTIES

The Applicant or its successors or assigns will be responsible for implementing this stream buffer averaging and enhancement plan, which includes preserving existing critical areas onsite and extending the existing riparian habitat corridor, planting native trees and shrubs, installing bird boxes, and physically and legally protecting the mitigation areas. Neither the Applicant nor any successor or assign shall be responsible for or be required to mitigate the effects of acts of nature that damage or kill trees, including fungal disease, windthrow or ice storms. The Applicant or its successors and assigns) also will conduct the prescribed maintenance and monitoring during the 10-year monitoring period or longer if warranted by contingency actions.

FUNCTIONAL ASSESSMENT

EXISTING CONDITIONS

The Green Mountain property was converted into a golf course in 1990 and expanded the year after. The golf course closed in spring 2016, but the site continues to be regularly mowed. Two streams and seven Category III and IV wetlands are located within Phase 2. Of the critical areas present, four wetland buffers are located within the action area for the project; the buffers for Wetland B, D, G, and J; therefore these wetlands and buffers are discussed within this functional assessment.

Vegetation

Wetland Buffers

The buffer of Wetland B is dominated by an overstory of black cottonwood, Oregon white oak, and Douglas fir (*Pseudotsuga menziesii*). The dense shrub stratum consists of native shrubs common snowberry (*Symphoricarpos albus*), redosier dogwood (*Cornus sericea*), salal (*Gaultheria shallon*), and trailing blackberry (*Rubus ursinus*). Portions of the eastern end of this wetland's buffer are functionally isolated by the compacted gravel golf cart paths. A noteworthy invasive shrub is Himalayan blackberry (*Rubus armeniacus*) scattered throughout the wetland buffer in patches. This wetland buffer is vegetated throughout, and contains only a small portion of former golf course which is still mowed, in the northeast portion of the buffer.

In the northern portion of Wetland D's buffer, the overstory is comprised of widely spaced Oregon white oak, bigleaf maple (*Acer macrophyllum*), black cottonwood, and Oregon ash. Red alder (*Alnus rubra*) and scouler willow (*Salix scouleriana*) are subordinate tree species. The shrub layer is sparse, although common snowberry, pacific ninebark (*Physcarpus capitatus*), and peafruit rose (*Rosa pisocarpa*) are noteworthy along the wetland boundary. Portions of the northeastern end of this wetland's buffer are functionally isolated by the compacted gravel golf cart paths. Himalayan blackberry is present in non-mowed areas along the wetland boundary and the northwestern buffer. Portions of the buffer were planted in spring 2016 as an oak and wetland buffer mitigation area for Phase 1. The majority of the understory is comprised of herbaceous plants, such as reed canarygrass, Canada thistle (*Cirsium arvense*), and other weedy grasses and forbs. The southern buffer of Wetland D lacks a mature overstory or shrub layer, but will develop over time.

Wetland G's buffer is dominated by grasses associated with the former golf course, with unmaintained areas of reed canarygrass, bull thistle (*Cirsium vulgare*), tall fescue (*Schedonorus arundinaceus*), and red fescue (*Festuca rubra*). Individual Oregon white oaks were the main tree species present within the buffer, with trailing blackberry the main species within the shrub stratum. Portions of the northern end of this wetland's buffer are functionally isolated by a paved road. A noteworthy invasive shrub is Himalayan blackberry scattered throughout the wetland buffer in patches.

The buffer of Wetland J is dominated by grasses associated with the former golf course, with coverage by Himalayan blackberry. This wetland buffer is functionally isolated by existing compacted gravel golf cart paths along the northern and western buffers. This buffer is connected to the stream buffer and riparian corridor of Stream A; however, there is only maintained golf course between the two critical areas.

Soils

The National Resources Conservation Service map depicts the six soil units onsite as Cove silty clay loam, 0 to 3 percent slopes (CvA), Dollar loam, 0 to 5 percent slopes (DoB), Lauren gravelly loam, 0 to 8 percent slopes (LgB), McBee silt loam, coarse variant, 0 to 3 percent slopes (MIA), and Olympic stony clay loams, 3 to 30 and 30 to 60 percent slopes (OmE and OmF, respectively) (NRCS 2014).

Hydrology

Hydroperiods within Wetland B consist of seasonally and occasionally flooded or inundated, as well as saturated only. This wetland scored low for hydrologic functions (5 points) because dense, uncut, rigid vegetation covers greater than ½, but less than 90 percent of the wetland, and the wetland does not have the opportunity to reduce flooding and erosion due to its position in the landscape where the reduction in water velocity it provides does not protect downstream property. Wetland B scored moderate for water quality functions (14 points) because it has a slope of 2- to 5-percent, the dense, ungrazed, herbaceous vegetation covers greater than 90 percent of the wetland, and there are residential, urban areas, or golf courses within 150 feet upslope of the wetland. Wetland B was rated according to *Washington State Wetlands Rating System for Western Washington, Revised* (Hruby 2004).

The wetland ratings are according to the *Washington State Wetlands Rating System for Western Washington, Revised* (Rating System) (Hruby 2014; Figure 2; Appendix B). Wetlands B, D, G, and O ratings are according to the *Washington State Wetlands Rating System for Western Washington, Revised* (Hruby 2004; Appendix C).

Hydroperiods within Wetland D consist of seasonally and occasionally flooded or inundated, as well as saturated only. This wetland scored low for hydrologic functions (8 points) because the unit has an intermittently flowing or highly constricted permanently flowing outlet, marks of ponding are 0.5- to 2-feet from the surface or bottom of the outlet, the area of the contributing basin is 10- to 100-times the area of the wetland unit, and the wetland does not have the opportunity to reduce flooding and erosion because the wetland is not in the headwater of a river or stream that has flooding problems, nor does it drain to one. Wetland D scored moderate for water quality functions (14 points) because it does have an outlet, has persistent, ungrazed, vegetation greater than ½ of the area, the seasonally ponded areas are less than ¼ of the total area of the wetland, and there are residential, urban areas, and/or golf courses within 150 feet of the wetland. Wetland D was rated according to *Washington State Wetlands Rating System for Western Washington, Revised* (Hruby 2004).

Hydroperiods within Wetland G consist of occasionally flooded or inundated and saturated only. This wetland scored low for hydrologic functions (5 points) because less than ½ of the wetland has dense, uncut rigid vegetation which can reduce flooding and erosion, but the wetland does outlet to a river or stream that has flooding problems. Wetland G scored moderate for water quality functions (14 points), as the slope of the wetland is 2- to 5-percent, the wetland consists of dense, ungrazed, herbaceous vegetation greater than 90 percent of the area, and there are residential, urban areas, or golf courses within 150 feet upslope of the wetland. Wetland D was rated according to *Washington State Wetlands Rating System for Western Washington, Revised* (Hruby 2004).

Hydroperiods within Wetland J consist of occasionally flooded or inundated and saturated only. This wetland scored moderate for hydrologic functions (5 points) because less than 90 percent of the wetland is covered by dense, uncut, rigid plants, more than 25 percent of the area within 150 feet upslope of the wetland is in land uses that generate excess surface runoff, and there are surface flooding problems in a sub-basin farther down-gradient from the wetland. Wetland J scored moderate for water quality functions (6 points) because the slope of the wetland is less than 1- to 2-percent, there are dense, uncut, herbaceous plants greater than ½ of the area of the wetland, greater than 10 percent of the area within 150 feet on the uphill side of the wetland consists of land uses that generate pollutants, and the wetland discharges to a waterbody that is on the 303(d) list, and is located within a basin for which a total maximum daily load (TMDL) is approved. Wetland J was rated according to *Washington State Wetlands Rating System for Western Washington, Revised* (Hruby 2014).

Habitat

Wetland Buffers

Available habitat is minimal within the buffers for Wetlands G and J. These buffers lack habitat features such as LWM, standing snags, and mainly consist of a single stratum of herbaceous vegetation which is routinely mowed, and is not suitable habitat for wildlife. Habitat availability within Wetland B's buffer is more appropriate for wildlife, as this wetland buffer mainly has a native deciduous forest with dense shrub understory, large, downed woody material, standing snags, and the presence of invasive plants is less than 25 percent of the wetland area in each stratum of plants. The diverse strata of vegetation provide more cover and feed, likely leading to a higher use of this wetland buffer by wildlife. The northeastern portion of this buffer consists of a single stratum of herbaceous vegetation which is routinely mowed, which is not appropriate habitat. The eastern and southwestern portions of Wetland D's buffer have been enhanced with the oak mitigation, however the plants have yet to develop into mature overstory. The northern and southern portion of this wetland's buffer consists of mainly enhanced former golf course including tree and shrub strata, with minimal overstory; however, the overstory will develop as the plants mature. These areas are somewhat suitable for wildlife, although none was observed during the site visits.

PROPOSED CONDITIONS

Vegetation

The vegetation proposed within the wetland buffer enhancement areas will consist of native, non-invasive species associated with wetlands and wetland buffers in southwestern Washington. Non-native, invasive species will be controlled following the performance standards (1g, 1h, and 1i).

Soils

Soils within the wetland enhancement areas will be ripped and tilled to prepare for areas for planting. Because the soils will no longer receive regular compaction from golf course activities, the soil texture may improve over time.

Hydrology

Hydrology within the impact areas will not be significantly altered. Surface runoff from the development will be directed to stormwater facilities for treatment. The new impervious coverage within the inner portions Wetland B's buffer only total 3,943 square feet. The buffer average-in areas will be intensively enhanced with native trees and shrubs which will increase buffer functions in areas which are currently mowed, leading to a wetland buffer which functions at the same or higher level as pre-construction conditions.

Habitat

Invasive, non-native species will be removed from the enhancement areas, and native species associated with southwestern Washington wetland and wetland buffers will be planted. The wetland buffer enhancement areas consist of mainly mowed grasses, with some areas that currently have canopy and sub-canopy cover. The proposed multi-strata native trees and shrubs will improve vegetative structure in the largely mowed grass areas, which will benefit wildlife habitat over the long-term. Invasive plant removal within the enhancement areas will allow better habitat availability and promote growth of native plant species which can be used by wildlife. Horizontal logs and bird boxes will also be installed to improve habitat structure and wildlife functions.

WILDLIFE ANALYSIS

The proposed plan has been designed with specific elements to avoid or minimize impacts to the existing habitat of wildlife species or evidence of species that were observed onsite. The trees and shrubs specified will provide nesting, roosting, and refuge habitat for birds (and some mammals). Many of the fruits, seeds, twigs, and leaves of the planted trees and shrubs will provide a food source for birds, mammals, and insects. In addition, bees frequent bigleaf maple flowers as a nectar source. Bird boxes are also proposed with varied diameter entry holes which will offer immediate nesting habitat to promote wildlife habitat functions. Horizontal logs will be installed to provide shelter and food source for some animals and provide beneficial nutrients to the enhancement areas as they decay. Providing natural barriers to the wetland buffers from the development will help prevent human disturbances and promote use of the areas by native fauna. The native plants, bird boxes, and horizontal logs proposed will

benefit all wildlife species common to the area, including insects, amphibians, birds, and mammals.

IMPLEMENTATION PLAN

PLANTING SCHEDULE AND EQUIPMENT

The native trees and shrubs will be installed in the wetland buffer enhancement areas during the late fall to early spring when the plants are dormant and the soil moisture conditions are favorable for planting. The trees and shrubs are intended to create a multi-strata plant community that provides for wildlife habitat, protection, and food and mimics the less disturbed, existing native understory habitat onsite (Figures 4, 6, and 7).

The following equipment may be used to prepare and install plants within the enhancement areas: brush hog, weed eater, tractor, rototiller, tree shovel, garden shovel, and power auger. Heavy equipment will avoid the drip zone of preserved and planted trees and shrubs to prevent soil compaction.

Table 7. Plant Specifications for the Wetland Buffer

Species	Spacing (feet on center)	Size	Quantity (11,829 sq. ft.)
Tree Stratum			
Bigleaf maple (<i>Acer macrophyllum</i> , FACU)	10	1 gal minimum	10
Oregon ash (<i>Fraxinus latifolia</i> , FACW)	10	1 gal minimum	10
Red alder (<i>Alnus rubra</i> , FAC)	10	1 gal minimum	10
Oregon white oak (<i>Quercus garryana</i> , FACU)	14	1 gal minimum	6
Total Trees			36
Shrub Stratum			
Tall understory			
Vine maple (<i>Acer circinatum</i> , FAC)	6	1 gal minimum	40
Black hawthorn (<i>Crataegus douglasii</i> , FAC)	6	1 gal minimum	40
Oceanspray (<i>Holodiscus discolor</i> , FACU)	6	1 gal minimum	40
Mid-understory			
Nootka rose (<i>Rosa nutkana</i> , FAC)	6	1 gal minimum	40
Peafruit rose (<i>Rosa pisocarpa</i> , FAC)	6	1 gal minimum	40
Common snowberry (<i>Symphoricarpos albus</i> , FACU)	6	1 gal minimum	40
Total Shrubs			240

Table 8. Plant Specifications for Stormwater Outfall

Species	Spacing (ft on center)	Size	Quantity (up to 250 sq. ft.)
Shrub Stratum			
Redosier dogwood (<i>Cornus sericea</i> , FACW)	4	1 gal minimum	10
Nootka rose (<i>Rosa nutkana</i> , FAC)	4	1 gal minimum	10
Total Shrubs			20

SPECIFICATIONS FOR SITE PREPARATION, PLANTING, AND MAINTENANCE

Prepare Wetland Enhancement Area

- Install silt fencing where necessary to control runoff from the development.
- Install temporary construction fencing along the perimeters of the buffer enhancement areas bordering the development.
- Mechanically remove existing non-native species, namely Himalayan blackberry, English holly, and reed canarygrass within the buffer enhancement areas. Selectively apply herbicide by hand as necessary to control regrowth of invasive plants.
- Rip or till soils in planting areas as needed to loosen compact soils and clear existing vegetation in planting areas.

Install Large Woody Material

- Install a minimum of 3 pieces of large woody material within the enhancement areas.

Horizontal Log Specifications

- Preferably Oregon white oak, Oregon ash, and bigleaf maple;
- At least 12-inches DBH for at least 10 feet in length;
- With lateral branches retained;
- Of hard to medium decay, and;
- With ends rough cut, mashed or ripped.
- Preferably located along critical area and development boundaries

Remove Golf Cart Path at Wetland J

- Remove gravel from the path and tear or rip up native soils.
- Seed bare soils with a native upland seed mix or mulch for erosion control.

Install Natural Barriers and Critical Area Signs

- As needed, install natural barriers where the wetland buffer addition and enhancement areas adjoin residential lots.

- Install durable, plastic critical area signs at a minimum of 100-foot intervals or 1 per lot on metal or wood posts along the critical areas bordering the development.

General Plant Specifications

- Plant the native trees and shrubs during the late fall to early spring (October-March) at the spacing identified in Table 3.
- Group the plants in uneven patches dominated by a single species, with patches interspersed among one another.
- All plant materials will be kept cool and moist prior to installation.
- All plant materials will have well developed roots and sturdy stems, with an appropriate root to shoot ratio.
- No damaged or desiccated roots or diseased plants will be accepted.

Plant Bareroot/Containerized Trees and Shrubs

- Dig the receiving hole several inches wider than the size of the root system.
- Position the planted species' root collar so that they are at or slightly above the level of the surrounding soil to allow for settling.
- Back the hole with soil.
- Gently compact the soil around the planted species to eliminate air spaces.
- Install a minimum of 3-inch depth by 4-foot diameter mulch layer around the base of planted species. The mulch will comprised of chipped, clean wood. Avoid placing mulch directly against plant stems.
- Install tree shelters as needed.
- Irrigate all newly installed plants as site and weather conditions warrant.

Install Bird Boxes

- Install a minimum of 3 cedar bird boxes in the wetland buffer enhancement areas. The bird boxes will have variable diameter holes to target different bird species (Link 1999) and will be at least 12 feet above the ground surface on posts or existing trees.

Maintain Wetland Buffer Enhancement Areas

The preserved and planted trees and shrubs will be maintained as often as necessary to ensure that the specified performance standards are met. The maintenance includes the following:

- Inspect the plantings at least once annually, or more often as appropriate, and maintain to achieve the performance standards specified in the subsection titled "Mitigation Goals, Objectives, & Performance Standards."
- Irrigate planted trees and shrubs during the dry season for the first 2 to 3 years after planting. Water should be delivered at a minimum rate of 1 gallon every 4 weeks (Campbell 2004). Adjust as necessary based on site and weather conditions.

- Remove competing vegetation from around the base of plant species during first 2 to 3 years after planting and as needed thereafter.
- Replace mulch as needed to suppress competing vegetation.
- Inspect tree shelters to ensure they are upright, stable, and likely to remain so for another year (Clements *et al.* 2011, Devin and Harrington 2010). Ensure that the terminal shoot of the planted species is not ensnared in the wall of the tree shelter. Remove tree shelters when species is robust enough to withstand browse or shelter is impeding growth.
- Replace dead or failed plants to meet the minimum annual performance standards (Table 2). Replaced plants will be installed as described for the original installation.

Minor corrective actions will be undertaken as necessary as a part of routine maintenance and will be documented in the subsequent monitoring report.

Corrective actions include, but are not limited to, the following:

- Replant trees or shrubs.
- Implement a fertilizing schedule.
- Repair damaged limbs or prune dead branches.
- Substitute the anti-herbivore device, such as installing a different type of tree shelter, painting lower stems with sanded latex paint, or spraying herbivore deterrent.

MONITORING PLAN

This wetland buffer averaging and enhancement plan establishes a 10-year monitoring plan with quantitative performance standards. The monitoring will commence the first growing season after the mitigation areas are completed and extend for a 10-year period, beginning with Years 0 (as-built), 1, 2, 3, 5, 7, and 10. The goal of the monitoring will be to determine if the previously stated performance standards are being met (Table 2). Reports in years 1, 2, 3, 5, 7, and 10 will be submitted to City of Camas by December 31 of each monitored year. The Year 1 monitoring report will include as-built figures depicting the plant installation.

MONITORING PLOTS

During the first annual monitoring event, monitoring plots will be established as follows:

- A minimum of 2 monitoring plots in the wetland buffer enhancement areas

The monitoring plots will be staked with metal t-posts and identification tags. Their locations will be identified by GPS and placed on an as-built site map that will accompany the monitoring reports. Permanent photo points will be established at each monitoring plot and directions documented on the site map.

Vegetation

To assess the status of the vegetation within the enhancement areas, the vegetation monitoring will measure the following:

1. Total density of planted native trees and shrubs (to determine survival rate) within a 15-foot radius from the metal t-post
2. Percent aerial cover of planted and naturally recruiting native trees and shrubs within a 15-foot radius from the metal t-post
3. Percent aerial cover of naturally occurring herbaceous plants within a 5-foot radius from the metal t-post
4. Percent aerial cover of non-native, invasive plants within a 15-foot radius from the metal t-post
5. Change in the plant community over time (documented at each designated photo point)

Fauna

To assess the development of wildlife habitat within the enhancement areas, wildlife monitoring will document the following:

1. Usage of bird boxes
2. Insect use
3. Amphibian use
4. Bird use
5. Mammal use
6. Level of herbivory

Soils and Hydrology

If the planted species show poor or failed growth, soil moisture and soil nutrients may also be monitored during the growing season. If necessary, soil moisture will be monitored monthly during the growing season and soil nutrients will be assessed annually during the growing season. Corrective actions will be taken as appropriate based on the soil moisture and soil nutrient data. These actions include, but are not limited to, a revised irrigation schedule and a fertilization schedule.

MONITORING REPORT

The annual monitoring reports will contain at least the following:

- Location map and as-built figure and revised plant quantity table as needed
- Historic description of project, including dates of plant installation, current year of monitoring, and restatement of performance standards
- Description of monitoring methods
- Documentation of bird boxes and critical area signs
- Documentation of plant survival, cover, and overall development within the enhancement areas
- Assessment of non-native, invasive plant species and recommendations for management
- Assessment of site hydrology and soils, only if they appear to be limiting plant survival

- Assessment of surrounding land use, use by humans, and use by wild and domestic animals
- Observations of wildlife, including, insects, amphibians, birds, and mammals
- Photographs from permanent photo points
- Summary of maintenance and contingency measures proposed for the next season and completed for the past season

ADAPTIVE MANAGEMENT PLAN

If the performance standards are not met by the fifth year of monitoring, or at an earlier time if necessary, an adaptive management plan will be developed and implemented. All adaptive management actions will be undertaken only after consulting and gaining approval from the City of Camas. The Applicant (or Successor as assigned) will complete an adaptive management plan that describes 1) the need for adaptive management, 2) proposed actions, 3) time-frame for completing actions, and 4) any additional maintenance and monitoring, if necessary.

REFERENCES

- Campbell, B.H. 2004. *Restoring Rare Native Habitats in the Willamette Valley: a landowner's guide for restoring oak woodlands, wetlands, prairies, and bottomland hardwood and riparian forests*. Oregon Department of Fish and Wildlife & Defenders of Wildlife, West Coast Office. West Linn, Oregon.
- City of Camas Municipal Code. 2008. *Critical Areas Ordinance Chapter 16.53 – Wetlands*. September 2016.
- City of Camas Municipal Code. 2008. *Critical Areas Ordinance Chapter 16.61 – Fish and Wildlife Habitat Conservation Areas*. September 2016.
- Ecological Land Services, Inc. 2014. *Critical Areas Report, Buffer Modification, and Tree Preservation Plan for Green Mountain Mixed Use PRD – Phase 1*. Camas, Washington.
- Ecological Land Services, Inc. 2016a. *Critical Areas Report for Green Mountain PRD Phase 2*. Camas, Washington.
- Ecological Land Services, Inc. 2016b. *Stream Buffer Averaging and Enhancement Plan for Green Mountain PRD Phase 2*. Camas, Washington.
- Ecological Land Services, Inc. 2016c. *Oregon White Oak Mitigation Plan for Green Mountain Mixed Use PRD*. Camas, Washington.
- Ecological Land Service, Inc. 2016d. *Addendum to the Oregon White Oak Mitigation Plan for Green Mountain Mixed Use PRD*. Camas, Washington.
- Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1*. U.S. Army Corps of Engineer Waterways Experiment Station, Vicksburg, Mississippi.
- Environmental Protection Agency (EPA). 2014.
- Hruby, T. 2014. *Washington State Wetland Rating System for Western Washington – Revised*. Washington State Department of Ecology Publication #14-06-029. Olympia, Washington.
- Hruby, T. 2004. *Washington State Wetland Rating System for Western Washington – Revised*. Washington State Department of Ecology Publication #04-06-025. Olympia, Washington.
- Knutson, K. L., and V. L. Naef. 1997. *Management recommendations for Washington's priority habitats: riparian*. Wash. Dept. Fish and Wildl., Olympia. 181pp.

Link, R. 1999. *Landscaping for Wildlife in the Pacific Northwest*. University of Washington Press and the Washington Department of Fish and Wildlife. Seattle, Washington.

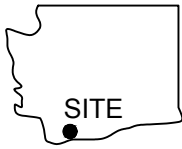
Natural Resource Conservation Service (NRCS). 2015. *Soil Survey of Clark County, Washington*. Online document. <http://www.or.nrcs.usda.gov/pnw_soil/wa_reports.html>. September 2016.

U.S. Army Corps of Engineers (Corps). 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)*, ed. J. S. Wakeley, R. W. Lichvar, and C. C. Noble. ERDC/EL TR-08-13. Vicksburg, Mississippi: U.S. Army Engineer Research and Development Center.

Figures

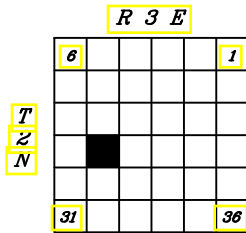
Figure 1	Vicinity Map
Figure 2	Critical Areas Map
Figure 3	Proposed Conditions Map
Figure 4	Wetlands B & D Buffer Mitigation Plan
Figure 5	Wetland J Buffer Mitigation Plan
Figure 6	Cross Section A-A'
Figure 7	Planting Details

WASHINGTON



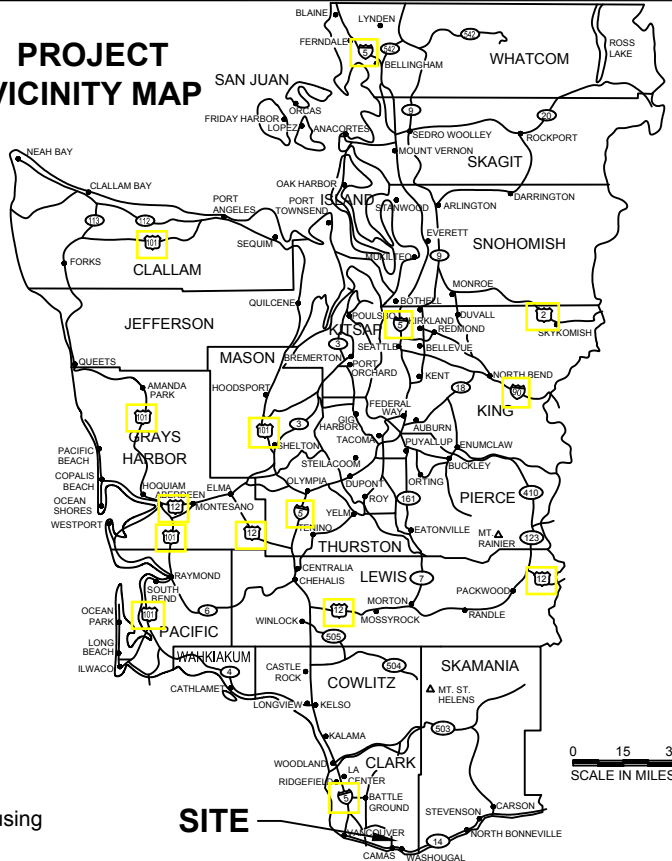
45.6471° Latitude
-122.4560° Longitude

LOCATION MAP



NOTE:
USGS topographic quadrangle map reproduced using
MAPTECH Inc., Terrain Navigator Pro software.

PROJECT
VICINITY MAP

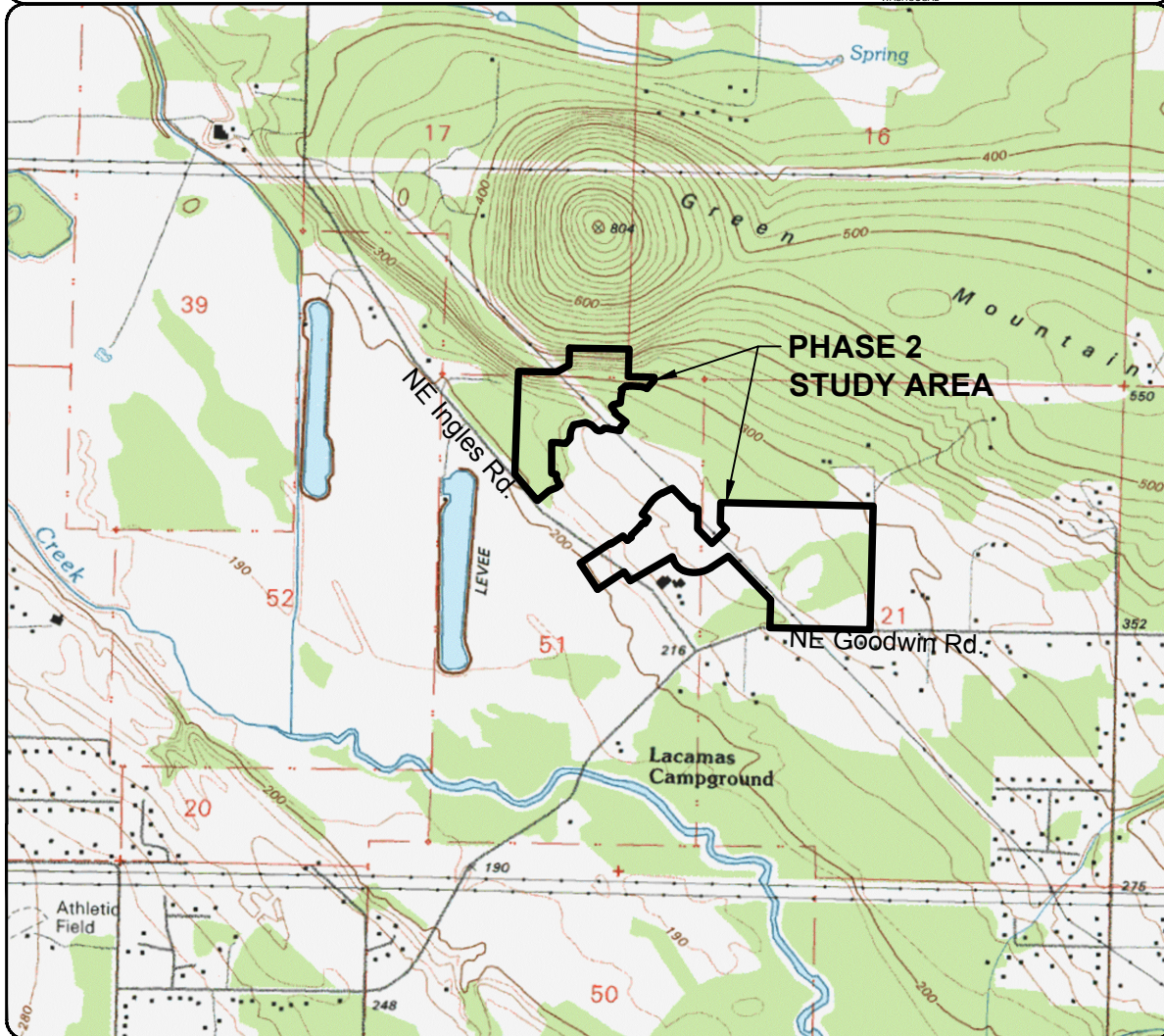


SITE

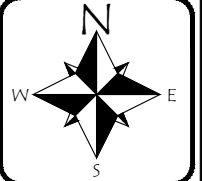
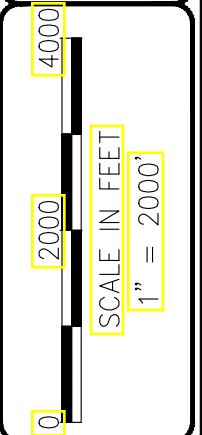
Figure 1
VICINITY MAP

Green Mountain Mixed Use PRD Phase 2
CLB Washington Options Solutions LLC
City of Camas, Clark County, Washington
Section 20, Township 2N, Range 3E, W.M.

DATE: 11/17/16
DWN: JKJ
REQ. BY: MM
PRJ. MGR: MM
CHK:
PROJECT NO: 2415.01



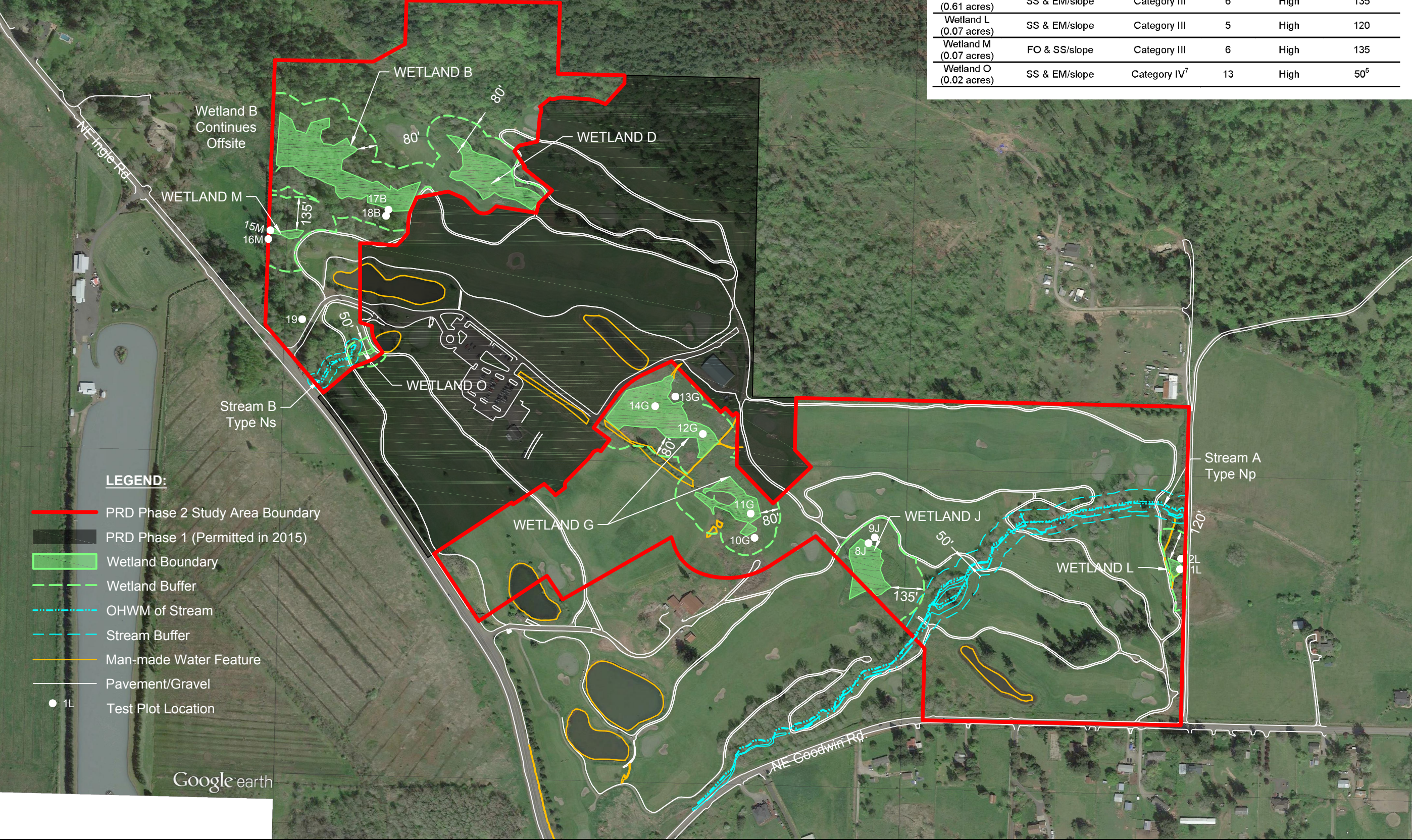
1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305
www.eco-land.com



11/17/2016 10:40 AM S:\ELSWA\Clark\Camas\2415-CLB Washington Options Solutions LLC\2415.01-Green Mountain Phase 2\2415.01-Figures\2415.01_SM-PHS2.dwg Jennifer

NOTE(S):

1. Aerial photo provided by Google Earth™.
2. Wetlands delineated on February 29 and March 1, 2016. Wetland flags surveyed by Olson Engineering.
3. Streams and man-made water features mapped using a hand-held GPS unit with ±0.5m accuracy.
4. Man-made water features considered exempt from jurisdictional regulation.
5. Wetlands B, D, G, and O vested per City File No. SUB14-02.



Wetland Name (size)	Cowardin Classification ¹ /HGM	State/Local Classification ²	Habitat Score ²	Proposed Land Use Intensity ³	Standard Buffer Width ⁴ (feet)
Wetland B (4.48 acres onsite)	FO, SS, EM/slope	Category III ⁷	21	High	80 ⁵
Wetland D (0.99 acres)	SS & EM/depressional	Category III ⁷	18	High	80 ⁵
Wetland G (1.94 acres)	SS & EM/slope	Category III ⁷	16	High	80 ⁵
Wetland J (0.61 acres)	SS & EM/slope	Category III	6	High	135
Wetland L (0.07 acres)	SS & EM/slope	Category III	5	High	120
Wetland M (0.07 acres)	FO & SS/slope	Category III	6	High	135
Wetland O (0.02 acres)	SS & EM/slope	Category IV ⁷	13	High	50 ⁵

DATE: 11/17/16
DWN: KJ
REQ. BY: MM
PRJ. MGR: MM
CHK:
PROJECT NO: 2415.01

1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305
www.eco-land.com

Ecological Land Services

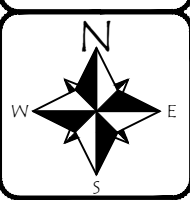
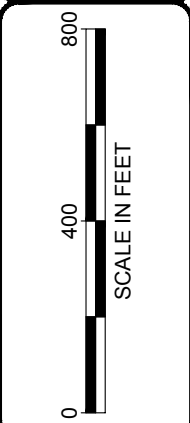


Figure 2
CRITICAL AREAS MAP
Green Mountain Mixed Use PRD Phase 2
CLB Washington Options Solutions, LLC
City of Camas, Clark County, Washington
Section 20, Township 2N, Range 3E, W.M.

11/17/2016 12:42 PM S:\ELSWA\Clark\Camas\2415-CLB Washington Options Solutions LLC\2415.01-Green Mountain Phase 2\2415.01-Figures\2415.01_SM-XING.dwg Jennifer

NOTE(S):

1. Aerial photo provided by Google Earth™.
2. Wetlands and streams delineated on February 29 and March 1, 2016.
Wetland flags surveyed by Olson Engineering.
3. Man-made water features considered exempt from jurisdictional regulation.
4. Wetlands B, D, G, and O vested per City File No. SUB14-02.
5. Phase 2 site design by Olson Engineering.

See Figure 4 for Wetlands B & D Buffer Mitigation Plan

See Figure 5 for Wetland J Buffer Mitigation Plan

LEGEND:

- PRD Phase 2 Study Area Boundary
- PRD Phase 1 (Permitted in 2015)
- Wetland Boundary
- Wetland Buffer
- OHWM of Stream
- Stream Buffer
- Man-made Water Feature
- Pavement/Gravel

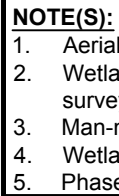
Google earth



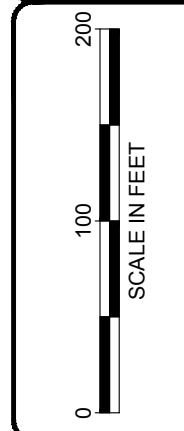
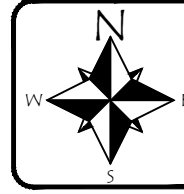
1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305
www.eco-land.com

DATE: 11/17/16
DWN: JKL
REQ. BY: MM
PRJ. MGR: MM
CHK:
PROJECT NO:
2415.01

Figure 3
PROPOSED CONDITIONS MAP
Green Mountain Mixed Use PRD Phase 2
CLB Washington Options Solutions, LLC
City of Camas, Clark County, Washington
Section 20, Township 2N, Range 3E, W.M.



- NOTE(S):**
1. Aerial photo provided by Google Earth™.
 2. Wetlands delineated on February 29 and March 1, 2016. Wetland flags surveyed by Olson Engineering.
 3. Man-made water features considered exempt from jurisdictional regulation.
 4. Wetlands B & D vested per City File No. SUB14-02.
 5. Phase 2 site plan by Olson Engineering.



1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305
www.eco-land.com

DATE: 11/17/16
DWN: JKL
REQ. BY: MM
PRJ. MGR: MM
CHK:
PROJECT NO:

Figure 4

11/17/2016 12:42 PM S:\ELSWA\Clark\Camas\2415-CLB Washington Options Solutions LLC\2415.01-Figures\2415.01_SM-XING.dwg Jennifer

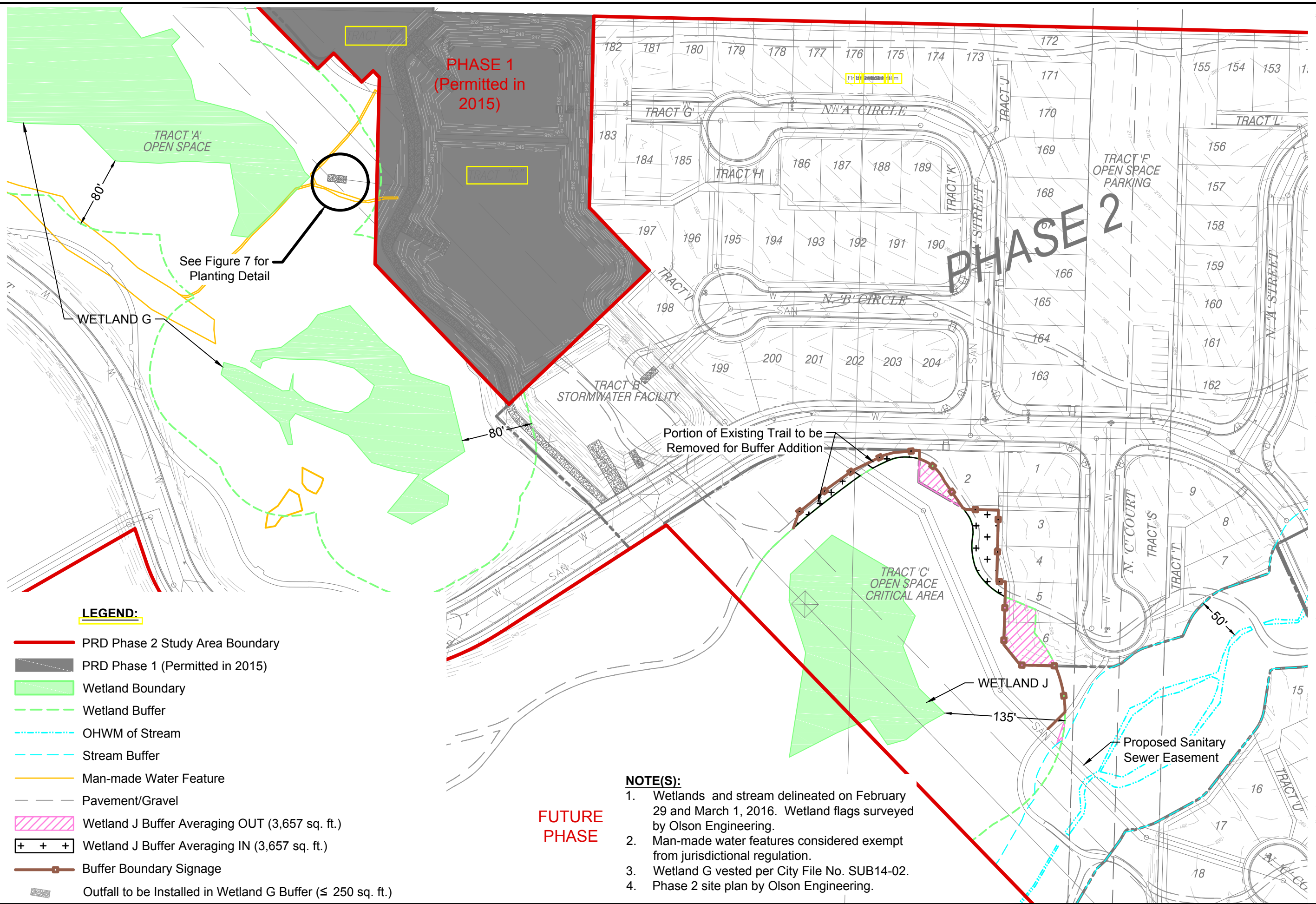
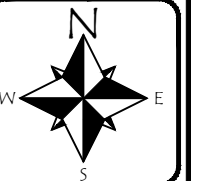
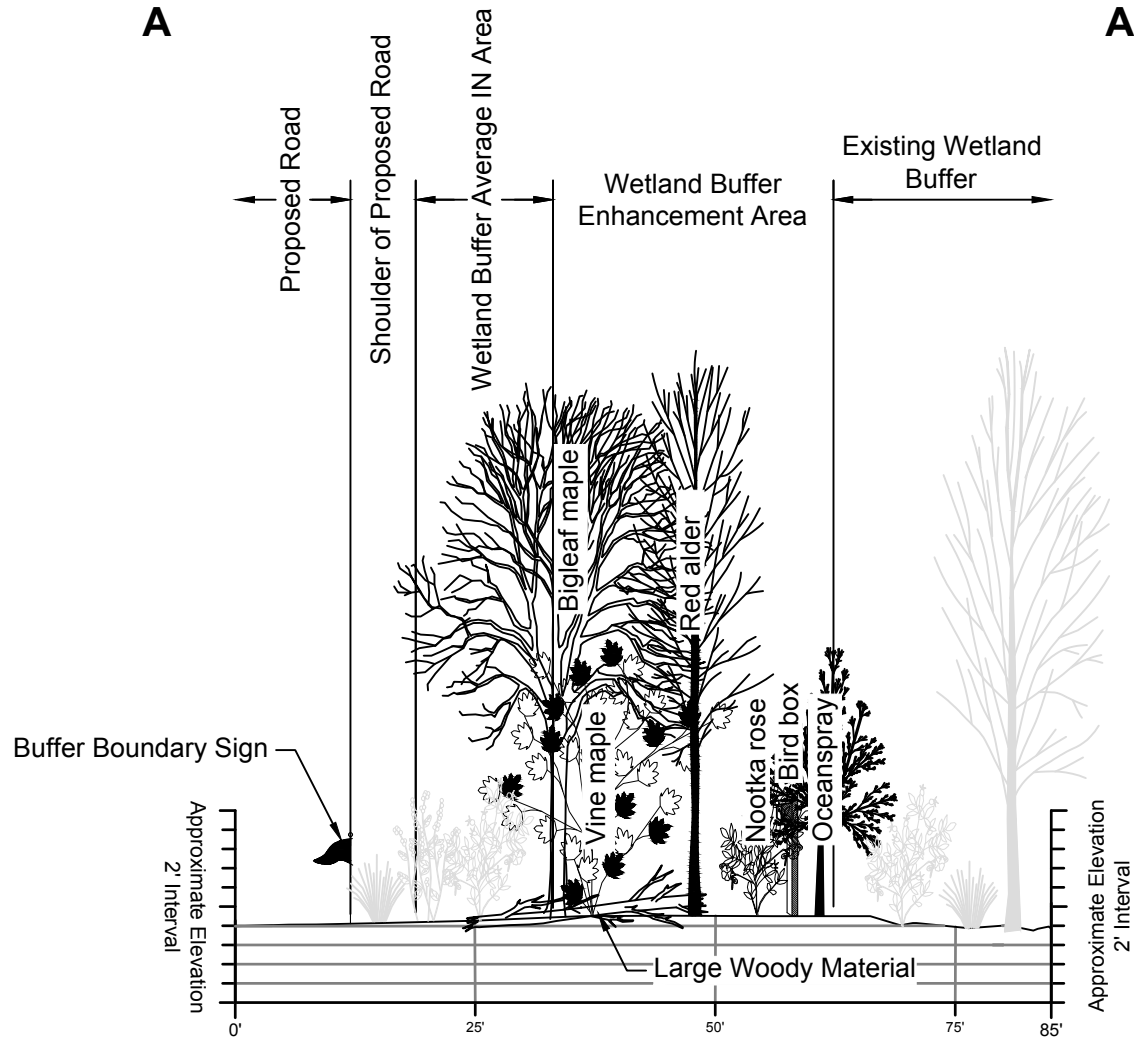


Figure 5
WETLAND J BUFFER MITIGATION PLAN
Green Mountain Mixed Use PRD Phase 2
CLB Washington Options Solutions, LLC
City of Camas, Clark County, Washington
Section 20, Township 2N, Range 3E, W.M.

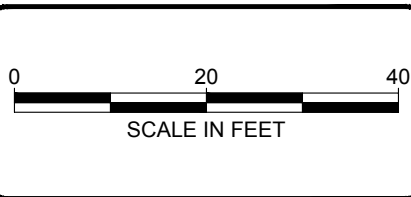
DATE: 11/17/16
DWN: JKJ
REQ. BY: MM
PRJ. MGR: MM
CHK:
PROJECT NO: 2415.01

1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305
www.eco-land.com





NOTE: Plants are not to scale and planting locations are approximate. Actual planting locations will be determined in the field with consideration to listed quantities and spacing to create the most natural look possible.

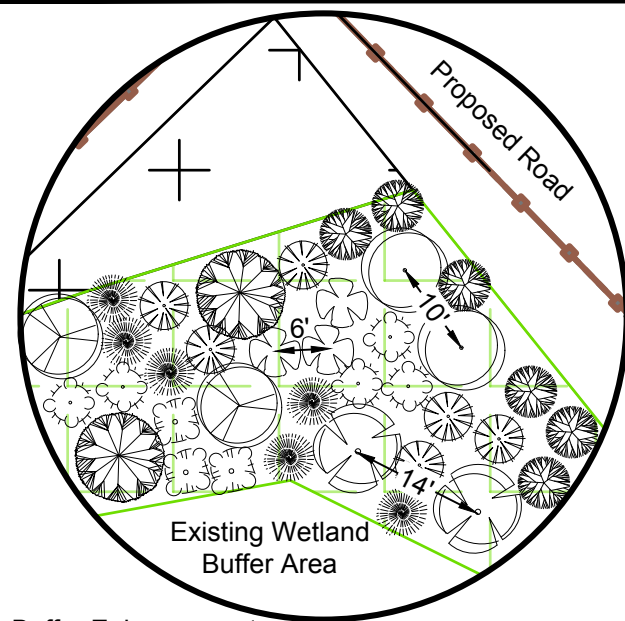
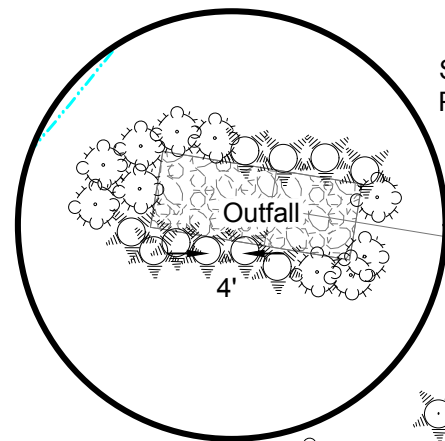
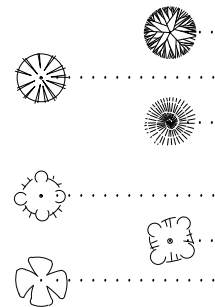
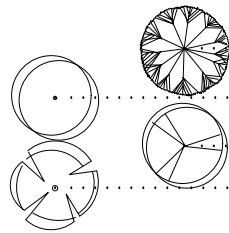


Ecological Land Services
1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305
www.eco-land.com

DATE: 11/17/16
DWN: JKJ
REQ. BY: MM
PRJ. MGR: MM
CHK:
PROJECT NO:
2415.01

Figure 6
CROSS SECTION A-A'
Green Mountain Mixed Use PRD Phase 2
CLB Washington Options Solutions LLC
City of Camas, Clark County, Washington
Section 20, Township 2N, Range 3E, W.M.

Wetland Buffer Enhancement Planting Table

Buffer Enhancement
Planting DetailStormwater Outfall
Planting Detail

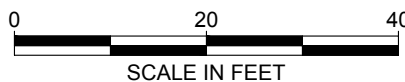
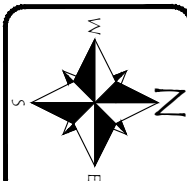
Species	Spacing (feet on center)	Size	Quantity (11,829 sq. ft.)
Tree Stratum			
Bigleaf maple (<i>Acer macrophyllum</i> , FACU)	10	1 gal minimum	10
Oregon ash (<i>Fraxinus latifolia</i> , FACW)	10	1 gal minimum	10
Red alder (<i>Alnus rubra</i> , FAC)	10	1 gal minimum	10
Oregon white oak (<i>Quercus garryana</i> , FACU)	14	1 gal minimum	6
Total Trees			36
Shrub Stratum			
Tall understory			
Vine maple (<i>Acer circinatum</i> , FAC)	6	1 gal minimum	40
Black hawthorn (<i>Crataegus douglasii</i> , FAC)	6	1 gal minimum	40
Oceanspray (<i>Holodiscus discolor</i> , FACU)	6	1 gal minimum	40
Mid-understory			
Nootka rose (<i>Rosa nutkana</i> , FAC)	6	1 gal minimum	40
Peafruit rose (<i>Rosa pisocarpa</i> , FAC)	6	1 gal minimum	40
Common snowberry (<i>Symphoricarpos albus</i> , FACU)	6	1 gal minimum	40
Total Shrubs			240

LEGEND:

- OWHM of Stream
- Stream Buffer Addition
- Stream Buffer Enhancement
- Stream Buffer Fencing/Riparian Habitat Signage
- Large Woody Material (3 total)
- Bird Box (3 total)

Stormwater Outfall Planting Table

Species	Spacing (ft on center)	Size	Quantity (up to 250 sq. ft.)
Shrub Stratum			
Redosier dogwood (<i>Cornus sericea</i> , FACW)	4	1 gal minimum	10
Nootka rose (<i>Rosa nutkana</i> , FAC)	4	1 gal minimum	10
Total Shrubs			20



1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305
www.eco-land.com

DATE: 11/17/16
DWN: JKJ
REQ. BY: MM
PRJ. MGR: MM
CHK:
PROJECT NO:
2415.01

Figure 7
PLANTING DETAILS
Green Mountain Mixed Use PRD Phase 2
CLB Washington Options Solutions LLC
City of Camas, Clark County, Washington
Section 20, Township 2N, Range 3E, W.M.