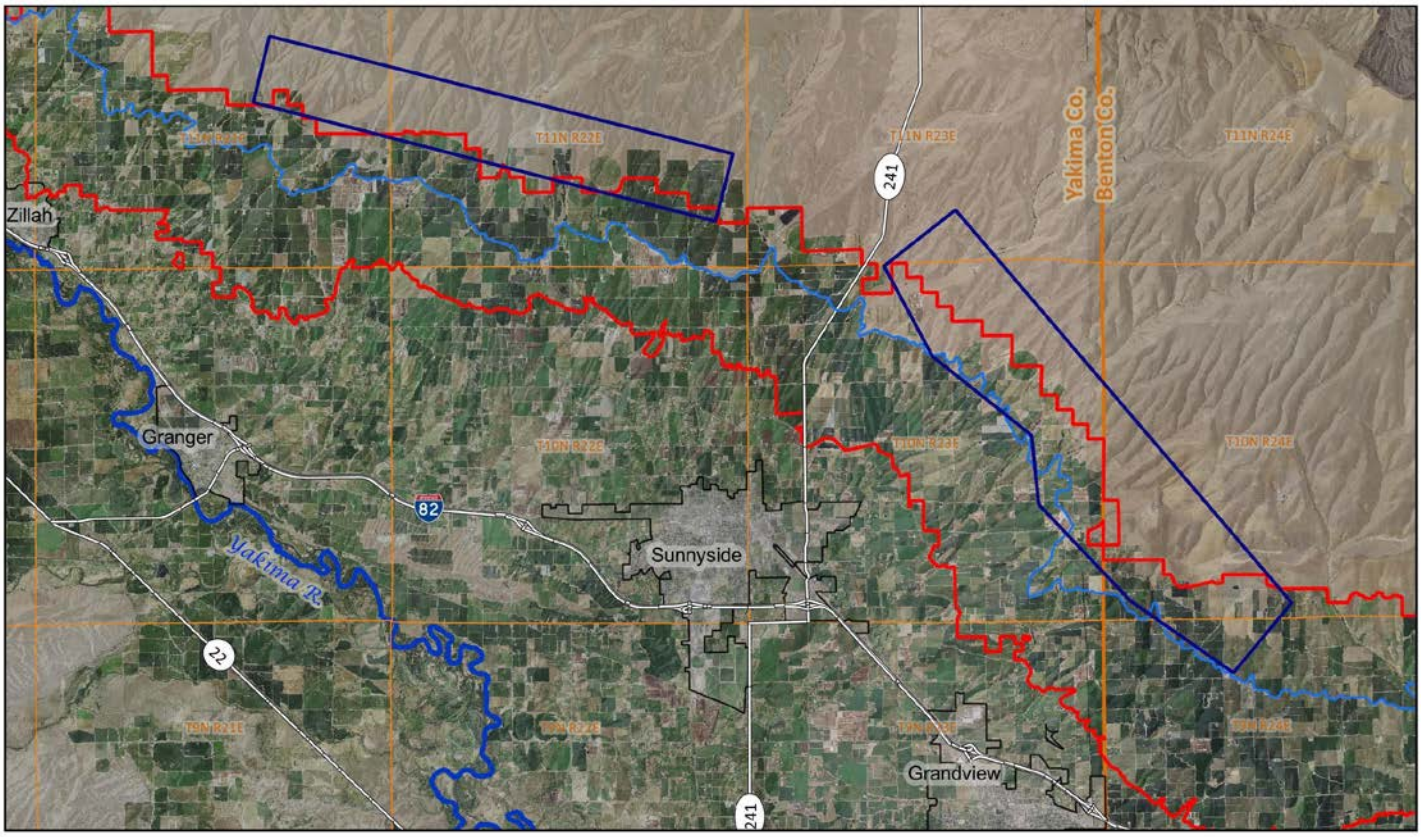
SURFACE AQUIFER RECHARGE

POTENTIAL ON

RATTLESNAKE RIDGE SOUTH FLANK



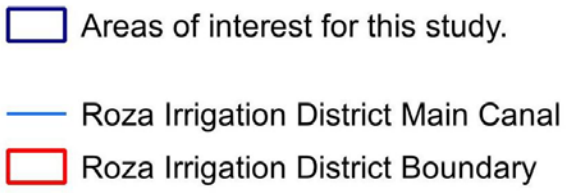
Coho Water Resources

Integrated Water Resource Management

August 12, 2024

Cover image:

South flank of Rattlesnake Ridge in the Lower Yakima Valley. Rattlesnake Ridge runs approximately WNW just beyond top of image and across upper right corner.



Surface Aquifer Recharge (SAR) Potential

on Rattlesnake Ridge South Flank

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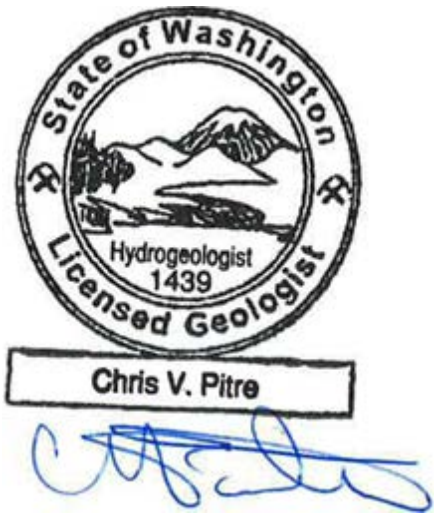

Ecology Project PNG0983
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August 2024

EXECUTIVE SUMMARY

This report presents a Phase 1 feasibility assessment of Surface Aquifer Recharge (SAR) to basalts in the Lower Yakima Valley, east of the Yakima River on the slope above the Roza Irrigation District (RID). The Groundwater Subcommittee of the Yakima Basin Integrated Plan (GWSC YBIP) commissioned a study of the potential of Managed Aquifer Recharge (MAR) to the basalts in the vicinity of the RID considering two methods of recharge:

1) Direct injection through wells (Aquifer Storage and Recovery – ASR).
2) Infiltration from ground surface (Surface Aquifer Recharge – SAR).

An interim report (Geosyntec and others, 2022 [MAR report]) found good potential for ASR, which is further evaluated in a final report by Geosyntec and Central Washington University focused on ASR (CWU; Geosyntec and CWU, 2024 [ASR report]). The interim report also recommended further evaluation of SAR in two Areas of Interest (AOIs) along the southern flank of Rattlesnake Ridge immediately upslope of the RID. This report presents the further evaluation for SAR. All three reports are part of Ecology Project PNG0983.

The units targeted for recharge by SAR are: 1) the Elephant Mountain (EM) basalt flow, which is part of the Saddle Mountains Basalt (SMB) formation; and, 2) the underlying Rattlesnake Ridge member of the sedimentary Lower Ellensburg Formation. The interim report MAR report evaluated SAR primarily by examining the USGS's compilation of overburden thickness and basalt stratigraphy from well logs in and near the RID (USGS Oregon Water Sciences Center, 2013). This SAR report focuses on the two AOIs by examining their stratigraphy in greater detail and evaluating their hydrogeologic setting and characteristics using additional sources.

FINDINGS

West and East AOIs:

- Both AOIs appear to have an adequate unsaturated vadose zone in the Elephant Mountain basalt and may have appropriate stratigraphy and hydrogeologic properties for SAR.

- A significant concern is the presence of loess at surface, especially in the East AOI, which clog transmissive fractures in the Elephant Mountain basalt and reduce its capacity to accept and transmit recharged water.
- The Rattlesnake Ridge sedimentary interbed appears to be more variable in texture and associated transmissivity than in the Moxee Valley (Kirk and Mackie, 1993). Its degree of hydraulic continuity with the Elephant Mountain basalt is unclear.
- Despite their proximity to each other, the two AOIs have differences that affect their suitability for SAR.

West AOI:

- Although the surficial geology maps indicate large areas in which the Elephant Mountain member of the Saddle Mountains Basalt is exposed at or near the surface, the lack of well logs in these areas does not allow confirmation of the extent of EM basalt near the surface. The overburden likely thins upslope of the RID.
- The unsaturated vadose zone extends from ground surface to the water table at approximately 200 feet below ground surface within the RID and is probably deeper upslope in the unirrigated areas. In the RID some wells tap the Rattlesnake Ridge interbed.
- The steep structural dip relative to topography suggests that only outcrops themselves and a narrow band surrounding outcrops will be sufficiently shallow and accessible to SAR development.
- Several parcels of publicly owned land exist in the West AOI for access to field investigations and possible project siting.

East AOI:

- The Elephant Mountain basalt is at or close to surface (e.g., <10 feet) in much of the East AOI.
- The water table depth in wells within the RID about a mile downslope of the AOI is 25 to 50 ft bgs and expected to be deeper in the areas of the AOI upslope of irrigated agriculture.
- The structural dip is shallower than in the West AOI such that the Elephant Mountain remains closer to ground surface in a broader band, and a large area may be practicably accessible for SAR development with the removal of overburden.
- The Sagebrush Ridge anticline in the southern part of the AOI may offer a pathway for recharged water to enter deeper hydrogeologic units, though shallow angle thrust faults may be an impediment to infiltration.
- Most of the land upslope of the RID is owned by one private entity.

PHASE 2 RECOMMENDED WORK

Further evaluation of SAR in both AOIs is recommended, and the next steps should focus on filling the following in gaps:

- The presence and extent of basalt outcrops.
- The depth of the vadose zone in the East AOI in areas upslope of the RID.
- The presence and nature of fractures in the near-surface basalt, including possible clogging by fine-grained overburden sediments, especially loess.
- The degree of connectivity and the hydrogeologic roles of the uppermost geologic units, both basalts and interbeds.

A field investigation supported by additional desktop analysis can address some of these gaps. Desktop analysis can include the following:

- Further analyzing of existing well logs and constructing of geologic cross-sections.
- Examining recently released lidar for geomorphic and structural
- Refining the conceptual hydrogeologic model of the upper geologic units in the area. Includes consulting with knowledgeable staff at the Ecology and the Washington Geological Survey.

Geologic field mapping can focus on these efforts:

- Confirming the large-scale surficial mapping of basalt outcrops in the West AOI.
- Identifying geologic units, their thicknesses, and hydrogeologic properties (e.g., porosity, permeability, fractures).
- Further characterizing the surficial unconsolidated Holocene sediments.
- Examining the presence and nature of fractures in the EM basalt, which could indicate fracture filling or active infiltration by water.
- Structural mapping of:
  - Stratigraphic bedding orientation to identify primary and secondary folds and probable associated fracture sets.
  - Faults that may impede or enhance groundwater mobility.
  - Fracture and joint orientation, spacing and density that may indicate the presence of nearby faults and folds.

If the field investigation indicates favorable conditions for SAR, more intensive exploratory work, such as geophysical surveys, excavations, drilling and pilot infiltration tests at prospective sites may be considered, which may allow a more determinative assessment of SAR potential at specific sites.

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Acronyms

AOI	Area of Interest
ASR	Aquifer Storage and Recovery
BLM	United States Bureau of Land Management
BOR	United States Bureau of Reclamation
Coho	Coho Water Resources, LLC
CRB or CRBG	Columbia River Basalt Group
CRGWDB	Ecology's Central Regional Office Groundwater Database
CWU	Central Washington University
DNR	Washington Department of Natural Resources
DTW	Depth to Water
Ecology	Washington Department of Ecology
EIM	Ecology's Environmental Information Management System
EM	Elephant Mountain flow/member of the SMB.
Fm.	Formation
Geosyntec	Geosyntec Environmental Consultants, Inc.
GWSC	Groundwater Subcommittee of YBIP
LYV GWMA	Lower Yakima Valley Groundwater Management Area
Ma	Million years ago
MAR	Managed Aquifer Recharge (includes ASR and SAR)
RID	Roza Irrigation District
RR	Rattlesnake Ridge sedimentary unit of the Lower Ellensburg Fm.
SAR	Surface Aquifer Recharge
Sed.	Sedimentary
SMB	Saddle Mountain Basalt, part of the CRBG. Contains the Rattlesnake Ridge and Elephant Mountain flows.
Std. Dev.	Standard Deviation
Unpub.	Unpublished
USGS	United States Geological Survey
WGS	Washington Geological Survey
YBIP	Yakima Basin Integrated Program

1. INTRODUCTION

This technical memorandum presents an evaluation of the potential for surface aquifer recharge into the uppermost Columbia River Basalts on the south flank of Rattlesnake Ridge in Yakima and Benton Counties, WA. Coho Water Resources, LLC (Coho) conducted this work as a subcontractor to Central Washington University (CWU) as part of a larger project, the Konnowac Pass Groundwater Storage Assessment, to evaluate Managed Aquifer Recharge (MAR) in and near the Roza Irrigation District (RID). This project was funded by the Washington Department of Ecology (Ecology) through the Yakima Basin Integrated Plan Groundwater Storage Sub-Committee (YBIP GWSC).

The RID suffers curtailment of its water supply in drought years, which are expected to increase as the warming climate decreases the amount of winter precipitation stored as snowpack in the upper elevation areas of the Yakima River Basin. Our broader project evaluated possible groundwater storage into the Columbia River Basalt aquifers near the RID to replenish groundwater reservoirs and to increase water supply reliability for irrigators during drought years. The project considered two types of MAR: Aquifer Storage and Recovery (ASR) and Surface Aquifer Recharge (SAR). In Task 2, the team reviewed existing information, conducted field reconnaissance, and made initial assessments of the feasibility of ASR and SAR in a summary report (Geosyntec and others, 2022).

As documented in the Task 2 report, our team determined that the Konnowac Pass area, which was originally identified as a potential site for a SAR project, was not suitable for SAR. In this area, fractures in the surficial basalt are clogged with fine sediment and a complicated faulting geometry limits the shallow subsurface volumes available for groundwater storage. Our team examined geologic maps and data across the RID for other possible locations for SAR. The Task 2 interim report identified two areas of interest (AOIs) southeast of Konnowac Pass and to the south of Rattlesnake Ridge based on basalt outcrops from the 100k geology maps and overburden thickness estimated by the USGS (Figure 1; DNR, 2016; Jones and others, 2006). The AOI extents were modified for this report to better fit basalt outcrops and overburden thicknesses as reported by well logs (Figure 2).

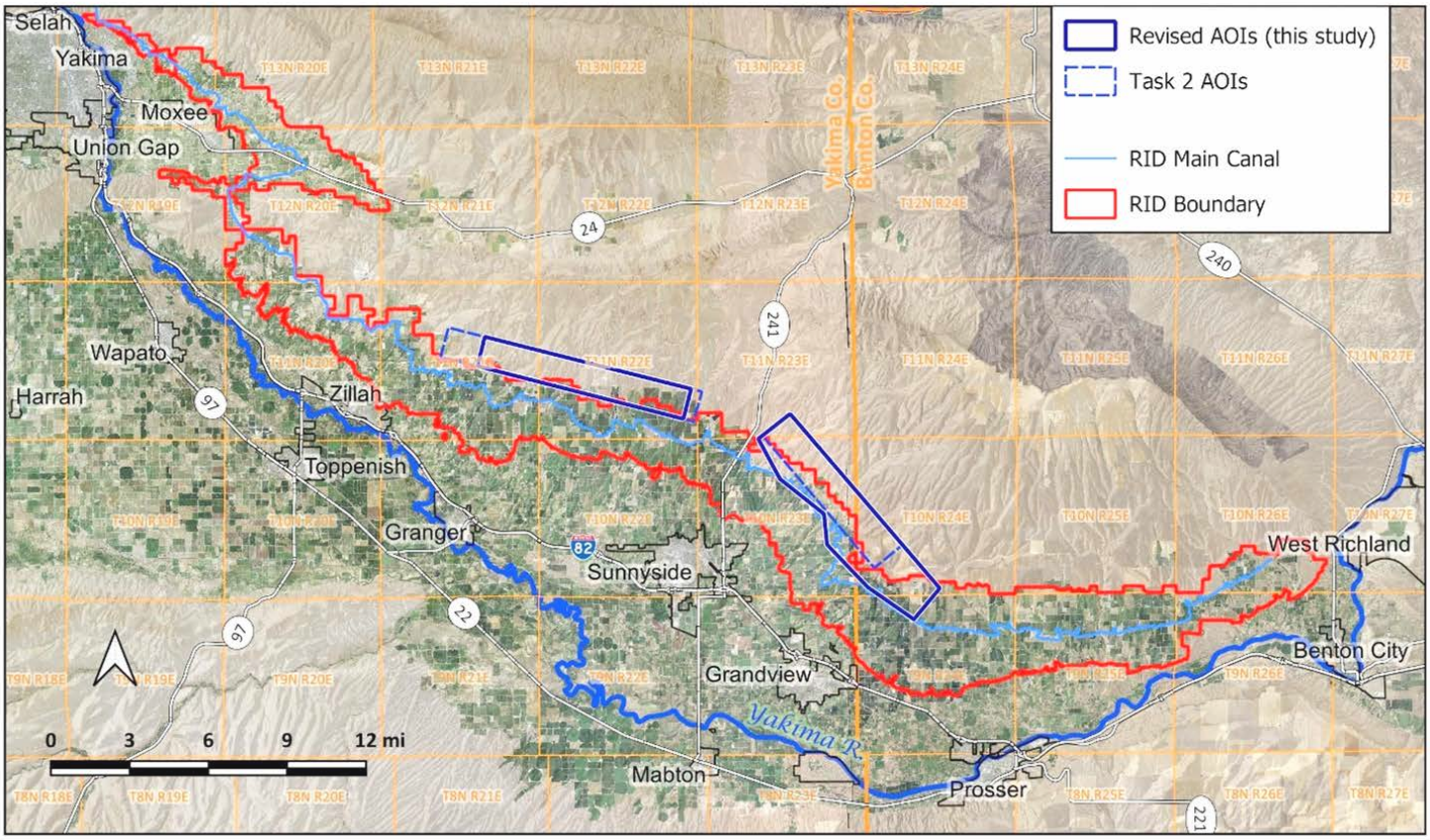


Figure 1: Roza Irrigation District with Areas of Interest for SAR evaluation.

This technical memorandum presents our evaluation of existing information about these areas. Work included:

- Compilation of well logs from Ecology's well log database (Ecology, 2024a) for well locations identified by:
  - Ecology's Central Regional Office Groundwater Database (CRGWDB; Ecology, 2024b)
  - The US Geological Survey's hydrogeological investigations of the Columbia Plateau (Oregon Water Science Center, 2013).
  - The Lower Yakima Valley Groundwater Management Area (LYV GWMA; Pacific Groundwater Group, 2019; Ecology, 2024c).
  - Additional matching of well logs with well locations for this study.
- Analysis of well logs for:
  - Depth to basalt (all located wells).
  - Character of overburden, uppermost basalts and sedimentary interbeds (subset of wells).

- Comparison of groundwater levels from multiple sources, including the LYV GWMA, Ecology in the CRGWDB (Ecology, 2024c), and measurements reported on well logs.
- Integration with additional work by our project team, such as geologic interpretations of Kharrazi (2023), and existing geologic maps and cross-sections.

This report presents a preliminary assessment of SAR criteria that can guide future site-specific SAR studies, including infiltration tests. A draft plan for additional analysis of existing data and a field investigation is included as possible next steps in the evaluation of SAR in these areas.

2. CONTEXT AND CONCEPT

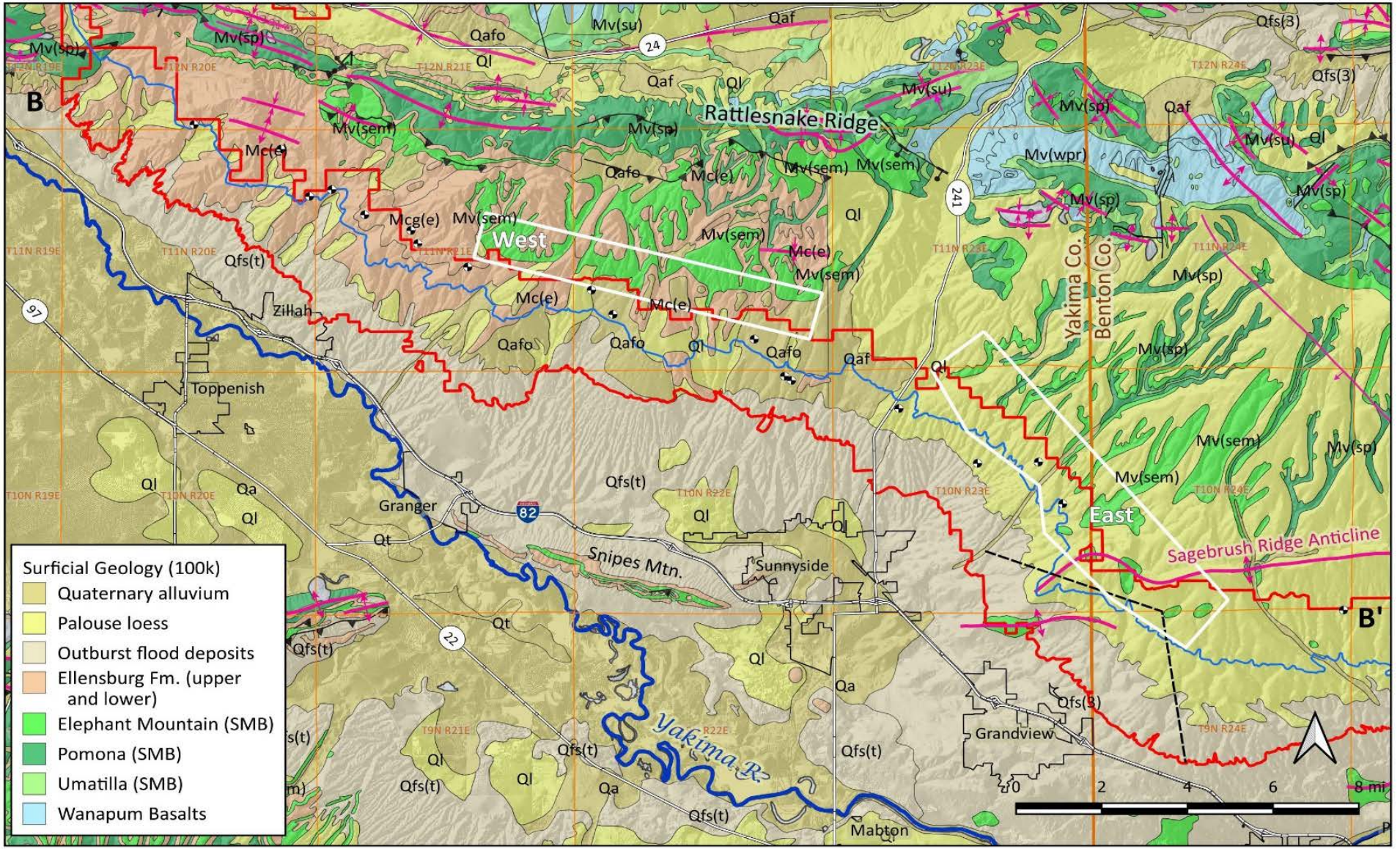
The Task 2 MAR report (Geosyntec and others, 2022) presented a detailed compilation of existing information on the geology, hydrogeology, and water quality in the vicinity of the RID. Based on the Task 2 report with additions from sources relevant to the AOIs, the features that are most relevant to a SAR project, particularly the upper portion of the stratigraphic column and the associated hydrogeology, are described below .The requirements for a successful SAR project and how a SAR project might operate in the RID is then discussed.

2.1. Study Area

The AOIs are along the south flank of Rattlesnake Ridge and straddle the Yakima/Benton County Line (Figure 1Figure 2). This side of Rattlesnake Ridge slopes to the southwest, and the ridge rises to 1,700-2,800 ft above the nearby valley floor of the Toppenish Basin. Land ownership in the RID is mostly private. A checkerboard of public and private ownership occurs upslope of the West AOI. A few parcels of public land parcels are scattered among private lands upslope of the East AOI, the majority of which are held by one entity.

Annual precipitation in the study area averages less than 10” (Vaccaro and Olsen, 2007). As seen in aerial photographs the contrast between irrigated and non-irrigated lands is stark. Irrigation has allowed the native sagebrush to be replaced with agricultural crops such as hops, fruit trees, and grapes, which use 2 to 3 ft of additional water over the growing season. This water demand emphasizes the dependence of agricultural activities on imported surface water or groundwater withdrawals.

The incised drainage channels on the slopes of Rattlesnake Ridge are typically dry in the current climate. Near our study areas the RID’s main canal is about 300 to 400 ft above the valley floor. The canal winds along the contours of the hillsides at an elevation of approximately 1,135 to 1,100 ft amsl, sloping downward from northwest to southeast.



SAR AOIs in white

Roza Irrigation District

Roza Main Canal

Cross-section from Kharrazi, 2023:

Brown, 1987

Well

Faults

Normal

Thrust

Strike-slip

Folds

Anticline

Syncline

Monocline

Figure 2

Surficial and Structural Geology

CWU-01.4: YBIP GWSC

SAR Potential on S Rattlesnake Ridge

2.2. Geology

The study area lies within the Yakima Fold Belt, which formed from the interplay of the folding of the Columbia River flood basalts and the erosion of the Cascade volcanic arc. North-south compression has created a series of anticlinal basalt ridges separated by sediment-filled synclinal basins (Figure 2; Table 1). The basalt itself is interlayered with volcaniclastic sedimentary rocks that were deposited and accumulated during quiet periods in the basalt eruption history. The basins have filled with more recent sediments, including alluvial/fluvial sediments, Missoula Glacial Flood deposits (Touchet Beds), and aeolian (Palouse Loess) deposits (Figure 2).

Table 1: Upper stratigraphic column near the AOIs.

After Reidel and others (2013) and Sadowski and others (2020).
Geology below the Wanapum is not shown.

Formation	Member	Description/Flow	Age (My)
Alluvium		Includes recent floodplain deposits and older alluvial fans.	
Palouse loess		Silt	<0.015
Missoula flood deposits / Touchet beds		Silt/fine sand	0.015
Upper Ellensburg		Cascade provenance buff-colored volcaniclastics.	4-5.6
Upper Saddle Mountain	Elephant Mtn.	One or two flows.	10.5
Lower Ellensburg	Rattlesnake Ridge	Cascade provenance buff-colored volcaniclastics.	~11
Lower Saddle Mountain	Pomona	One or two flows.	11.8
Lower Ellensburg	Selah	Cascade provenance buff-colored volcaniclastics.	11.8
Lower Saddle Mountain	Umatilla	One or two flows.	~13
Lower Ellensburg	Mabton	Cascade provenance buff-colored volcaniclastics.	14.5
Wanapum	Multiple members		14.5-15.3

2.2.1. Sediments Above the Basalts

The following sedimentary units are found above the basalts and grouped into the category of "overburden" in the USGS hydrogeologic models of the Yakima R. Basin:

- Quaternary alluvium: Silt, sand, and gravel deposits of diverse compositions. Includes alluvial fans, the older of which contain semi-consolidated fanglomerate (Schuster, 1994).
- Palouse loess: Windblown deposits of mostly silt transported from the lakebeds left behind by glacial outburst floods.
- Outburst flood deposits (Touchet Formation [Fm.]): Sediments deposited by floodwaters from glacial Lake Missoula. Presence and thickness are determined by local elevation relative to water levels of successive floods. The highest elevation reached by these deposits near the Yakima Basin is estimated to be approximately 1,200 ft asl (Last and Rittenour, 2021).
- Upper Ellensburg Formation: Semiconsolidated volcaniclastics from the Cascade Range to the west, fluvially reworked with grain sizes ranging from clay to gravel (Schuster, 1994). Deposited after last basalt flow.

Jones and others (2006) and Vaccaro and others (2009) refer to the sediments above the Saddle Mountains Basalt in the Toppenish Basin as the Rattlesnake Ridge member of the Ellensburg Formation, based on Campbell (2001). In contrast most researchers, including Reidel and others (2013), identify the interbed between the Elephant Mountain and Pomona members of the Saddle Mountains Basalt as the Rattlesnake Ridge member of the Lower Ellensburg Formation.

2.2.2. Columbia River Basalts and Sedimentary Interbeds

Columbia River Basalt Group (CRBG) consists of a series of basalt flows with occasional volcaniclastic sedimentary interbeds, called the Lower Ellensburg Fm., that blanket eastern Washington and parts of Idaho and Oregon. The flows of the CRBG occurred over a span of more than 11 million years (~16.5 to 5.5 Ma; Figure 3). In the study area the uppermost CRBG formations, from youngest (shallowest) to oldest (deepest), are:

- Saddle Mountains
- Wanapum
- Grande Ronde

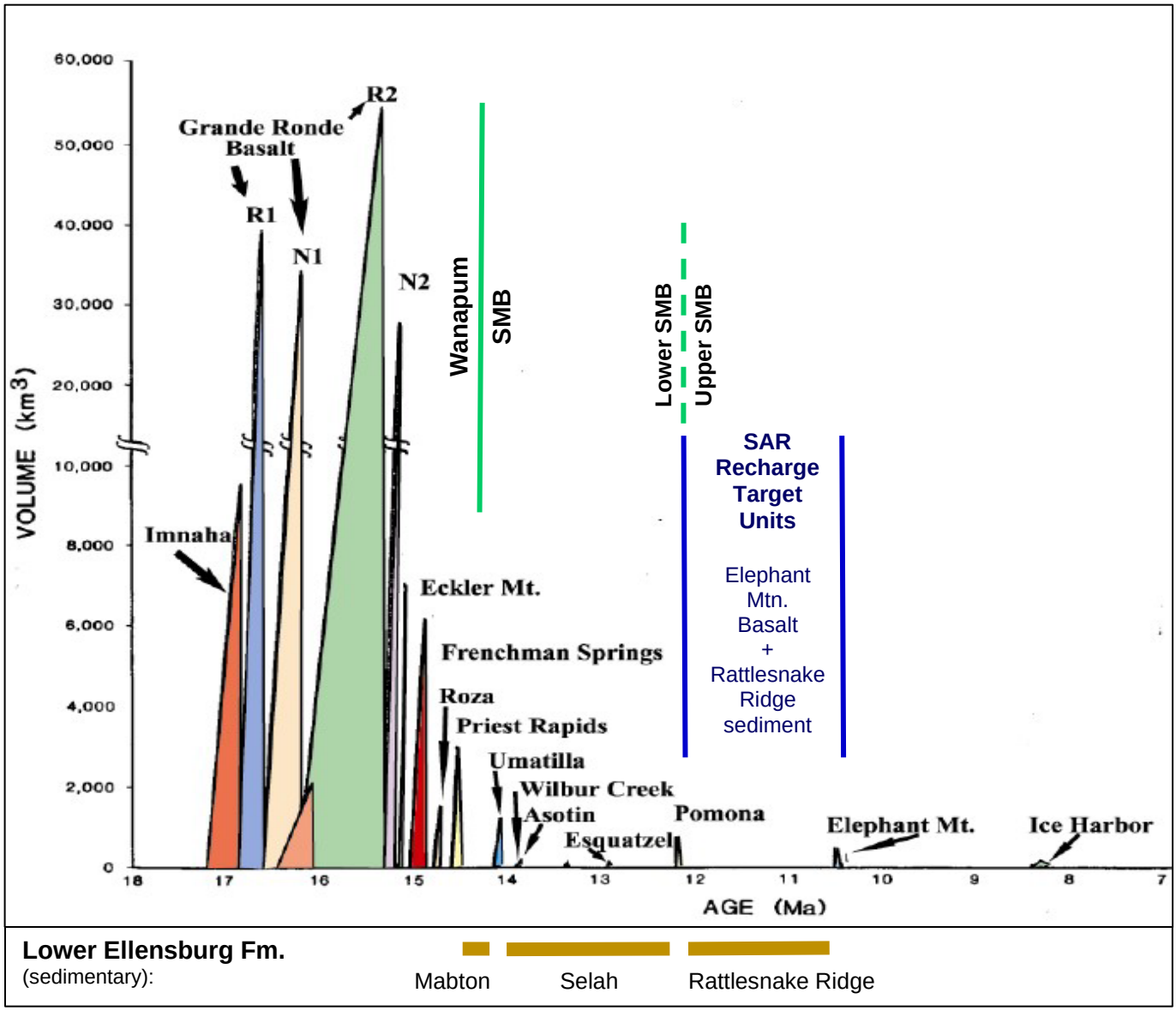


Figure 3: Chronology and volume of basalt flows, with SAR recharge target units.
(After Reidel and others, 2002, with additional annotations.)

Each formation consists of multiple members, which in turn may contain one or more flows with a variety of internal structures (Figure 4). The Wanapum Basalt and Saddle Mountains Basalt Formations emerged during the waning stage of the flood-basalt eruptions (~15.6 to 5.5 Ma) and represent 5.8% and 1.1%, respectively, of the total basalt flows (Reidel and others, 2013).

The flows of the Grande Ronde were almost continuously emplaced and are laterally continuous and extensive (Figure 3). The Wanapum flows occurred over less than 1 Ma, while lapses of more than 1 Ma occurred before and between SMB flows (Figure 3). In

the Yakima Basin, topography developed between flows as a result of fluvial erosion and the initiation of folding that formed the Yakima Fold Belt. The Wanapum and Sadle Mountains Basalts flows are “intracanyon” flows that filled in the topographic lows (Reidel and others, 2013). The gaps in flow emplacement allowed sediments to accumulate at the surface. In our study area, sedimentary layers between basalt flows are grouped into the Lower Ellensburg Fm. The Saddle Mountains Basalt contains the thickest Lower Ellensburg Fm. sedimentary interbeds, because of the long elapsed time between basalt flows and the proximity of the Cascade Range that is the primary provenance of these sediments (Figure 3; Vaccaro and others, 2009).

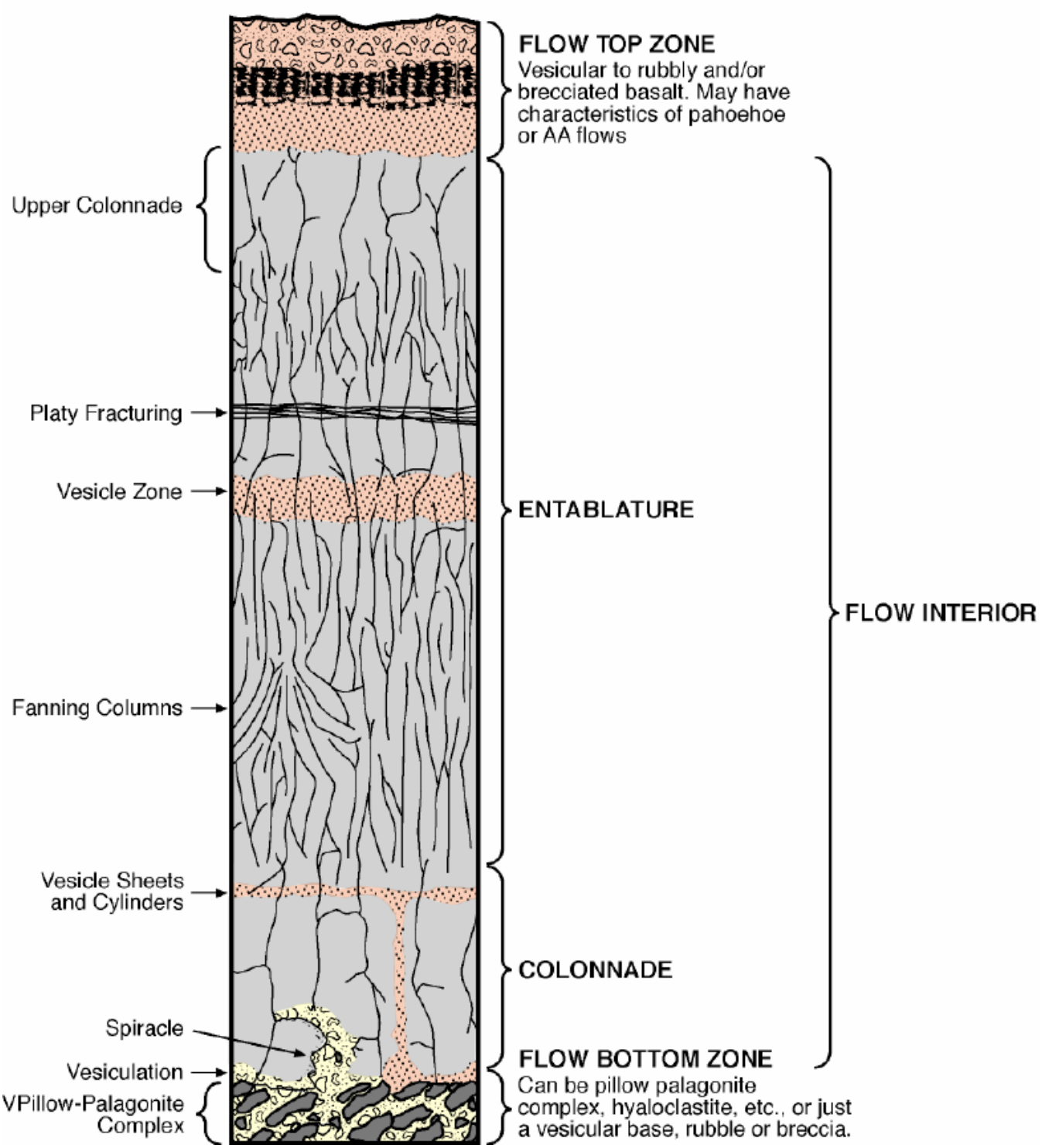


Figure 4: Features of a typical Columbia River Basalt flow.
(Kahle and others, 2011; Reidel and others, 2002.)

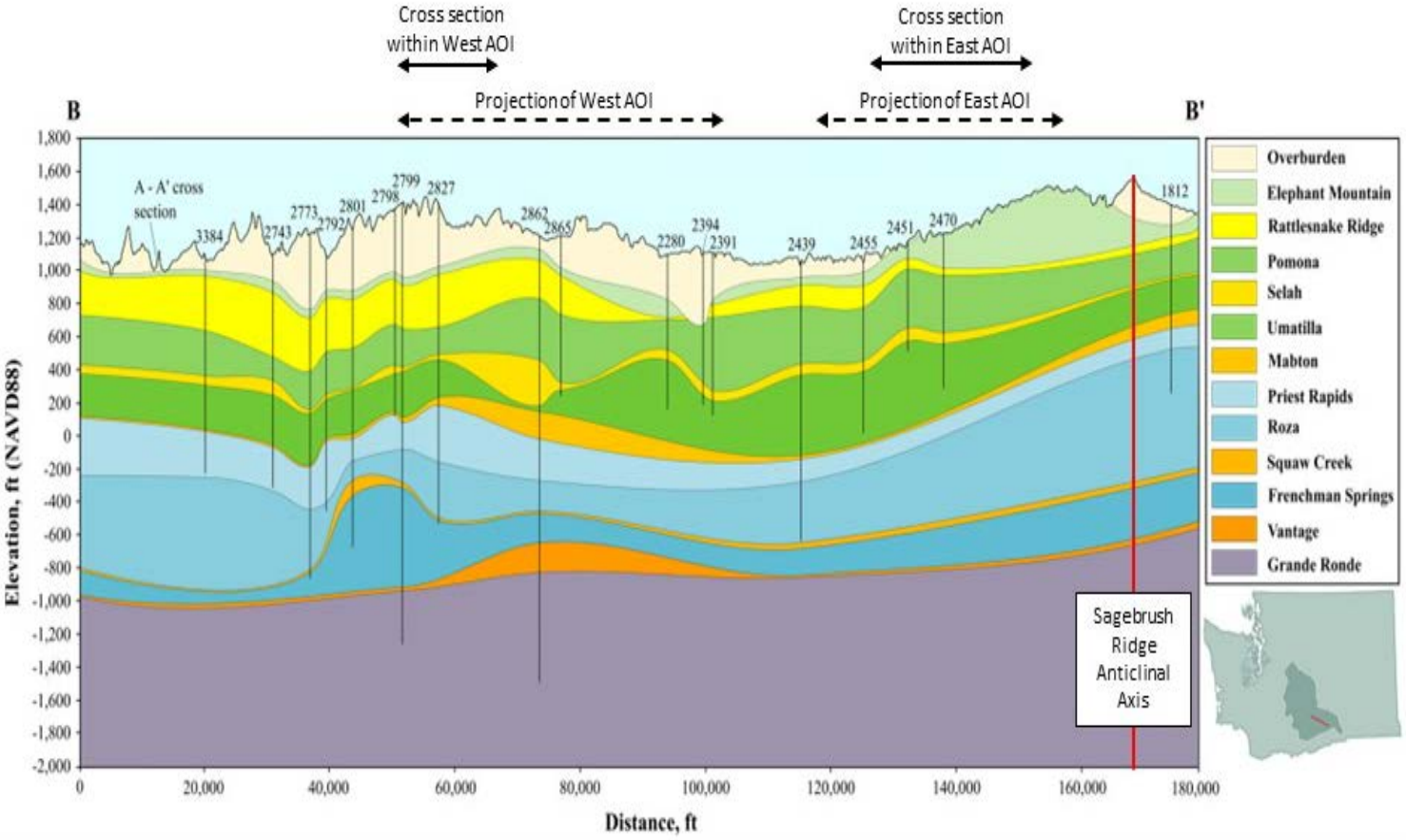


Figure 5: Cross-section along south flank of Rattlesnake Ridge.
Cross-section location along strike shown in **Figure 2**. After Kharrazi, 2023.

Table 2: Formation thicknesses along the south side of Rattlesnake Ridge.

Unit		Average Thickness (ft)	Standard Deviation (ft)
SMB	**Lower Ellensburg Fm.**		
Elephant Mtn. (Upper SMB)		58	~5
	Rattlesnake Ridge	207	~30
Pomona (Lower SMB)		284	~20
	Selah	64	~15
Umatilla (Lower SMB)		254	~30
	Mabton	38	~12
Wanapum Basalt			

Source: Figure 18 in Kharrazi (2023).
* SMB = member of Saddle Mountains Basalts

In the study area, the Saddle Mountains Basalt consists of three members, from youngest (shallowest) to oldest (deepest):

- Elephant Mountain Member.
- Pomona Member.
- Umatilla Member.

In and near the RID, the Elephant Mountain member of the Saddle Mountains Basalt is the most common surficial or close-to-surface member of the CRBG. Kharrazi (2023) constructed a cross-section along the south side of Rattlesnake Ridge and compiled the thickness of the basalt and interbed units in this area (Figure 5; Table 2). The average thickness of the Elephant Mountain member along Rattlesnake Ridge is about 60 ft. The Pomona and Umatilla members are much thicker than the Elephant Mountain member, each with an average thickness of more than 250 ft. Each of these three SMB members are comprised of one or two basalt flows, depending upon location (Reidel and others, 2013).

The Rattlesnake Ridge Member, the highest/shallowest stratigraphic member of the Lower Ellensburg Formation, separates the Elephant Mountain Member from the Pomona Member (Reidel and others, 2013). It averages 200 feet thick in the study area but thins toward the east in the cross-section (Figure 5). The interbed often contains cross-bedded sediments, suggestive of fluvial deposition, which includes a variety of facies and a wide range of grain sizes and associated hydraulic conductivity. In the Moxee Valley, north of the study area, the upper two-thirds of the Rattlesnake Ridge interbed is sandy whereas the lower third contains cemented sand and gravel or clay (Kirk and Mackie, 1993). This pattern of a coarser-grained upper portion over a finer-grained lower portion does not extend into the AOIs and is discussed in Section 5.

2.3. Hydrogeology

Near the study area, the hydrogeologic units are aligned with the geologic units and are described below.

2.3.1. Quaternary Sediments

The Quaternary sediments in the AOIs generally consist of:

1) Fluvial sediments, including alluvial fans located at the changes in slope between steep uplands and flatter lowlands.
2) Palouse Loess (aeolian/wind deposits).
3) Missoula Flood deposits (Touchet beds).

Fluvial sediments are generally of limited extents and thicknesses along ephemeral/historical stream channels. Alluvial fans are loose sands and gravels that are found where streams (ephemeral or historical) discharge from steep uplands onto flatter lowlands. The storage capacity of both fluvial and alluvial fans is high as a function of porosity (e.g., unconfined specific yield of up to 25%) but low as a function of stratigraphic volume. They are generally less than 100 feet thick and of limited lateral extent. They can have high permeability and can receive and drain water quickly. Given their low storage capacity due to their limited stratigraphic volume and low probability of holding water, and high permeability, they are not considered to be significant with respect to, or be an impediment to, SAR.

Both the Touchet Beds and Palouse Loess are of concern in evaluating the feasibility of SAR. These fine-grained sediments may winnow down into underlying consolidated and semi-consolidated formations (e.g., Elephant Mountain basalt flow and Rattlesnake Ridge sedimentary unit, respectively) and clog fractures that might otherwise act as conduits for the downward infiltration of recharged water.

The Missoula Flood deposits (Touchet Formation) mantle the Lower Yakima Valley up to approximately 1,200 feet above sea level. They were deposited when large volumes of water were released from ice-dammed lakes in Idaho and Montana at the end of the last ice age (13,000-15,000 years before present). The water flowed down the Columbia River and backed up into the Yakima Valley, where it deposited fine-grained silt. The Palouse Loess is a wind-blown sediment of silt and fine sand, remobilized from glacial outwash and the Missoula Flood deposits.

Despite the concern of fine-grained sediments overlying SAR targets (e.g., Elephant Mountain basalt flow and Rattlesnake Ridge sedimentary unit), the fine-grained sediments are absent over portions of the AOIs or are sufficiently thin that removal by excavation may be feasible to prepare sites for infiltration. Preparation of infiltration sites should be conducted with care.

2.3.2. Upper Ellensburg Formation

This semi-consolidated volcaniclastic sandstone formation forms the major drinking water source aquifer for communities throughout the Yakima Basin, including along the southern side of Rattlesnake Ridge. Most of the domestic wells in the Lower Yakima River valley floor are finished in the Upper Ellensburg Formation. A number of these wells have elevated nitrate concentrations, a water quality concern that led to the formation of the Lower Yakima Ground Water Management Area (LYV GWMA; Washington Department of Agriculture and others, 2010).

2.3.3. CRBG Formations and Lower Ellensburg Formation

The flow structures within an individual basalt flow in the CRBG vary in their hydrogeologic properties (Figure 4; Kahle and others, 2011; Tolan and others, 2009). Generally, the highest storage potential and the most transmissive zones are in the basalt flow tops and bottoms, which are broken and rubbly, as opposed to the interior of basalt flows, which have lower porosity colonnade structure. Flow tops may also be vesicular, and flow bottoms may contain pillow structures which may be permeable. The dense, competent basalt interiors contain little storage volume because of their low porosity and may act as confining units, though flow may occur through the vertical joints of the colonnade structure and fractures. The intercalated members of the Lower Ellensburg Formation may contain both clay-rich layers, which can impede the vertical migration of groundwater between basalt units, and sandier layers, which can store and transmit water. For example, the sedimentary fine-grained Mabton interbed lies between the Saddle Mountains and Wanapum Basalts. It is clay-rich, regionally continuous, and is a confining layer between the two basalt aquifers. The Lower Ellensburg Formation is in places hydraulically connected with basalt flow tops or flow bottoms, such as in the Moxee Valley where the sandy upper part of the Rattlesnake Ridge member is in hydraulic continuity with the overlying EM basalt (Kirk and Mackie, 1993).

This contrast in structure and permeability means that each larger CRBG formation, such as the Wanapum Basalt or the Saddle Mountains Basalt, consists of multiple aquifers which have varying degrees of hydraulic connectivity based on the degree of fracture of

the flow interiors that separate them. Kirk and Mackie (1993) recognized two aquifers within the Saddle Mountains Basalt in the Moxee Valley:

1) Upper SMB: Includes the Elephant Mountain basalt and the permeable upper two thirds of the Rattlesnake Ridge interbed.
2) Lower SMB: Presumably includes the Pomona and Umatilla basalts and is separated from the upper SMB by a laterally extensive aquitard in the lower third of the Rattlesnake Ridge interbed.

Faults and folds in the region also create hydrogeologic compartments within the basalts and interbeds. Considering the wider area around the study area, the anticlinal structures along Rattlesnake Hills and Toppenish Ridge, combined with high angle faulting at the anticlines, conceptually produces a “compartment” or “block” that likely laterally confines groundwater. Minor scale faults or structures within this basin-wide structure may form smaller compartments or blocks.

2.3.4. General Hydrogeologic Patterns

Groundwater under the RID is heavily influenced by irrigation. Recharge is estimated in the range of 3” to 24” per year within the RID (Vaccaro and Olsen, 2007). Outside of the irrigated areas, recharge in the AOIs is estimated at less than 2” per year.

Vaccaro and others (2009) summarized the general patterns of groundwater flow in multiple layers of the hydrogeologic system of the subbasins of the Yakima River Basin (Figure 6). Their work treated each basalt formation as a single hydrogeologic unit. In reality, the formations can be composed of multiple hydrogeologic units.

According to the study’s measurements and model, most of the groundwater flow occurs in the upper subsurface, and groundwater gradients generally slope downward from the uplands to the lowlands and streams. Local groundwater flow patterns are also controlled by geologic structures. For example, where the Toppenish subbasin merges into the narrower southwestern Benton Basin, the sedimentary fill thins as the basin floor becomes shallower, creating a local area in which groundwater flows against the direction of the Yakima River (Figure 6).

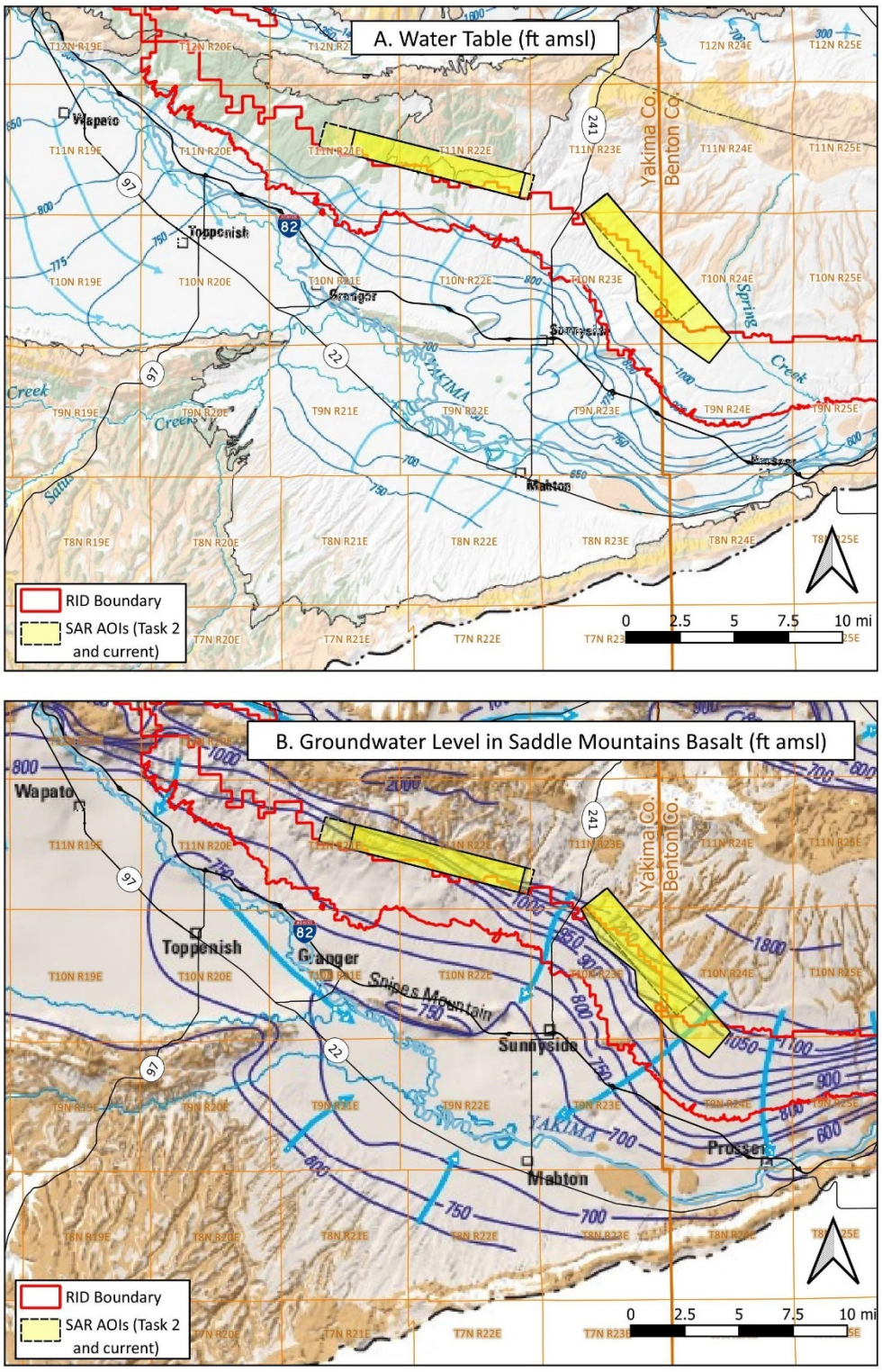
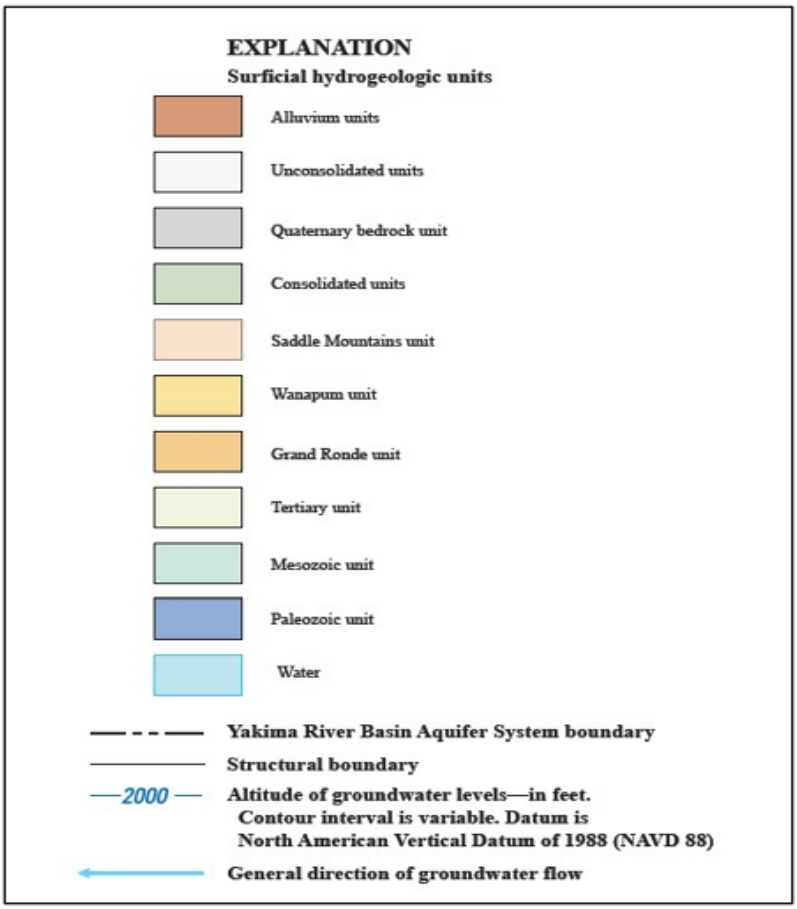


Figure 6: Generalized groundwater levels and flow patterns near the study area.

See Figure 7 for legends. Excerpted from Plates 3 and 4 in Vaccaro and others, 2009.

(Rattlesnake Ridge.ggs.qgz / Vaccaro Water Table and SMB GW Levels 2024-07-31)

Legend for #A - Water Table Elevation:



Legend for #B – Groundwater Elevation in Saddle Mountains Basalt:

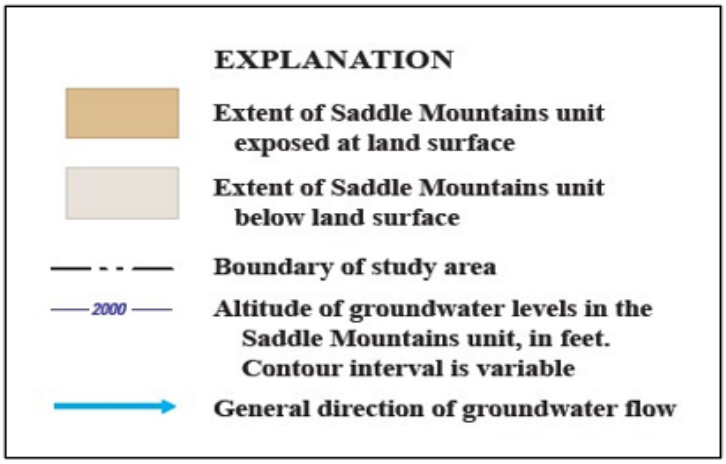


Figure 7: Legends for Figure 6.

Groundwater in the study area is used for irrigation and domestic supply. Kharrazi (2023) inventoried wells in the study area and observed that the deeper, more productive wells drilled into the Wanapum Basalt are most often used for irrigation. The Saddle Mountains Basalt and coarse-grained units in the overburden are frequently accessed for domestic water supply. No specific information was found about water use by wells in the Elephant Mountain member of the Saddle Mountains Basalt, the likely target for SAR, in or near the study area.

Irrigation itself can provide substantial recharge to the underlying aquifers, particularly to the alluvium and Upper Ellensburg Formation (Vaccaro and Olsen, 2007). Historically, in the nearby Sunnyside Irrigation District, water levels in wells drilled before irrigation rose 15 to 75 ft after irrigation commenced (Jayne, 1907). This recharge can eventually percolate downward into the basalts. Stable isotopes have served as a useful tool for identifying this recharged irrigation water (e.g., Sleeper, 2020).

Ecology's Central Region Office has monitored groundwater levels in numerous wells within the study area since the 1970s. These wells are identified by the preface "CRGWDB" in Ecology records, an abbreviation for "Central Region Groundwater Database". Many wells have records of more than 30 years. The Task 2 report included a summary and discussion of data for 51 wells on the south flank of Rattlesnake Ridge (Geosyntec and others, 2022). In general groundwater levels have declined significantly in both the Saddle Mountains and the Wanapum Basalt Aquifers, amounting to losses of tens of thousands of acre-feet of water per year from each unit in this area (Table 3; Kharrazi, 2023).

Table 3: Changes in groundwater levels in Saddle Mountains and Wanapum Aquifers on south flank of Rattlesnake Ridge.

Annual Water Level Change in Saddle Mountain and Wanapum Aquifers							
Aquifer	Date Range	Number of Wells				Rate (ft/year)	
		Total	Declining (≤ -1 ft/yr)	Stable (-1 ≤ 1 ft/yr)	Increasing (≥ 1 ft/yr)	Range	Average
Saddle Mountain	1964-2019	27	18	6	3	-8.07 – 6.24	-1.61
Wanapum	1974-2019	20	14	3	3	-10.55 – 2.88	-3.07

Kharrazi (2023). Analysis of data retrieved from EIM (Ecology, 2023a).

Regional groundwater flow in the Toppenish Basin east of the Yakima River is to the southeast, and vertical gradients between the Saddle Mountains and Wanapum Basalts are broadly downward (Geosyntec and others, 2022).

2.4. SAR Near the Roza Irrigation District

Requirements for a SAR project are (Alley and others, 2022):

- A sufficient demand for water stored by the project.
- An adequate amount and quality of "surplus" water for recharge.
- A suitable aquifer that can:
  - ♦ Receive water infiltrated from the surface.
  - ♦ Store this additional water.
  - ♦ Deliver this additional water to locations where there is demand.
  - ♦ Hold water long enough to be recoverable when needed.
- Access to/appropriate ownership of sufficient land area for project operations.
- Infrastructure and capability to effectively manage the project.

2.4.1. Previous Screening for SAR Locations in the Yakima Basin

Anderson and others (2008) evaluated SAR in the Yakima basin in alluvium adjacent to streams using an inverse Streamflow Depletion Factor approach. Their assessment extended up to 1.2 miles from streams and did not extend into our AOIs.

Gibson (2018) ranked the SAR potential across the Yakima Basin on a scale of 1 to 5 (least to most suitable) based on five criteria:

i. Slope.
ii. Land use.
iii. Surficial geology.
iv. Transmissivity of the surface geological unit.
v. Static water level from well logs.

The transmissivity of a unit was estimated from averages of hydraulic conductivity and thickness for each type of surficial geology across the basin. More than 90% of the East AOI was assigned a suitability of 2 or 3, while about half of the West AOI was evaluated and ranked mostly as suitability 3 or 4 (Figure 8).

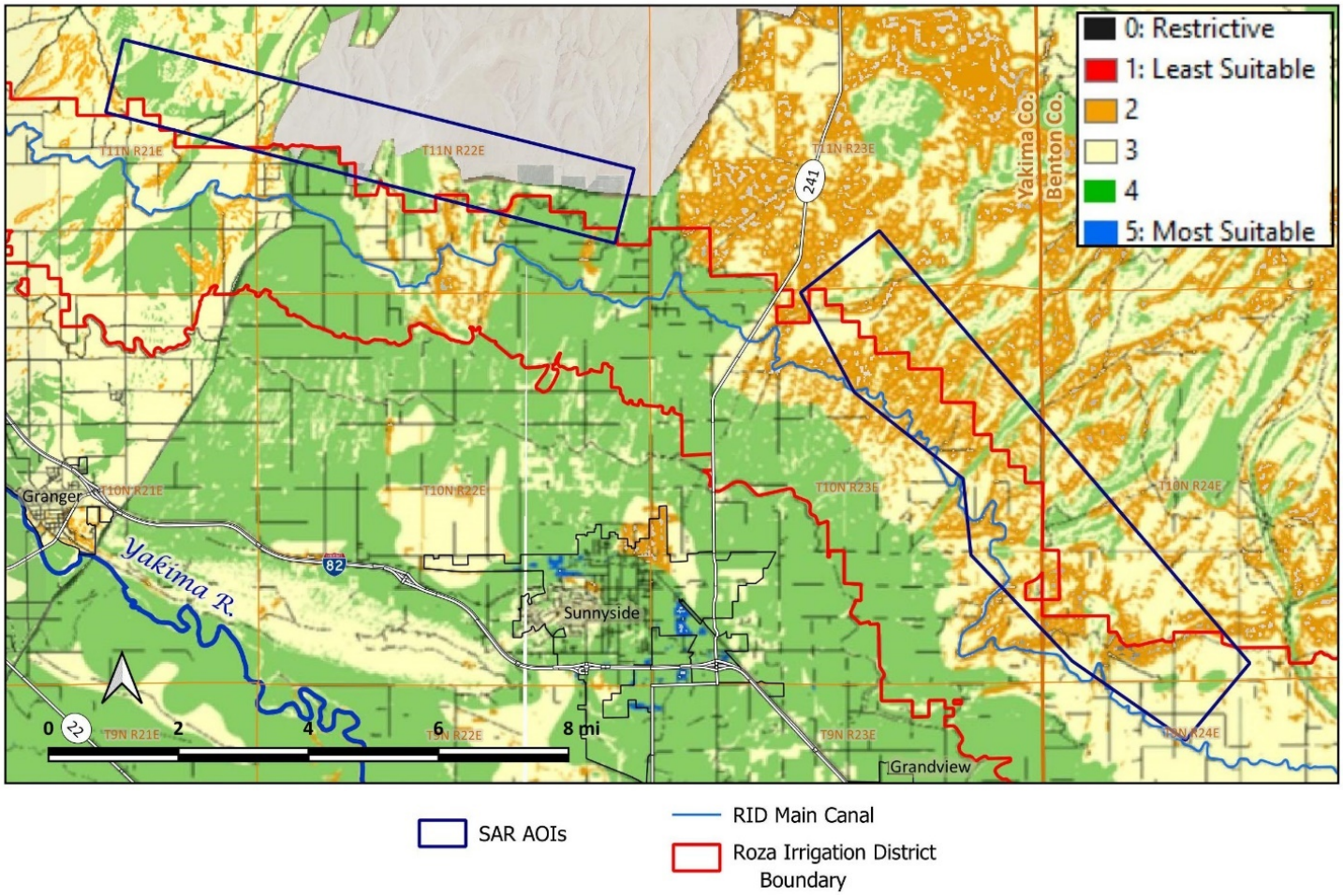


Figure 8: Ranking of SAR potential in AOIs by Gibson (2018).

Base image from Gibson (2018). Gray speckles are same rank as surrounding areas. Area in upper center of image not evaluated, so underlying faded airphoto is seen.
(Rattlesnake Ridge.ggs.qgz / Gibson ranks of SAR suitability vs. SAR AOIs 2024-08-09)

Our project took the following approach: 1) recognized the vicinity of the RID with unmet water demand and in need of additional water storage and supply; 2) identified near-surface basalt as a potential target for SAR; and, 3) searched for favorable locations near the RID. Looking more closely at a smaller area allowed us to examine well logs in greater detail and to determine the actual thickness of units rather than use an average. The well log examination also determined when the reported static water level reflected the water table depth, an important variable for SAR, rather than the water level in a deeper hydrogeologic unit.

2.4.2. Current Concept for SAR in the Roza Irrigation District

The RID is a junior water right holder and endures pro-rationing of irrigation during drought years. Drought years and attendant pro-rationing will occur more frequently in the future because of climate change. MAR offers solutions to help mitigate this shortage. SAR can be a low-cost method to store water compared to ASR or surface water projects.

The current general concept is to use SAR to help meet the RID's demand for irrigation water during times of curtailment. During the "shoulder" periods of the irrigation season, the RID canals and laterals would be used to deliver surplus water from the Yakima River to recharge locations. The goal would be to recharge water to the Elephant Mountain Basalt and/or Rattlesnake Ridge sediments at or near surface, relying on the movement of water through vertically oriented fractures in basalts to reach deeper units, and horizontal distribution through permeable strata such as the Rattlesnake Ridge sedimentary interbed (Figure 9). Infiltration could be accomplished through trenches, ponds, or dry wells.

Benefits of this recharged water may include:

- Active recovery when needed (e.g., irrigation during times of curtailment).
- Restoring depleted groundwater storage.
- Contribution to return flow to the Yakima River.

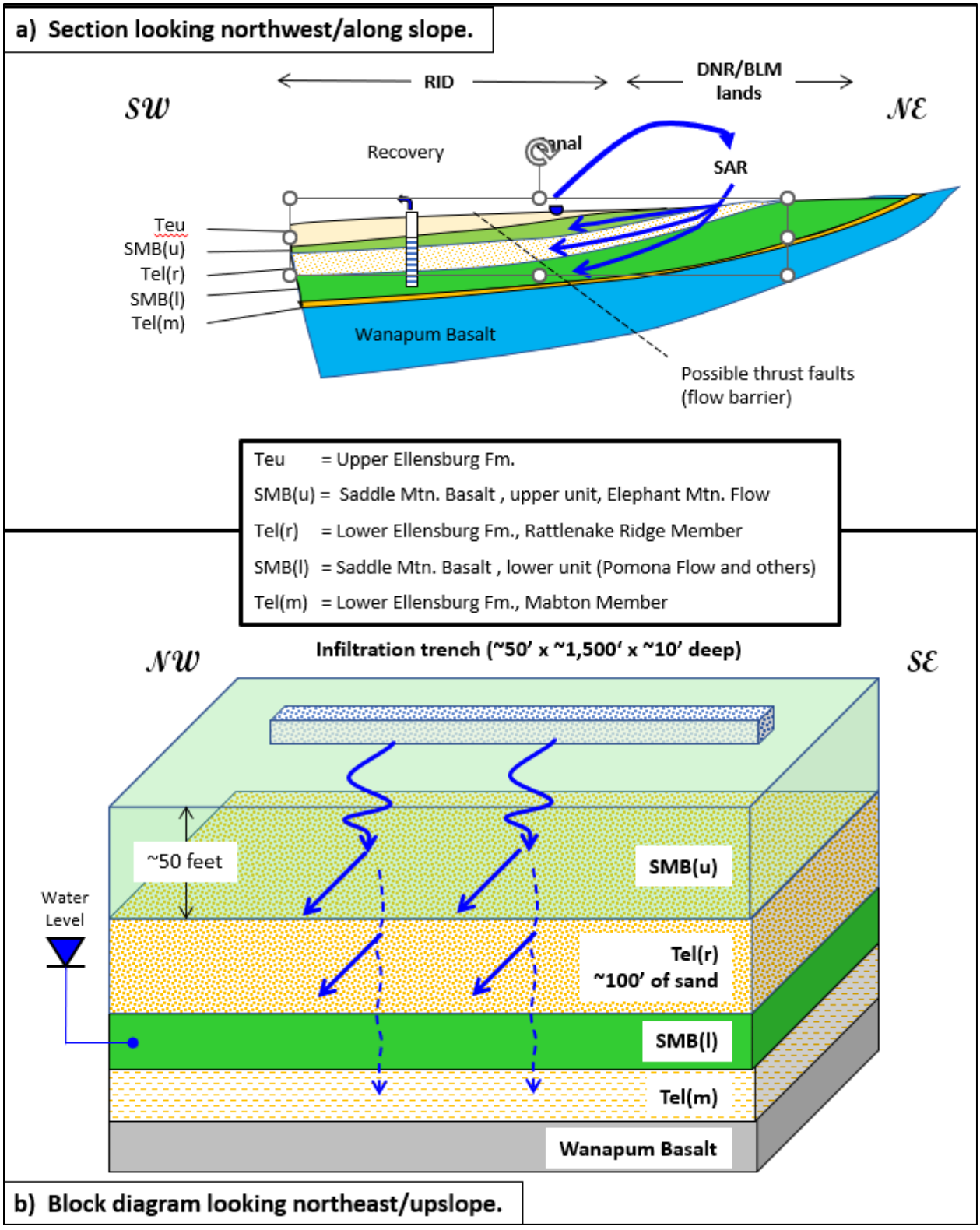


Figure 9: Schematic drawings of a SAR project.

3. STUDY METHOD

This evaluation uses existing data to assess the suitability of the hydrogeologic setting (SAR requirements 3a-d in Section 2.4) in the two AOIs identified in Task 2. Our examination focused on the uppermost basalt, the Elephant Mountain (EM) member of the Saddle Mountains Basalt, the sediments above it, and the Rattlesnake Ridge member of the Lower Ellensburg Fm., the sedimentary interbed below the EM basalt. This work relied on information compiled during Task 2 and additional data relevant to the AOIs. The main sources of information and the methods by which the information was analyzed are described below.

3.1. Well Log Compilation and Analysis

The main source of information on subsurface conditions came from well logs downloaded from Ecology's on-line well log database. Ecology's well log numbers are used as unique identifiers. Only well logs confidently located to the resolution of a parcel or better were used. Well locations come from these sources (Figure 10):

- Ecology well report viewer: Well log and well records for this project were downloaded from the well report viewer (Ecology, 2024a). Wells whose record provided an address and/or parcel number were added to the project database whenever possible.
- United States Geological Survey (USGS): The USGS compiled well logs for studies of the hydrogeology of the Yakima Basin and broader Columbia Plateau Regional Aquifer System. During Task 2 of this project, team members matched the USGS well with well logs from the Ecology well log database (USGS Oregon Water Sciences Center, 2013; Ecology, 2024b).
- Washington State Department of Natural Resources (DNR) and CRGWDB: DNR used these well logs to characterize subsurface conditions. The CRGWDB wells are a subset of the DNR wells used to monitor groundwater levels over time. The CRGWDB wells are mostly irrigation wells.
- Lower Yakima Valley Groundwater Management Area (LYV GWMA): In 2018-2019, 31 monitoring wells were installed across the LYV GWMA (Figure 1 and Figure 10). The well locations were chosen to evaluate nitrate concentrations near the water table (PGG, 2019). The logs describe the upper geologic layers, mostly above the water table.

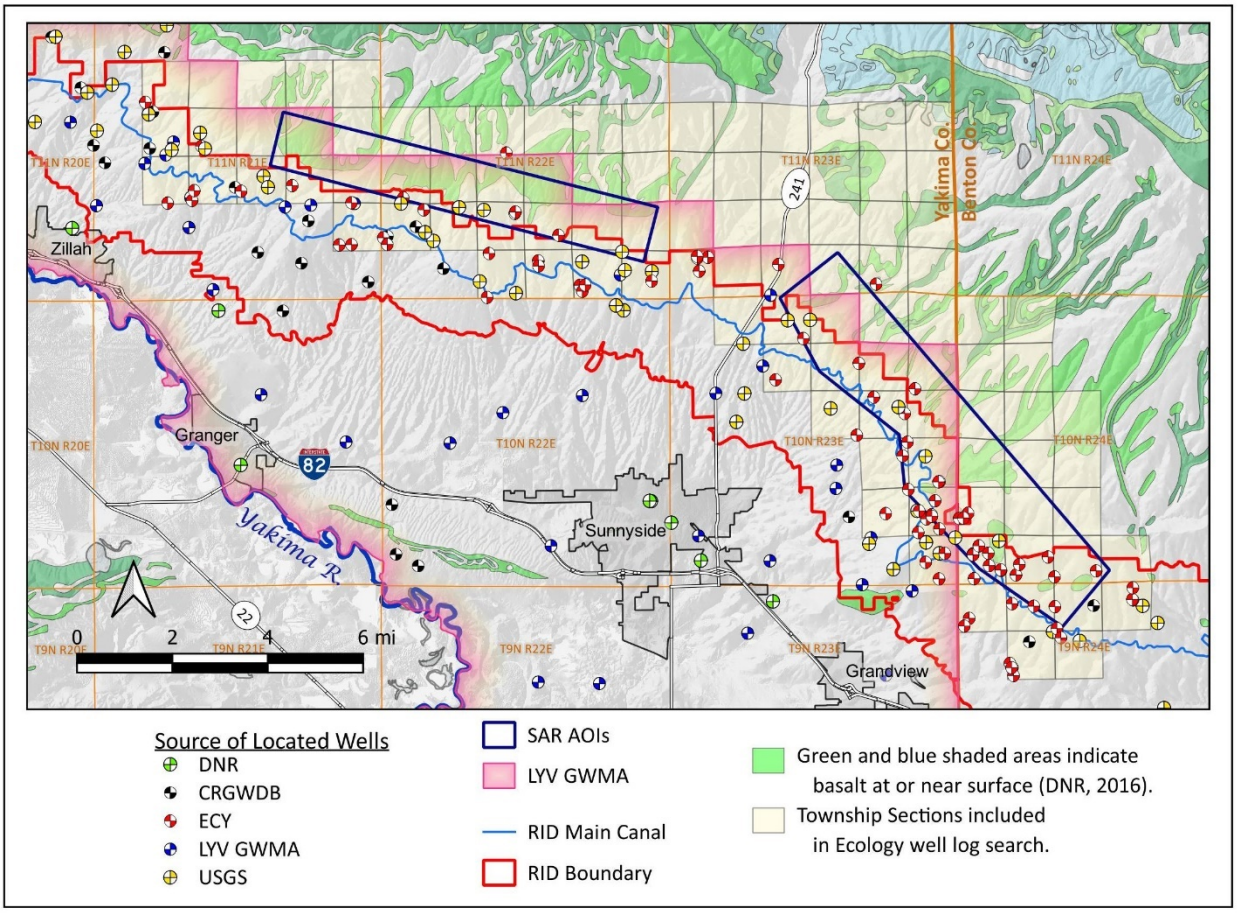


Figure 10: Locations of well logs compiled for this study.

(Rattlesnake Ridge.qgs.qgz / Located Wells with Logs 2024-08-06)

Approximately 150 well logs were located from these datasets, ranging from shallow monitoring wells in the Upper Ellensburg Formation to deep irrigation wells completed in the Wanapum Basalt. Depth to basalt was recorded for all wells, where it was encountered.

Thin or absent overburden is considered favorable for SAR. Therefore, this was used as a criterion to create a subset of well logs in the vicinity of each AOI for more detailed geologic interpretation (Figure 11). The following details were extracted from these logs and added to a GIS layer for mapping:

- Thickness and description of:
  - ♦ Overburden materials.
  - ♦ Elephant Mountain member.

    - ♦ Rattlesnake Ridge interbed.
- Indications of the presence of water or moist conditions.
- Completion aquifer.

We also examined the geology of nearby LYV GWMA monitoring wells to determine the geologic unit in which the water table was encountered.

Thirteen logs in the vicinity of the West AOI, and 25 logs in the vicinity of the East AOI were examined (Appendix A). These included three logs from LVY GWMA wells in each area. In the East AOI, our initial interpretations led us to concentrate further well log examinations in the area around the Sagebrush Ridge anticline (Figure 11). Low angle thrust faults were observed along the Rattlesnake Ridge anticline that were not favorable for SAR. Examining the Sagebrush anticlinal structure in field mapping may determine whether low angle thrust faults are present and whether they may be a determinant of SAR feasibility at that location.

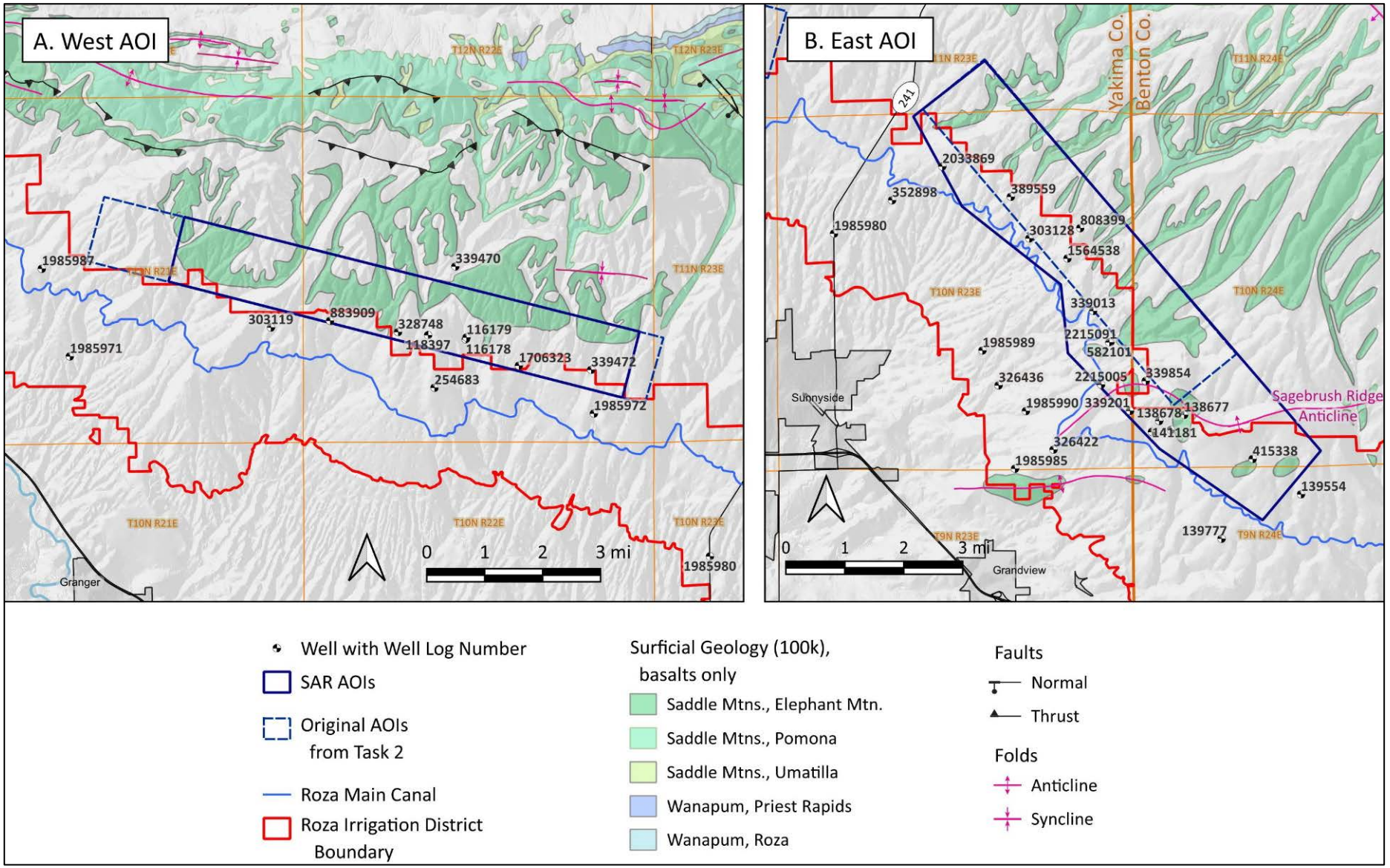


Figure 11: Locations of wells examined for geological interpretations.

(Rattlesnake Ridge.qgs.qgz / SAR AOIs with geol logs 2 pane 2024-07-31)

3.2. Water Level Data

In the Task 2 effort, water levels collected by Ecology were obtained for wells completed in the Saddle Mountains Basalt. We extracted the water levels for wells closest to the AOIs and downloaded water levels for additional wells not in the Task 2 compilation, including the LYV GWMA monitoring wells (Ecology 2024c). The LYV GWMA data were collected roughly quarterly from late 2021 to early 2023. The wells in the Saddle Mountains Basalts had 16 to 55 water level measurements collected over various portions of the last 40 years.

3.3. Supporting Information

We examined materials compiled during Task 2 with an emphasis on the upper basalts and interbeds:

- 1:100,000 surficial geology map (Washington Division of Geology and Earth Resources, 2016).
- Kharrazi's (2023) B-B' cross-section along south side of Rattlesnake Ridge, together with interpreted logs of that cross-section.
- Hand-drawn geologic cross-sections from Ecology (George and Hoselton, unpublished).
- Reports and research papers (e.g., Reidel and others, 2013; Vaccaro and others, 2009; and more cited throughout the text and listed in the Citations Section).

The following additional data was also examined:

- 1:24,000 surficial geology map, available for portions of the East AOI and based on mapping conducted in the 1970s (Washington Geological Survey, 2023).
- Cross-sections from reports submitted with water rights (Brown, 1977 and 1987).
- Property ownership (Yakima County, 2020; Benton County, 2024).

4. RESULTS

Well log lithologies and groundwater levels are presented in this section (Figure 12; Figure 13). The two AOIs have different near-surface geology and different quality of information in their well logs and are presented separately below. As described earlier, the AOIs chosen in Task 2 of this project were based on the 100k geology map (DNR, 2016); the USGS estimates of overburden thickness (Jones and others, 2006); and the RID border. For this report, we adjusted the extents of the two AOIs based on more detailed data for overburden thickness (Figure 1; Figure 12).

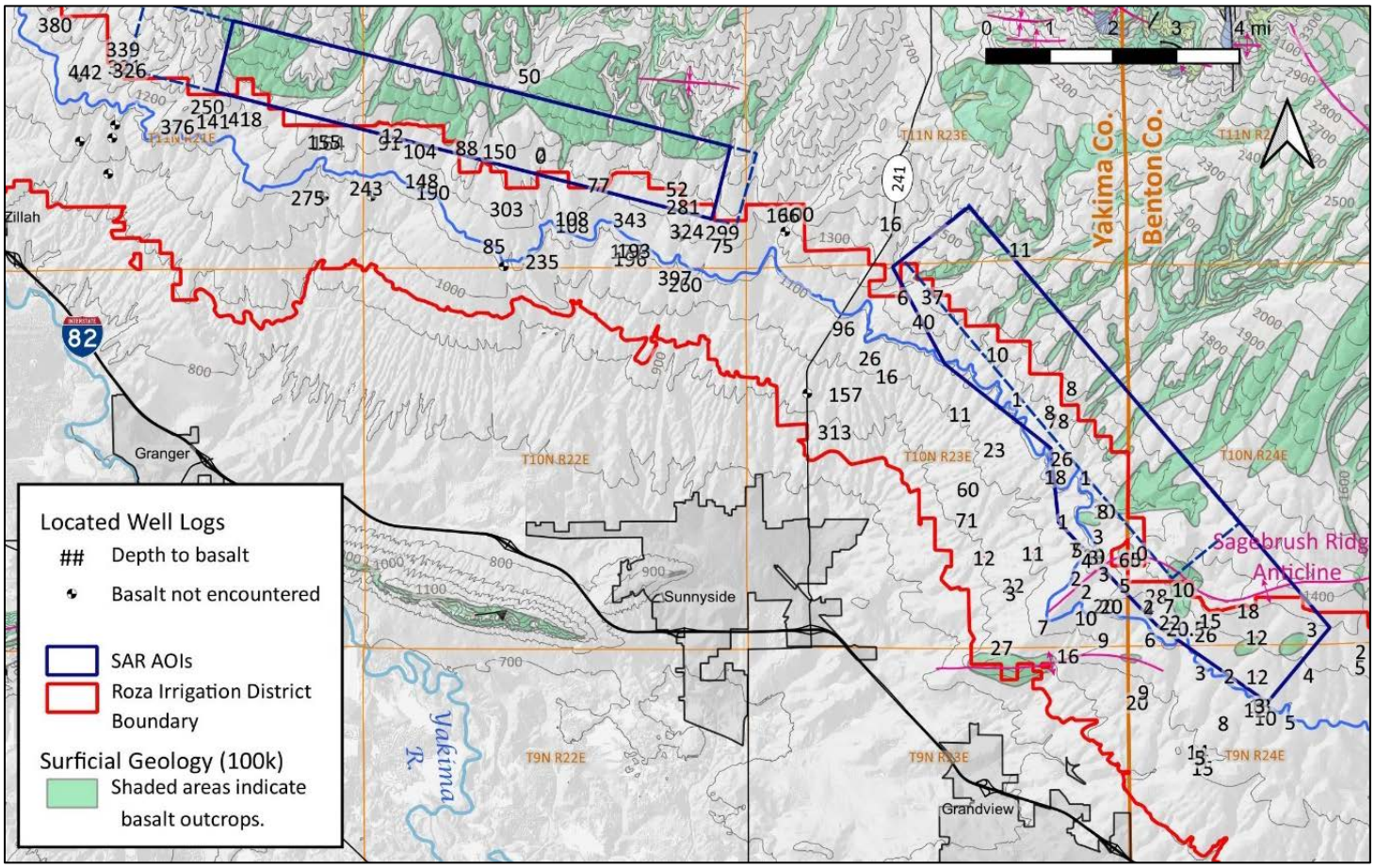
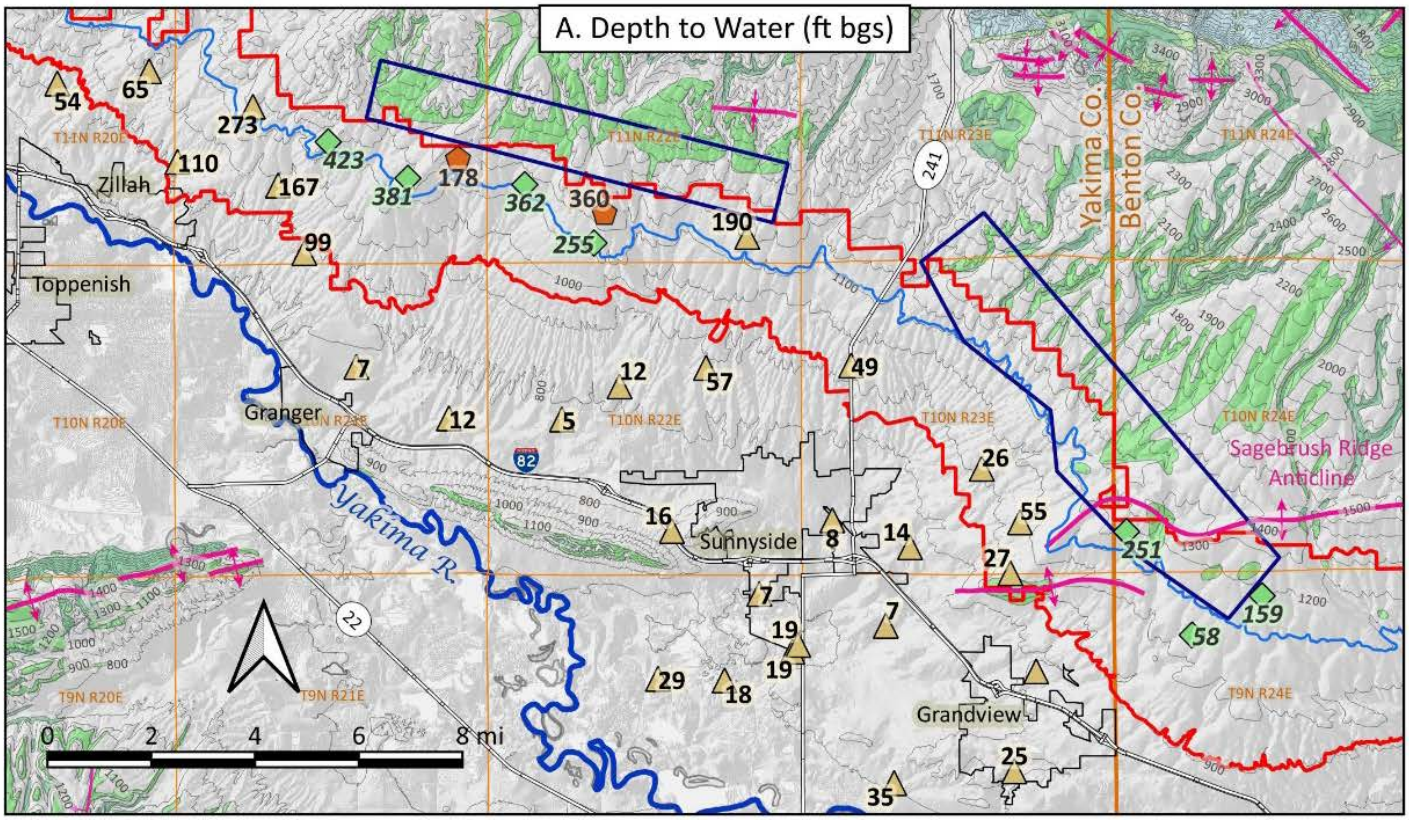
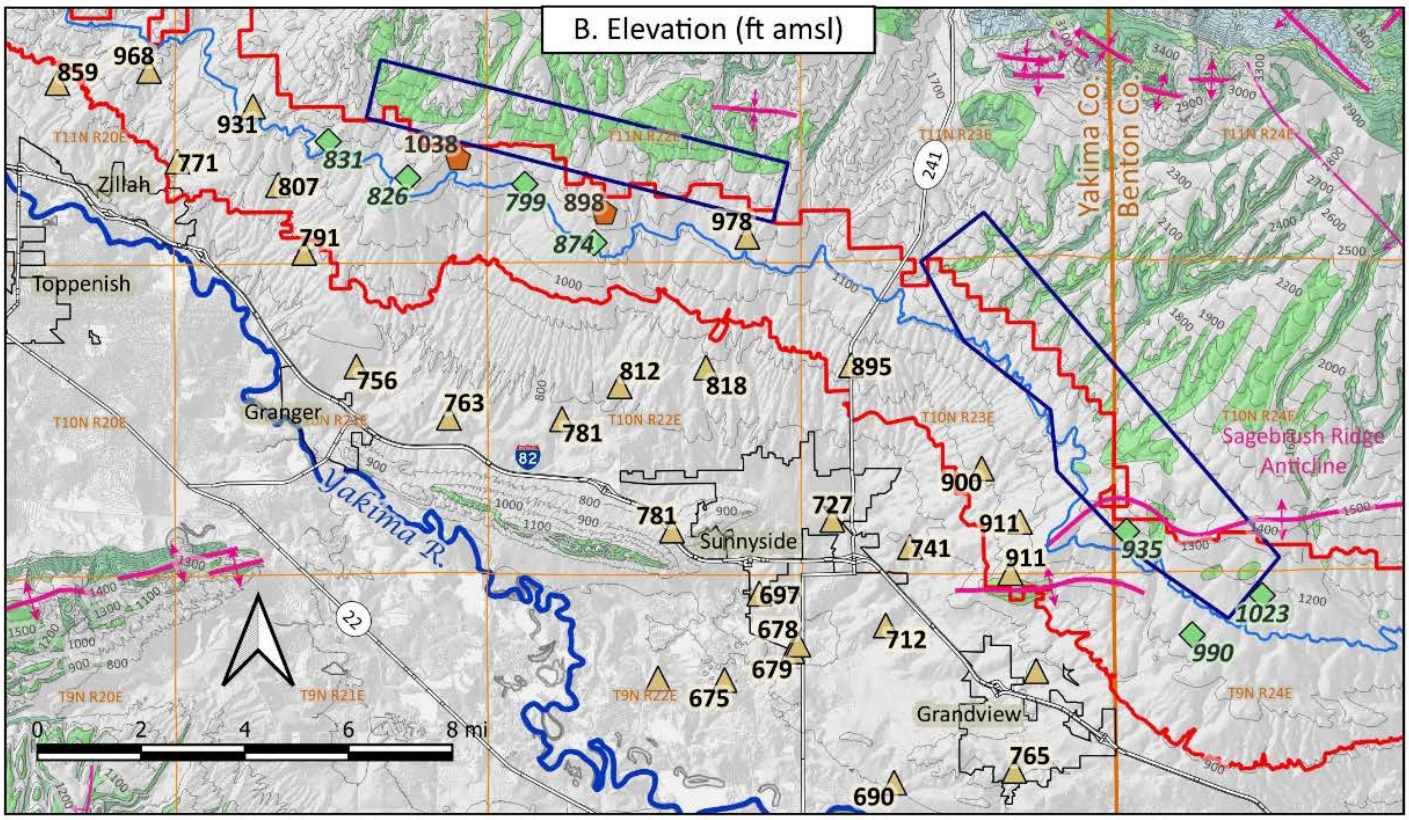


Figure 12: Overburden thickness above basalt.

Numbers shown at well locations, indicating thickness in feet. Black and white symbols indicate wells where basalt was not reached.





Water table (LYV GWMA monit. wells, Jan. 2022)

Rattlesnakke Ridge (from well logs, 2000)

Lower SMB (median value, from CRGWDB, ~1980-2010)

SAR AOIs

RID main canal

RID boundary

Ground surface elevation (100 ft contours)

Shaded areas indicate basalt outcrops (100k)

Figure 13

Comparison of groundwater levels from different sources

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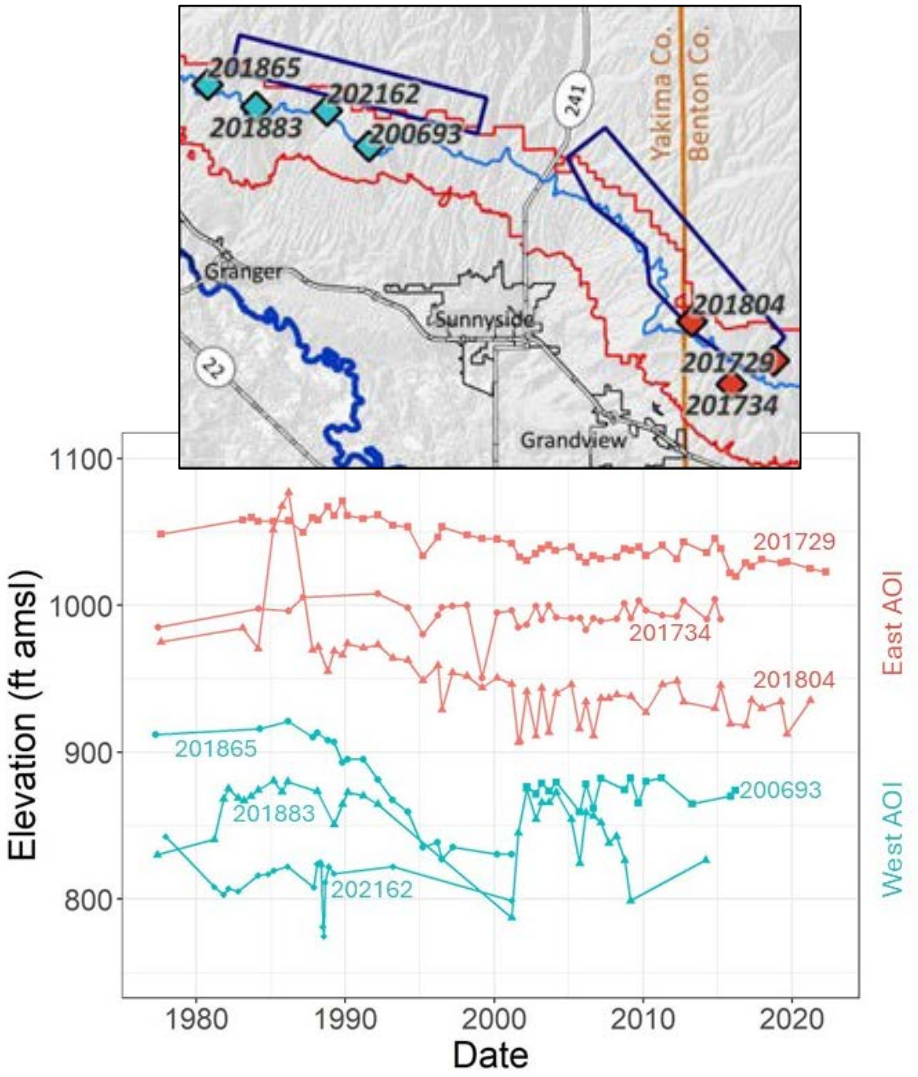

Figure 14: Groundwater levels over time in the Lower Saddle Mountains Basalts.

(SAR Figures LS 5 14 17.pptx)

4.1. West AOI

Much of the West AOI is outside of the RID, and conditions are inferred from wells along its southern edge inside the RID.

Overburden: Overburden is thinnest at higher elevations and thickens steadily downslope towards the south (Figure 12). Approximately 40% of the West AOI is mapped as having no overburden, but only three well logs reported no overburden or overburden thickness of less than 15 feet. Where the overburden is thicker, its texture is typically described as stratified with layers whose grain sizes range from clay to gravel.

Elephant Mountain Basalt: According to the well logs, none of the examined wells were located within the mapped exposures of the Elephant Mountain basalt, but nine encountered the Elephant Mountain basalt at depth, and eight fully penetrated the member. Its thickness ranged from 24 to 78 ft thick (Table 4). The logs describe the basalt as black or gray, with only one log mentioning weathered or broken basalt. No logs mention the presence of water bearing zones in Elephant Mountain basalt.

Table 4: SAR target unit thicknesses in AOIs.

(feet)

Unit	West AOI	East AOI	Across South Flank Rattlesnake Ridge (Kharrazi, 2023)
Elephant Mtn. Basalt (Upper SMB)	**Average: 48** Median: 49 Range: 24-78 Variability: 3.2 n = 8	**Average: 80** Median: 85 Range: 25-130 Variability: 5.2 n = 17	**Average: 58** Std. Dev.: ~5
Rattlesnake Ridge Sediment (Lower Ellensburg Fm.)	**Average: 187** Median: 189 Range: 150-230 Variability: 1.5 n = 5	**Average: 81** Median: 82 Range: 31-150 Variability: 4.8 n = 17	**Average: 207** Std. Dev.: ~30

*Variability = max/min thickness

Rattlesnake Ridge Interbed: When penetrated, the thickness of the Rattlesnake Ridge interbed ranged from 150 to 230 ft (Table 4). Well logs describe a range of textures, most commonly clay, sand and sandstone in multiple layers throughout the interbed. Only two describe sand or sandstone directly below the Elephant Mountain basalt, while other logs describe clay or a clay and sand/sandstone combination in the uppermost Rattlesnake Ridge. Four well logs note a sand-rich layer at the bottom of the interbed.

Of the examined wells, two water supply wells are completed in the Rattlesnake Ridge layer, so the interbed is at least partially saturated in these locations (Figure 13).

Nearby groundwater levels: Groundwater levels are available from several sources in an area close to the southern boundary of the west AOI (Figure 13). The two LYV wells which monitor the water table indicate an unsaturated zone greater than 150 ft in this area. The water level in one of the Rattlesnake Ridge is similar, suggesting it might tap an unconfined aquifer. Comparing water table elevations to the elevation of groundwater levels in the SMB wells indicates downward gradients, but water level elevations of Rattlesnake Ridge wells bracket the water table. The only water levels available for the Rattlesnake Ridge wells are from their drill logs, so observations based on this data are preliminary. The data for the three well types were collected at different times: the water table measurements are from January 2022, the SMB water levels were measured most recently sometime between 2001 and 2016, and the Rattlesnake Ridge wells were measured during drilling, both in 2000.

Of the water supply wells examined near the West AOI, two were completed in the Rattlesnake Ridge sedimentary member, and the rest were completed in the lower SMB and Wanapum Basalts.

4.2. East AOI

Overburden: Half of the 25 well logs examined reported less than 10 ft of overburden. When the overburden is thin, it is most often described as “topsoil”, and “brown clay” is also mentioned. A wide range of textures, from clay and caliche to sand and gravel, are documented where the overburden is thicker.

Elephant Mountain Basalt: The thickness of the Elephant Mountain basalt in the well logs ranges from 25 to 130 ft (Table 4). Well logs describe a variety of colors and competencies in the layers of basalt within the Elephant Mountain member that may affect transmissivity. Some describe broken basalt underlain by hard basalt. In other logs, layers described as broken, rotten, or weak alternate with medium or hard basalt, sometimes with hard basalt at the bottom and other times ending in fractured or weak basalt.

Several logs mention the presence of water in the Elephant Mountain basalt, but none of the water supply wells which were examined were completed in this basalt. Of the three LYV GWMA monitoring wells downslope of the East AOI, one first encountered groundwater in the Elephant Mountain, the second at the contact of the overburden and the Elephant Mountain, and the third within the overburden.

Rattlesnake Ridge interbed: Nineteen of the examined well logs encountered the Rattlesnake Ridge interbed, and sixteen penetrated it fully. The thickness of the interbed ranged from 31 to 150 ft (Table 4). Five of the logs describe the interbed as only sandstone, and sandstone is included in fourteen of the logs . Five of the logs note clay layers at least 18 ft thick, but the vertical position of the layer within the interbed varies. Near the Sagebrush Ridge anticline, two older logs did not note a Rattlesnake Ridge interbed; but these logs contain sparse information and come from the same driller, so interpreting them is difficult.

None of the water supply wells were completed in the Rattlesnake Ridge interbed.

Nearby groundwater levels: The LYV GWMA monitoring wells closest to the East AOI are approximately a mile to the southwest and 200 ft lower in elevation. In these wells, the water table was measured at 25 to 60 ft bgs, equal to an elevation of approximately 900 ft amsl. The seasonal variations over two years were less than 5 ft in two wells and 10 ft in the third. The depth of the unsaturated zone should be as large or even larger further upslope, especially once crossing the RID border and losing the influence of irrigation, but no data exists to confirm this expectation.

The three CRGWDB wells completed in the Saddle Mountains Basalt and closest to the East AOI are near the southernmost portion of the AOI. The water level elevations in these wells are higher than those of the downslope water table elevations and may represent the water table in these areas.

Of the 19 logs for water supply wells, over half were completed in the Saddle Mountains Basalt below the Rattlesnake Ridge interbed.

5. DISCUSSION

In this section, information from earlier sections is combined with more general information about the local geologic and hydrogeologic context to assess the suitability of the two AOIs for SAR. The discussion focuses on the capacity of each area for infiltration of water into the basalt aquifers that are near the surface. The ability of these areas to store recharged water and deliver it to an appropriate location and time for beneficial use is also considered. Additional information that may be useful is identified.

5.1. West AOI

Basalt near surface: Only three well logs indicated the presence of basalt within 15 ft of the surface. However, geologic mapping and fold structure suggest that the Saddle Mountains Basalt unit is at or close to surface in large areas to the north of the RID. Because of the lack of wells installed in these areas, field work is required to investigate further.

Infiltration capacity: Infiltration capacity is difficult to evaluate without information from areas where the overburden is thin or absent. The following sediments might overlie the basalt in the West AOI and affect the ability to transfer water to the basalt through surface infiltration (Figure 15):

- Older alluvial fans (Qafo): Expected to be coarse-grained semi-consolidated, cemented with clay (Schuster, 1994).
- Palouse Loess: Mostly fine-grained in texture
- Upper Ellensburg Formation: Heterogeneous with a range of grain sizes.

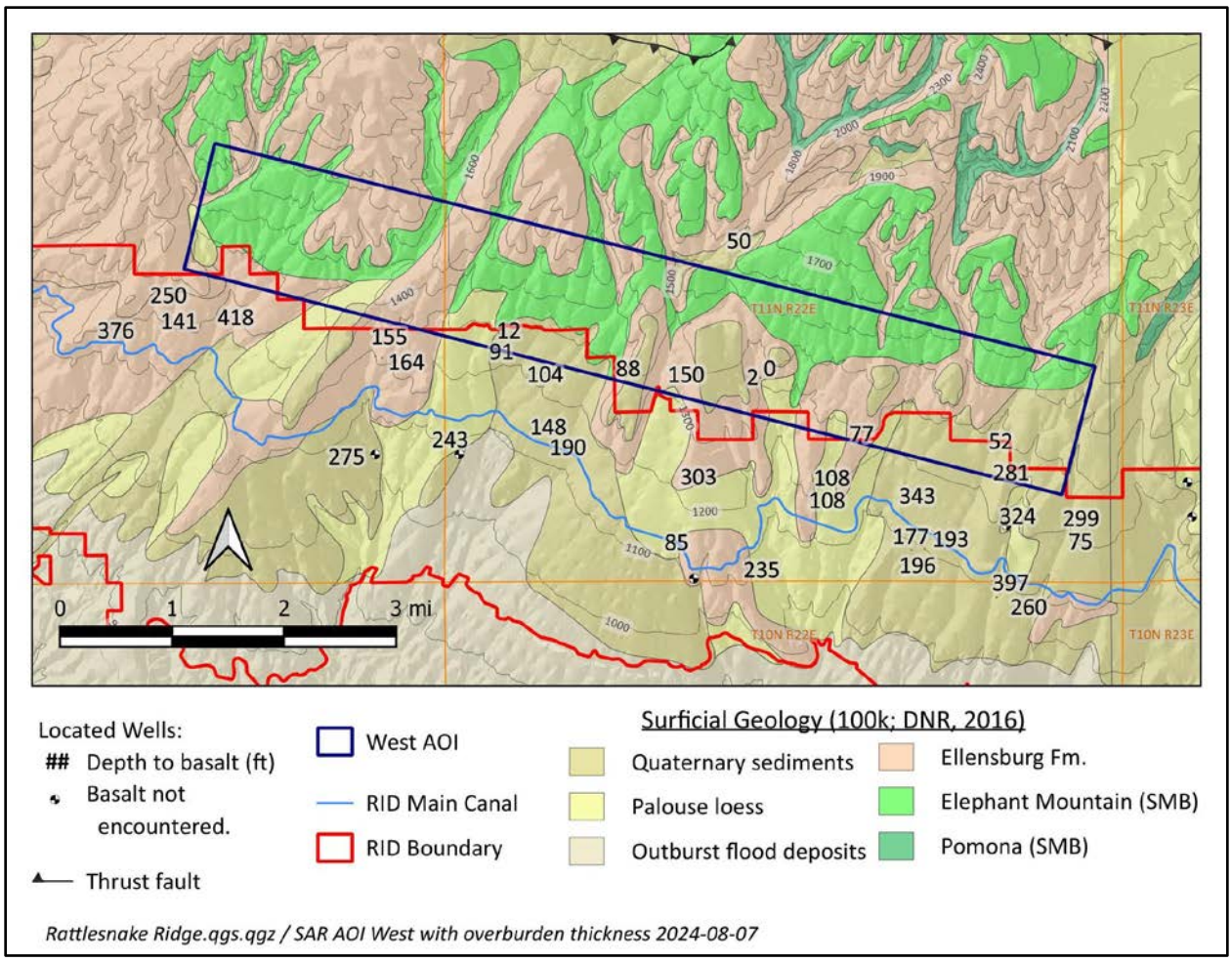

Figure 15: Surficial geology and overburden thickness in the West AOI.

Some depth-to-basalt markers have been shifted slightly from well locations for clarity of display.

Of these, loess is of most concern for limiting infiltration. Upper Ellensburg is generally permeable and able to transmit water.

The presence of fractures in the basalt through which water might flow is also unknown. Field observations should examine the condition of the uppermost basalt for brecciated conditions that would enhance infiltration and whether clogging of fractures is present.

Stratigraphic and structural setting: The detailed stratigraphy of the AOI is difficult to untangle. The current mapping of the southern slope of Rattlesnake Ridge (Schuster, 1994, DNR, 2016) does not clearly distinguish between the Upper and Lower Ellensburg Formations. As described in Section 2.2., the Upper Ellensburg Fm. is younger than the

CRBG basalts and overlies the Elephant Mountain basalt, while the Lower Ellensburg Fm. consists of sedimentary layers intercalated with the CRBG, including the Rattlesnake Ridge interbed that underlies the Elephant Mountain basalt. The geologic map of the West AOI only identifies two texturally distinct units of the Ellensburg Formation: 1) basic sedimentary deposits and 2) a coarser-grained sedimentary conglomerate (Shuster, 1994). More detailed mapping of the two units would clarify the details of the stratigraphic and structural relationships.

No local geologic structures have been identified that would create compartments to block or contain recharged water within the AOIs. The main anticlinal axis of Rattlesnake Ridge lies several miles north of and roughly parallel to the West AOI. A minor syncline is mapped about 0.7 miles north of the AOI, and a series of southwest-dipping thrust faults begins approximately 1 mile north of the AOI. The geologic beds dip to the south at a steeper angle than the topography (George and Hoselton, unpub.). Further mapping might identify structures in or near the AOI that could impact the local hydrogeology.

Hydrogeologic setting: If the uppermost basalt provides pathways for recharged water to travel downward, the nearby water table depths suggest available space for storage. The groundwater elevation within the West AOI is not known because of lack of wells but it's expected to be deeper than in downslope wells, because the AOI is at higher elevation and mostly outside of irrigated agricultural lands. Modern recharge to the basalt over the West AOI is from natural precipitation. However, it is not clear if water infiltrated on the surface would reach deeper aquifers and how long it might take to do so.

Water level data near the West AOI indicate that groundwater flow directions are towards the southwest for both the SMB and water table aquifers as described in Vaccaro and others (2009) and shown in Figure 5. As in that study, the groundwater levels compared here indicate a downward vertical gradient between the unconfined aquifer and Saddle Mountains Basalt aquifer.

Water supply wells in the region are mostly completed in the Wanapum Basalt formation, so the hydrogeologic units within the Saddle Mountains Basalt are not known. We expect

that groundwater use from the Saddle Mountains Basalt is from the Pomona and Umatilla members.

In our conceptual model, the Elephant Mountain member of SMB and the Rattlesnake Ridge member of Ellensburg Fm. form the target aquifer for SAR. However, the well logs in the West AOI do not describe the same layers observed in the Rattlesnake Ridge interbed in the Moxee Valley, which has coarse-grained lenses underlain by clay (Kirk and Mackie, 1993). Here several logs mention a clay-rich layer at the top of the unit, so it is not clear that the Elephant Mountain basalt and Rattlesnake Ridge interbed form a hydrogeologic unit as they do in the Moxee Valley.

Future directions to fill data gaps: Some basic information regarding stratigraphic and structural relationships and basalt aquifer suitability could be obtained from surface observations and mapping. In particular, the extent of basalt on the surface should be clarified and the nature of the surface exposures in terms of fractures, weathering and other factors that affect permeability. In addition, the Upper and Lower Ellensburg Formations should be distinguished and the nature of any contact between them determined.

Because of the lack of wells in the West AOI, a single well would be invaluable for clarifying the nature of the overburden and the uppermost basalt aquifer, and the depth to groundwater in the AOI.

5.2. East AOI

The East AOI straddles the RID border and contains many wells on its southeastern side, in the RID service area, which aided in this characterization effort (Figure 10).

Basalt near surface: In the East AOI, only small outcrops of basalt are mapped, but well logs indicate that the overburden is less than 20 ft thick in large areas (Figure 16). These results are in general agreement with the USGS estimates of overburden thickness in this area and likely extend to the portion of the AOI outside of the RID boundary, as the overburden is expected to thin as the elevation increases.

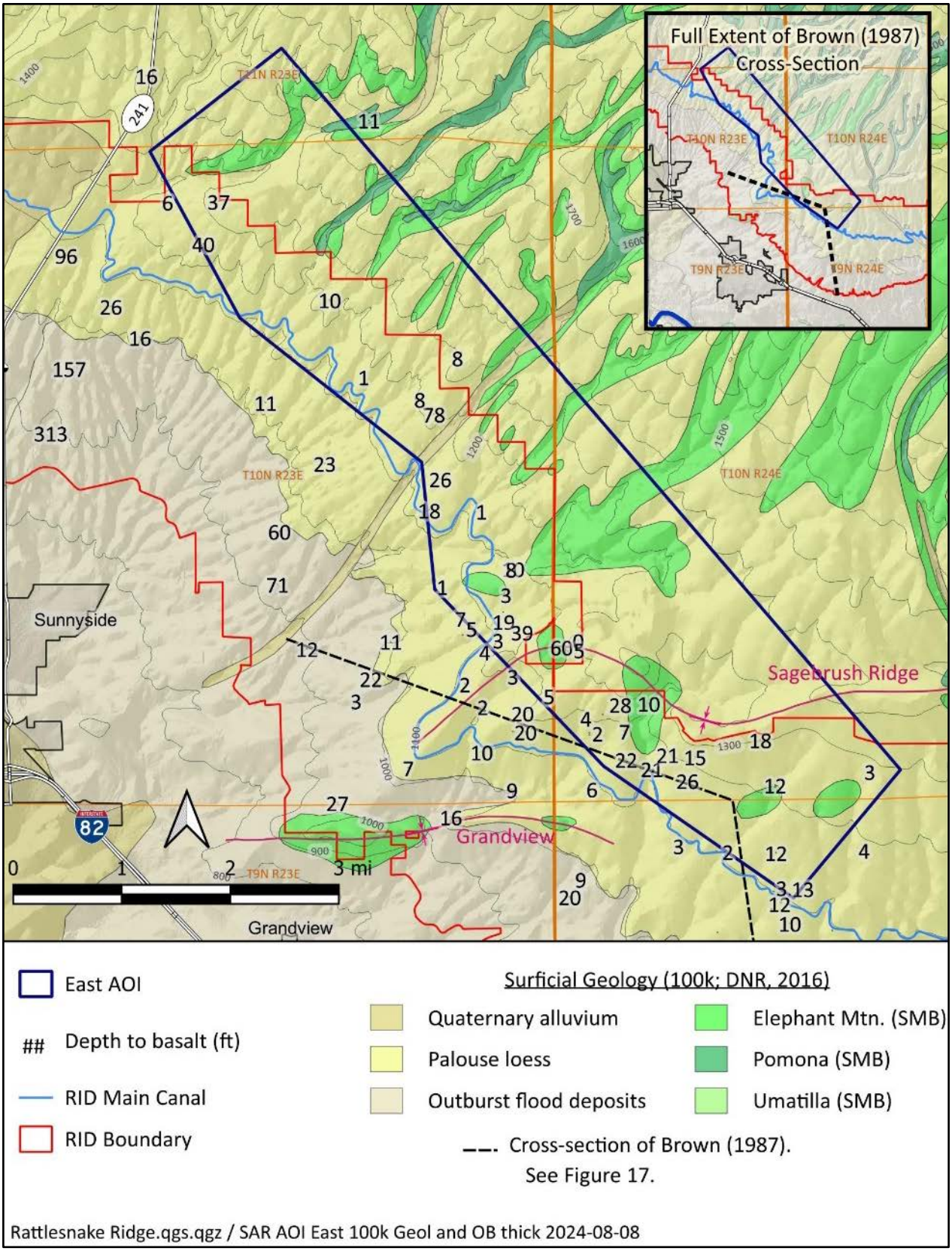

Figure 16: Surficial geology and overburden thickness in the East AOI.

Some depth-to-basalt markers have been shifted slightly from well locations for clarity of display.

Infiltration capacity: The presence of brecciated basalt at or near the surface suggests capacity to accept and transmit water. However, the nature of the thin overburden, particularly its texture, is crucial for SAR suitability. Almost all the overburden in the East AOI is mapped as loess (Reidel and Fecht, 1994; WGS, 2023). The presence of loess is cause for concern. Sediments that have high clay or fine silt content tend to have lower infiltration capacities and permeabilities, and fine sediments may sift downward and clog fractures in basalt that would otherwise be preferential flow paths for water. Well logs in the East AOI suggest some variability in sediment sizes, and it is possible that loess is not as pervasive as the mapping suggests.

Stratigraphy and structure: The slopes of basalt flows and bedding are gentler in the East AOI than in West AOI (George and Hoselton, unpub.). The Rattlesnake Ridge anticline is not as prominent in this region, and the Sagebrush Ridge anticline crosses the southeastern portion of the AOI, creating a flattened saddle between the anticlines (Geoscience Research Consultants, 1978a). The Sagebrush Ridge and nearby Grandview anticlines align roughly with Snipes Mountain and the Toppenish Ridge anticline to the west. The cross-section of Brown (1987) shows folding of beds due to the Sagebrush Ridge anticline (Figure 17), but this work and the other maps do not indicate any thrust faults near the East AOI.

Sunnyside Gap, which lies between the West and East AOIs, has been posited to be the channel of the ancestral Columbia River directly after the Elephant Mountain basalt flow, when the southward growth of Naneum Ridge blocked the river's path to the west (Figure 18; Reidel and Tolan, 2013). Reidel and Tolan (2013) describe the gap as a natural structurally controlled, topographic low. As such it may have been a local drainage channel before the migration of the Columbia River through the gap.

The 100k geologic map (Reidel and Fecht, 1994) and the cross-section of Brown (1977) map both flows of Elephant Mountain basalt, the Wards Gap flow and the Elephant Mountain flow, as present in this area, so an interflow zone may exist between the two. Kharrazi (2023) shows the Elephant Mountain basalt as greater than 500 feet thick upslope of the southeastern end of the East AOI (Figure 5), an unusually large thickness for this unit. This interpretation may not consider the influence of the Sagebrush Ridge anticlinal fold and might change with the addition of data on the intervening areas.

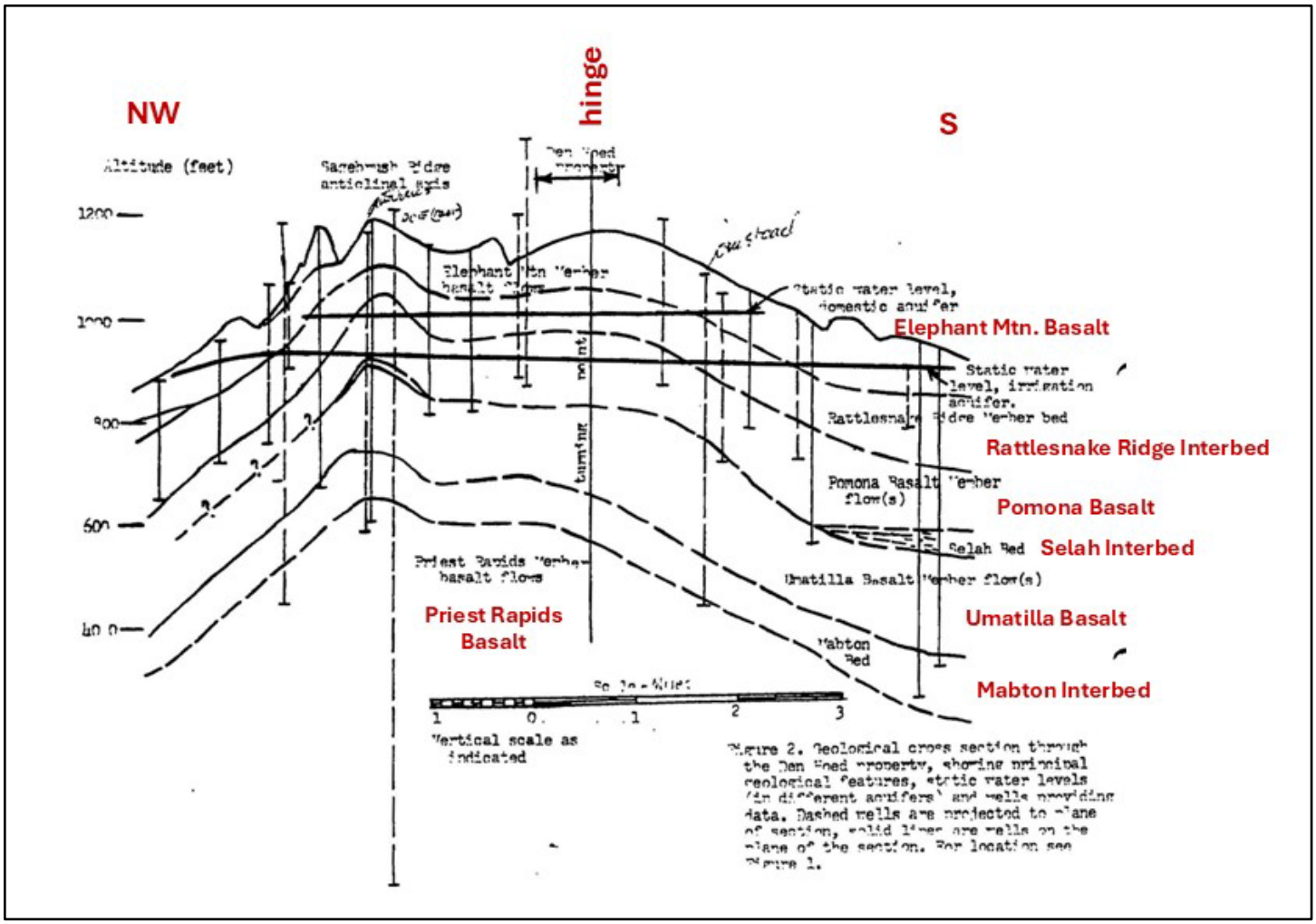

Figure 17: Cross-section near southern end of East AOI.

From Brown (1987). Location shown in Figure 16. Original caption reads: "Geological cross section through the Den Hoed property, showing principal geologic features, static water levels in different aquifers and wells providing data. Dashed wells are projected to plane of section, solid lines are wells on plane of the section."

In contrast to our examination of well logs and the existing cross sections in this area (Brown, 1977; Brown, 1987; Kharrazi, 2023), the geologic maps do not include a distinct Rattlesnake Ridge interbed (Reidel and Fecht, 1994; WGS, 2023 [24k]). For instance, several of the basalt exposures in and upslope of the East AOI show the Pomona basalt directly in contact with the Elephant Mountain basalt (Figure 16). It is not clear if the Rattlesnake Ridge has thinned or disappeared in these areas or if mapping lumped the sediments into the surrounding basalt layers. If the maps are accurate, the drainage channels may provide access to the lower Saddle Mountains Basalt.

Hydrogeologic setting: Due to the lack of measurements of the water table elevation within the eastern AOI, the depth of the unsaturated zone in this area is unknown but is expected to be at least as large at that observed in the downslope monitoring wells (25 to 60 ft). In areas upgradient and outside of the irrigation region, the water table is likely deeper compared to within the heavily irrigated region.

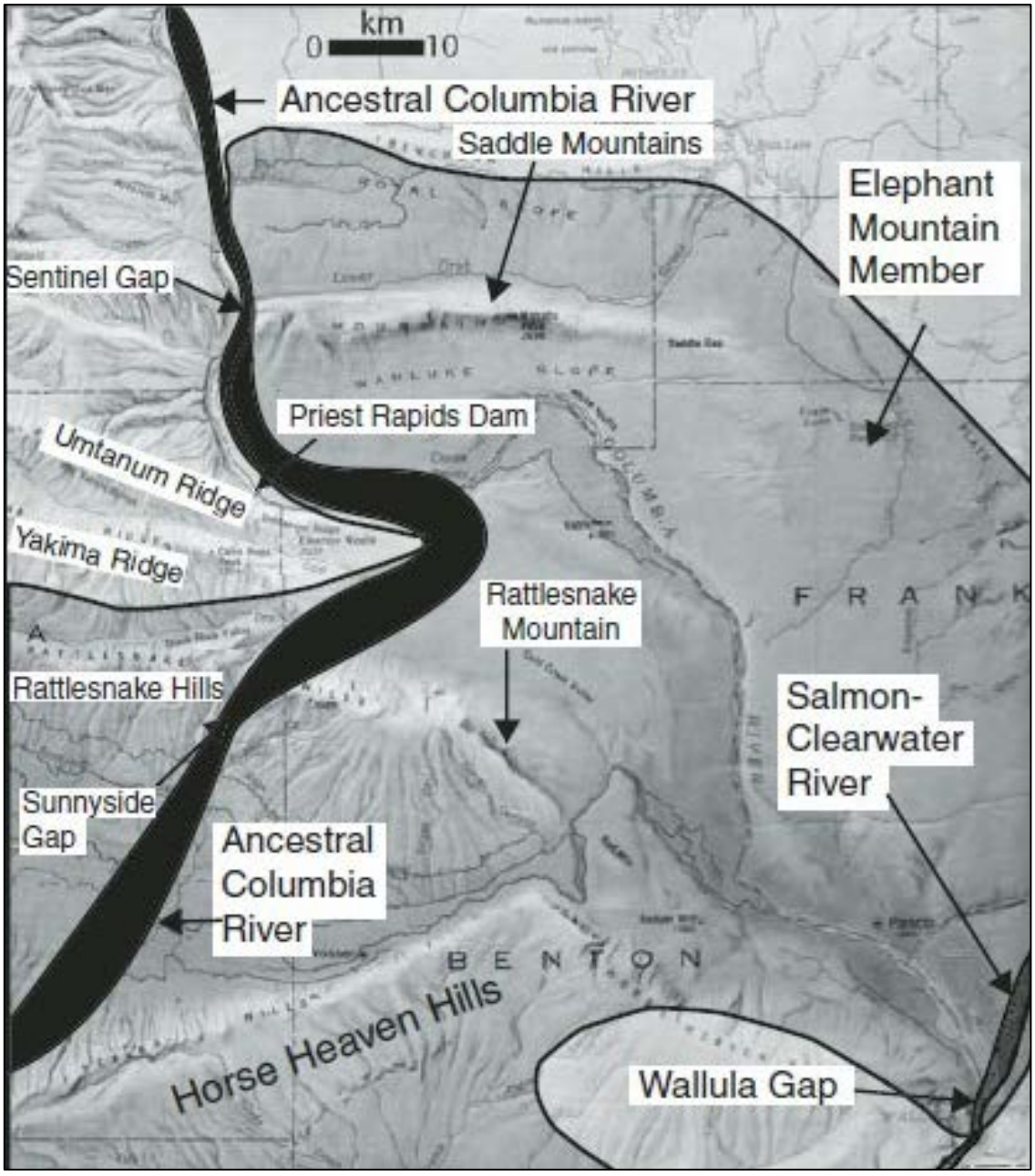

Figure 18: Path of ancestral Columbia River through Sunnyside Gap, after Elephant Mountain basalt flow.

(Figure 22 in Reidel and Tolan, 2013)

The water levels in the Saddle Mountains Basalt are higher in the East AOI than in the West AOI, despite the general trend of decreasing levels along the flow path of the Yakima River (Figure 6). Vaccaro and others, 20## noted that groundwater flow in this area is somewhat isolated from that of areas to the west. The erosion of the ancestral Columbia R. through the upper basalt layers in the Sunnyside gap may be responsible for this disconnect.

Observations from Brown (1987) near the southern end of the eastern AOI describe the hydrogeology of that area based on well logs and groundwater levels from late 1970s. Brown includes 3 wells apparently completed in the Rattlesnake Ridge formation on a cross-section and describes three aquifers from which domestic wells commonly withdraw water:

- Upper: Composed of the Rattlesnake Ridge interbed and the top of the underlying Pomona flow.
- Middle: Lower Pomona-Selah Interbed through the upper Umatilla.
- Lower: Base of the Umatilla flow and the top of the Mabton bed.

The top of the Priest Rapids member is important elsewhere, but little explored by Brown (1987). The pairing of the Rattlesnake Ridge interbed with underlying Pomona basalt into a single aquifer contrasts with observations from Kirk and Mackie (1993) in the Moxee Valley, in which they group the Rattlesnake Ridge interbed and the overlying Elephant Mountain basalt into a hydrogeologic unit.

Well logs indicate that most wells are completed in the lower SMB and Wanapum formation suggesting that these are the two most productive aquifers. Water level trends in the monitored wells in the lower Saddle Mountains Basalt are decreasing with time near the eastern AOI, likely due to over-pumping (Figure 13). The Sagebrush Ridge anticline may influence water levels and groundwater flow direction in the vicinity of the eastern AOI.

5.3. Preliminary assessment and information gaps

Despite their proximity, the West and East AOIs differ in characteristics, the types and amounts of existing data, and the remaining data gaps that should be filled. At this stage

of assessment, they also possess different strengths and weaknesses for a possible SAR project.

- Western AOI: The examination of well logs near the West AOI did not identify areas with thin overburden or exposures of Elephant Mountain basalt at the surface, but this is probably due to the lack of wells in the West AOI. If the geologic maps are accurate, field examination should find areas with shallow or exposed basalt directly upslope of the West AOI. It is also not possible to assess the condition of fractures in the basalt, especially the presence of fine grained sediments clogging them, with the available information. Water levels and well logs indicate that there is available space in the unsaturated zone to store water if it can be infiltrated. The Elephant Mountain basalt is likely completely unsaturated, but the underlying Rattlesnake Ridge is tapped for water supply in some nearby areas and may be partially saturated. The geologic beds slope towards the south with no apparent structural obstacles, suggesting that water could move towards likely areas of use, but the connectivity between surficial basalt and deeper basalt aquifers in this area is not established. This AOI includes land managed by BLM near its western end, which is useful for field investigations, pilot tests, and project siting.

  Priorities for the West AOI:

  - Confirm that basalt is present at or near the surface in the AOI near the RID border.
  - Characterize fractures in the basalt and their ability to transmit water.
  - Investigate the nature of Rattlesnake Ridge interbed and map it separately from the upper Ellensburg Fm.

- East AOI: Large areas of the AOI within the RID have basalt within 20 ft of ground surface and conditions of similar or thinner overburden are expected immediately upslope of the RID. The fine-grained surficial sediments of the Palouse Loess that are mapped over most of the AOI are a concern for potentially clogging fractures in the underlying basalt. The depth to the water table in the East AOI is unclear and might limit the ability to recharge water, but the unsaturated zone will be larger

upslope than in the RID itself. The geologic beds slope towards the southwest, possibly allowing recharged water to flow towards likely areas of use. The Sagebrush Ridge anticline and/or the incised drainage channels may provide direct access to deeper basalts if low angle thrust faults are not present. Publicly owned land is scarce in the East AOI near the RID boundary.

Priorities for the East AOI:

- Determine depth to water upslope of RID.
- Characterize fractures in the basalt and their ability to transmit water.
- Further evaluate and characterize the local stratigraphy of the Saddle Mountain Basalt and its interbeds.
- Further characterize the nature of the Rattlesnake Ridge unit in terms of hydraulic and other aquifer properties and spatial extent and thickness.

- Priorities for both AOIs:
  - Form a preliminary conceptual model for each AOI that describes the functional hydrogeologic units, the degree of connection between them, and the opportunities, if any, by which recharged water can reach the units tapped for groundwater supply. For instance, the coarser grained layers of the Rattlesnake Ridge interbed may be associated with Elephant Mountain and/or Pomona members of the Saddle Mountains Basalt or the finer-grained layers may block or slow downward movement of water.
  - Investigate potential structural features relevant to hydrogeology, including near the Sagebrush Ridge anticline. Compressive reverse faults may be barriers to horizontal groundwater flow. Low angle reverse thrust faults may be barriers to vertical subsurface flow. Such faults may have been missed in coarse scale mapping.

6. PROPOSED PHASE 2 WORK PLAN

Both the West and East AOIs have sufficient potential for SAR to warrant further investigation. The priority information can be best gathered through field investigation supported with additional desk-top examinations and analyses. The field investigation can be followed by an exploratory investigation if warranted. A draft outline of possible components of a field investigation is presented here, along with options for further explorations.

We advise engaging with individuals knowledgeable of the geology and hydrogeology of the area throughout the Phase 2 work, including for review of the field investigation design, field mapping, and interpretations. Such individuals include Ecology technical staff and Andrew Sadowski and others at WGS.

6.1. Geologic Field Mapping

Field mapping should consist of: 1) preparatory effort; 2) field mapping; and, 3) processing and synthesis of field data with previously collected data. The goal of the effort is to improve the assessment of SAR feasibility in these areas and to illuminate the most important steps to take next, as appropriate.

6.1.1. Preparation

- Well log review and cross-section preparation: Well logs were spatially located and interpreted within the limitations of time and budget (Section 3). In areas where further information is desired, locating more well logs could be incorporated into the analysis by correlating them with Yakima County property records.
- Examination of recently released Lidar (NV5 Geospatial, 2021 and 2023): This improved elevation data may be helpful for geomorphologic, structural, and stratigraphic interpretations and for planning of field investigations.
- Work with LYV GWMA project: The LYV GWMA team is also interested in groundwater dynamics and flow paths in these areas and collects data on nitrate concentrations and groundwater levels. There may be opportunities to conduct analyses that benefit both projects.
- Identification of locations for further evaluation
  - West AOI: Given paucity of existing data, choosing a location will be based on the further analysis laid out above. Prioritization may be those areas of publicly owned land where basalt outcrops are mapped. BLM manages two parcels that include large areas mapped as Elephant Mountain basalt (Figure 19).
  - East AOI: Tentative locations include near the Sagebrush Ridge anticline and on BLM-managed lands in the northwest:

- The anticline may provide groundwater pathways along strata dipping to depth, but if present, reverse and thrust faults may be flow barriers. The area around the Sagebrush Ridge anticline is not farmed, and most of it is owned by a company with large holdings in the area.
- Elephant Mountain and Pomona basalts are mapped at surface in stream channels in and near the AOI, including one channel in the northern part of the AOI. The BLM manages land that includes this feature.

- Field investigation design: Designing the field investigation will include developing a schedule and coordinating with involved entities, such as Ecology and WGS staff for mapping and property owners for access. The RID may assist in facilitating access to or across privately-owned lands. A cultural resource survey will be required if ground disturbance is expected. If field plans include the use of heavy equipment, the RID may be able to supply it.

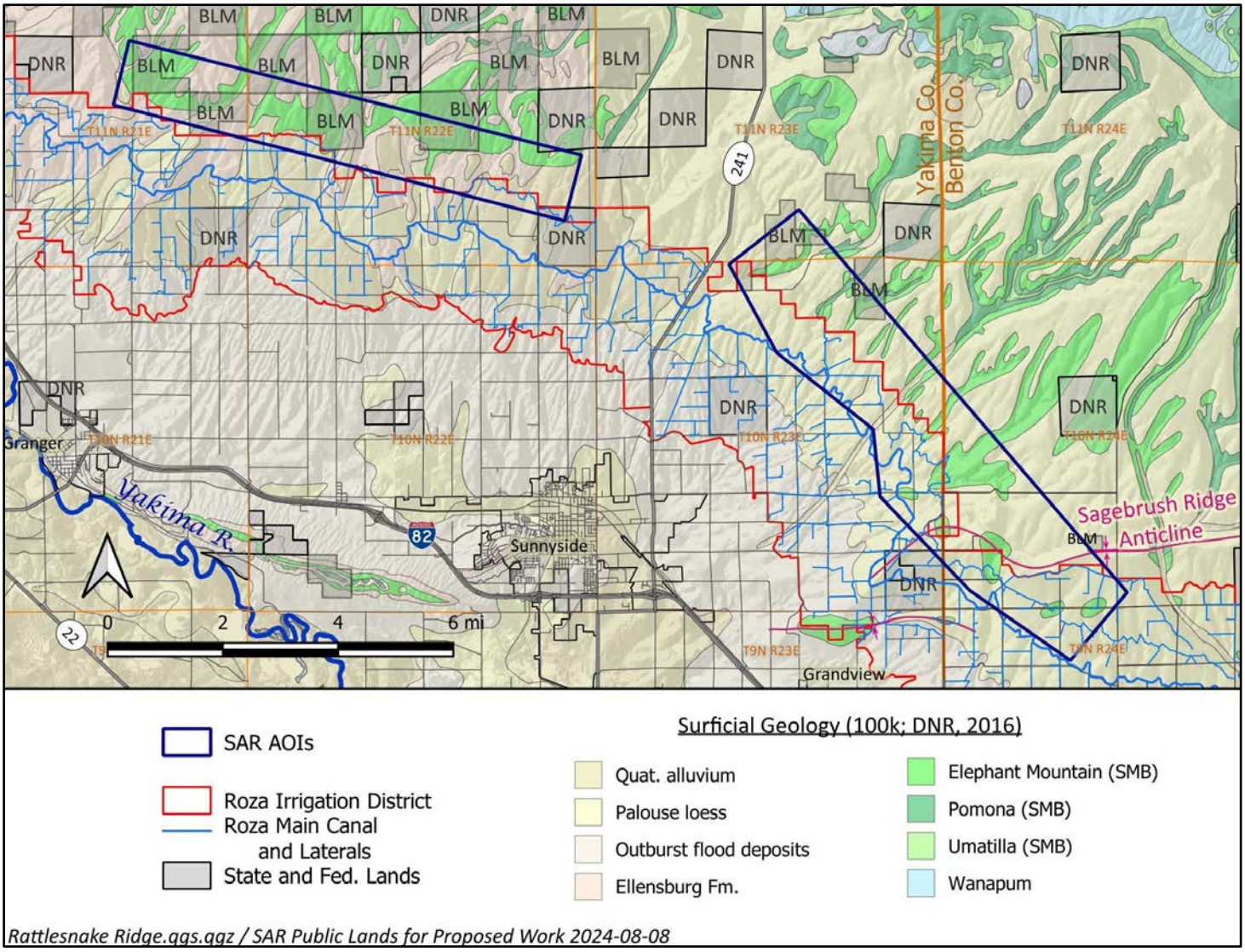

Figure 19: RID water distribution system and publicly-owned lands.

6.1.2. Field Mapping

Mapping should include:

- Detailed mapping of stratigraphy in outcrops (e.g., individual flows and sedimentary interbeds). The eruption history and lengthy time periods between flows may cause variability in the thickness and texture of the Saddle Mountains Basalt flows and make them challenging to map and correlate.
- Extents/coverage/thickness of fine sediments (i.e., Palouse loess)
- Geologic/orogenic structures, including bedding strike and dip; and, faults and folds.
- Fractures, including primary (e.g., due to cooling of basalt) and secondary (e.g., associated with orogenic events).
- Internal basalt flow structures relating to permeability, such as tops, entablature, colonnade, and pillows.
- Contact metamorphism of any interbedded sediments.
- Exposures of Lower Ellensburg Fm. members (e.g., Rattlesnake Ridge Member). In the West AOI, include nature of undifferentiated Ellensburg Fm. as mapped on 100k maps above Elephant Mountain basalt member on Rattlesnake Ridge.
- Mineralogy, including grab samples for laboratory analysis (e.g., whole rock analysis using ICP-MS method to identify basalt flows mapped).

6.1.3. Wrap-Up

After field mapping, the feasibility of SAR can be reassessed with knowledge gained from field mapping. The conceptual hydrogeologic model can likewise be revised, and recommendations for an exploratory field investigation can be made, if warranted.

6.2. Exploratory Field Investigation

If favorable sites are identified by field mapping, follow-on explorations may be considered to allow a more determinative assessment of SAR potential at specific sites. The following techniques may be useful:

- Geophysics may be appropriate based on preceding work (e.g., to determine the thickness of unconsolidated sediments overlying basalt or map fault structures). A comprehensive design of a geophysical survey should be developed balancing the quality of data obtained with cost considering Very Low Frequency (VLF), seismic reflection or refraction surveys, and other methods. Geophysical surveying is low cost relative to the areal coverage of information obtained.
- Excavations might be useful to confirm the thickness of unconsolidated sediments overlying basalt, and to prepare test infiltration pits or trenches. It would be an advantage if the excavator is strong enough to break into brecciated basalt. Simple excavations may be low cost if heavy equipment is provided by the RID.
- Drilling may be an alternative or complement to the above activities. Drilling obtains high quality information at specific locations and is more expensive than the other options considered. Sonic and diamond bit coring methods recover core samples from which fracture information relevant to permeability/transmissivity may be obtained. Drilling should fully penetrate the Elephant Mountain and Rattlesnake Ridge members, and advance into the Pomona flow.
- Pilot infiltration tests: Conducting pilot infiltration tests will require more logistics (e.g., a water supply), design, and subsequent analysis.

LIMITATIONS

This work was conducted within the limitations of time, budget and available information. Interpretations and recommendations are subject to change upon further examination and/or information.

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APPENDIX A

WELL LOGS EXAMINED FOR STRATIGRAPHIC AND HYDROGEOLOGIC INFORMATION

Sorted well by Ecology Well Log Number (first column).

Table A1: Well Location information sources.

Abbreviation	Description
CRGWDB	Ecology Central Region Groundwater Database
DNR	Washington State Department of Natural Resources
ECY	Ecology Well Report Viewer - located by Coho for this study
LYV GWMA	Lower Yakima Valley Groundwater Management Area
USGS	USGS Columbia Plateau Regional Aquifer System and Yakima Basin studies

Table A2: Well logs.

Ecology Well Log Number	Pages	Well Owner	Other well names and identifiers	TRS	Source of well location	Nearest AOI	Well Type
116178	1	Kershaw Sunnyside Farms		T11N R22E S28	ECY	W	Supply
116179	1	Kershaw Sunnyside Ranches			ECY		
118397	1	Spring Creek Orchards	USGS 2856	T11N R22E S28	USGS		
138677	1	David Strickland	461815119510801 USGS 2515	T10N R24E S31	USGS	E	Dry
138678	1			T10N R24E S31	ECY		Supply
139554	1	Elbert B. Schinmann	CRGWDB-201729, T09N/R24E-04H01, 461749119484901	T9N R24E S04	DNR CRGWDB		
139777	1	Florence Investment Co.	CRGWDB-201734, T09N/R24E-08C01	T9N R24E S08	DNR CRGWDB		
141181	5	James McPherson		T10N R24E S31	ECY		
254683	1	Peter Plath		T11N R22E S33	ECY	W	
303119	1	Robert Foster	LYV-OL-168	T11N R21E S25	LYV GWMA		
303128	1	Dave Cowan		T10N R23E S14	ECY	E	
326422	3	Brown Fruit of Washington	461815119534801 USGS 2500	T10N R23E S35	USGS		
326436	1	Rob Rattray	CRGWDB-211595, T10N/R23E-27K	T10N R23E S27	DNR CRGWDB		
328748	2	Dwaine Van Patter	462503120052401 USUS2858	T11N R22E S29	USGS	W	
339013	3	Waren Hazen	462037119530201 USGS 2470	T10N R23E S24	USGS	E	

Table A2: Well logs.

Ecology Well Log Number	Pages	Well Owner	Other well names and identifiers	TRS	Source of well location	Nearest AOI	Well Type
339201	1	Bill Evans	461859119522801 USGS 2504	T10N R23E S36	USGS	E	Supply
339206	1	Richard Cundiff		T10N R24E S31	ECY		
339470	1	Two Bar A Ranch		T11N R22E S16	ECY	W	
339472	1	Rattle Snake Ranch	462430120011902 USGS 2852 CRGWDB-202107	T11N R22E S26	USGS DNR CRGWDB		
339854	1	Marshall Anderson		T10N R24E S30	ECY	E	
352898	1	Don Prett Const.	LYV-SS-180	T10N R23E S08	LYV GWMA		
389559	1	Grant Wayne Jackson		T10N R23E S10	ECY		
415338	2	Desert Hills Vineyard	Andy Denhoed	T10N R24E S33	ECY		
582101	4	Anthony & Brenda Veiga		T10N R23E S24	ECY		
808399	1	Dan Sims	Triple A Dairy	T10N R23E S12	ECY		
883909	1	George DeRuyter & Sons Dairy		T11N R22E S19	ECY	W	MW
1564538	1	Wine Makers		T10N R23E S14	ECY	E	Supply
1706323	1	Tom Garrison		T11N R22E S27	ECY	W	
1985971	6	Yakima Co. Public Services	LYV-MW-007, YC-MW-11	T11N R21E S29	LYV GWMA		MW
1985972	6		LYV-MW-016, YC-MW-15	T11N R22E S35	LYV GWMA		

Table A2: Well logs.

Ecology Well Log Number	Pages	Well Owner	Other well names and identifiers	TRS	Source of well location	Nearest AOI	Well Type
1985980	3		LYV-MW-017, YC-MW-06	T10N R23E S17	LYV GWMA	E	
1985985	2		LYV-MW-027, YC-MW-14	T10N R23E S35	LYV GWMA		
1985987	7	Yakima Co. Public Services	LYV-MW-006, YC-MW-25	T11N R21E S17	LYV GWMA	W	MW
1985989	4		LYV-MW-025, YC-MW-09	T10N R23E S22	LYV GWMA	E	
1985990	3		LYV-MW-026, YC-MW-41	T10N R23E S35	LYV GWMA		
2033869	1	View Pt Dairy		T10N R23E S04	ECY		
2215005	1	Ted & Rosie Kranz		T10N R23E S25	ECY		Supply
2215091	1	JLS Slegers Dairy		T10N R23E S24	ECY		

Ecology Well Log 116178

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

Application No.
Permit No 94-24824

(1) OWNER: Name Kershaw Sunnyside Farms Address R 2 Box 456 Yak

(2) LOCATION OF WELL: County YAKIMA — NE ¼ NE ¼ Sec 28 T 11 N, R 22 W M.
Fr and distance from section or subdivision corner

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

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

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

(6) CONSTRUCTION DETAILS:
Casing installed: 12 " Diam. from 0 ft. to 197 ft
Threaded ☐ 12 " Diam. from 560 ft. to 635 ft
Welded ☐ 8 " Diam from 771 ft. to 1071 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? ft.
Material used in seal
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: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 630 ft below top of well Date
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
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:
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 formation.

MATERIAL	FROM	TO
Grey Basalt	0	50
Sand & Sandstone	50	75
Sandstone & Basalt	75	100
Sand Stone	100	175
Sandstone & Basalt	175	200
Black & Broken Basalt	200	250
Hard Grey Basalt	250	300
Broken Basalt	300	325
Black Basalt	325	350
Black Fojas Basalt	350	375
Black & Grey Basalt	375	400
Grey Basalt	400	500
Grey Basalt & Grey Jores	500	525
Little Water	525	580
Water Jacket, Grey & Black Basalt	580	600
Interbed	600	625
~~600~~ Change To 10" Casing	625	635
Grey Basalt Hard	635	700
Grey Basalt & Black Basalt	700	775
Green Basalt, Caving	775	800
Black Basalt, Small Crevice	800	850
Grey Basalt	850	875
Interbed, Water	875	880
Water	880	950
Hard Grey Basalt	950	1000
Black Basalt & Black Jores	1000	1025
Water & Red Rock	1025	1030
Lots Of Water	1030	1050
Black Broken Basalt (Surveild Drilling)	1050	1075
Water & Grey Basalt	1075	1100
Crevices Black Broken Basalt	1100	1125
Black Broken Basalt	1125	1160

Work started , 19 Completed , 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME A Plock Drilling (Person, firm, or corporation) (Type or print)
Address P.O. Box 31 Hill

[Signed] (Well Driller)
License No. 0.0 1 Date , 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Ecology Well Log 116179

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

8499 Start Card No. 47026

Water Right Permit No. G4-24814P A

(1) OWNER: Name Kershaw Sunnyside Ranches Address 151 Low Road, Yakima, WA 98908

(2) LOCATION OF WELL: County Yakima NE¼ NE¼ Sec. 28 T. 11 N., R. 22 W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) 970 Kershaw Hts., Sunnyside, WA

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

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

(5) DIMENSIONS: Diameter of well 16 inches. Drilled 1165 feet. Depth of completed well 1165 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 16" Diam. from +1 ft. to 255 ft.
Welded ☒ 14" Diam. from 439 ft. to 660 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? 255 ft.
Material used in seal Cement grout
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: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 669 ft. below top of well Date 3-5-93
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 1000± gal./min. with stem set at 1165 ft. for 3 hrs.
Artesian flow g.p.m. Date
Temperature of water 65 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	
Brown soil	0	2	
Black & yellow basalt	2	14	
Gray basalt	14	49	
Brown & yellow clay	49	246	
Gray basalt, hard	246	372	
Gray basalt, medium	372	618	
Green clay & sand	618	653	WB
Gray basalt	653	682	
Brown & black basalt	682	692	
Gray basalt, hard	692	736	
Brown & black basalt	736	807	
Brown & gray basalt	807	839	
Gray basalt, hard	839	893	
Black basalt, some green soapstone	893	988	WB
Gray basalt, hard	988	1012	
Black basalt	1012	1028	
Inter bed, gray clay with some sand	1028	1055	WB
Gray basalt, hard	1055	1132	
Black basalt, some green soapstone	1132	1159	WB
Gray basalt, hard	1159	1165	

Hole diameter:
0-660 15¼"
660-905 13¼"
905-1165 12"

RECEIVED APR 1993 DEPARTMENT OF ECOLOGY

Work started 2-8-93 19. Completed 3-5 19 93

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 Wallace Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 1707 SW 18th, Pendleton, OR 97801

(Signed) Patrick Wallace (WELL DRILLER) License No. 1663

Contractor's Registration No. WALLAD-090NR Date 3-31 19 93

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329- 3

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

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

B D

Application No. G4-28547
Permit No. G4-28547P

(1) OWNER: Name SORINA Creek Orchards Address Box 915 Sunnyside WA 98944

(2) LOCATION OF WELL: County Yakima NW ¼ NW ¼ Sec 28 T. 11 N., R 22 E.W.M.
Bearing and distance from section or subdivision corner

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

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

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

(6) CONSTRUCTION DETAILS:
Casing installed: 20" Diam. from 6" ft. to 19-6 ft.
Threaded ☐ 16" Diam. from +1 ft. to 417 ft.
Welded ☒ 14" Diam. from 357 ft. to 827 ft.
10" 807 to 875'

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? 875' ft.
Material used in seal Cement
Did any strata contain unusable water? Yes ☒ No ☐
Type of water? Salty Depth of strata .....
Method of sealing strata off Cement Grout

(7) PUMP: Manufacturer's Name .....
Type: ..... H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ..... ft.
Static level 666 ft. below top of well Date 11-30-87
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.
"Air Tested - Not More Than
"200 to 300 GPM. " "

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.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:
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 formation.

MATERIAL	FROM	TO
Top Soil	0	1
Clay Yellow	1'	41
Dirt & Gravel	4'	12'
Gravel & Boulders	12	17'
Brown Clay & Gravel	17	95'
Sticky Black Clay	95'	150'
Caliche Basalt Hard Ground	150	207
Gray Clay Sticky	207	396
Crevised Basalt Gray	396	410'
Hard Gray Loose Basalt	410	580
Med Soft Basalt	580	605'
Hard Broken Basalt	605	687'
Soft Black & Brown Basalt Clay	687	723'
Hard Caliche Basalt	723	799'
Clay-Basalt, Gravel & Sand	799	815
Brown Clay Mabton Bed	815	870'
Hard Black Basalt	870	878
Cracked Basalt W/ Sand	878	895'
Hard Basalt Gray	895	1025
Soft Hard Black Basalt	1025	1100
Med Soft Red & Brown Basalt	1100	1130
Med Soft Black Basalt	1130	1190'
Med Hard Black Basalt	1190	1250'
Hard Cracked Basalt Gray	1250	1266'

deepened (see Amended Reports) for 1/3 90

RECEIVED
JAN [redacted]
DEPARTMENT OF ECOLOGY
CENTRAL REGION OFFICE

Work started Sept 14, 19 87 Completed [redacted], 19 87

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME [redacted] (Person, firm, or corporation) (Type or print)
Address 2204 [redacted]
[Signed] [redacted] (Well Driller)
License No. 0276 Date Dec 10, 19 87

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

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

Application No. —
Permit No. —

(1) OWNER: Name David Strickland Address RT2 Box 2720B Grandview Wash

(2) LOCATION OF WELL: County Benton NE ¼ NE ¼ Sec. 31 T. 10 N., R. 24E W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

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

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 660 ft. Depth of completed well 660 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 8 " Diam. from +1 ft. to 30 ft.
Threaded [ ] " Diam. from ft. to ft.
Welded [X] " Diam. from ft. to ft.

Perforations: Yes [ ] No [X]
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 [X]
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes [ ] No [X] Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes [X] No [ ] To what depth? 20 ft.
Material used in seal Puddling Clay
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name X
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level ft. below top of well Date
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.
" THis Well Blew 5GPM "
" From 600 By air Rotary "

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.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG:

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 formation.*

MATERIAL	FROM	TO
Top Soil	1	3
Brown Clay	3	10
Broken Basalt	10	25
Hard Basalt	25	200
Broken Basalt clay	200	215
Hard Basalt	215	345
Broken Basalt	345	355
Brown Clay	355	395
Hard Basalt	395	485
Broken Basalt	485	515
Hard Basalt	515	525
Broken Basalt clay	525	595
Hard Basalt	595	635
Broken Basalt	635	660

RECEIVED
JUL 15 1977
DEPARTMENT OF ECOLOGY
CENTRAL REGIONAL OFFICE

Work started 4-12, 19 77 Completed 4-21, 19 77

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Carman Water Well's INC
(Person, firm, or corporation) (Type or print)

Address RT 1 Box 1299 Benton City

[Signed] Daylord M Robins
(Well Driller)

License No. 371 Date 4-21, 19 77

(USE ADDITIONAL SHEETS IF NECESSARY) OK

ECY 050-1-20

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

Application No. .....
Permit No. 64-23965

(1) OWNER: Name David Strickland Address Route 2 Box 2220R Grandview Wash 98930

(2) LOCATION OF WELL: County Benton SE1/4 NE¼ NW¼ Sec. 31 T. 10 N., R. 24 W.M.

Bearing and distance from section or subdivision corner

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

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

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 383 ft. Depth of completed well 380 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 8 " Diam. from 0 ft. to 50 ft.
Threaded ☐ 6 " Diam. from 160 ft. to 320 ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☒ No ☐ torch
Type of perforator used
SIZE of perforations 4 in. by 6 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? 50 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: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 214 ft. below top of well Date Sept 15 76
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? blow
Yield: 35 gal./min. with 100 ft. drawdown after 6 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
er test gal./min. with ft. drawdown after hrs.
rtesian flow g.p.m. Date
Temperature of water 60 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

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 formation.*

MATERIAL	FROM	TO
Brown Clay	0	10
Cemented Gravel	10	28
Brown broken rock	28	42
Brown rock	42	60
Casing 8" 250 sealed bentonite 7 cement		
black rock	50	87
soft grey rock clay seams	87	100
Brown rock soft	100	125
lavyflow grey	125	200
Cavy area lined to 320' Conglomerate		
POrous rock water Bearing	200	225
soft cavy area cemented	225	250
drilled 250 recemented cased		
soft decomposed basalt	250	350
quicksand and clayblue	350	383
cemented redrilled same problem		
lined with a 6" liner		

RECEIVED
JAN 6 1977
DEPARTMENT OF ECOLOGY
CENTRAL REGIONAL OFFICE

Work started August 10, 1975 Completed Sept 1, 1975

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Great Western Drilling A subsidiary of Presently Martel Previously [redacted]
(Person, firm, or corporation) (Type or print)

Address Friday Harbor WAsh . Nine Mile Falls

[Signed] Don Forman Estacada ore
(Well Driller)

License No. "Has one" Date Sept 15, 1976

I Don't have a log of this well in my Oregon records The company has been sold 5/19/77 This as recalled by A.C.Engelhart May have a log in Friday Harbor Wash

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

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

#5 Farm

Ecology Well Log 139554

Application No. .....

Permit No G4-25176

(1) OWNER: Name Elbert B. Schimmels Address Rt 2 Box 2658

(2) LOCATION OF WELL: County Benton SE ¼ NE ¼ Sec 4 T 9 N., R 24 W.M.

Bearing and distance from section or subdivision corner 650 feet N. 1050 feet W. of E ¼ corner

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

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

(5) DIMENSIONS: Diameter of well 16 inches.
Drilled 320 ft. Depth of completed well 320 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 16 " Diam. from 0 ft. to 235 ft.
Threaded ☐ ..... " Diam. from ..... ft. to ..... ft.
Welded ☒ ..... " 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? 25 ft.
Material used in seal Neat Cement
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: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level .... 1175 ft.
Static level 135 ft. below top of well Date Aug 22-1977
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? G Valley Pump
Yield: 1500 gal./min. with 54 ft. drawdown after 8 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.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

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 formation.

MATERIAL	FROM	TO
Top Soil	0	4
Brown to Black Basalt	4	110
Sand Stone	110	182
Soft Fractured Basalt	182	200
Hard Basalt	200	280
Fractured Basalt	280	320
200 GPM From 110 to 182		
1600 GPM 280 to 320		

RECEIVED
AUG 24 1977
DEPARTMENT OF ECOLOGY
CENTRAL REGIONAL OFFICE

Work started 6-1, 19 77 Completed 8-15, 19 77

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME St George Drilling Co
(Person, firm, or corporation) (Type or print)

Address 701 S 45 W Richland Wash

[Signed] John Schlaegel
(Well Driller)

License No. 0481 Date 8-21, 19 77

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71)
ECY-070-28

3

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

Application No. 94-24791
Permit No.

(1) OWNER: Name Florence Investment Co. Address [illegible]

(2) LOCATION OF WELL: County Benton NE ¼ NW ¼ Sec 8 T 9 N. R 24 W.M.
ng and distance from section or subdivision corner

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

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

(5) DIMENSIONS: Diameter of well 12" inches.
Drilled 353 ft. Depth of completed well 353 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 10 " Diam. from 0 ft. to 235 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☐ " 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? 40 ft.
Material used in seal
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: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 63 ft below top of well Date
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 OUR TEST
[illegible] 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
	AIR	TEST	1500	6 PM	

Date of test June 9-77
[illegible] test gal./min with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 47 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:
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 formation.

MATERIAL	FROM	TO
TOP SOIL	0	8
BASALT Broken BLACK	8	24
BASALT HARD BLACK	42	96
SANDSTONE	96	165
BASALT HARD BLACK	165	195
Sand fine TAN	195	197
BASALT HARD BLACK	197	235
" " "	235	265
BASALT Very Broken WITH BASALT	265	325
BASALT HARD BLACK	325	335
WATER 96' CASED OFF		
WATER AT 265'		
Approximately MAY 12 1977		
June 4 1977		

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME ST. George Drilling Co.
(Person, firm, or corporation) (Type or print)

Address 701 S. 45th W. Pasco

[Signed] [illegible]
(Well Driller)

License No. [illegible] Date [illegible], 19 77

(USE ADDITIONAL SHEETS IF NECESSARY) OR

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

Application No. G4-24765
Permit No.

(1) OWNER: Name James McPherson Address RT2 - Box 720 Grandview

(2) LOCATION OF WELL: County Benton SE¼ NW¼ Sec. 31 T. 10 N R. 24 E.W.M.
Bearing and distance from section or subdivision corner 1000 FT From SE corner

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

(4) TYPE OF WORK: Owner's number of well (if more than one) 2
New well ☒ Method Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 12 inches. Drilled 359 ft. Depth of completed well 354 ft.

(6) CONSTRUCTION DETAILS:
Casing installed. 10" Diam from 0 ft. to 304 ft.
Threaded ☐ Diam. from ft. to ft.
Welded ☒ 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? 25 ft.
Material used in seal Neat Cement
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: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 211 ft below top of well Date
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? PaceMore
Yield: gal./min with ft drawdown after hrs.
912 0 4

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.
Artesian flow g.p.m. Date
Temperature of water 61 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG
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 formation.

MATERIAL	FROM	TO
Top Soil	0	4
Basalt Black hard	4	49
Broken Brown	49	56
10 GPM at 56		
Basalt Black Hard	56	89
Sand Rock Fair	89	175
50-60 GPM 165-175		
Basalt Broken Black	175	250
Clay Gray	250	275
Basalt Broken Black	275	285
Basalt Gray Very Hard	285	310
Basalt Black Red Clay Weathered Into Basalt Gravel		
Caving 255-310	310	359
2000 GPM @ 310		

RECEIVED
SEP 14 1977
DEPARTMENT OF ECOLOGY
Central Regional Office

Work started 6/1 19 77 Completed 8-15 19 77

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME St George's Drilling Co (Person, firm, or corporation) (Type or print)
Address 701 So 45th W. Richland Wash
[Signed] (Well Driller)
License No. 0482 Date 19

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7256—OS—(Rev. 4 71)
ECY-070-28

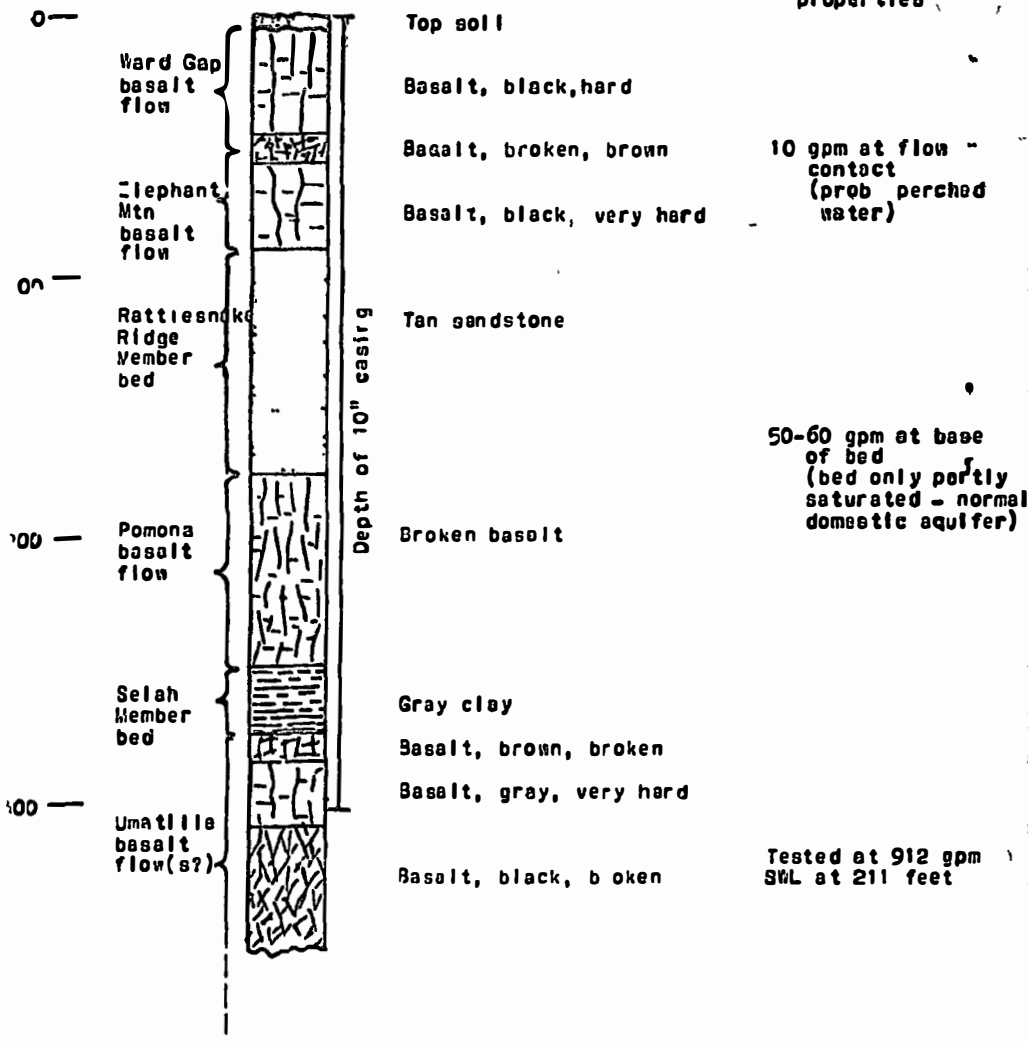


Figure 3 Columnar section McPherson well

Randall E Brown
September 1977

Ecology Well Log 141181, cont.

Name & Place James & McPherson

FARMORE PUMP & IRRIGATION
WELL TEST LOG

Box 1207 Airport Road
PENDLETON OREGON 97801
Phone 503 276-4197

Test Number 1 Driller St George

Rig Foreman Mike Ward

Well Size 12" Static Level 210'

Pump Setting 285 + Bowls Air Line 285' Well Depth 350' Date 8-15-77

START TIME	RPM CHECK	GPM READING	AIRLINE READING	ORFICE READING	DROP PIPE	BOWL SIZE	COLUMN SIZE	PUMP INSTALLED SERIAL	PUMP INSTALLED MODEL	WATER TEMP.
4:00	1500	465	320 211'	14"		8	6			63
4:05	1500	465	320 211'	14"						
4:15	1500	480	320 211'	15"						
4:30	1500	473	320 211'	14 5"				Increase RPM, Clear, Cold		
4:35	1600	548	320 211'	20"						
4:45	1600	548	320 211'	20"						
5:00	1600	548	320 211'	20"				Increase RPM, Clear		
5:05	1700	566	320 211'	21.5"						
5:15	1700	566	320 211'	21 5"						
5:30	1700	554	320 211'	20 5"				Increase RPM, Clear		
5:35	1800	662	320 211'	29.5"						
5:45	1800	662	320 211'	29.5"						
6 00	1800	662	320 211'	29.5"				Increase RPM, Clear		
6:05	1900	726	320 211'	35"						
6:15	1900	726	320 211'	35"						
6:30	1900	726	320 211'	35"						

Ecology Well Log 141181, cont.

Page 2 of 2

Name & Place James McPhearson

Test Number _____ Driller _____

Rig Foreman _____

Pump Setting _____ Air Line _____

FARMORE PUMP & IRRIGATION
WELL TEST LOG

Well Size _____ Static Level _____

Well Depth _____ Date _____

Box 1307 Airport Road
PENDLETON, OREGON 97801
Phone 503 276-4137

START TIME	RPM CHECK	GPM READING	AIRLINE READING	ORIFICE READING	DROP PIPE	EDUCTOR SIZE	COLLAPSE SIZE	PUMP INSTALLED SERIAL	PUMP INSTALLED MODEL	WATER TEMP
6 35	2000	770	320 211'	39"				Increase RPM		
6.45	2000	781	320 211'	40"						
7.00	2000	781	320 211'	40"						
7 15	2000	754	320 211'	37.5				Increase RPM		
7 20	2100	820	320 211'	44"						
7 30	2100	820	320 211'	44"				Increase RPM		
7-35	2200	872	320 211'	50"						
7 45	2200	872	320 211'	50"						
7 50	2300	912	320 211'	55"						
7 55	1900	703	320 211'	33"						
8 00	1900	709	320 211'	33 5"						
8 05			320 211'							

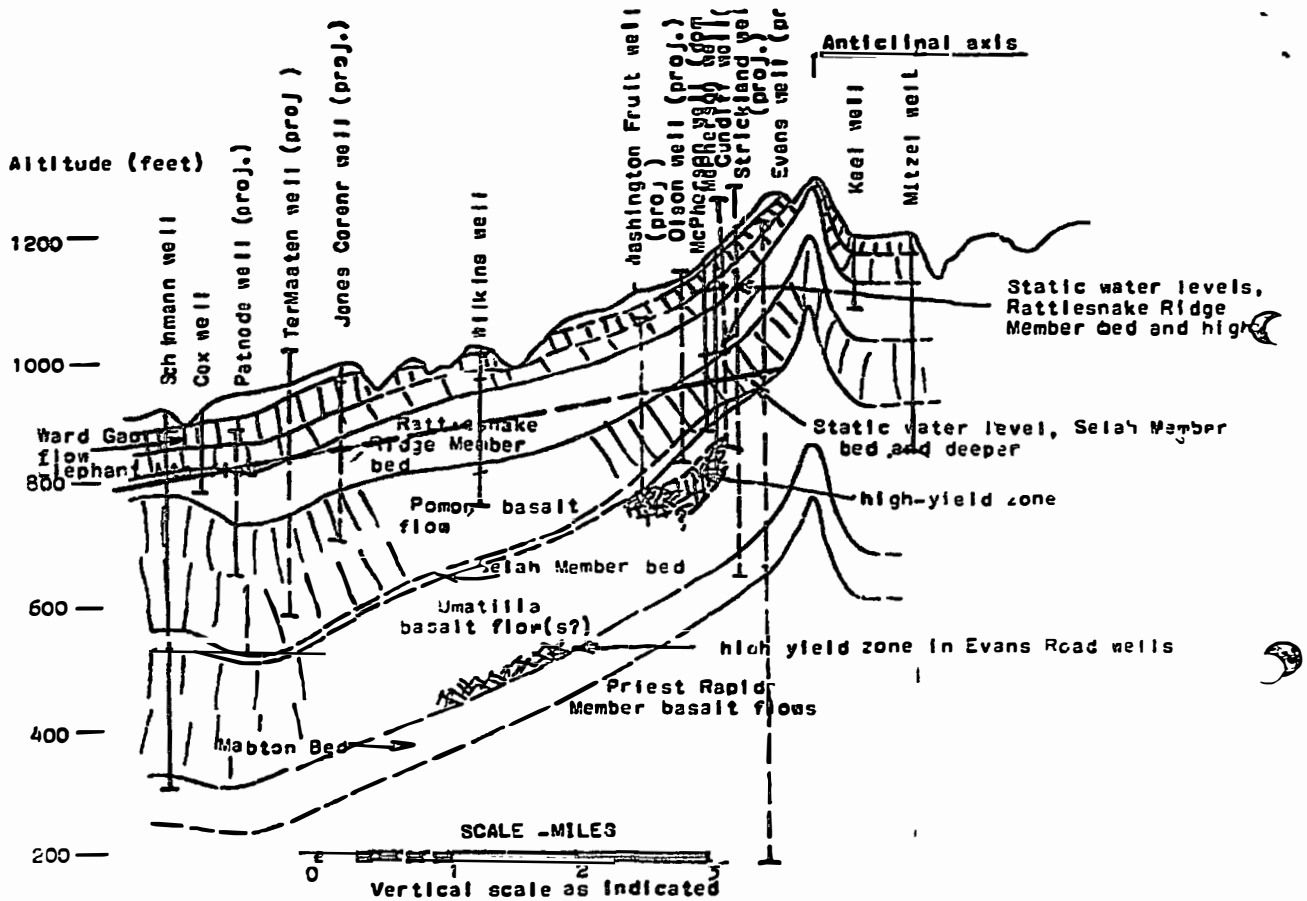


Figure 2. Geologic cross section through the County Line Road - Snipes Road area, showing geologic structures, stratigraphy, key wells, and approximate static water levels. For location see Figure 1.

Ecology Well Log 254683

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

Notice of Intent W109690

UNIQUE WELL I.D. # ~~AFH902~~ AFH903

Water Right Permit No.

(1) OWNER: Name PETER PLATH Address 780 CHAFFEE RD, OUTLOOK, WA 98938

(2) LOCATION OF WELL: County YAKIMA - NW 1/4 NW 1/4 Sec 33 T. 11 N.,R 22 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 780 CHAFFEE RD

TAX PARCEL NO. 221133-22002

(3) PROPOSED USE: [X] Domestic [ ] Industrial [ ] Municipal [ ] Irrigation [■] Test Well [ ] Other [ ] DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
[X] New Well Method: [ ] Dug [ ] Bored [ ] Deepened [ ] Cable [ ] Driven [ ] Reconditioned [ ] Rotary [X] Jetted [ ] Decommission

(5) DIMENSIONS: Diameter of well 6 inches. Drilled 498 feet. Depth of completed well 498 ft.

(6) CONSTRUCTION DETAILS:
Casing Installed:
[X] Welded 6 " Diam. from +2 1/2 ft. to 454 ft.
[ ] Liner installed _____ " Diam. from _____ ft. to _____ ft.
[ ] Threaded _____ " Diam. from _____ ft. to _____ ft.

Perforations: [ ] Yes [X] 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 [X] 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 [X] No [ ] Size of gravel/sand _____
Material placed from _____ ft. to _____ ft.

Surface seal: [X] Yes [ ] No To what depth? 360 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? [ ] Yes [X] No
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 360 ft. below top of well Date 5/4/2000
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 [X] 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 30 gal./min. with stem set at 440 ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analyses made? [■] Yes [X] No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION:
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. Indicate all water encountered.

MATERIAL	FROM	TO
SOIL BOULDS AND GRAVEL	0	3
BOULDERS GRAVEL AND SAND	3	46
CLAY SANDY	46	195
GRAVEL SANDY	195	205
CEMENTED GRAVEL AND SAND	205	303
BASALT	303	344
CLAY	344	361
SANDSTONE AND CLAY	361	429
GRAVEL SAND	429	434
SANDSTONE	434	485
SAND	485	492
SANDSTONE	492	498
40 GPM 460FT		
30 GPM 440FT		
10 GPM 400FT		

Work Started 4/28/2000, 19. Completed 5/4/2000, 19

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.

Type or Print Name TOM MCGUIRE License No. 0357
(Licensed Driller/Engineer)
Trainee Name _____ License No. _____
Drilling Company RICK POULIN WELL DRILLING
(Signed) Tom McGuire License No. 0357
(Licensed Driller/Engineer)
Address 1301 LANCASTER RD SELAH, WA 98942
Contractor's Registration No. RICKPWD042J2 Date 5/11/00, 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 (360) 407-6800. The TDD number is (360) 407-6006.

File Original with Department of Ecology 89392
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent W 113836
UNIQUE WELL I D # AFE 181
Water Right Permit No Ecology Well Log 303119

(1) OWNER Name Robert Foster Address 1410 E. Houghton Rd. Zillah, Wa

(2) LOCATION OF WELL County Yakima NE 1/4 NW 1/4 Sec 25 T 11 N R 21 WM

(2a) STREET ADDRESS OF WELL (or nearest address)

TAX PARCEL NO

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

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

(5) DIMENSIONS Diameter of well 6 inches
Drilled 265 feet Depth of completed well 256 ft

(6) CONSTRUCTION DETAILS
Casing Installed
☒ Welded 6 " Diam from +1 ft to 256 ft
☐ Liner installed " Diam from ft to ft
☐ Threaded " Diam from ft to ft

Perforations ☒ Yes ☐ No
Type of perforator used torch
SIZE of perforations 10 in by 6/16 in
58 perforations from 232 ft to 256 ft

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
Material placed from ft to ft

Surface seal ☒ Yes ☐ No To what depth? 20 ft
Material used in seal Hole plug
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 H P

(8) WATER LEVELS Land-surface elevation above mean sea level ft
Static level 178 ft below top of well Date 9/27/00
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
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 75 gal./min with 235 ft drawdown after 1 hrs
Artesian flow g p m Date
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION
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 Indicate all water encountered

MATERIAL	FROM	TO
Top soil	0	3
Clay, white, some gravel	3	9
Clay, tan	9	19
Clomgerate, brown, clay with gravel	19	102
Clay, tan, occasional gravel lenses	102	145
Clay, tan, loose gravel lenses	145	164
Basalt, black	164	234
Basalt, gray	234	242
Sandstone, w/ gravel H20	242	260
Sand, yellow, h2o	260	265+

DEPT OF ECOLOGY Received OCT 10 2000 CENTRAL REGION FILES

Work Started 9/21/00 Completed 9/28/00

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

Type or Print Name Larry Cassel License No 0073
(Licensed Driller/Engineer)

Trainee Name License No
Drilling Company Cassel Well Drilling
(Signed) License No 0073
(Licensed Driller/Engineer)
Address 1308 Voelker Ave. Yakima, Wa.

Contractor's Registration No Cassewd 317 cp Date 9/28/00

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer For special accommodation needs, contact the Water Resources Program at (360) 407 6600 The TDD number is (360) 407-6006

ECY 050-1-20 (11/98)

File Original with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

84996

WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent W127912

UNIQUE WELL I D # AFQ-610

Water Right Permit No

(1) **OWNER** Name Dave Cowan Address 2644 Wilson Hwy., Grandview

(2) **LOCATION OF WELL** County Yakima NE 1/4 NW 1/4 Sec 14 T 10 N R 23 WM

(2a) **STREET ADDRESS OF WELL** (or nearest address) SLI. Rd. (East Of Roza Canal)

TAX PARCEL NO 231014-21403

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

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

(5) **DIMENSIONS** Diameter of well 6 inches
Drilled 325 feet Depth of completed well 325 ft

(6) **CONSTRUCTION DETAILS**
Casing Installed
☒ Welded 6 " Diam from +1 ft to 161 ft
☒ Liner installed 5 " Diam from 136 ft to 325 ft
☐ Threaded " Diam from ft to ft

Perforations ☒ Yes ☐ No
Type of perforator used Cutting Torch
SIZE of perforations 3/8 in by 6 in
30 perforations from 315 ft to 325 ft
60 285 305

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
Material placed from ft to ft

Surface seal ☒ Yes ☐ No To what depth? 23 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 H P

(8) **WATER LEVELS** Land-surface elevation above mean sea level 1040 ft
Static level 134 ft below top of well Date 9-27-00
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
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 45 gal./min with ft drawdown after 1 hrs
Artesian flow g p m Date 9 27 00
Temperature of water 65 Was a chemical analysis made? ☐ Yes ☒ No

(10) **WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION**
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 Indicate all water encountered

MATERIAL	FROM	TO
Topsoil	0	1
Br. Basalt	1	16
Med. Gray Basalt	16	19
Br. & Gray Basalt	19	45
Gray Basalt w/ Br. Cracks	45	78
Porus Gray & Br. Basalt W/ Br. Clay & Water	78	85
Gray Sandstone & Br. Clay	85	100
Br. Sandstone & Br. Clay	100	158
Br. & Gray Basalt	158	185
Br. Basalt	185	200
Br. Sandstone & Porus Br. Basalt & Water	200	214
Br. & Gray Basalt	214	218
Med. Gray Basalt	218	290
Porus Br. Basalt & Hd. Yellow Clay & Water	290	294
Br. & Gray Basalt	294	298
Gray Basalt & Blue Strips	298	315
Gray Basalt W/ Br. Cracks	315	325

Work Started 9-20-, 00 Completed 9-27-, 00

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

Type or Print Name Jerry Rank License No 1435
(Licensed Driller/Engineer)

Trainee Name License No

Drilling Company Oasis Drilling

(Signed) Jerry L. Rank License No 1435
(Licensed Driller/Engineer)

Address 2017 S. 16th. Ave., Union Gap

Contractor's Registration No OASISD*072J9 Date 9-27-, 00

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer For special accommodation needs contact the Water Resources Program at (360) 407 6600 The TDD number is (360) 407-6006

ECY 050-1-20 (11/98)

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

WATER WELL REPORT

STATE OF WASHINGTON

Application No.

Permit No. 14-2-16954

(1) OWNER: Name Brown Fruit of Washington Address South Hill Rd Sunnyside, Wa

(2) LOCATION OF WELL: County Yakima — SE ¼ SE ¼ Sec. 35 T 10 N., R 23 W M

Bearing and distance from section or subdivision corner 1300 Ft West

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

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

(5) DIMENSIONS: 22"-16"-13"-8" Diameter of well inches.
Drilled ft. Depth of completed well 817' ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 16" Diam. from +1 ft. to 18' ft
Threaded ☐ 12" Diam. from +1 ft. to 316' ft.
Welded ☐ 10" Diam. from +1 ft. to 530 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'-216' ft.
Material used in seal
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: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 850 ft.
Static level 167' ft. below top of well Date
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.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG: SID 210969

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 formation.

MATERIAL	FROM	TO
Sandy Dirt	0	7'
Hard Fractured Brown Basalt.	7'	67'
Brown Sandstone	67	155'
Med--Hard Black Basalt	155'	165'
Med. Soft Brown Basalt With Blue Mineral Red & Brown & Black Broken Gravel, Lower Bed (water)	165'	195'
Med-Hard Black Basalt	195'	207'
Very Fractured, Brown & Black Basalt, (Water Bearing) Soft	207'	265'
Very Hard Fractured Gray Basalt.	265'	275'
Brown Soft Broken Basalt (Water Bearing)	275	280
Med-Hard-Black Basalt	280	284'
Soft Brown Basalt	284	285'
Very Hard Blackish Gray Basalt	285'	288'
Soft Brown & Black Fractured Basalt. (Some Water)	288'	317'
Med. Hard Fractured Basalt (Water Bearing) With Blue Mineral	317'	353'
Very Hard Gray Basalt	333'	343'
Med. Hard Black Basalt	343'	352'
Black Fractured Basalt With Blue Static Deposits (Water)	352	368'
Hard Black Basalt	368	385'
Hard Gray Basalt	385	410'
Red Basalt Some Porous (Water)	410	500'
Blue Slate Soft	500	507'
Fine Sand Stone Green Color	507	549'
Blue Slate Soft.	549	551'
Hard Blue Gray Slate	551	573'
	573	575'

Work started March 16 19 77 Completed March 27 19 77

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Leach Well Drilling Co.
(Person, firm, or corporation) (Type or print)

Address RT 2 Box 243 Moses Lake Wa

[Signed] (Well Driller)

License No. 0276 Date Apr. 16 19 77

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

White-Original with Ecology
Green-Owner's Copy
Goldenrod-Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ...
Permit No G4-24177

Ecology Well Log 326422, cont.

(1) OWNER: Name Brown Fruit of Washington Address ...

(2) LOCATION OF WELL: County ... — ¼ ¼ Sec. 35 T. 10 N., R. 23 W.M.

Bearing and distance from section or subdivision corner

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

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

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

(6) CONSTRUCTION DETAILS:
Casing installed: ... " Diam. from ... ft to ... ft
Threaded ☐ ... " Diam. from ... ft to ... ft
Welded ☐ ... " 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? ... ft
Material used in seal ...
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: ... H.P. ...

(8) WATER LEVELS: Land-surface elevation above mean sea level. ... ft
Static level ... ft. below top of well Date ...
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 ...
... test ... gal./min. with ... ft drawdown after ... hrs
... flow ... g p m Date ...
Temperature of water ... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

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 formation.

MATERIAL	FROM	TO
Hard Black Basalt Fractured	575	595
Green-Gray Med-Hard Basalt	595	632
Soft Black Basalt	632	640
Med-Hard Black Basalt	640	687
Hard Fractured Black Basalt	687	692
Gray Basalt	692	697
Med-Hard Black Basalt	697	698
Gray-Green Fractured Basalt (With Mineral Deposits)	698	737
Hard-Gray Green Basalt	737	770
Soft Black Basalt Solid Structure With Green Mixed Somewhat Porous Some Water	770	780
Med Hard Gray-Black Basalt	780	795
Hard Gray-Black Basalt — Black Porous Basalt — (Very Large Volume Of Water.)	795	817
Hard Gray Basalt	817	TD

RECEIVED
MAY 27 1977
DEPARTMENT OF ECOLOGY
CENTRAL REGIONAL OFFICE

Work started ..., 19... Completed ..., 19...

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Leach Well Drilling Co
(Person, firm, or corporation) (Type or print)

Address Rt 2 Box 243 Moses Lake Wa

[Signed] Nathaniel C. Leach
(Well Driller)

License No. 0276 Date May 16, 1977

(USE ADDITIONAL SHEETS IF NECESSARY)

VC

ECY 050-1-20

WALDROP DRILLING & PUMP CO., INC.

431 NORTHSHORE DRIVE
MOSES LAKE, WASHINGTON 98837
Telephone 765-7506 — 765-7105

№ 00003

Licensed and Bonded
General Contractor

Date April 26, 1977

T

Brown Fruit Co. of Washington

P. O. Box 611 Box 1635

Sunnyside, Wa. 98944 755

HOURS	DESCRIPTION	RATE	AMOUNT	
520.6'	10 3/4 x .156 wall casing	4.41@	$2,295	85
4'	8" x 2½" x 1½" col.,tube, shft.	500.00@	2,000	00
1	8" flow meter	425.00	425	00
	Additional cost for set of bowls		700	00
81'	10 3/4 casing	5.95@	481	95
68.5	hrs. install 2 times, pull 2 times			
	& run liner, no charge for initial			
	installation.	40.00@	2,740	00
1	ring for adaption of liner to			
	casing 12" to 10"	75.00@	75	00
5	gal. turbine oil		10	00
480'	Air line	.50@	240	00
1	Gauge, & Valve stem	10.00	10	00
			$8,977	80
		Tax	457	87
		Total	$9,435	67
	Invoiced 3/22/77		14,892	50
		Balance	$24,328	17

A FINANCE CHARGE is computed at the RATE OF 1% A MONTH on the unpaid balance, excluding previous interest charges, which is an ANNUAL PERCENTAGE RATE of 12%.

APPROVED AND RECEIVED _____

Ecology Well Log 326436

WATER WELL REPORT

STATE OF WASHINGTON

File Original with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy 109634

Notice of Intent W-089918
UNIQUE WELL I.D. # AFQ 321
Water Right Permit No. G4-34505

(1) OWNER: Name Rod Rattray Address 3451 Bethany RD Sunnyside, WA

(2) LOCATION OF WELL: County Yakima NE 1/4 SE 1/4 Sec. 27 T. 10 N.R. 23 E WM

(2a) STREET ADDRESS OF WELL: (or nearest address) _____

TAX PARCEL NO. _____

J

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

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

(5) DIMENSIONS: Diameter of well 12 inches
Drilled 515 feet. Depth of completed well 515 ft

(6) CONSTRUCTION DETAILS
Casing Installed:
☒ Welded 20" Diam. from +1 ft. to 38 ft
☐ Liner installed 12" Diam from +1 ft to 247 ft.
☐ Threaded _____" Diam from _____ ft. to _____ ft.

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

Screens: ☐ Yes ☐ No ☒ K-Pac Location 50'
Manufacturer's Name Home MADE
Type _____ Model No _____
Diam 10 12 Slot Size _____ from _____ ft. to _____ ft.
Diam. _____ Slot Size _____ from _____ ft. to _____ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand _____
Material placed from _____ ft. to _____ ft

Surface seal: ☒ Yes ☐ No To what depth? 38 ft
Material used in seal Neat Cement
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. _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft
Static level 88 ft below top of well Date 2-7-02
Artesian pressure 13 lbs per square inch Date 2-7-02
Artesian water is controlled by Cemented Off (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
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
	500+	By Air Lift			

Date of test _____
Bailer test _____ gal./min. with _____ ft drawdown after _____ hrs
Airtest _____ gal./min. with _____ ft drawdown after _____ hrs
Artesian flow _____ g p m Date _____
Temperature of water _____ Was a chemical analysis made? ☐ Yes ☐ No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION
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. Indicate all water encountered.

MATERIAL	FROM	TO
Brown Soil + Clay	0	12
lg Basalt Boulders - Blk	12	17
Basalt - Gravel	17	20
Med Black Basalt	20	38
Hard Black Basalt	38	46
Black Broken Basalt	46	48
Hard Black Basalt	48	95
Broken Black Basalt	95	105
Brown sand med - Hard	105	130
Brown Sandstone	130	185
Brown Clay	185	220
Hard Basalt (no water)	220	383
Black Basalt - yellow clay	383	405
Soft Black Basalt	405	415
Yellow Clay - Basalt (water)	415	418
Hard Black Basalt	418	492
Broken Basalt Cinders	492	515
Estimated 300 gpm		

DEPT. OF ECOLOGY Received FEB 12 2002 CENTRAL REGION OFFICE

Work Started 9-15-01 Completed 2-7-02

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

Type or Print Name Joshua Carman License No 2219
(Licensed Driller/Engineer)

Trainee Name _____ License No _____
Drilling Company C+W Drilling
(Signed) Joshua Carman License No. 2219
(Licensed Driller/Engineer)
Address 1115 6th St Prosser, WA
Contractor's Registration No CWDRI006MQ Date 7-17-02

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (360) 407-6600. The TDD number is (360) 407-6006

ECY 050-1-20 (11/98)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Appli. # 9905
Per. # 9096

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

WELL LOG

Record by Driller
Source Driller's Record

Location: State of WASHINGTON
County Yakima
Area
Map

NW¼ NW¼ NE¼ sec. 29 T. 11 N., R. 22 E.

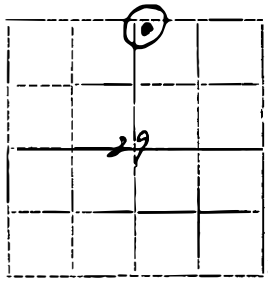


Diagram of Section

Drilling Co. Gib King Well Drilling Zillah, Wash.
Address Route 2, Box 232, [redacted]
Method of Drilling Cable Date Aug. 4, 1969
Owner Dwaine Van Patter Outlook,
Address Route 1, Box 157, [redacted] Wash. 98938
Land surface, datum ..... ft. above / below
SWL 495 ft. Date --- , 19 Dims. 8" x 884'

CORRELATION	MATERIAL	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Domestic & Irrigation		
	Dirt	0	3
	Gravel, cemented	3	41
	Clay	41	70
	Gravel, cemented	70	88
	Basalt, gray	88	112
	Clay	112	120
	Sand	120	140
	Clay	140	185
	Sand	185	235
	Clay	235	290
	Sand	290	320
	Rock	320	342
	Basalt, gray	342	496
	Rock, broken, shale filler	496	540
	Basalt	540	709

Turn up

Sheet ..... of ..... sheets

WELL LOG.—Continued No. A/9905

Dwaine van Patter

CORRELATION	MATERIAL	From (feet)	To (feet)
	Depth forward	———	
	Rock, broken - water	709	722
	Clay, blue	722	756
	Shale, green	756	785
	Sand stone - water	785	800
	Rock, broken & clay - wood	800	827
	Rock, gray	827	877
	Rock, black	877	882
	Sand & water	882	884
	Casing: 8" from 0' to 312'		
	Perforations: Torch. from 642 ft. to 782 ft.		
	Surface Seal: Filled with cuttings		
	Pump: Layne & Bowler, turbine, 50 hp		

S. F. No. 7449—OS—12-65.

Ecology Well Log 339013

WATER WELL REPORT

STATE OF WASHINGTON

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

Start Card No 086754

UNIQUE WELL I D #

Water Right Permit No GU29605P

RECEIVED MAY - 6 1993

(1) OWNER Name Waren E Hazen Address P O Box 302, Sunnyside, WA 98944

(2) LOCATION OF WELL County Yakima SE / NW ¼ Sec 24 T 10 N R 23 WM

(2a) STREET ADDDRESS OF WELL (or nearest address) Holmason Rd

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

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

(5) DIMENSIONS Diameter of well 18x16x12x10 inches
Drilled 848 feet Depth of completed well 848 ft

(6) CONSTRUCTION DETAILS
Casing installed 12" Diam from +2 ft to 223 ft
Welded ☒ Liner installed ☒ Threaded ☐ 10" Diam from +2 ft to 618 ft
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? 618 ft
Material used in seal Cement
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 H P

(8) WATER LEVELS Land surface elevation above mean sea level ft
Static level 535 ft below top of well Date 4/29/93
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 500+ gal /min with ft drawdown after hrs
Estimated air lift 500+ GPM

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 gal /min with stem set at ft for hrs
Artesian flow g p m Date
Temperature of water 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
Top soil	0	1
Light brown rotten basalt	1	12
Hard gray basalt	12	30
Brown rotten basalt	30	39
Black basalt	39	45
Rotten basalt	45	55
Layers of solid & rotten basalt	55	79
Layers of clay & rotten basalt	79	124
Layers of brown clay & gravel	124	170
Rotten brown basalt	170	185
Black basalt	185	195
Yellow shale brown & black basalt	195	209
Brown & gray basalt fractured	209	214
Hard black basalt	214	232
Fractured black basalt	232	309
Gray basalt	309	317
Red/brown pouris basalt water	317	331
Fractured brown black basalt	331	340
Rotten brown basalt	340	362
Fractured black basalt	362	370
Yellow clay brown & black basalt	370	380
Layers of black/red/brown basalt	380	470
Fractured gray basalt	470	514
Blue conglomerate	514	525
Brown shale	525	530
Soupy brown sand w/mica	530	550
Brown sandy clay & shale	550	566
Blue clay	566	570
Layers of blue & brown clay	570	574
Blue clay and shale	574	578
Hard black basalt	578	618
Hard gray basalt	618	635
Medium black basalt	635	650

Work started 4/12/93 19 Completed 4/29 19 93

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 Ponderosa Drilling & Development, Inc (PERSON FIRM OR CORPORATION) (TYPE OR PRINT)

Address E 6010 Broadway Spokane, WA 99212

(Signed) Bob Britton (WELL DRILLER) License No 0043

Contractor s Registration No PO-ND-EI*248JE Date 4/30 19 93 (Bob Britton)

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050 1 20 (10/87) 1329 18

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Ecology Well Log 339013, cont. 2

8677

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No 086754

UNIQUE WELL I D #

Water Right Permit No 64-29605 P

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

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

(1) OWNER Name Waren Hazen Address

(2) LOCATION OF WELL County Yakima SE ¼ NW ¼ Sec 24 T 10 N R 23 WM

(2a) STREET ADDDRESS OF WELL (or nearest address)

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

(4) TYPE OF WORK Owner s number of well (if more than one)

Abandoned ☐ New well ☐ Deepened ☐ Reconditioned ☐ Method Dug ☐ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS Diameter of well inches Drilled feet Depth of completed well ft

(6) CONSTRUCTION DETAILS

Casing installed ____ Diam from ____ ft to ____ ft
Welded ☐ Liner installed ☐ Threaded ☐ ____ Diam from ____ ft to ____ ft
____ 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? ft
Material used in seal
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 H P

(8) WATER LEVELS Land surface elevation above mean sea level ft
Static level ft below top of well Date
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 500+ gal /min with ____ ft drawdown after ____ hrs
Estimated air lift 500+ GPM

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 ____ gal /min with stem set at ____ ft for ____ hrs
Artesian flow g p m Date
Temperature of water ____ 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
Hard gray basalt	650	750
Pouris black basalt w/water	750	760
Hard black basalt	760	767
Soft black basalt	767	777
Hard black basalt	777	805
Hard gray basalt	805	837
Pouris black basalt black glass	837	846
Hard black basalt	846	848
Note water at 750' has a lot of gas in it		

RECEIVED MAY - 6 1993 DEPARTMENT OF ECOLOGY

Work started 4/12/93 19 Completed 4/29 1993

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 Ponderosa Drilling & Development Inc (PERSON FIRM OR CORPORATION) (TYPE OR PRINT)

Address E 6010 Broadway Spokane, WA 99212

(Signed) Bob Britton (WELL DRILLER) License No 0043

Contractor s Registration No PO-ND-EI*248JE Date 4/30 19 93

(Bob Britton)

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050 1 20 (10/87) 1329 18

Ecology Well Log 339013, cont.

Gutierrez, Erin (ECY)

WE21544
WINE MAKERS LLC

From: Richardson, Avery (ECY)
Sent: Monday, June 06, 2016 10:43 AM
To: Gutierrez, Erin (ECY)
Subject: we21544 update

WE21544 driller called in with well airtest volume. Driller states the well blew 500GPM.

Thank you,

Avery Richardson
Well Construction Coordinator
Department of Ecology
1250 West Alder St.
Union Gap, WA 98903
(509) 575-2639

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

Application No 9424592
Permit No

(1) OWNER Name Bill Evans Address Route 6, Box 326F, Yakima, Wa. 98908

(2) LOCATION OF WELL County Yakima NE ¼ NE ¼ Sec 36 T 10 N R 23 WM
Bearing and distance from section or subdivision corner

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

(4) TYPE OF WORK Owner's number of well (if more than one) 1
New well ☒ Method Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS Diameter of well 16" inches
Drilled 1320 ft Depth of completed well 1320 ft

(6) CONSTRUCTION DETAILS
Casing installed 16 Diam from 0 ft to 7 ft
Threaded ☐ 12 Diam from 0 ft to 310 ft
Welded ☐ 10 Diam from 475 ft to 580 ft

Perforations Yes ☐ No ☐
Type of perforator used
SIZE of perforations ½ in by 4 in
60 perforations from 475 ft to 485 ft
60 perforations from 570 ft to 580 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 310 ft
Material used in seal
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 H.P

(8) WATER LEVELS Land surface elevation above mean sea level
Static level 580 ft below top of well Date 4/10/77 ft
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?
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

RECEIVED
JAN 18 1978
DEPARTMENT OF ECOLOGY
CENTRAL REGIONAL OFFICE

Date of test
Bailer test gal/min with ft drawdown after hrs
Artesian flow Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG
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 formation

MATERIAL	FROM	TO
Top soil	0	5
Basalt brown	5	34
Basalt soft red	34	42
Basalt hard black	42	82
Clay	82	100
Sandstone	100	150
Basalt hard black	150	182
Basalt hard black	182	262
Basalt soft black	262	271
Basalt black & brown	271	275
Basalt med black	275	305
Basalt hard black	305	475
Clay, sandstone & brown basalt	475	485
Clay green	485	569
Basalt brown	569	573
Basalt soft black	573	576
Basalt soft black	576	583
Basalt hard black	583	722
Basalt soft black	722	754
Basalt hard black	754	785
Basalt broken black	785	787
Basalt hard black	787	800
Basalt med. black	800	825
Basalt soft brown	825	830
Basalt hard black	830	883
Basalt soft brown	883	890
Basalt soft black	890	906
Basalt hard black	906	924
Basalt soft brown	924	926
Basalt soft black	926	955
Basalt soft black	955	975
Basalt hard black	975	1208
Basalt soft black	1208	1237
Basalt hard black	1237	1320

Work started 3/4 19 77 Completed 4/10 19 77

WELL DRILLER'S STATEMENT

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

NAME Moore Drilling, Inc.
(Person firm or corporation) (Type or print)

Address P O Drawer P, Moses Lake, Wa. 98837

[Signed] Richard F Moore
(Well Driller)

License No 0405 Date 8/17 19 77

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1 20

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

Application No

Permit No

(1) OWNER Name Richard E Cendiff Address 204 ASH Grandview Wash

(2) LOCATION OF WELL County Benton — SW ¼ NE ¼ Sec 31 T 10 N R 24E WM

Bearing and distance from section or subdivision corner

(3) PROPOSED USE Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(4) TYPE OF WORK Owner's number of well (if more than one)
New well [X] Method Dug [ ] Bored [ ]
Deepened [ ] Cable [ ] Driven [ ]
Reconditioned [ ] Rotary [X] Jetted [ ]

(5) DIMENSIONS Diameter of well 8"6" Liner inches
Drilled ft Depth of completed well ft

(6) CONSTRUCTION DETAILS
Casing installed 8 Diam from +1 ft to 20 ft
Threaded [ ] Diam from ft to ft
Welded [ ] Diam from ft to ft

Perforations Yes [ ] No [X]
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 [X]
Manufacturer's Name
Type Model No
Diam Slot size from ft to ft
Diam Slot size from ft to ft

Gravel packed Yes [ ] No [X] Size of gravel
Gravel placed from ft to ft

Surface seal Yes [X] No [ ] To what depth? 20 ft
Material used in seal Puddeling Clay
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP Manufacturer's Name X
Type H P

(8) WATER LEVELS Land surface elevation above mean sea level ft
Static level 140 ft below top of well Date 4-16-77
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? US
Yield 35 gal/min with ft drawdown after hrs
By air Rotary Blown

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
Artesian flow g p m Date
Temperature of water Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG

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 formation

MATERIAL	FROM	TO
Top Soil	1	3
Brown Clay	1	7
Broken Basalt	7	13
Hard Basalt	13	225
Broken Basalt with Blue Clay	225	255
Hard Basalt	255	305
Broken Basalt	305	335
Hard Basalt	335	340
Hard Pay Sandstone	340	350
Hard Basalt	350	385
Broken Basalt	385	380
Hard Basalt	380	405

RECEIVED
JUN 15 1977
DEPARTMENT OF ECOLOGY
CENTRAL REGIONAL OFFICE

Work started 4-14 19 77 Completed 4-15 19 77

WELL DRILLER'S STATEMENT

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

NAME Carman Water Well's INC.
(Person firm or corporation) (Type or print)

Address RT 1 Box 1299 Benton City

[Signed] James D Carman
(Well Driller)

License No 0699 Date 4-16 19 77

(USE ADDITIONAL SHEETS IF NECESSARY)

VC

ECY 050-1 20

Ecology Well Log 339470

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 086978

Water Right Permit No G

(1) OWNER Name Two Bar A Ranch Address 1131 Maires Rd., Outlook, WA 98938

(2) LOCATION OF WELL County Yakima SW / NE / Sec 15 T 11 N R 22 WM

(2a) STREET ADDDRESS OF WELL (or nearest address)

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

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

(5) DIMENSIONS Diameter of well 10 & 8 inches
Drilled 820 feet Depth of completed well 820 ft

(6) CONSTRUCTION DETAILS
Casing installed 8 Diam from +2 ft to 743 ft
Welded ☒ Liner installed ☐ Threaded ☐ Diam from ft to ft
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? 300+ ft
Material used in seal Bentonite & Cement
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 ft
Static level 403 ft below top of well Date
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 85 gal /min with ft drawdown after hrs
ESTIMATED AIRLIFT

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 gal /min with stem set at ft for hrs
Artesian flow g p m Date
Temperature of water 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
Soil & Cobbles	0	12
Broken Basalt	12	14
Silt, Sand, Clay	14	50
Fractured Basalt	50	58
Basalt, Gray, Hard JUL 24 1992	58	65
Basalt, Broken	65	120
Broken Basalt	120	140
Decomposed Basalt	140	160
Fractured Basalt	160	178
Fractured Basalt, Gray	178	268
Weathered, Rotten Basalt	268	347
Fractured Basalt	347	400
Shale, Brown, Sandy	400	426
Fractured Basalt, Black	426	460
Basalt, Gray, Hard	460	510
Fractured Basalt, Black	510	525
Basalt, Broken, Black w/Shale, Yellow	525	578
Basalt, Black, Hard	578	600
Fractured Basalt, Porous	600	602
Basalt, Black	602	640
Bad Crevis	640	660
Broken Basalt, Porous	660	675
Basalt, Blue & Gray, Shale	675	682
Broken Basalt, Black	682	708
Broken Basalt, Black, Caving	708	730
Red Rock	730	755
Broken Red Rock, Porous	755	763
Fractured Basalt, Black	763	805
Broken Basalt, Brown	805	810
Sandstone, Brown, Clay	810	815
Clay, Blue	815	820
8" Drive Shoe Utilized		

Work started 6-23-92 19 Completed 7-7-92 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 Ponderosa Drilling & Development, Inc. (PERSON FIRM OR CORPORATION) (TYPE OR PRINT)

Address E 6010 Broadway, Spokane, WA 99212

(Signed) Bob Britton (WELL DRILLER) License No 0043

Contractor s Registration No PO-ND-EI*248JE (Bob Britton) Date July 8 19 92

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050 1 20 (10/87) 1329 3

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

Application No
Permit No G3-009975P

(1) OWNER Name Rattle Snake Ranch Address NW

(2) LOCATION OF WELL County Yakima NW ¼ SE ¼ Sec 24 T 11 N R 22 WM

Bearing and distance from section or subdivision corner 1100 ft. So. & 2000' W of E¼ Corner of SE ¼

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

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

(5) DIMENSIONS Diameter of well 17½ & 12¼ inches
Drilled ft Depth of completed well 1164 ft

(6) CONSTRUCTION DETAILS

Casing installed 20 Diam from +1 ft to 18 ft
Threaded ☐ 14 Diam from +1 ft to 420 ft
Welded ☒ 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 Cement
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 H P

(8) WATER LEVELS Land surface elevation above mean sea level 1205 ft
Static level ft below top of well Date
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
Artesian flow g p m Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG

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 formation

MATERIAL	FROM	TO
Top Soil	0	4
Gravel	4	18
Sand stone	18	52
Broken Blk Basalt	52	78
Brown Clay	78	94
Gry white Sand	94	123
Blk Hard Basalt	123	147
Silt & Sand w/ Coarse Clay	147	347
Blk Basalt	347	538
Blk, Red Lrd Broken Basalt	538	545
Silt Sand & Blu Clay	545	602
Blk Basalt	602	711
Blk Broken Basalt	711	725
Blk. Hard Basalt	725	838
Broken Basalt water	838	855
Blk & Gry Basalt	855	1070
Red & Rust Basalt water	1070	1091
Blk Basalt water	1091	1110
Red & Rust Broken Basalt water	1110	1148
Black Hard Basalt	1148	1165

RECEIVED
AUG 31 1977
DEPARTMENT OF ECOLOGY
CENTRAL OFFICE

Work started 5-20 1977 Completed 6-18 1977

WELL DRILLER'S STATEMENT

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

NAME Taylor Drilling Inc (Person firm or corporation) (Type or print)
Address Chehalis WA
[Signed] (Well Driller)
License No 0282 Date 7-5 1977

(USE ADDITIONAL SHEETS IF NECESSARY)

S F No 7356—OS—(Rev 4 71)
ECY 070 28

Ecology Well Log 339854

File Original and First Copy with Department of Ecology 119427
Second Copy Owner's Copy
Third Copy Driller s copy

WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent W160605
UNIQUE WELL I D # AGM506
Water Right Permit No

(1) OWNER Name MARSHALL ANDERSON Address 411 N COUNTY LINE, GRANDVIEW, WA 98930

(2) LOCATION OF WELL County BENTON SW 1/4 1/4 Sec 30 T 10 N R 24 WM

(2a) STREET ADDRESS OF WELL (or nearest address) N COUNTY LINE

TAX PARCEL NO 13004301 1405-002 L, m, N, P

(3) PROPOSED USE [X] Domestic [ ] Industrial [ ] Municipal [ ] Irrigation [ ] Test Well [ ] Other [ ] DeWater

(4) TYPE OF WORK Owner's number of well (If more than one)
[X] New Well Method
[ ] Deepened [ ] Dug [ ] Bored
[ ] Reconditioned [ ] Cable [ ] Driven
[ ] Decommission [X] Rotary [ ] Jetted

(5) DIMENSIONS Diameter of well 6 inches
Drilled 414 feet Depth of completed well 388 ft

(6) CONSTRUCTION DETAILS
Casing Installed
[X] Welded 6 Diam from +2 ft to 185 ft
[ ] Liner installed Diam from ft to ft
[ ] Threaded Diam from ft to ft

Perforations [ ] Yes [X] 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 [X] 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 [X] No [ ] Size of gravel/sand
Material placed from ft to ft

Surface seal [X] Yes [ ] No To what depth? 185 ft
Material used in seal BENTINITE
Did any strata contain unusable water? [ ] Yes [X] No
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP Manufacturer's Name
Type H P

(8) WATER LEVELS Land surface elevation above mean sea level ft
Static level 340 ft below top of well Date 5/9/2002
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 [X] 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 2 gal./min with stem set at 382 ft for hrs
Artesian flow g p m Date
Temperature of water Was a chemical analyses made? [ ] Yes [X] No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION

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 Indicate all water encountered

MATERIAL	FROM	TO
SOIL BASLT AND BOULDERS	0	3
BASALT BROKEN AND SOIL	3	7
BASALT BROKEN AND CLAY	7	16
BASALT	16	59
CLAY	59	117
SAND	117	141
BASALT BROKEN GREY BROWN	141	167
BASALT BLACK BROWN	167	183
BASALT BLACK	183	223
BASALT BROKEN BLACK BROWN	223	258
BASALT GREY BLACK	258	265
BASALT BROKEN BLACK BROWN LARGE CUTTING CAVING	265	279
BASALT GREY HARD	279	304
BASALT GREY BLACK BROWN BROKEN SOFT	304	309
BASALT GREY	309	318
BASALT GREY BROWN SOFT BROKEN CAVING	318	325
BASALTGREY BLACK HARD	325	341
BASALT GREY BLACK BROWN SOFT H2O	341	354
BASALT GREY BLACK BROWN SOFT AND GREEN SHALE CLAY	354	365
BASALT GREY BLACK BROWN SOFT AND BROWN CLAY	365	382
BASALT GREY BLACK BROWN SOFT LARGE CUTTINGS CAVING	382	391
BASALT GREY BLACK BROWN SOFT AND BROWN CLAY	391	414

DEPT OF ECOLOGY Received JUL 09 2002 CENTRAL REGION OFFICE

Work Started 5/8/2002 19 Completed 5/9/2002 19

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

Type or Print Name TOM MCGUIRE License No 0357
(Licensed Driller/Engineer)
Trainee Name License No
Drilling Company RICK POULIN WELL DRILLING
(Signed) Tom McGuire License No 0357
(Licensed Driller/Engineer)
Address 1301 LANCASTER RD SELAH, WA 98942
Contractor's Registration No RICKPWD042J2 Date 5/9/02 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 (360) 407 6600 The TDD number is (360) 407 6006

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Ecology Well Log 352898

WATER WELL REPORT

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

Construction/Decommission (x in circle)
X Construction 126783
O Decommission *ORIGINAL CONSTRUCTION Notice of Intent Number* _____

CURRENT Notice of Intent No WSL60 41664

Unique Ecology Well ID Tag No AHK 209

Water Right Permit No _____ N

Property Owner Name Don Pratt Const

Well Street Address 2803 County Meadows Loop

City Richland County Benton

Location SW 1/4 1/4 SW 1/4 Sec 20 Twn 8N R 28 E W M circle one

Lat/Long (s t r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No 1-2098-302-0006-009

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

TYPE OF WORK Owner's number of well (if more than one) _____
X New Well ☐ Reconditioned *Method* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☐ Cable X Rotary ☐ Jetted

DIMENSIONS Diameter of well 6 inches drilled 1236 ft
Depth of completed well 1236 ft

CONSTRUCTION DETAILS
Casing Installed X Welded 6 Diam from +1 ft to 1236 ft
☐ Liner installed _____ Diam from _____ ft to _____ ft
☐ Threaded _____ Diam from _____ ft to _____ ft

Perforations ☐ Yes X No
Type of perforator used _____
SIZE of perfs _____ in by _____ in and no of perfs _____ from _____ ft to _____ ft

Screens ☐ Yes X 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 X No ☐ Size of gravel/sand _____
Materials placed from _____ ft to _____ ft

Surface Seal X Yes ☐ No To what depth? 20 ft
Materials used in seal Bentonite
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 78 ft below top of well Date 7-12-02
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 40 gal/min with stem set at 110 ft for 2 hrs
Artesian flow _____ g p m Date _____
Temperature of water _____ Was a chemical analysis made? ☐ Yes ☐ No

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 Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY)

MATERIAL	FROM	TO
Sand Rock silty	0	26
Basalt Gravel	26	
aquifer		51
Silt Rock	51	82
Basalt Gravel aquifer waters Bearing	82	
		1236

DEPT OF ECOLOGY Received OCT 04 2002 CENTRAL REGION OFFICE

Start Date 7-11 Completed Date 7-12-02

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.

X Driller ☐ Engineer ☐ Trainee Name (Print) Jim Nelson
Driller/Engineer/Trainee Signature Jim Nelson
Driller or Trainee License No 0361

Drilling Company Nelson Well Drilling, Inc
Address 7505 W Coors
City State Zip Pasco WA 99301
Contractor's Registration No NELSOWD198CQ Date 7-12-02

If trainee, licensed driller's Signature and License no _____

Ecology is an Equal Opportunity Employer ECY 050 1 20 (Rev 4/01)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Ecology Well Log 389559

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

Permit No. G4-28151

(1) OWNER: Name GRANT WAYNE JACKSON Address

(2) LOCATION OF WELL: County YAKIMA SW¼ NW¼ Sec. 11 T. 10 N. R. 23 W.M.
¼ and distance from section or subdivision corner

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

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

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 0 ft. Depth of completed well 420 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: ..." Diam. from ... ft. to ... ft.
Threaded ☐ ..." Diam. from ... ft. to ... ft.
Welded ☑ 8 " Diam. from 0 ft. to 120' 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? 20' ft.
Material used in seal
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: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 125 ft. below top of well Date
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.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

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 formation.

MATERIAL	FROM	TO
Top Soil	0	10
Boulders	10	40
Sand Stone Soft	40	170
Broken Rock	170	200
Hard Black Basalt	200	218
Medium Hard Gray Basalt	218	300
Hard Gray Basalt	300	385
Broken Brown Rock	385	420
With water		

RECEIVED
FEB 23 1983
DEPARTMENT OF ECOLOGY

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME (Person, firm, or corporation) (Type or print)

Address

[Signed] (Well Driller)

License No. Date 19

EP 2/28/83

(USE ADDITIONAL SHEETS IF NECESSARY)

CY 050-1-20

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Ecology Well Log 415338

WATER WELL REPORT

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

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

☐ Construction

☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* 175285

RECEIVED DEPT. OF ECOLOGY Received AUG 01 2005 WELL CONSTRUCTION SECTION

CURRENT

Notice of Intent No. W150759

Unique Ecology Well ID Tag No. AHP774

Water Right Permit No. CG4-31301C

Property Owner Name Desert Hills Vineyard (Andy Denhoed)

Well Street Address 61603 N. Wilgus Rd.

City Grandview County Benton

Location SW1/4-1/4 SW1/4 Sec 33 Twn 10N R 24 EWM or WWM ☑ circle one

Lat/Long (s, t, r Still **REQUIRED**) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

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 ☐ Deepened *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Cable ☑ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 12" inches, drilled 515 ft.

Depth of completed well 515 ft.

CONSTRUCTION DETAILS

Casing Installed: ☑ Welded 24" Diam. from +1 ft to 19' ft

☑ Liner installed 12" Diam. from +1 ft to 197' ft

☐ Threaded _____" Diam. from _____ ft to _____ ft

Perforations: ☐ Yes ☑ No

Type of perforator used _____

SIZE of perfs _____ in by _____ in. and no. of perfs ____ from ____ ft to ____ ft

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? 197' ft

Material used in seal cement

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 184' ft. below top of well Date _____

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 750 gal./min. with stem set at 500 ft. for 1 hrs.

Artesian flow _____ g.p.m. Date _____

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

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
Soft brown silt	0	12
Med. hard brown & gray basalt	12	33
Reddish brown basalt soft	33	37
Med. hard gray & brown basalt	37	53
Hard gray basalt	53	75
Soft Brown Sandstone	75	154
Med. soft reddish brown & black basalt		
Trace of Tan Clay	154	160
Med. hard gray basalt	160	173
Hard gray basalt	173	258
Broken Brown & gray visicular basalt some tan		
claystone	258	262
Med. hard gray basalt	262	268
Broken brown & gray basalt some visicular Trace of		
tan claystone water 5 gpm	268	273
Hard gray basalt	273	285
Med. soft broken brown & gray basalt some brown		
clay Water 200gpm	285	305
Med. hard gray basalt some porus with green clay	305	330
Hard light gray basalt	330	366
Med soft dark gray porus basalt with some green		
claystone little reddish brown basalt	366	373
Med. hard dark gray basalt	373	390
Soft reddish brown basalt	390	395
Med. hard brown & gray basalt	395	423
Hard dark gray basalt	423	457
Med. soft porus dark gray basalt Trace of hard green		
clay water	457	462
Med. hard dark gray basalt	462	468
Reddish brown basalt med. soft	468	472
Porus basalt, trace of hard greeen clay	472	475

Start Date 6-24-05 Completed Date 7-6-05

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) Larry McLanahan

Driller/Engineer/Trainee Signature _____

Driller or trainee License No. 0337

Drilling Company BJ Exploration Co., Inc.

Address 404 North Conway Street

City, State, Zip Kennewick, WA 99336

Contractor's Registration No. BJEXPCI132QK Date 7-29-05

If TRAINEE,

Driller's Licensed No. _____

Driller's Signature _____

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05) **The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.**

WATER WELL REPORT

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

DEPT. OF ECOLOGY Received AUG 01 2005 CENTRAL REGION OFFICE

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

☐ Construction

☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* 178285

CURRENT
Notice of Intent No. W150759

Unique Ecology Well ID Tag No. AHP774

Water Right Permit No. CG4-31301C

Property Owner Name Desert Hills Vineyard (And Orchard)

Well Street Address 61603 N. Wilgus Rd.

City Grandview County Benton

Location SW1/4-1/4 SW1/4 Sec 33 Twn 10N R 24 EWM or WWM ☑ circle one

Lat/Long (s, t, r Still **REQUIRED**) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

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 ☐ Deepened *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Cable ☑ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 12" inches, drilled 515 ft.
Depth of completed well 515 ft.

CONSTRUCTION DETAILS

Casing Installed: ☑ Welded 24" Diam. from +1 ft to 19' ft
☑ Liner installed 12" Diam. from +1 ft to 197' ft
☐ Threaded _____ Diam from _____ ft to _____ ft

Perforations: ☐ Yes ☑ No
Type of perforator used _____
SIZE of perfs _____ in by _____ in. and no. of perfs _____ from _____ ft to _____ ft

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? 197' ft.
Material used in seal cement
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 184' ft. below top of well Date _____
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 750 gal./min. with stem set at 500 ft. for 1 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? ☐ Yes ☐ No

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
Med. hard gray basalt	475	495
Med. soft gray & black porus basalt	495	512
Green Sandstone & clay	512	515
12" casing 197'		
11 7/8" hole to 197' to 515'		

Start Date 6-24-05 Completed Date 7-6-05

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) Larry McLanahan

Driller/Engineer/Trainee Signature Larry McL

Driller or trainee License No. 0337

Drilling Company BJ Exploration Co., Inc.

Address 404 North Conway Street

City, State, Zip Kennewick, WA 99336

Contractor's Registration No. BJEXPCI132QK Date 7-29-05

If TRAINEE,
Driller's Licensed No. _____
Driller's Signature _____

Ecology is an Equal Opportunity Employer.

WATER WELL REPORT

State of Washington Date Printed: 27-Feb-2009 Log No. 0

Construction / Decommission: Original Construction

Construction 337913 Notice of Intent #:

PROPOSED USE: LIVESTOCK

TYPE OF WORK: Owners's Well Number: (If more than one well) PAGE1OF2

NEW WELL Method: ROTARY

DIMENSIONS: Diameter of well: 8X6 inches

Drilled 345 ft. Depth of completed well 345 ft.

CONSTRUCTION DETAILS:

Liner installed:

" Dia from ft. to ft.

Casing installed WELDED

8 " Dia from +1 ft. to 37 ft.

6 " Dia from +2 ft. to 334 ft.

" Dia from ft. to ft.

Perforations: No Used In:

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: No K-Pac Location:

Manufacture's Name

Type: Model No

Diam. slot size: from ft. to ft.

Diam. slot size: from ft. to ft.

Gravel/Filter packed: No Size of Gravel

Material placed from ft. to ft.

Surface seal: Yes To what depth 20 ft.

Seal method: Material used in seal BENTONITE

Did any strata contain unusable water No

Type of water Depth of strata

Method of sealing strata off

PUMP: Manufacture's name

Type: H.P. 0

WATER LEVELS: Land-surface elevation above mean sea level: 0 ft.

Static level 190 ft. below top of well Date 01/15/2009

Artesian Pressure lbs per square inch Date

Artesian water controlled by

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

Was a pump test made? No If yes, by whom

Yield: gal/min with ft drawdown after

Yield: gal/min with ft drawdown after

Yield: gal/min with ft drawdown after

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 ft drawdown after hrs.

Air test 50+ gal/min w/ stem set at 345 ft. for 1 1/2 hours

Artesian flow gpm Date

Temperature of water Was a chemical analysis made No

CURRENT

Notice of Intent No.: WE09503

Unique Ecology Well I.D. No BBH042

Water Right Permit Number:

OWNER: VEIGA, ANTHONY & BRENDA

OWNER ADD 7010 EAST EDISON ROAD

SUNNYSIDE, WA 98944

Well Add: 7190 SHELLER ROAD

City: Sunnyside, WA 98944 County: Yakima

Location: NW 1/4 SE 1/4 Sec 24 T 10 R 23E EW

Lat/Long: (s, t, r still REQUIRED) Lat Deg Lat Min/Sec

Long Deg Long Min/Se

Tax Parcel No.: 231024-43003

CONSTRUCTION OR DECOMMISSION PROCEDURE

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

Material	From	To
SILTY TOPSOIL W/SAND	0	8
BASALT BROKEN BROWN BLACK W/SAND	8	29
BASALT BROKEN BROWN W/SOME CLAY	29	37
BASALT BLACK MED	37	44
BASALT BROWN SOFT	44	65
BASALT BLACK HARD	65	81
BASALT BLACK MED W/FRAC	81	100
HARD TAN CLAY W/SANDSTONE SOFT	100	170
COARSE SAND	170	188
BASALT BROWN BLACK FRAC W/WATER	188	218
BASALT BLACK HARD	218	289

Notes:

1 - 8" DRIVE SHOE & 1 - 6" DRIVE SHOE

RECEIVED

APR 23 2009

DEPARTMENT OF ECOLOGY CENTRAL REGIONAL OFFICE

Work started 01/12/2009 Complete 01/15/2009

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 are true to my best knowledge and belief.

☑ Driller ☐ Engineer ☐ Trainee

Name: TODD LIVELY License No.: 2321

Signature:

If trainee, Licensed driller is: License No.:

Licensed Driller Signature

Drilling Company:

NAME: FOGLE PUMP & SUPPLY, INC. Shop: COLVILLE

ADDRESS: 316 W. 5TH

Colville, WA 99114

Phone: 509-684-2569 Toll Free: 800-533-6518

E-Mail: jeanne@foglepump.com

FAX: 509-684-3032 WEB Site: www.foglepump.com

Contractor's Registration No.: FOGLEPS095L4 Date Log Created: 1/29/2009

WATER WELL REPORT

State of Washington Date Printed: 27-Feb-2009 Log No. 0

Construction / Decommission: Original Construction

Construction 337913 Notice of Intent #:

PROPOSED USE: LIVESTOCK

TYPE OF WORK: Owners's Well Number: (If more than one well) PAGE2OF 2

NEW WELL Method: ROTARY

DIMENSIONS: Diameter of well: 8X6 inches

Drilled 345 ft. Depth of completed well 345 ft.

CONSTRUCTION DETAILS:

Liner installed:

" Dia from ft. to ft.

Casing installed WELDED

8 " Dia from +1 ft. to 37 ft.

6 " Dia from +2 ft. to 334 ft.

" Dia from ft. to ft.

Perforations: No Used In:

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: No K-Pac Location:

Manufacture's Name

Type: Model No

Diam. slot size: from ft. to ft.

Diam. slot size: from ft. to ft.

Gravel/Filter packed: No Size of Gravel

Material placed from ft. to ft.

Surface seal: Yes To what depth 20 ft.

Seal method: Material used in seal BENTONITE

Did any strata contain unusable water No

Type of water Depth of strata

Method of sealing strata off

PUMP: Manufacture's name

Type: H.P. 0

WATER LEVELS: Land-surface elevation above mean sea level: 0 ft.

Static level 190 ft. below top of well Date 01/15/2009

Artesian Pressure lbs per square inch Date

Artesian water controlled by

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

Was a pump test made? No If yes, by whom

Yield: gal/min with ft drawdown after

Yield: gal/min with ft drawdown after

Yield: gal/min with ft drawdown after

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 ft drawdown after hrs.

Air test 50+ gal/min w/ stem set at 345 ft. for 1 1/2 hours

Artesian flow gpm Date

Temperature of water Was a chemical analysis made No

CURRENT

Notice of Intent No.: WE09503

Unique Ecology Well I.D. No BBH042

Water Right Permit Number:

OWNER: VEIGA, ANTHONY & BRENDA

OWNER ADD 7010 EAST EDISON ROAD

SUNNYSIDE, WA 98944

Well Add: 7190 SHELLER ROAD

City: Sunnyside, WA 98944 County: Yakima

Location: NW 1/4 SE 1/4 Sec 24 T 10 R 23E EW

Lat/Long: (s, t, r still REQUIRED) Lat Deg Lat Min/Sec

Long Deg Long Min/Se

Tax Parcel No.: 231024-43003

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure. Show thicknessof aquifers and the kind and nature of the material in each stratum penetrated. Show at least one entry for each change in formation.

Material	From	To
BASALT BROKEN BROWN BLACK W/WATER	327	337
BASALT BLACK BROWN MED. W/FRAC	337	345

Notes:

1 - 8" DRIVE SHOE & 1 - 6" DRIVE SHOE

RECEIVED APR 2 2 2009 DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Work started 01/12/2009 Complete 01/15/2009

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 are true to my best knowledge and belief.

☑ Driller ☐ Engineer ☐ Trainee

Name: TODD LIVELY License No.: 2321

Signature:

If trainee, Licensed driller is: License No.:

Licensed Driller Signature

Drilling Company:

NAME: FOGLE PUMP & SUPPLY, INC. Shop: COLVILLE

ADDRESS: 316 W. 5TH

Colville, WA 99114

Phone: 509-684-2569 Toll Free: 800-533-6518

E-Mail: jeanne@foglepump.com

FAX: 509-684-3032 WEB Site: www.foglepump.com

Contractor's Registration No.: FOGLEPS095L4 Date Log Created: 1/29/2009

Amended

WATER WELL REPORT

State of Washington Date Printed: 12-Sep-2012 Log No. 0

Construction / Decommission: Original

Construction 337913 Construction Notice

PROPOSED USE: **LIVESTOCK**

TYPE OF WORK: Owners's Well Number: (If more than one well)

NEW WELL Method: **ROTARY**

DIMENSIONS: Diameter of well: **8X6** inches

Drilled **345** ft. Depth of completed well **345** ft.

CONSTRUCTION DETAILS:

Liner installed:

" Dia from ft. to ft.

Casing installed **WELDED**

8 " Dia from **+1** ft. to **37** ft.

6 " Dia from **+2** ft. to **334** ft.

" Dia from ft. to ft.

Perforations: **No** Used In:

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: **0** K-Pac Location:

Manufacture's Name

Type: Model No

Diam. slot size: from ft. to ft.

Diam. slot size: from ft. to ft.

Gravel/Filter packed: **No** Size of Gravel

Material placed fro ft. to ft.

Surface seal: **Yes** To what depth **20** ft.

Seal method: Material used in seal **BENTONITE**

Did any strata contain unusable water **No**

Type of water Depth of strata

Method of sealing strata off

PUMP: Manufacture's name

Type: H.P. **0**

WATER LEVELS Land-surface elevation above mean sea level: **0** ft.

Static level **190** ft. below top of well Date **01/15/2009**

Artesian Pressure lbs per square inch Date

Artesian water controlled by

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

Was a pump test made **No** If yes, by whom

Yield: gal/min with ft drawdown after

Yield: gal/min with ft drawdown after

Yield: gal/min with ft drawdown after

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 ft drawdown after hrs.

Air test **50+** gal/min w/ stem set at **345** ft. for **1.5** hours

Artesian flow gpm Date

Temperature of water Was a chemical analysis made **No**

CURRENT

Notice of Intent No.: **WE09503**

Unique Ecology Well I.D. No **BBH042**

Water Right Permit Number:

OWNER: **VEIGA, ANTHONY & BRENDA**

OWNER ADD **7010 EAST EDISON ROAD**

SUNNYSIDE, WA 98944

Well Add **7190 SHELLER RD**

City: **Sunnyside, WA 98944** County: **Yakima**

Location: **SW** 1/4 **SE** 1/4 Sec **24** T **10** R **23** EW

Lat/Long: (s, t, r still REQUIRED) Lat Deg Lat Min/Sec

Long Deg Long Min/Se

Tax Parcel No.: 231024-43003

DEPT OF ECOLOGY Received SEP 28 2012 CENTRAL REGION OFFICE

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure. Show thickness of aquifiers and the kind and nature of the material in each stratum penetrated. Show at least one entry for each change in formation.

Material	From	To
SILTY TOP SOIL W/SAND	0	8
BASALT BROKEN BROWN BLACK W/SAND	8	29
BASALT BROKEN BROWN W/SOME BROWN CL	29	37
BASALT BLACK MED	37	44
BASALT BROWN SOFT	44	65
BASALT BLACK HARD	65	81
BASALT BLACK MED W/FRAC	81	100
HARD TAN CLAY W/SANDSTONE SOFT	100	170
COARSE SAND	170	188
BASALT BROWN BLACK FRAC W/WATER	188	218
BASALT BLACK HARD	218	289
BASALT BLACK MED W/FRAC	289	327
BASALT BROKEN BROWN BLACK W/WATER	327	337

Notes:

1 - 8" drive shoe, 1 - 6" drive shoe

Work starte **01/12/2009** Complete **01/15/2009**

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 are true to my best knowledge and belief

☑ Driller ☐ Engineer ☐ Trainee

Name: **TODD LIVELY** License No.: **2321**

Signature:

If trainee, Licensed driller is: License No.:

Licensed Driller Signature

Drilling Company:

NAME: **FOGLE PUMP & SUPPLY, INC.** Shop: **COLVILLE**

ADDRESS: **316 W. 5TH**

Colville, WA 99114

Phone: **509-684-2569** Toll Free: **800-533-6518**

E-Mail: **jeanne@foglepump.com**

FAX: **509-684-3032** WEB Site: **www.foglepump.com**

Contractor's Registration No.: **FOGLEPS095L4** Date Log Created: **9/8/2012**

Water Well Log - Page 2

Ecology Well Log 582101, cont.

337913

FOGLE PUMP & SUPPLY, INC.

Log No. 0

Notice of Intent No.: WE09503

Unique Well I.D. No.: BBH042

Well Construction Details Continued:

Material	From	To
BASALT BLACK BROWN MED W/FRAC.	337	345

Ecology Well Log 808399

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*

451047 *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 6 inches, drilled 343 ft. Depth of completed well 343 ft.

CONSTRUCTION DETAILS

Casing ☒ Welded 6" Diam. from +2 ft. to 18 ft.

Installed: ☒ Liner installed 4" Diam. from -3 ft. to 343 ft.

☐ Threaded ____" Diam. From ____ ft. to ____ ft.

Perforations: ☒ Yes ☐ No

Type of perforator used skill saw

SIZE of perfs 1/4 in. by 6 in. and no. of perfs 45 from 303 ft. to 343 ft.

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? 18 ft.

Material used in seal hole plug

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 184 ft. below top of well. Date 03/31/12

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 15 gal./min. with stem set at 338 ft. for 1 hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water 57 Was a chemical analysis made? ☐ Yes ☒ No

CURRENT

Notice of Intent No. WE14361

Unique Ecology Well ID Tag No. BBJ-846

Water Right Permit No. N/A

Property Owner Name Dan Sims

Well Street Address 4250 SLI road

City Sunnyside County Yakima

Location Nw1/4-1/4 SW1/4 Sec 12 Twn 10 R 23 (s, t, r Still REQUIRED) EWM ☒ Or WWM ☐

Lat/Long Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____

Tax Parcel No. (Required)231012-32001

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
Top soil	0	8
broken basalt	8	15
Black Basalt	15	76
Brown Sandstone	76	82
Brown Sand	82	101
Tan Clay	101	148
Black Basalt	148	270
Broken Basalt	270	274
Basalt	274	288
Broken Basalt	288	309
Black Basalt	309	343

ST OF ECOLOGY Received JUN 19 2012 CENTRAL REGION OFFICE

Start Date 03/29/12 Completed Date 03/31/12

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)

Driller/Engineer/Trainee Signature Lyle D. Amos

Driller or trainee License No. 1224

IF TRAINEE: Driller's License No: [redacted]

Driller's Signature: Lyle D. Amos

Drilling Company Triple A Drilling, Inc.

Address 785 Tumb[illegible]

City, State, Zip Burbank, WA 99323

Contractor's Registration No. TripldI937BB Date 03/31/12

Ecology Well Log 883909

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No: RE09281

Construction/Decommission

[X] Construction 491650
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well
[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: George DeRuyter & Sons Dairy
Site Address: CHAPELLE RD. & E. NOUGHTON RD.

Consulting Firm: ARCADIS

City: ZILLAH County: Yakima

Unique Ecology Well ID Tag No.: BIC-607

Location: NW 1/4 SE 1/4 Sec 19 Twn 11N R 22E or WWM EWM

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.

Lat/Long (s,t,r still Required) Lat Deg ___ Lat Min/Sec ___ Long Deg ___ Long Min/Sec ___

[X] Driller [ ] Engineer [ ] Trainee Name (Print) Ed Kostecky

Driller/Trainee Signature

Driller/Trainee License No. 2490

Tax Parcel No. 221193004

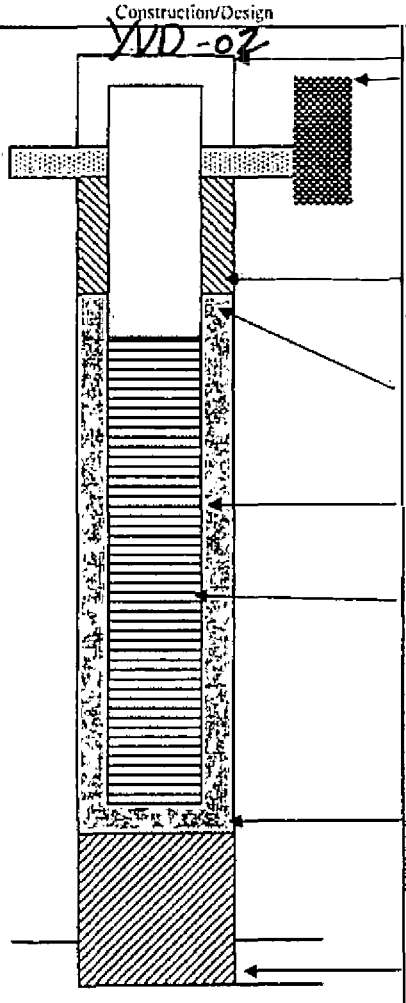
If trainee, licesned drillers' Signature and License No.

Cased or Uncased Diameter 8" Static Level 20.05

Work/Decommision Start Date 8-21-2013

Work/Decommision End Date 8-21-2013

Construction/Design



Well Data W3-384

Locking Cap	
Protective Post	
Concrete Surface Seal Depth	FT
Blank Casing (dia x dep)	2" +2.5-15'
Material	SCH 40 PVC
Backfill	FT
Type	
Seal	3-13' 10'
Material	Bent. Chips
	13-36'
Gravel Pack	23' FT
Material	10-20 SAND
	15-35'
	2" X 20'
Screen (dia x dep)	
Slot Size	.020
Material	SCH 40 PVC
Well Depth	35 FT
Backfill	SAND
Material	/ Bent.
Total Hole Depth	48 FT

Formation Description

0 - 4 SiH FT
4-12 - Gravelly SAND
12-30 wX boul
30-48 BASALT

0 - FT

0 - FT

DEPT OF ECOLOGY Received NOV 15 2013 CENTRAL REGIONAL OFFICE

DEPT OF ECOLOGY Received OCT 04 2013 CENTRAL REGION OFFICE

Scale 1" = _____ Page _____ of _____

ECY 050-12 (Rev 2-01)

Ecology Well Log 1564538

WATER WELL REPORT

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

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

● Construction

○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

CURRENT

Notice of Intent No. WE21544

Unique Ecology Well ID Tag No. BJB551

Water Right Permit No. G4-25233C

Property Owner Name Wine Makers LLC

Well Street Address SR 1 Rd and Jolaha Rd

City Grandview County Yakima

Location SE 1/4-1/4 NE 1/4 Sec 14 Twn 10N R 23 (EWM or WWM) circle one

Lat/Long (s, t, r Still **REQUIRED**) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. 231014140001

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

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

☑ New well ☐ Reconditioned ☐ Deepened

Method: ☐ Dug ☐ Bored ☐ Driven ☐ Cable ☑ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 12 inches, drilled 1010 ft.

Depth of completed well 1010 ft.

CONSTRUCTION DETAILS

Casing Installed: ☑ Welded 16" Diam. from +1' ft. to 380 ft.

☑ Liner installed 12" Diam. from +2 ft. to 656 ft.

☐ Threaded _____" Diam. from _____ ft. to _____ ft.

Perforations: ☐ Yes ☑ No

Type of perforator used _____

SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.

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? 380 ft.

Material used in seal Portland cement

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 707 ft. below top of well Date 10-27-15

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 _____ gal./min. with stem set at _____ ft. for _____ hrs.

Artesian flow _____ g.p.m. Date _____

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

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
Loose cemented gravel	0	35
Soft broken brown & brown clay	35	78
Soft black basalt	78	128
Sand Stone	128	150
Soft brown basalt	150	186
Sand stone	186	202
Hard black basalt	202	335
Soft reddish brown basalt	335	355
Soft black basalt	355	360
Hard grey basalt	360	540
Soft black basalt	540	545
Soft brown basalt	545	550
Soft green clay	550	630
Soft black basalt	630	655
Hard black basalt	655	792
Soft porous black basalt	792	835
Hard black basalt	835	859
Soft black basalt	859	875
Hard black basalt	875	942
Soft black basalt	942	1005
Hard black basalt	1005	1010

DEPT OF ECOLOGY Received NOV 20 2015 CENTRAL REGION OFFICE

Start Date 7-28-15 Completed Date 10-27-15

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) David Smith

Driller/Engineer/Trainee Signature David Smith

Driller or trainee License No. 2844

Drilling Company Blue Star Enterprises

Address 2019 Battler Loop

City, State, Zip Richland WA. 99354

Contractor's Registration No Bluesen 942 RM Date 11-13-15

If TRAINEE,

Driller's Licensed No. _____

Driller's Signature _____

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05) **The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.**

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report

Ecology Well Log 1706323

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

Notice of Intent W307944
UNIQUE WELL I.D. # BIN475
Water Right Permit No.

(1) OWNER: Name Tom Garrison Address 251 Wade RD, Sunnyside, WA 98944

(2) LOCATION OF WELL: County Yakima - SW 1/4 NW 1/4 Sec 27 T. 11 N.,R 22 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 251 Wade Sunnyside WA 98944

TAX PARCEL NO. 221127-42003

(3) PROPOSED USE: [X] Domestic [ ] Industrial [ ] Municipal [ ] Irrigation [ ] Test Well [ ] Other [ ] DeWater

(4) TYPE OF WORK: Owner's number of well (If more than one)
[X] New Well Method: [ ] Dug [ ] Bored [ ] Deepened [ ] Cable [ ] Driven [ ] Reconditioned [ ] Rotary [ ] Jetted [ ] Decommission

(5) DIMENSIONS: Diameter of well 8 inches. Drilled 540 feet. Depth of completed well 503 ft.

(6) CONSTRUCTION DETAILS:
Casing Installed:
[X] Welded 8 " Diam. from +2 ft. to 89 ft.
[X] Liner installed 6 " Diam. from 74 ft. to 350 ft.
[ ] Threaded 4 1/2 " Diam. from 275 ft. to 515 ft.

Perforations: [X] Yes [ ] No
Type of perforator used Saw
SIZE of perforations 1/8 in. by 6 in.
25 perforations from 495 ft. to 515 ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: [ ] Yes [X] 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 [X] No [ ] Size of gravel/sand
Material placed from ft. to ft.

Surface seal: [X] Yes [ ] No To what depth? 89 ft.
Material used in seal Bentonite Hole Plug
Did any strata contain unusable water? [ ] Yes [X] No
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 304 ft. below top of well Date 12/14/2017
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 [X] No If yes, by whom?
Yield: 40 gal./min. with 500 ft. drawdown after hrs.
Yield: 20 gal./min. with 480 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 gal./min. with stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analyses made? [ ] Yes [X] No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION:
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. Indicate all water encountered.

MATERIAL	FROM	TO
Soil	0	2
Gravel & Clay	2	11
Sand	11	27
Sandy Clay	27	77
Basalt Black Brown	77	110
Basalt Black Brown & Clay Brown	110	134
Basalt Grey	134	142
Basalt Dark Grey & Clay Brown	142	149
Sandy Clay	149	308
Sand & Gravel	308	318
Basalt Brown Soft	318	337
Basalt Black	337	364
Basalt Black Brown Sorft	364	370
Basalt Black	370	373
Basalt Black Brown Soft	373	385
Basalt Black	385	403
Basalt Black Brown & Broken Layers Soft	403	440
Basalt Black Brown & Clay Brown Soft	440	455
Basalt Black Brown	455	463
Basalt Black Brown Broken Layers Soft	463	487
Basalt Brown Soft	487	507
Basalt Black Brown	507	512
Basalt Black Broken	512	527
Basalt Dark Grey	527	540

Set Pump 440 Feet 10 GPM

Department of Ecology
FEB 22 2018
Water Resources Program

Work Started 12/4/2017 , 19. Completed 12/14/2017 , 19

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.

Type or Print Name TOM MCGUIRE (Licensed Driller/Engineer) License No. 0357
Trainee Name License No.
Drilling Company RICK POULIN WELL DRILLING INC.
(Signed) (Licensed Driller/Engineer) License No. 0357
Address 1301 LANCASTER RD SELAH, WA 98942
Contractor's Registration No. RICKPWD944PW Date 12/14/2017 , 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 (360) 407-6600. The TDD number is (360) 407-6006.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report

Ecology Well Log 1985971

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE16683

Construction/Decommission 18-7653WA

☒ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well
☒ Resource Protection
☐ Geotechnical Soil Boring

Property Owner: Yakima County Public Services
Site Address: 128 N Second Street
Consulting Firm: PGG
City: Yakima County: Yakima

Unique Ecology Well ID
Tag No. BKB-731

Location 1/4 SE 1/4 NE Sec 29 Twn 11N R 21E ☐ EWM ☐ WWM

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

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.

Tax Parcel No. _____

☒ Driller ☐ Trainee Name (Print) Casey Wallace
Driller/Trainee Signature _____
Driller/Trainee License No. 3182

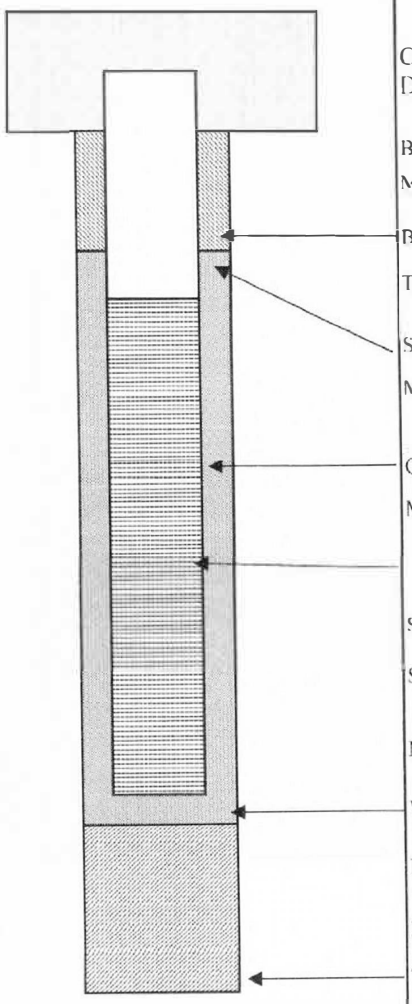
Cased Diameter 6" Static Level 164'

Work/Decommission Start Date 11/07/2018

If trainee, licensed driller's Signature and License No. _____

Work/Decommission End Date 11/08/2018

Construction/Design **Well Name:** MW-11



Concrete Surface Seal Depth	0 - 1 FT
Blank Casing (dia x dep)	2 " 1 x 164 FT
Material	Sch40 PVC
Backfill	FT
Type	
Seal	1 - 162 FT
Material	bentonite chips
Gravel Pack	162 - 179 FT
Material	12/20 silica sand
Screen (dia x dep)	2 " 164 x 179 FT
Slot Size	0.010
Material	Sch40 PVC
Well Depth	179 FT
Backfill	
Material	
Total Hole Depth	179 FT

Formation Description

0 - 20 FT	SILTY SANDS AND GRAVELS
20 - 70 FT	SILTY SANDS AND COBBLES
70 - 120 FT	CLAYEY SILT
120 - 176 FT	GRAVELY COBBLES
176 - 179 FT	SILTY SANDS WITH GRAVELS
- FT	

RECEIVED
WELL CONSTRUCTION AND LICENSING OFFICE
AUG 26 2020

Scale 1" = _____ Page _____ of _____

ECY 050-12 (Rev 2/01)

The Department of Ecology does NOT warranty the Data and/or information on this well report.

PGG Log matching Ecology Well Log 1985971

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
0				Moist, light brown, silty fine SAND.	Flush mount monument with concrete pad Top of PVC is 0.36 feet below top of steel monument
5				Moist, brown, fine sandy SILT. Moderately dense. Increased density and slight gravel fraction from 11.5 to 12 feet.	Hydrated bentonite annular seal 2-162 feet
10				Moist, reddish-brown sandy medium GRAVEL. Very dense layer of silty sand from 12.5 to 13 feet.	
15				Moist, brown, silty fine SAND. Dry to moist, light brown, fine to medium sandy medium to coarse GRAVEL.	Borehole diameter 6-inches
20				Dry to moist, light brown, fine to medium SAND. Slight softening downward.	2-inch schedule 40 flush thread PVC blank well casing 0.36-179.2 feet
25				Moist, light brown, silty fine SAND.	
30				Moist, light brown, fine to medium SAND.	
35				Moist, light brown, medium to coarse gravelly fine to medium SAND. Moist, light brown, medium sand. Very well sorted. Fining downward to fine to medium sand.	
40				Moist, light brown, gravelly fine to medium SAND. Sand fraction coarsening downward. Gravel fraction includes moderate CaCO3 accumulation.	
45				Moist, grey to light brown, fine to medium SAND. Moist, grey to light brown, coarse gravelly fine to medium SAND. Moist, light brown, fine to medium SAND with gravel fraction. Sand fraction slightly to moderately oxidized. Gravel fraction includes slight to moderate CaCO3	

Location (TRS): T11R21-29
Northing/Easting: N 393333.5 ft, E 1713616.4 ft
Logged by: David Wampler, PGG
Completion Date: 11/7/2018
Ecology ID: BKB-731

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 162.55 ft
MP Elevation: 974.13 ft
V. Datum: NAD88

YC-MW-11
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985971, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
50				accumulation.	
55				Moist, reddish-brown, clayey SILT. Silt fraction moderately oxidized.	
				Moist, light brown, fine to medium SAND. Well sorted. Fining downward. Trace gravel fraction.	
60					
65				Moist, light brown to reddish brown, fine to medium SAND. Well sorted. Moderate to significant presence of oxidization.	
				Moist, light brown to reddish brown, fine to medium SAND. Well sorted. Slight presence of oxidization.	
70					
75				Moist, light brown, silty fine to medium SAND. Interbedded sandy silt.	
				Dry to moist, brown to grey, fine sandy SILT.	
80				Moist to wet, reddish brown to grey, clayey SILT.	
				Moist, grey, fine sandy SILT.	
85				Moist, grey, clayey SILT.	
				Moist, grey, fine sandy SILT. Interbedded dense clayey silt layers.	
				Moist, reddish brown, fine sandy SILT. Slight clay fraction. Slight presence of thin beds with significant oxidization.	
90					
95				Moist, brown to grey, clayey SILT. Hardening downward from slightly to moderately dense.	

Location (TRS): T11R21-29
Northing/Easting: N 393333.5 ft, E 1713616.4 ft
Logged by: David Wampler, PGG
Completion Date: 11/7/2018
Ecology ID: BKB-731

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 162.55 ft
MP Elevation: 974.13 ft
V. Datum: NAD88

YC-MW-11
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985971, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
100					
				Moist, brown, clayey SILT. Very dense.	
105					
110				Moist, brown, fine sandy SILT interbedded with medium sand. Sand fraction well sorted.	
				Moist, brown, fine sandy SILT. Hardening downward from soft to very dense. Slight presence of oxidization from 115.5 to 116.5 feet.	
115				Moist, brown, fine to medium sandy SILT. Slight gravel fraction.	
				Moist, light brown, medium to coarse gravelly fine SAND.	
120				Moist, light brown, sandy fine to medium GRAVEL.	
125				Moist, very dark brown to very dark reddish brown, sandy fine to medium GRAVEL.	
				Dry to moist, light grey to light brown, gravelly fine to medium SAND. Slight presence of CoCO3 accumulation on gravel fraction.	
130					
				Moist, light yellow to reddish brown, sandy medium to coarse GRAVEL. Slight presence of oxidization.	
135					
				Moist, light grey to light yellow, fine sandy medium to coarse GRAVEL. Sand fraction well sorted.	
140				Dry to moist, very light grey, gravelly fine SAND.	
				Dry to moist, very light yellow to light grey, fine to medium sandy medium to coarse GRAVEL. Very well sorted brown medium sand from 145 to 145.5 feet.	
145				Dry to moist, light grey, fine to medium sandy medium to coarse GRAVEL. Trace presence of oxidization.	

Location (TRS): T11R21-29
Northing/Easting: N 393333.5 ft, E 1713616.4 ft
Logged by: David Wampler, PGG
Completion Date: 11/7/2018
Ecology ID: BKB-731

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 162.55 ft
MP Elevation: 974.13 ft
V. Datum: NAD88

YC-MW-11
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985971, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
150					
155					
160					
165				Moist, light brown to brown, fine to medium sandy GRAVEL.	12-20 silica sand pack 162-180 feet 2-inch 10 slot PVC screen 164-179 feet with a flush thread tail pipe
170				Wet, brown, medium gravelly fine to medium SAND. Wet, brown, fine to medium SAND. Slight silt fraction.	
175				Wet, brown, sandy medium to coarse GRAVEL.	
180					Bottom of the well 179.2 feet Bottom of the boring 180 feet
185					
190					
195					

Location (TRS): T11R21-29
Northing/Easting: N 393333.5 ft, E 1713616.4 ft
Logged by: David Wampler, PGG
Completion Date: 11/7/2018
Ecology ID: BKB-731

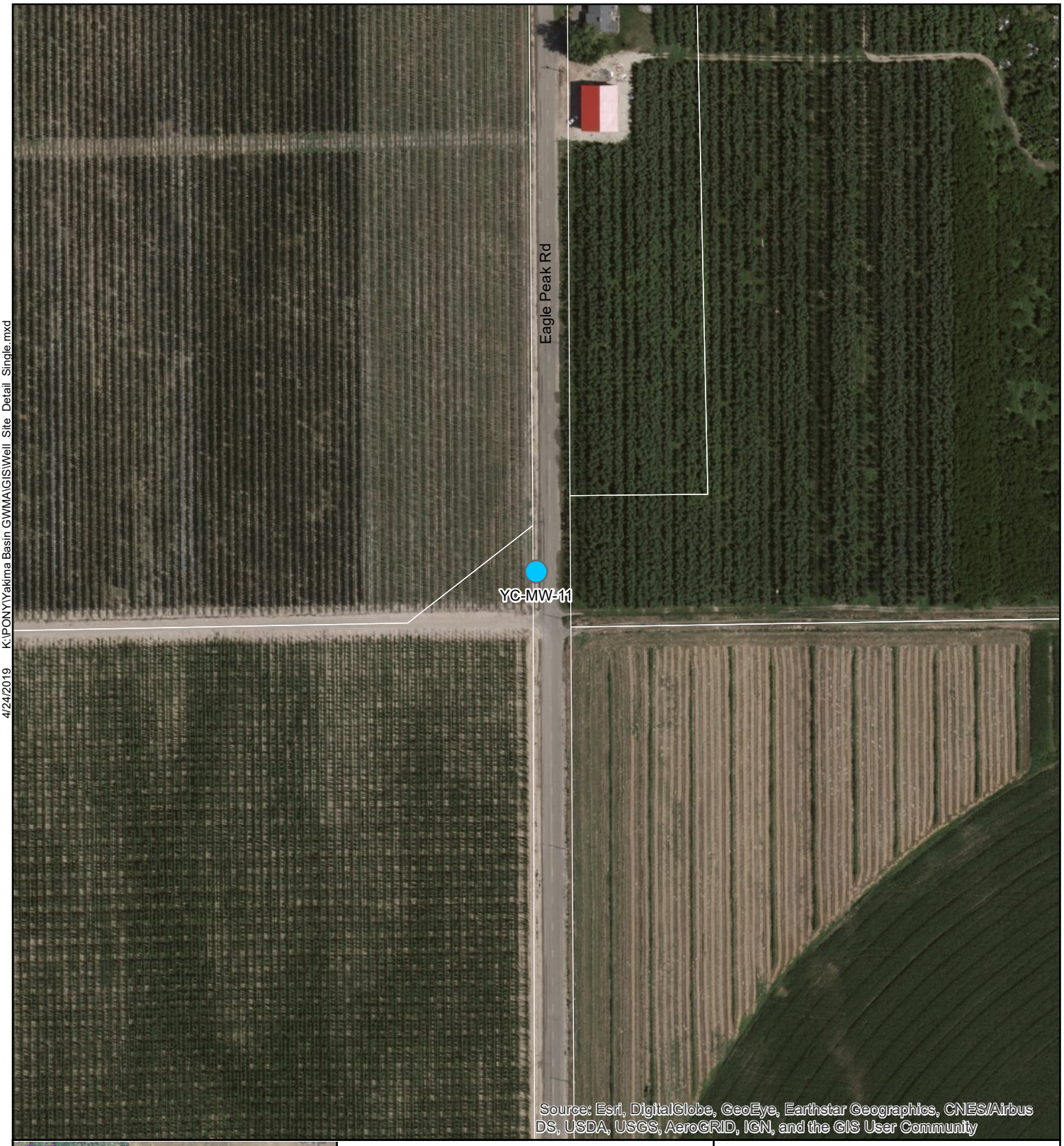
Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 162.55 ft
MP Elevation: 974.13 ft
V. Datum: NAD88

YC-MW-11
Boring Log and As-Built

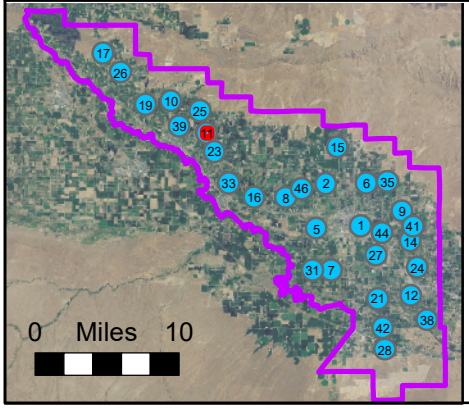
Yakima GWMA

JE1803

PgG



4/24/2019 K:\PONY\Yakima Basin GWMA\GIS\Well Site Detail Single.mxd



Well Location

N

0 Feet 200

Yakima GWMA
Monitoring Well
YC-MW-11

PGG Log matching Ecology Well Log 1985971, cont.

PGG

Ecology Well Log 1985972

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE16716

Construction/Decommission 18-7653WA

Type of Well

[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: Yakima County Public Services
Site Address: 128 N Second Street

Consulting Firm: PGG

City: Yakima County: Yakima

EWM

Unique Ecology Well ID
Tag No. BKB-734

Location 1/4 NE 1/4 SE Sec 35 Twn 11N R 22E or WWM

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.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

[X] Driller [ ] Trainee Name (Print) Casey Wall ace

Driller/Trainee Signature _____

Driller/Trainee License No. 3182

Cased Diameter 6" Static Level 181'

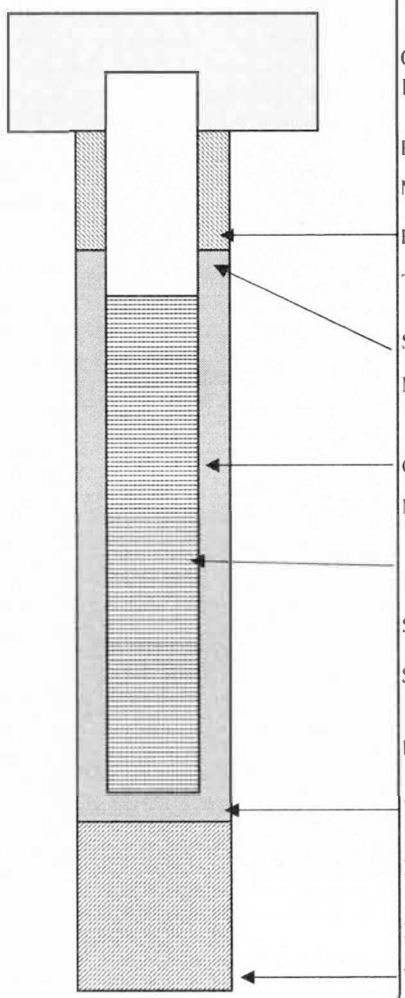
Work/Decommission Start Date 11/10/2018

If trainee, licensed driller's Signature and License No. _____

Work/Decommission End Date 11/11/2018

Construction/Design

Well Name: MW-15



Concrete Surface Seal Depth	0 - 1 FT
Blank Casing (dia x dep)	2 " 1 x 185 FT
Material	Sch40 PVC
Backfill	FT
Type	
Seal	1 - 183 FT
Material	bentonite chips
Gravel Pack	183 - 200 FT
Material	12/20 silica sand
Screen (dia x dep)	2 " 185 x 200 FT
Slot Size	0.010
Material	Sch40 PVC
Well Depth	200 FT
Backfill	
Material	
Total Hole Depth	200 FT

Formation Description

0 - 140 FT	CLAYEY SI LT
140 - 156 FT	GRAVELY COBBLES
156 - 200 FT	CEMENTED COBBLES AND GRAVELS
- FT	
- FT	
- FT	
- FT	

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PGG Log matching Ecology Well Log 1985972

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
0				Moist, light brown to brown, medium to coarse gravelly fine SAND.	Flush mount monument with concrete pad Top of PVC is 0.31 feet below top of steel monument
5				Moist, brown, fine SAND. Slight silt fraction.	Hydrated bentonite annular seal 2-183 feet
				Moist, dark brown, medium to coarse gravelly fine to medium SAND. Well sorted.	
10				Moist, brown, silty fine SAND. Moderate presence of oxidization.	
15					Borehole diameter 6-inches
				Moist, brown, fine sandy SILT. Moderate presence of oxidization.	2-inch schedule 40 flush thread PVC blank well casing 0.31-200.2 feet
20					
				Moist to wet, brown, SILT. Slight clay fraction. Extremely dense layer from 26.5 to 27.5 feet.	
25					
30					
35					
				Moist, brown, fine sandy SILT.	
40					
45					
				Moist, brown, silty fine SAND.	

Location (TRS): T11R22-35
Northing/Easting: N 388100.1 ft, E 1761377.3 ft
Logged by: David Wampler, PGG
Completion Date: 11/12/2018
Ecology ID: BKB-734

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 188.68 ft
MP Elevation: 1168.18 ft
V. Datum: NAD88

YC-MW-15
Boring Log and As-Built

Yakima GWMA

JE1803

PGG

PGG Log matching Ecology Well Log 1985972, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
50				Moist, brown, fine sandy SILT.	
				Moist, brown, silty fine SAND.	
55				Moist, brown, fine SAND. Well sorted.	
				Moist, brown, silty fine SAND. Fining downward.	
60					
65					
				Moist, brown, fine sandy SILT.	
70					
				Moist, brown, silty fine SAND.	
75				Moist, brown, fine sandy SILT. Thin bed of moderately oxidized silt at bottom of layer.	
				Moist, brown, silty fine SAND. Moderate presence of oxidization.	
80				Moist, light brown to grey, SILT with clay and fine sand fractions.	
85					
				Moist, light grey, fine sandy SILT.	
90					
				Moist, light grey, SILT. Very dense. Hardening downward. Trace presence of clayey silt beds. Slight presence of oxidization.	
95					

Location (TRS): T11R22-35
Northing/Easting: N 388100.1 ft, E 1761377.3 ft
Logged by: David Wampler, PGG
Completion Date: 11/12/2018
Ecology ID: BKB-734

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 188.68 ft
MP Elevation: 1168.18 ft
V. Datum: NAD88

YC-MW-15
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985972, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
100					
105					
110					
115				Moist, grey to light brown, fine sandy SILT. Slight presence of oxidization.	
				Moist, grey, silty fine SAND. Hardening downward.	
120				Moist, grey, silty CLAY.	
				Moist, brown to grey, fine sandy SILT. Coarsening downward.	
125					
				Moist, brown, silty fine SAND.	
130				Moist, brown, fine SAND. Well sorted.	
				Moist, brown, silty fine SAND.	
135					
				Moist, dark brown, fine to medium SAND. Very dense. Significantly oxidized.	
				Moist to wet, dark brown to dark orange, fine sandy medium to coarse GRAVEL with silt fraction.	
140				Dry to moist, dark brown to dark orange, medium to coarse gravelly fine to medium SAND.	
				Dry to moist, dark brown to light brown, fine sandy medium to coarse GRAVEL.	
145					
				Dry to moist, dark brown to light brown, fine sandy medium to coarse GRAVEL. Bed of fine sandy silt from 145 to 145.5 feet. Slight presence of oxidization.	

Location (TRS): T11R22-35
Northing/Easting: N 388100.1 ft, E 1761377.3 ft
Logged by: David Wampler, PGG
Completion Date: 11/12/2018
Ecology ID: BKB-734

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 188.68 ft
MP Elevation: 1168.18 ft
V. Datum: NAD88

YC-MW-15
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985972, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
150				Moist, dark brown, gravelly fine sandy SILT.	
				Dry, light grey, medium to coarse gravelly fine SAND.	
155				Moist, dark brown, fine sandy SILT with medium to coarse gravel fraction. Slight to moderate presence of oxidization.	
				Moist, dark brown, medium to coarse gravelly fine to medium SAND. Moderate presence of oxidization.	
				Moist, dark brown, fine to medium sandy medium to coarse GRAVEL.	
160				Moist, dark brown, fine to medium sandy medium to coarse GRAVEL.	
165				Dry to moist, brown to light grey, medium to coarse gravelly fine to medium SAND. Moderate presence of oxidization.	
				Moist, dark brown, fine sandy medium to coarse GRAVEL.	
170				Moist, dark brown to light grey, medium to coarse gravelly fine SAND.	
175				Moist, light yellow, fine to medium SAND. Well sorted.	
180				Moist, dark brown, medium to coarse gravelly fine to medium SAND.	
				Dry, light grey, fine to medium sandy GRAVEL.	12-20 silica sand pack 183-200.2 feet
185				Moist to wet, dark brown to light grey, medium to coarse GRAVEL with fine sand and silt fractions. Well sorted.	2-inch 10 slot PVC screen 185-200 feet with a flush thread tail pipe
190				Moist, yellowish brown to grey, fine to medium sandy medium GRAVEL.	
				Wet, dark brown, fine to medium SAND. Well sorted.	
				Wet, dark brown, medium gravelly SAND.	
				Wet, dark brown, silty fine to medium SAND.	
195				Wet, dark brown to grey, fine to medium sandy medium to coarse GRAVEL.	

Location (TRS): T11R22-35
Northing/Easting: N 388100.1 ft, E 1761377.3 ft
Logged by: David Wampler, PGG
Completion Date: 11/12/2018
Ecology ID: BKB-734

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 188.68 ft
MP Elevation: 1168.18 ft
V. Datum: NAD88

YC-MW-15
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985972, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
200					Bottom of the well 200.2 feet Bottom of the boring 200.2 feet
205					
210					
215					
220					
225					
230					
235					
240					
245					

Location (TRS): T11R22-35
Northing/Easting: N 388100.1 ft, E 1761377.3 ft
Logged by: David Wampler, PGG
Completion Date: 11/12/2018
Ecology ID: BKB-734

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 188.68 ft
MP Elevation: 1168.18 ft
V. Datum: NAD88

YC-MW-15
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

Ecology Well Log 1985980

Reset Form

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE16763

Construction/Decommission 18-7653WA

Type of Well

[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: Yakima County Public Services
Site Address: 128 N Second Street
City: Yakima County: Yakima

Consulting Firm: PGG

Unique Ecology Well ID
Tag No.: BKB-744

Location: 1/4 NW 1/4 NW Sec 17 Twn 10N R 23E [EWM] or [WWM]

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

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.

Tax Parcel No.: County ROW

[X] Driller [ ] Trainee Name (Print): Casey Wallace

Driller/Trainee Signature: _____

Driller/Trainee License No.: 3182

Cased Diameter: 6" Static Level: 52'

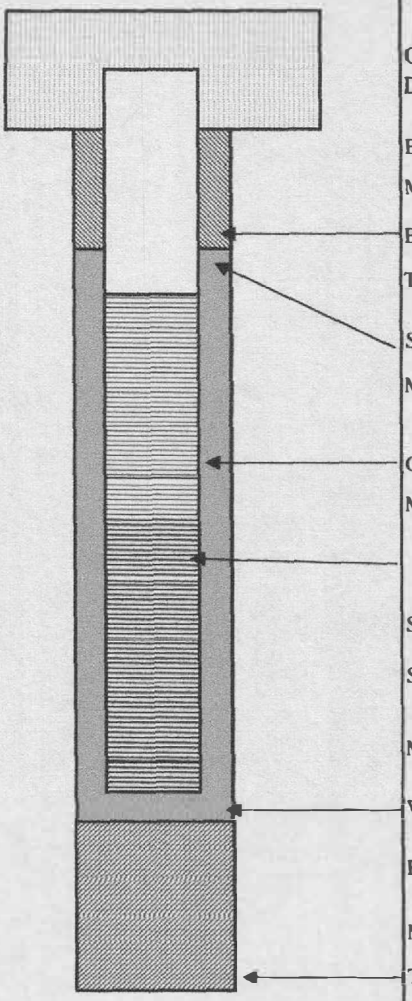
Work/Decommission Start Date: 11/18/2018

If trainee, licensed driller's Signature and License No.: _____

Work/Decommission End Date: 11/18/2018

Well Name: MW-6

Construction/Design



Concrete Surface Seal Depth	0 - 1 FT
Blank Casing (dia x dep)	2 " 1 x 58 FT
Material	Sch40 PVC
Backfill	FT
Type	
Seal	1 - 56 FT
Material	bentonite chips
Gravel Pack	56 - 68 FT
Material	12/20 silica sand
Screen (dia x dep)	2 " 58 x 68 FT
Slot Size	0.010
Material	Sch40 PVC
Well Depth	68 FT
Backfill	
Material	
Total Hole Depth	68 FT

Formation Description

0 - 55 FT	clayey silt
55 - 68 FT	silty sand
- FT	
- FT	
- FT	

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WELL CONSTRUCTION AND LICENSING OFFICE
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PGG Log matching Ecology Well Log 1985980

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Interval	Description	Well Construction
0				Moist, light brown, very fine, sandy SILT.	Flush mount monument with concrete pad Top of PVC is 0.29 feet below top of steel monument Hydrated bentonite annular seal 2-56 feet.
5					
10					
15					Borehole diameter 6-inches 2-inch schedule 40 flush thread PVC blank well casing 0.29-68.2 feet
20				Moist, dark brown, gravely SILT with rocks.	
25				Moist, light brown, sandy SILT.	
30				Moist, olive gray SILT.	
35					
40					
45				Moist, red-brown, clayey SILT.	

Location (TRS): T10R23-17
Northing/Easting: N 375010.9 ft, E 1771956.8 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/18/2018
Ecology ID: BKB-744

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 48.14 ft
MP Elevation: 944.33 ft
V. Datum: NAD88

YC-MW-06
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985980, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
50					
55				Moist, red-brown, sandy SILT.	12-20 silica sand pack 56-70 feet
				Wet, red to light brown, fine sandy SILT.	2-inch 10 slot PVC screen 58-68 feet with a flush thread tail pipe
60				Wet, light brown, slightly silty, fine SAND.	
65					
					Bottom of the well 68.2 feet
70				Wet, light brown, silty SAND.	Bentonite bottom seal 70-76 feet
75				Wet, light brown, very fine sandy SILT.	
					Bottom of the boring 76 feet
80					
85					
90					
95					

Location (TRS): T10R23-17
Northing/Easting: N 375010.9 ft, E 1771956.8 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/18/2018
Ecology ID: BKB-744

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 48.14 ft
MP Elevation: 944.33 ft
V. Datum: NAD88

YC-MW-06
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

Ecology Well Log 1985985

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT

Notice of Intent No. RE16631

Construction/Decommission 18-7653WA

Type of Well

[X] Construction

[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

[X] Resource Protection

[ ] Geotechnical Soil Boring

Property Owner: Yakima County Public Services

Site Address: 128 N Second Street

Consulting Firm: PGG

City: Yakima County: Yakima

EWM

Unique Ecology Well ID Tag No.: BKB-729

Location 1/4 SW 1/4 SE Sec 35 Twn 10N R 23E or WWM

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.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

[X] Driller [ ] Trainee Name (Print): Casey Wallace

Driller/Trainee Signature: _____

Driller/Trainee License No.: 3182

Cased Diameter: 6" Static Level: 25'

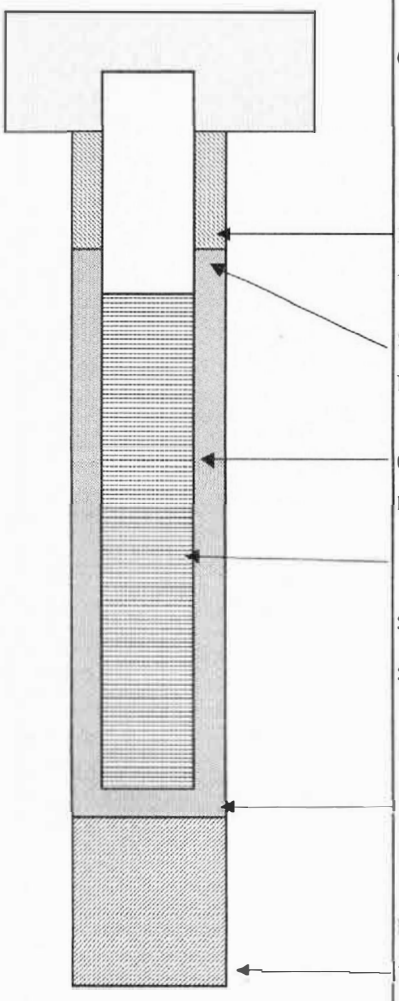
Work/Decommission Start Date: 11/06/2018

If trainee, licensed driller's Signature and License No.: _____

Work/Decommission End Date: 11/06/2018

Well Name: MW-14

Construction/Design



		Formation Description
Concrete Surface Seal Depth	0 - 1 FT	0 - 27 FT SILTY SAND WITH GRAVELS
Blank Casing (dia x dep)	2 " 0 x 22 FT	- FT
Material	Sch40 PVC	
Backfill	FT	- FT
Type		
Seal	0 - 20 FT	- FT
Material	bentonite chips	
		- FT
Gravel Pack	20 - 27 FT	
Material	12/20 silica sand	
Screen (dia x dep)	2 " 22 x 27 FT	
Slot Size	0.010	
Material	Sch40 PVC	
Well Depth	27 FT	- FT
Backfill		
		- FT
Material		
Total Hole Depth	27 FT	

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WELL CONSTRUCTION AND LICENSING OFFICE

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ECY 050-12 (Rev 2/01)

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PGG Log matching Ecology Well Log 1985985

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Interval	Description	Well Construction
0				No recovery.	Flush mount monument with concrete pad Top of PVC is 0.27 feet below top of steel monument
5				Moist, light brown, fine SAND. Massive structure.	Hydrated bentonite annular seal 2-20 feet
10				Moist, light brown, silty fine SAND.	Borehole diameter 6-inches 2-inch schedule 40 flush thread PVC blank well casing 0.27-27.2 feet
15					
20				Moist, brown, gravelly SAND with silt fraction.	12-20 silica sand pack 20-28 feet
25				Moist, brown, sandy GRAVEL. Gravel fraction predominantly basalt. Gravel fraction is significantly oxidized and has CaCO3 accumulation. Moist, brown, gravelly SAND. Moist, brown, sandy GRAVEL. Gravel fraction predominantly basalt. Gravel fraction is significantly oxidized and has CaCO3 accumulation.	2-inch 10 slot PVC screen 22-27 feet with a flush thread tail pipe Bottom of the well 27.2 feet Bentonite bottom seal 28-48 feet
30				Dry, dark brown to dark grey, BASALT. Trace to slight presence of oxidized fractures.	
35					
40					
45					

Location (TRS): T10R23-35
Northing/Easting: N 353843.6 ft, E 1788173 ft
Logged by: David Wampler, PGG
Completion Date: 11/6/2018
Ecology ID: BKB-729

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 27.05 ft
MP Elevation: 938.04 ft
V. Datum: NAD88

YC-MW-14
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

Ecology Well Log 1985987

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE16685

Construction/Decommission 18-1008WA

Type of Well

[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: Yakima County Public Services
Site Address: 128 N Second Street
City: Yakima County: Yakima

Consulting Firm: PGG

Unique Ecology Well ID Tag No.: BKB-747

Location: 1/4 SW 1/4 SE Sec 17 Twn 11N R 21E [EWM] or WWM

Lat/Long (s.t.r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

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.

Tax Parcel No.: ROW

[X] Driller [ ] Trainee Name (Print): Casey Wallace
Driller/Trainee Signature: _____
Driller/Trainee License No.: 3182

Cased Diameter: 2" Static Level: 250'

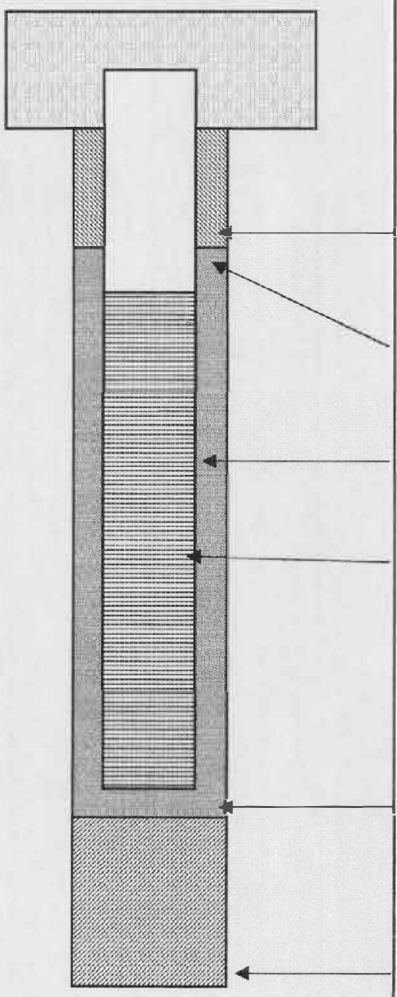
Work/Decommission Start Date: 11/27/2018

If trainee, licensed driller's Signature and License No.: _____

Work/Decommission End Date: 11/29/2018

Well Name: MW25

Construction/Design



Concrete Surface Seal Depth	0 - 1 FT
Blank Casing (dia x dep)	2 " 0 x 253 FT
Material	SCH 40 PVC
Backfill	FT
Type	
Seal	1 - 215 FT
Material	bentonite grout
Gravel Pack	215 - 273 FT
Material	12/20 Sand
Screen (dia x dep)	2 " 253 x 273 FT
Slot Size	0.010
Material	
Well Depth	273 FT
Backfill	
Material	
Total Hole Depth	273 FT

Formation Description

0 - 10 FT	silty sand and gravels
10 - 90 FT	clayey silt
90 - 130 FT	silty gravels and cobbles
130 - 220 FT	sandy silt
220 - 235 FT	gravely silty
235 - 273 FT	sandy silt

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PGG Log matching Ecology Well Log 1985987

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Interval	Description	Well Construction
0				Dry, tan fine to medium SAND.	Flush mount monument with concrete pad Top of PVC is 0.26 feet below top of steel monument Hydrated bentonite annular seal 2-251 feet
10					
15				Moist to wet, tan clayey SILT.	Borehole diameter 6-inches 2-inch schedule 40 flush thread PVC blank well casing 0.26-273.2 feet
20				Dry to moist, fine SAND.	
25				Moist to wet, olive brown, silty fine SAND.	
30				Dry, gray fine to medium SAND (grain sizes coarsens with depth).	
35				Dry, gray, medium SAND containing some gravel between 32-33ft.	
40					
45				Moist, light brown sandy SILT (mottling 39-43 ft).	

Location (TRS): T11R21-17
Northing/Easting: N 401363.8 ft, E 1711060 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/29/2018
Ecology ID: BKB-747

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 263.55 ft
MP Elevation: 1204.67 ft
V. Datum: NAD88

YC-MW-25
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985987, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
50					
				Moist, orange-brown, medium SAND.	
55				Moist to dry, silty medium to coarse SAND.	
60				Moist, light brown, sandy SILT.	
				Moist to dry, tan, fine SAND.	
65					
70					
				Moist to dry, orange-brown, silty very fine silty SAND.	
75					
				Moist orange-brown, sandy SILT.	
80				Moist, light gray medium to coarse SAND with gravel and rocks.	
85					
90					
95					

Location (TRS): T11R21-17
Northing/Easting: N 401363.8 ft, E 1711060 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/29/2018
Ecology ID: BKB-747

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 263.55 ft
MP Elevation: 1204.67 ft
V. Datum: NAD88

YC-MW-25
Boring Log and As-Built

Yakima GWMA

JE1803

PGG

PGG Log matching Ecology Well Log 1985987, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
100					
				Moist, gray medium to coarse SAND.	
				Moist, gray medium to coarse SAND with gravel.	
105					
				Moist, gray, SILT containing gravel.	
				Moist, gray, fine to medium gravelly SAND.	
110					
115					
120					
125					
				Moist, light gray, fine sandy SILT.	
				Moist, light brown, fine, silty SAND.	
130					
135				Moist, light brown sandy SILT.	
140					
145					
				Moist to wet, gravelly SILT.	
				Moist, light brown silty SAND.	

Location (TRS): T11R21-17
Northing/Easting: N 401363.8 ft, E 1711060 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/29/2018
Ecology ID: BKB-747

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 263.55 ft
MP Elevation: 1204.67 ft
V. Datum: NAD88

YC-MW-25
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985987, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
150					
155					
160				Moist, light gray fine SAND.	
				Moist, light brown, very fine sandy SILT.	
165				Moist, light brown, silty fine SAND.	
170					
175				Moist, light gray, medium to coarse SAND.	
180					
185					
190					
195				Moist, tan, silty, fine SAND.	

Location (TRS): T11R21-17
Northing/Easting: N 401363.8 ft, E 1711060 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/29/2018
Ecology ID: BKB-747

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 263.55 ft
MP Elevation: 1204.67 ft
V. Datum: NAD88

YC-MW-25
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985987, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
200					
				Moist, light brown, very fine SAND.	
205					
210					
215					
				Moist dark brown silty, fine and medium SAND (containing cobbles, gravel, and rounded rocks).	
220					
225					
230					
235					
240					
245					
				Moist, light brown, sandy SILT.	

Location (TRS): T11R21-17
Northing/Easting: N 401363.8 ft, E 1711060 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/29/2018
Ecology ID: BKB-747

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 263.55 ft
MP Elevation: 1204.67 ft
V. Datum: NAD88

YC-MW-25
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985987, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
250					12-20 silica sand pack 251-275 feet
255				Wet, dark brown, silty fine SAND (contains some gravel and rocks).	2-inch 10 slot PVC screen 253-273 feet with a flush thread tail pipe
260				Moist to wet, light brown, very fine SAND to sandy SILT (finer with depth).	
265				Moist to wet, dark brown, silty SAND.	
270				Moist to wet, dark brown fine to medium SAND.	
275				Moist, light brown, silty medium to find SAND.	Bottom of the boring 275 feet
280					
285					
290					
295					

Location (TRS): T11R21-17
Northing/Easting: N 401363.8 ft, E 1711060 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/29/2018
Ecology ID: BKB-747

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 263.55 ft
MP Elevation: 1204.67 ft
V. Datum: NAD88

YC-MW-25
Boring Log and As-Built

Yakima GWMA

JE1803

PGG

Ecology Well Log 1985989

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT

Notice of Intent No. RE16629

Construction/Decommission 18-7653WA

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

☒ Resource Protection

☐ Geotechnical Soil Boring

Property Owner: Yakima County Public Services

Site Address: 128 N Second Street

Consulting Firm: PGG

City: Yakima County: Yakima

Unique Ecology Well ID Tag No. BKB-727

Location 1/4 se 1/4 sw Sec 22 Twn 10n R 23e ☐ EWM ☐ WWM

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.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

☒ Driller ☐ Trainee Name (Print) Casey Wallace

Driller/Trainee Signature _____

Driller/Trainee License No. 3182

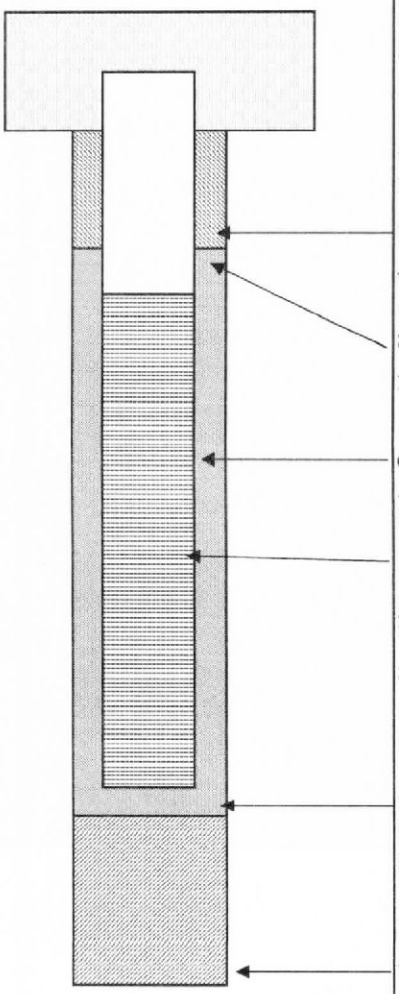
Cased Diameter 6" Static Level 24'

Work/Decommission Start Date 10/28/2018

If trainee, licensed driller's Signature and License No. _____

Work/Decommission End Date 10/29/2018

Construction/Design **Well Name:** MW-9



Concrete Surface Seal Depth	0 - 1 FT
Blank Casing (dia x dep)	2 " 0 x 26 FT
Material	Sch40 PVC
Backfill	FT
Type	
Seal	0 - 24 FT
Material	bentonite chips
Gravel Pack	24 - 36 FT
Material	12/20 silica sand
Screen (dia x dep)	2 " 26 x 36 FT
Slot Size	0.010
Material	Sch40 PVC
Well Depth	36 FT
Backfill	
Material	
Total Hole Depth	36 FT

Formation Description

0 - 36 FT silty sand with cobbles

FT

FT

FT

FT

This is the incorrect log filed with Ecology for this monitoring well. It is a duplicate of 1985978 for MW-8. See attached PGG log for correct info. (SRW 2024-06-13)

FT

FT

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WELL CONSTRUCTION AND LICENSING OFFICE

AUG 26 2020

FT

Scale 1" = _____ Page _____ of _____

ECY 050-12 (Rev 2/01)

The Department of Ecology does NOT warranty the Data and/or information on this well report.

PGG Log matching Ecology Well Log 1985989

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
0				Dry, brown, slightly sandy SILT.	Flush mount monument with concrete pad Top of PVC is 0.44 feet below top of steel monument
5					Hydrated bentonite annular seal 2-24 feet
10					
15					Borehole diameter 6-inches
				Dry, brown, sandy SILT.	2-inch schedule 40 flush thread PVC blank well casing 0.44-36.2 feet
20				Dry, brown, fine SAND with trace round gravel and siltbound clasts.	
				Dry to moist, brown, slightly silty, very gravelly, fine with medium SAND.	
				Dry, white, loosely consolidated, slightly gravelly, siltbound SAND (ASH).	
25				Wet, gray, slightly silty, very gravelly, fine to medium SAND coarsening downwards. Oxidation. Gravel up to 3 inches.	12-20 silica sand pack 24-37.5 feet
				Wet, brown, slightly silty, gravelly, fine SAND.	
30				Moist, gray, gravelly SILT with cobbles.	2-inch 10 slot PVC screen 26-36 feet with a flush thread tail pipe
				Moist, gray-brown, silty, gravelly, medium SAND.	
35				Dry to moist, white, slightly sandy SILT with oxidation.	
					Bottom of the well 36.2 feet
					Bentonite bottom seal 37.5-72 feet
40					
				Moist, grayish-green, clayey SILT with loosely consolidated siltstone clasts. Harder below 24.5 feet with semi-consolidated ash.	
45				Dry, gray, gravelly, fine SAND.	
				Moist to wet, gray, gravelly, silty, fine SAND. Wet below 50 feet.	

Location (TRS): T10R23-22 SW Qtr SE QtrQtr
Northing/Easting: N 364486.6 ft, E 1785256.1 ft
Logged by: I. Jackson and K. Mayer-Blackwell, PGG
Completion Date: 10/29/2018
Ecology ID: BKB-727

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 23.72 ft
MP Elevation: 926.45 ft
V. Datum: NAD88

YC-MW-09
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

PGG Log matching Ecology Well Log 1985989, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
50					
55				Dry, gray, cobbly, sandy SILT.	
60				BOULDER.	
65				Moist to wet, dark gray, COBBLES and fine sandy SILT. Dry, light brown, fine sandy SILT.	
70				Black/dark gray, unfractured ROCK.	
75					Bottom of the boring 72 feet
80					
85					
90					
95					

Location (TRS): T10R23-22 SW Qtr SE QtrQtr
Northing/Easting: N 364486.6 ft, E 1785256.1 ft
Logged by: I. Jackson and K. Mayer-Blackwell, PGG
Completion Date: 10/29/2018
Ecology ID: BKB-727

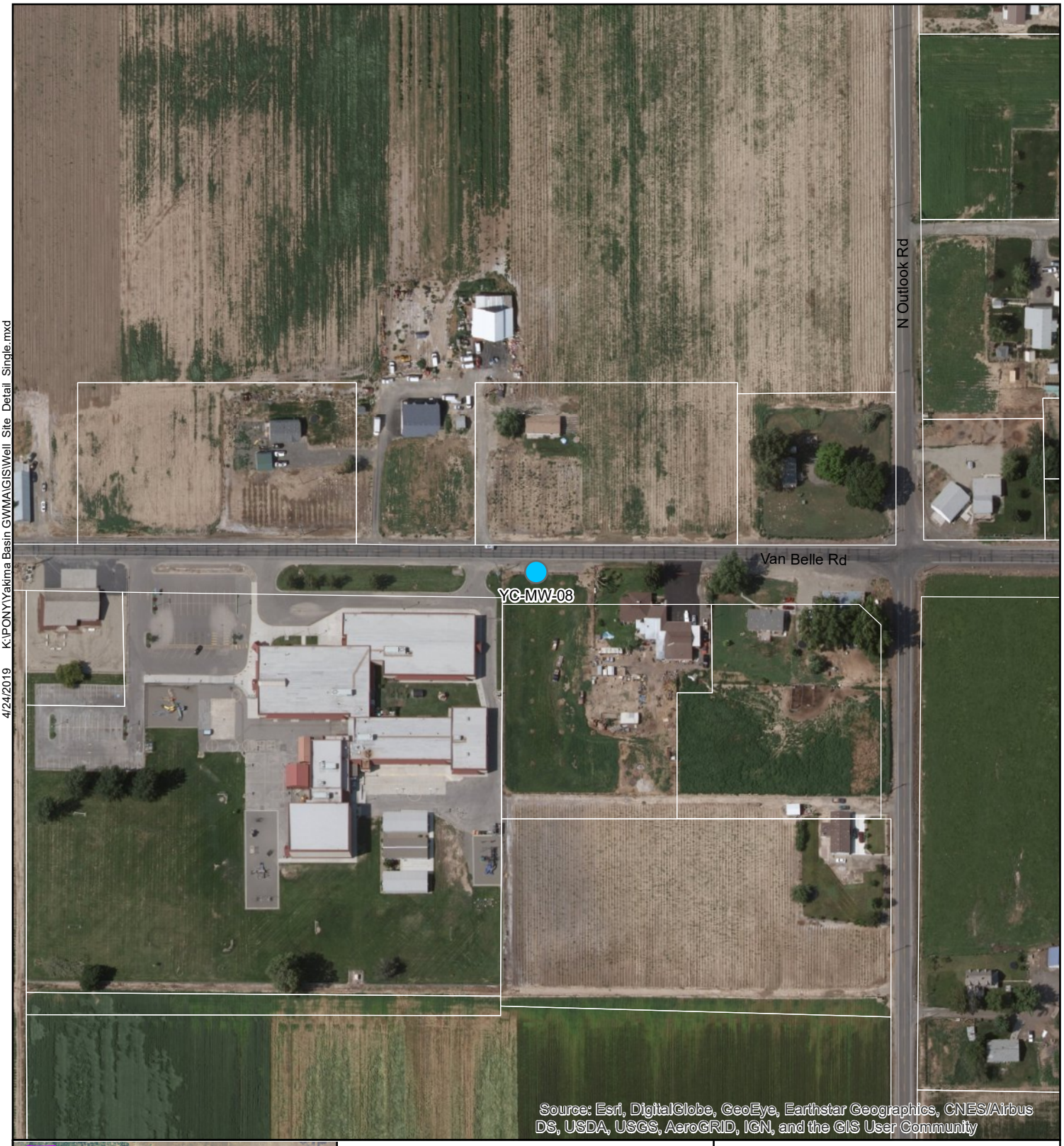
Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 23.72 ft
MP Elevation: 926.45 ft
V. Datum: NAD88

YC-MW-09
Boring Log and As-Built

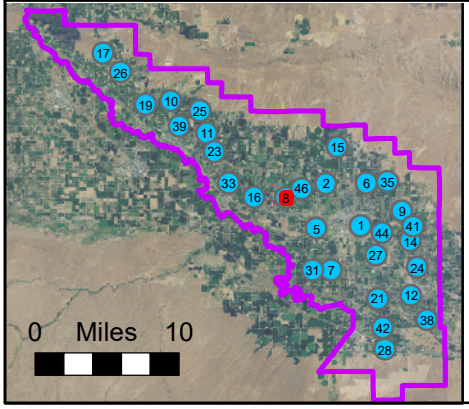
Yakima GWMA

JE1803

PGG



4/24/2019 K:\PONY\Yakima Basin GWMA\GIS\Well Site Detail Single.mxd



Well Location

0 Feet 200

Yakima GWMA
Monitoring Well
YC-MW-08

PGG Log matching Ecology Well Log 1985989, cont.

PGG

Ecology Well Log 1985990

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. RE16805

Construction/Decommission 18-1008WA

Type of Well

[X] Construction
[ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

[X] Resource Protection
[ ] Geotechnical Soil Boring

Property Owner: Yakima County Publi cServices
Site Address: 128 N Second Street
Consulting Firm: PGG
City: Yaki ma County: Yaki ma

Unique Ecology Well ID
Tag No. BKB-748

Location 1/4 NW 1/4 NW Sec 35 Twn 10N R 23E [EWM] or WWM

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.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. ROW

[X] Driller [ ] Trainee Name (Print) Casey Wallace
Driller/Trainee Signature _____
Driller/Trainee License No. 3182

Cased Diameter 2" Static Level 57'

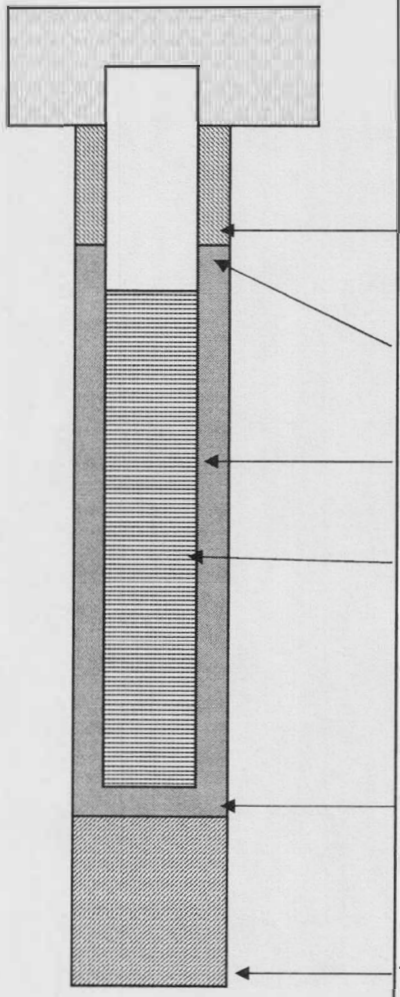
Work/Decommission Start Date 11/30/2018

If trainee, licensed driller's Signature and License No. _____

Work/Decommission End Date 11/30/2018

Well Name: MW41.1

Construction/Design



Concrete Surface Seal Depth	0 - 1	FT
Blank Casing (dia x dep)	2 " 0 x 56	FT
Material	SCH 40 PVC	
Backfill		FT
Type		
Seal	1 - 54	FT
Material	bentonite chips	
Gravel Pack	54 - 66	FT
Material	12/20 Sand	
Screen (dia x dep)	2 " 56 x 66	FT
Slot Size	0.010	
Material		
Well Depth	66	FT
Backfill		
Material		
Total Hole Depth	66	FT

Formation Description

0 - 20	sandy silt	FT
20 - 66	basalt	FT
-		FT
-		FT
-		FT
-		FT
-		FT

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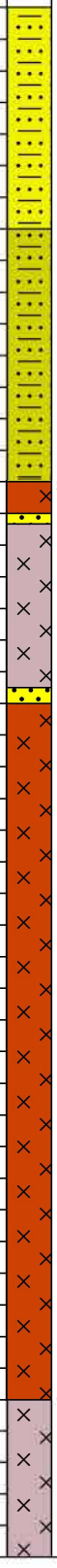
WELL CONSTRUCTION AND LICENSING OFFICE
AUG 26 2020

Scale 1" = _____ Page _____ of _____

ECY 050-12 (Rev 2/01)

PGG Log matching Ecology Well Log 1985990

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Interval	Description	Well Construction
0				Moist, light brown, silty, very fine SAND (grain size becomes finer with depth).	Flush mount monument with concrete pad Top of PVC is 0.29 feet below top of steel monument Hydrated bentonite annular seal 2-54 feet
5					
10				Moist to wet, light brown, sandy SILT.	
15				Dry, light gray, fractured rock. Light pink, fine, chalky SAND. Dry, light black, rock.	Borehole diameter 6-inches 2-inch schedule 40 flush thread PVC blank well casing 0.29-66.18 feet
20					
25				Moist, black and orange SAND. Dry, black, vesicated BASALT.	
30					
35					
40					
45				Dry, black, BASALT.	

Location (TRS): T10R23-35
Northing/Easting: N 359037 ft, E 1789145.7 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/26/2018
Ecology ID: BKB-748

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 44.29 ft
MP Elevation: 965.66 ft
V. Datum: NAD88

YC-MW-41
Boring Log and As-Built

Yakima GWMA

JE1803

PGG

PGG Log matching Ecology Well Log 1985990, cont.

Depth (ft)	Graphic Log	Samples: Sample ID / PID (ppm)	Samples: Interval	Description	Well Construction
50					
55				Wet, black, fractured BASALT.	12-20 silica sand pack 54-67 feet 2-inch 10 slot PVC screen 56-66 feet with a flush thread tail pipe
60					
65					Bottom of the well 66.18 feet Bentonite bottom seal 67-72 feet
70					Bottom of the boring 72 feet
75					
80					
85					
90					
95					

Location (TRS): T10R23-35
Northing/Easting: N 359037 ft, E 1789145.7 ft
Logged by: Koshlan Mayer-Blackwell, PGG
Completion Date: 11/26/2018
Ecology ID: BKB-748

Drilling Firm: Yellow Jacket
Drilling Method: Sonic
DTW: 44.29 ft
MP Elevation: 965.66 ft
V. Datum: NAD88

YC-MW-41
Boring Log and As-Built

Yakima GWMA

JE1803

PgG

Ecology Well Log 2033869

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT Notice of Intent No. RE 19771

Construction/Decommission *(select one)*
- [X] Construction
- [ ] Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well *(select one)*
- [X] Resource Protection
- [ ] Geotech Soil Boring

Consulting Firm: Anchor QEA

Unique Ecology Well ID Tag No.: BLW 349

Property Owner: View Point Dairy

Site Address: 1400 Lewandowski Rod

City: Sunnyside County: Yakima

Location: sw 1/4-1/4 se 1/4 Sec 4 Twn 10n R 23e (Select One: [ ] EWM [ ] WWM)

Lat/Long (s, t, r still REQUIRED): Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No.: _____

Cased or Uncased Diameter: 7 & 6 Static Level: 198

Work/Decommission Start Date: Aug 4 2020

Work/Decommission Completed Date: Aug 8 2020

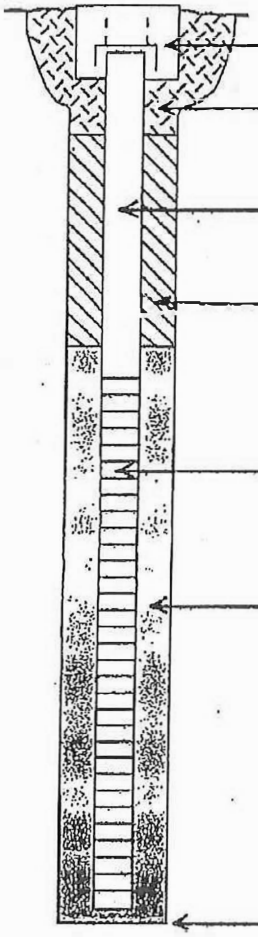
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

[X] Driller [ ] Engineer [ ] Trainee Name (Print): Aurelio Rodriguez

Driller/Engineer /Trainee Signature: _____

Driller or Trainee License No.: 3262

If trainee, licensed driller's Signature and License No.: _____

Construction/Design	Well Data	Formation Description
	MONUMENT TYPE: Above CONCRETE SURFACE SEAL 0-2 ft. PVC BLANK 2 "x +3-225 BACKFILL 2-223 ft. TYPE: Bentonite Grout PVC SCREEN 2 "x 225-240 SLOT SIZE: .010 TYPE: PVC GRAVEL PACK 223-240 ft. MATERIAL: Sand 10x20 WELL DEPTH 240 ' "	0 - 40 ft. Silty Sandstone 40 - 130 ft. Fractured Basalt 130 - 170 ft. Basalt 170 225 Sandstone 225 - 240 ft. Fine Sands - ft.

REMARKS VPD-01

Cascade Drilling # 110.20.1074

RECEIVED
DEC 14 2020
Dept of Ecology
Central Regional Office

The Department of Ecology does NOT warranty the Data and/or information on this well report.

Ecology Well Log 2215005

WATER WELL REPORT

DEPARTMENT OF ECOLOGY State of Washington

RECEIVED
NOV 18 2022
Dept. of Ecology
Central Regional Office

Notice of Intent No. WE50351

Unique Ecology Well ID Tag No. BLD796

Site Well Name (if more than one well):

Water Right Permit/Certificate No.

Property Owner Name Ted & Rosie Kranz

Well Street Address 461 Webster Rd

City Sunnyside County Yakima

Tax Parcel No. 231025 31402

Was a variance approved for this well? ☐ Yes ☒ No

If yes, what was the variance for?

Type of Work:
☒ Construction
☐ Decommission ⇨ Original installation NOI No.

Proposed Use: ☒ Domestic ☐ Industrial ☐ Municipal ☐ Dewatering ☐ Irrigation ☐ Test Well ☐ Other

Construction Type: ☒ New well ☐ Alteration ☐ Deepening ☐ Other

Method: ☐ Driven ☐ Jetted ☐ Cable Tool ☐ Dug ☒ Air- ☐ Mud-Rotary

Dimensions: Diameter of boring 8 x 6 in., to 477 ft.
Depth of completed well 477 ft.

Construction Details:

Casing	Liner	Diameter	From	To	Wall Thickness	Steel	PVC	Welded	Thread
☒	☐	8 in.	+2	44	.250 in.	☒	☐	☒	☐
☒	☐	6 in.	+1	258	.250 in.	☒	☐	☒	☐
☐	☒	4 1/2 in.	17	477	in.	☐	☒	☐	☐
☐	☐	in.			in.	☐	☐	☐	☐

Perforations: ☒ Yes ☐ No Type of perforator used Saw
No. of perforations 44 Size of perforations 1/8 in. by 6 in.
Perforated from 460 ft. to 477 ft. below ground surface

Screens: ☐ Yes ☒ No ☐ K-Packer ⇨ Depth ft.
Manufacturer's Name
Type Model No.
Diameter in. Slot size in. from ft. to ft.
Diameter in. Slot size in. from ft. to ft.

Sand/Filter pack: ☐ Yes ☒ No Size of pack material
Materials placed from ft. to ft.

Surface Seal: ☒ Yes ☐ No To what depth? 44 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

Pump: Manufacturer's Name Type:
H.P. Pump intake depth: ft. Designed flow rate: gpm

Water Levels: Land-surface elevation above mean sea level ft.
Stick-up of top of well casing 2 ft. above ground surface
Static water level 190 ft. below top of well casing Date 9/8/22
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (cap, valve, etc.)

Well Tests:
Was a pumping test performed? ☒ No ☐ Yes ⇨ by whom?
Yield gpm with ft. drawdown after hrs.
Yield gpm with ft. drawdown after hrs.
Yield gpm with ft. drawdown after hrs.

Recovery data (time = zero when pump is turned off – water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of pumping test

Bailer test gpm with ft. drawdown after hrs.
Air test 50+ gpm with stem set at 476 ft. for 1 hrs. Date 9/7/22
Artesian flow gpm
Temperature of water °F Was a chemical analysis made? ☐ Yes ☒ No

Location (see instructions on page 2): ☐ WWM or ☒ EWM
NE ¼-¼ of the SW ¼; Section 25 Township 10 Range 23
Latitude (Example: 47.12345) 46.322 7
Longitude (Example: -120.12345) -119.88404

Driller's Log/Construction or Decommission Procedure
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each layer penetrated, with at least one entry for each change of information. Use additional sheets if necessary.

Material	From	To
Silt	0	4
Caliche w/Basalt (Black)	4	8
Caliche	8	18
Clay (Brown/Tan)	18	39
Basalt (Gray &Brown) vesicular	39	82
Basalt (Gray/Black) hard	82	93
Basalt (Gray/Black) soft	93	123
Basalt (Gray/Black) hard	123	147
Basalt (Blackw/Brown&Green) ves. W.B.	147	153
Sandstone (Green & White) W.B.	153	162
Clay/Claystone (Gray/Green & Tan)	162	205
Clay/Claystone (Brown)	205	223
Sand	223	228
Claystone (Green)	228	236
Basalt (Brown) w/Tan Shale, ves.	236	260
Basalt (Black&Brown w/Red) ves. fractured	260	263
Basalt (Black) hard	263	270
Basalt (Black w/Brown) hard	270	273
Basalt (Black/Gray) hard	273	389
Basalt (B&B) ves. w/Quartz	389	392
Basalt (Black w/Brown&Green) w/Tan Shale	392	404
Basalt (Black w/Blue) fract.	404	418
Basalt (Black) hard	418	421
Basalt (Black) ves. w/Green Shale	421	438
Basalt (Black) hard	438	446
Basalt (Black) ves. soft	446	451
Basalt (Black) ves. w/Gray Shale	451	459
Basalt (Black) soft	459	472
Basalt (Black) hard	472	477

Start Date 8/30/22 Completed Date 9/8/22

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 ☐ Trainee ☐ PE Print Name Michael Robinson

Signature

License No. 1544

IF TRAINEE: Sponsor's License No.

Sponsor's Signature

Drilling Company Robinson Drilling & Development, Inc.

Address 4902 Viewland Drive

City, State, Zip Yakima, WA 98908

Contractor's Registration No. ROBINDD938QE Date 9/9/22

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Ecology Well Log 2215091

WATER WELL REPORT

DEPARTMENT OF ECOLOGY State of Washington

Type of Work:
☒ Construction
☐ Decommission ⟹ Original installation NOI No. _____

Proposed Use: ☐ Domestic ☐ Industrial ☐ Municipal ☐ Dewatering ☐ Irrigation ☐ Test Well ☒ Other Livestock

Construction Type: ☒ New well ☐ Alteration ☐ Deepening ☐ Other _____

Method: ☐ Driven ☐ Jetted ☐ Cable Tool ☐ Dug ☒ Air- ☐ Mud-Rotary

Dimensions: Diameter of boring 10 in., to 382 ft.
Depth of completed well 380 ft.

Construction Details:

Casing	Liner	Diameter	From	To	Wall Thickness	Steel	PVC	Welded	Thread
☒	☐	10 in.	+2	56	.250 in.	☒	☐	☒	☐
☐	☒	8 in.	20	380	.250 in.	☒	☐	☒	☐
☐	☐	____ in.	____	____	____ in.	☐	☐	☐	☐
☐	☐	____ in.	____	____	____ in.	☐	☐	☐	☐

Perforations: ☒ Yes ☐ No Type of perforator used Plasma
No. of perforations 100 Size of perforations .125 in. by 10" in.
Perforated from 340 ft. to 378 ft. below ground surface

Screens: ☐ Yes ☒ No ☐ K-Packer ⟹ Depth ____ ft.
Manufacturer's Name _____
Type _____ Model No. _____
Diameter ____ in. Slot size ____ in. from ____ ft. to ____ ft.
Diameter ____ in. Slot size ____ in. from ____ ft. to ____ ft.

Sand/Filter pack: ☐ Yes ☒ No Size of pack material ____ in.
Materials placed from ____ ft. to ____ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 19 ft.
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 Franklin Type: Sub
H.P. 20 Pump intake depth: 330 ft. Designed flow rate: VFD gpm

Water Levels: Land-surface elevation above mean sea level 1175 ft.
Stick-up of top of well casing 2 ft. above ground surface
Static water level 217 ft. below top of well casing Date 6/3/22
Artesian pressure ____ lbs. per square inch Date _____
Artesian water is controlled by _____ (cap, valve, etc.)

Well Tests:
Was a pumping test performed? ☒ No ☐ Yes ⟹ by whom? _____
Yield ____ gpm with ____ ft. drawdown after ____ hrs.
Yield ____ gpm with ____ ft. drawdown after ____ hrs.
Yield ____ gpm with ____ ft. drawdown after ____ hrs.
Recovery data (time = zero when pump is turned off – water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of pumping test _____
Bailer test ____ gpm with ____ ft. drawdown after ____ hrs.
Air test 35 gpm with stem set at 370 ft. for 1 hrs. Date 6/3/22
Artesian flow ____ gpm
Temperature of water ____ ° F Was a chemical analysis made? ☐ Yes ☒ No

Notice of Intent No. WE49153
Unique Ecology Well ID Tag No. BNP 629
Site Well Name (if more than one well): N/A
Water Right Permit/Certificate No. Exempt
Property Owner Name JLS Siegers Dairy LLC
Well Street Address 7190 Shellar Rd
City Sunnyside County Yakima
Tax Parcel No. 23102443003

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JUN 24 2022
Dept. of Ecology
Central Regional Office

Was a variance approved for this well? ☐ Yes ☒ No
If yes, what was the variance for? _____

Location (see instructions on page 2): ☐ WWM or ☒ RWM
SW ¼-¼ of the SW ¼; Section 10 Township 10 Range 23
Latitude (Example: 47.12345) 46.3317
Longitude (Example: -120.12345) -119.8823

Driller's Log/Construction or Decommission Procedure
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each layer penetrated, with at least one entry for each change of information. Use additional sheets if necessary.

Material	From	To
Gravel/road base	0	1
Silty sand and gravel - Br	1	10
Basalt - medium - Bl	10	12
Basalt - silty/sandy - weathered - Br	12	63
Basalt - weand and broken - Bl	63	83
Basalt - medium - Bl	83	92
Basalt - weak - Bl	92	100
Silty sandstone/sandy siltstone - Tan	100	183
Basalt - weak and broken - Bl/Red	183	198
Basalt - medium - Bl	198	303
Basalt - fractured - some red color - Bl	303	325
Basalt - medium - Bl	325	340
Basalt - fractured - some tan and green shale- Bl	340	380
Basalt - Bl	380	382

Start Date 6/1/22 Completed Date 6/3/22

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 ☐ Trainee ☐ PE – Print Name Chad N Gregory
Signature Chad N Gregory
License No. 2369
IF TRAINEE: Sponsor's License No.
Sponsor's Signature

Drilling Company Gregory Drilling Inc
Address 14112 452nd Ave SE
City, State, Zip North Bend, WA 98045
Contractor's Registration No. GREGODI110JP Date 6/8/22

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