MEADOW SPRINGS, STARLITE ESTATES, AND TAMARACK RIDGE

Wetland Report

Prepared for:

Barghausen Consulting Engineers, Inc.

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TABLE OF CONTENTS

1.0 PROJECT AUTHORIZATION AND SCOPE OF WORK 1

2.0 SITE DESCRIPTION 1

3.0 WETLAND DEFINITION AND REGULATIONS 1

4.0 METHODS 1

4.1 REVIEW OF EXISTING INFORMATION 2

4.2 ON-SITE INVESTIGATION 2

4.2.1 Determining the Presence of Wetlands and Delineating Wetland Boundaries 2

4.2.2 Classifying Wetlands 3

4.2.3 Assessing Wetland Functions 3

5.0 FINDINGS 3

5.1 EXISTING INFORMATION 3

5.2 WETLAND DETERMINATIONS 4

5.2.1 Wetland A 4

5.2.2 Wetland B 5

5.2.3 Wetland C 6

5.2.4 Wetland D 6

5.2.5 Wetland F 7

5.3 STREAM DESCRIPTION 7

6.0 REGULATORY IMPLICATIONS 8

6.1 FEDERAL REGULATIONS 8

6.2 STATE REGULATIONS 8

6.3 LOCAL REGULATIONS 8

6.3.1 Wetlands 9

6.3.2 Streams 10

7.0 IMPACTS AND MITIGATION 10

7.1 WETLAND IMPACTS 10

7.2 STREAM IMPACTS 11

7.3 BUFFER IMPACTS 11

8.0 LIMITATIONS 12

9.0 GLOSSARY 13

10.0 REFERENCES 19

FIGURES AND PHOTOGRAPHS 21

APPENDIX A: METHODS USED TO EVALUATE WETLAND CHARACTERISTICS A-1

APPENDIX B: WETLAND DETERMINATION DATA SHEETS B-1

APPENDIX C: WETLAND RATING FORMS C-1

LIST OF FIGURES

Figure 1 - Vicinity Map

Figure 2 - National Wetland Inventory

Figure 3 - Wetland and Stream Location Map and Site Layout

1.0 PROJECT AUTHORIZATION AND SCOPE OF WORK

At the request of Barghausen Consulting Engineers, Inc. (BCE), ESA Adolfson (Adolfson) performed wetland delineations and prepared this technical report for the Meadow Springs, Starlite Estates, and Tamarack Ridge development projects in unincorporated Kittitas County, Washington. All rights-of-entry to the subject properties for the purpose of conducting this study were granted by the property owner, Sapphire Skies, LLC. The boundaries of the study area were established based upon parcel boundaries, project site plans and a description by BCE staff.

The scope of work for this project includes wetland determinations, delineations, ratings, an assessment of wetland functions, and an assessment of wetland impacts from the proposed developments. A brief discussion of regulatory implications and permitting considerations is also included in this report. The project area included Kittitas County parcels 19148, 21139, 21140, 21141, 21142, 735334, 015434, and 025434. Adolfson did not evaluate all proposed access roads or utility corridors associated with the developments.

2.0 SITE DESCRIPTION

The proposed development projects are located southwest of the City of Cle Elum and accessed from Pasco Road and the Westside Road, in Kittitas County, Washington (Sections 1 and 19, Township 19 North, Range 14 East) (Figure 1). The combined area is approximately 225 acres is positioned along undulating ridges and valleys. A BPA powerline easement is located in the middle of the property in an east-west orientation.

3.0 WETLAND DEFINITION AND REGULATIONS

The characteristics of an area that result in its classification as "wetland" have been formally defined by federal and state agencies, as described in Appendix A. Numerous federal, state, and local regulations govern development and other activities in or near wetlands; at each level, there are typically several agencies charged with such powers (Ecology, 1994). Specific regulatory implications concerning the subject property are summarized later in this report.

4.0 METHODS

Two levels of investigation were conducted for the analysis of wetlands on the subject property: a review of existing information and an on-site investigation.

4.1 Review of Existing Information

A review of existing literature, maps, and other materials was conducted to identify wetlands or site characteristics indicative of wetlands on the project site. These sources can only indicate the likelihood of the presence of wetlands; actual wetland determinations must be based upon data obtained from field investigations.

Several documents were reviewed:

- Kittitas County Mapsifter, accessed at http://www.co.kittitas.wa.us/cds/default.asp ;
- Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) database, July 16, 2007;
- National Wetland Inventory (NWI) Map, Cle Elum (USFWS, 1987);
- *Draft Soil Survey of Kittitas County*, Washington (NRCS, 2007); and
- Aerial orthophotographs (USDA, National Agriculture Imagery Program, 2007).

4.2 On-site Investigation

4.2.1 Determining the Presence of Wetlands and Delineating Wetland Boundaries

Methods defined in the *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997), a manual consistent with the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987), were used to determine the presence and extent of wetlands on the subject property. Washington state and all local governments must use the state delineation manual to implement the Shoreline Management Act and/or the local regulations adopted pursuant to the Growth Management Act. The methodology outlined in the manual is based upon three essential characteristics of wetlands: (1) hydrophytic vegetation; (2) hydric soils; and (3) wetland hydrology. Field indicators of these three characteristics must all be present in order to determine that an area is a wetland (unless problem areas or atypical situations are encountered).

The "routine on-site determination method" was used to determine the wetland boundaries. The routine method is used for areas equal to or less than five acres in size, or for larger areas with relatively homogeneous vegetative, soil, and hydrologic properties.

Formal data plots were established where information regarding each of the three wetland parameters (vegetation, soils, and hydrology) was recorded. This information was used to distinguish wetlands from non-wetlands. Wetland boundaries were identified with sequentially numbered colored flagging. Data plot locations were also marked with colored flagging. Visual observations were made of off-site areas from the site boundaries to determine if potential wetlands occur and if buffer areas would encumber project development.

The methods used to assess wetland characteristics are described in greater detail in Appendix A.

4.2.2 Classifying Wetlands

Two classification systems are commonly used to describe wetlands: 1) the hydrogeomorphic (HGM) system developed by the Corps and 2) the Cowardin habitat system developed by the U.S. Fish and Wildlife Service (USFWS). The HGM system describes wetlands in terms of their position in the landscape and the movement of water in the wetland (Brinson, 1993). The USFWS classification system (Cowardin *et al.*, 1979) describes wetlands in terms of their vegetation communities; these include, for example, emergent, scrub-shrub, and forested community types.

4.2.3 Assessing Wetland Functions

Wetlands play important roles that provide valuable benefits to the environment and society. Because detailed scientific knowledge of wetland functions is limited, evaluations of the functions of individual wetlands are somewhat qualitative and dependent upon professional judgment. For this project, wetland functions were assessed using the *Washington State Wetland Rating System for Eastern Washington – Revised* (Hruby, 2007).

5.0 FINDINGS

The following sections describe the wetland habitats identified during the field investigations. The investigations were conducted on June 7, 8, 11, and 12, 2007 by Adolfson scientists Ilon Logan, Adam Merrill, and Lara Thoreson. Twenty-six data plots were established on the site. Data forms for each of the formal data plots are provided in Appendix B.

5.1 Existing Information

The NWI identifies a palustrine scrub-shrub (PSS) temporarily flooded wetland located in the middle of the study area near the southern boundary (Figure 2). The NWI also identifies several palustrine emergent (PEM) temporarily flooded wetlands located northwest, southeast, and west of the PSS wetland. NWI wetland mapping shows these wetlands continuing off-site to the west and east.

The *Draft Soil Survey of Kittitas County* (2007) identifies six soil types in the project area: 1) Bertolotti ashy sandy loam, 2) Dystroxerepts, 3) Quicksell loam, 4) Haplosaprists, 5) Volperie very paragravely ashy sandy loam, and 6) Volperie very paragravelly ashy sandy loam (NRCS, 2007). Bertolotti, Dystroxerepts, and Volperie soil types are all classified as well-drained and are not considered to be hydric soils according to the *Draft Survey of Kittitas Hydric Soil List for Washington* (NRCS, 2007). Quicksell is a somewhat poorly drained soil and is not considered to be hydric; however, somewhat poorly drained soils by definition are found to have water tables at or near the surface for extended periods of time during the growing season, which can be

sufficient for soils to form hydric characteristics. Haplosaprists are silty clay loam soils that area very poorly drained and considered to be hydric.

5.2 Wetland Determinations

Five wetlands were identified in the project area; these areas are referred to as Wetlands A, B, C, D and F. Figure 3 shows the locations of the wetlands and data plots in the study area. One unnamed stream is present in the project area that occurs within the boundaries of Wetland A. Several ditches are present in the project area that appear to have been excavated for agricultural purposes. A main ditch extends generally with the BPA powerline easement in an east-west direction. The ditch conveys flow to the east and discharges to a stream within the boundaries of Wetland A. A north-south ditch is present within Wetland D and connects the main ditch within the BPA easement. The flagged wetland boundaries were professionally surveyed by BCE.

5.2.1 Wetland A

Overview. Wetland A covers the majority of parcel 025434 and a portion of parcel 015434, and continues offsite to the south and east (Figure 3). The on-site portion of Wetland A is 32.5 acres. The vegetation communities of Wetland A are palustrine forested (PFO), PSS, and PEM (Photos 1 and 2). Two upland meadow areas are located within the wetland near the southeastern property boundary. Data plots 2, 3, 5, 13, and 15 characterize Wetland A.

Hydrology. The main sources of water for Wetland A appear to be a seasonally high groundwater table, hillside seeps, and surface water runoff from the surrounding area. At the time of the June field investigation, soils were saturated to the surface throughout the wetland, and several areas of seasonal ponding were observed. A unnamed perennial stream flows west to east through the northern portion of the wetland, inside the wetland boundary. The onsite portion of Wetland A drains to the east via seasonal drainage channels and the stream described above.

Soils. The observed soil types varied throughout Wetland A and were generally not consistent with the mapped soil types (Bertolotti ashy sandy loam and Quicksell loam) Observed soils throughout the wetland consist of an A horizon of black (10YR 2/1) loam or sandy loam, extending from the surface to between 10 and 16 inches deep. An A2 horizon was observed in plots 3, 5, and 15, which extends from approximately 12 inches deep to below 16 inches deep. The A2 horizon consists of a dark (10YR 2/2, 10YR 3/2, 10YR 3/4) loam or sandy loam with mottles.

Vegetation. The majority of Wetland A consists of PFO habitat, which is dominated by western red cedar (*Thuja plicata)*, vine maple (*Acer circinatum*), red-osier dogwood (*Cornus stolonifera*), lady fern (*Athyrium filix-femina*), skunk cabbage (*Lysichiton americanum*), and field horsetail (*Equisetum arvense*). The PSS portions of the wetland are dominated by Sitka alder (*Alnus crispa*), field horsetail, sedges (*Carex spp.*), sweet coltsfoot (*Petasites frigidus*), Indian hellebore (*Veratrum viride*), and small-fruited bulrush (*Scirpus microcarpus*). The eastern portion of Wetland A consists of PEM habitat, which is dominated by small-fruited

bulrush, reed canarygrass (*Phalaris arundinacea*), sedges, field horsetail, western fescue (*Festuca occidentalis*), and sweet coltsfoot.

Wetland Functions. Wetland A is situated on a gentle slope and contains dense, ungrazed vegetation; therefore, it merits a "moderate" rating for water quality functions (16 points). The wetland scores a "moderate to high" rating for hydrologic (i.e. flood storage) functions, due to its sloping topography and dense, rigid vegetation (12 points). The wetland merits a "high" rating for habitat functions, due to the diversity of vegetation classes, presence of special habitat features, and connectivity to large areas of undisturbed habitat (30 points). Wetland rating forms are provided in Appendix C.

5.2.2 Wetland B

Overview. Wetland B is a depressional wetland located near the northwestern property corner of parcel 735334. The majority of the wetland is located within the BPA powerline easement and continues to the west and south (Figure 3). The delineated and surveyed portion of the wetland is 24.5 acres in size and consists primarily of PEM habitat (Photo 3). Wetland B is characterized by data plots 7, 9, and 10.

Hydrology. The main sources of water for Wetland B appear to be a seasonally high groundwater table and surface water runoff from immediate surrounding areas. At the time of the field investigation, soils were saturated within 12 inches of the soils surface throughout the wetland. A ditch, approximately two feet deep and four feet wide, extends along near the northern boundary of this wetland. The ditch appears to have been excavated for agricultural purposes and conveys flow easterly under the north-south gravel road through a 36-inch corrugated metal culvert. At the time of field investigation, the ditch contained standing water near the surface, but no obvious flow was observed.

Soils. The observed soils in Wetland B did not resemble the mapped Haplosaprists soil unit. Soil in data plots 7 and 9 both had A horizons extending to a depth greater than 16 inches, of black (10YR 2/1) loam with no mottles. Soil in data plot 10 contained an A horizon extending to a depth of 12 inches, of black (2.5Y 2.5/1) silty clay loam with two colors of mottles: olive (5Y 4/6) and dark brown (10YR 3.3). The B horizon is a black (2.5Y 2.5/1) silty clay loam to a depth greater than 17 inches with two colors of prominent mottles: olive brown (2.5Y 4/3) and dark yellowish brown (10YR 4/6).

Vegetation. Wetland B is characterized by a PEM community dominated by reed canarygrass, fowl bluegrass (*Poa palustris*), timothy (*Phleum pretense*), creeping buttercup (*Ranunculus repens*), common dandelion (*Taraxacum officinale*), and small-fruited bulrush.

Wetland Functions. Wetland B merits a "high" rating for water quality functions, due to the presence of persistent, ungrazed vegetation covering the majority of the wetland (22 points). The wetland scores a "low to moderate" rating for hydrologic functions, due to the presence of a permanently flowing surface outlet and a shallow depth of storage during wet periods (6 points).

In terms of habitat functions, the wetland scores a "moderate to high" rating because it is connected to other wetlands and is adjacent to undisturbed forest habitats.

5.2.3 Wetland C

Overview. Wetland C is a small, shallow depressional wetland located near the southeast property boundary of parcel 735334 and in the southern portion of the BPA powerline easement (Figure 3). Wetland C is 0.06 acre (2,798 square feet). The wetland contains PEM habitat (Photo 4) and is characterized by data plot 18.

Hydrology. The main source of water for Wetland C appears to be a seasonally high groundwater table. At the time of the field investigation, soils were saturated to the surface and free water was observed within eleven inches of the ground surface in the soil pit. The wetland has no surface water outlet.

Soils. The observed soils in Wetland C were very similar to the mapped soil unit, Quicksell loam. Soil investigation found a black (10YR 2/1) silty clay loam, extending 11 inches in depth. Soil directly below the A horizon to a depth of 13 inches, is a dark yellowish brown (10YR 4/4), silty clay loam. From a depth of 13 inches to 18 inches and greater, soil is a black (10YR) sandy clay loam.

Vegetation. Wetland C consists of a PEM community dominated by small-fruited bulrush, field horsetail, fowl bluegrass, and sedge.

Wetland Functions. Wetland C merits "moderate" ratings for water quality (12 points) and hydrologic (8 points) functions because the wetland is a closed depression with no surface water outlet. The wetland merits a "low" rating for habitat functions due to a lack of vegetation structure diversity, lack of special habitat features, and disturbance within its buffer (8 points).

5.2.4 Wetland D

Overview. Wetland D is a depressional wetland located on the eastern half parcel number 735334 (Figure 3). The wetland is 1.0 acre and supports PEM habitat (Photo 5). It is characterized by data plot 19.

Hydrology. The main sources of water for Wetland D appear to be a seasonally high groundwater table and surface water runoff from immediate surrounding areas. At the time of the field investigation, soils were saturated to a depth of 6 inches and free water within the pit was observed within 12 inches of the ground surface in the soil pit. A ditch is located in the middle of this wetland in a north south orientation. Wetland D drains into the main east-west ditch within the BPA easement.

Soils. The observed soils in Wetland D do not match the mapped soil unit, Dystroxerepts. Soil investigation found a black (2.5Y 2.5/1) sandy clay loam with olive brown (2.5Y 4/3) mottles, extending to at 11 inches in depth, and a dark gray (2.5Y 4/1), sandy clay horizon to a depth greater than 18 inches, with yellowish brown (10YR 5/6) mottles.

Vegetation. Wetland D consists of a PEM vegetation community, which is dominated by fowl bluegrass, tall buttercup (*Ranunculus occidentalis*), sawbeak sedge (*Carex stipata*), spikerush (*Eleocharis sp.*), and Watson willowherb (*Epilobium watsonii*).

Wetland Functions. Wetland D merits "low" ratings for water quality (6 points) and hydrologic (2 points) functions, and a "low to moderate" rating for habitat functions (11 points). The wetland is situated on a slope and is periodically mowed. In addition, the wetland contains only an emergent vegetation community, and lacks special habitat features.

5.2.5 Wetland F

Overview. Wetland F is a slope wetland located near the south property boundary of parcels 21142 and 21141 and within the BPA powerline easement. The wetland continues offsite to the southeast. Wetland F is at least 0.4 acre in size and consists of PEM habitat (Photo 6). The wetland is characterized by data plot 27.

Hydrology. The main source of water for Wetland F appears to be a seasonally high groundwater table and surface water runoff from immediate surrounding areas. At the time of the field investigation, soils were saturated at 4 inches from the surface.

Soils. The observed soils in Wetland F did not match the mapped soil units, Volperie and Quicksell series. Soil investigation found a very dark brown (10YR 2/2) sandy clay loam, with dark yellowish brown (10YR 4/4) mottles, extending 15 inches in depth. Soil directly below the A horizon to a depth of 18 inches, is a brown (10YR 4/3), silty clay loam, with dark yellowish brown (10YR 4/4) mottles.

Vegetation. Vegetation in Wetland F consists of a PEM community, dominated by fowl bluegrass, common yarrow (*Achillea millefolium*), bird's-foot trefoil (*Lotus sp.*), and creeping buttercup.

Wetland Functions. Wetland F merits a "low" rating for water quality functions (7 points), a "moderate" score for hydrologic functions, and a "low" rating for habitat functions (9 points). The wetland is situated on a gentle slope and contains dense vegetation. The wetland has low vegetation class diversity and lacks special habitat features, but is surrounded by undisturbed upland buffer.

5.3 Stream Description

Adolfson biologists observed an unnamed stream that occurs onsite and lies within the boundaries of Wetland A. The stream flows west to east and continues out of the study area to the east. It receives flow from the agricultural ditches present within the BPA powerline corridor and from Wetland A. The width of the stream ranges from one to four feet and, in some localized areas, extends as broad sheet flow without a defined bed and bank. Stream depths range from six to 18 inches with a variety of substrates including muck and silt to small cobbles and sand. The stream was not flagged due to its location within the boundaries of Wetland A.

6.0 REGULATORY IMPLICATIONS

Wetlands and other waters are regulated at the federal, state, and local levels. Agencies with jurisdiction include the Corps, Washington State Department of Ecology (Ecology), and Kittitas County. The Washington Department of Fish and Wildlife regulates work within streams. Regulatory implications associated with development in wetlands and streams include, but may not be limited to, those discussed in this section. All applicable permits should be obtained prior to developing or otherwise altering wetlands.

6.1 Federal Regulations

The Corps regulates discharges of dredged or fill materials into waters of the United States, including wetlands, under Section 404 of the Clean Water Act. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." A Section 404 permit may be required if a proposed project involves filling wetlands or altering streambeds or other waters of the U.S.

The Corps has established two types of permit programs under Section 404: nationwide and individual. Nationwide permits (NWPs) are issued when a proposed activity will have minimal adverse impacts to wetlands. All other projects are evaluated under the individual permitting process. The Corps determines which permitting process is used for a proposed project. The Corps will require that wetland impacts be avoided or minimized to the extent practicable, and mitigation will likely be required for unavoidable wetland impacts. The NWP program was updated in March 2007 with revised conditions and standards. However, the regional conditions associated with this program for the Seattle District have not yet been issued.

6.2 State Regulations

The state certification process under Section 401 of the federal Clean Water Act is usually triggered through a Section 404 permit application. Section 401 directs each state to certify that proposed in-water activities will not adversely affect water quality or violate state aquatic protection laws. In Washington State, Ecology is responsible for administering the state certification program. Ecology may issue approval, approval with conditions, denial, or a request for delay due to lack of information. Any conditions attached to the 401 certification become part of the Section 404 permit issued by the Corps.

6.3 Local Regulations

Wetlands and streams are regulated by Kittitas County Code (KCC) Title 17A – Critical Areas, as in effect in June 2007.

6.3.1 Wetlands

According to Title 17A, wetlands are classified into four categories: Category I (extreme high value), Category II (high value), Category III (average value), and Category IV (less than average value) (KCC 17A.04.010). The KCC does not specify the use of a particular rating system, nor is a methodology for rating wetlands included in the code. To determine wetland categories, biologists are to use best professional judgment and refer to Ecology's *Washington State Wetland Rating System for Eastern Washington – Revised* (Hruby, 2007) for additional guidance (personal communication, Dan Valoff, Kittitas County Community Development Services, June 2007).

Adolfson biologists rated each of the delineated wetlands using the Ecology rating system; completed data forms are included as Appendix C. Wetland A contains several vegetation classes and is largely unaltered, but is not a rare wetland type such as a bog or mature forest. Therefore, Adolfson biologists determined that Wetland A meets Category II wetland criteria. Wetland B is composed primarily of emergent habitat, which is periodically mowed/hayed. However, the wetland contains some forested habitat near its southern boundary. Therefore, the wetland was determined to meet Category III criteria. Wetland C is a small, highly-altered depressional area with low plant species diversity. They were determined to meet Category IV wetland criteria. Both Wetlands D and F are composed primarily of emergent habitat, and are periodically mowed. Therefore, they were determined to meet Category IV wetland criteria.

Table 6-1 summarizes the wetland buffer ranges as required under KCC 17A.04.020. KCC 17A.04.025 states that the planning director shall base the actual buffer size based upon: 1) the overall intensity of the proposed use; 2) the presence of threatened, endangered, or sensitive species; 3) the site's susceptibility to severe erosion; and 4) the use of a buffer enhancement plan by the applicant which uses native vegetation or other measures which will enhance the functions and values of the wetland or buffer.

Table 6-1. Wetland buffer ranges

Wetland Category	Minimum Regulated Size (square feet)	Required Buffer (feet)
I	Any size	50-200
II	Over 2,000	25-100
III	Over 10,000	20-80
IV	43,560	Not to exceed 25

To assist with site layout planning, Adolfson applied the maximum buffer widths to each wetland based on the above table. The buffer widths may be reduced by the Kittitas County Community Development Services during project review. Table 6-2 provides a summary of the wetlands, their ratings and buffer widths, in the project area.

Table 6-2. Wetland summary

Wetland Name	Area (acres)	Hydrogeomorphic (HGM) Class	Cowardin Classes	Kittitas County Rating	Maximum Buffer Width (feet)	Required Mitigation Ratio
A	32.5	slope	PEM, PSS, PFO	II	100	2:1
B	24.5	depressional	PEM, PFO	III	80	1.5:1
C	0.06	depressional	PEM	IV	25	1:1
D	1.05	slope	PEM	III	80	1.5:1
F	0.38	slope	PEM	IV	25	1:1

6.3.2 Streams

Kittitas County has adopted the five-tier typing system as described in WAC 222-16-030 to classify surface waters such as streams (KCC 17A.02.300). Based on the state water typing system, the unnamed stream observed within Wetland A is classified as a Type 3 water. Type 3 waters have a riparian habitat buffer range of 20 – 50 feet from the ordinary high water mark (OHWM). The maximum buffer is less that the 100-foot wetland buffer applied to Wetland A.

7.0 IMPACTS

The Meadow Springs, Starlite Estates, and Tamarack Ridge projects involve subdivision of lots and construction of single-family, residences. Access roads for each of three developments will also be provided as part of the projects. As a result, there will be unavoidable permanent impacts to wetlands and wetland buffers. Only one of the five wetlands identified in the study area and the buffer of two of the wetlands will be affected by the project (Figure 3 and Table 7-1).

The following assessment of wetland and buffer impacts is based on a preliminary site plan layout developed by BCE, dated August 20, 2007. The preliminary site plan includes lot layout and proposed roads, and does not show associated infrastructure for water, sewer, power, and gas services.

7.1 Wetland Impacts

Based on the preliminary site plan, the proposed project will impact approximately 0.09 acre or 3,884 square feet of wetland in the study area (Table 7-1). The project developer and project engineers avoided all impacts to wetland and wetland buffer by locating the all of the proposed lots outside of delineated wetlands their buffers. The project team further avoided and minimized wetland impacts by locating proposed access roads in upland areas wherever possible. However, the proposed access road to the southern lots in the Meadow Springs development will result in minor impact to Wetland A.

7.2 Stream Impacts

No impacts to the unnamed stream associated with Wetland A are proposed as part of the project. In addition, there will be no impacts to Wetland A that might influence the existing hydrology of the watercourse.

7.3 Buffer Impacts

The proposed project will impact 59,521 square feet of the buffer associated with Wetland A. The northern portion of the buffer would be reduced in multiple areas to accommodate proposed access roads and proposed lots 4, 5, and 6 (Figure 3). Approximately 13,402 square feet of Wetland D buffer would be impacted to accommodate the proposed access road to the southern lots in the Meadow Springs development.

Table 7-1. Wetland and Buffer Impact Summary

Wetland Name	Area (acres)	Kittitas County Rating	Preliminary Wetland Impact (sf)	Preliminary Buffer Impact (sf)
A	32.5	II	3,884	59,521
B	24.5	III	0	0
C	0.06	IV	0	0
D	1.05	III	0	13,402
F	0.38	IV	0	0
Total	58.49		3,884	72,923

8.0 MITIGATION

Federal, state, and local agencies require the use of mitigation sequencing for limiting and reducing impacts to wetlands. Mitigation sequencing has been followed during site layout and design of this project. Typically, mitigation for impacts to wetlands must be addressed in the following sequence:

1. Avoid wetland and buffer impacts.
2. Minimize wetland and buffer impacts.
3. Mitigate for wetland and buffer impacts in the following order of preference:
    a. restore wetlands on upland sites that were formerly wetlands;
    b. enhance significantly degraded wetlands;
    c. create wetlands on disturbed upland sites such as those with vegetative cover consisting primarily of exotic introduced species or noxious weeds.

In Kittitas County, up to two acres of Class IV wetlands may be filled, drained, or modified with no approval required from the planning manager, and no required mitigation (KCC 17A.04.040). However, mitigation may be required by state and/or federal agencies. The KCC requires mitigation for Category IV wetland fill or modification that exceeds two acres (17A.04.040). KCC 17A.04.050 requires the following wetland replacement ratios for wetland impacts:

Table 7-2. Wetland mitigation ratios

Wetland Category	Replacement Ratio (replacement: impact)
I	3:1
II	2:1
III	1.5:1
IV	1:1

To mitigate for the direct impacts to wetlands and buffers resulting from site development, the project is proposing to provide enhancement of existing low value wetland areas within the project vicinity. To mitigate for impacts to wetland buffers, the project proposes to add an equal area of upland buffer. The buffer addition areas are shown on Figure 3. The areas of wetland enhancement will be identified after a final grading plan has been developed. It is anticipated that portions of Wetland B will be targeted for wetland enhancement. The enhanced wetland would provide additional water quality improvement function, wildlife habitat value, and increased plant species diversity.

9.0 LIMITATIONS

Within the limitations of schedule, budget, scope-of-work, and seasonal constraints, we warrant that this study was conducted in accordance with generally accepted environmental science practices, including the technical guidelines and criteria in effect at the time this study was performed, as outlined in the Methods section. The results and conclusions of this report represent the authors' best professional judgment, based upon information provided by the project proponent in addition to that obtained during the course of this study. No other warranty, expressed or implied, is made.

10.0 GLOSSARY

agricultural wetland - Areas where wetland soils and hydrology remain, but hydrophytic vegetation has been removed to allow a crop to be grown.

anaerobic - A situation in which molecular oxygen is absent (or effectively so) from the environment.

atypical situation - Areas in which one or more wetland parameters (vegetation, soil, and/or hydrology) have been sufficiently altered by recent human activities or natural events to preclude the presence of wetland indicators of the parameter. "Recent" is intended to mean that period of time since legal jurisdiction of an applicable law began.

best management practices (BMPs) – The physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollutant discharges.

buffer - A designated area along the edge of a stream or wetland that is regulated to control the negative effects of adjacent development from intruding into the aquatic resource.

concretion - A local concentration of chemical compounds such as calcium carbonate or iron oxide in the soil that forms a grain or nodule of varying size, shape, hardness, and color. Concretions of significance in hydric soil are usually iron and/or manganese oxides occurring at or near the soil surface that develop under conditions of prolonged soil saturation.

dominant species – Plant species that define the character of a vegetation community. In wetland delineation, this is typically measured using percent areal cover. For each stratum in the plant community (trees, shrubs, and herbs), dominant species are the most abundant plant species that when ranked in descending order of abundance and cumulatively totaled immediately exceed 50 percent cover for the stratum, plus any additional species that individually compose 20 percent or more of the total cover in the stratum. The list of dominant plant species is then combined across strata (Environmental Laboratory, 1987; Ecology, 1997)

emergent - A plant that grows rooted in shallow water, the bulk of which emerges from the water and stands vertically. Usually applied to non-woody vegetation.

emergent wetland - In the USFWS classification system (Cowardin et al., 1979), a wetland characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens.

enhancement - An improvement in the functions and values of an existing wetland, typically through native plantings.

fill material - Any material placed in an area to increase the surface elevation.

forested wetland - In the USFWS classification system (Cowardin et al., 1979), a wetland characterized by woody vegetation that is six meters (20 feet) tall or taller.

gleyed - A soil condition resulting from prolonged soil saturation, manifested by the presence of bluish or greenish colors throughout the soil or in mottles (spots or streaks) among other colors.

herbaceous - Having the characteristics of an herb; a plant with no persistent woody stem above the ground.

hydric soil – A soil that formed under conditions of saturation, flooding, or ponding long enough to develop anaerobic conditions in the upper part.

hydrogeomorphic (HGM) classification – A system of classifying wetlands based on their position in the landscape and the movement of water within the wetland.

hydrology – The science dealing with the properties, distribution, and circulation of water.

hydrophyte - Any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. The sum total of hydrophytes in an area is known as "hydrophytic vegetation."

in-kind compensation - Compensation for lost wetland habitat with a replacement wetland of the same habitat type.

inundation – A condition in which water from any source temporarily or permanently covers a land surface.

invasive plant species - Plant species that become established easily in disturbed conditions, reproduce readily, and often establish monocultures. Most invasive plants are non-native species; they were introduced to the Northwest intentionally or unintentionally by humans. Examples of common invasive species in the Pacific Northwest are Scot's broom, Canada thistle, hedge bindweed, English ivy, reed canarygrass, and purple loosestrife.

lacustrine - In the USFWS classification system (Cowardin et al., 1979), lacustrine refers to a freshwater area that has all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) has less than 30% coverage of trees, shrubs, persistent emergent plants, mosses, or lichens; and (3) total area exceeds 20 acres. For areas less than 20 acres, an area is considered lacustrine if it has an active wave-formed or bedrock shoreline or is deeper than 6.6 feet in the deepest part. "Freshwater" means less than 0.5 parts per thousand ocean-derived salts.

mitigation – Defined in WAC 197-11-766 as:

(1) Avoiding the impact altogether by not taking a certain action or parts of an action;

(2) Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;

(3) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

(4) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;

(5) Compensating for the impact by replacing, enhancing or providing substitute resources or environments: and/or

(6) Monitoring the impact and taking appropriate corrective measures.

100-year floodplain - The flood with a 100-year recurrence interval; those areas identified as Zones A, A1-30, AE, AH, AO, A99, V, V1-30, and VE on most current Federal Emergency Management Agency (FEMA) Flood Rate Insurance Maps, or areas identified as 100-year floodplain on applicable local Flood Management Program maps.

ordinary high-water mark - The line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; changes in the character of soil or vegetation; topographic shelves; or the presence of a line of litter or debris.

out-of-kind compensation - Compensation for lost wetland habitat with a replacement wetland of a different habitat type.

palustrine - In the USFWS classification system (Cowardin et al., 1979), palustrine refers to freshwater areas dominated by trees, shrubs, persistent emergent plants, mosses, or lichens. They can be non-tidal or tidal. Palustrine also includes wetlands lacking this vegetation but with the following characteristics: (1) area less than 20 acres; (2) no active wave-formed or bedrock shoreline; (3) water depth in the deepest part is less than 6.6 feet at low water. "Freshwater" means having less than 0.5 parts per thousand ocean-derived salts.

persistent emergents – Emergent plants that remain standing at least until the beginning of the next growing season.

reach - A length of stream channel with uniform characteristics.

redoximorphic soil characteristics – Features of the soil such as masses, nodules, or mottles formed through reduction and oxidation of iron and manganese in seasonally saturated soils.

restoration - To improve a disturbed or altered wetland by returning wetland parameters that may be missing.

rhizosphere - The zone of soil surrounding a plant root in which interactions between the living root and microorganisms occur.

riverine - In the USFWS classification system (Cowardin et al., 1979), riverine refers to freshwater areas that are contained within a channel and are not dominated by trees, shrubs, and persistent emergent plants. Examples include rivers and streams. "Freshwater" means having less than 0.5 parts per thousand ocean-derived salts.

saturated soil conditions - A condition in which all easily drained spaces between soil particles in the root zone are temporarily or permanently filled with water.

scrub-shrub - In the USFWS classification system (Cowardin et al., 1979), areas dominated by woody vegetation less than 6 meters (20 feet) tall. The species include tree shrubs, young trees, and trees or shrubs that are stunted because of environmental conditions.

Section 404 permit - A permit issued by the U.S. Army Corps of Engineers under Section 404 of the federal Clean Water Act that allows an activity (filling) within a wetland. A 404 permit usually requires compensation or mitigation for the wetland impacts.

soil matrix - The portion of a given soil that has the dominant color. In most cases, the matrix is the portion of the soil having more than 50% of the same color.

synonymy - Different scientific names for the same species.

waters of the United States - As defined in 33 CFR Part 328, the term "waters of the United States" means:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
    i. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
    ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    iii. Which are used or could be used for industrial purpose by industries in interstate commerce;
4. All impoundments of waters otherwise defined as waters of the United States under the definition;
5. Tributaries of waters identified in paragraphs 1-4;
6. The territorial seas;
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs 1-6.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.

8. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.

wetlands - Those areas that are inundated or saturated by surface or groundwater 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. Wetlands generally include swamps, marshes, bogs, and similar areas (Federal Register, 1982, 1986).

wetland boundary – The point on the ground at which a shift from wetlands to non-wetlands or aquatic habitat occurs.

wetland hydrology - Wetland hydrology is considered to be present when there is permanent or periodic inundation or soil saturation at or near the soil surface for more than 12.5% of the growing season (typically two weeks in lowland Pacific Northwest areas). Areas that are inundated or saturated for between 5% and 12.5% of the growing season in most years may or may not be wetlands. Areas inundated or saturated for less than 5% of the growing season are non-wetlands (Ecology, 1997).

wetland indicator status (WIS) - Categories assigned to plant species based upon the estimated probabilities (expressed as a frequency of occurrence) of the species occurring in a wetland or a non-wetland. Wetland indicator status categories include the following:

Obligate (OBL): species that almost always occur in wetlands under natural conditions (estimated probability >99%).

Facultative wetland (FACW): species that usually occur in wetlands (estimated probability 67 to 99%), but are occasionally found in non-wetland areas.

Facultative (FAC): species that are equally likely to occur in wetlands (estimated probability 34 to 66%) or non-wetland areas.

Facultative upland (FACU): species that usually occur in non-wetland areas (estimated probability 67 to 99%), but are occasionally found in wetlands.

Upland (UPL): species that almost always occur in non-wetland areas under normal conditions (estimated probability >99%).

A (+) or (-) following the WIS signifies a greater or lesser likelihood, respectively, of the species being found in wetland conditions. Plant species can also be designated "No indicator" or NI, which includes species for which insufficient information is available to determine status, or

which were not evaluated by USFWS in compiling the WIS listings. Plant species that are not listed on the USFWS list of WIS ratings are designated "NL" and are presumed to be upland species.

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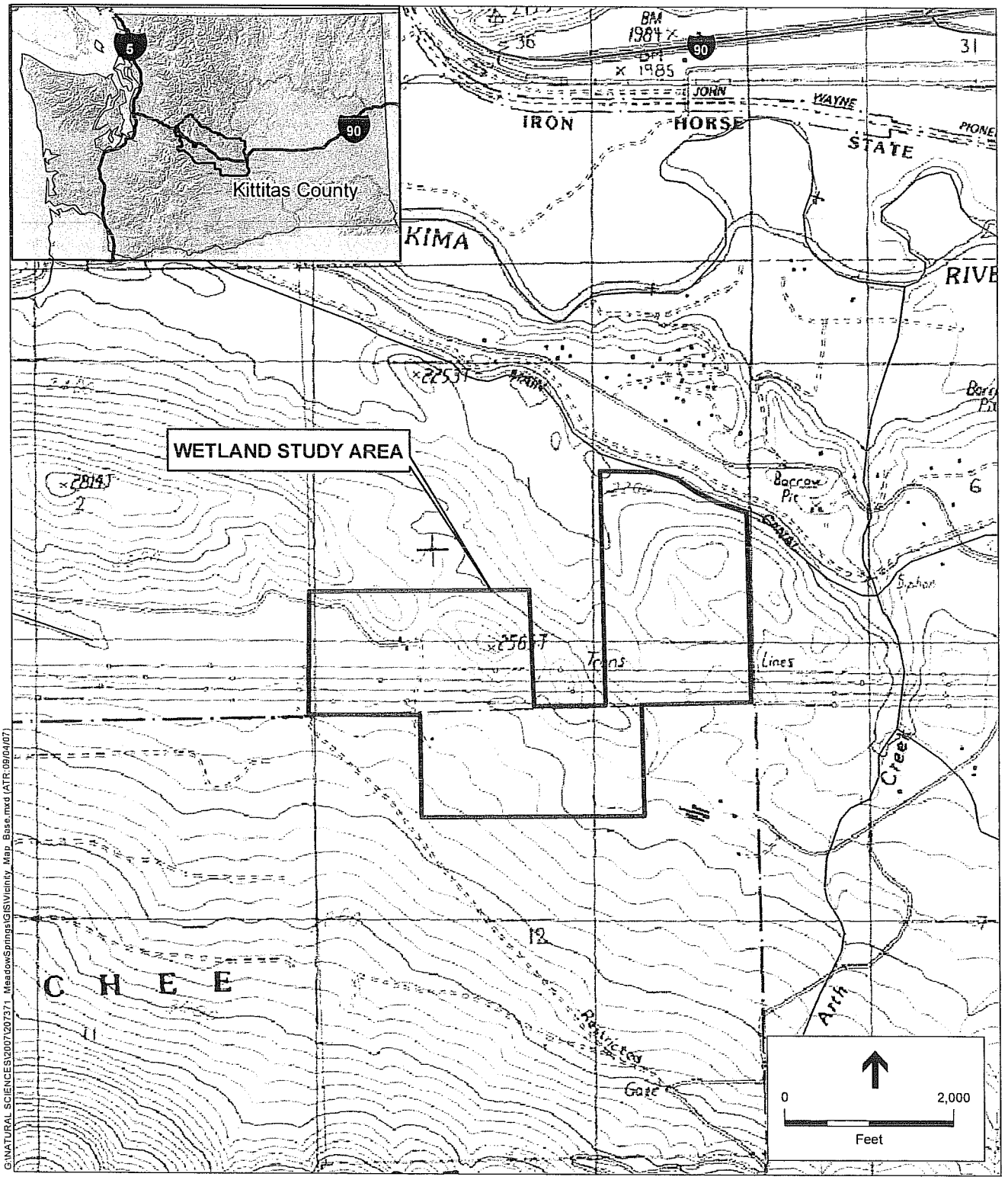
FIGURES AND PHOTOGRAPHS



SOURCE: ESRI, 2007; WADOE (2005), 2006; WASHDOT (2004), 2007

Map data shown are the property of the sources listed above. Inaccuracies may exist, and ESA Adolfson implies no warranties or guarantees regarding any aspect of data depiction.

Meadow Springs. 207371

Figure 1
Vicinity Map
Kittitas County, Washington

Meadow Springs . 207371

SOURCE: NAIP, 2006; WADOE, 2001; WDFW, 2007

Figure 2
Aerial Photograph
Kittias County, Washington

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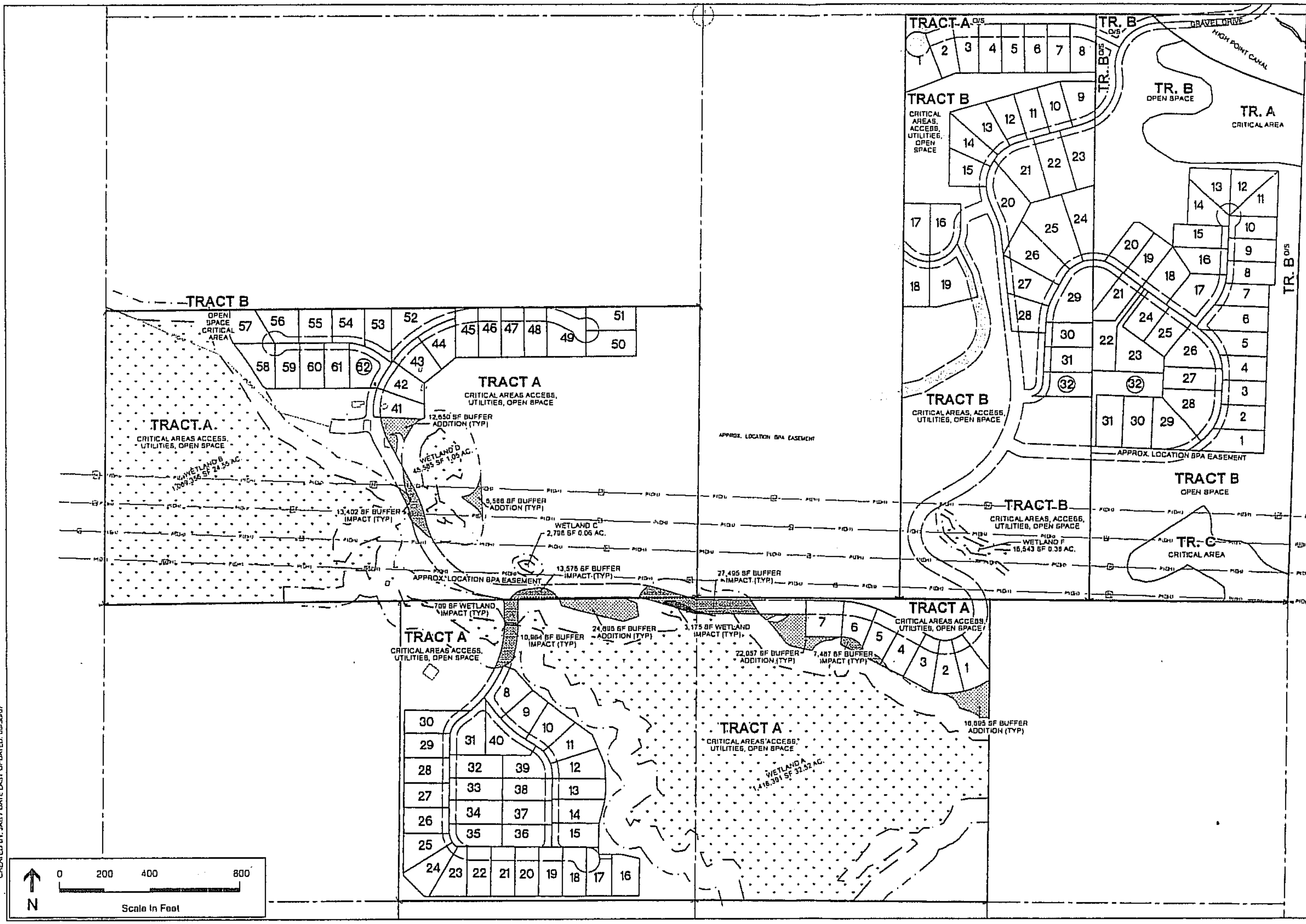

MEADOW SPRING WETLAND IMPACT TABLE

	WETLAND IMPACT AREA	3,884 SF
	WETLAND ADDITION AREA	TBD
	BUFFER IMPACT AREA	72,923 SF
	BUFFER ADDITION AREA	81,687 SF
TOTAL NET LOSS IN WETLAND AREA		TBD
TOTAL NET GAIN IN BUFFER AREA		8,762 SF

SOURCE: Barghausen Consulting Engineers, August 20, 2007.

Meadow Springs . 207371

Figure 3

Wetland Location Map and Site Layout
Cle Elum, Washington

Photo 1 – Wetland A – typical PFO community.

Photo 2 – PEM community in eastern portion of Wetland A, facing east.

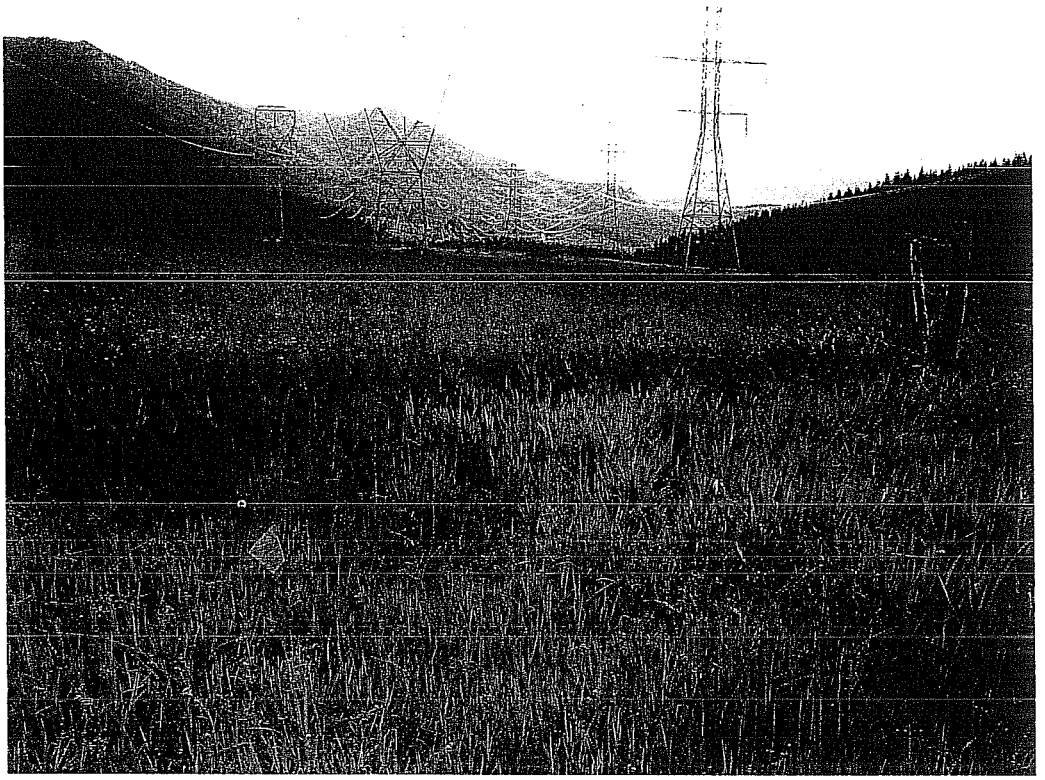

Photo 3 – Wetland B – facing west from existing gravel road .

Photo 4 – Wetland C – facing east.

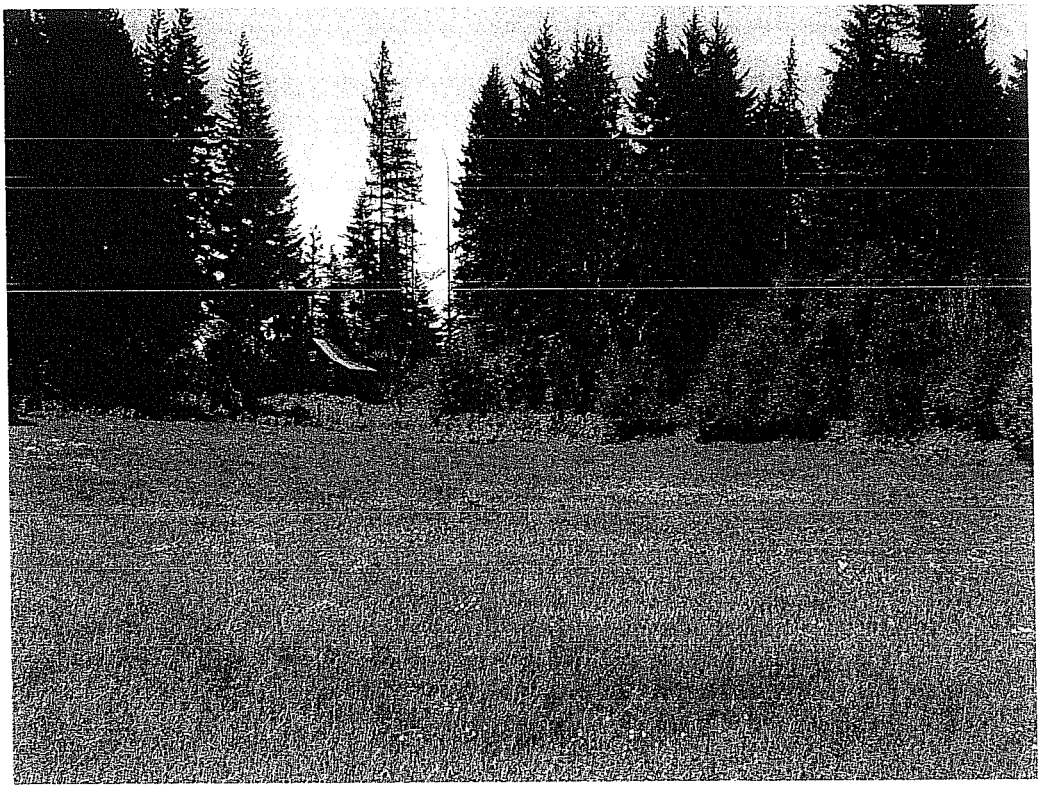

Photo 4 – Wetland D – facing north from southern wetland boundary.

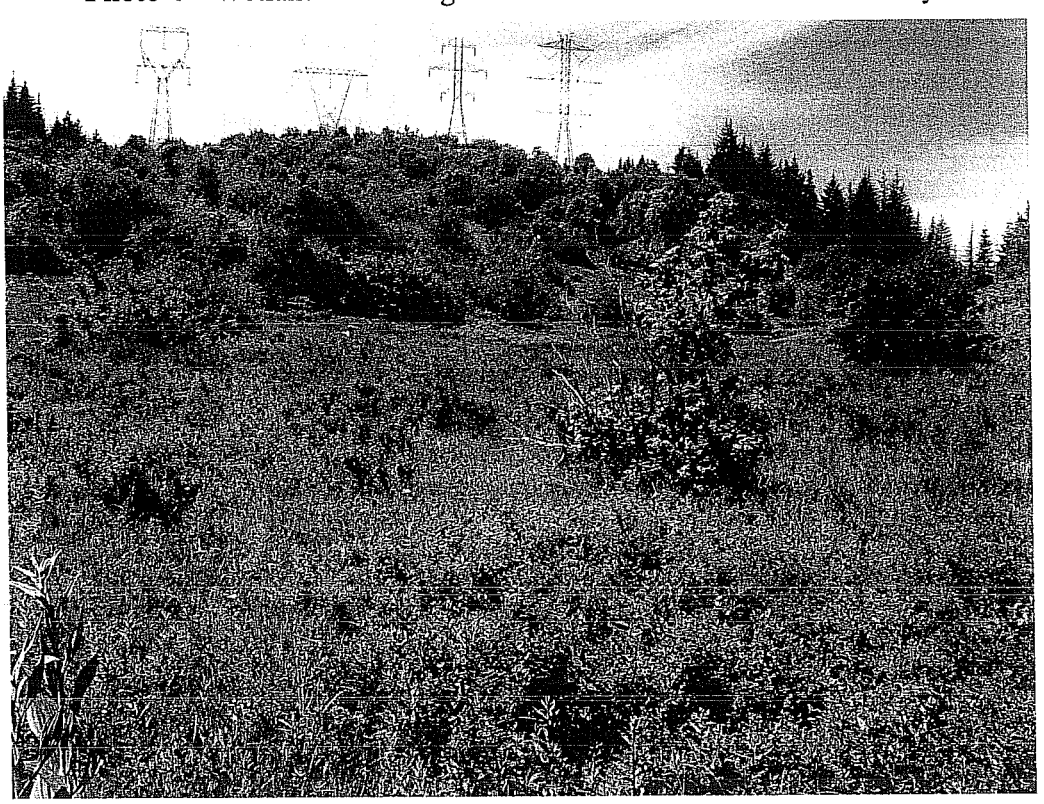

Photo 5 – Wetland F – facing west.

APPENDIX A:
METHODS USED TO EVALUATE WETLAND CHARACTERISTICS

Wetland Definition

Wetlands are formally defined by the U.S. Army Corps of Engineers (Corps) (Federal Register, 1982), the Environmental Protection Agency (EPA) (Federal Register, 1988), the Washington Shoreline Management Act (SMA) of 1971 (Ecology, 1991) and the Washington State Growth Management Act (GMA) (Ecology, 1992) as

> *... those areas that are inundated or saturated by surface or groundwater 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. Wetlands generally include swamps, marshes, bogs, and similar areas* (Federal Register, 1982, 1986).

In addition, the SMA and the GMA definitions add:

> *Wetlands do not include those artificial wetlands intentionally created from non-wetland site, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990 that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificially created wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.*

Methods defined in the *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997), a manual consistent with the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987), were used to determine the presence and extent of wetlands on the subject property. Washington state and all local governments must use the state delineation manual to implement the SMA and/or the local regulations adopted pursuant to the GMA. The methodology outlined in the manual is based upon three essential characteristics of wetlands: (1) hydrophytic vegetation; (2) hydric soils; and (3) wetland hydrology. Field indicators of these three characteristics must all be present in order to determine that an area is a wetland (unless problem areas or atypical situations are encountered). These characteristics are discussed below.

Vegetation

Plants must be specially adapted for life under saturated or anaerobic conditions to grow in wetlands. The U.S. Fish and Wildlife Service (USFWS) has determined the estimated probability of each plant species' occurrence in wetlands and has accordingly assigned a "wetland indicator status" (WIS) to each species (USFWS, 1988b, 1993). Plants are categorized as obligate (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), upland (UPL), not listed (NL), or no indicator status (NI). Definitions for each indicator status are listed in the Glossary. Species with an indicator status of OBL, FACW, or FAC are considered adapted for life in saturated or anaerobic soil conditions. Such species are referred to as "hydrophytic" vegetation. A (+) or (-) sign following the WIS signifies greater or lesser likelihood, respectively, of the species being found in wetland conditions.

Areas of relatively homogeneous vegetative composition can be characterized by "dominant" species. The indicator status of the dominant species within each vegetative stratum is used to determine if the plant community may be characterized as hydrophytic. The vegetation of an area is considered to be hydrophytic if more than 50% of the dominant species have an indicator status of OBL, FACW, or FAC.

Soils

Hydric soils are indicative of wetlands. Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile (Federal Register, 1994). The Natural Resources Conservation Service (NRCS), in cooperation with the National Technical Committee for Hydric Soils, has compiled lists of hydric soils (NRCS, 1997). These lists identify soil series mapped by the NRCS that meet hydric soil criteria. It is common, however, for a map unit of non-wetland (non-hydric) soil to have inclusions of hydric soil, and vice versa. Therefore, field examination of soil conditions is important to determine if hydric soil conditions exist.

The NRCS has developed a guide for identifying field indicators of hydric soils (NRCS, 1998). This list of hydric soil indicators is considered to be dynamic; revisions are anticipated to occur on a regular basis as a result of ongoing studies of hydric soils. Anaerobic conditions create certain characteristics in hydric soils, collectively known as "redoximorphic features," that can be observed in the field (Vepraskas, 1999). Redoximorphic features include high organic content, accumulation of sulfidic material (rotten egg odor), greenish- or bluish-gray color (gley formation), spots or blotches of different color interspersed with the dominant or matrix color (mottling), and dark soil colors (low soil chroma) (NRCS, 1998; Vepraskas, 1999). Soil colors are described both by common color name (for example, "dark brown") and by a numerical description of their hue, value, and chroma (for example, 10YR 2/2) as identified on a Munsell soil color chart (Munsell Color, 2000). Soil color is determined from a moist soil sample.

Hydrology

Water must be present in order for wetlands to exist; however, it need not be present throughout the entire year. Wetland hydrology is considered to be present when there is permanent or periodic inundation or soil saturation at or near the soil surface for more than 12.5% of the growing season (typically two weeks in lowland Pacific Northwest areas). Areas that are inundated or saturated for between 5% and 12.5% of the growing season in most years may or may not be wetlands. Areas inundated or saturated for less than 5% of the growing season are non-wetlands (Ecology, 1997).

Indicators of wetland hydrology include observation of ponding or soil saturation, water marks, drift lines, drainage patterns, sediment deposits, oxidized rhizospheres, water-stained leaves, and local soil survey data. Where positive indicators of wetland hydrology are observed, it is assumed that wetland hydrology occurs for a sufficient period of the growing season to meet the wetland criteria, as described by Ecology (1997).