WATER TRANSFER WORKING GROUP PROJECT DESCRIPTION

APPLICATION NO./COURT CLAIM NO.: **Court Claim No. 0525**		
APPLICANT NAME Washington State Department of Transportation (WSDOT)	CONTACT NAME Debi Freudenthal & Larry Mattson, SCR Environmental Office Brian White, SCR Assistant Regional Administrator	TELEPHONE NO. 509-577-1923 509-577-1700
WATER RIGHT HOLDER'S NAME (if different)		EMAIL: Freuded@wsdot.wa.gov; WhiteB@wsdot.wa.gov

DATE OF APPLICATION: January 2012	PRIORITY DATE: April 1, 1885
WATER SOURCE: Rattlesnake Creek	CROP: Pasture
INSTANTANEOUS QUANTITY: 1.5 cfs	ANNUAL QUANTITY: 45 acre feet/year *(WSDOT's portion)*
PERIOD OF USE: April 1 – October 31	
Existing PLACE OF USE: That portion of the W ½ SW ¼ of Section 2 lying westerly of the county road (Nile Road; EXCEPT the south 534 feet lying easterly of Carmack Parker Ditch. That portion of the E1/2 SE ¼ of Section 3 lying southerly of the county road (Nile Road). That portion of the NW ¼ NW ¼ NW¼ of Section 11 lying east of a flowing stream; ALL in T 15, R 15 EWM.	PURPOSE OF USE: *Current*-Irrigation *Proposed*: Instream Flow (mitigation for landscape and restoration area watering)
IRRIGATION METHOD: Flood	
CONSUMPTIVE USE CALCULATION: *Not applicable.* There is no increase of annual consumptive quantity proposed. WSDOT is not proposing to use the maximum allocation in its request for temporary authorization for short term restoration area watering.	

NARRATIVE DESCRIPTION OF PROJECT:

As part of the emergency response to the October 2009 Nile Valley Landslide, WSDOT, in collaboration with Yakima County, acquired properties, demolished homes and buildings, and constructed a detour road and a new section of the Naches River channel away from the toe of the landslide. Of the >80 acres acquired to date, 29 acres were located within the Boyd Brown surface Water Right Claim 0525 boundary; 17 acres of which included attached water rights. Court Claim #0525 was confirmed in the Conditional Final Order issued in June 29, 1993 for the Yakima River, Subbasin No. 16, for 225 acre-feet/1.5 cfs for the irrigation of 75 acres.

Just prior to the landslide, Boyd Brown and other property owners within the claim sought a permanent change of the point of diversion from Rattlesnake Creek to a shallow ring well. In 2007, Ecology issued a temporary change approval that included a determination of extent and validity of the water right which reduced the water right from 225 acre feet per year to 195. The temporary approval was issued to move the project forward due to its environmental benefits of not diverting Rattlesnake Creek. The status of the permanent change is unknown and will not be pursued by WSDOT.

In October 2011, Ecology affirmed its 2007 extent and determination and Judge Gavin granted a partition request authorizing 45 acre-feet per year as WSDOT's portion of the claim. Also in October 2011, Ecology accepted WSDOT's temporary ten-year donation of the water right claim into the State Water Right Trust Program.

In 2012, WSDOT will reconstruct SR 410 around the toe of the landslide and the detour highway will be turned back to Yakima County as a local access road. Due to the extensive vegetative damage from the landslide, channel excavation, road construction, etc., extensive replanting and restoration will occur. Although a majority of the replanting will not need landscape water for plant establishment, WSDOT wants to assure success of planting hundreds of trees and shrubs that will require supplemental watering, and will install two shallow wells for this purpose. The water use nearly qualifies as an industrial exempt well use; however, to avoid exempt well challenges

for this small and short term use, WSDOT will apply for a temporary authorization to Ecology to use approximately three to five acre/feet/year total water use (3 acre feet consumptive use) for up to three years to support landscape and mitigation area plant establishment. This request will include a temporary change of the purpose authorized by the temporary trust donation (from irrigation to instream flow), point of diversion (from Rattlesnake Creek to two shallow wells) and place of use (planting and restoration areas located within and adjacent to the Claim 0525 boundary).

Table 1. Estimated Landscape Water Needs (acre-feet)

Year	May	June	July	August	September	October	Total
2012					0.50	0.50	1
2013 & 2014	0.50	0.75	0.75	0.75	0.75	0.50	5

See the attached maps for additional information (Attachment A)

WTWG Narrative and Checklist

1. **Validity.** This 1885 water right claim received a Conditional Final Order in 1993, a temporary point of diversion change approval by Ecology in 2007 [CS4-00525CTCL] that included an extent and validity determination review, and has been in full and continuous use since that time-- -up until the landslide occurred. There is no known cloud on the claim or title to the right.

2. **Water budget neutrality.**
   - The temporary authorization is water budget neutral. If the temporary change did not occur, water would still be available at the existing and temporarily approved points of diversion.
   - The transfer is TWSA neutral. WSDOT withdrawal is less than the full water right and will not exceed the consumptive use amount of the water right. The remaining water will be dedicated to instream flow.
   - The temporary transfer will result in less consumptive use.
   - The temporary transfer will not result in detriment or injury to existing rights (RCW 90.03.380(1)).

3. **Timing and availability.** WSDOT completed the temporary donation to the Trust Water Right Program and is pursuing a temporary, multi-year permit application to divert water for the 3 year highway restoration and mitigation site plant establishment.

4. **Impairment of instream flow.**
   - The temporary authorization will result in an increase to instream flow. Unused water will remain in the Trust program as instream flow.
   - The Yakima River water supply is measured at Prosser and Parker. Consumptive use of reservoir water will be metered and will not exceed the consumptive use amount of the Trust water right.

5. **Operational considerations.**
   - WSDOT's contractor will design the irrigation system based on the 5 acre feet of estimated annual water need. The contractor may seek a slight variation in the monthly consumptive use limits while maintaining the annual consumptive use allowed by the water right without impacts to other users or fish/aquatic species.
   - WSDOT's contractor will also not exceed the instantaneous demand and annual quantity established for the WSDOT water right.
   - The temporary authorization will not impact Yakima Project operations.
   - The two wells installed for this purpose will be decommissioned once performance measures for plant establishment are met, which is estimated to occur within 3 years of planting.

6. **For Transfers Between Surface Water and Ground Water.**

- A temporary change in 2007 was approved for the diversion to a ring well. No impairments were identified in that process. Since that time, water use and land ownership has changed drastically due to the landslide. There are less chances of impairment now than in 2007.
- WSDOT completed a hydrologic analysis. See Attachment B - Technical Memorandum Hydrogeologic Analysis of Irrigation Wells Proposed for the SR 410 Nile Landslide Reconstruct Route Project.
- WSDOT will pursue a temporary authorization to use groundwater with surface water connection for restoration and planting area watering for 3 years.

7. **Other considerations.**
   - The temporary authorization is in agreement with public policy. The SR 410 Project is an important infrastructure improvement.
   - Based on extensive environmental review, collaboration and acquisitions, the economic, social and environmental effects of completing the SR 410 project and the associated revegetation of a denuded area, the SR 410 Project will be highly positive.
   - The temporary authorization does not rely on return flow.

WTWG Checklist

1. Validity	*WSDOT Response*
Is there continued beneficial use history sufficient to ensure that the right has not been relinquished or abandoned?	*Yes*
Is it free of any "cloud" or claim on the title of the water right?	*Yes*
2. Water Budget Neutrality	
Is the transfer water budget neutral?	*Yes*
Is the transfer TWSA (Total Water Supply Available) neutral?	*Yes*
Does the transfer of the right result in equal or less consumptive use?	*Yes*
Can the transfer be made without detriment or injury to existing rights? (RCW 90.03.380(1))	*Yes*
3. Timing and Availability	
Temporary Transfers: If a seasonal transfer, can the transfer be implemented in the time remaining in the season?	*n/a*
Permanent Transfers: Is there a map of the fallowed land or discontinued use and can it be confirmed?	*n/a*
4. Impairment of instream flow	
Does the transfer cause no adverse change to instream flows?	*Yes*
Is all the water accounted for at Parker and Prosser (if applicable)?	*Yes*
5. Operational Considerations	
If the transfer relies on space in existing Reclamation storage, is storage capacity available?	*n/a*
Can the transfer be "bucketed", with different rate and timing, without adverse impacts on other users and fish and other aquatic life?	*Yes*
Does the transfer have no impermissible impact on Yakima Project operations?	*Yes*
6. For Transfers Between Surface Water and Ground Water	
Can the hydrologic impacts of the transfer be accurately evaluated?	*Yes; no impacts*
7. Other considerations	
Is the transfer in agreement with public policy?	*Yes*
Is the transfer free of unacceptable secondary effects – economic, environmental, or cultural?	*Yes. The overall social environmental benefits of the SR 410 Nile Valley Reconstruct Route Project are extensive and significant, including the reconnection of a transportation route between eastern and western Washington and the preservation of over 80 acres of floodplain and river channel.*
Does the transfer not rely on return flow?	*Yes*

DEPARTMENT OF ECOLOGY
State of Washington

Water Resources Program
Application for Change/Transfer of Water Right

For Ecology Use (Date Stamp)

DRAFT

For filing with the Department of Ecology or with County Water Conservancy Boards

A NON-REFUNDABLE MINIMUM FEE OF $50.00 MUST ACCOMPANY THIS APPLICATION IF FILED WITH THE DEPARTMENT OF ECOLOGY

(Check all that apply.)

- ☒ Change purpose(s) of use
- ☐ Add purpose(s) of use
- ☐ Change point(s) of diversion/withdrawal
- ☐ Add point(s) of diversion/withdrawal
- ☐ Change/transfer place of use
- ☐ Other (i.e. consolidation, intertie, trust water)

Explain: Temporary change of purpose, POD and POU

FOR OFFICIAL USE ONLY

DATE APPLICATION RECEIVED _____
CHECK NO. _____ FEE $ _____
DATE ACCEPTED _____ BY _____
CHANGE NO. _____
COUNTY _____ WRIA _____
SPECIAL AREA _____

SEPA: ☐ EXEMPT ☐ NOT EXEMPT
ECY CODING: 001-002-WR10285-000011
APP NO. _____ PERMIT NO. _____
CERT NO. _____ CERT OF CHG NO. _____

IF MORE SPACE IS NEEDED, ATTACH ADDITIONAL SHEETS (PLEASE PRINT OR TYPE CLEARLY)

1. Applicant Information

APPLICANT/BUSINESS NAME	PHONE NO.	FAX NO.
Washington State Department of Transportation **Jason W. Smith, Environmental Manager** **South Central Region** Email: SmithJW@wsdot.wa.gov	509-577-1750	
ADDRESS P.O. Box 12560		
CITY Yakima	STATE WA	ZIP CODE 98909

CONTACT (IF DIFFERENT FROM ABOVE)	PHONE NO.	FAX NO.
Washington State Department of Transportation Larry Mattson, Assistant Environmental Manager Debi Freudenthal, Asst. Environmental Coordinator South Central Region Email: FreudeD@wsdot.wa.gov	509-577-1922 509-577-1923	
ADDRESS Same as above		

2. Water Right Information

WATER RIGHT OR CLAIM NUMBER	RECORDED NAME(S)
00525 Boyd and Shirley Brown (portion)	WA Department of Transportation

DO YOU OWN THE RIGHT TO BE CHANGED? ☒ YES ☐ NO

IF NO, PROVIDE OWNER(S) NAME and ADDRESS:

HAS THE WATER BEEN PUT TO BENEFICIAL USE IN THE LAST FIVE (5) YEARS? ☒ YES ☐ NO

Please attach copies of any documentation that demonstrates consistent, historical use of water since the right was established. Also, if you have a water system plan or conservation plan, please include a copy with your application.

3. Point(s) of Diversion/Withdrawal:

A. Existing

SOURCE	NO.	¼	¼	SEC.	TWP.	RGE.	PARCEL #	WELL TAG #
Rattlesnake Creek		NW	SE	3	15	15	151502-	
Ring well (temporary authorization-CS4-00525CTCL that was installed, and later damaged/replaced after the landslide)		NW	SW	2	15	15	151503-	

B. Proposed

SOURCE	NO.	¼	¼	SEC.	TWP.	RGE.	PARCEL #	WELL TAG #
Shallow well			SW	2	15	15	151502-	N/A
Shallow well			NW	11	15	15	151511-	N/A

DO YOU OWN THE EXISTING AND PROPOSED POINT(S) OF DIVERSION/WITHDRAWAL?

EXISTING: ☐ YES ☒ NO PROPOSED: ☐ YES ☐ NO – IF NO, PROVIDE OWNER(S) NAME: Boyd and Shirley Brown

Please include copies of all water well reports involved with this proposal. Also, if you know the distances from the nearest section corner to the above point(s) of diversion/withdrawal, please include that information in Item No. 6 (remarks) or as an attachment.

4. Purpose of Use:

A. Existing

PURPOSE OF USE	GPM or CFS	ACRE-FT/YR	PERIOD OF USE
Irrigation	22.06cfs/134.6 gpm	45	April 1-October 31

B. Proposed

PURPOSE OF USE	GPM or CFS	ACRE-FT/YR	PERIOD OF USE
Short term 3.5 acre restoration area watering; watering frequency will occur once every 7-14 days to promote deep root growth	133 gpm	5	May 1-October 31

5. Place of Use:

A. Existing

LEGAL DESCRIPTION OF LANDS WHERE WATER IS PRESENTLY USED:							
Portions of Sections 2, 3 and 11, Township 15 N, Range 15 E, WM consisting of properties under WSDOT ownership within the 00525 claim boundaries							
¼	¼	SEC.	TWP.	RGE.	COUNTY	PARCEL #	# OF ACRES
					Yakima	151502, 3, 11	17

DO YOU OWN ALL THE LANDS IN THE EXISTING PLACE OF USE? ☒ YES ☐ NO

IF NO, PROVIDE OWNER(S) NAME: _____

B. Proposed

LEGAL DESCRIPTION OF LANDS WHERE NEW USE IS PROPOSED:							
Portions of SW¼ of Section 2 and NW¼ of Section 11, Township 15N, Range 15 E, WM identified as irrigated planting areas in the attached map							
¼	¼	SEC.	TWP.	RGE.	COUNTY	PARCEL #	# OF ACRES
	SW, NW	2, 11	15	15	Yakima	151502-33002, 33006, 33400, 33401 151511-99993, 22007	3.5

DO YOU OWN ALL THE LANDS IN THE PROPOSED PLACE OF USE? ☒ YES ☐ NO

IF NO, PROVIDE OWNER(S) NAME: _____

Attach a detailed map of your proposed change/transfer. The map should show existing and proposed point(s) of diversion/withdrawal, place of use and any other features involved with this application. If platted property, please include a certified copy of the plat map.

Are there any ADDITIONAL WATER rights OR CLAIMS RELATED to the same property as the ONE PROPOSED FOR CHANGE/TRANSFER?

☒ ES ☐ NO – IF YES, PROVIDE THE WATER RIGHT/CLAIM NUMBER(S): 1007 (Dexter), 1399 (Chandlee)

6. Remarks and Other Relevant Information:

WSDOT's portion of the Brown Claim 0525 was partitioned by Yakima Superior Court in October 2011. WDSOT's portion totals 45 acre-feet per year.

WSDOT's portion of the Brown Claim 0525 was placed into the Washington Trust Water Right Program in October 2011 for the purpose of instream flow. [CS4-00525sb16@3]

WSDOT's contractor will install two wells to temporarily supply water to irrigated restoration areas for 3 year years. Underground irrigation systems will also be designed and installed by WSDOT's contractor; these systems will remain until the plant establishment performance standards are met.

WSDOT estimates plant watering frequency to be once every 7 to 14 days, depending on the irrigation system installed. The infrequent watering will promote deep root establishment for long term sustainability of the restoration areas. The groundwater withdrawal rate will not exceed WSDOT's portion of the instantaneous demand of the entire claim.

IF FOR SEASONAL OR TEMPORARY, START DATE 9/1/2012 END DATE 10/31/2015 (seasonal use May 1-Oct. 31 each year)

Certain applications may incur a Real Estate Excise Tax liability for the seller of the water rights. The Department of Revenue has requested notification of potential taxable water right related actions and therefore may be provided with a copy of this request. For further information, contact: Department of Revenue, Real Estate Excise Tax, PO Box 47477, Olympia, WA 98504-7477. Phone (360) 570-3265.

7. Signatures:

I certify that the information above is true and accurate to the best of my knowledge. I understand that in order to process my application, I am hereby granting staff from the Department of Ecology or the County Conservancy Board access to the above site(s) for inspection and monitoring purposes. If assisted in preparing this above application, I understand that all responsibility for the accuracy of the information rests with me.

Jason Smith, Environmental Manager *Applicant Printed Name – Title*	_____ *Applicant Signature*	/ / *(Date)*
Brian White, Assistant Regional Administrator *Water Right Holder Printed Name*	_____ *Water Right Holder Signature*	/ / *(Date)*
Same as water right holder *Land Owner of Existing Place of Use Printed Name*	_____ *Land Owner of Existing Place of Use Signature*	/ / *(Date)*
Same as water right holder *Land Owner of Proposed Place of Use Printed Name*	_____ *Land Owner of Proposed Place of Use Signature*	/ / *(Date)*

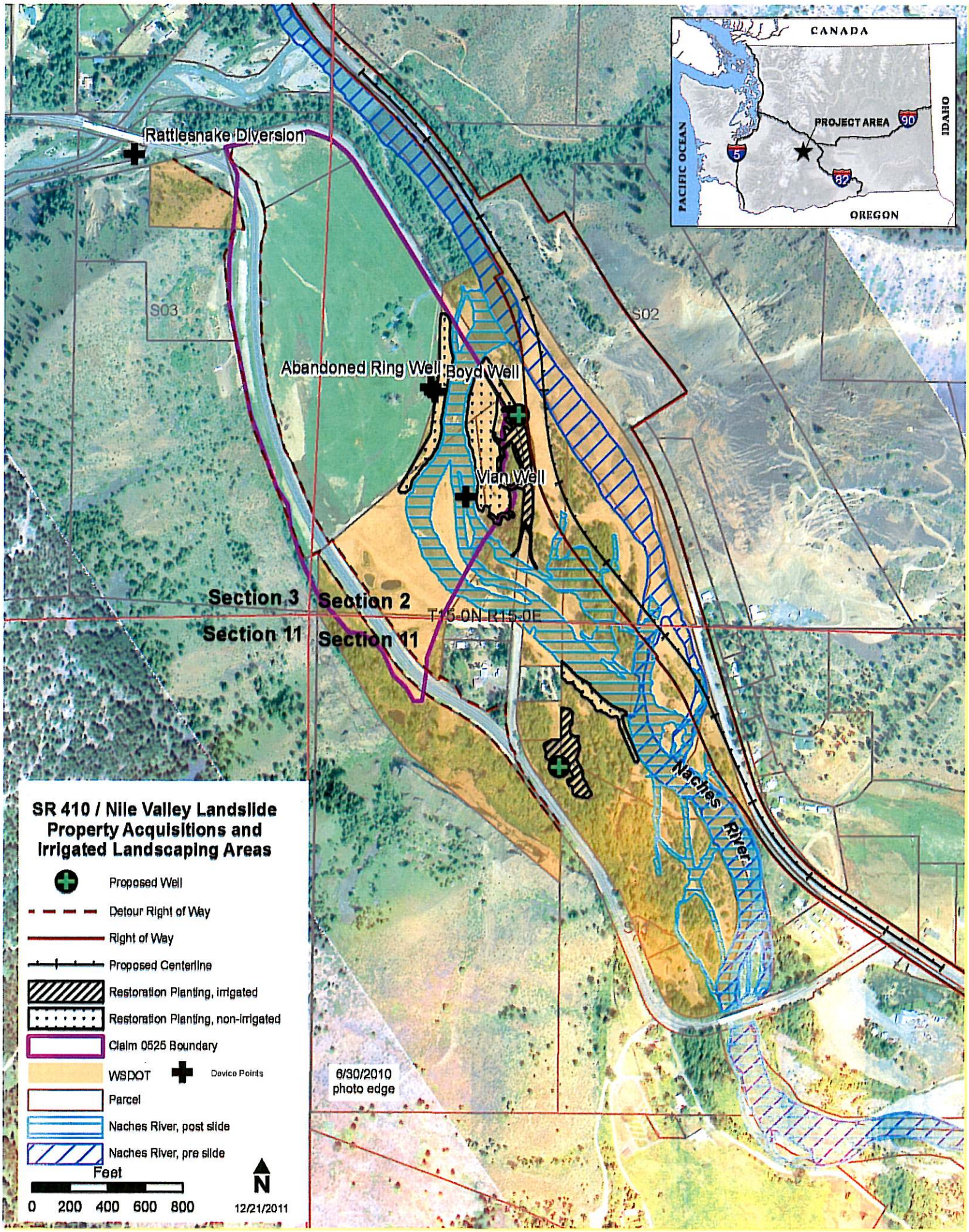
Please check the region in which the project is located:

***Submit your application to:** DEPARTMENT OF ECOLOGY CASHIERING SECTION PO BOX 47611 OLYMPIA, WA 98504-7611	☒ Central Regional Office 15 W Yakima Avenue, Suite 200 Yakima, WA 98902 (509) 575-2490	☐ Eastern Regional Office 4601 N. Monroe Street Spokane, WA 99205-1295 (509) 329-3400
	☐ Northwest Regional Office 3190 – 160th Avenue SE Bellevue, WA 98008-5452 (425) 649-7000	☐ Southwest Regional Office PO Box 47775 Olympia, WA 98504-7775 (360) 407-6300

WE ARE RETURNING YOUR APPLICATION FOR THE FOLLOWING REASON(S):

- ☐ APPLICATION FEE NOT ENCLOSED
- ☐ MAP NOT INCLUDED or INCOMPLETE
- ☐ ADDITIONAL SIGNATURES REQUIRED
- ☐ SECTION _____ IS INCOMPLETE
- ☐ OTHER/EXPLANATION: _____

STAFF: _____ ***DATE:*** ____/____/____


CANADA
PACIFIC OCEAN
PROJECT AREA
IDAHO
OREGON
5
90
82
Rattlesnake Diversion
S03
S02
Abandoned Ring Well
Boyd Well
Vian Well
Section 3
Section 2
Section 11
Section 11
T15-0N R15-0E
Naches River
S10
6/30/2010
photo edge
SR 410 / Nile Valley Landslide
Property Acquisitions and
Irrigated Landscaping Areas
Proposed Well
Detour Right of Way
Right of Way
Proposed Centerline
Restoration Planting, irrigated
Restoration Planting, non-irrigated
Claim 0525 Boundary
WSDOT
Device Points
Parcel
Naches River, post slide
Naches River, pre slide
Feet
0 200 400 600 800
N
12/21/2011

Technical Memorandum

Hydrogeologic Analysis of Irrigation Wells Proposed for the SR 410 Nile Landslide Reconstruct Route Project

Work Order XL 3811

Rob Schanz, R.G., LHG
WSDOT Environmental Services
Hydrology Program

January 2012

Washington State Department of Transportation
Environmental and Engineering Service Center
Environmental Services Office

Hydrogeologic Analysis of Irrigation Wells Proposed for the SR 410 Nile Landslide Reconstruct Route Project

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Introduction and Background

The Washington State Department of Transportation (WSDOT) is proposing to install two wells to irrigate riparian and wetland restoration sites for the SR 410 Nile Valley Landslide Reconstruct Route project. This project will reconstruct portions of SR 410 that were destroyed during the 2009 Nile Valley Landslide between mileposts (MP) 107.4 and 108.5. WSDOT is installing riparian and wetland plants on both sides of the adjacent Naches River floodplain as mitigation for project impacts.

Two wells will be installed to irrigate plants while they are becoming established (Figure 1). Well 1 will be located on the left/east side of the Naches River on an upland terrace between SR 410 and the river. Well 2 will be located on the right/west side of the river in a low floodplain area. The two wells combined are anticipated to withdraw about three acre-feet per year. Pumping rates will range between 20 and 60 gallons per minute (gpm) for each well.

WSDOT plans to obtain a temporary authorization for water withdrawal from these wells utilizing an existing upstream surface water right on Rattlesnake Creek (Figure 1). WSDOT owns a 45 acre-feet per year portion of Claim 0525 from the properties that were purchased after the slide. Rattlesnake Creek enters the Naches River about 2000 feet upstream of the project area.

This report analyzes hydrogeologic conditions near the wells and assesses potential for impairment of existing groundwater uses and surface and groundwater rights. It is intended to support WSDOT's application for a temporary authorization to change the point of diversion, place of use, and purpose for the existing water right.

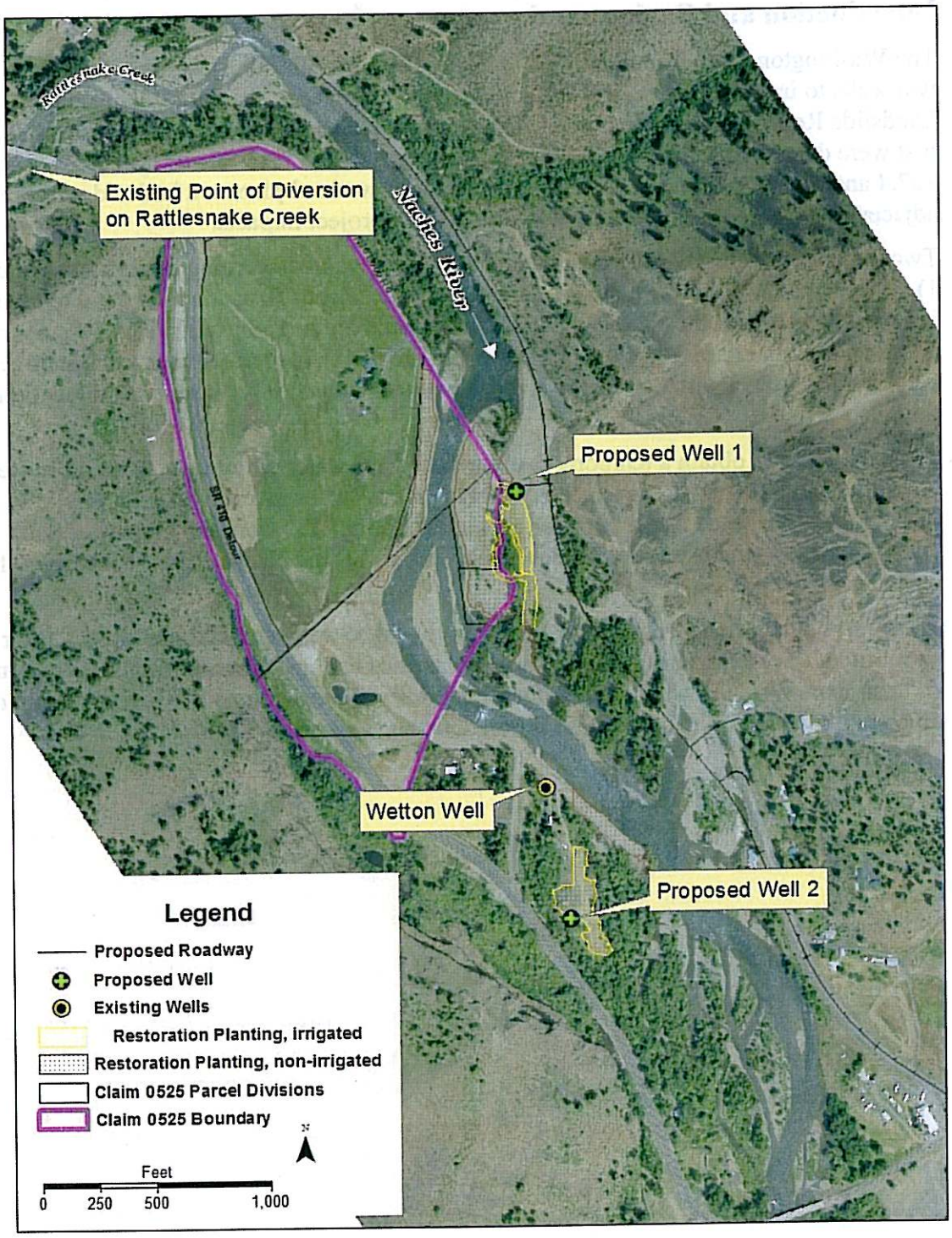

Figure 1. Locations of the proposed wells.

Hydrogeologic Setting

WSDOT has installed a number of monitoring wells and borings in the project area for wetland mitigation planning and geotechnical analysis as part of the emergency response to the October 2009 Nile Valley Landslide. This section uses this data to describe hydrogeologic conditions near the proposed wells. Appendix A contains bore logs for wells and piezometers near the proposed well locations.

Stratigraphy of the aquifer tapped by the proposed wells

The new wells would be drilled into a shallow unconfined aquifer in alluvial deposits on the Naches River valley floor. This alluvium is made up of poorly sorted sand and gravel deposited by glaciers and streams (Yakima County, 2006). In 2009 a massive slide of volcanic rock fell across SR 410 and blocked the Naches River. Yakima County subsequently relocated the river into a new channel that curves around the slide deposits. The slide deformed and uplifted areas of alluvium on the east side of the valley (near Well 1), but did not cover either of the proposed well sites.

The alluvium near proposed Well 1 is covered by Weirman sandy loam soil (USDA, 1985). These soils occur in areas with frequent flooding and channel migration, and contain stratified layers of permeable gravel and sand with minimal organic matter. Well 1 will be located near WSDOT piezometer H-11P-10. The bore log for this 15-foot piezometer shows silty gravel with sand down to a depth of 14 feet. This is underlain by poorly graded gravel with sand.

The west side of the valley near Well 2 is covered by Logy and Wenas silt loam soils that typically form on floodplains where velocities are lower. Well 2 will be located near WSDOT piezometer H-02P-11. The bore log for this 6-foot piezometer shows silty gravel near the surface underlain by well-graded gravel with sand.

The Wetton well is the closest domestic well to proposed Well 2. This bore log shows boulders, gravel, sand, and brown clay down to a depth of 50-feet. The log implies that the brown clay becomes more predominant below 11-feet depth, but does not describe the layering of these deposits in detail.

The bore log for a 60-foot well drilled by the North Yakima Conservation District (believed to be on behalf of Boyd Brown) shows more detail on the stratigraphy in the alluvial deposits on the west side of the valley. This well encountered gravel and sand near the surface that transitioned at 23-feet depth into layers of silt-bound sandy gravel and cobbles. The silt-bound layers were underlain by coarse sandy gravels and cobbles at 34-feet depth. The well casing was perforated between 34- and 60-feet depth to obtain water from this deep coarse layer.

Seasonal water levels

Figure 2 shows monthly water levels measured by WSDOT in piezometers located near the proposed wells. The depth to water at H-11P-10 near Well 1 ranged from 4.5 feet in June when Naches River flows were elevated by snowmelt to 11 feet at the end of the dry season. Depths to water at H-02P-11 near Well 2 followed a similar pattern but were much shallower, ranging from 2.3 to 4.5 feet.

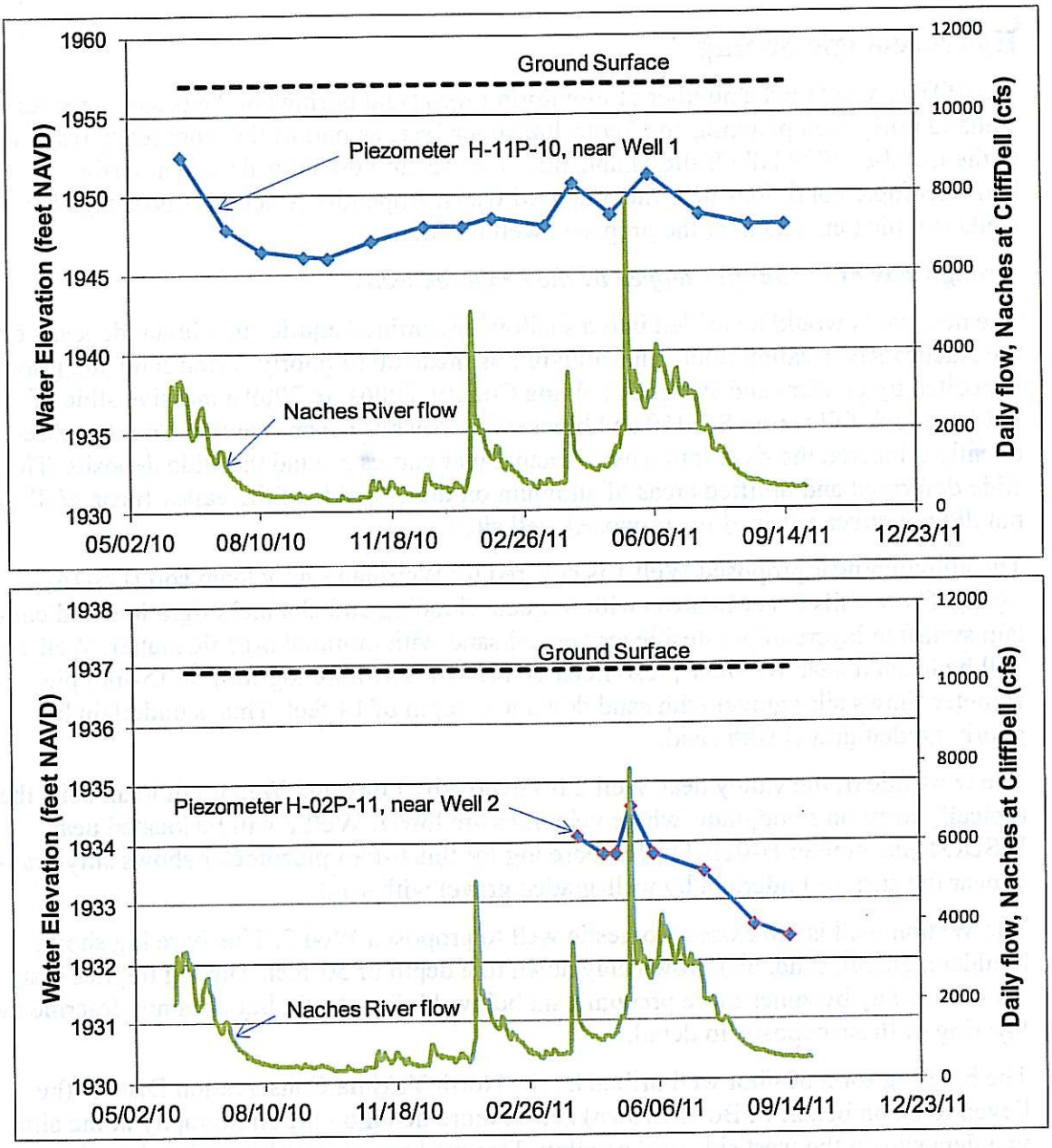

Figure 2. Water levels measured in piezometers near the proposed wells

Connectivity to the Naches River

The shallow groundwater levels shown in Figure 2 closely track seasonal flow patterns recorded in the Naches River at Cliffdell (USBR, 2011). Groundwater elevations were lowest at the end of the summer dry season when river flows were lowest. River and groundwater elevations rose in the fall and winter in response to rainstorms, and reached their maximum levels in the late spring when snowmelt from the upper watershed feeds the Naches River. This direct response of shallow groundwater to snowmelt-elevated flows indicates a high level of connectivity with surface flow in the Naches River.

Figures 3 and 4 compare measured groundwater levels to river valley cross sections near the proposed wells. Minimum summer groundwater levels lie near the bottom of the adjacent river and side channels, while maximum spring levels rise to within a few feet of channel bankfull stage. This again points to a strong connection between groundwater levels and river flows.

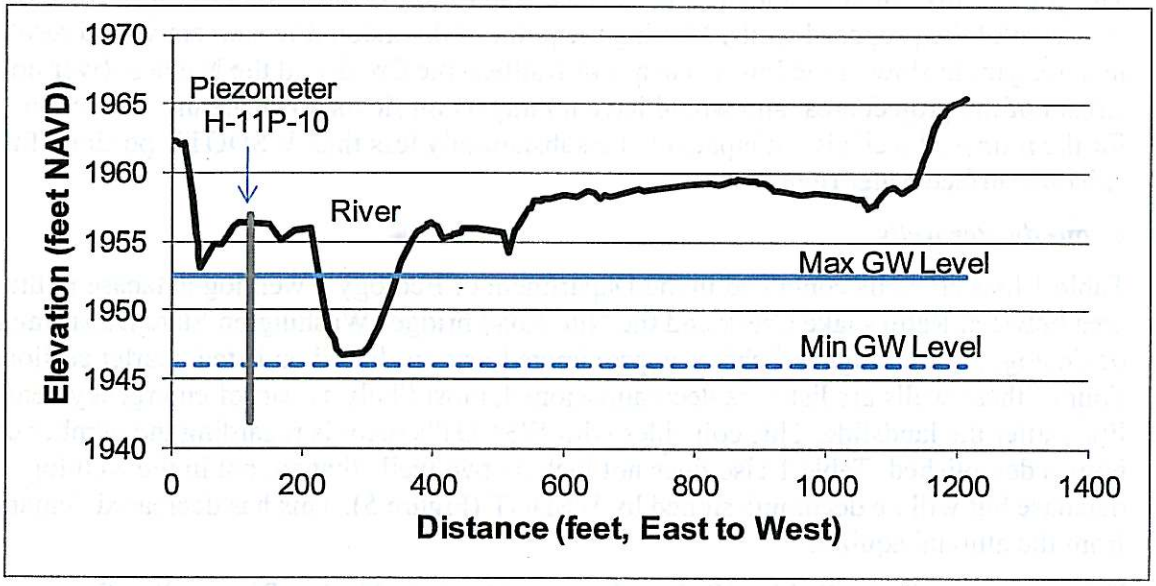

Figure 3. River cross section and groundwater levels near proposed Well 1

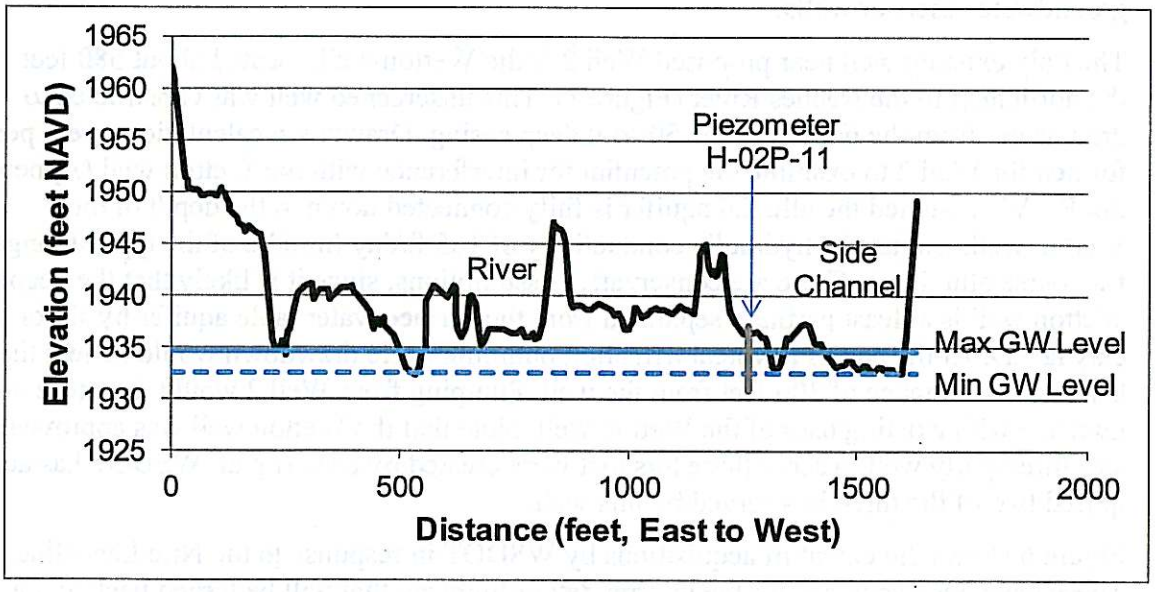

Figure 4. River cross section and groundwater levels near proposed Well 2

Impacts to Beneficial Uses

Surface Water

The analysis above demonstrates that the alluvial aquifer is strongly connected to surface flow in the Naches River. Some portion of the water pumped from the proposed wells will therefore be drawn from the river.

The point of diversion for the original surface water right is located on Rattlesnake Creek upstream of the proposed wells. Moving the point of diversion downstream would result in a net gain in flow in the lower reaches of Rattlesnake Creek and the Naches River upstream of the project area, and would have no impact on flows downstream. Water use for the proposed wells is anticipated to be substantially less than WSDOT's portion of the existing surface water right.

Groundwater wells

Table 1 lists all wells contained in the Department of Ecology's well log database in the area between Rattlesnake Creek and the Nile Road bridge (Washington State Department of Ecology, 2011). Figure 5 shows approximate locations based on listed quarter sections. Four of these wells are listed as decommissioned, most likely as part of emergency demolition after the landslide. This coincides with WSDOT's records regarding the number of homes demolished. Table 1 also does not include two wells that are not in the well log database but will be decommissioned by WSDOT (Figure 5). This has decreased demand from the alluvial aquifer.

There are no active wells identified on the east side of the Naches River valley floor near proposed Well 1. Drawdown from this well will therefore have no impact on existing groundwater users or wells.

The only existing well near proposed Well 2 is the Wetton well, located about 580 feet to the north next to the Naches River (Figure 1). This unscreened well was constructed to draw water from the bottom of the 50-foot deep casing. Drawdown calculations were performed for Well 2 to examine the potential for interference with the Wetton well (Appendix B). We assumed the alluvial aquifer is fully connected down to the depth of the Wetton well, and used a hydraulic conductivity of 165 ft/day (middle of the typical range for coarse alluvium). These are conservative assumptions, since it is likely that the deeper Wetton well is at least partially separated from the surface water table aquifer by silt or clay layers. At the end of a typical irrigation pumping cycle drawdown would be less than 0.1 feet at a distance of 200 feet from the well. Pumping from Well 2 would therefore not interfere with existing uses of the Wetton well. Note that the Wetton well was approved as a three-party well to serve three lots that were created by a short plat. WSDOT has acquired two of the three lots served by this well.

Figure 6 shows the extent of acquisitions by WSDOT in response to the Nile Landslide. These have been acquired for the interim detour highway that will be turned back to Yakima County to maintain as a local access road, new river channel and the highway reconstruction. These parcels are generally located between the existing highway and temporary detour, are mostly located within the Naches River floodplain, and will be restricted from future re-development.

Water Rights in the Project Area

According to Ecology's records, WSDOT's acquisitions involved properties with other water right claims besides the Brown Claim 0525. These include Claim #1007 (Dexter), #1399 (Chandlee), #1577 and #1578 (Randall) for a total of 39-acre feet with priority dates of June 1892. The only other claim known to be active at the time of the landslide was #1650 (Dexter) for 65 acre-feet with a place of use east of SR 410; however this diversion was damaged by the landslide and has not been re-established. No groundwater rights were identified.

Potential for Impairment

Based on the above, the installation of two wells and the short term temporary use for mitigation site irrigation will not impair existing groundwater use or surface and ground water rights identified in the area.

Table 1: Inventory of existing wells located near the proposed wells

Original Owner/Well ID	Parcel Number or Address	Type	Depth (feet)	Perforations (feet)	Static Water Depth (feet)	Status
Brown/171453	151502-32400	Irrigation	11	3 to 11	5	Drilled 2007, decommissioned 2009
Brown/ W242665		Irrigation	65			
Smith	8961 SR 410	Domestic	40	None	9	Drilled 1994
Hobbs	151502-33001	Domestic	23	None	9	Drilled 1977
N Yak Cons. Dist	151502-33404	Irrigation	60	34 to 60	11	Drilled 2008, decommissioned 2009
Milligan (Rose)	151502-32002	Domestic	30	None	12	Drilled 1976, decommissioned 2009
Milligan	151502-32002	Irrigation	21	None	9.5	Drilled 1976, no decommission filed
Davidson	151502-33006	Domestic	10	None	4	Decommissioned, 2009
Will	12420 SR 410	Domestic	50	None	10	Drilled 1986
Earl	151503-41401	Domestic	70	None	17	Drilled 2010
Sainsbury	151503-41406	Domestic	125	104 to 125	25	Drilled 2010
Skeath	150503-14002	Domestic	65	None	7	Drilled 2008
WSDOT only						
Wetton	622 Nile Road	Domestic	50	None	9	Drilled 1998
McDonald	11601 SR 410	Domestic	32	22 to 32	15	Drilled 1973
Yakima County	River nr bridge	Resource	7	6.5 to 7	Not listed	Drilled and decommissioned, 2004

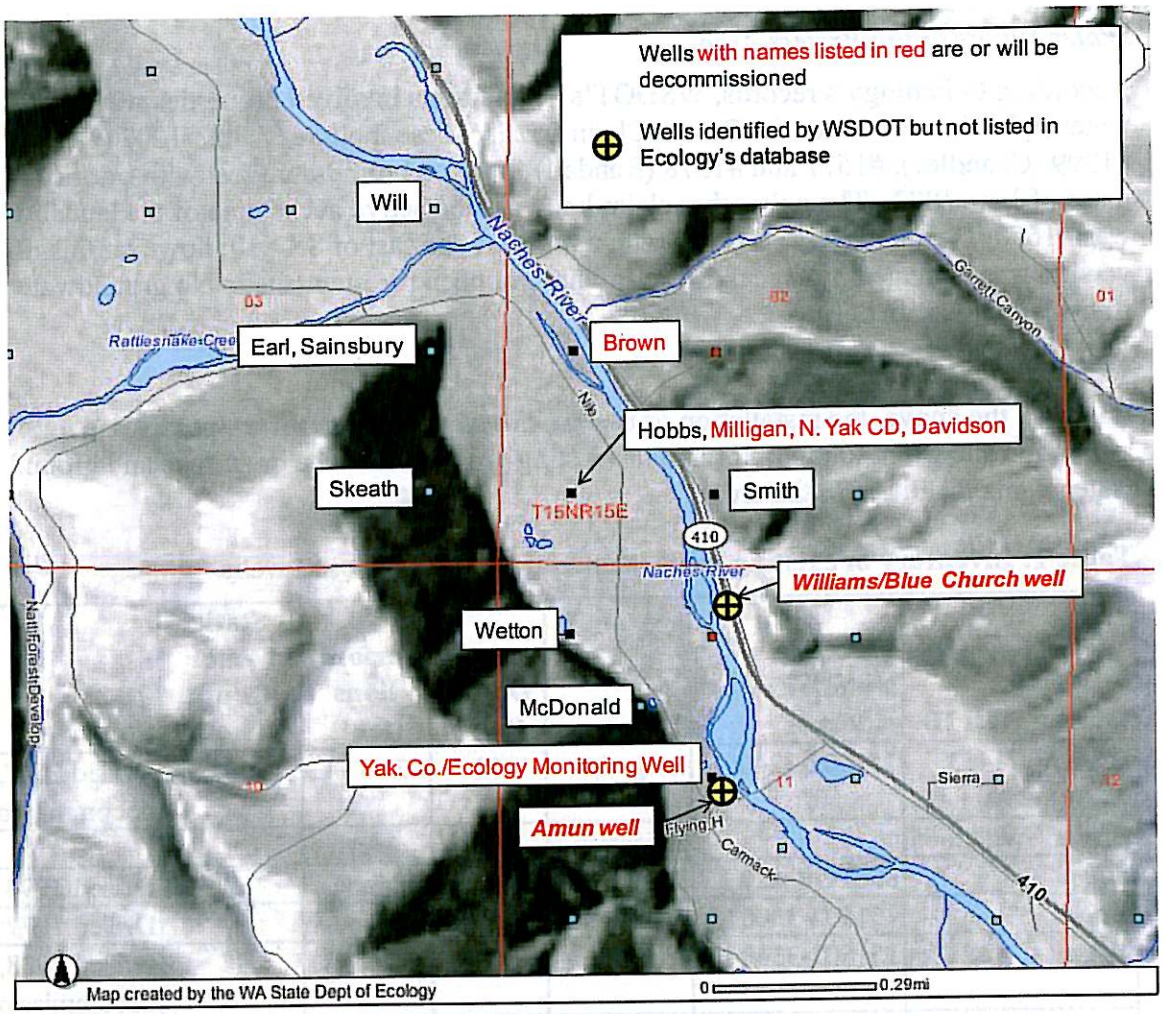

Figure 5. Approximate locations of nearby wells by quarter section

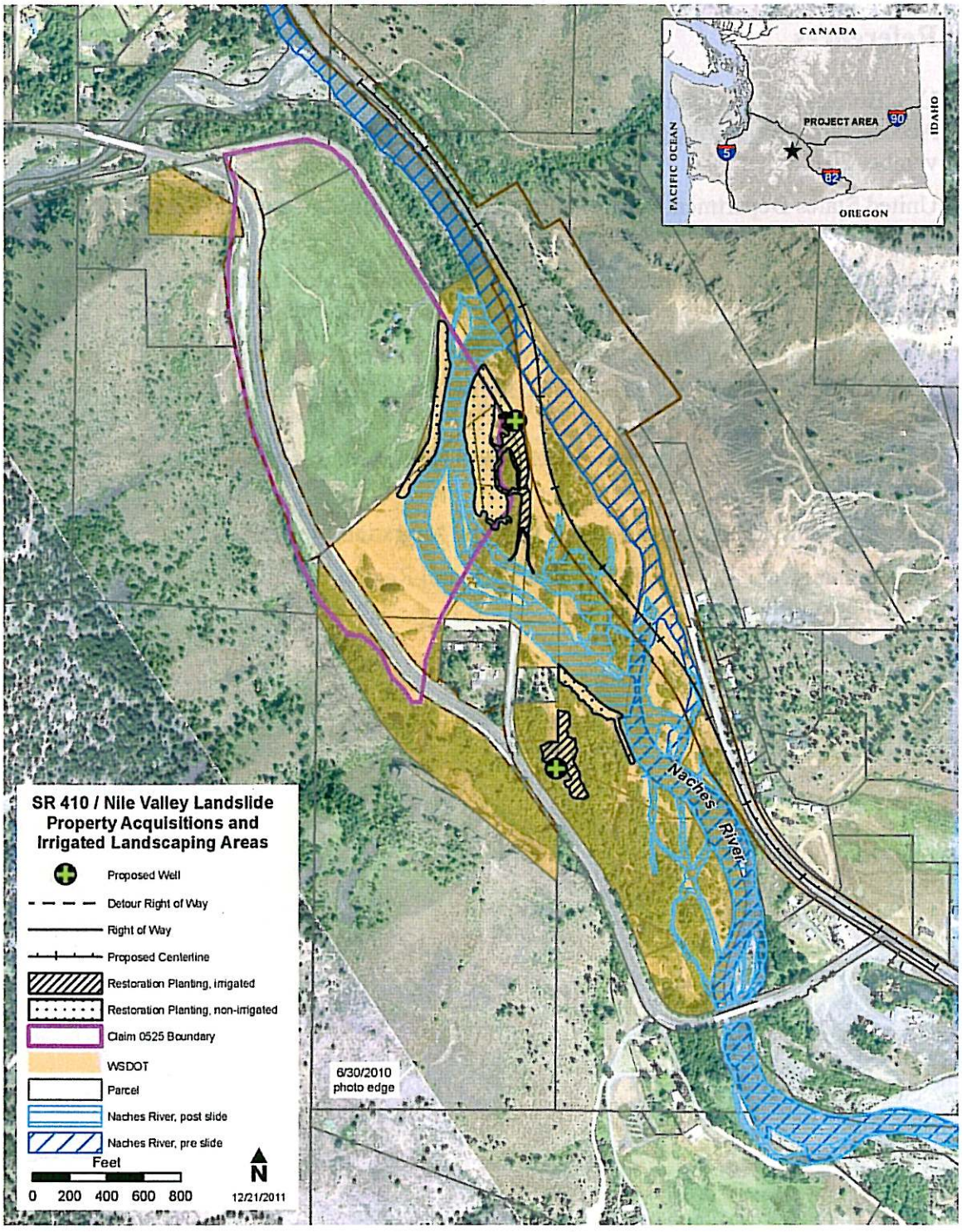

Figure 6. WSDOT property acquisitions in response to the Nile landslide

References

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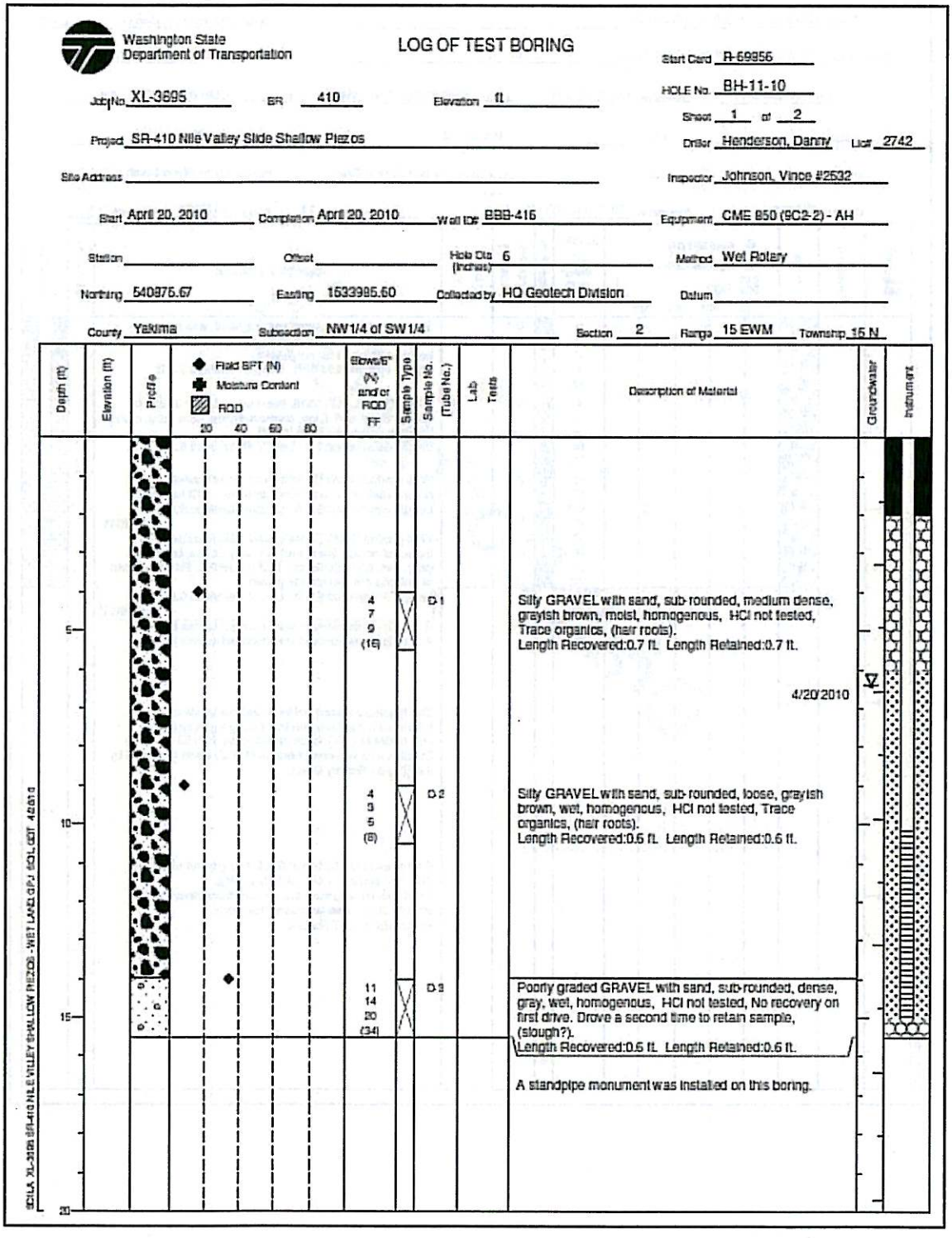
Appendix A – Selected Bore Logs for Existing Wells in the Project Area



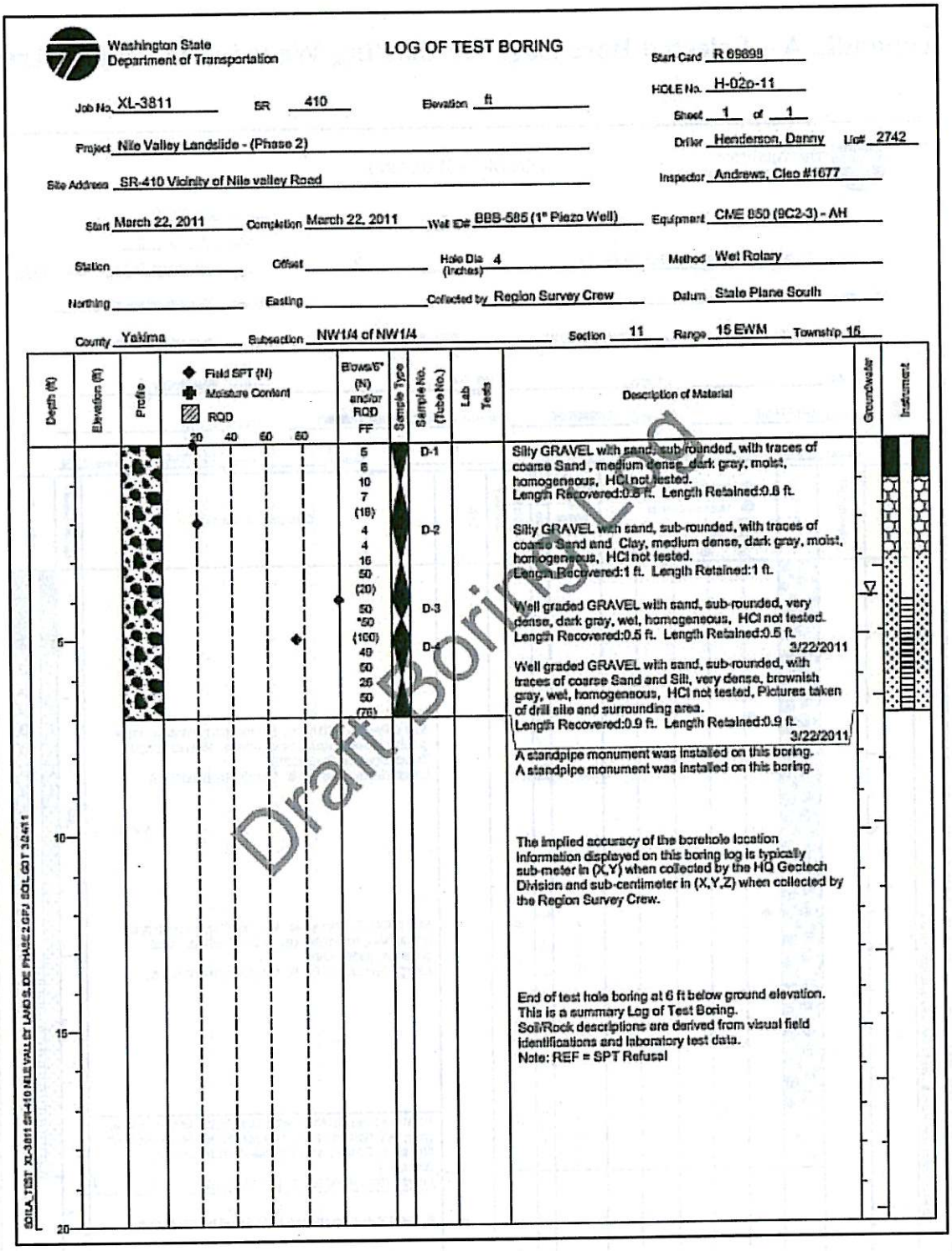
Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-69956
HOLE No. BH-11-10
Sheet 1 of 2
Driller Henderson, Danny Lic# 2742
Inspector Johnson, Vince #2532
Equipment CME 850 (9C2-2) - AH
Method Wet Rotary
Datum

Job No. XL-3695 BR 410 Elevation ft
Project SR-410 Nile Valley Slide Shallow Piezos
Site Address
Start April 20, 2010 Completion April 20, 2010 Well ID# BBB-416
Station Offset Hole Dia 6 (inches)
Northing 540875.67 Easting 1533985.60 Collected by HQ Geotech Division
County Yakima Subsection NW1/4 of SW1/4 Section 2 Range 15 EWM Township 15 N

Depth (ft)	Elevation (ft)	Profile	Field SPT (N) / Moisture Content / RQD (20 40 60 80)	Blows/6" (N) and or RQD FF	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5				4 7 9 (16)	D-1			Silty GRAVEL with sand, sub-rounded, medium dense, grayish brown, moist, homogenous, HCl not tested, Trace organics, (hair roots). Length Recovered:0.7 ft. Length Retained:0.7 ft.	4/20/2010	
10				4 3 5 (8)	D-2			Silty GRAVEL with sand, sub-rounded, loose, grayish brown, wet, homogenous, HCl not tested, Trace organics, (hair roots). Length Recovered:0.6 ft. Length Retained:0.6 ft.		
15				11 14 20 (34)	D-3			Poorly graded GRAVEL with sand, sub-rounded, dense, gray, wet, homogenous, HCl not tested, No recovery on first drive. Drove a second time to retain sample, (slough?). Length Recovered:0.6 ft. Length Retained:0.6 ft.		
20								A standpipe monument was installed on this boring.		



Washington State Department of Transportation

LOG OF TEST BORING

Start Card R 69899
HOLE No. H-020-11
Sheet 1 of 1

Job No. XL-3811 SR 410 Elevation ft
Project Nile Valley Landslide - (Phase 2)
Site Address SR-410 Vicinity of Nile valley Road
Driller Henderson, Danny Lic# 2742
Inspector Andrews, Cleo #1677
Start March 22, 2011 Completion March 22, 2011 Well ID# BBB-585 (1" Piezo Well) Equipment CME 850 (9C2-3) - AH
Station Offset Hole Dia (Inches) 4 Method Wet Rotary
Northing Easting Collected by Region Survey Crew Datum State Plane South
County Yakima Subsection NW1/4 of NW1/4 Section 11 Range 15 EWM Township 15

Depth (ft)	Elevation (ft)	Profile	Field SPT (N) / Moisture Content / RQD (20 40 60 80)	Blows/6" (N) and/or RQD FF	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				5		D-1		Silty GRAVEL with sand, sub-rounded, with traces of coarse Sand , medium dense, dark gray, moist, homogeneous, HCl not tested. Length Recovered:0.8 ft. Length Retained:0.8 ft.		
				6 10 7 (18)						
				4		D-2		Silty GRAVEL with sand, sub-rounded, with traces of coarse Sand and Clay, medium dense, dark gray, moist, homogeneous, HCl not tested. Length Recovered:1 ft. Length Retained:1 ft.		
				4 16 50 (20)						
				50		D-3		Well graded GRAVEL with sand, sub-rounded, very dense, dark gray, wet, homogeneous, HCl not tested. Length Recovered:0.5 ft. Length Retained:0.5 ft. 3/22/2011		
5				"50 (100)						
				49		D-4		Well graded GRAVEL with sand, sub-rounded, with traces of coarse Sand and Silt, very dense, brownish gray, wet, homogeneous, HCl not tested, Pictures taken of drill site and surrounding area. Length Recovered:0.9 ft. Length Retained:0.9 ft. 3/22/2011		
				50 26 50 (76)				A standpipe monument was installed on this boring.		
								A standpipe monument was installed on this boring.		
10								The implied accuracy of the borehole location information displayed on this boring log is typically sub-meter in (X,Y) when collected by the HQ Geotech Division and sub-centimeter in (X,Y,Z) when collected by the Region Survey Crew.		
15								End of test hole boring at 6 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. Note: REF = SPT Refusal		
20										

SDIA_TEST XL-3811 SR-410 NILE VALLEY LANDSLIDE PHASE 2.GPJ SDL.GDT 3/24/11

68023

RECEIVED FEB 2 1999 CENTRAL REGION OFFICE

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. AEG-093
UNIQUE WELL I.D. # W105334
Water Right Permit No.

(1) OWNER: Name Kelly Wetton Address 22206 S.E. 424th. St., Enumclaw

(2) LOCATION OF WELL: County Yakima NW 1/4 NW 1/4 Sec 11 T 15 N, R 15 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 622 Nile Rd. D

(3) PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal ☐ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches. Drilled 50 feet. Depth of completed well 50 ft.

(6) CONSTRUCTION DETAILS:
Casing Installed: 6 " Diam. from +1 ft. to 50 ft.
Welded ☒ " Diam. from ft. to ft.
Liner Installed ☐ Threaded ☐ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: HP

(8) WATER LEVELS: Land-surface elevation above mean sea level 1920
Static level 9 ft below top of well Date 11-16-98
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airtest 60 gal./min. with stem set at 50 ft. for 1 hrs.
Artesian flow g.p.m. Date 11-16-98
Temperature of water 53 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Large Boulders & Small Boulders & Large Gravel & Br. Sand & Br. Clay	0	11
Large Boulders & Small Boulders & Large Gravel & Br. Clay & Br. Sand & Water	11	50

Work Started 11-13-98, 19 Completed 11-16-98, 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME OASIS DRILLING (Person, firm or corporation) (Type or print)
Address 2017 S 16th Ave, Union Gap, WA 98903
(Signed) [signature] (Well Driller) License No. 1435
Contractor's Registration No. OASISD*072J9 Date 11-16-98, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

DEPARTMENT OF ECOLOGY State of Washington

Construction/Decommission *("x" in circle)*

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION* 321913

Notice of Intent Number _____

PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☒ Irrigation ☐ Test Well ☐ Other _____

TYPE OF WORK: Owner's number of well (if more than one) _____

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 8 inches, drilled 60 ft. Depth of completed well 60ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 8" Diam. from +2 ft. to 60 ft. ☒ Liner installed _____" Diam. from _____ ft. to _____ ft. ☐ Threaded _____" Diam. From _____ ft. to _____ ft.

Perforations: ☒ Yes ☐ No

Type of perforator used AIR PERFORATOR

SIZE of perfs .25in. by 3 in. and no. of perfs 80from 34ft. to 60ft

Screens: ☐ Yes ☒ No ☐ K-Pac Location _____

Manufacturer's Name _____

Type _____ Model No. _____

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: ☐ Yes ☐ No Size of gravel/sand _____

Materials placed from _____ ft. to _____ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 20ft.

Material used in seal BENTONITE CHIPS

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? _____ Depth of strata _____

Method of sealing strata off _____

PUMP: Manufacturer's Name _____

Type _____ H.P _____

WATER LEVELS: Land-surface elevation above mean sea level _____ ft

Static level 11ft below top of well Date 9/24/2008

Artesian pressure _____ lbs. per square inch Date _____

Artesian water is controlled by _____ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☒ No If yes, by whom? _____

Yield: _____ gal./min with _____ ft. drawdown after _____ hrs.

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs

Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____

Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.

Airtest 100+ gal./min with stem set at 45ft. for 4hrs.

Artesian flow _____ g.p.m. Date _____

Temperature of water _____ Was a chemical analysis made? ☐ Yes ☐ No

CURRENT

Notice of Intent No. WE09046

Unique Ecology Well ID Tag No. BAC 339

Water Right Permit No. C54-00525CTCL

Property Owner Name NORTH YAKIMA CONSERVATION DISTRICT

Well Street Address NILE RD

City NACHES County YAKIMA

Location SW1/4-1/4 SW1/4 Sec 29 Twn 15 R 15E EWM ☒ Or WWM ☐

(s, t, r Still REQUIRED) 02

Lat/Long Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. (Required) 15150233404

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
BROWN SANDY LOAM	0	2
BROWN GRAVELLY FINE TO MEDIUM	2	
SAND WITH COBBLES		18
BROWN SANDY GRAVEL TIGHT,	18	
MOIST		23
BROWN SILT BOUND MEDIUM TO	23	
CORSE SANDY GRAVEL WITH		
COBBLES, LOOSE WET		30
GRAY TIGHT SILT BOUND SANDY	30	
GRAVEL, DRY		34
BROWN LOOSE MEDIUM TO CORSE	34	
SANDY GRAVEL TO COBBLES,		
WATER		60

RECEIVED NOV 05 2008 Washington State Department of Ecology

RECEIVED NOV 10 2008 DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Start Date 9/22/2008 Completed Date 9/24/2008

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) BRANDON HICKS

Driller/Engineer/Trainee Signature _____

Driller or trainee License No. 2785

IF TRAINEE: Driller's License No:

Driller's Signature:

Drilling Company ARCADIA DRILLING INC.

Address P.O.BOX 1790

City, State, Zip SHELTON , WA, 98584

Contractor's Registration No ACADDI098K1 Date 9/29/2008

Appendix B – Example Drawdown Calculation for Well 2

Theis Solution for drawdown by a pump near a Stream

Theis equation: Drawdown = [Q/(4piT)]*[W(u)]

$u = (r^2S)/(4Tt)$

$W(u) = -0.5772 - \ln u + u - u^2/2*2! + u^3/3*3! - u^4/4*4! + u^5/5*5! \ldots\ldots$

T is transmissivity, = Hydraulic Conductivity times aquifer thickness

S is storativity, or specific yield in unconfined aquifers

t is time, r is distance of drawdown from well, and Q is pumping rate

Streams can be treated as constant head boundary by putting an image recharge well on opposite side of stream

r_{image} = 2*(distance of well from stream) - r

Drawdown = $[Q/(4piT)]*[W(u)-W(u_{image})]$

Steady-state drawdown = $[Q/(2piT)]*\ln(r_{image}/r)$

Input Data: in yellow		
all other values calculated		
Location for drawdown	260	feet from naches
Pump location	460	feet from naches river
r for drawdown calculation	200	feet from well
r_{image}	720	feet from image well
pump rate	60	gallons/minute, maximum of estimated range per well
	11551.68	ft^3/day
	0.13	cfs
Hydraulic conductivity	165	ft/day, mid range for sand and gravel from 30 to 300
Aquifer Thickness	50	feet, depth of Wetton well
Transmissivity	8250	ft^2/day
Specific Yield	0.25	value for fine gravel

Time (hrs)	Time (days)	u	Wu	u_{image}	Wu_{image}	x/sqrt(4TtS)	Drawdown with stream (ft)	Drawdown (ft) without stream	Flow pumped from stream (cfs)
12	0.500	0.606060606	0.448896	7.854545455	0.000045	1.79054757	0.05	0.05	0.00
24	1.000	0.303030303	0.898258	3.927272727	0.0043	1.26610833	0.10	0.10	0.01
48	2.000	0.151515152	1.455833	1.963636364	0.051446	0.89527379	0.16	0.16	0.03
168	7.000	0.043290043	2.605459	0.561038961	0.491977	0.47854397	0.24	0.29	0.07
Long Time	1.00E+05	3.0303E-06	12.12965	3.92727E-05	9.56782	0.00400379	0.29	1.35	0.13
Steady-State							0.29		