



**Preliminary Wetland Buffer Mitigation Plan**  
for  
**Green Mountain PRD Phase 3**

*Prepared for:*  
**Green Mountain Land, LLC**  
17933 NW Evergreen Parkway, Suite 300  
Beaverton, Oregon 97006  
(503) 597-7100

*Prepared by:*  
**Ecological Land Services, Inc.**  
1157 3<sup>rd</sup> Avenue, Suite 220A  
Longview, Washington 98632  
(360) 578-1371  
ELS #2048.02

September 25, 2017

## **SIGNATURES**

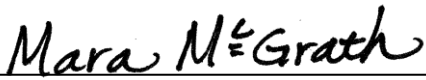
---

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

---

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| <b>INTRODUCTION .....</b>                                            | <b>1</b>  |
| <b>PROJECT DESCRIPTION .....</b>                                     | <b>1</b>  |
| WETLAND BUFFER IMPACTS .....                                         | 1         |
| WETLAND BUFFER ENHANCEMENT .....                                     | 1         |
| <b>ASSESSMENT OF IMPACTS IN THE PROJECT AREA.....</b>                | <b>1</b>  |
| <b>LOCAL REGULATORY AUTHORITY .....</b>                              | <b>2</b>  |
| AVOIDANCE AND MINIMIZATION .....                                     | 2         |
| COMPENSATION MEASURES .....                                          | 2         |
| <b>SITE DESCRIPTION .....</b>                                        | <b>3</b>  |
| <b>METHODS.....</b>                                                  | <b>4</b>  |
| <b>ENHANCMENT PLAN DESCRIPTION.....</b>                              | <b>5</b>  |
| AVOIDANCE MEASURES .....                                             | 5         |
| MINIMIZATION MEASURES.....                                           | 5         |
| COMPENSATION MEASURES .....                                          | 6         |
| GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS.....                    | 6         |
| Vegetative Structure.....                                            | 6         |
| Old Access Road Removal .....                                        | 7         |
| Habitat Structure .....                                              | 7         |
| Long-term Protection.....                                            | 8         |
| <b>RESPONSIBLE PARTIES .....</b>                                     | <b>8</b>  |
| <b>FUNCTIONAL ASSESSMENT.....</b>                                    | <b>8</b>  |
| EXISTING CONDITIONS.....                                             | 8         |
| Vegetation .....                                                     | 9         |
| Soils.....                                                           | 9         |
| Hydrology .....                                                      | 9         |
| Habitat .....                                                        | 10        |
| PROPOSED CONDITIONS.....                                             | 10        |
| Vegetation .....                                                     | 10        |
| Soils.....                                                           | 10        |
| Hydrology .....                                                      | 10        |
| Habitat .....                                                        | 10        |
| WILDLIFE ANALYSIS .....                                              | 11        |
| <b>IMPLEMENTATION PLAN.....</b>                                      | <b>11</b> |
| PLANTING SCHEDULE AND EQUIPMENT .....                                | 11        |
| SPECIFICATIONS FOR SITE PREPARATION, PLANTING, AND MAINTENANCE ..... | 12        |
| Maintain Wetland Buffer Enhancement Area .....                       | 14        |
| <b>MONITORING PLAN.....</b>                                          | <b>14</b> |

|                                       |           |
|---------------------------------------|-----------|
| MONITORING PLOTS .....                | 15        |
| Vegetation .....                      | 15        |
| Fauna .....                           | 15        |
| MONITORING REPORT .....               | 15        |
| <b>ADAPTIVE MANAGEMENT PLAN .....</b> | <b>16</b> |
| <b>REFERENCES.....</b>                | <b>17</b> |

## **LIST OF TABLES**

---

|                                                                                          |    |
|------------------------------------------------------------------------------------------|----|
| Table 1. Wetland Buffer Impacts and Enhancement Details .....                            | 3  |
| Table 2. Critical Area Wetland Summary .....                                             | 4  |
| Table 3. Performance Standards for Vegetation by Monitored Year .....                    | 7  |
| Table 4. Plant Specifications for the Wetland Buffer .....                               | 12 |
| Table 5. Specifications for Site Preparation, Planting, and Habitat Feature Installation | 13 |

## **LIST OF FIGURES**

---

|          |                               |
|----------|-------------------------------|
| Figure 1 | Vicinity Map                  |
| Figure 2 | Site Map                      |
| Figure 3 | Proposed Conditions Map       |
| Figure 4 | Wetland C Detail              |
| Figure 5 | Cross Section A-A'            |
| Figure 6 | Buffer Mitigation – Wetland C |
| Figure 7 | Planting Details – Wetland C  |

## **APPENDIX A**

---

Post Bat House Specifications and Brush Shelter Specifications

## **INTRODUCTION**

---

This preliminary wetland buffer mitigation plan has been prepared by Ecological Land Services, Inc. (ELS) on behalf of Green Mountain Land, LLC for Phase 3 of the Green Mountain Planned Residential Development (PRD, City File No. SUB14-02). The proposal is to develop the site into single-family residential lots with park, trails, and open space. Phase 3 includes constructing single-family residences within one Category III wetland buffer.

This approximately 131-acre site is located at 2817 NE Ingle Road in the City of Camas, Clark County, Washington. The project area falls within portions of Sections 17 and 20, Township 2 North, Range 3 East of the Willamette Meridian, and is further identified as Clark County parcel numbers 171704000, 171727000, and 172341000 (Figure 1). This report describes mitigation activities in accordance with the *City of Camas Municipal Code (CMC) Wetlands Chapter 16.53* and following guidance in the Washington State Department of Ecology's (Ecology) *Wetland Mitigation in Washington State, Parts 1 & 2* (2006).

## **PROJECT DESCRIPTION**

---

Phase 3 of the Green Mountain PRD development includes constructing over 150 single-family residential lots with parks, trails, and open space. Portions of residential lots are proposed within the outer buffer of one Category III wetland.

### ***WETLAND BUFFER IMPACTS***

A total of 41,515 square feet of Wetland C's regulated buffer will be impacted from residential development. Residential lots will be installed no closer than 50 feet from the wetland boundary.

### ***WETLAND BUFFER ENHANCEMENT***

To compensate for impacting the buffer of Wetland C, and satisfy requirements per the CMC, buffer enhancement is proposed. The existing disturbed buffer, which is dominated by invasive plant species (Himalayan blackberry), will be enhanced so that functions of the post-project wetland and buffer are greater than pre-construction conditions. Invasive plant species will be removed, the buffer will be enhanced with native trees and shrubs, and habitat features, including downed logs, bat boxes, and brush shelters, will be installed. Additionally, the old access road will be decommissioned, and the compacted gravel will be removed, soils will be loosened, and the footprint will be enhanced with native plants for an overall gain in 3,742 square feet of wetland buffer area. Removing the compacted gravel and enhancing with native plants will reconnect the disconnected portions of wetland buffer.

## **ASSESSMENT OF IMPACTS IN THE PROJECT AREA**

---

A total of 41,515 square feet of Wetland C's regulated buffer will be impacted, and the remaining buffer will be entirely enhanced. The buffer as it currently exists is dominated by Himalayan blackberry, a non-native invasive plant species. Residential lot

construction within this wetland buffer will not degrade wetland buffer functions from pre-construction conditions. Enhancing the remaining buffer and buffer addition areas with native vegetation and habitat features will provide a more natural barrier between the development and the wetland than currently exists, controlling invasive plant species will allow the native plant population to reestablish, and will provide valuable habitat for small mammals, birds, insects, and amphibians.

## **LOCAL REGULATORY AUTHORITY**

---

Per *CMC Chapter 16.53, Wetlands*, wetlands constitute important natural resources that provide significant environmental functions, and require wetland buffers to protect these functions. The wetland buffer of Wetland C will be impacted to install residential lots and then enhanced to lift overall functions of the remaining buffer onsite. This wetland buffer 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 Phase 3 of the PRD. All jurisdictional wetlands have been avoided, and wetland buffer impacts have been limited to one wetland buffer for only 10 residential lots of 138 lots proposed. Wetland A is currently being assessed by the U.S. Army Corps of Engineers (Corps) for an Approved Jurisdictional Determination (AJD; Figure 4). The wetland is non-jurisdictional to the City of Camas per *CMC 16.53.010(C)(2)(a)*, because the wetland is under 4,350 square feet and is hydrologically isolated. The wetland fill has been addressed in a separate report for the Department of Ecology (Ecology) (ELS 2017b). Wetland buffer impacts have been limited to 41,515 square feet within areas dominated by invasive plant species. The pedestrian trails have also been placed outside of wetlands and buffers, or on existing gravel roadbeds.

## **COMPENSATION MEASURES**

Buffer impacts for Phase 3 of the PRD will be mitigated through buffer enhancement within the same buffer as the impact. 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 through planting native trees and shrubs and installing habitat features. The following general standards are required according to *CMC 16.53.050, Wetland Permits*. Only the sections of *CMC* that are applicable to the proposed project are included within this discussion.

1. **CMC 16.53.050(B)(1)** – *The proposed activity shall not cause significant degradation of wetland functions.*

Wetland C's buffer is currently dominated in the woody vine layer by Himalayan blackberry, a non-native, invasive plant species. Currently, the blackberry dominates the understory of the buffer, preventing growth of native shrubs and establishment of tree saplings. Habitat features such as downed logs or standing snags are virtually non-existent. A compacted gravel road, called the "old access road" is located throughout the majority of Wetland C's buffer, and will be removed to create a more contiguous wetland buffer. Enhancing the remaining buffer after removing the old access road will immensely improve the plant community and habitat functions over existing conditions. The enhancement proposes a three-fold strategy of: removing and controlling invasive plants, removing a compacted gravel road, and installing native plants and habitat features (Table 1).

**Table 1.** Wetland Buffer Impacts and Enhancement Details

| Impact Location  | Impact Type      | Impact Amount  | Mitigation Type and Amount                                                                  | Mitigation Location | Overall Ratio<br>(Enhanced : Impacted) |
|------------------|------------------|----------------|---------------------------------------------------------------------------------------------|---------------------|----------------------------------------|
| Wetland C Buffer | Residential Lots | 41,515 sq. ft. | Buffer Enhancement<br>58,899 sq. ft.<br>(Includes 3,742 sq. ft. of Old Access Road Removal) | Wetland C Buffer    | 1.4 : 1                                |

2. **CMC 16.53.050(B)(1)** – *The proposed activity shall comply with all state, local, and federal laws, including those related to sediment control, pollution control, floodplain restrictions, stormwater management, and on-site wastewater disposal.*

Phase 3 of the PRD has been designed to comply with all applicable state, local, and federal laws. Erosion control measures including, but not limited to, silt fencing, temporary sediment traps, and other best management practices will be utilized to minimize erosion.

## **SITE DESCRIPTION**

The project area is an undeveloped mixed deciduous-coniferous forest, which is bisected by a Bonneville Power Administration easement. The study area slopes to the west and southwest. A well maintained gravel road (hereafter referred to as County access road) in the northern portion of the study area provides access to a Clark County Public Utilities building that is associated with a water line serving nearby residences. In addition, an old access road is located between the two wetlands near the northern boundary, identified as Wetlands A and C. This road is maintained through mowing and brush clearing; however, gravel has not been placed within recent years.

Table 2. **Critical Area Wetland Summary**

| Wetland Name<br>(acres)    | Cowardin Classification <sup>1</sup> /HGM | State/Local Classification <sup>2</sup> | Habitat Score <sup>2</sup> | Proposed Land Use Intensity <sup>3</sup> | Standard Buffer Width <sup>4</sup><br>(feet) |
|----------------------------|-------------------------------------------|-----------------------------------------|----------------------------|------------------------------------------|----------------------------------------------|
| Wetland A<br>(0.03)        | FO, SS, EM/slope                          | Category III                            | 6                          | High                                     | Exempt                                       |
| Wetland B<br>(2.60 onsite) | FO, SS, EM/slope                          | Category III                            | 19                         | High                                     | 80 <sup>5</sup>                              |
| Wetland C<br>(0.51 onsite) | SS & EM/depressional                      | Category III                            | 6                          | High                                     | 135                                          |

<sup>1</sup>Cowardin *et al.* 1979

<sup>2</sup>According to Hruby 2014 and Hruby 2004

<sup>3</sup>According to CMC Table 16.53.040-4

<sup>4</sup>According to CMC Table 16.53.040-1 and Table 16.53.040-3

<sup>5</sup>See the *Critical Areas Report for Green Mountain PRD Phase 3*, for buffer designations on vested Wetland B.

The buffer width for Wetland B was previously approved by the City of Camas according to a *Critical Areas Report* (ELS 2014), for Phase 1 of the Green Mountain PRD. Under City File No. SUB14-02, the City granted PRD approval for a 1,300 lot multi-phased, multi-use development, and subdivision approval for 201 lots. Those approvals impacted critical areas relating to Wetland B, thus triggering the City's regulations. Because of this, the Applicant was required to perform critical area analyses compliant with the City's protocols. This analysis resulted in the City establishing the category and buffer standards for these wetlands under the municipal code active at the time (Table 5).

## METHODS

The wetlands were delineated on March 1 and April 1, 2016. ELS biologists flagged wetland boundaries with consecutively numbered pin flags or flagging labeled "WETLAND BOUNDARY". Vegetation, hydrology, and soil data were collected from 10 test plots to determine presence or absence of positive wetland indicators on March 1, 2016 and May 3, 2017 (Appendix A). Test plots were paired along the wetland/upland interface in areas that were representative of the overall wetland conditions and to substantiate the wetland boundary. Wetland boundaries were identified based on distinct changes in vegetation and hydrology that corresponded to changes in topography. Olson Engineering, Inc. surveyed the wetland boundaries. ELS biologists recorded the test plot locations with a hand-held Trimble GPS capable of sub-meter accuracy.

ELS' methodology for delineating wetlands 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, Version 2.0* (Corps 2010). Soil colors in test plots were evaluated by hue, value, and chroma using the Munsell Soil Color Chart (Munsell 2000). Plant dominance was based on the 50/20 rule (Corps 2010).

Hydrology is critical in determining what is wetland, but is often difficult to assess because hydrologic conditions can change periodically (hourly, daily, or seasonally).

Consequently, it is necessary to determine if hydrophytic vegetation and hydric soils are present, which would indicate that water is present for long enough duration to support a wetland plant community. By definition, wetlands are 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 (40 CFR §230.3). Wetlands are regulated as “Waters of the United States” by the Corps, as “Waters of the State” by the Ecology, and locally by the City of Camas (*Chapter 16.53 CMC*).

## **ENHANCEMENT PLAN DESCRIPTION**

---

This plan describes a series of measures that will be implemented to avoid, minimize, and compensate for buffer impacts at Wetland C. Activities within wetland buffers allowed per the *CMC* discussed in the *Local Regulatory Authority* section of this report include:

- Buffer impacts to Wetland C to construct residential lots within the buffer; and
- Buffer enhancement to compensate for wetland buffer impacts.

## **AVOIDANCE MEASURES**

Avoiding impacts to critical areas, including wetland buffers, was the primary consideration when designing Phase 3 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 wetlands and only 41,515 square feet of wetland buffers for residential lots. Impacts to Oregon white oaks are addressed in a separate mitigation plan (ELS 2016). To avoid additional impacts to the wetlands and their buffers during construction, the following avoidance measures will be implemented:

- Construction access and staging areas will avoid all critical areas onsite and will be 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 reduce impacts to the remaining wetland buffer and minimize habitat disruption beyond the extent required to undertake the proposal. The minimization measures are as follows:

- Install temporary construction fencing around the outer limits of the buffer enhancement area.
- Design site grading to avoid construction activity within the wetland buffer enhancement areas.

## **COMPENSATION MEASURES**

**Wetland Buffer Impacts** - A total of 41,515 square feet of Wetland C's buffer will be impacted from residential development. These impacts will be mitigated through buffer enhancement.

**Wetland Buffer Enhancement** - To compensate for wetland buffer impacts due to installing residential lots, a total of 58,899 square feet of buffer enhancement is proposed at a 1.4:1 enhancement ratio (buffer enhancement square footage : impacted wetland buffer square footage). Enhancement includes installing 910 native trees and shrubs and multiple habitat features, such brush shelters and bat boxes. As the buffer is currently forested, removing non-native invasive understory will allow for planting native vegetation that will create a multi-strata vegetative community more suitable for wildlife use.

## **GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS**

The goal of this wetland buffer mitigation plan is to replace any lost functions due to a loss in buffer area from installing residential lots in the buffer. To accomplish this, the following objectives and performance standards are appropriate to ensure the success of the onsite mitigation.

### **Vegetative Structure**

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

- ▶ *Performance Standard 1a.* Planted native trees and shrubs in the enhancement area 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 area 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 area 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.* In all years, non-native invasive plant species, except for reed canarygrass, will not exceed 20 percent cover within the wetland buffer enhancement area.
- ▶ *Performance Standard 1f.* 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 1g.* 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.

**Table 3.** Performance Standards for Vegetation by Monitored Year

|                                                                  | Percent Survival and Cover |        |        |        |
|------------------------------------------------------------------|----------------------------|--------|--------|--------|
|                                                                  | Year 1                     | Year 2 | Year 3 | Year 5 |
| <b>Tree Strata</b>                                               |                            |        |        |        |
| Survival                                                         | ≥90%                       | ≥80%   | ≥75%   | --     |
| Cover <sup>1</sup>                                               | --                         | --     | --     | ≥25%   |
| <b>Shrub Strata</b>                                              |                            |        |        |        |
| Survival                                                         | ≥90%                       | ≥80%   | ≥75%   | --     |
| Cover <sup>1</sup>                                               | --                         | --     | --     | ≥10%   |
| <b>Invasive Plants</b>                                           |                            |        |        |        |
| Cover of non-native, invasive plants, excluding reed canarygrass | <20%                       | <20%   | <20%   | <20%   |

<sup>1</sup>Includes naturally recruited species.

### Old Access Road Removal

*Objective 2. Provide contiguous buffer free of man-made disturbances within the buffer of Wetland C through removing the old access road.*

- *Performance Standard 2a.* Remove the compacted gravel and tear or rip up native soils on the old access road. Seed the exposed soils with a native upland seed mix. This performance standard is complete when photo documentation within the Year 1 monitoring report demonstrates the trail has been removed.

### Habitat Structure

*Objective 3. Install habitat features to favor small mammals, birds, and insects to improve habitat functions.*

- *Performance Standard 3a.* Place a minimum of 3 horizontal logs, at least 12 inches diameter at breast height (DBH) and 10 feet long, within the enhancement area. 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 3b.* Install a minimum of 4 bat boxes within the enhancement area. This performance standard is completed when the bat boxes are installed and documented in the first annual monitoring report.
- *Performance Standard 3c.* Install a minimum of 2 brush shelters within Wetland C. This performance standard is completed when the brush shelters are installed and documented in the first annual monitoring report.

## **Long-term Protection**

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

- ▶ *Performance Standard 4a.* Install signs on metal posts at minimum of 100-foot intervals or 1 per lot along the boundary of the critical areas bordering the development, whichever provides greater protection. The signs will be 12 inches by 18 inches, a minimum of 6 feet above the ground, and state language similar to the following: “sensitive natural area” and “retain in a natural state.” 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 area.*

- ▶ *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 4a shall be referenced in the homeowners’ association’s Covenants, Codes, and Restrictions.

## **RESPONSIBLE PARTIES**

---

The Applicant or its successors or assigns will be responsible for implementing this wetland buffer mitigation plan, which includes controlling invasive plant species, removing of a compact gravel road, planting native trees and shrubs, installing downed logs, bat boxes, and brush shelters, and physically and legally protecting the buffer enhancement area. 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 5-year monitoring period or longer if warranted by contingency actions.

## **FUNCTIONAL ASSESSMENT**

---

### ***EXISTING CONDITIONS***

Three wetlands are located within the project area and will not be impacted. The buffer of Wetland C (Category III), which is jurisdictional to the City of Camas, is proposed to

be impacted and mitigated as allowed per the CMC; therefore, only this wetland and buffer is discussed within this functional assessment.

Wetland C and its buffer lie in a topographic saddle between Green Mountain and a smaller knoll to the west. Water runs downslope to this topographical saddle, where surface runoff tends to infiltrate, or flow north, northwest, west, and southwest. The wetland and buffer areas onsite are not pristine and are bisected by the County access road, an additional old access road, and border a regularly mowed field owned by an adjoining property owner to the north (Figure 2). The wetland buffer is forested, however is heavily infested with Himalayan blackberry.

## Vegetation

Common overstory trees in the upland buffers surrounding Wetland C include red alder (*Alnus rubra*, FAC), bigleaf maple (*Acer macrophyllum*, FACU), black cottonwood (*Populus trichocarpa*, FAC), and Douglas-fir (*Pseudotsuga menziesii*, FACU). Oregon white oak (*Quercus garryana*, FACU) is scattered widely in more open parts of the forest; but outside of the buffer of Wetland C. Himalayan blackberry dominates the shrub layer within the buffer; however, red elderberry (*Sambucus racemosa*, FACU), salal (*Gaultheria shallon*, FAC), common snowberry (*Symphoricarpos albus*, FACU), vine maple (*Acer circinatum*, FAC) are also common shrubs and woody vines in upland areas. The understory is dominated by lady fern (*Athyrium felix-femina*, FAC), youth-on-age (*Tolmiea menziesii*, FAC), sword fern (*Polystichum munitum*, FACU), and trailing blackberry (*Rubus ursinus*, FACU) where Himalayan blackberry has not dominated the understory.

## Soils

The National Resources Conservation Service maps four soil units onsite (NRCS 2014):

- Cove silty clay loam, 0 to 3 percent slopes (CvA), a hydric soil;
- Dollar loam, 0 to 5 percent slopes (DoB), a non-hydric soil; and
- Olympic stony clay loams, 3 to 30 and 30 to 60 percent slopes (OmE and OmF, respectively), non-hydric soils.

## Hydrology

Wetland C receives hydrology from the seasonally high groundwater table and surface runoff from areas upslope. Water likely outlets offsite to the north. Hydroperiods within Wetland C consist of occasionally flooded or inundated and saturated.

Wetland C was rated according to *Washington State Wetlands Rating System for Western Washington, Revised* (Hruby 2014). This wetland scored moderate for water quality functions (6 points) because the wetland has a highly constricted permanently flowing outlet, greater than 95 percent of the wetland is covered by persistent, ungrazed plants, and there are septic systems within 250 feet of the wetland.

Wetland C scored moderate for hydrologic functions (5 points) because the wetland ponds water to less than 6 inches, the contributing basin is 10 to 100 times the area of

the unit, greater than 10 percent of the area within 150 feet of the wetland is in uses that generate excess runoff, and flooding problems are in a sub-basin farther down gradient.

### **Habitat**

Available habitat within the buffer of Wetland C is minimal for larger mammals due to the dominance of the non-native, invasive plant, Himalayan blackberry. Native trees are established in the overstory and provide some existing habitat for birds and small mammals. However, the buffers lack plant species diversity and habitat features such as large woody material and standing snags.

## ***PROPOSED CONDITIONS***

### **Vegetation**

The vegetation proposed within the wetland buffer enhancement area 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 (1e, 1f, and 1g).

### **Soils**

Soils within the wetland buffer enhancement area will only be undisturbed, except for a narrow corridor to remove gravels and compacted soils within the old access road. Because the soils will have deciduous tree and shrub species installed after the Himalayan blackberry is removed, soil nutrient levels may improve overtime due to the decay and decomposition of organic material and nitrogen fixation of the red alders.

### **Hydrology**

Hydrology within the wetland buffer will not be adversely affected due to the buffer impacts. Conversely, removing invasive plant species, installing native plants, and removing the compacted gravel from the old access road will improve hydrological functions to the wetland buffer. Gained hydrological functions include: control of surface runoff in the buffer through infiltration and preventing sedimentation. Installed plants will slow runoff speed, and removing gravel provides additional surface area within the buffer for surface water infiltration. Surface runoff from the development will be directed to stormwater facilities for treatment, outside of wetlands or wetland buffers.

### **Habitat**

Invasive, non-native plant species will be removed and controlled in the enhancement area, and native species associated with southwestern Washington will be planted. Invasive plant removal within the enhancement area will provide better habitat availability and promote native plant species diversity, which will improve wildlife habitat. Horizontal logs, brush shelters, and bat boxes will also be installed to improve habitat structure and wildlife functions over existing conditions and will provide habitat for small mammals, birds, insects, and amphibians.

## ***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 native 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 wildlife. In addition, bees frequent bigleaf maple flowers as a nectar source. Bat boxes are also proposed, which will offer immediate nesting habitat to promote wildlife habitat functions. Horizontal logs and brush shelters will be installed to provide shelter and food source for some animals and provide beneficial nutrients to the enhancement area as they decay. Providing natural barriers along the outer wetland buffers, if necessary, will help limit human disturbances and promote use of the areas by native fauna. The native plants, bat boxes, brush shelters 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 area 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 6 and 7).

The following equipment may be used to prepare and install plants within the enhancement area: brush hog, weed eater, tractor, 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 4 contains plant specifications for the enhancement area.

**Table 4.** Plant Specifications for the Wetland Buffer

| <b>Species</b>                                             | <b>Spacing</b><br>(feet on center) | <b>Size</b>   | <b>Quantity</b><br>(58,899 sq. ft.) |
|------------------------------------------------------------|------------------------------------|---------------|-------------------------------------|
| <b>Tree Stratum</b>                                        |                                    |               |                                     |
| Bigleaf maple<br>( <i>Acer macrophyllum</i> , FACU)        | 10                                 | 1 gal minimum | 70                                  |
| Oregon ash<br>( <i>Fraxinus latifolia</i> , FACW)          | 10                                 | 1 gal minimum | 70                                  |
| Red alder<br>( <i>Alnus rubra</i> , FAC)                   | 10                                 | 1 gal minimum | 70                                  |
| <b>Total Trees</b>                                         |                                    |               | <b>210</b>                          |
| <b>Shrub Stratum</b>                                       |                                    |               |                                     |
| Black hawthorn<br>( <i>Crataegus douglasii</i> , FAC)      | 6                                  | 1 gal minimum | 140                                 |
| Salal<br>( <i>Gaultheria shallon</i> , FACU)               | 6                                  | 1 gal minimum | 140                                 |
| Nootka rose<br>( <i>Rosa nutkana</i> , FAC)                | 6                                  | 1 gal minimum | 140                                 |
| Red-flowering currant<br>( <i>Ribes sanguineum</i> , FACU) | 6                                  | 1 gal minimum | 140                                 |
| Common snowberry<br>( <i>Symphoricarpos albus</i> , FACU)  | 6                                  | 1 gal minimum | 140                                 |
| <b>Total Shrubs</b>                                        |                                    |               | <b>700</b>                          |

***SPECIFICATIONS FOR SITE PREPARATION, PLANTING, AND MAINTENANCE***

Table 5 on the following page contains specific details for site preparation, habitat feature installation, and planting.

**Table 5.** Specifications for Site Preparation, Planting, and Habitat Feature Installation

| Mitigation Feature/Action                        | Quantity                           | Location              | Site Preparation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------|------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Plants                                           | 910<br>(210 trees<br>& 700 shrubs) | Wetland C<br>Buffer   | <ul style="list-style-type: none"><li>▪ Install silt fencing where necessary to control runoff from the development.</li><li>▪ Install temporary construction fencing along the perimeters of the buffer enhancement area bordering the development.</li><li>▪ Mechanically remove existing non-native species, namely Himalayan blackberry, English holly, and reed canarygrass within the buffer enhancement area. Selectively apply herbicide by hand as necessary to control regrowth of invasive plants.</li><li>▪ Rip soils in planting areas as needed to loosen compact soils and clear existing vegetation in planting areas.</li></ul> | <ul style="list-style-type: none"><li>▪ Plant the native trees and shrubs during the late fall to early spring (October-March) at the spacing identified in Table 4.</li><li>▪ Group the plants in uneven patches dominated by a single species, with patches interspersed among one another.</li><li>▪ All plant materials will be kept cool and moist prior to installation.</li><li>▪ All plant materials will have well developed roots and sturdy stems, with an appropriate root to shoot ratio.</li><li>▪ No damaged or desiccated roots or diseased plants will be accepted.</li><li>▪ Dig the receiving hole several inches wider than the size of the root system.</li><li>▪ Position the planted species' root collar so that they are at or slightly above the level of the surrounding soil to allow for settling.</li><li>▪ Back the hole with soil.</li><li>▪ Gently compact the soil around the planted species to eliminate air spaces.</li><li>▪ Install a minimum of 3-inch depth by 4-foot diameter mulch layer around the base of planted species, as needed. The mulch will comprised of chipped, clean wood. Avoid placing mulch directly against plant stems.</li><li>▪ Install tree shelters as needed.</li><li>▪ Irrigate all newly installed plants as site and weather conditions warrant.</li></ul> |
| Downed Logs                                      | ≥ 3                                | Wetland C<br>& Buffer |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"><li>▪ Preferably Oregon white oak, Oregon ash, and bigleaf maple.</li><li>▪ At least 12-inches DBH for at least 10 feet in length.</li><li>▪ With lateral branches retained.</li><li>▪ Of hard to medium decay, and.</li><li>▪ With ends rough cut, mashed or ripped.</li><li>▪ Preferably located along critical area and development boundaries.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Brush Shelters                                   | ≥ 2                                | Wetland C             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"><li>▪ Place base logs 6-12 inches apart.</li><li>▪ Base logs 2-4 inches in diameter and 8 feet long.</li><li>▪ Add small branches across the top layer of the base log layer in semi-random arrangement.</li><li>▪ Repeat with logs laying alternate direction than base layer, then branches.</li><li>▪ Repeat until brush shelter is min 5 feet tall.</li><li>▪ Pack fallen leaves and small rotting twigs into some, but not all of the lower portions of the pile to provide moist, safe shelter for insects.</li><li>▪ See Appendix A for specific details.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Bat Boxes                                        | ≥ 4                                | Wetland C<br>Buffer   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"><li>▪ Bat box materials consist of plywood and board lumber.</li><li>▪ The bat boxes will be constructed according to the specifications in Appendix A (Link 1999) and will be at least 12 feet above the ground surface on posts.</li><li>▪ Bat boxes will be located away from tree branches and in open areas exposed to the sun.</li><li>▪ See Appendix A for specific details.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Remove Old Access Road                           | 3,742 sq. ft.                      | Wetland C<br>Buffer   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"><li>▪ Gravel removal will occur during the dry season, prior to any plant installation.</li><li>▪ Remove gravel from the old access road and tear or rip up native soils.</li><li>▪ Dispose of gravel outside of any critical areas onsite.</li><li>▪ Seed bare soils with a native upland seed mix or mulch for erosion control, to prepare for plant installation.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Install Natural Barriers and Critical Area Signs | To be determined                   | Wetland C<br>Buffer   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"><li>▪ As needed, install natural barriers where the wetland buffer enhancement area adjoins residential lots.</li><li>▪ Install durable, plastic critical area signs at a minimum of 100-foot intervals or 1 per lot on metal posts along the critical areas bordering the development.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## **Maintain Wetland Buffer Enhancement Area**

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, as needed. 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 mitigation plan establishes a 5-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 5-year period, beginning with Years 1, 2, 3, and 5. Year 1 monitoring report will include the as-built. The goal of the monitoring will be to determine if the previously stated performance standards are being met (Table 3). Reports in years 1, 2, 3, and 5 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 and habitat feature 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 area

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 area, the vegetation monitoring will measure the following:

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

### **Fauna**

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

- Usage of bat boxes
- Insect use
- Amphibian use
- Bird use
- Mammal use
- Level of herbivory

## ***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 downed logs, brush shelters, bat boxes, and critical area signs in the first annual monitoring report
- Documentation that the old access road has been removed in the first annual monitoring report

- Documentation of plant survival, cover, and overall development within the enhancement area
- 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 (including bats)
- 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. 2016. *Oregon White Oak Advance Mitigation Plan for Green Mountain Mixed Use PRD*. Camas, Washington.
- Ecological Land Services, Inc. 2017a. *Critical Areas Report for Green Mountain PRD Phase 3*. Camas, Washington.
- Ecological Land Services, Inc. 2017b. *Bank Use Plan for Green Mountain PRD Phase 3*. 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.
- 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*. Washington Department of Fish and Wildlife. Olympia, Washington. 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](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.

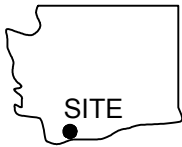
Washington Department of Ecology (Ecology), U.S. Army Corps of Engineers Seattle District, and U.S. Environmental Protection Agency Region 10. March 2006. *Wetland Mitigation in Washington State - Parts 1 & 2*. Washington Department of Ecology Publications #06-06-011a and #06-06-011b. Olympia, Washington.

## FIGURES

---

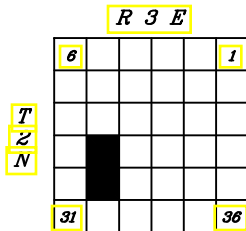
|          |                               |
|----------|-------------------------------|
| Figure 1 | Vicinity Map                  |
| Figure 2 | Site Map                      |
| Figure 3 | Proposed Conditions Map       |
| Figure 4 | Wetland C Detail              |
| Figure 5 | Cross Section A-A'            |
| Figure 6 | Buffer Mitigation – Wetland C |
| Figure 7 | Planting Details – Wetland C  |

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**

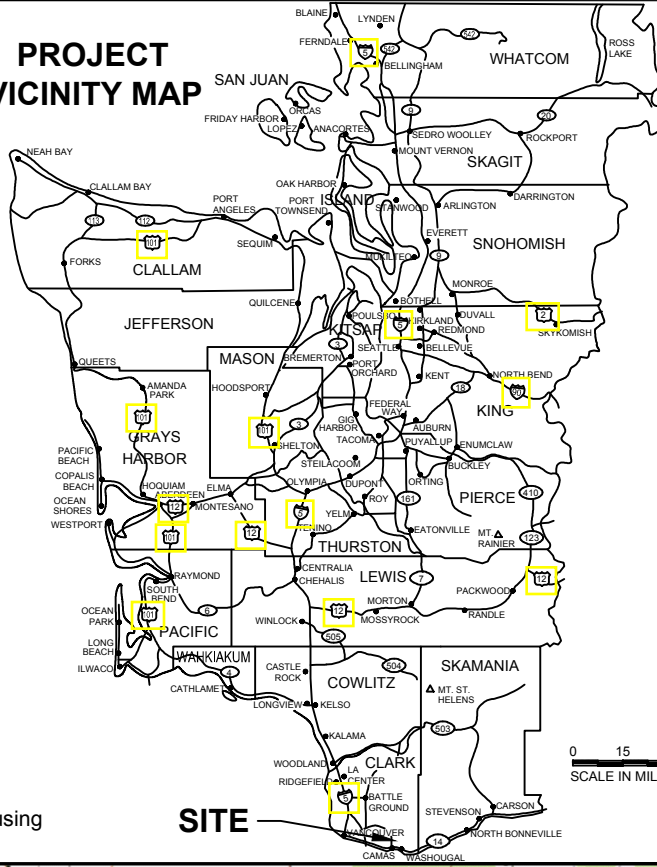


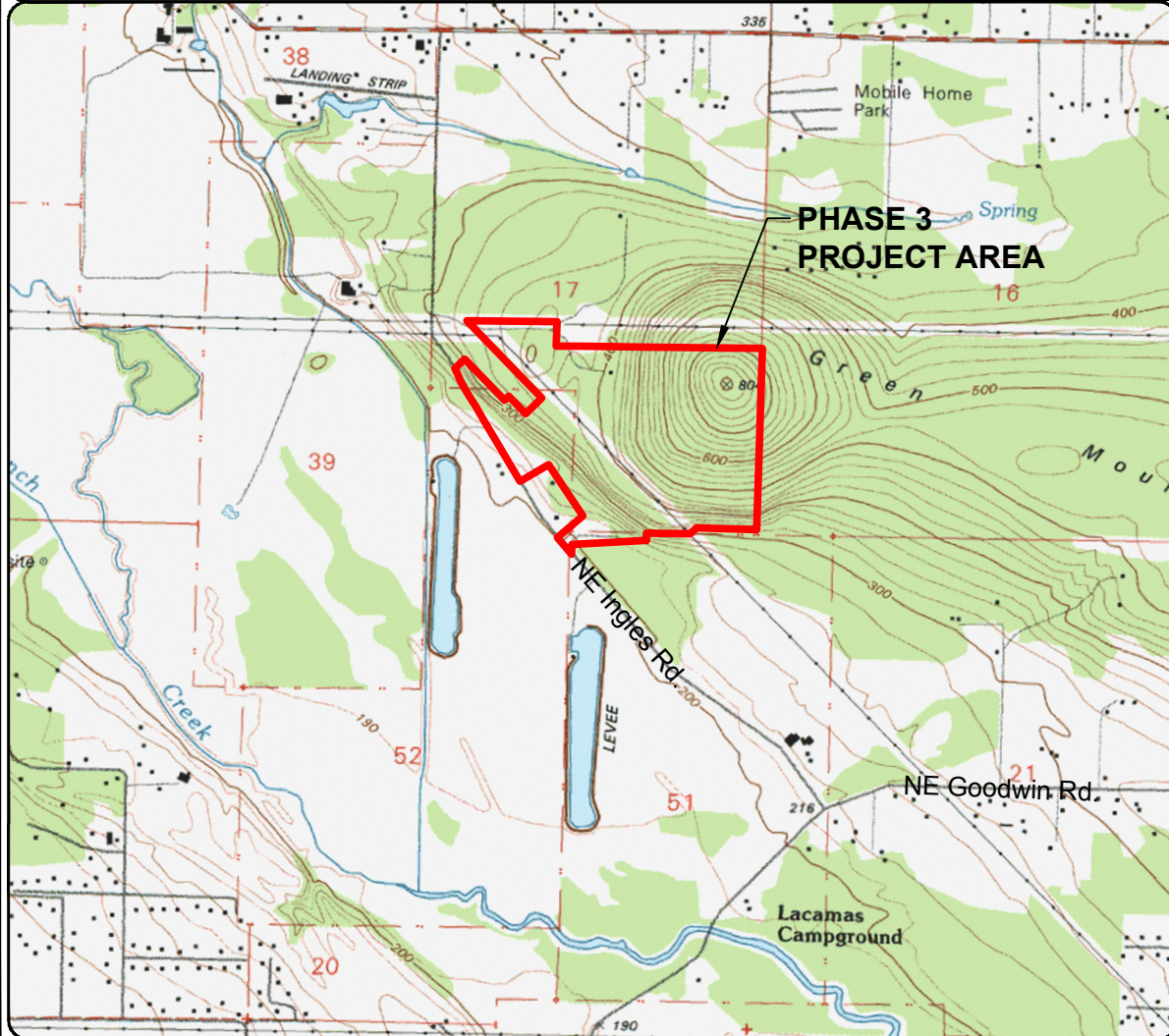
Figure 1  
VICINITY MAP

Green Mountain PRD-Phase 3

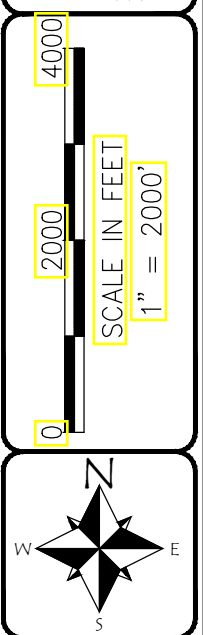
Green Mountain Land, LLC

City of Camas, Clark County, Washington  
Sections 17 & 20, Township 2N, Range 3E, W.M.

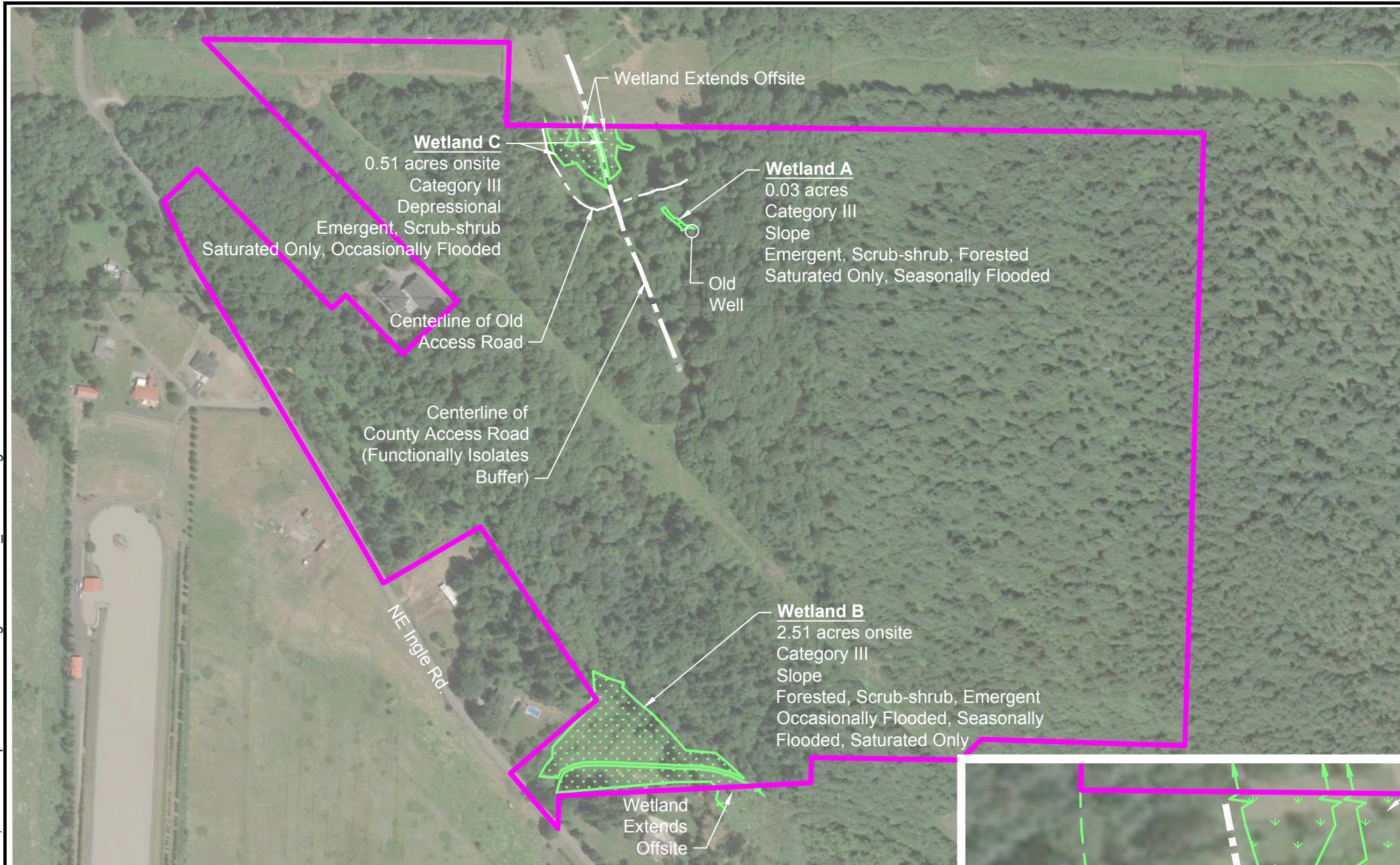
DATE: 9/27/17  
DWN: JKJ  
REQ. BY: LH  
PRJ. MGR: MKM  
CHK:  
PROJECT NO: 2048.02



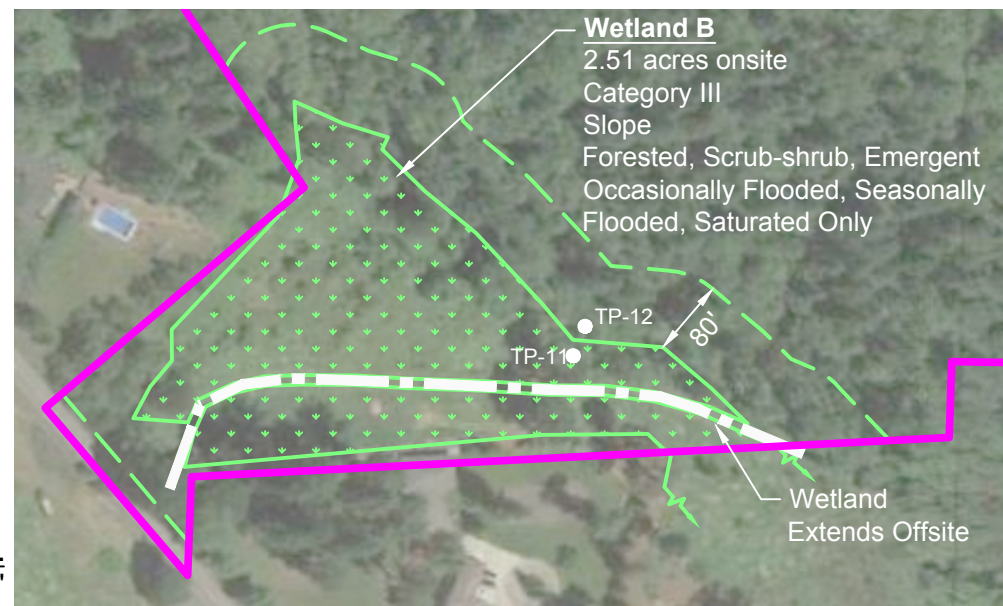
1157 3rd Ave., Suite 220A  
Longview, WA 98632  
Phone: (360) 578-1371  
Fax: (360) 414-9305  
www.eco-land.com



9/27/2017 12:02 PM s:\ELSWA\Clark\Camas\2048-green mountain land, llc\2048.02-phase 3\2048.02-figures\2048.02\_DL-PH3.dwg Jennifer



**SITE MAP OVERVIEW**  
1" = 400'



**WETLAND B DETAIL**  
1" = 200'

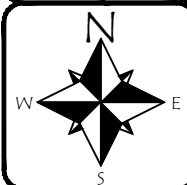
**LEGEND:**

- Project Area
- Wetland Boundary
- Wetland Buffer
- TP-1 ● Test Plot Location
- Centerline of Road

**NOTE(S):**

- Aerial photo provided by Google Earth™.
- Wetlands delineated on February 29 and March 1, 2016; and May 3, 2017. Wetland flags surveyed by Olson Engineering.
- Wetland buffers are per City of Camas Code Chapter 16.53 CMC.

**WETLANDS A & C DETAIL**  
1" = 100'



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

DATE: 9/27/17  
DWN: JKL  
REQ. BY: LH  
PRJ. MGR: MKM  
CHK:  
PROJECT NO: 2048.02

Figure 2  
SITE MAP  
Green Mountain PRD-Phase 3  
Green Mountain Land, LLC  
City of Camas, Clark County, Washington  
Sections 17 & 20, Township 2N, Range 3E, W.M.

1. Aerial photo provided by Google Earth™.
2. Wetlands delineated on February 29 and March 1, 2016; and May 3, 2017. Wetland flags surveyed by Olson Engineering.
3. Wetland buffers are per City of Camas Code Chapter 16.53 CMC.
4. Site plan (received 9-21-17) by Olson Engineering.

 Project Area  
 Wetland  
 Wetland Buffer  
 Centerline of Road

— See Figure 4 for Wetland C Detail

**Wetland C**  
0.51 acres onsite  
Category III  
Depressional  
Upland, Scrub-shrub  
Occasionally Flooded

Centerline of Old  
Access Road

**Wetland B**  
acres onsite  
Category III  
Slope  
b, Emergent  
aturated Only

- Wetland non-jurisdictional to the City of Camas per CCC 16.53.010(C)(2)(a).

**Wetland A to be filled**  
0.03 acres  
Category III  
Slope  
Emergent, Scrub-shrub, Forested  
Saturated Only, Seasonally Flooded

— Centerline of  
County Access Road

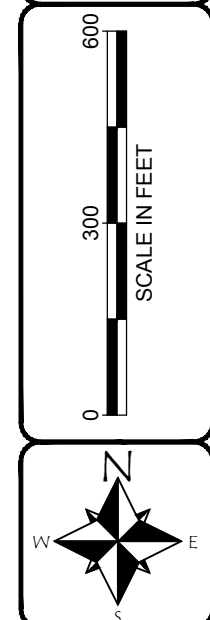
## Wetland Extends Offsite

Figure 3  
PROPOSED CONDITIONS MAP  
Green Mountain PRD-Phase 3  
Green Mountain Land, LLC  
City of Camas, Clark County, Washington  
Sections 17 & 20, Township 2N, Range 3E

DATE: 9/27/17  
DWN: JKJ  
REQ. BY: LH  
PRJ. MGR: MKM  
CHK:  
PROJECT NO:  
2048.02

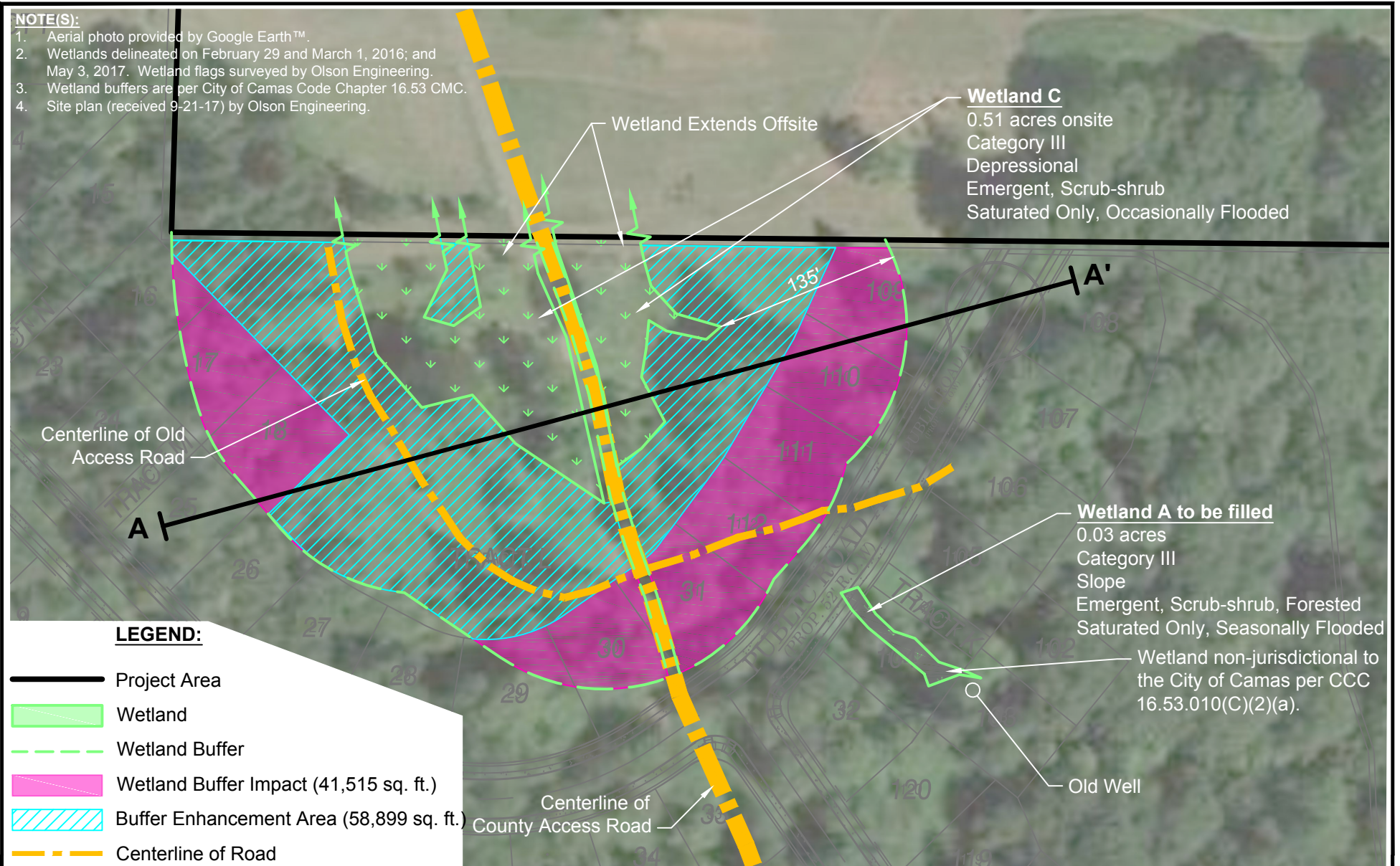
 **Ecological  
Land Services**

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



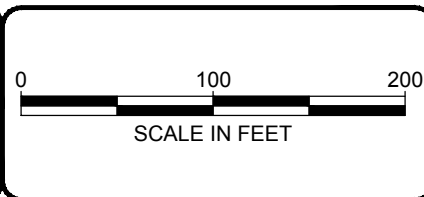
**NOTE(S):**

1. Aerial photo provided by Google Earth™.
2. Wetlands delineated on February 29 and March 1, 2016; and May 3, 2017. Wetland flags surveyed by Olson Engineering.
3. Wetland buffers are per City of Camas Code Chapter 16.53 CMC.
4. Site plan (received 9-21-17) by Olson Engineering.



**LEGEND:**

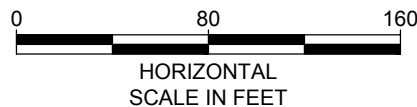
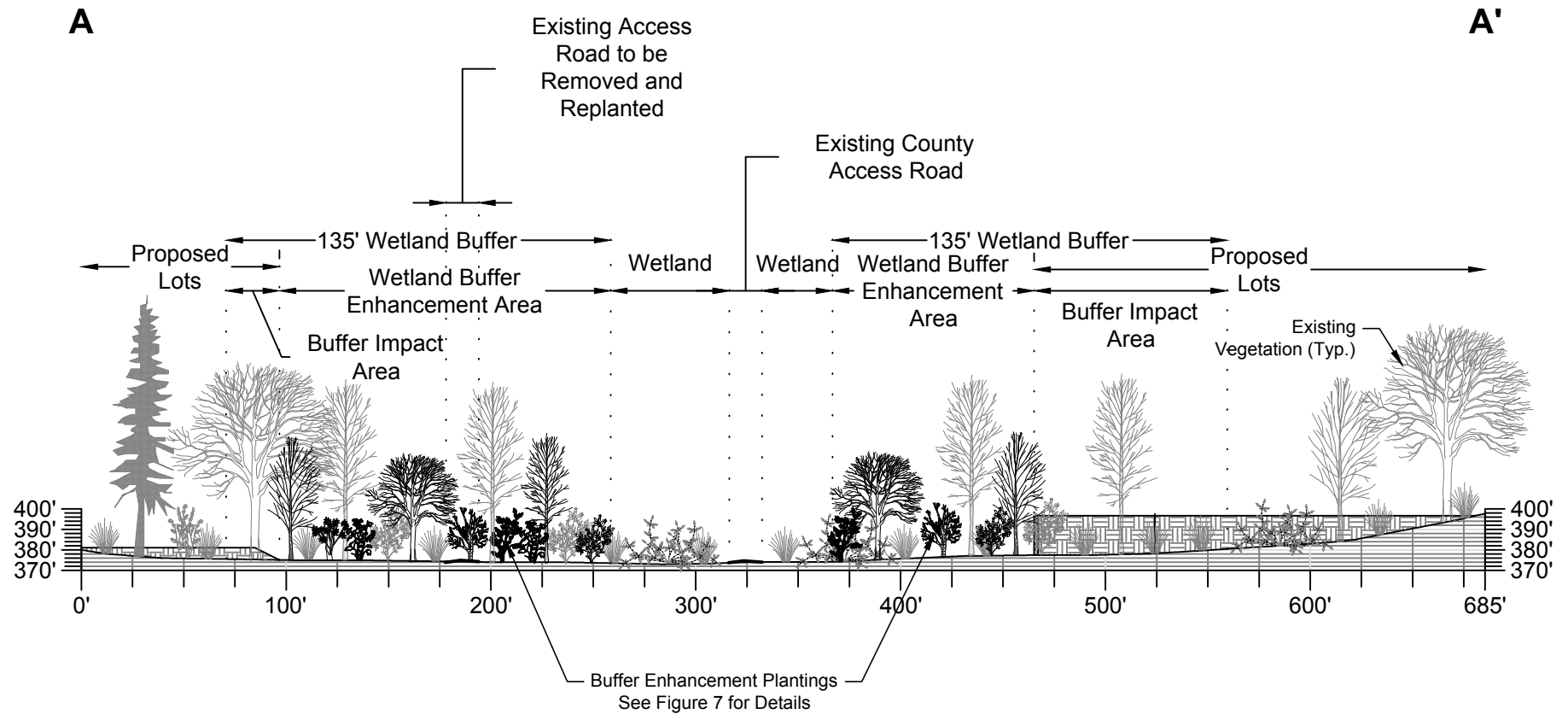
- Project Area
- Wetland
- Wetland Buffer
- Wetland Buffer Impact (41,515 sq. ft.)
- Buffer Enhancement Area (58,899 sq. ft.)
- Centerline of Road



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

DATE: 9/27/17  
 DWN: JKJ  
 REQ. BY: LH  
 PRJ. MGR: MKM  
 CHK:  
 PROJECT NO:  
 2048.02

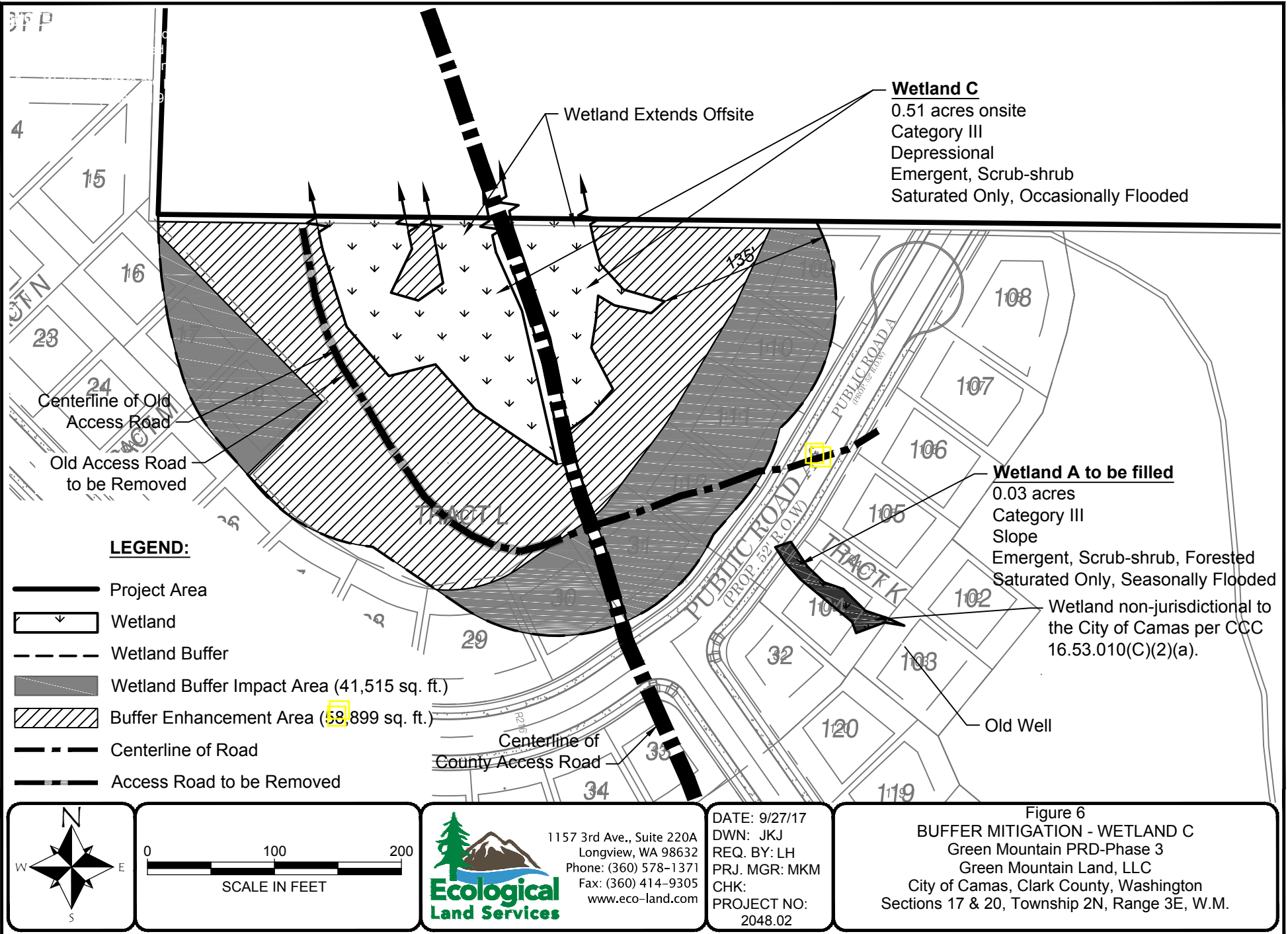
Figure 4  
 WETLAND C DETAIL  
 Green Mountain PRD-Phase 3  
 Green Mountain Land, LLC  
 City of Camas, Clark County, Washington  
 Sections 17 & 20, Township 2N, Range 3E, W.M.



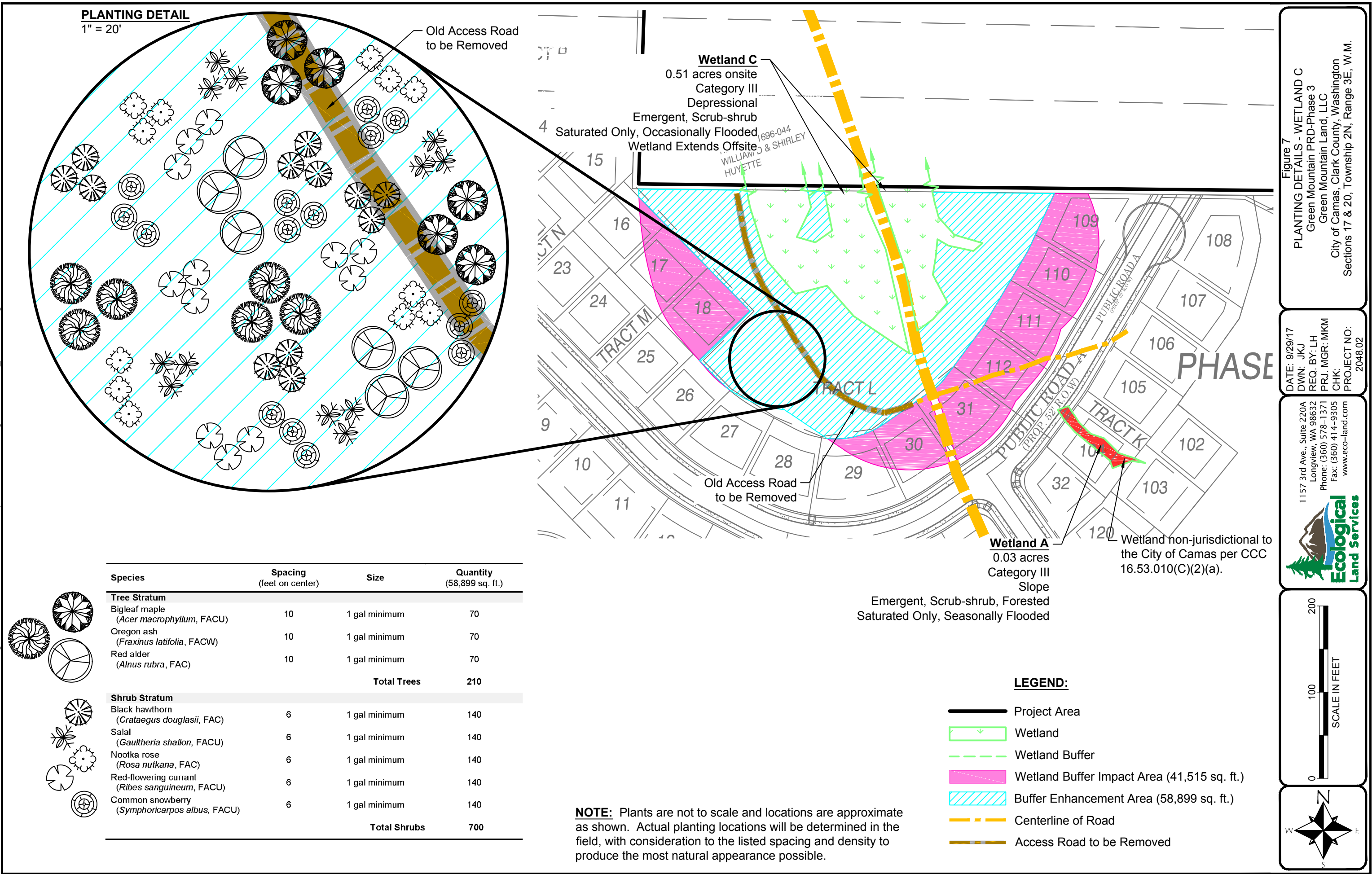
1157 3rd Ave., Suite 220A  
Longview, WA 98632  
Phone: (360) 578-1371  
Fax: (360) 414-9305  
www.eco-land.com

DATE: 9/22/17  
DWN: JKJ  
REQ. BY: LH  
PRJ. MGR: MKM  
CHK:  
PROJECT NO:  
2048.02

Figure 5  
CROSS SECTION A-A'  
Green Mountain PRD-Phase 3  
Green Mountain Land, LLC  
City of Camas, Clark County, Washington  
Sections 17 & 20, Township 2N, Range 3E, W.M.



9/29/2017 11:49 AM S:\ELSWA\Clark\Camas\2048-green mountain land, llo2048.02-phase 3\2048.02-figures\2048.02\_DL-PH3.dwg Jennifer

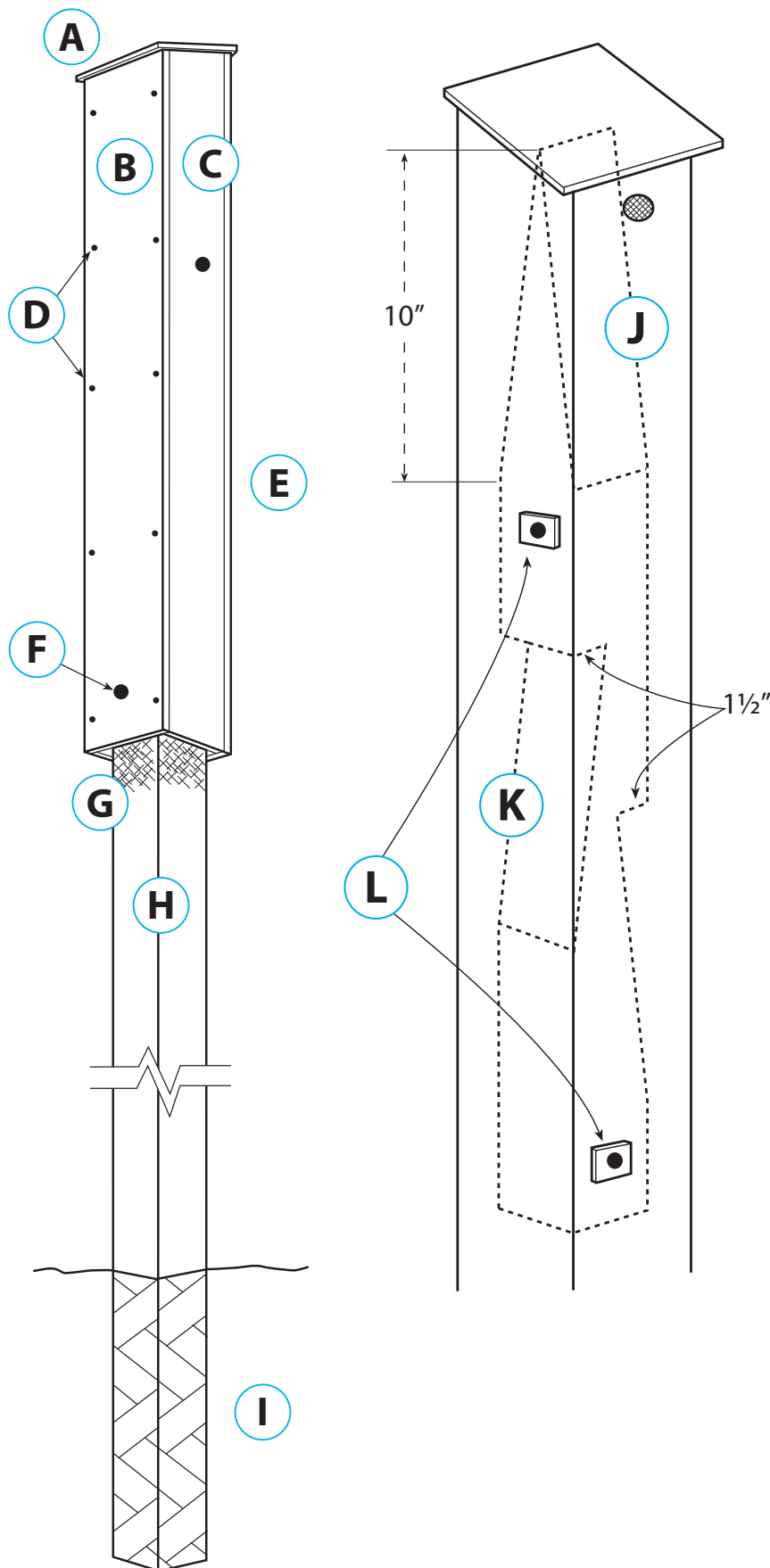


## **APPENDIX A**

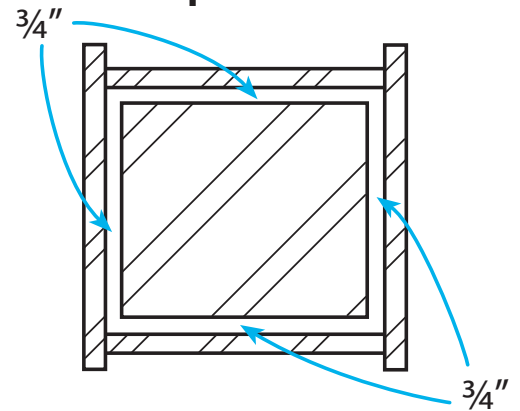
---

Post Bat House Specifications and Brush Shelter Specifications

## Post Bat House Houses



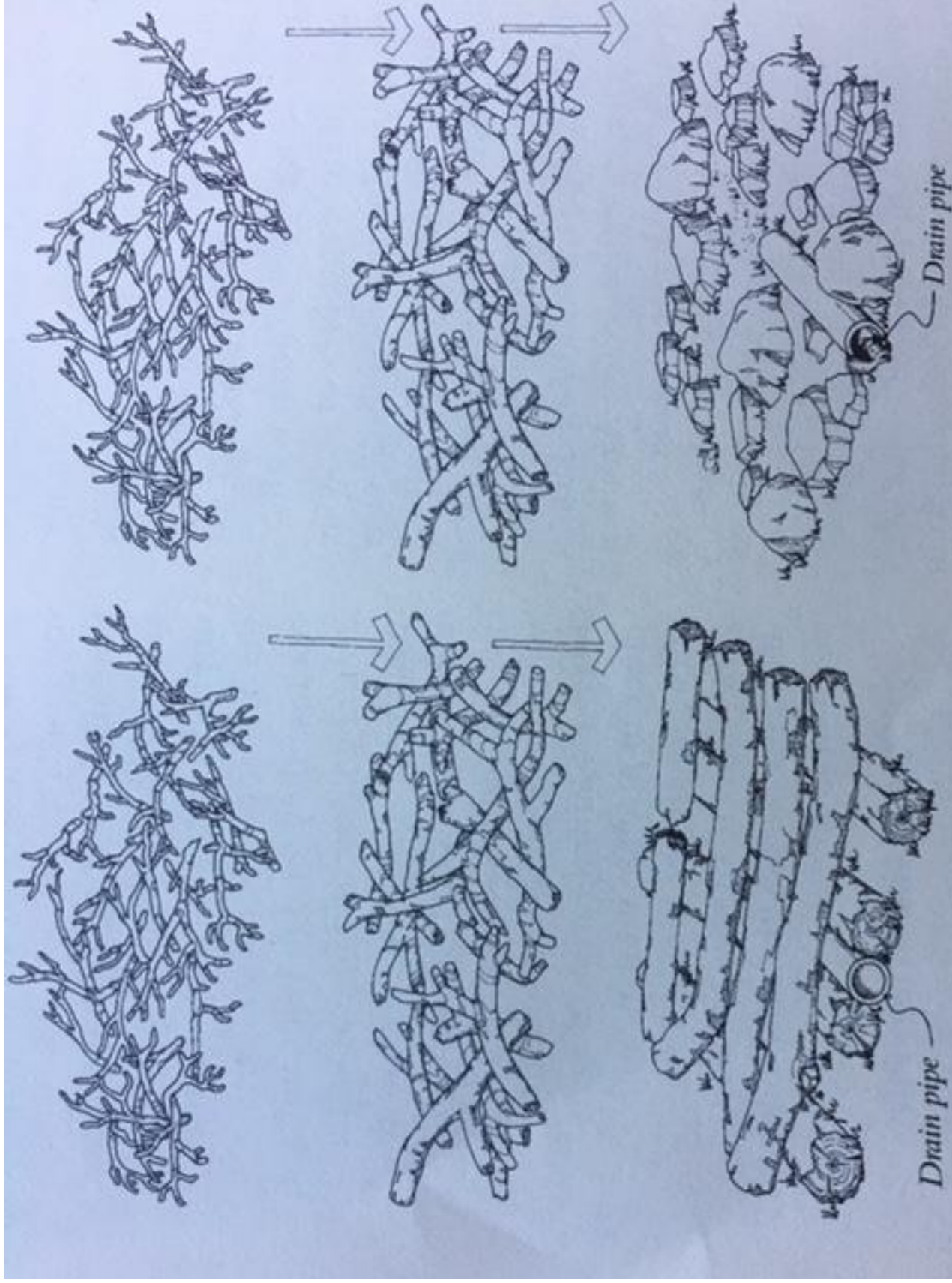
Top View



### Materials

- A** Slanted roof
- B** 1 x 6 board
- C** 1 x 8 board ripped or left full size (see top view below)
- D** Galvanized screws
- E** Bat house box should be at least 3' long
- F** 4 lag bolts
- G** Bats enter and exit here. Roughen area with claw hammer.
- H** Non-treated 4 x 4 post 12 to 16 long.
- I** Place 30" to 36" into ground. Chemical treatment is recommended.
- J** Cut top of post at an angle and roughen sides. This is where most bats will roost.
- K** 1 1/2" cut
- L** 3/4" spacer (wood block). Use 4 lag bolts to attach box to 4 x 4 post

For placement and other information, see <http://www.batcon.org>



**Figure 3.** Examples of how to construct a brush pile. The top portion alone is large enough to attract songbirds to a small yard.