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ENVIRONMENTAL GROUP

Addendum 1

In Reference to: The Wetland Baseline Findings linked to a Preliminary Conceptual Enhancement Report (dated: June, 2010); northern 106 Acres associated with the McKenzie Conservation Area (Spokane County, Washington).

Conclusion:

Please allow this addendum to address a discovered error presented in the above-referenced report.

Within Appendix C, specifically the table illustrating the Newman Lake Pool Elevations, the elevation presented on June 9, 2010 (page 4 of 4), should have been 2,129.455 Ft MSL (NAVD88). This change is significant, since it is a three foot difference in relation to what had been presented.

In regard to this individual lake level elevation data point, other changes within the report that are required include:

(1) On page 11, within the second paragraph, the last sentence should be omitted. The sentence that should be deleted reads, "However, on June 10, 2010, during atypical conditions, the pool rose to 2,132.45 feet which could impact surface and groundwater conditions on the site."

(2) On page 12, Figure 8, the elevation for the final data point, June 9, 2010 is corrected to 2,129.455 Ft MSL, NAVD88. Consequently, Figure 8 should not display a noticeable (3-foot) increase in lake pool elevation correlated to the far right hand side of the line-graph.

Respectfully submitted by:

Vincent Barthels, Biologist
J-U-B ENGINEERS, Inc.

Date: 8-17-10

Wetland Baseline Findings linked to a Preliminary Conceptual Enhancement Report

Northern 106 Acres associated with the McKenzie Conservation Area
(Spokane County, Washington)

[Located in Sections 27 & 28, Township 27 North, Range 45 East]

June, 2010

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APPENDICES

Preface

The attached report details the following: current habitat (i.e. streams and wetlands) conditions that fall within the defined project study area (encompassing approximately 106 acres), limited groundwater monitoring and soil borings (2) data, as well as a preliminary conceptual restoration alternative. Wetlands and Streams described in this report were classified pursuant to the Spokane Critical Areas Ordinance (Chapter 11.20). It should be noted, that the proposed wetland enhancements outlined in the plan (both in text and drawings) are preliminary conceptual designs and final design has not yet been performed by J-U-B ENGINEERS, Inc. The recommended preliminary conceptual enhancement alternative is intended for habitat functionality only. Prior to the implementation of a final design, J-U-B ENGINEERS, Inc. recommends that the impacts of the recommendations outlined in this report be analyzed by a licensed professional engineer in regards to bank stability, slope protection, stream hydraulics, flooding concerns, sedimentation, and scour. Should engineering analysis show that changes to the proposed recommendations are required, such changes should be reviewed for habitat functionality by the project biologist.

Executive Summary

The McKenzie Conservation Area (CA) spans over 421 acres near the northwest corner of Newman Lake and is owned and managed by Spokane County. The defined project study area is a subset of the entire CA, encompassing approximately 106 acres, and is illustrated on the McKenzie Conservation Area Exhibit as well as the Project Summary Exhibit (see pages 2 and 3, respectively). Based on the findings from a previous study (PBS&J, 2009), the defined study area has been identified as a suitable wetland restoration project site located within Water Resource Inventory Area (WRIA) 57. In parallel with the previously mentioned study, the goal of this report is to present the collected data linked to the onsite wetland investigations, which took place between December of 2009 and June of 2010.

The conducted onsite field investigations include: a topographic survey, a wetland delineation and subsequent functional assessment, the installation and monitoring of six groundwater monitoring wells, hourly measurement of water levels in the wells, monthly recording of a stream stage measurement from one roadway culvert inlet, and drilling of two soil borings that explored to a depth of approximately 30 feet.

The site's topography is fairly flat, sloping gradually to the east and southeast; elevations range between approximately 2,150 and 2,130 feet above sea level. A large percentage of the study area is classified as a category III, sloped, emergent wetland. The wetland feature contains several typed stream channels, 2 Type "F" (fish), 1 Type "Np" (non-fish perennial), and 1 Type "X" (an artificially created, farm ditch or drainage-way channel). Groundwater monitoring efforts depict groundwater levels fluctuating from at the surface to a depth of 16.5 inches below the surface, at the time the wells were installed. Between April 20th and June 10th, the measured stream staff gauge varied between 0.43 feet and 0.29 feet. The soil investigations depicted organic soils in the upper three feet, underlain by layers of silts, coarse sands and clay soils.

The recommended preliminary conceptual restoration alternative for the defined study area is a combination of alternatives posed by PBS&J (2009). The presented preliminary restoration concept yields a more sinuous native stream channel, an in-channel pond and two depressional areas that are independent of the stream channel (see Preliminary Conceptual Enhancement Exhibit on page 15). Depending on the final selection of wetland enhancements implemented for this site, the recommended conceptual restoration alternative contains several measures that should increase the habitat value and other wetland functions in

accordance with the Department of Ecology (DOE) Eastern Washington Wetland Rating System.

Critical Areas Investigation

General Habitat Descriptions

The subject property, encompassing approximately 106 acres, is situated in a flat and open wet meadow that is located northwest of Newman Lake. The shores of Newman Lake are located approximately 2,100 feet from the southeastern portion of the subject property (see Figure 1, located on page 2). Several intermittent stream channels flow through the subject property and discharge to Newman Lake (see Figure 2, located on page 3). Adjacent uplands contain dense, mixed conifer forests on rolling foothills. The photo on the cover page was captured from the center of the subject property looking westerly. Scattered rural homesteads, with mixed agricultural uses (e.g. livestock and planted hay fields) surround the subject property.

Wetland Classifications

Appendix A of this report provides a detailed wetland delineation report for the defined study area. Within the approximately 106-acre defined study area, an emergent, sloped, category III wetland occupying approximately 97 acres has been identified. Based on Cowardin's (1979) wetland classification system, this wetland feature is field verified to be PEM1Cd, which is consistent with the National Wetland Inventory (NWI) Map designation.

The Department of Ecology's (DOE) Wetland Rating System for Eastern Washington was applied. In terms of the DOE rating system, the wetland area within the defined study area is rated as a sloped system and scored to be a Category III Wetland based on its rating (see DOE rating forms in Appendix A), which scored a total of 47 points [24 for Water Quality functions, 4 for hydrologic functions and 19 for habitat functions]. The standard buffer for Category III wetland is 150 feet in accordance with Spokane County's Critical Areas Ordinance (Section 11.20.050.C).

The wetlands identified in this report share several important functions and values that include: the ability to protect and improve water quality; flood storage; ground water recharge; and, provide for wildlife habitat. These wetlands generally act as a sloped catch basin by intercepting run-off from adjacent higher elevations. These wetlands filter the water by capturing or breaking down pollutants, prior to the waters having the potential to flow into Newman Lake.

Figure 1 McKenzie Conservation Area Exhibit

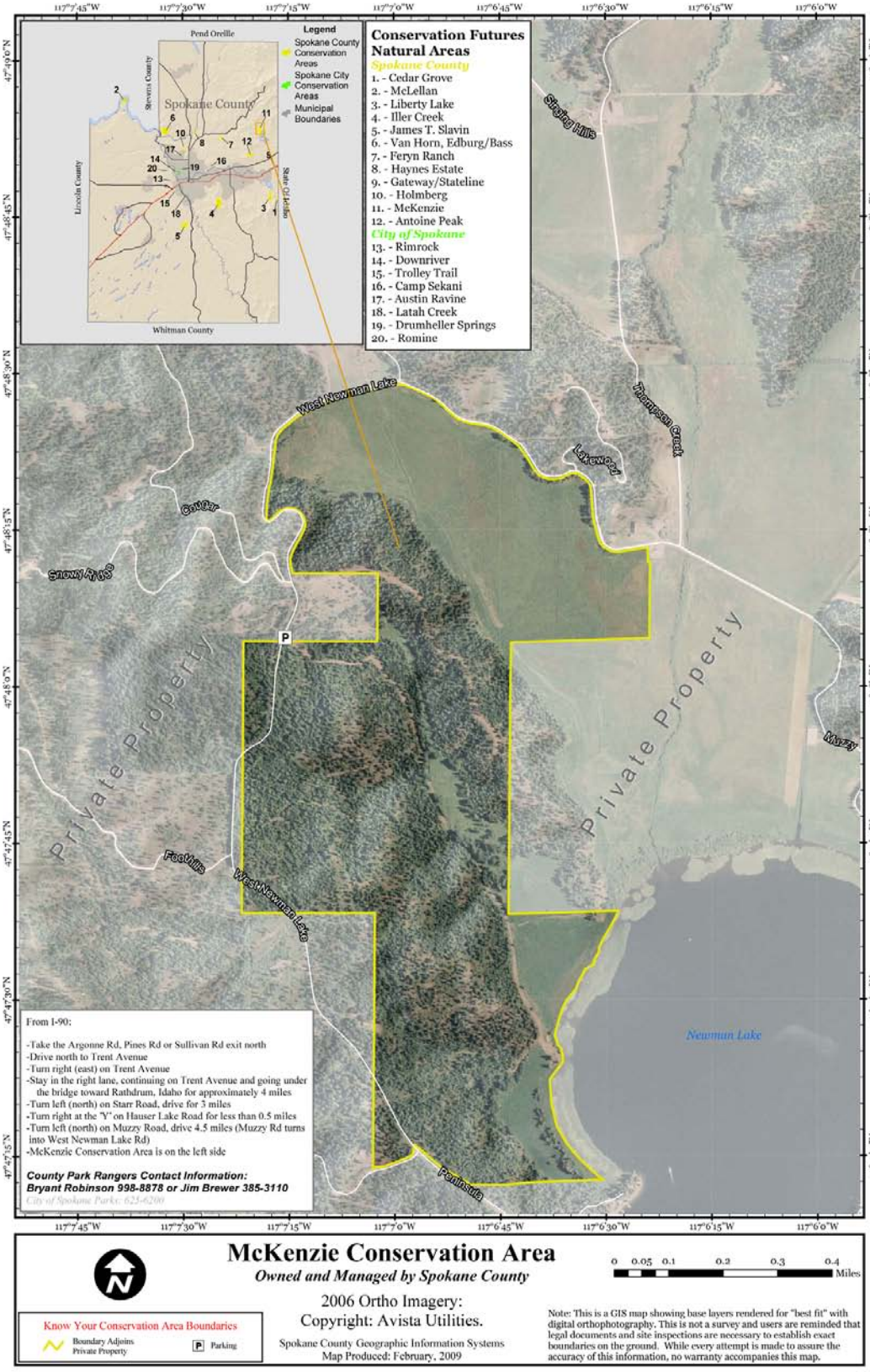
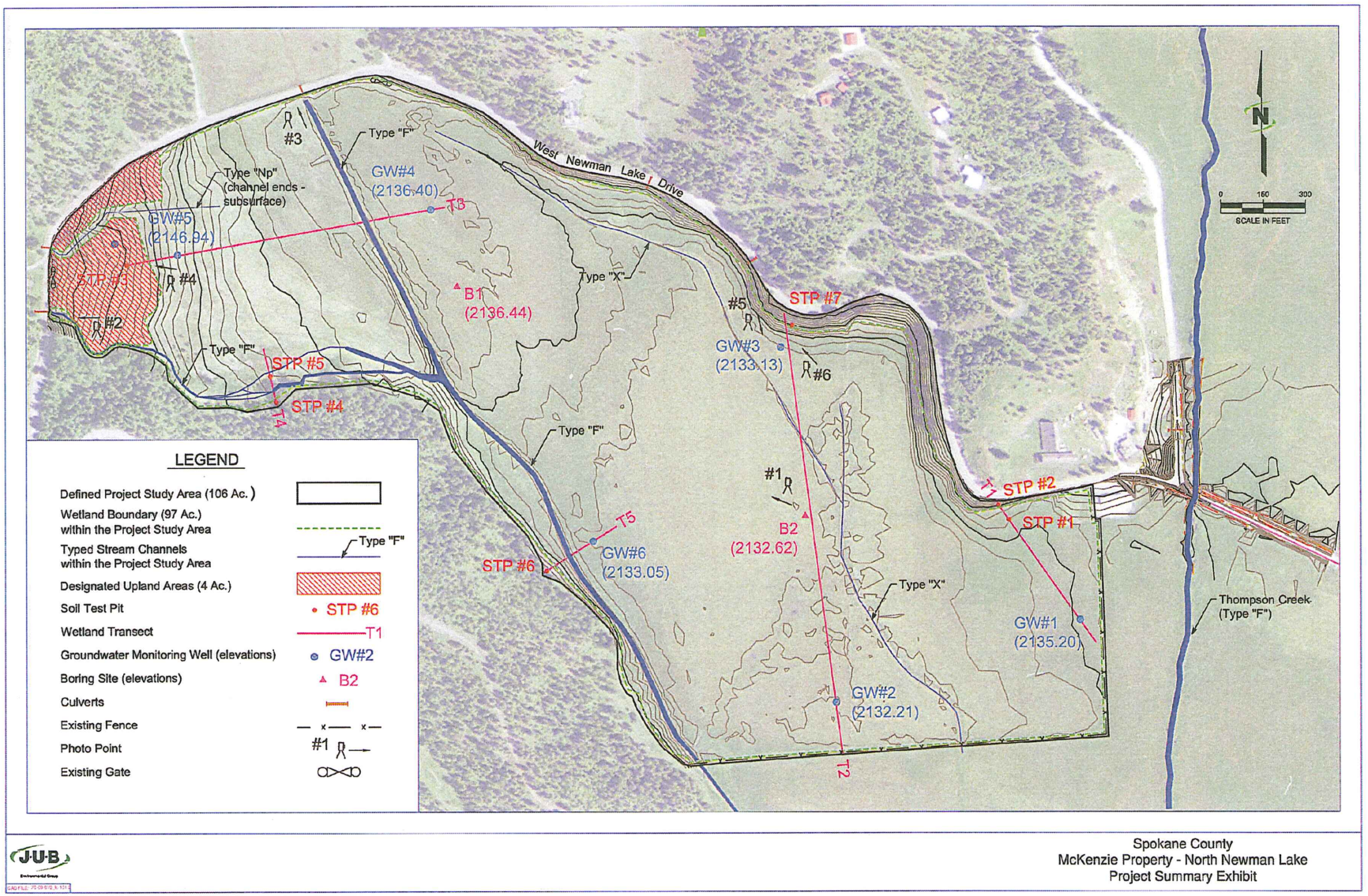


Figure 2 - Project Summary Exhibit



Spokane County
McKenzie Property - North Newman Lake
Project Summary Exhibit

Hydrological and Soil Investigations

Groundwater Monitoring Well Installation

On April 12 and 13, 2010, six soil borings, designated GW#1 through GW#6 were drilled on the property by Budinger & Associates, Inc. (Budinger), of Spokane, Washington. The borings were advanced using a track-mounted AVS with 12-inch diameter solid stem auger to a depth of 6 feet. The soils were logged and monitoring wells were constructed in the borings.

Two additional borings were advanced to a depth of 31 and 31.5 feet on June 3, 2010 by Budinger. The borings were advanced using 3¼ inside diameter hollow-stem auger drilling equipment. After the soils were logged, the two deeper borings were sealed to surface with bentonite.

Soils encountered in borings consisted of two or three feet of organic peat, underlain by silty sand or sandy silt with small amounts of clay. A uniform clay unit was encountered at 24 and 28.5 feet below surface in the two deeper borings Groundwater was encountered within 10 inches of the surface at all boring locations and at GW#2 and GW#6 groundwater was at the surface during the drilling activities. Budinger's soil logs are provided in Appendix D. The boring locations are shown on Figure 2.

Budinger constructed monitoring wells in each shallow boring using flush-threaded 2-inch diameter schedule 40 PVC pipe with 0.010-inch factory slotted PVC screen. The screen section was installed from 4 to 6 feet below surface in each well. The PVC casing was protected with a flush-mounted vault. The top of casing elevation of each well was surveyed by Spokane County's Surveying Department, relative to the National Geodetic Vertical Datum (NAVD 1988). Budinger's well installation report is provided in Appendix B.

Groundwater Elevation Monitoring

Methods

Groundwater elevation monitoring was conducted in each groundwater monitoring well using a transducer and data logging system (Solinist Levelogger Junior). The water pressure measurements were recorded each hour from April 13 to June 10, 2010. On April 20, 2010, a small hole was drilled in each well cap to allow the pressure within the well to equalize with atmospheric pressure. The pressure transducer data were downloaded monthly

and compiled into a spreadsheet, where it was manipulated to obtain the groundwater elevation in each well relative to standard datum NAVD88 (see Appendix C).

Elevation Findings

Schwyn Environmental Services, LLC (Schwyn) plotted the depth to groundwater below the top of casing in each well (Figure 3) and the well elevation data (Figure 4) to assess trends during the monitoring period. Elevation data plotted on Figure 4 do not include data collected before the well caps were drilled to allow equalization with atmospheric pressure on April 20, 2010.

The depths to groundwater below top of casing in each well are shown on Figure 3. The depth to water in the casings ranged from elevations above the top of casing (standing water pooled above the well) at GW#2 and GW#6 to 2.65 feet below the top of casing in GW#1. During the monitoring period the groundwater elevations were highest in GW#5, which is located on the western hillside. The surface elevation of GW#5 is more than 10 feet higher than the other wells, and therefore, the groundwater elevations are presented at two different scales on Figure 3. The lowest groundwater levels were observed in GW#2 on the south side of the property. During the monitoring period the groundwater levels fluctuated from 0.86 feet in GW#6 to 2.16 feet in GW#1.

Two general elevation peaks were observed; the first from April 27 to May 3 and the second beginning about May 31. These peaks correspond directly, or with some delay, from significant precipitation events that occurred from April 27 through May 1, and May 31 through June 10. The monthly precipitation data are shown on Figure 5. The precipitation data illustrate the considerably wet spring of 2010.

Groundwater elevation data collected on May 1 and May 26, 2010 was utilized to develop potentiometric surface maps (Figures 6 and 7). May 1st was a relatively high water date and May 26th was a relatively low water date during the monitoring period. The groundwater elevation profiles for both events indicate that the groundwater surface is essentially the same as the topographic profile at the site. Groundwater appears to enter the site from the northwest in the vicinity of GW#5 and from the southeast in the vicinity of GW#1. Groundwater flow in the vicinity of GW#5, has a steeper gradient to the east, consistent with the topography, and appears to recharge the stream channel that flows from north to south across the site. Groundwater in the southeast corner of the property appears to be receiving some groundwater recharge from Thompson Creek located east of the

Figure 3 Depth to Water Plot

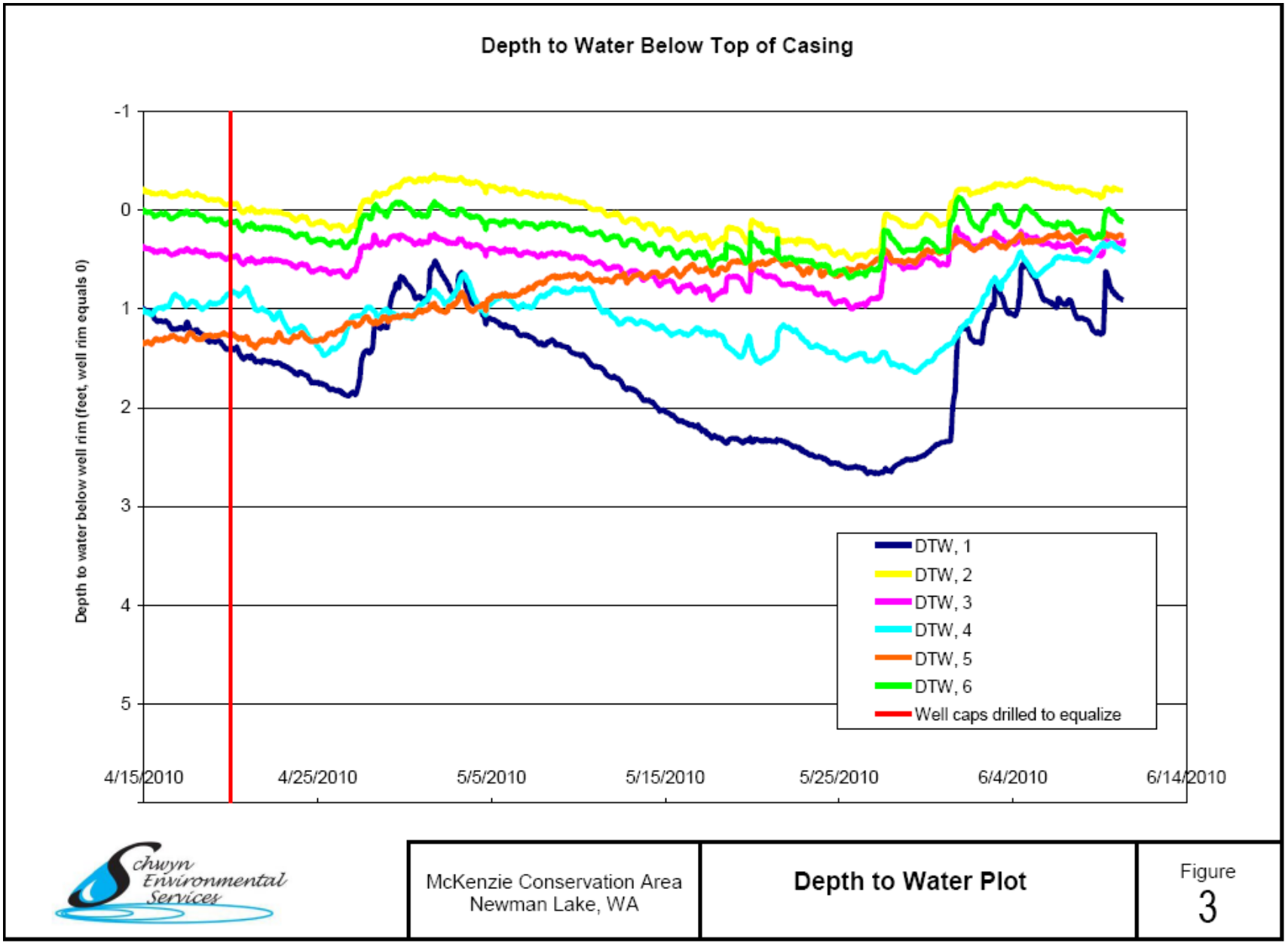


Figure 4 Groundwater Elevation Plot

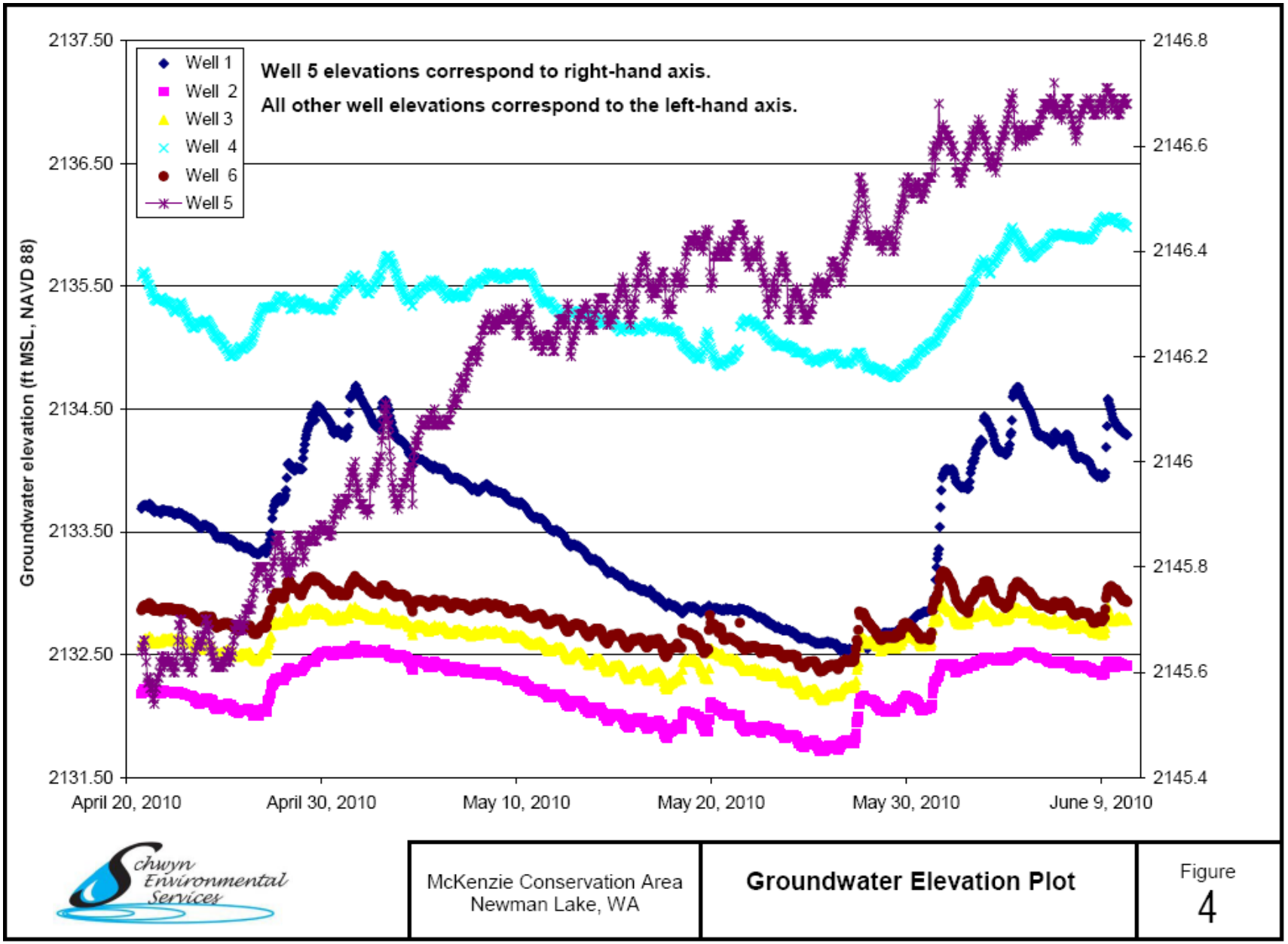
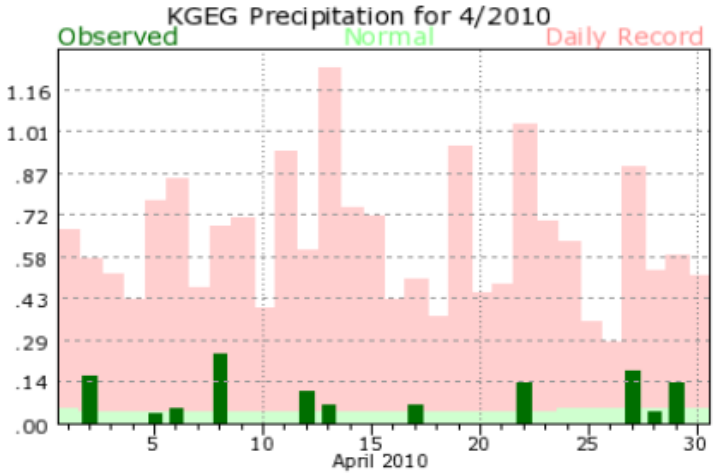
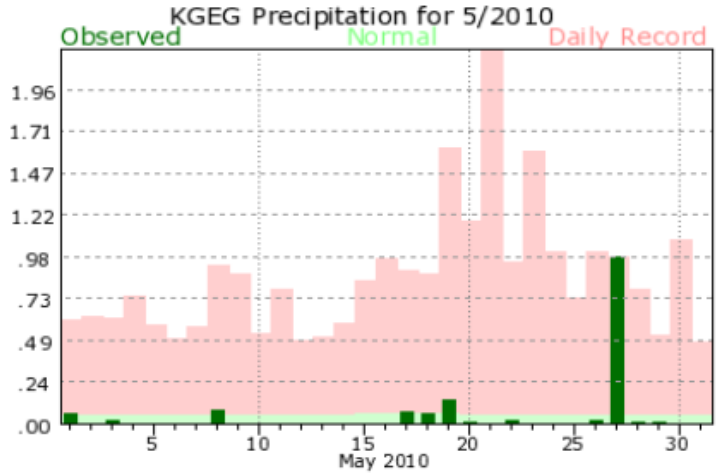
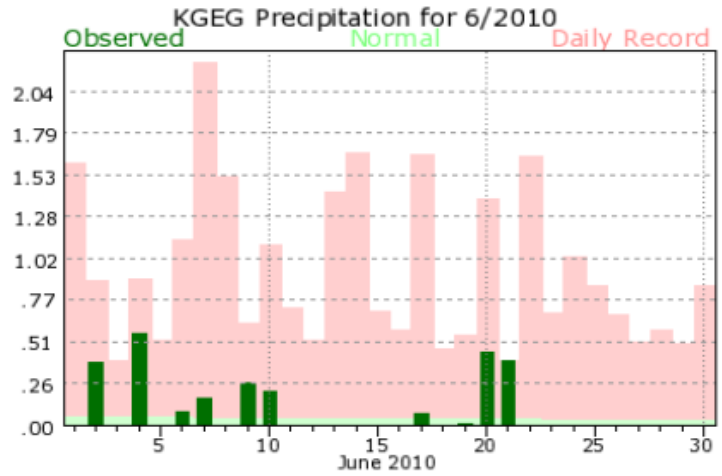


Figure 5: Precipitation Data Summary







2010 Precipitation Data (Inches)

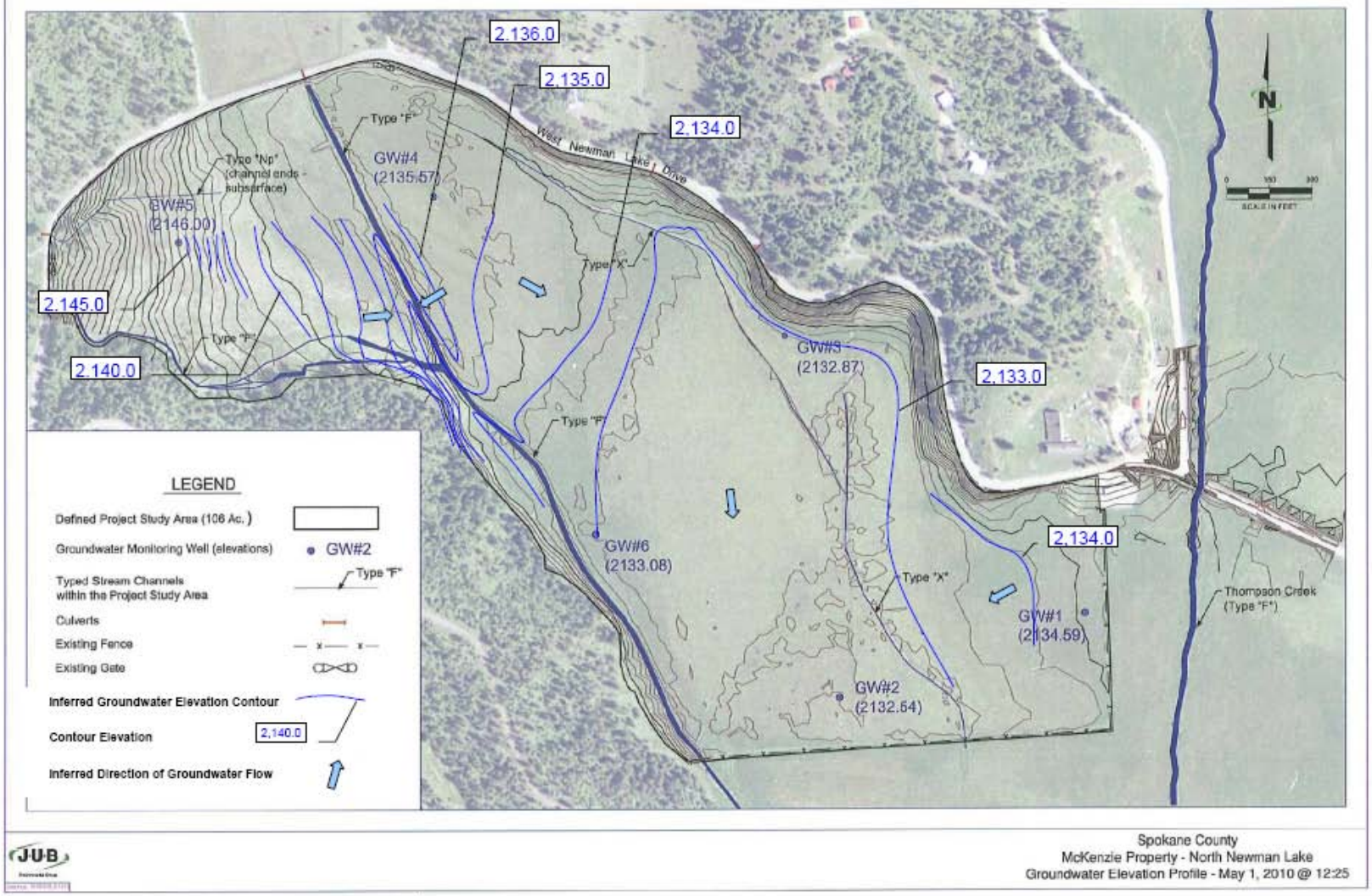
Month	Observed	Normal
April	1.21	1.28
May	2.15	1.60
June	2.55	1.18
(through June 22)		

From: NOAA. Preliminary precipitation data for Spokane, WA.

Schwyn Environmental Services

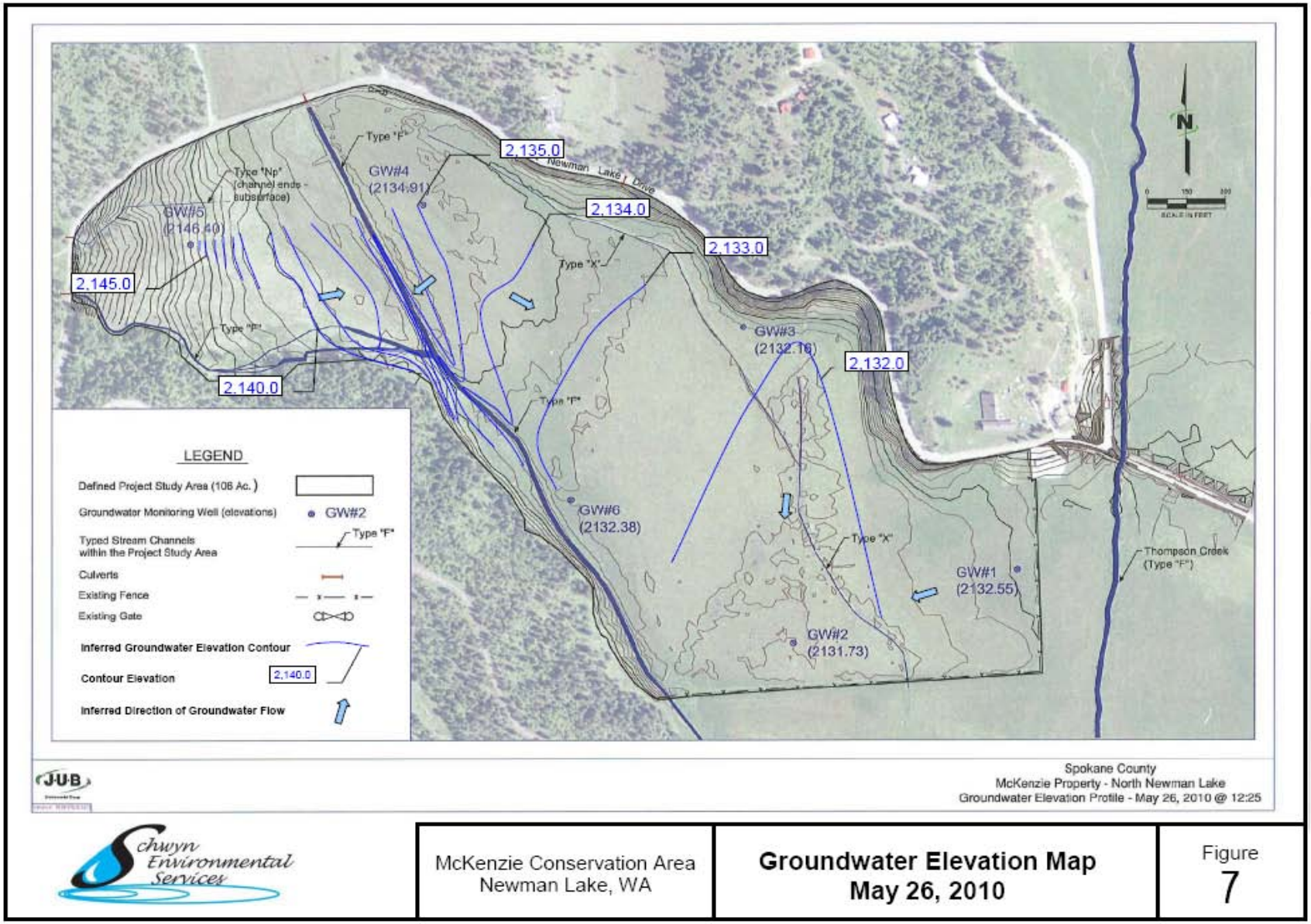
McKenzie Conservation Area Newman Lake, WA	**Precipitation Data Summary**	Figure 5

Figure 6 Groundwater Elevation Map, May 1, 2010



Schwyn Environmental Services	McKenzie Conservation Area Newman Lake, WA	**Groundwater Elevation Map** **May 1, 2010**	Figure 6

Figure 7 Groundwater Elevation Map, May 26, 2010



Schwyn Environmental Services

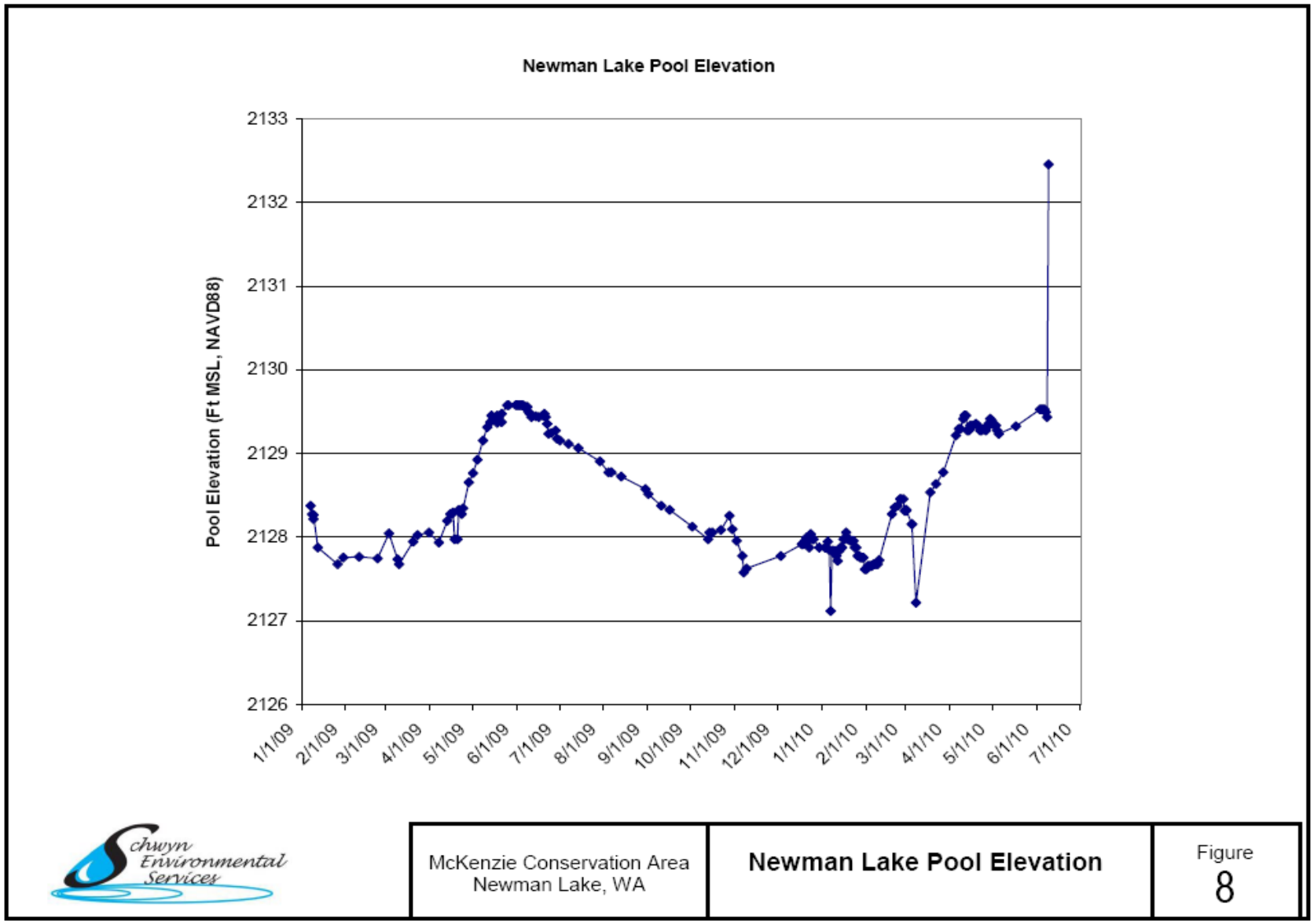
McKenzie Conservation Area Newman Lake, WA	**Groundwater Elevation Map May 26, 2010**	Figure 7

property. The primary groundwater flow direction across the site is to the southeast to southwest toward the shore of Newman Lake.

Review of Newman Lake pool elevations (Figure 8) indicates that the pool is normally below the groundwater levels at the site. Maximum pool elevation is typically about 2,129.5 feet MSL, which is about 2 or 3 feet lower than groundwater levels in GW#2 on May 1 and 26, 2010. Therefore, on these dates the lake pool is not affecting the regular groundwater flow on the site. However, on June 10, 2010, during atypical conditions, the pool rose to 2,132.45 feet which could impact surface and groundwater conditions on the site.

A Type X stream channel (subsurface drain) extends along the northern boundary of the site and exits to the south. It is likely that some impact to the groundwater elevations on the site are caused by the subsurface drain; however, the specific impact was not apparent in this study.

Figure 8 Newman Lake Pool Elevation



Preliminary Conceptual Designs

The previously mentioned PBS&J (2009) Report identifies three potential wetland restoration designs. PBS&J characterized their conceptual wetland improvements as restoration designs, since they stated "much of the site is drained and likely does not currently meet wetland criteria."(p. 12) The term "wetland restoration" is synonymous with converting an area that is not currently a wetland, but had been historically a wetland, back into a wetland area. Based on the fact that most of the site has been more recently delineated as a wetland, any wetland improvements implemented onsite would be characterized as "enhancements."

In parallel with the aforementioned PBS&J report (2009), JUB has developed a preliminary conceptual enhancement exhibit, which is a hybrid and/or spin-off of the PBS&J (2009) designs. More specifically, PBS&J called for establishing wetland cells (in-stream and independent of the existing stream channel), as well as re-construction activities linked to the intermittent (Type "F") stream channels located onsite. Figure 9 (page 15) captures the recommended conceptual wetland enhancements for the site. These enhancements were derived to solely increase the habitat value and species diversity within the identified wetland area.

Alternatives Matrix

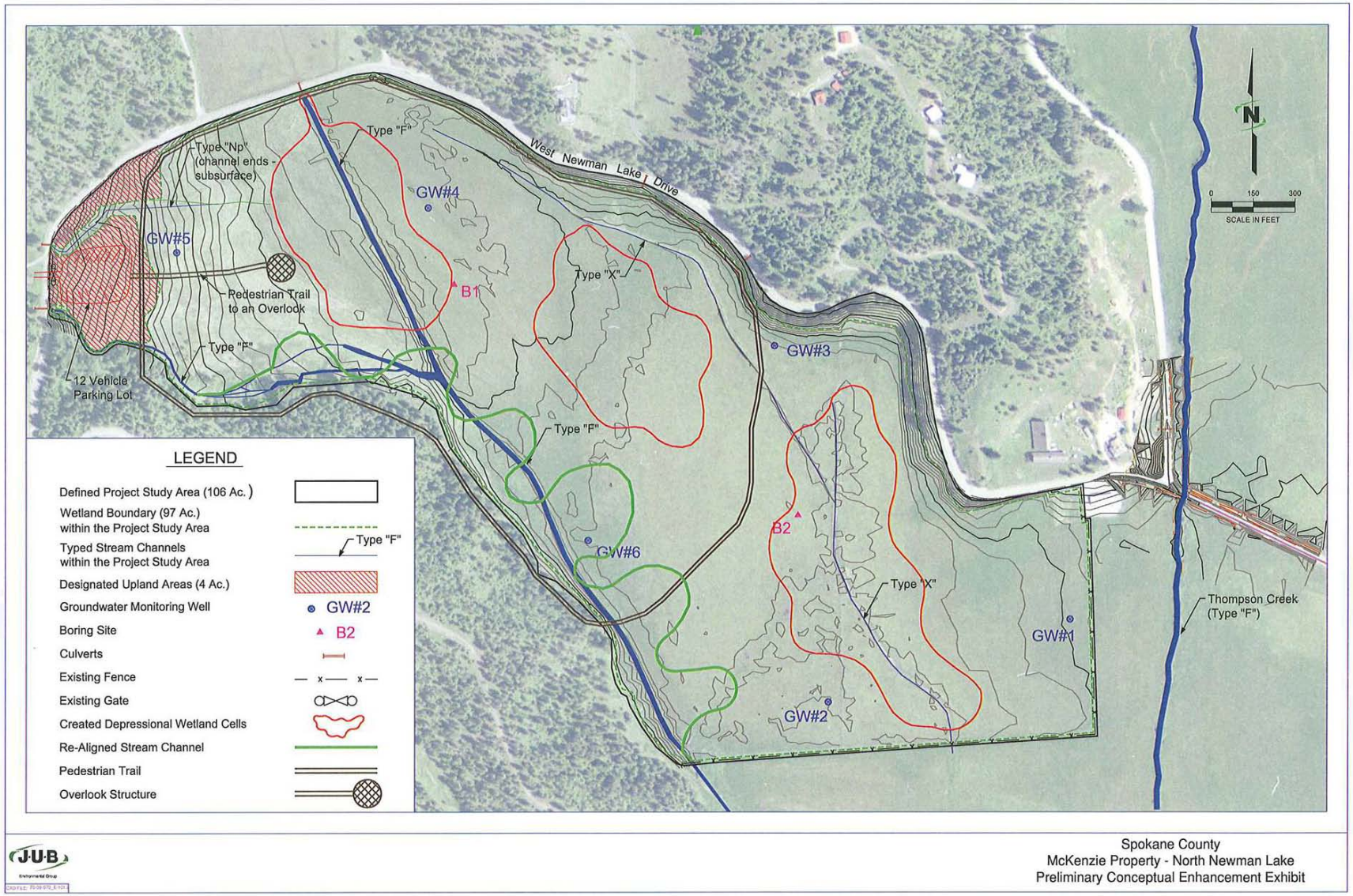
As mentioned in the attached wetland report (see Appendix A), the wetland onsite serves many functions. By utilizing the established DOE wetland rating system, Table 1 summarizes the anticipated scoring values associated with conducting some of the abovementioned wetland enhancement measures, as illustrated on Figure 9. In defining scores or values to these wetland enhancements, it is assumed that native vegetative communities (e.g. Aspen/Hawthorn/Snowberry (*Populus tremuloides/Crataegus douglasii/Symphoricarpos albus*)) will be installed onsite in concert with the enhancement measures.

Table 1 illustrates that all three of the conceptual wetland enhancement strategies have the potential to improve the hydrologic and habitat functional scores as well as increase the wetland category classification (from a "3" to a "2"). If final wetland enhancement designs are sought out, then the enhancements incorporated into the designs should be geared toward a specific wetland function (e.g. water storage or wildlife habitat) and specific site designs could be developed to maximize the value of the preferred wetland function.

Table 1: Comparative matrix of potential wetland enhancements; rated using the DOE Eastern WA Wetland Rating System (2004)

Wetland Feature or Enhancement	Score for Water Quality Function	Score for Hydrologic Functions	Score for Habitat Functions	Total Score and Wetland Category
Baseline wetland conditions, as delineated on April, 2010 (rated as: sloped).	24	4	19	47; Category III
Creating approximately 24 acres in wetland cells only (rated as: depressional)	20	16	24	60; Category II
Re-aligning approximately 4,400 feet of Type F Stream Channel (rated as: riverine)	12	28	22	62; Category II
Creating the wetland cells and re-aligning the Type F stream channel (rated as: depressional)	20	16	27	63; Category II

Figure 9 Preliminary Conceptual Enhancement Exhibit



Recommended Future Actions

The inherent value of wetlands can be derived from the many functions wetlands provide, some primary (e.g. water storage) and some secondary (e.g. environmental education). The 1.3 mile pedestrian trail or loop that is illustrated on Figure 9 is an example of a piece of infrastructure, which can be perceived as a bridge to a secondary wetland function (i.e. passive recreation or environmental education). Case in point, prior to implementing a wetland enhancement strategy for a site, the stakeholders must settle on goals and objectives in terms of wetland functionality. Clearly, the ultimate goals and objectives for this site still need to be defined.

This report represents the first stage in documenting baseline data for the identified 106-acre portion of the McKenzie CA property. As the "enhanced" wetland's functional goals are defined, the enhancement measures can be further refined through additional studies and testing. Inevitably, further engineering analysis coupled with hydrological and geo-technical studies will be warranted prior to constructing any of the aforementioned conceptual wetland enhancement measures. Some of the additional studies or tests that may be needed include: permeability studies in terms of the onsite soils, mapping water rights and/or water budgets, and further hydrological modeling linked to the specific wetland enhancements.

The groundwater monitoring efforts linked to this report covered a mere snap-shot (a 56-day period) within a growing season during an unusually wet spring. Continuing the groundwater monitoring throughout a full year and optimally continuing through next August (2011) is recommended. Designing wetland features based merely on 56 days of groundwater monitoring data is not recommended.

Conclusion

This report concludes that a large portion of defined 106-acre McKenzie CA property is in fact currently wetlands; specifically, an emergent, sloped, category III wetland. A topographic survey has been completed for the defined study area. Six groundwater monitoring wells have be strategically installed across the site and have provided groundwater elevation data for a period of 56 days (April 15th through June 10th). Two deeper soil borings were drilled near the middle portions of the site and provide soil profile/structure data. Cumulatively, this report represents a preliminary baseline report for potential future wetland enhancements onsite. This site can feasibly be enhanced to improve the wetland's hydrologic and habitat functions as well as increase the wetland's classification (from a Category "3" to a "2"). Further planning, engineering analysis, hydrological and geo-technical studies, and continuing the groundwater monitoring is recommend prior to implementing any enhancement designs.

Respectfully submitted by:

6-30-10

Vincent Barthels, Biologist

J-U-B Engineers Inc.

References

Hruby, T. 2004. Washington State wetland rating system for eastern Washington – Revised. Washington State Department of Ecology Publication # 04-06-15.

PBS&J. 2009. In-Depth Wetland Restoration Studies WRIA 55 & 57. Prepared by PBS&J for Spokane County Division of Utilities. September. 67 pgs.