SITE SPECIFIC LAND APPLICATION PLAN FOR
Brown and Jackson

This Plan is a component of Brown & Jackson, Inc. Application for Coverage Under the General Permit for Biosolids Management

The site described in this plan is located in: Kittitas County

The area described in this plan is located in Water Resource Inventory Area: WRIA 39 - Upper Yakima Watershed

The Legal Description of the site is:
The Northwest Quarter and that portion of the Northeast Quarter of the Southwest Quarter lying above the right of way of the canal of the Kittitas Reclamation District, in Section 34, in Township 18 North, Range 20 East. In the County of Kittitas, State of Washington.

EXCEPTING THEREFROM:

1. That portion of the North Half of the Northwest Quarter of Section 34, Township I8 North, Range 20 East, W M., Kittitas County, Washington which is bounded by a line described as follows: Beginning at the Northwest corner of said Section 34; thence N 90°00'00" E, along the North boundary of said Section 34, 1173.78 feet to the true point of beginning; thence N 90°00'00" E, 434 30 feet; thence S 501.50 feet; thence S 90°00'00" W, 434.30 feet; thence North 501.50 feet to the true point of beginning,

2. Right of way of Parke Creek County Road along the Westerly boundary thereof.

Version 1.0 Date: June 2020

Table of Contents

1.0 Ownership, Management, and Landowner Agreements

Land Owner: 4G FARMS LLC (an entity of Brown & Jackson, Inc.)

Primary Contact: Rikki Schmitt
107 North Main Street
Ellensburg, WA 98926
509-925-1564
brownandjackson107@gmail.com

Site Location: A portion of the Western half of Section 34, Township 18 North, Range 20 East, W.M., Kittitas County, Washington. The site can be accessed from near the intersection of Christensen Road and Parke Creek Road in Ellensburg, Washington.

Parcel No.: 295134

See Appendix 1 – Land Owner Agreement

2.0 Introduction

The site is located on Kittitas County Tax Parcel No. 295134, located in the western half of Section 34, Township 18 North, Range 20 East, W.M. This Beneficial Use Facility will contain a series of storage ponds to hold the septage that is pumped from a variety of commercial and residential sources around the greater Ellensburg and Kittitas area. The ponds will store the septage until it is land applied to the designated farmland. The land in which the septage is being applied is owned by 4G Farms, an agricultural entity of Brown & Jackson, LLC.

This facility has regulatory obligations under WAC 173-308, Septage Management. This document outlines the plans and procedures for land application. The Washington State Department of Ecology has permitting and oversight authority for the implementation of this plan.

The Goals of this plan include the following:

- Establish a septage land application program sufficient to meet the Beneficial Use of Septage requirements as defined in WAC 173-308-080;
- Describe the procedures required for soil sampling within the Application Units;
- Document allowable activities regarding the storage, handling, and application methods for Septage land application at this facility;
- Structure the procedures for land application to achieve the following objectives:
    - Insure consistent, uniform, and orderly land application of septage at approved agronomic rates
    - Improve soil characteristics including tilth, fertility, and stability
    - Provide the amount of nitrogen necessary for the optimum growth of a targeted vegetation type.
    - Define crop management practices that enhance the targeted vegetation type while limiting noxious weeds
    - Limit nutrient loss through leaching of mineral nitrogen.

The Washington State Department of Ecology is the permitting authority and conducts oversight of rates and land application procedures. Septage will be applied at agronomic rates for the purposes of fertilization and soil improvement.

3.0 Definitions

Agricultural land - is land on which a food crop, feed crop, or fiber crop is grown. This includes range land and land used as pasture.

Agronomic rate- is the biosolids application rate that provides the amount of nitrogen necessary for the optimum growth of targeted vegetation, and that will not result in the violation of applicable standards or requirements for the protection of ground or surface water as established under chapter 90.48 RCW and related rules including chapters 173-200 and 173-201A WAC.

Application Units- delineated areas where septage is applied.

Beneficial use facility - means a receiving-only facility consisting of a site or sites where biosolids from other treatment works treating domestic sewage are applied to the land for beneficial use, which has been permitted as a treatment works treating domestic sewage in accordance with the provisions of WAC 173-308-310, and that has been designated as a beneficial use facility through the permitting process.

Beneficial use of biosolids - means the application of biosolids to the land for the purposes of improving soil characteristics including tilth, fertility, and stability to enhance the growth of vegetation consistent with protecting human health and the environment.

Septage - is liquid or solid material removed from septic tanks, cess pools, portable toilets, type III marine sanitation devices, vault toilets, pit toilets, RV holding tanks, or similar systems that receive only domestic sewage. Septage may also include commercial or industrial septage mixed with domestic septage if approved in accordance with the provisions in WAC 173-308-020 (3)(g).

Septage management facility - means a person who applies septage to the land or one that treats septage for application to the land.

Summer Fallow - to plow and work (land) in summer in order to prepare for sowing in the fall or the following spring : plow and let lie fallow

4.0 Maps

Septage shall only be applied to specifically identified areas as shown on maps attached to, or as an addendum to, this Site Specific Land Application Plan.

The land application units for this site are identified on the attached site map, and are labeled as Farm Area ‘A’, Farm Area ‘B’, and Farm Area ‘C’. Septage shall only be applied to these specific identified application units. Additionally, these designations shall be used in referencing the individual areas for the agronomic rate calculations.

Table 4.0: Application Acreage

Land Application Area Designation	Area available for Land Application (Acres)
Farm Area 'A'	26
Farm Area 'B'	10
Farm Area 'C'	70
Total	106

4.1 General Location Map
A vicinity Map of the site is included in the appendix.

4.2 Site Map or Field Map
The following maps are located in the appendix:
- Site Map
- Adjacent Well Site Map
- Zoning Map
- Ownership Map
- Flood Map

4.3 Soils Map
Included in the appendix is: Custom Soil Resource Report for Kittitas County Area, Washington.

5.0 Buffers
Septage applied to Application Units identified in this Site Specific Land Application Plan shall maintain the minimum buffer widths shown below. These buffers shall be identified on Application Unit maps.

- Public roadways; 50'
- Dwellings: 200'
- Property line: 100' if property owner is not part of the project; variable if the adjacent property owner is associated with the land application project and agrees to a reduced buffer
- Breaks in the topography resulting in slopes exceeding 15%: 25'
- Surface water (perennial):100'
- Surface water (intermittent): 100'
- Domestic, irrigation, or sampling wells:100'

For this site it is important to note the required 100' buffers from Park Creel and the Seasonal Canal that run through the project site. Additionally, locates to the south of the site is the KRD North Branch Canal, which also has a required 100 foot setback for any land application.

6.0 Application Unit Approval

All Application Units authorized for Septage land application shall be approved by the Washington State Department of Ecology in advance of land applying Septage. Application units must, at a minimum, meet the requirements set forth in sections 4 and 5 above before being reviewed for approval. Ecology reserves the right to exercise professional judgment when evaluating proposed application units regarding their suitability to meet the objectives set forth in this plan.

7.0 Septage Application Rate Determination

One of the objectives of this plan is to achieve uniform septage application rates over each individual application unit in the late summer/early fall of each year during what is considered the summer fallow period. At that time septage will be pumped out from the ponds, sprayed on to the field evenly at agronomic rates, and disked into the soil within 6 hours after application.

Following the summer fallow period and the septage application to each application unit, the area shall be seeded with winter wheat. It is anticipated that harvesting of the wheat will occur the following year.

Application equipment shall be capable of providing reasonably even application in accordance with the approved agronomic application rates.

Agronomic application rates shall be determined prior to any land application of septage. A revised agronomic rate will calculated by Soiltest (or another selected and approved lab) and will be evaluated by the Department of Ecology. These calculations shall be performed for each application unit where septage is to be applied. In developing each new application rate, annual soil sampling shall occur. The soil samples shall be tested for organic matter, TKN, ammonium, and nitrate.

The calculated application rates for the septage shall be used based on the following:

- Plant nitrogen uptake or crop requirement at 2.5 pounds of available nitrogen per bushel of wheat
- An estimate of 40 bushels of wheat produced per acre (unless the grower has records to indicate higher production)
- The soil nitrogen data
- And the professional judgement of the Department of Ecology

Per WAC 173-308-270, the net nitrogen requirement, in ponds per acre, shall be divided by the constant 0.0026 in order to determine the gallons per acre of septage to be applied annually.

Ecology shall have 14 calendar days for review of soil sampling data, so that they may provide an agronomic rate recommendation. The 14 day review period shall start after the properly collected soil sampling data is received by the Department of Ecology.

Per WAC 173-308-270 Equation 3, the septage must be applied at a rate not exceeding the rate determined by the following equation:

$AAR = N \div 0.0026$

AAR: annual application rate in gallons per acre per 3650-day period

N: amount of nitrogen in ponds per acre per 365-pay period needed by the crop or vegetation grown on the land (subtract and nitrogen supplied by other sources)

To determine the distance (in feet) over which a load of liquid septage should be spread to meet the application rate, use the following equation (per WAC 173-308-270 equation 4):

$Drive\ Length\ (feet) = gallons\ \div spread\ width\ (in\ feet) x\ 43{,}560\ \div AAR$

AAR: annual application rate in gallons per acre per 365-day period calculated using equation 3

8.0 Methods of Application

Land application of the septage may be conducted with any equipment suitable for the purpose and the material being land applied. Land application methods will be even and consistent in accordance with the calculated application rate (see section 9).

Equipment that may be used includes:

- Rear- and side-discharge manure spreaders for dewatered biosolids.
- Spray irrigation equipment for liquid biosolids.
- Injectors for liquid biosolids.
- Other equipment as approved by Ecology.

The septage will meet the vector attraction reduction requirements in WAC 173-308-180 and may be surface-applied without a requirement for incorporation. “Vector attraction” is the primarily odorous characteristic of septage that attracts rodents, flies, or other organisms capable of transporting infectious agents.

9.0 Timing of Septage Applications

Land application of septage will take place during normal farming hours. Septage will be applied during daylight hours when weather and site conditions allow for proper application and management. Septage will not be applied if the soil is overly saturated, frozen, of there is excessive snow cover, or if site conditions exist such that adequate infiltration or incorporation is precluded. Damage to soil structure shall be avoided by limiting equipment use during periods when soils are wet.

10.0 Vector and Pathogen Requirements

Vector an pathogen requirements are both met through incorporation into the soil. The septage will be incorporated into the soil within 6 hours after application.

11.0 Septage Staging and On-Site Storage

Septage will be produced off site and then hauled and delivered to the septage ponds by Brown & Jackson, LLC. All septage delivered to Brown and Jackson shall be accompanied by a haul ticket or other documentation record containing the following information:

- Name of Hauling Company and Driver’s Name
- Name of Septage Source or Generator
- Date of Delivery
- Ticket or Invoice Number
- Weight of Septage delivered in pounds, wet tons, or dry tons.

On site storage areas will be visibly posted with signage to notify unauthorized persons to not enter the site until septage has been applied and the site restriction has been met. The site is on private property and no trespassing rules may be enforced by the landowners as needed.

Septage will be stored in a planned series of ponds located well within the property line of the site. The septage being delivered to the site will be coming from a variety of sources, and per the department of Ecology a Sampling Plan has been developed. The septage will be stored on site for several months, until it is land applied approximately once a year.

12.0 Screening Requirements

Per WAC 173-308-205, septage stored on site stall be physically screened though a bar screen with a maximum opening of 3/8 inches, in order to remove any unwanted material prior to land application.

The screening of the septage prior to land application on this site will be through a Screenco Mega Screen 600 receiving station, a bar screen system that meets the requirements of WAC 173-308-205. This ensures that any unacceptable waste is not entering the storage ponds. The rejected waste retained on the screens will be disposed of via the on-site dumpsters and then hauled off site to a landfill.

13.0 Incorporation of Land Applied Septage

Per WAC 173-308-210 (4) (b), the septage will be incorporated into the soil within six hours after application to the land. As discussed previously the septage will be disked in to the soil, within six hours of application.

14.0 Soil Sampling Requirements

Pre-Application composite soil samples will be collected at each site where the septage will be applied. Soil samples shall be collected independently for the top foot of soil (0"–12"depth) and the second foot of soil (12"–24" depth). A minimum of 15 individual samples, typically taken as soil cores 10-12" in length, shall be collected from the indicated depths.

As described in the Sampling and Analysis Plan that has been prepared for this site, An independent contractor will take the composite samples, as described above, for each individual application unit that will be receiving septage. The soil samples shall be analyzed for total N (or TKN), N03-N,NH4-N, and organic matter. The individual samples shall be evenly distributed across an application unit to ensure that the composite sample is representative of the soil across the entire application unit.

Pre-application composite samples will be analyzed for pollutant concentrations as defined in WAC 173-308-160. Refer to the Soil Sampling Plan, located in the appendix, for more detailed information. The testing results of the samples shall be submitted to the Department of Ecology.

Note: For sites that have not previously received septage, concentrations of the Priority Pollutants per WAC 173-308-160, Table 1) shall be determined for the top foot of the soil.

15.0 Cropping Practices and Livestock Management

Dryland winter wheat is the primary crop to be planted on soils receiving biosolids applications at Brown and Jackson. Some alfalfa, soft wheat, hard wheat, grass hay, and other crops may be also grown. Site management criteria will be appropriate to the farmer's plan including, crop type and projected crop yield.

Dryland farming sites are typically planted once a year in the late-summer or early-fall. On occasion, all or portions of the fields may be re-cropped to spring wheat or other crop as determined by the farmer. Re-cropping is a common practice that is performed to return a field to its proper or preferred rotation. Recropping may also be done to control weeds, to minimize pest pressures, for nutrient management or to increase crop production in favorable years.

Crops grown on these sites may be used for human and or livestock consumption. It is anticipated that the crops grown on site will be sold for animal feed production. Per the General Permit, crop harvest waiting periods will be 30 days after biosolids application for food, feed, or fiber crops. At this time, no livestock graze at this site. Should this change, livestock grazing will be restricted for 30 days after biosolids application.

Depending on the farming activities the following information may be collected and documented for nitrogen and pathogen management and review by Ecology.

- Field/ Unit Management Logs, Biosolids Land Application Records, Application Rate Calculators
    - Crops- Name/Type, Crop Nitrogen Requirements, Harvest Frequency, Crop Removal (i.e. removal of Nitrogen) Quantity
    - Tillage- such as plowing, disking, harrowing- Dates, Frequency
    - Planting/ Crop changes, over seeding
    - Irrigation frequency, duration, quantity
    - Biosolids application- date, time, management unit, quantity, WWTF source, weather, soil condition/moisture; ground water level
    - Other added nutrients or amendments
    - Livestock- type, frequency, duration, quantity, manure nitrogen contribution factor
    - Weather- precipitation, temperatures
- Post-Harvest soils test results

16.0 Other Nutrient Sources and Soil Amendments

Any use of other nutrient sources or soil amendments will be taken into consideration when determining septage application rates. This may include manures and residual mineralization of soil amendments recently applied to the site.

Cover crops may be used to improve the soil by adding organic matter, to control weeds, stabilize soil, and scavenge leftover nutrients.

17.0 Groundwater Protection Plan

Agriculture dryland and irrigated farming sites are typically located above the groundwater table for effective crop production. It is not anticipated that any land applications will occur from December to late-March, which are generally considered relatively high precipitation months. Average annual precipitation for the Ellensburg area is nine inches. Available data suggests that depth to groundwater is greater than 100 feet throughout the project area.

Land application of septage will not occur if groundwater levels are with three feet of the ground surface. Land applications on sites that may be affected by high water tables may be temporarily restricted on specific areas of a site as determined by Ecology. The Department of Ecology's guidance on Assessing Seasonal High Groundwater may be referenced as needed.

18.0 Erosion Control Plan

Agricultural sites are typically managed to control erosion, given that farmers rely on their soil for their livelihood. The farming community is very knowledgeable in farming practices that help minimize soil erosion. Many farms in Kittitas County have adopted reduced tillage system practices (1) leave soil mostly undisturbed and (2) leave high levels of crop residues behind that provide ground cover and can significantly reduce soil erosion.

Biosolids are a nutrient-rich, organic product that returns valuable nutrients and carbon to the land. Biosolds enrich soils and increase soil tilth by adding organic matter keeping sites productive and healthy. There is evidence that biosolids applications help reduce wind and water erosion effects.

Application sites will be managed to control erosion. Growers will adhere to the requirements of their erosion control contracts or agreements as prescribed. This may include considerations of slope, timing of application, site conditions, and distance to surface waters. Depending upon the site and details of land application activities, an Erosion Control Plan may be written in an as-needed basis. NECS and FSA erosion control contact information may be made available upon request.

19.0 Noxious Weed Plan

Landowners are required to control the spread of noxious weeds in accordance with RCW 17.10.140, Owners Duty to Control Spread of Noxious Weeds.

Land application procedures that result in the spread of noxious weeds will be interpreted by Ecology as not meeting the Beneficial Use requirements of WAC 173-308-080.

Agricultural sites are typically managed to control weeds and usually will not be subject to this requirement.

20.0 Restricting Site Access

The access points to this site are identified on the Site Map, and can be found in the appendix. An informational "Restricted Access" sign shall be posted at the primary entrances to the site for at least 30

SEPTAGE MANAGEMENT APPLICATION SITE

Septage Applied: 4G Farms has applied septage to this site as a soil amendment. Management of applied septage at this site is in compliance with WAC *Chapter 173-308, Biosolids Management,* the *General Permit for Biosolids Management,* and our *Site Specific Land Application Plan.*

Contact information for 4G Farms is:
Rikki Schmitt
107 North Main Street
Ellensburg, WA 98926
Phone: 509-929-2469

Contact Information for the Permitting Authorities for this project are:

Jesse Cox	Canming Xiao
Environmental Health Specialist	Solid Waste Management Program
Kittitas County Environmental Health	Washington State Department of Ecology
507 N. Nanum St. Suite 102	1250 W. Alder Street
Ellensburg WA 98926	Union Gap, WA 98903-0009
Phone: 509-962-7515	Phone: 509-575-2842
environmentalhealth@co.kittitas.wa.us	CXIA461@ECY.WA.GOV

Harvesting of plant material is not allowed without written permission from 4G Farms.

ACCESS IS RESTRICTED TO PERSONS INVOLVED IN THIS PROJECT AND REGULATORY PERSONNEL

days following the land application of septage, Per WAC 173-308-210. The informational sign must contain the following information:

Additionally, signs (informational or “no trespassing” will also be placed around the perimeter of the property as deemed appropriate by Brown and Jackson or the Department of Ecology. Entering improved property without permission of the land owner or person who has right of possession (lease holder) is a violation of state law. The posting of signs noting the site is restricted adds an additional measure for public protection and also signals that the land is not open for public access.

Restricted Access Minimum Buffers Applied to Fields

Property Lines	10 feet
Fence Liens	10 feet
Secondary Roads	10 feet
On Site Dwellings	120 feet
Off Site Dwellings	50 feet
Outbuildings	10 feet

21.0 Recordkeeping

Specific records of land application activities shall be kept. These records shall be available for inspection by Ecology upon request. As a minimum, the following information shall be included and maintained in the land application site records:

- Sampling and analysis data you were responsible to obtain or that you used to make decisions on land application.
- The source of biosolids delivered.
- The amount of biosolids delivered.
- The amount of biosolids applied.
- The number of acres on which biosolids were applied.
- The rate of application.
- The date biosolids were applied.
- The targeted vegetation and its nitrogen requirement.
- Information on how site management and access restrictions were met, including for livestock.
- Information on how vector attraction reduction requirements were met if biosolids were required to be tilled or injected.
- The amount in storage.

Appendixes

1.0 – Land Owner Agreement

3.1 – Vicinity Map

3.2 – Site Maps

- Preliminary Site Map
- Adjacent Well Site Map
  - Corresponding Well Logs
- Zoning Map
- Ownership Map
- Firmette Flood Map

3.3 – USDA Custom Soil Resource Report for Kittitas County Area, Washington

Brown & Jackson **Septic/Portable Toilets**

107 North Main Street
Ellensburg, WA 98926

509-925-1564
brownandjackson107@gmail.com

Land Owner Agreement

Brown & Jackson Inc and it's agricultural entity, 4G Farms LLC, understands and acknowledges the applicability and requirements of Chapter 173-308 WAC regarding the storage and application of septage on our property on Parke Creek Road in Ellensburg, WA. Kittitas County Parcel No. 295134. As we have been a family run septic/portable toilet business for over 40 years we are committed to working with the Department of Ecology, soil experts, engineers, and liner professionals to ensure success with this endeavor.

Additionally, authorized individuals from the Department of Ecology and the jurisdictional health department may access these properties to inspect and insure that the biosolids rule requirements are being met.

The undersigned certifies that they are the landowner(s) of record and have the full and complete authority to make the approval stated herein:

Brown & Jackson Inc.

Tyler Schmitt-President

Dan C Schmitt

Dan Schmitt-Vice President

Terri Schmitt

Terri Schmitt-Secretary

4G Farms LLC

Tyler Schmitt-Member

Rikki Schmitt

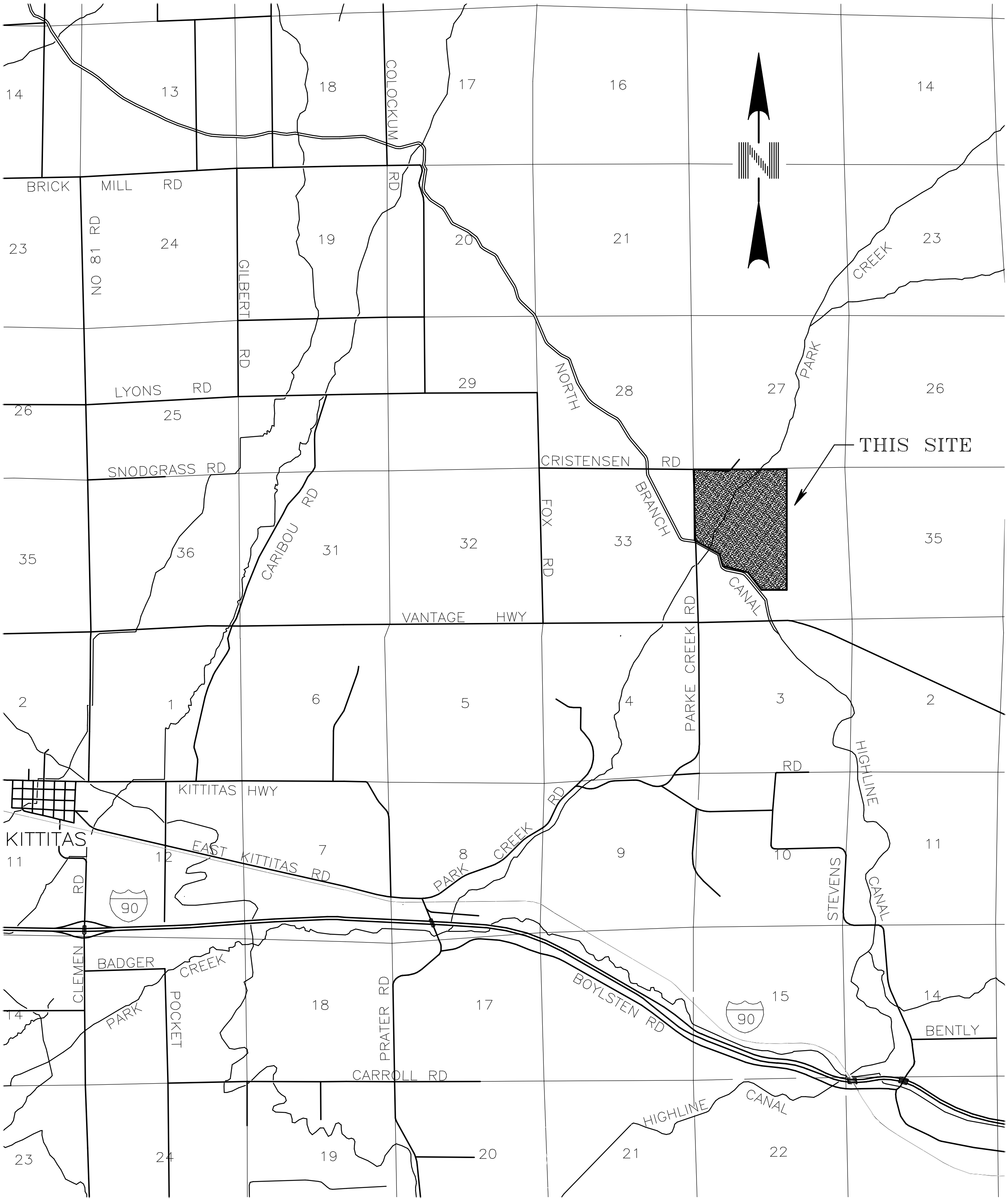
Rikki Schmitt-Managing Member

Dan C Schmitt

Dan Schmitt-Member

Terri Schmitt

Terri Schmitt-Member

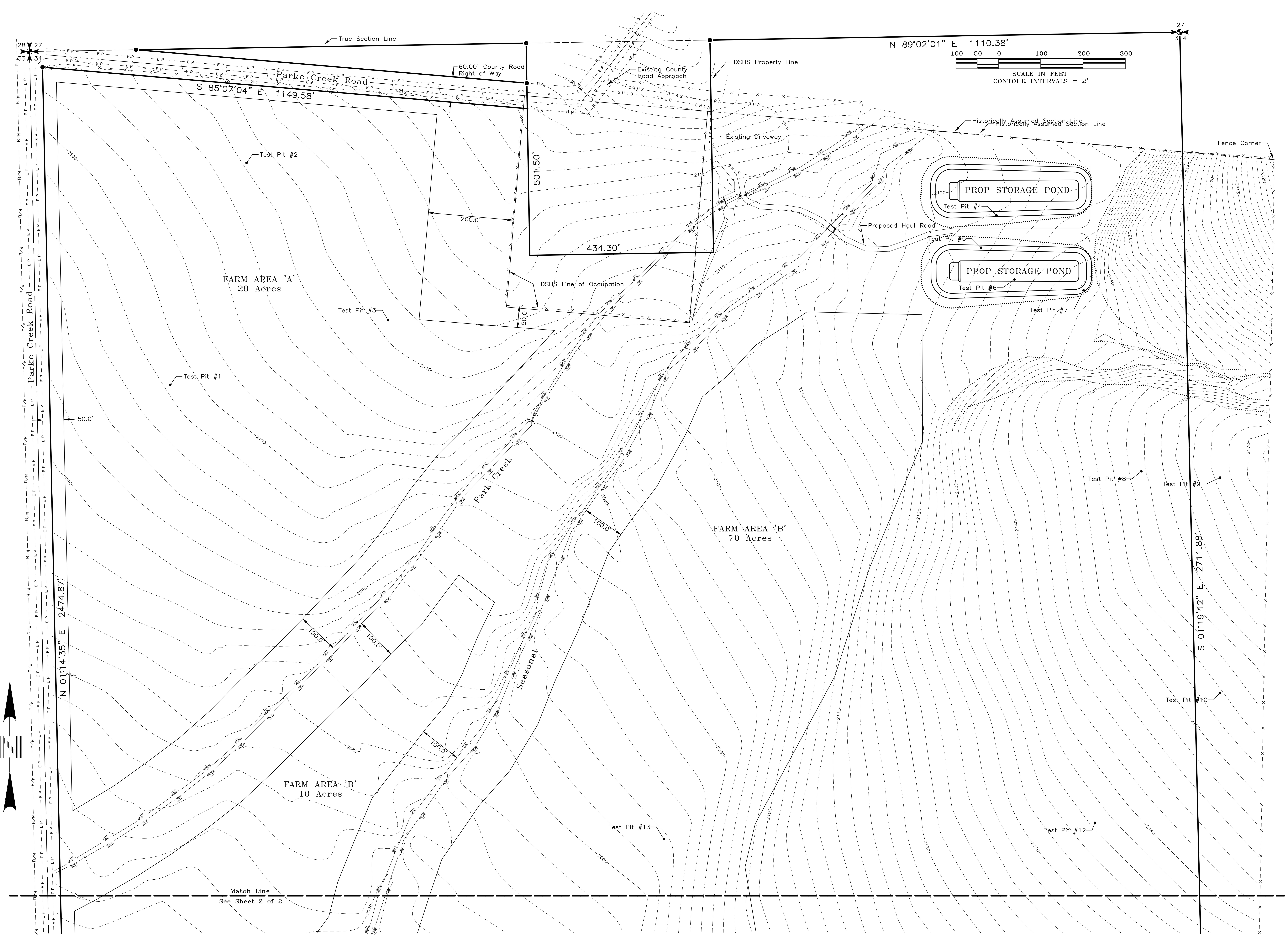


WESTERN PACIFIC ENGINEERING & SURVEY
A TERRA DEVELOPMENT SERVICES CORPORATION

1328 East
Hunter Place
Moses Lake, WA
T:(509)765-1023
F:(509)765-1298

BROWN & JACKSON
Land Application Site Vicinity Map

DRAWN BY: NDN	DATE:	WPE PROJECT #:	Scale: 1" = 5000'
CHECKED BY: NDN	April 14, 2020	20410	PLATE NO.: 01



STATE OF WASHINGTON
NATHANIEL D. NOFZIGER
38806
REGISTERED PROFESSIONAL ENGINEER

WESTERN PACIFIC
ENGINEERING & SURVEY
A TERRA DEVELOPMENT SERVICES CORPORATION
1328 E. Hunter Place, Moses Lake, Washington
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Services in Washington and Idaho

No.	Revision	Date	By

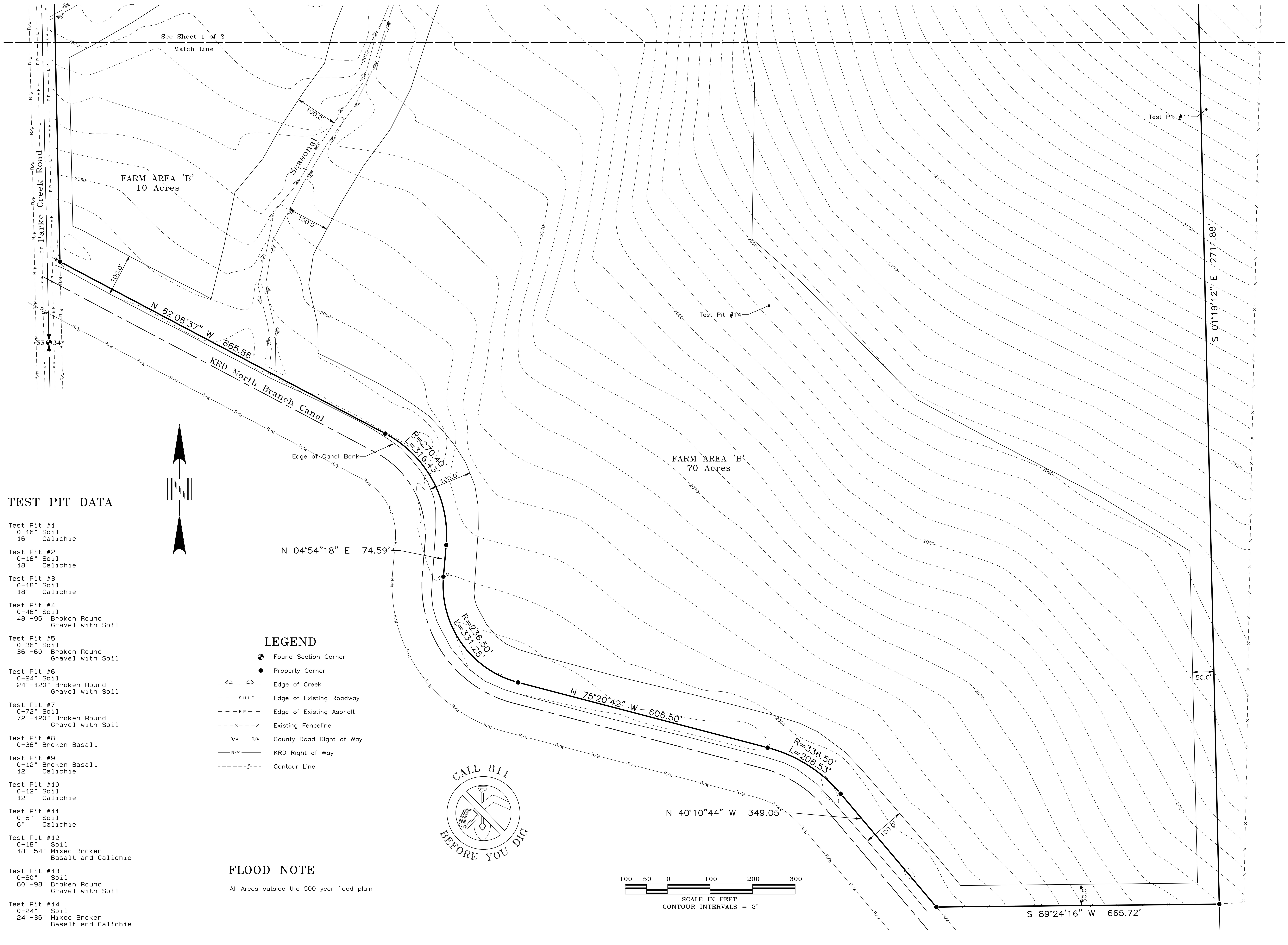
BROWN & JACKSON
Land Application Site
Preliminary
Site Map

Kittitas County Washington

Designed by NDN
Drawn by Tml/NDN
Checked by NDN
Project No. 20102
Date: April 2020
Scale:
Hor. 1" = 3'
Vert. 1" = N/A
Sec 34, T 18 N, R 20 E

SHEET NO.
1 of 2

201834



TEST PIT DATA

Test Pit #1
0-16" Soil
16" Calichie

Test Pit #2
0-18" Soil
18" Calichie

Test Pit #3
0-18" Soil
18" Calichie

Test Pit #4
0-48" Soil
48"-96" Broken Round Gravel with Soil

Test Pit #5
0-36" Soil
36"-60" Broken Round Gravel with Soil

Test Pit #6
0-24" Soil
24"-120" Broken Round Gravel with Soil

Test Pit #7
0-72" Soil
72"-120" Broken Round Gravel with Soil

Test Pit #8
0-36" Broken Basalt

Test Pit #9
0-12" Broken Basalt
12" Calichie

Test Pit #10
0-12" Soil
12" Calichie

Test Pit #11
0-6" Soil
6" Calichie

Test Pit #12
0-18" Soil
18"-54" Mixed Broken Basalt and Calichie

Test Pit #13
0-60" Soil
60"-98" Broken Round Gravel with Soil

Test Pit #14
0-24" Soil
24"-36" Mixed Broken Basalt and Calichie

LEGEND

- Found Section Corner
- Property Corner
- Edge of Creek
- SHLD — Edge of Existing Roadway
- EP — Edge of Existing Asphalt
- x — Existing Fenceline
- R/W — R/W County Road Right of Way
- R/W KRD Right of Way
- # Contour Line

FLOOD NOTE

All Areas outside the 500 year flood plain

File -- Project Desc.: X:\20410\Drafting\20410e1.sitemap.pro Date: Fri Apr 24, 2020

NATHANIEL D. NOFZIGER
STATE OF WASHINGTON
38806
REGISTERED PROFESSIONAL ENGINEER

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No.	Revision	Date	By

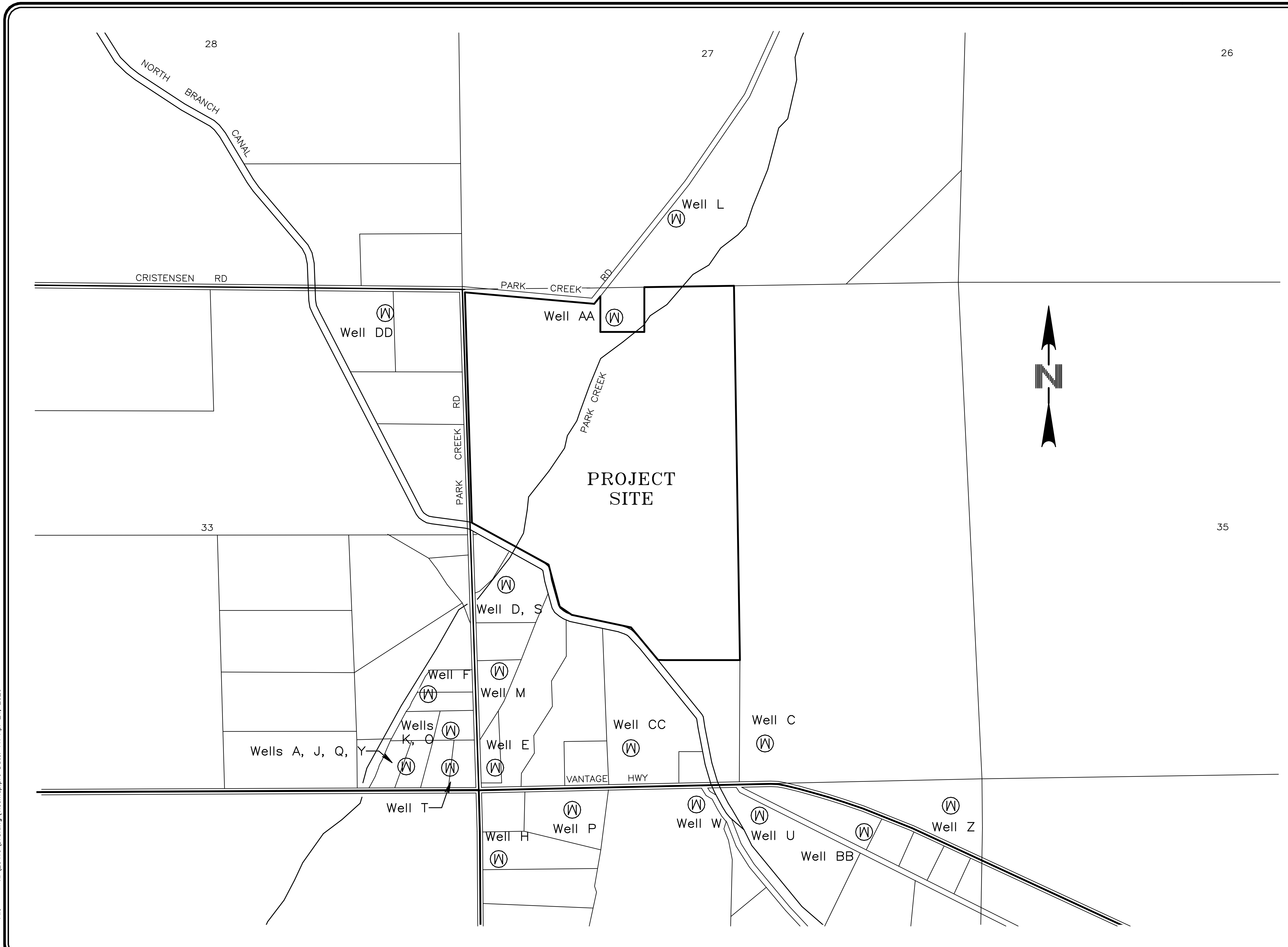
BROWN & JACKSON
Land Application Site
Preliminary Site Map

Kittitas County Washington

Designed by NDN
Drawn by Tml/NDN
Checked by NDN
Project No. 20102
Date: April 2020
Scale:
Hor. 1" = 3'
Vert. 1" = N/A
Sec 34, T 18 N, R 20 E

SHEET NO.
2 of 2

201834



WESTERN PACIFIC ENGINEERING & SURVEY
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1328 E. Hunter Place, Moses Lake, Washington
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No.	Revision	Date	By

BROWN & JACKSON
Land Application Site
Adjacent Well Site Map

Grant County Washington

Designed by NDN
Drawn by Tml/NDN
Checked by NDN
Project No. 20410
Date: April 2020
Scale:
Hor. 1" = 1000'
Vert. 1" = N/A
Sec 34, T 18 N, R 20 E

SHEET NO.
C1.1

File -- X:\20410\Drafting\Vicemap.pro Date: Fri Apr 24, 2020

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

Well A

RECEIVED
JUL 11 2000
DEPARTMENT OF ECOLOGY
WELL DRILLING UNIT

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

WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent W108913
UNIQUE WELL I.D. # AEQ 998
Water Right Permit No. ______

(1) OWNER: Name Bill Pitts Address P.O. 1079, Kittitas, WA. 98934

(2) LOCATION OF WELL: County Kittitas SE 1/4 SE 1/4 Sec 33 T 18 N.R. 20 WM

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

TAX PARCEL NO.: ______ R

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

(4) TYPE OF WORK: Owner's number of well (if more than one) ______
'00 JUL -7
☑ New Well ☐ Deepened ☐ Reconditioned ☐ Decommission
Method: ☐ Dug ☐ Bored ☐ Cable ☐ Driven ☑ Rotary ☐ Jetted

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 140 feet. Depth of completed well 140 ft.

(6) CONSTRUCTION DETAILS

Casing Installed:
☑ Welded 6" Diam. from +4 ft. to 90 ft.
☑ Liner installed 4" Diam. from -10 ft. to 140 ft.
☐ Threaded ______" Diam. from ______ ft. to ______ ft.

Perforations: ☑ Yes ☐ No
Type of perforator used Skillsaw
SIZE of perforations 1/4 in. by 4 in.
100 perforations from 120 ft. to 140 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? 18 ft.
Material used in seal bentonite
Did any strata contain unusable water? ☐ Yes ☑ No
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

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

(8) WATER LEVELS: Land-surface elevation above mean sea level ______ ft.
Static level 10 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.
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 20 gal./min. with ______ ft. drawdown after 2½ 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
dirt/cobbles	0	10
cement gravel	10	90
medium basalt	90	140

DEPT. OF ECOLOGY
Received
JUL 14 2000
CENTRAL REGION OFFICE

Work Started June 13 2000 Completed June 15 2000

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 Mike Mayfield License No. 2361
(Licensed Driller/Engineer)
Trainee Name Jeremy Bach License No. 2536
Drilling Company Bach Drilling Co.
(Signed) Mike Mayfield License No. 2361
(Licensed Driller/Engineer)
Address 3340 Wilson Creek Rd
Contractor's Registration No. Mike BDC 133N4 Date Jun 22 2000

(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 and First Copy with Department of Ecology
Second Copy Owner's Copy
Third Copy Driller's copy 147438

WATER WELL REPORT
STATE OF WASHINGTON

Notice of Intent W171665
UNIQUE WELL I D # AKO429
Water Right Permit No

(1) OWNER Name BRUCE KATOCS Address 16781 VANTAGE HWY ELLENSBURG, WA 98926

(2) LOCATION OF WELL County KITTITAS SE 1/4 SW 1/4 Sec 34 T 18 N R 20 WM

(2a) STREET ADDRESS OF WELL (or nearest address) 16781 VANTAGE HWY ELLENSBURG WA 98926

TAX PARCEL NO 182034 000 0006 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 [ ] Deepened [ ] Reconditioned [ ] Decommission
Method [ ] Dug [ ] Bored [ ] Cable [ ] Driven [X] Rotary [ ] Jetted

(5) DIMENSIONS Diameter of well 6 inches
Drilled 223 feet Depth of completed well 223 ft

(6) CONSTRUCTION DETAILS
Casing Installed
[X] Welded 6 Diam from +4 ft to 145 ft
[X] Liner installed 4 1/2 Diam from 123 ft to 223 ft
[ ] Threaded Diam from ft to ft

Perforations [X] Yes [ ] No
Type of perforator used SKILLSAW
SIZE of perforations 1/8 in by 6 in
25 perforations from 203 ft to 223 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? 145 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 107 ft below top of well Date 2/26/2004
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 60 gal /min with stem set at 220 ft for 1 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 & BOLDERS	0	1
CLAY & BOLDERS	1	14
BROKEN BASALT & BOLDERS & CLAY BROWN	14	66
BROKEN BASALT & CLAY	66	84
BASALT	84	90
SOFT BASALT GREY BROWN & CLAY BROWN	90	124
BASALT DARK GREY & BROWN	124	173
BASALT GREY	173	195
BASALT GREY BROWN	195	216
BASALT GREY BLACK BROWN BROKEN SHALE	216	
CLAY		223
60 GPM @ 220		
40 GPM @ 140		

DEPT OF ECOLOGY Received MAR 17 2004 CENTRAL REGION OFFICE

Work Started 2/25/2004 19 Completed 2/26/2004 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
(Signed) Tom McGuire (Licensed Driller/Engineer) License No 0357
Address 1301 LANCASTER RD SELAH, WA 98942
Contractor's Registration No RICKPWD042J2 Date 2/26/2004 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Well C

Well D

368410

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W36922
Unique Well I.D. #
Water Right Permit No.

(1) OWNER: Name MARCHEL, CHRIS   Address ROUTE 3, BOX 1131   ELLENSBURG, WA 98926-

(2) LOCATION OF WELL: County KITTITAS   - W 1/4 SW 1/4 Sec 34 T 18 N., R 20 WM
(2a) STREET ADDRESS OF WELL (or nearest address) ,

(3) PROPOSED USE: DOMESTIC

(4) TYPE OF WORK: DEEPENED   Owner's Number of well (If more than one) 1   Method: ROTARY

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 64 ft. Depth of completed well 160 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 5 " Dia. from +2 ft. to 131 ft.
WELDED " Dia. from ft. to ft.
" Dia. from ft. to ft.

Perforations: 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: NO
Manufacturer's Name
Type Model No.
Diam. slot size from ft. to ft.
Diam. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: NO To what depth? ft.
Material used in seal
Did any strata contain unusable water? NO
Type of water? Depth of strata ft.
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 52 ft. below top of well Date 05/05/94
Artesian Pressure lbs. per square inch Date
Artesian water controlled by

(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 in formation.

MATERIAL	FROM	TO
BROKEN BASALT	96	115
BASALT HARD	115	130
BROKEN BASALT	130	160
	160	

MAY 25

Work started 05/03/94   Completed 05/05/94

(9) 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 hrs.

Recovery data
Time Water Level Time Water Level Time Water Level

Date of test / /
Bailer test gal/min. ft. drawdown after hrs.
Air test 22 gal/min. w/ stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

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

ADDRESS E 4010 BROADWAY

[SIGNED] Dennis J. Urain   License No. 2154

Contractor's Registration No. PO-ND-EI*248JE   Date 05/19/94

368411

Well E

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W089871
Unique Well I.D. # ACP575
Water Right Permit No.

(1) OWNER: Name **MARCHEL, CHRIS** Address **9120 PARK CREEK ROAD ELLENSBURG, WA 98926-**

(2) LOCATION OF WELL: County **KITTITAS** - **W 1/2 SW 1/4 Sec 34 T 18 N., R 20 WM**
(2a) STREET ADDRESS OF WELL (or nearest address) ,

(3) PROPOSED USE: **DOMESTIC**

(4) TYPE OF WORK: Owner's Number of well (If more than one)
NEW WELL Method: **ROTARY**

(5) DIMENSIONS: Diameter of well **6** inches
Drilled **160** ft. Depth of completed well **160** ft.

(6) CONSTRUCTION DETAILS:
Casing installed: **6** " Dia. from **+2** ft. to **113** ft.
WELDED " Dia. from ft. to ft.
" Dia. from ft. to ft.

Perforations: **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: **NO**
Manufacturer's Name
Type Model No.
Diam. slot size from ft. to ft.
Diam. slot size from ft. to ft.

Gravel packed: **NO** Size of gravel
Gravel placed from ft. to ft.

Surface seal: **YES** To what depth? **18** ft.
Material used in seal **BENTONITE**
Did any strata contain unusable water? **NO**
Type of water? Depth of strata ft.
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type **NONE** H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level **70** ft. below top of well Date **04/14/98**
Artesian Pressure lbs. per square inch Date
Artesian water controlled by

(10) WELL LOG M, N

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 in formation.

MATERIAL	FROM	TO
CLAY BROWN	0	2
GRAVEL CEMENTED	2	58
BASALT BROKEN MEDIUM	58	64
CEMENTED GRAVEL BASALT	64	
------- W/WATER	64	91
BASALT FRACTURED MEDIUM	91	
------- W/WATER	91	127
BASALT BLACK MEDIUM	127	152
BASALT FRACTURED BROWN	152	
------- BLACK W/WATER	152	160

RECEIVED APR 29 1998

Work started **04/13/98** Completed **04/14/98**

(9) 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 hrs.

Recovery data
Time Water Level Time Water Level Time Water Level

Date of test / /
Bailer test gal/min. ft. drawdown after hrs.
Air test **30** gal/min. w/ stem set at **160** ft. for **1** hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? **NO**

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 **FOGLE PUMP & SUPPLY, INC.**
(Person, firm, or corporation) (Type or print)

ADDRESS **POB 1450, AIRWAY HTS. WA.**

[SIGNED] Todd Lively/mo License No. **2321**

Contractor's Registration No. **FOGLEPS095L4** Date 04/21/98

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

Well F

File Original with Department of Ecology 97991
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent W113449
UNIQUE WELL I D # AFE 239
Water Right Permit No

(1) OWNER. Name Dale Brusius Address 220 mt Rainier Place nw Iss wa 9802

(2) LOCATION OF WELL. County Kittitas Se 1/4 Se 1/4 Sec 33 T 18 N R 20 WM

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

TAX PARCEL NO

R

(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 ☐ Bored ☐ Cable ☐ Driven ☒ Rotary ☐ Jetted

(5) DIMENSIONS Diameter of well 10x6 inches
Drilled 145 feet. Depth of completed well 145 ft.

(6) CONSTRUCTION DETAILS
Casing installed.
☒ Welded 6" Diam from +2 ft to -102 ft
☐ Liner installed " Diam from ft to 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
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? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP Manufacturer's Name
Type H P

(8) WATER LEVELS Land-surface elevation above mean sea level ft
Static level 51 ft below top of well Date 3/5/01
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

ESTIMATED AIRLIFT

Date of test
Bailer test gal./min with ft drawdown after hrs
Airtest 30-35 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
TOPSOIL DRKBRN M	0	3
Cemented Gravel DrKBrn mH	3	31
BROKEN BASALT Clay BrnBlk mH	31	75
BROKEN BASALT SANDSTONE BrnBlk mH	75	91
BASALT BRNBlK H	91	108
POURCE BASALT BRNBlK M	108	145

Work Started 3/2/01 Completed 3/5/01

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 Chris Hayes License No 1908
(Licensed Driller/Engineer)

Trainee Name License No
Drilling Company Waterman Well Drilling Inc
(Signed) License No 1908
(Licensed Driller/Engineer)
Address 106 Berryman ln Selah Wa 9894

Contractor's Registration No WATERWD022DB Date 3/6/01

(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. I Report.

Well H

WATER WELL REPORT

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

CURRENT Notice of Intent No. W170991

Unique Ecology Well ID Tag No. ALF 359

Water Right Permit No.

Construction/Decommission *("x" in circle)* 177017

○ Construction

○ Decommission *ORIGINAL CONSTRUCTION Notice of Intent Number*

Property Owner Name Dave + Nichole Burke

Well Street Address Park Creek

City Ellensburg County Kittitas

Location NW 1/4- 1/4 NW 1/4 Sec 03 Twn 17 R 20 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. 17200305100002 D

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 125 ft.

Depth of completed well 125 ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 6" Diam. from +2 ft. to 45 ft.

☒ Liner installed 4" Diam. from -10 ft. to 125 ft.

☐ Threaded " Diam. from ft. to ft.

Perforations: ☒ Yes ☐ No

Type of perforator used Skil Saw

SIZE of perfs 7 in. by 1/4 in. and no. of perfs 300 from 80 ft. to 125 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? 45 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 30 ft. below top of well Date 7-6-05

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 20 gal./min. with stem set at 120 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
top soil	0	2
Brown Basalt med	2	15
Black Basalt Hard	15	45
Brown Black Basalt	45	85
Black Brown Basalt water	85	125

DEPT OF ECOLOGY Received AUG 02 2005 CENTRAL REGION OFFICE

Start Date 7-5-05 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) Mike Morefield

Driller/Engineer/Trainee Signature Mike Morefield

Driller or Trainee License No. 2361

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

Drilling Company Waterman Well Drilling

Address P.O. Box 246

City, State, Zip Selah Wa 98942

Contractor's Registration No. WATERWD022D0 Date 7/11/05

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

Well J

38255

WATER WELL REPORT
STATE OF WASHINGTON

Start Card No. W50927
Unique Well I.D. # ABW466
Water Right Permit No.

(1) OWNER: Name CHRISTIANSON, DENNIS Address 15531 VANTAGE HIGHWAY ELLENSBURG, WA 98926-

(2) LOCATION OF WELL: County KITTITAS - SE 1/4 SE 1/4 Sec 33 T 18 N., R 20E WM
(2a) STREET ADDRESS OF WELL (or nearest address) ,

R

(3) PROPOSED USE: DOMESTIC

(4) TYPE OF WORK: Owner's Number of well (If more than one)
NEW WELL Method: ROTARY

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 260 ft. Depth of completed well 260 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Dia. from +2 ft. to 125 ft.
WELDED 4 " Dia. from -6 ft. to 260 ft.
" Dia. from ft. to ft.

Perforations: YES
Type of perforator used SKILL SAW
SIZE of perforations 1/8 in. by 6 in.
102 perforations from 240 ft. to 260 ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: NO
Manufacturer's Name
Type Model No.
Diam. slot size from ft. to ft.
Diam. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: YES To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? YES
Type of water? OTHER Depth of strata ft.
Method of sealing strata off OVERBORE

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

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 81 ft. below top of well Date 02/17/95
Artesian Pressure lbs. per square inch Date
Artesian water controlled by

(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 in formation.

MATERIAL	FROM	TO
COBBLES LOAM BROWN	0	7
COBBLES BOULDERS HARD	7	36
SANDSTONE BROWN GRAVEL	36	42
CEMENTED GRAVEL COBBLES	42	52
SANDSTONE BROWN MEDIUM	52	56
CEMENTED GRAVEL HARD	56	137
BROKEN BASALT SHALE	137	210
POROUS BASALT RED	210	260
	260	

RECEIVED
MAR 6 1995

Work started 02/14/95 Completed 02/17/95

(9) 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 hrs.

Recovery data
Time Water Level Time Water Level Time Water Level

Date of test / /
Bailer test gal/min. ft. drawdown after hrs.
Air test 25 gal/min. w/ stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

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

ADDRESS E 6010 BROADWAY

[SIGNED] License No. 2060 OR07

Contractor's
Registration No. PO-ND-EI*240JE Date 02/23/95

Well K

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

107039

WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent W123134
UNIQUE WELL I D # AFH-374
Water Right Permit No

(1) OWNER: Name Gary Huss Address 71 Duffy Rd., Ellenburg

(2) LOCATION OF WELL: County Kittitas SE 1/4 SE 1/4 Sec 33 T 18 N R 20 WM

(2a) STREET ADDRESS OF WELL: (or nearest address) 71 Duffy Rd.

TAX PARCEL NO.

R

(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 ☐ Bored ☐ Cable ☐ Driven ☒ Rotary ☐ Jetted

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 125 feet Depth of completed well 125 ft

(6) CONSTRUCTION DETAILS
Casing Installed:
☒ Welded 6" Diam from +1 ft to 90 ft
☒ Liner installed 4½" Diam from 65 ft to 125 ft
☐ Threaded " Diam from ft to ft

Perforations: ☒ Yes ☐ No
Type of perforator used Skill Saw
SIZE of perforations 3/16 in by 5 in
80 perforations from 105 ft to 125 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? 18 ft
Material used in seal Bentonite
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? Depth of strata
Method of sealing strata off

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

(8) WATER LEVELS: Land-surface elevation above mean sea level 1760 ft
Static level 50 ft below top of well Date 4-21-00
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 ft drawdown after 1 hrs
Artesian flow g p m Date 4-21-00
Temperature of water 56 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	6
Cemented Gravel & Br. Clay	6	108
Br. & Gray Basalt	108	113
Br. Porus Basalt & Hd. Br. Clay & Water	113	125

RECEIVED JUN 2 2000 DEPARTMENT OF ECOLOGY CENTRAL REGION

RECEIVED JUN 2000 DEPARTMENT OF ECOLOGY CENTRAL REGION

Work Started 4-19-, 00 Completed 4-21-, 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 4-23-, 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)

Well L

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. 64-24093
Permit No. 64-24093P

(1) OWNER: Name Howard Clerf Address

(2) LOCATION OF WELL: County Kittitas SW ¼ E ½ Sec. 27 T. 18 N., R. 20 W.M. LP
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 465 ft. Depth of completed well 465 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: " Diam. from ft. to ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☑ 8 " Diam. from 0 ft. to 110 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? 110 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 pressure grout

(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 95 lbs. per square inch Date Sept. 9, 76
Artesian water is controlled by Valve (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 2000 g.p.m. Date Sept. 9, 1976
Temperature of water 68 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
Dirt, Cobbles	0	16
Broken rock	16	100
Hard black basalt	100	120
Soft broken basalt	120	122
75-80 gpm		
Hard basalt	122	140
Soft broken basalt	140	141
Hard black basalt	141	203
Soft basalt blue	230	380
clay (increase flow)		
Med. basalt	380	400
Soft basalt	400	410
Med. basalt	410	450
Soft basalt	450	455
Hard black basalt	455	465

RECEIVED
SEP 13 1976
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 Bach Drilling Co. (Person, firm, or corporation) (Type or print)
Address
[Signed] (Well Driller)
License No. 22 W Date Sept. 10, 1976

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

The Dept. 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

Well M

8736

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 086885

UNIQUE WELL I.D. #

Water Right Permit No.

(1) OWNER: Name Jack Loftis Address Rt. 3 Box 585, Ellensburg, WA 98926

(2) LOCATION OF WELL: County Kittitas W½ ¼ SW ¼ Sec. 34 T. 18 N., R 20 W.M.

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

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

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

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 160 feet. Depth of completed well 160 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from +2 ft. to 126 ft.
Welded [X] Liner installed [X] Threaded [ ] PVC 4 " Diam. from 20 ft. to 160 ft.
" Diam. from ft. to ft.

Perforations: Yes [X] No [ ] PVC Liner
Type of perforator used Skill Saw
SIZE of perforations 6 in. by 1/8 in.
102 perforations from 140 ft. to 160 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 Bentonite
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
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 [X] If yes, by whom?
Yield: 40 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
Loam, Dark Brown, Soft	0	3
Cobbles, Boulders, Hard	3	7
Gravel, Boulders, Hard	7	18
Cemented Gravels, Brown, Hard	18	36
Sandstone, Brown, Medium Soft	36	48
Cemented Gravels, Brown, Hard	48	52
Sandstone, Tan, Medium	52	56
Gravels/Sand, Tan/Black, Med. Hard	56	125
Porous Basalt, Black/Red, Hard	125	160

MAY 14 1993

6" Drive Shoe Utilized

Work started 4-28-93, 19. Completed 4-29-93, 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) (WELL DRILLER) License No. 2060
(Dave Ricard)

Contractor's Registration No. PO-ND-EI*248JE Date April 30, 1993

(USE ADDITIONAL SHEETS IF NECESSARY)

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

Well N

WATER WELL REPORT

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

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

⊗ Construction

○ Decommission *ORIGINAL CONSTRUCTION Notice of Intent Number* 193100

CURRENT Notice of Intent No. W208268

Unique Ecology Well ID Tag No. ALE 956

Water Right Permit No.

Property Owner Name James Kelly J

Well Street Address 9741 Parke Creek road

City Ellensburg County: Kittitas

Location NE 1/4- 1/4 SE 1/4 Sec 33 Twn 18N R 20 EWM (circle one) or WWM

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

Tax Parcel No. 18-20-33040-0028

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 160 ft. Depth of completed well 160 ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 6" Diam. from +3 ft. to 65 ft.
☒ Liner installed 4" Diam. from -5 ft. to 160 ft.
☐ Threaded ___" Diam. from ___ ft. to ___ ft.

Perforations: ☒ Yes ☐ No

Type of perforator used Skillsaw

SIZE of perfs 12 in. by 1/4 in. and no. of perfs 350 from 60 ft. to 160 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? 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 73 ft. below top of well Date 4/4/06

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 15-18 gal./min. with stem set at 140 ft. for 2 1/2 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
top soil	0	5
gravel	5	50
clay	50	55
gravel	55	60
rock	60	100
gravel	100	115
rock	115	145
broken rock	145	160

DEPT. OF ECOLOGY Received APR 14 2006 CENTRAL REGION OFFICE

Start Date 4/3/06 Completed Date 4/4/06

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) Jeremy Bach

Driller/Engineer/Trainee Signature [signature]

Driller or Trainee License No. #2536

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

Drilling Company Bach Drilling

Address 3340 Wilson Creek

City, State, Zip Ellensburg WA 98926

Contractor's Registration No. MFKEDBDC133 Date 4/4/06

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

Well O

WATER WELL REPORT

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

Construction/Decommission (x in circle)
[X] Construction 150367
O Decommission ORIGINAL CONSTRUCTION Notice of Intent Number

CURRENT Notice of Intent No W-171241
Unique Ecology Well ID Tag No AKD-125
Water Right Permit No
Property Owner Name JANET PEEK R
Well Street Address 180 Duffy Rd
City Ellensburg County Kittitas
Location SE 1/4 1/4 SE 1/4 Sec 33 Twn 18 R 20 (EWM) circle one or WWM
Lat/Long (s,t r still REQUIRED) Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____
Tax Parcel No 18-20-33040-0033

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

TYPE OF WORK Owners 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 ____ ft
Depth of completed well ____ ft

CONSTRUCTION DETAILS
Casing Installed [X] Welded 6 Diam from +2 ft to 92½ ft
[X] Liner installed 4½ Diam from 65 ft to 145 ft
[ ] Threaded Diam from ____ ft to ____ ft

Perforations [X] Yes [ ] No
Type of perforator used Skillsaw
SIZE of perfs 1/4 in by 6 in and no of perfs 80 from 65 ft to 145 ft

Screens [ ] Yes [X] No [ ] K Pac Location
Manufacturers 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 [X] No
Type of water? ____ Depth of strata ____
Method of sealing strata off

PUMP Manufacturers Name
Type ____ H P

WATER LEVELS Land surface elevation above mean sea level / ft
Static level 45 ft below top of well Date 4/30/04
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 [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 140 ft for 2 hrs
Artesian flow ____ g p m Date
Temperature of water ____ Was a chemical analysis made? [ ] Yes [X] 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
TOP SOIL	0	3
CEMENTED GRAVEL	3	25
BROKEN BASALT-BROWN	25	49
CLAY-WATER	49	75
BROWN BLACK-BROKEN	75	91
BASALT-CLAY		
BROWN BLACK	91	108
BASALT-WATER	108	145

DEPT OF ECOLOGY Received JUN 10 2004 CENTRAL REGION OFFICE

Start Date 4/26/04 Completed Date 4/30/04

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) Craig Wamsley
Driller/Engineer/Trainee Signature [signature]
Driller or Trainee License No 2408

If trainee, licensed driller s Signature and License no

Drilling Company Hidden Rivers Drilling
Address 1450 Gibson Rd
City State Zip Selah, WA 98942
Contractor s Registration No HiddeRD010DB Date

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.

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

Well P

Please print, sign and return to the Department of Ecology

Water Well Report

Original – Ecology, 1st copy – owner, 2nd copy – driller

Construction/Decommission

☐ Construction

☐ Decommission ORIGINAL INSTALLATION Notice of Intent Number ______

168929

Current Notice of Intent No. W170985

Unique Ecology Well ID Tag No. AKL 788

Water Right Permit No. D

Property Owner Name Joe Chard

Well Street Address 16300 Vantage Hwy.

City Ellensburg County Kittitas

Location NW 1/4-1/4 NW 1/4 Sec 03 Twn 17 R 20 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. 172003051000l

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 125 ft.
Depth of completed well 125 ft.

CONSTRUCTION DETAILS

Casing Installed: ☑ Welded 6" Diam. from +2 ft. to 85 ft.
☐ Liner installed ______" Diam. from ______ ft. to ______ 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? 20 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. ______

WATER LEVELS: Land-surface elevation above mean sea level ______ ft.
Static level 50 ft. below top of well Date 3-16-05
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 25 gal./min. with stem set at 120 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
Top Soil	0	9
Tan Clay + Sandstone	9	29
Brown Black Bassalt	29	65
Black Bassalt	68	85
Hard Black Bassalt	85	125

DEPT. OF ECOLOGY Received MAR 23 2005 CENTRAL REGION OFFICE

Start Date 3-15-05 Completed Date 3-16-05

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) Mike Morefield
Driller/Engineer/Trainee Signature Mike Morefield
Driller or trainee License No. 2361

If TRAINEE, Driller's Licensed No. Levi Morefield
Driller's Signature ______

Drilling Company Waterman Well Drillins Inc
Address P.O. Box 246
City, State, Zip Selah Wa 98942
Contractor's Registration No. WATERWD022DB 3/18/05

Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 2/03)

Well Q

WATER WELL REPORT

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

Construction/Decommission (x in circle) 118936
☒ Construction
○ Decommission ORIGINAL CONSTRUCTION Notice of Intent Number ______

CURRENT Notice of Intent No W 113533
Unique Ecology Well ID Tag No AHK361
Water Right Permit No ______
Property Owner Name Jonathan Goss R
Well Street Address 108 Duffy Rd.
City Ellensburg County Kittitas
Location SE 1/4-1/4 SE 1/4 Sec 33 Twn 18 R 20 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 18-20-33040-0034

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 143 ft
Depth of completed well 143 ft

CONSTRUCTION DETAILS
Casing Installed ☒ Welded 6 Diam from +2 ft to 101 ft
☐ Liner installed ______ Diam from ______ ft to ______ 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? 18 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 45 ft below top of well Date 6-24-02
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 45 gal /min with stem set at 140 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 Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY)

MATERIAL	FROM	TO
Top Soil	0	3
Silt	3	10
Gravel	10	25
Cemented Gravel	25	36
Sandstone	36	40
Gravel	40	75
Clay & Gravel	75	80
Basalt Black & Brown Broken	80	143

DEPT OF ECOLOGY RECEIVED JUL 17 2002 CENTRAL REGION OFFICE

Start Date 6-20-02 Completed Date 6-24-02

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

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Gary Lydin
Driller/Engineer/Trainee Signature Gary Lydin
Driller or Trainee License No 1023

If trainee, licensed driller s Signature and License no ______

Drilling Company Apple Valley Well Drilling
Address PO Box 55
City State Zip Selah Wa.
Contractors Registration No Applevw... Date 6-24-02

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

Well S 4186

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. 28749

Water Right Permit No. M

(1) OWNER: Name KEN McKENZIE Address Park Creek Rd.

(2) LOCATION OF WELL: County Kittitas NW ¼ SW ¼ Sec 34 T. 18 N., R. 20 W.M.

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

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

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

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

(6) CONSTRUCTION DETAILS:
Casing installed: 6" Diam. from +4 ft. to 120 ft.
Welded [X] ____" Diam. from ____ ft. to ____ ft.
Liner installed [ ]
Threaded [ ] ____" Diam. from ____ ft. to ____ ft.

Perforations: Yes [ ] No [ ]
Type of perforator used
SIZE of perforations ____ in. by ____ in.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.

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

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

Surface seal: Yes [X] No [ ] To what depth? 20 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 42 ft. below top of well Date 11-7-90
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 40 gal./min. with stem set at 155 ft. for 2 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
Dirt + Cobbles	0	4
Hardpan + Cobbles	4	12
Sandstone + Gravel	12	20
Cemented Gravel	20	80
Cemented Gravel With Layers of Basalt	80	115
Med. Brown + Black Basalt	115	160

RECEIVED DEC 6 1990 DEPARTMENT OF ECOLOGY CENTRAL REGION OFFICE

ENTERED

Work started 11-6, 1990 Completed 11-7, 1990

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 Bach Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address Rt5 Box 1010 Ellensburg, WA.
(Signed) Mike Bach (WELL DRILLER) License No. 22
Contractor's Registration No. MIKE BDC 133N4 Date 11-12, 1990

(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

90592

WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent W122112
UNIQUE WELL I D # AFH314
Water Right Permit No

(1) OWNER. Name LEN CARDWELL Address 36 DUFFY RD, ELLENSBURG, WA 98926

(2) LOCATION OF WELL County KITTATAS - SE 1/4 ___ 1/4 Sec 33 T 18 N,R 20 WM JKQR

(2a) STREET ADDRESS OF WELL (or nearest address) DUFFY RD E-BURG

TAX PARCEL NO. 18-20-33040-0032

(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; [ ] Deepened; [ ] Reconditioned; [ ] Decommission
Method: [ ] Dug [ ] Bored [ ] Cable [ ] Driven [X] Rotary [ ] Jetted

(5) DIMENSIONS Diameter of well 6 inches
Drilled 253 feet Depth of completed well 253 ft

(6) CONSTRUCTION DETAILS:
Casing Installed:
[X] Welded 6 " Diam from +2 ft to 99 ft
[X] Liner installed 4 /12 " Diam from 93 ft to 253 ft
[ ] Threaded " Diam from ft to ft

Perforations [X] Yes [ ] No
Type of perforator used SKILL SAW
SIZE of perforations 1/8 in by 8 in
25 perforations from 233 ft to 253 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? 85 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 35 ft below top of well Date 9/27/2000
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 60 + gal /min with stem set at 250 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
TOP SOIL	0	12
GRAVEL AND CLAY	12	52
BASALT BLACK AND BROWN BROKEN	52	85
BASALT GREY, BLACK AND BROWN LAYERS	85	220
CLAY WHITE AND SHALE LAYERS	220	250
SANDSTONE	250	253
10 GPM @ 80		
25 GPM @ 120		
50 GPM @ 200		
60+ GPM @ 250		

DEPT OF ECOLOGY Received OCT 2 5 2000 CENTRAL REGION OFFICE

Work Started 9/26/2000 , 19 Completed 9/27/2000 , 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 RICK POULIN License No 942 (Licensed Driller/Engineer)
Trainee Name License No
Drilling Company RICK POULIN WELL DRILLING
(Signed) Rick Poulin License No 942 (Licensed Driller/Engineer)
Address 1301 LANCASTER RD SELAH, WA 98942
Contractor's Registration No RICKPWD042J2 Date 9/29/00 , 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) 407-6600 The TDD number is (360) 407-6006

Well T

WELL LOG CHANGE FORM

Instructions: Record any change made to the well log record on this form. Append this form to the well log image. File with the original.

WCL Log ID (Required) ______________ Well Log ID __________

Regional Office: ☑ CRO ☐ ERO ☐ NWRO ☐ SWRO

Type of Well: ☐ Water ☐ Resource

Notice of Intent: ____________ Ecology Well ID Tag No. __________

Property (Well) Owner's Name ______________________________
Well Street Address ______________________________
City ______________ County ____________ Zip Code ____________

Location: ____1/4-1/4 ____1/4 Sec ____ Twn ____ R ____ E or W (Circle One)

Lat./Long: (Required) Lat. Deg. ______ Lat. Min/Sec ______
Long. Deg. ______ Long. Min/Sec ______
Horizontal Collection Method Code ______

Tax Parcel No ______________________

Type of Work: ☐ New Well ☐ Reconditioned ☐ Deepened
Well Log Received Date __/__/__
Well Diameter ___ (in inches) Well Depth _____ (in feet) Well Completed Date __/__/__

Driller's Ecology License No. ______________
Trainee's Ecology License No. ______________

Reason/Source of Change (Required)
INTERNAL CORRECTION - IMAGE UNCHANGED

Signature of Well Log Tracker (Required) EG Date 1-19-05

Imaging Well Log Phase 11 – Change Form
ECY-WR-WLCF Rev. 10/02/02

Well U

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 24875A

(1) OWNER: Name M. G. Weeks Address ....

(2) LOCATION OF WELL: County Kittitas — NW¼ NE¼ Sec. 3 T. 17 N., R. 20 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 ~~[illegible]~~ 420 ft. Depth of completed well ~~[illegible]~~ 420 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8 " Diam. from 0 ft. to 68 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 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 80 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 100 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
Cement Gravel	0	68
Med. Black Basalt	68	300
Brown Basalt w/ Sandrock	300	400
Interbeds Waterbearing		
Black Basalt	400	420

Work started July 1, 1979. Completed July 29, 1979

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 Bach Drilling Company (Person, firm, or corporation) (Type or print)
Address Rt 5, Box 1010 Ellensburg
[Signed] [illegible] (Well Driller)
License No. [illegible] [redacted] [illegible] 1980

(USE ADDITIONAL SHEETS IF NECESSARY)

DK 1.02.81

ECY 050-1-20

Well W

File Original with 98031
Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent W 113538
UNIQUE WELL I D # AFE 248
Water Right Permit No

(1) OWNER Name Mark Johnson Address 16730 Vantage Hwy Ell Wa 98926

(2) LOCATION OF WELL County Kittitas NE 1/4 NE 1/4 Sec 03 T 17 N R 20 WM

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

TAX PARCEL NO

A

(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 ☐ Bored ☐ Cable ☐ Driven ☒ Rotary ☐ Jetted

(5) DIMENSIONS Diameter of well 10x6 inches
Drilled 182 feet Depth of completed well 182 ft

(6) CONSTRUCTION DETAILS
Casing Installed
☒ Welded 6" Diam from +2 ft to -60 ft
☒ Liner installed PVC 4" Diam from -7 ft to -182 ft
☐ Threaded " Diam from ft to ft

Perforations ☒ Yes ☐ No
Type of perforator used SKILSAW
SIZE of perforations 7/4 in by 1/8 in
~~140~~ 104 perforations from 142 ft to 182 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? 18 ft
Material used in seal Bentonite
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP Manufacturer's Name
Type H P

(8) WATER LEVELS Land-surface elevation above mean sea level ft
Static level 87 ft below top of well Date 4/16/01
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
	ESTIMATED AIRLIFT				

Date of test
Bailer test gal./min with ft drawdown after hrs
Airtest 30 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
Topsoil Brn M	0	2
Cemented Gravel Clay Sandstone	2	
Tan Brn Blk MH		47
BASALT Brn Blk H	47	158
Fracture BASALT Brn Gry H	158	182

Work Started 4/13/01 Completed 4/16/01

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 Chris Hayes License No 1908
(Licensed Driller/Engineer)

Trainee Name License No
Drilling Company Water Man Well Drilling
(Signed) [signature] License No 1908
(Licensed Driller/Engineer)
Address 106 Berriman Ln Selah Wa
Contractor's Registration No WATERWD022DB 4/10/0

(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.

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. G-24876
Permit No. ....

(1) OWNER: Name MARTIN G. WEEKES Address Rt 3 Box 239 KITTITAS, WN.

(2) LOCATION OF WELL: County KITTITAS — E½ ¼ SE¼ ¼ Sec. 33 T. 18 N., R. 20 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 8" inches.
Drilled 675 ft. Depth of completed well 675' ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 12" Diam. from +1 ft. to 95' ft.
Threaded ☐ 8" Diam. from 95 ft. to 320 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? 320' ft.
Material used in seal SAND GROUT
Did any strata contain unusable water? Yes ☒ No ☐
Type of water? Depth of strata 125'-200
Method of sealing strata off CASED + CEMENTED

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

(8) WATER LEVELS: Land-surface elevation above mean sea level 1900' ft.
Static level 156' ft. below top of well Date 7/19/77
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?
Yield: 1500 gal./min. with ft. drawdown after hrs.
Air TEST " " "
" " "

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 58° 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
OVERBURDEN	0	3
basalt boulders	3	20
MED BASALT	20	100
MED BROKEN BASALT / WATER BRG	100	150
SOFT BASALT	150	190
SOFT BROKEN BASALT	190	285
MED BROKEN BASALT WATER/BRG	285	300
HARD BASALT	300	395
MED BROKEN BASALT / WATER BRG	395	400
MED HARD BASALT	400	510
WATER BEARING @ 440' - 460'		
Very Hard BASALT	510	675
Water - 100-125'		
275'-325'		
440'		
460'		
500'		
560'		
650-675'		

Work started 6/27, 1977 Completed 7/18, 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. # C-326

NAME Worrell Well Drilling (Person, firm, or corporation) (Type or print)
Address PO Box 753 - Sunnyside, Wa
[Signed] Doug Worrell (Well Driller)
License No. 666 Date 7/26, 1977

(USE ADDITIONAL SHEETS IF NECESSARY)

OK

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

Well Y

Please print, sign and return to the Department of Ecology   Well Z

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

Water Well Report

Original – Ecology, 1st copy – owner, 2nd copy – driller

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Construction/Decommission

☐ Construction
☐ Decommission   *ORIGINAL INSTALLATION Notice of Intent Number* ______

174704

Current Notice of Intent No. W-170969

Unique Ecology Well ID Tag No. ALF-231

Water Right Permit No. B

Property Owner Name OPERATING ENGINEERS

Well Street Address P.O. BOX 629

City KITTITAS   County KITTITAS

Location NW 1/4-1/4 NE 1/4 Sec 03 Twn 17 R 20 EWM ☐ circle one WWM ☐

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

Tax Parcel No. 17-20-03000001

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 210 ft.
Depth of completed well 210 ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 6" Diam. from +2 ft. to 107 ft.
☒ Liner installed 4 1/2" Diam. from 90 ft. to 210 ft.
☐ Threaded ______" Diam. from ______ ft. to ______ ft.

Perforations: ☒ Yes ☐ No
Type of perforator used SKILLSAW
SIZE of perfs 1/4 in. by 6 in. and no. of perfs 50 from 90 ft. to 210 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? 107 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. ______

WATER LEVELS: Land-surface elevation above mean sea level ______ ft.
Static level 134 ft. below top of well Date 3/21/05
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 60+ gal./min. with stem set at 205 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 indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
DIRT	0	3
GRAVEL	3	6
HARDPAN & COBBLES	6	12
BROWN CLAY & GRAVEL	12	44
BOULDERS & CLAY	44	65
BROKEN BASALT CLAY-BOULDERS	65	86
BROWN BASALT	86	91
BROWN BASALT - HARD	91	163
BLACK & BROWN BASALT	163	172
BLACK BASALT HARD	172	182
BROWN BASALT	182	194
	194	210

DEPT. OF ECOLOGY Received JUN 22 2005 CENTRAL REGION OFFICE

Start Date 3/16/05   Completed Date 3/18/05

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) GARY WAMSLEY
Driller/Engineer/Trainee Signature G. Wamsley
Driller or trainee License No. 2428

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

Drilling Company HIDDEN RIVERS DRILLING
Address PO BOX 993
City, State, Zip SELAH, WA 98942
Contractor's Registration No. HIDDEN 010DB   Date 3/21/05

Ecology is an Equal Opportunity Employer.   ECY 050-1-20 (Rev 2/03)

[redacted]py with
[redacted]s Copy
[redacted]Copy

Well AA

WATER WELL REPORT

STATE OF WASHINGTON

9397

Start Card No. 08680

UNIQUE WELL I.D. # D

Water Right Permit No.

[redacted] Name Park Creek Boys Home Address Park Creek

[redacted]TION OF WELL: County Kittitas NW ¼ NW ¼ Sec 34 T. 18 N., R 20 W.M.

(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) 2

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: 8 " Diam. from 0 ft. to 20 ft.
Welded ☑ 6 " Diam. from +2 ft. to 298 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? 25 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 260 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.

Airtest 15 gal./min. with stem set at 360 ft. for 1 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
Dirt - clay	0	10
Medium Black Basalt	10	140
Sandstone	140	180
Medium Basalt	180	340
Fractured Basalt	340	360

RECEIVED
AUG 27 1993
DEPARTMENT OF ECOLOGY
CENTRAL REGION OFFICE

Work started 6-28, 19. Completed 7-12, 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 Bach Drilling Co.
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address Rt5, Box 1010, Ellensburg, WA.

(Signed) Mike BDC133N4 License No. 22
(WELL DRILLER)

Contractor's Registration No. MIKEBDC133N4 Date 7-15, 1993

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329- 18

DEPARTMENT OF ECOLOGY
State of Washington

Water Resources Program
Well Tagging Form

RECEIVED
SEP 19 2016
Dept of Ecology
Central Regional Office

Unique Well ID Tag Number: BJA 353

Use this form ONLY if an Water Well Report IS FOUND
Attach the original well report to this form

If a Water Well Report is **not** available contact the Well Construction and Licensing Office wclo@ecy.wa.gov or 360-407-6650 to request a *Water Well Report for an Existing Well* form.

Well Ownership

First name Parke Creek Treatment Facility	Last name	
Street Address 11042 Parke Creek Rd		
City Ellensburg	State Wa	Zip Code 98926

Location of Well *** Township, Range, and Section is required.**

Well Address 11042 Parke Creek Rd				
City Ellensburg			County Kittitas	
¼ -¼ NW	¼ NW	Township 18 North	Range 20 ☒ E or ☐ W	Section 34
Latitude	Degrees		Minutes	Seconds
Longitude	Degrees		Minutes	Seconds
Elevation at land surface _____ ☐ feet ☐ meters *(check one)*				
Tax Parcel Number 085134				

Well Characteristics

Location of Well Identification Tag Attached to the Well head inside the Well house

D	C	B	A
E	F	G	H
M	L	K	J●
N	P	Q	R

Scale 1:24,000 (1" = 2,000')

Indicate the location of the well within the Section by drawing a dot at that point

Section "J"

Comments: ______________________

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

Well BB

WATER WELL REPORT

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

Construction/Decommission *("x" in circle)* 177027

☒ Construction

☐ Decommission *ORIGINAL CONSTRUCTION Notice of Intent Number*

CURRENT Notice of Intent No. W186959

Unique Ecology Well ID Tag No. ALF427

Water Right Permit No.

Property Owner Name Richard Guthrie

Well Street Address 580 Sunrise lane

City Kittitas County: Kittitas

Location ~~NE~~ 1/4-1/4 NE 1/4 Sec 3 Twn 17N R 20E EWM or WWM *circle one*

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

Tax Parcel No. ~~NW~~ 17-20-03000-0025

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 160 ft. Depth of completed well 160 ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 6" Diam. from +4 ft. to 55 ft.

☒ Liner installed 4" Diam. from -5 ft. to 160 ft.

☐ Threaded " Diam. from ft. to ft.

Perforations: ☒ Yes ☐ No

Type of perforator used Skillsaw

SIZE of perfs 12 in. by 1/4 in. and no. of perfs 200 from 80 ft. to 160 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? 20 ft

Materials used in seal cement/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 76 ft. below top of well Date July 9 2005

Artesian pressure na lbs. per square inch Date

Artesian water is controlled by na (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 15-18 gal./min. with stem set at 140 ft. for 2 1/2 hrs.

Artesian flow na 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
dirt	0	5
gravel	5	48
rock	48	160

CENTRAL REGION OFFICE AUG 08 2005 Received DEPT OF ECOLOGY

Start Date July 8 Completed Date July 9 2005

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) Jeremy Bach

Driller/Engineer/Trainee Signature

Driller or Trainee License No. 2536

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

Drilling Company Bach Well Drilling

Address 3340 Wilson Creek

City, State, Zip Ellensburg WA 98926

Contractor's Registration No. ~~NK~~ BACHWDC133J4 Date July 9 2005

368409

Well CC

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W089878
Unique Well I.D. # ACP594
Water Right Permit No.

(1) OWNER: Name **BOWERS, RON** Address **205 SOUTH SAMPSON ELLENSBURG, WA 98926-**

(2) LOCATION OF WELL: County **KITTITAS** - 1/4 **SW** 1/4 Sec **34** T **18** N., R **20E** WM
(2a) STREET ADDRESS OF WELL (or nearest address) ,

(3) PROPOSED USE: **DOMESTIC**

(4) TYPE OF WORK: Owner's Number of well (If more than one)
NEW WELL Method: **ROTARY**

(5) DIMENSIONS: Diameter of well **6** inches
Drilled **140** ft. Depth of completed well **140** ft.

(6) CONSTRUCTION DETAILS:
Casing installed: **6** " Dia. from **+2** ft. to **80** ft.
LINER **4** " Dia. from **-10** ft. to **140** ft.
" Dia. from ft. to ft.

Perforations: **YES**
Type of perforator used **SKILL SAW**
SIZE of perforations **1/8** in. by **6** in.
40 perforations from **120** ft. to **140** ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: **NO**
Manufacturer's Name
Type Model No.
Diam. slot size from ft. to ft.
Diam. slot size from ft. to ft.

Gravel packed: **NO** Size of gravel
Gravel placed from ft. to ft.

Surface seal: **YES** To what depth? **18** ft.
Material used in seal **BENTONITE**
Did any strata contain unusable water? **NO**
Type of water? Depth of strata ft.
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type **NONE** H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level **70** ft. below top of well Date **04/14/98**
Artesian Pressure lbs. per square inch Date
Artesian water controlled by

(10) WELL LOG C, D, E, F

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 in formation.

MATERIAL	FROM	TO
CLAY BROWN	0	1
CEMENTED GRAVEL COBBLES	1	
------- BROWN CLAY	1	27
CEMENTED GRAVEL BASALT	27	
------- W/LENSES	27	82
BASALT FRACTURED W/WATER	82	140

RECEIVED APR 29 1998

Work started **04/14/98** Completed **04/15/98**

(9) 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 hrs.

Recovery data
Time Water Level Time Water Level Time Water Level

Date of test / /
Bailer test gal/min. ft. drawdown after hrs.
Air test **20+** gal/min. w/ stem set at **140** ft. for **1** hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? **NO**

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 **FOGLE PUMP & SUPPLY, INC.**
(Person, firm, or corporation) (Type or print)

ADDRESS **POB 1450, AIRWAY HTS. WA.**

[SIGNED] Todd Lively/mo License No. 2321

Contractor's Registration No. **FOGLEPS095L4** Date 04/21/98

Please print, sign and return to the Department of Ecology

Well DD

Water Well Report

Original – Ecology, 1st copy – owner, 2nd copy – driller

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Construction/Decommission

☒ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* W244255

192783

Current Notice of Intent No. W244255

Unique Ecology Well ID Tag No. ALE 625

Water Right Permit No. B

Property Owner Name Ron S. Axtman

Well Street Address Christensen Rd

City Ellensburg County Kittitas 19

Location NW 1/4-1/4 NE 1/4 Sec 33 Twn 18 R 20 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. 18-20-3300-0011

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 220 ft.
Depth of completed well 220 ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 6" Diam. from +2 ft. to 118 ft.
☒ Liner installed 4" Diam. from 5 ft. to 220 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? 20 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. ____

WATER LEVELS: Land-surface elevation above mean sea level ____ ft.
Static level 84 ft. below top of well Date 3/11/06
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 17 gal./min. with stem set at 215 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
Top Soil	0	1
Cemented Gravel	1	11
Brown Clay & Gravel	11	116
Black Basalt	116	191
Black & Brown Basalt and Water	191	220

DEPT OF ECOLOGY Received MAR 21 2006 CENTRAL REGION OFFICE

Start Date 3/10/06 Completed Date 3/11/06

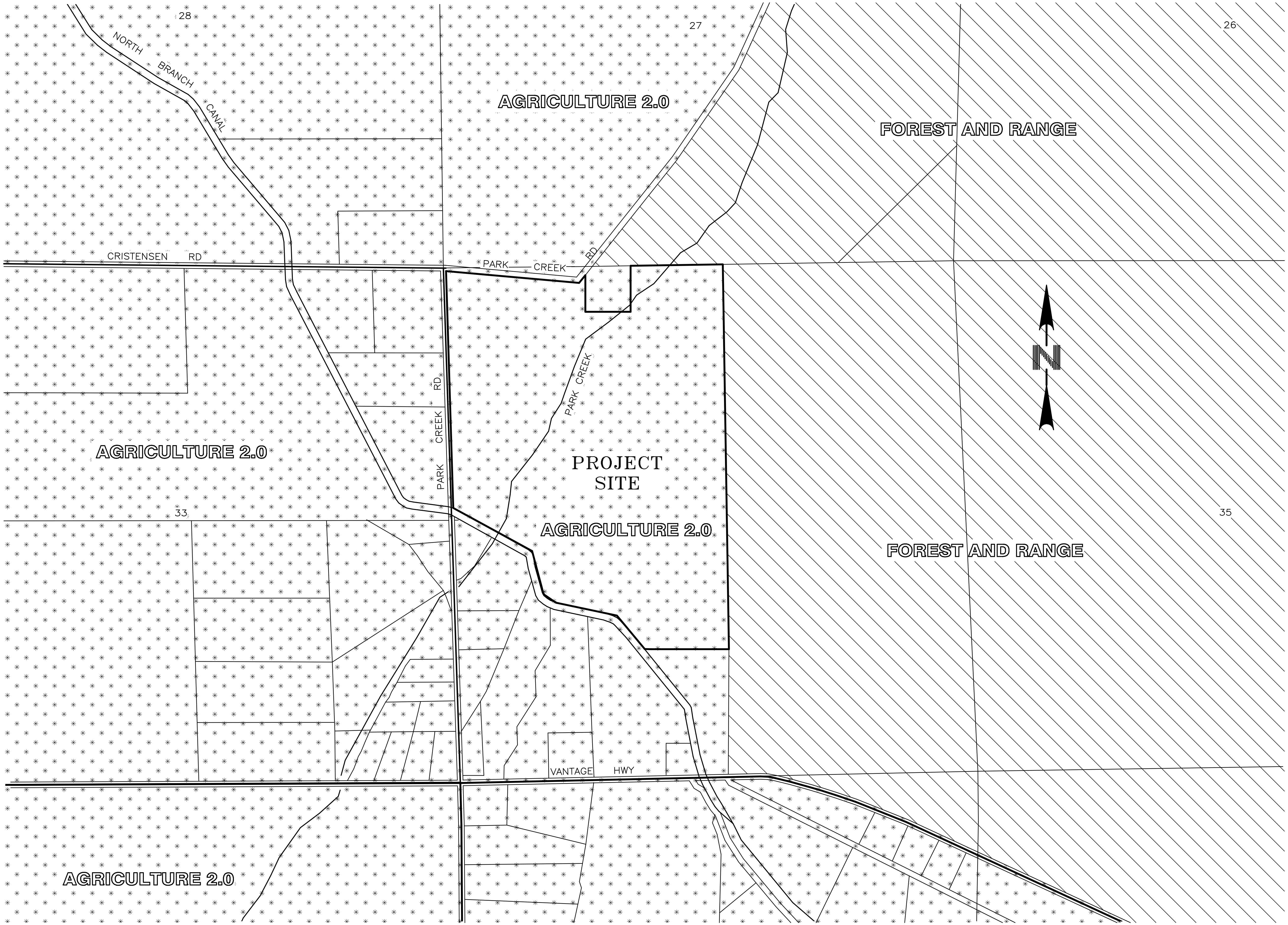
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Driller/Engineer/Trainee Name (Print) Mitch Mathews
Driller/Engineer/Trainee Signature Mitch Mathews
Driller or trainee License No. 1247

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

Drilling Company Mathews Drilling
Address 2317 Rd 10.2 NE
City, State, Zip Moses Lake, Wa. 98837
Contractor's Registration No. MATHEDC117BS Date 3/11/06

Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 2/03)



WESTERN PACIFIC
ENGINEERING & SURVEY
A TERRA DEVELOPMENT SERVICES CORPORATION
1328 E. Hunter Place, Moses Lake, Washington
T:(509)765-1023 F:(509)765-1298

No.	Revision	Date	By

BROWN & JACKSON
Land Application Site
Zoneing Map

Grant County Washington

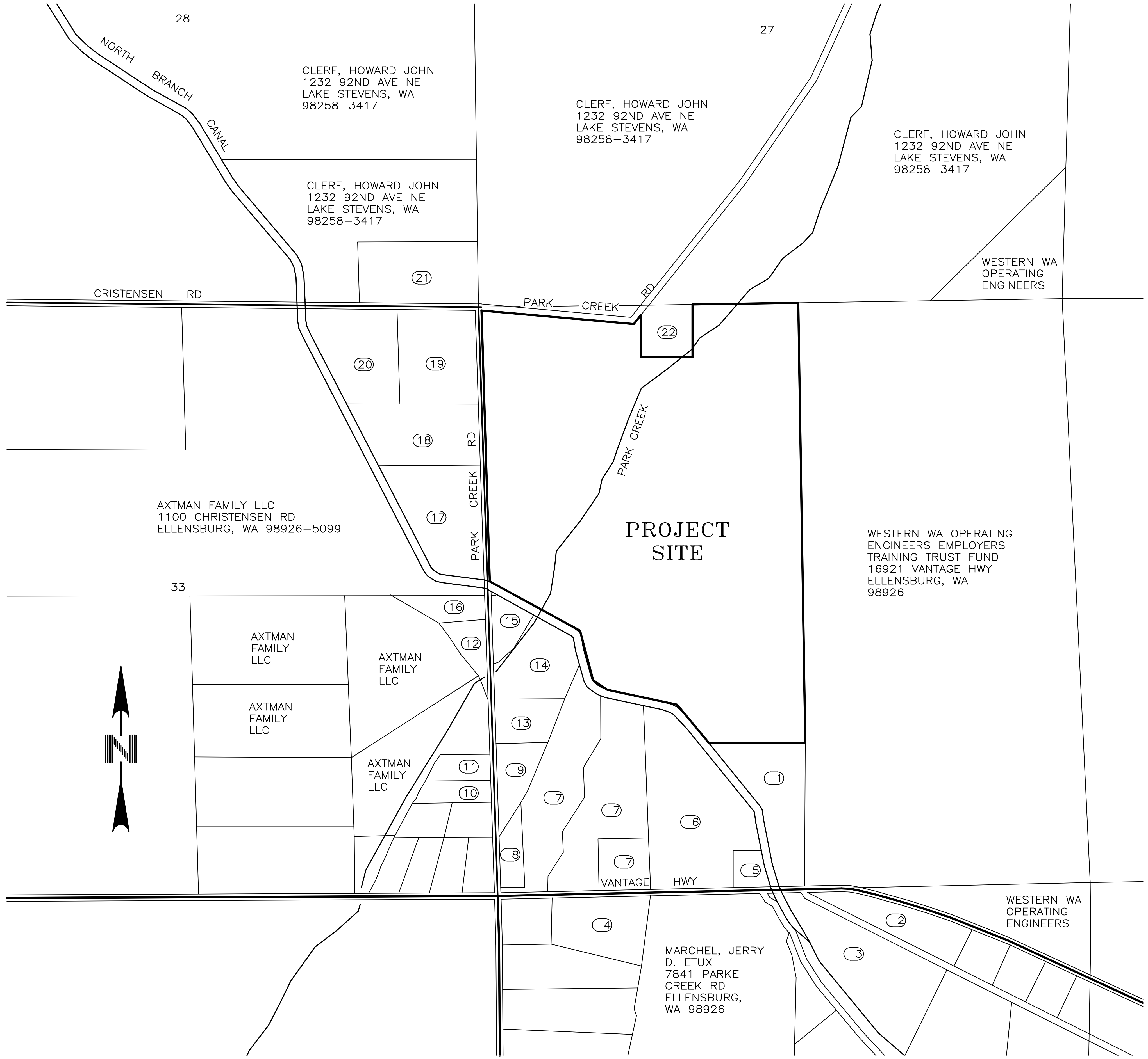
Designed by NDN
Drawn by Tml/NDN
Checked by NDN
Project No. 20410
Date: April 2020
Scale:
Hor. 1" = 1000'
Vert. 1" = N/A
Sec 34, T 18 N, R 20 E

SHEET NO.
C1.2

File -- X:\20410\Drafting\Vicemap.pro Date: Fri Apr 24, 2020

PROPERTY OWNERS

1. KATOCS, BRUCE C ETUX
   16781 VANTAGE HWY
   ELLENSBURG, WA 98926
2. SHRINER, DONALD Q. ETUX
   181 SUNSET RD
   ELLENSBURG, WA 98926
3. MONTES, GUADALUPE ETUX &
   LOPEZ, ESPERANZA
   14915 182ND AVE SE
   MONROE, WA 98272-1131
4. HANNAH, CHRISTOPHER L
   16300 VANTAGE HWY
   ELLENSBURG, WA 98926-5067
5. ROST, BO J ETUX
   16671 VANTAGE HIGHWAY
   ELLENSBURG, WA 98926
6. BOWERS, RONALD R
   16621 VANTAGE HWY
   ELLENSBURG, WA 98926-7001
7. MARCHEL, CHRIS W & KAROLYN M
   6271 VANTAGE HWY
   ELLENSBURG, WA 98926-5014
8. RAMSEY, JEFFREY & CINDY SUE
   9120 PARKE CREEK RD
   ELLENSBURG, WA 98926-7009
9. CUNNINGHAM, JAMES L & CARMEN R
   9290 PARKE CREEK RD
   ELLENSBURG, WA 98926-7018
10. WEYNA, ROBERT H & PRISCILLA W
    9311 PARKE CREEK RD
    ELLENSBURG, WA 98926-6663
11. DERTING, CLYDE ETUX
    9341 PARK CREEK RD
    ELLENSBURG, WA 98926
12. KELLY, JAMES E ETUX
    9741 PARKE CREEK RD
    ELLENSBURG, WA 98926-5095
13. MCMILLAN, WYNN L
    9440 PARKE CREEK RD
    ELLENSBURG, WA 98926
14. POFAHL, ERICH T
    9610 PARKE CREEK RD
    ELLENSBURG, WA 98926-7016
15. BYERS, CHERY
    9810 PARKE CREEK RD
    ELLENSBURG, WA 98926-5004
16. ONEILL, JULIE J & TOM
    9811 PARKE CREEK RD
    ELLENSBURG, WA 98926-5004
17. CARDWELL, PHIL L & BRENDA L
    1290 CHRISTENSEN RD
    ELLENSBURG, WA 98926-7011
18. BISHOP, SHAWN C & STACY L
    1290 CHRISTENSEN RD
    ELLENSBURG, WA 98926-7011
19. CARDWELL, CATRENA M
    PO BOX 887
    KITTITAS, WA 98934-0887
20. H&C TRUST
    1290 CHRISTENSEN RD
    ELLENSBURG, WA 98926-7011
21. SLYFIELD, HUNTER J
    1671 CHRISTENSEN RD
    ELLENSBURG, WA 98926-7012
22. STATE OF WASH (DSHS)
    PARKE CREEK GROUP HOME
    11042 PARKE CREEK RD
    ELLENSBURG, WA 98926



WESTERN PACIFIC ENGINEERING & SURVEY
A TERRA DEVELOPMENT SERVICES CORPORATION
1328 E. Hunter Place, Moses Lake, Washington
T:(509)765-1023 F:(509)765-1298

No.	Revision	Date	By

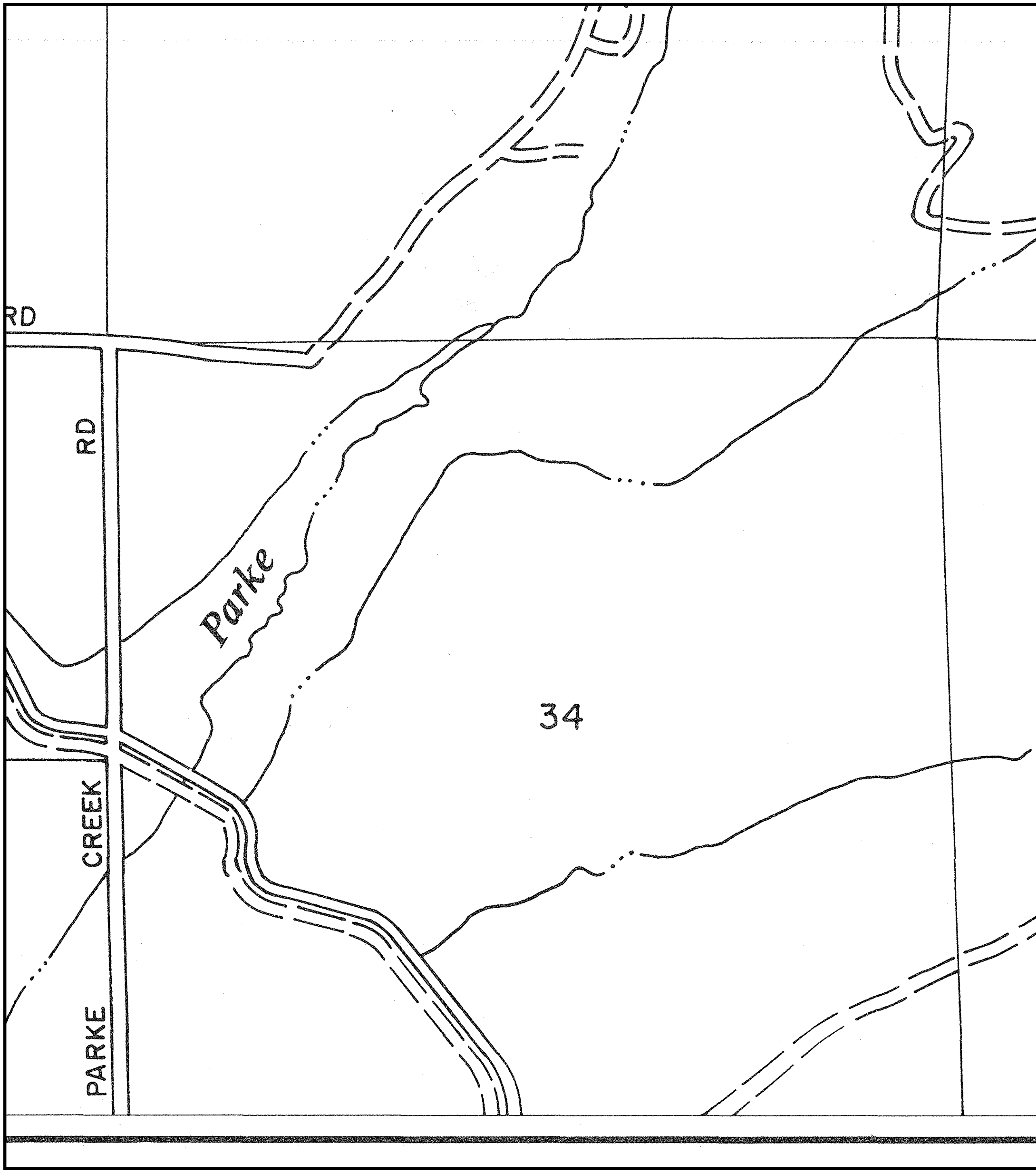
BROWN & JACKSON
Land Application Site
Ownership Map

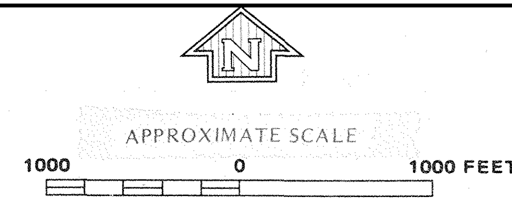
Grant County Washington

Designed by NDN
Drawn by Tml/NDN
Checked by NDN
Project No. 20410
Date: April 2020
Scale:
Hor. 1" = 1000'
Vert. 1" = N/A
Sec 34, T 18 N, R 20 E

SHEET NO.
C1.3

File -- X:\20410\Drafting\Vicemap.pro Date: Fri Apr 24, 2020





NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

KITTITAS COUNTY, WASHINGTON
(UNINCORPORATED AREAS)

PANEL 465 OF 700
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
530095 0465 B

EFFECTIVE DATE:
MAY 5, 1981

federal emergency management agency
federal insurance administration

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

United States Department of Agriculture

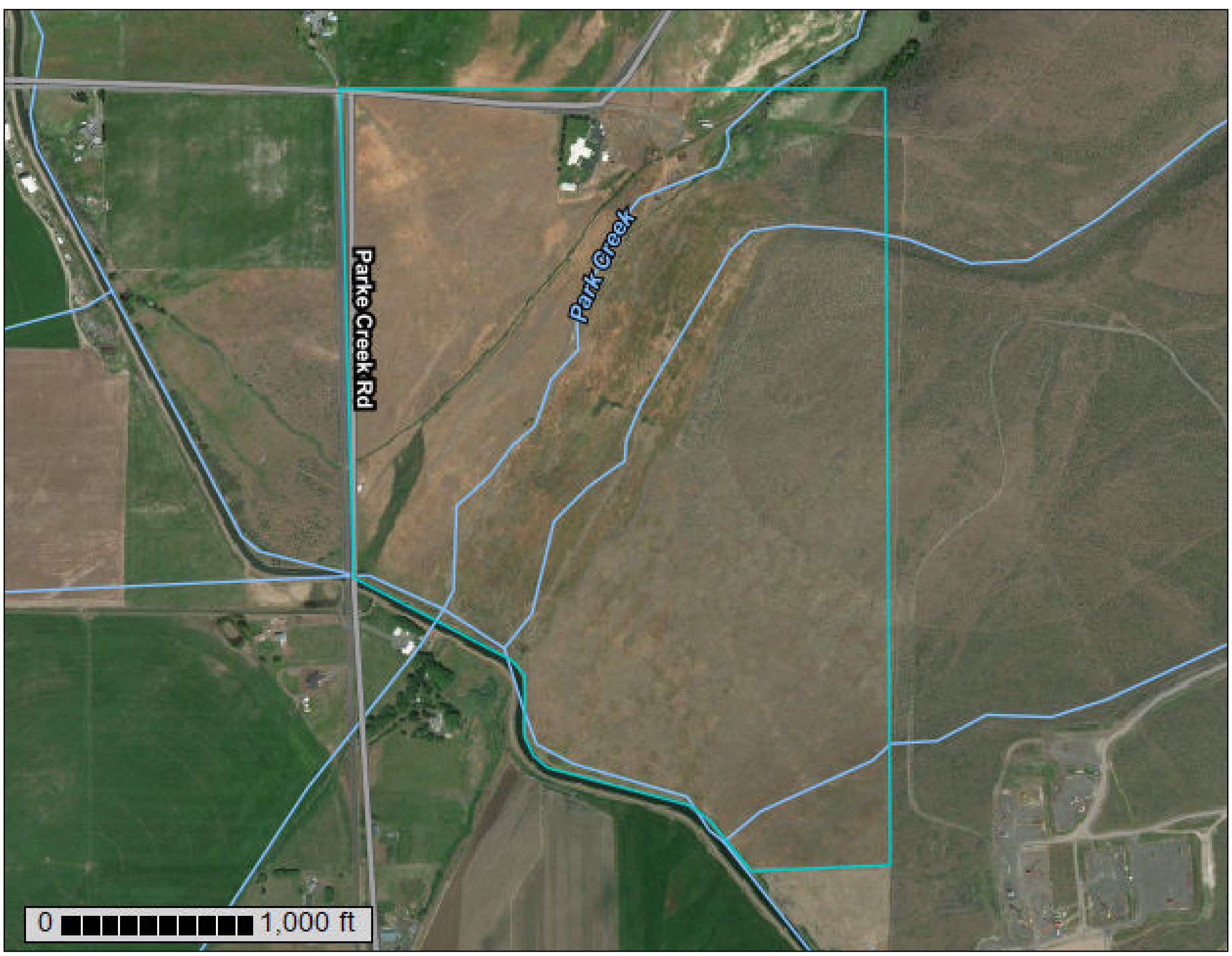
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Kittitas County Area, Washington



April 10, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

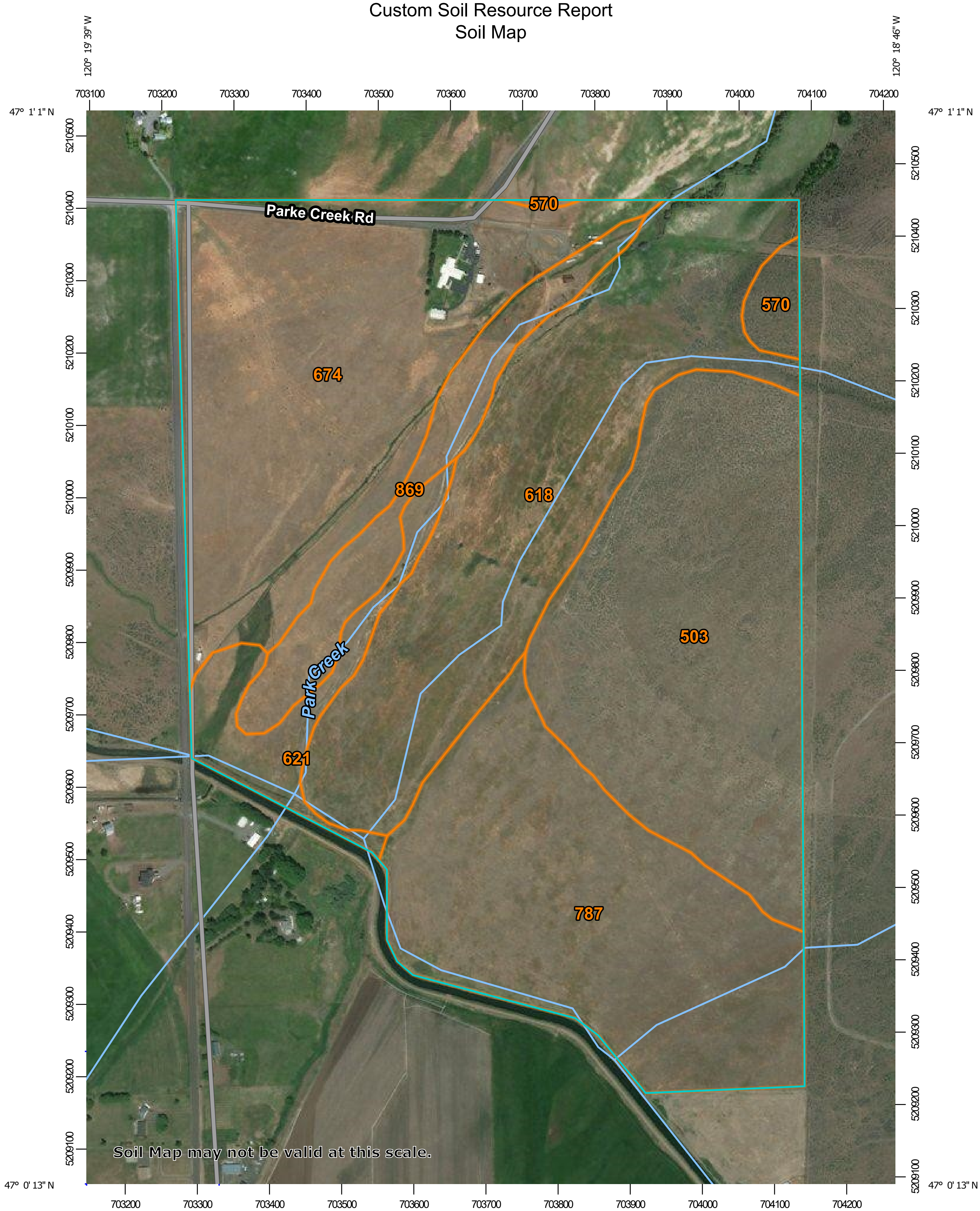
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

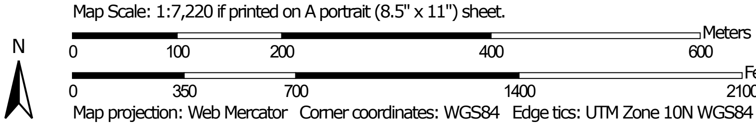
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:7,220 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kittitas County Area, Washington
Survey Area Data: Version 12, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 3, 2014—Sep 21, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
503	Terlan-Durtash-Selah complex, 5 to 15 percent slopes	50.0	22.3%
570	Wipple cobbly clay loam, 15 to 30 percent slopes	2.6	1.2%
618	Nitzel ashy silt loam, gravelly substratum, 0 to 2 percent	48.8	21.8%
621	Mitta ashy silt loam, flooded, 0 to 2 percent slopes	9.1	4.1%
674	Durtash gravelly loam, 3 to 10 percent slopes	54.2	24.2%
787	Terlan-Durtash-Selah complex, 2 to 5 percent slopes	47.1	21.0%
869	Weirman complex, drained, 0 to 5 percent slopes	12.2	5.4%
Totals for Area of Interest		**224.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Kittitas County Area, Washington

503—Terlan-Durtash-Selah complex, 5 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2l1x
Elevation: 1,500 to 2,500 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Terlan and similar soils: 40 percent
Durtash and similar soils: 35 percent
Selah and similar soils: 20 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Terlan

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over alluvium

Typical profile

H1 - 0 to 7 inches: gravelly loam
H2 - 7 to 15 inches: gravelly clay loam
H3 - 15 to 18 inches: very gravelly loam
H4 - 18 to 26 inches: cemented material
H5 - 26 to 60 inches: cemented material

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 10 to 20 inches to duripan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): 6s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: DRY STONY 10-16 PZ (R008XY201WA)
Hydric soil rating: No

Description of Durtash

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium with loess in the upper part

Typical profile

H1 - 0 to 5 inches: gravelly loam
H2 - 5 to 14 inches: very gravelly clay loam
H3 - 14 to 19 inches: extremely gravelly clay
H4 - 19 to 29 inches: cemented material
H5 - 29 to 60 inches: cemented material

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 10 to 20 inches to duripan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 6s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: DRY STONY 10-16 PZ (R008XY201WA)
Hydric soil rating: No

Description of Selah

Setting

Landform: Terraces
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loess and alluvium

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 17 inches: silty clay loam
H3 - 17 to 21 inches: cobbly clay loam
H4 - 21 to 31 inches: cemented material
H5 - 31 to 60 inches: cemented material

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 3 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: DRY LOAMY 10-16 PZ (R008XY101WA)
Hydric soil rating: No

Minor Components

Benwy

Percent of map unit: 5 percent
Hydric soil rating: No

570—Wipple cobbly clay loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2l3v
Elevation: 1,200 to 3,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Wipple and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wipple

Setting

Landform: Hillslopes, structural benches
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Colluvium from basalt with minor amounts of loess in the surface

Typical profile

H1 - 0 to 7 inches: cobbly clay loam
H2 - 7 to 11 inches: very gravelly clay loam
H3 - 11 to 30 inches: very gravelly clay
H4 - 30 to 50 inches: very cobbly clay loam
H5 - 50 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: STONY 10-16 PZ (R008XY202WA)
Hydric soil rating: No

Minor Components

Argabak

Percent of map unit: 5 percent
Hydric soil rating: No

Clerf

Percent of map unit: 5 percent
Hydric soil rating: No

Vantage

Percent of map unit: 5 percent
Hydric soil rating: No

618—Nitzel ashy silt loam, gravelly substratum, 0 to 2 percent

Map Unit Setting

National map unit symbol: 2l58
Elevation: 1,500 to 2,000 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 150 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Nitzel, gravelly substratum, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nitzel, Gravelly Substratum

Setting

Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium with an influence of volcanic ash in the upper part

Typical profile

H1 - 0 to 8 inches: ashy silt loam
H2 - 8 to 29 inches: ashy loam
H3 - 29 to 46 inches: loam
H4 - 46 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 29 to 46 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Mitta

Percent of map unit: 5 percent
Hydric soil rating: No

Tanaha

Percent of map unit: 5 percent
Hydric soil rating: No

621—Mitta ashy silt loam, flooded, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2l5c

Elevation: 1,500 to 2,300 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 150 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Mitta, flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mitta, Flooded

Setting

Landform: Flood plains, fan aprons, fan skirts, inset fans
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Alluvium mixed with volcanic ash in the upper part

Typical profile

H1 - 0 to 6 inches: ashy silt loam
H2 - 6 to 15 inches: ashy silt loam
H3 - 15 to 34 inches: ashy silt loam
H4 - 34 to 49 inches: silty clay loam
H5 - 49 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 34 to 49 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0
Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Nack

Percent of map unit: 5 percent
Hydric soil rating: No

Opnish

Percent of map unit: 5 percent
Hydric soil rating: No

Woldale

Percent of map unit: 5 percent

Hydric soil rating: No

674—Durtash gravelly loam, 3 to 10 percent slopes

Map Unit Setting

National map unit symbol: 2l6z
Elevation: 1,500 to 2,500 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Durtash, gravelly, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Durtash, Gravelly

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium with loess in the upper part

Typical profile

H1 - 0 to 5 inches: gravelly loam
H2 - 5 to 14 inches: very gravelly clay loam
H3 - 14 to 19 inches: extremely gravelly clay
H4 - 19 to 29 inches: cemented material
H5 - 29 to 60 inches: cemented material

Properties and qualities

Slope: 3 to 10 percent
Depth to restrictive feature: 10 to 20 inches to duripan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 6s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Ecological site: DRY STONY 10-16 PZ (R008XY201WA)
Hydric soil rating: No

Minor Components

Selah
Percent of map unit: 10 percent
Hydric soil rating: No

Manastash
Percent of map unit: 5 percent
Hydric soil rating: No

Terlan
Percent of map unit: 5 percent
Hydric soil rating: No

787—Terlan-Durtash-Selah complex, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: 2l8x
Elevation: 1,600 to 2,600 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition
Terlan and similar soils: 40 percent
Durtash and similar soils: 30 percent
Selah and similar soils: 25 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Terlan

Setting
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over alluvium

Typical profile
H1 - 0 to 7 inches: gravelly loam
H2 - 7 to 15 inches: gravelly clay loam
H3 - 15 to 18 inches: very gravelly loam
H4 - 18 to 26 inches: cemented material
H5 - 26 to 60 inches: cemented material

Properties and qualities
Slope: 2 to 5 percent
Depth to restrictive feature: 10 to 20 inches to duripan

Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): 6s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: DRY STONY 10-16 PZ (R008XY201WA)
Hydric soil rating: No

Description of Durtash

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium with loess in the upper part

Typical profile

H1 - 0 to 5 inches: gravelly loam
H2 - 5 to 14 inches: very gravelly clay loam
H3 - 14 to 19 inches: extremely gravelly clay
H4 - 19 to 29 inches: cemented material
H5 - 29 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 10 to 20 inches to duripan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 6s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: DRY STONY 10-16 PZ (R008XY201WA)
Hydric soil rating: No

Description of Selah

Setting

Landform: Terraces
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loess and alluvium

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 17 inches: silty clay loam
H3 - 17 to 21 inches: cobbly clay loam
H4 - 21 to 31 inches: cemented material
H5 - 31 to 60 inches: cemented material

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 3 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: DRY LOAMY 10-16 PZ (R008XY101WA)
Hydric soil rating: No

Minor Components

Benwy

Percent of map unit: 5 percent
Hydric soil rating: No

869—Weirman complex, drained, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2lct
Elevation: 400 to 2,900 feet

Mean annual precipitation: 7 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Weirman, very gravelly sandy loam, and similar soils: 55 percent
Weirman, very cobbly sandy loam, and similar soils: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weirman, Very Gravelly Sandy Loam

Setting

Landform: Flood plains, terraces
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium

Typical profile

H1 - 0 to 5 inches: very gravelly sandy loam
H2 - 5 to 15 inches: very gravelly loamy sand
H3 - 15 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: 3 to 18 inches to strongly contrasting textural stratification
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Very low (about 0.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: STONY BOTTOM 6-10 PZ (R007XY403WA)
Hydric soil rating: No

Description of Weirman, Very Cobbly Sandy Loam

Setting

Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium

Typical profile

H1 - 0 to 4 inches: very cobbly sandy loam
H2 - 4 to 15 inches: very gravelly loamy sand
H3 - 15 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: 3 to 18 inches to strongly contrasting textural stratification
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Very low (about 0.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Kayak

Percent of map unit: 5 percent
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Management

This folder contains a collection of tabular reports that present soil interpretations related to land management. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Nitrate Leaching Potential (WA)

These interpretations are designed to evaluate the potential for nitrate-nitrogen to be transmitted through the soil profile below the root zone by percolating water for both nonirrigated and irrigated conditions. Leaching nitrates have the potential to contaminate shallow and deep aquifers used for drinking water. The ratings are based on inherent soil and climate properties that affect nitrate leaching, and do not account for management practices such as nitrogen fertilizer application rates and timing, crop rotation, or irrigation water management.

The following soil and climate factors are used in the interpretation criteria:

1. *Mean annual precipitation minus potential evapotranspiration* - this factor provides an estimate of the amount of water that is available to move through the soil profile on an annual basis. Potential evaporation is estimated from mean annual

air temperature, using an algorithm developed by the National Soil Survey Center, using the Hamon potential evapotranspiration method.

2. *Water travel time through the entire soil profile* - this factor uses the saturated hydraulic conductivity (Ksat) and thickness of each soil horizon, to estimate the number of hours that would be required for a given volume of water to move through the entire soil profile. One advantage of this method for accounting for the rate of water movement is that the properties and thickness of each soil horizon are accounted for, rather than using an average saturated hydraulic conductivity for the entire profile. This method accounts for subtle differences between soils in texture, structure, horizon thickness, and depth to water-restricting layers.

3. *Available water capacity* - this factor accounts for the cumulative amount of water available to plants that the entire soil profile can hold at field capacity to a depth of 150 cm. The more water the soil profile can hold, the less water is available for deep leaching.

4. *Depth and duration of water table* - this factor uses a water table index based on the minimum average depth to a water table, and the number of months that the water table is present during the months of April through October. It is used to account for the loss of nitrates to the atmosphere as nitrous oxide or nitrogen gas due to denitrification under anaerobic conditions caused by water saturation. The higher the water table and the longer it's duration, the larger the quantity of nitrates that would potentially be lost to the atmosphere, and therefore not be available for deep leaching.

5. *Slope gradient adjusted for hydrologic soil group* - the steeper the slope gradient, the higher the potential surface runoff, resulting in less water available to move through the soil profile.

The nonirrigated and irrigated interpretations use the same factors in the criteria, but they are weighted differently. For example, the *Mean Annual Precipitation minus Potential Evapotranspiration* factor is weighted more heavily in the nonirrigated interpretation, because supplemental water is applied in the irrigated condition, and precipitation is less important.

The ratings indicate the potential for nitrate leaching below the root zone, based on inherent soil and climate properties. A *Low* rating indicates a low potential for nitrates to leach below the root zone. A *High* rating indicates a high potential for nitrates to leach below the root zone. The *Moderate* and *Moderately high* rating indicate intermediate potentials.

Report—Nitrate Leaching Potential (WA)

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential for nitrate leaching for all factors, except the "denitrification due to saturation" and "slope" factors. For these factors, the greater the value, the lower the potential for nitrate leaching.

Nitrate Leaching Potential (WA)–Kittitas County Area, Washington					
Map symbol and soil name	Pct. of map unit	Nitrate leaching potential, irrigated (WA)		Nitrate leaching potential, nonirrigated (WA)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
503—Terlan-Durtash-Selah complex, 5 to 15 percent slopes					
Terlan	40	High	0.97	Moderate	0.38
		Water travel time	1.00	Water travel time	1.00
		Water holding capacity	0.88	Water holding capacity	0.88
Durtash	35	Moderate	0.45	Low	0.20
		Water holding capacity	0.90	Water holding capacity	0.90
		Water travel time	0.25	Water travel time	0.25
Selah	20	High	0.90	Moderate	0.36
		Water travel time	0.91	Water travel time	0.91
		Water holding capacity	0.86	Water holding capacity	0.86
570—Wipple cobbly clay loam, 15 to 30 percent slopes					
Wipple	85	Low	0.15	Low	0.01
		Water holding capacity	0.88	Water holding capacity	0.88
		Slope	0.12	Slope	0.12
618—Nitzel ashy silt loam, gravelly substratum, 0 to 2 percent					
Nitzel, gravelly substratum	90	Moderately high	0.61	Low	0.22
		Water travel time	0.88	Water travel time	0.88
621—Mitta ashy silt loam, flooded, 0 to 2 percent slopes					
Mitta, flooded	85	Moderate	0.33	Low	0.12
		Water travel time	0.47	Water travel time	0.47
674—Durtash gravelly loam, 3 to 10 percent slopes					
Durtash, gravelly	80	Moderate	0.45	Low	0.20
		Water holding capacity	0.90	Water holding capacity	0.90
		Water travel time	0.25	Water travel time	0.25

Nitrate Leaching Potential (WA)–Kittitas County Area, Washington					
Map symbol and soil name	Pct. of map unit	Nitrate leaching potential, irrigated (WA)		Nitrate leaching potential, nonirrigated (WA)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
787—Terlan-Durtash-Selah complex, 2 to 5 percent slopes					
Terlan	40	High	0.97	Moderate	0.38
		Water travel time	1.00	Water travel time	1.00
		Water holding capacity	0.88	Water holding capacity	0.88
Durtash	30	Moderate	0.45	Low	0.20
		Water holding capacity	0.90	Water holding capacity	0.90
		Water travel time	0.25	Water travel time	0.25
Selah	25	High	0.90	Moderate	0.36
		Water travel time	0.91	Water travel time	0.91
		Water holding capacity	0.86	Water holding capacity	0.86
869—Weirman complex, drained, 0 to 5 percent slopes					
Weirman, very gravelly sandy loam	55	High	0.99	Moderate	0.40
		Water travel time	1.00	Water travel time	1.00
		Water holding capacity	0.99	Water holding capacity	0.99
Weirman, very cobbly sandy loam	40	High	0.99	Moderate	0.40
		Water travel time	1.00	Water travel time	1.00
		Water holding capacity	0.99	Water holding capacity	0.99

Soil Chemical Properties

This folder contains a collection of tabular reports that present soil chemical properties. The reports (tables) include all selected map units and components for each map unit. Soil chemical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil chemical properties include pH, cation exchange capacity, calcium carbonate, gypsum, and electrical conductivity.

Chemical Soil Properties

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Chemical Soil Properties–Kittitas County Area, Washington								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
503—Terlan-Durtash-Selah complex, 5 to 15 percent slopes								
Terlan	0-7	10-20	—	5.6-7.3	0	0	0.0-2.0	0
	7-15	15-25	—	6.1-7.3	0	0	0.0-2.0	0
	15-18	15-25	—	7.4-8.4	5-15	0	0.0-2.0	0-2
	18-26	—	—	—	—	—	—	—
	26-60	—	—	—	—	—	—	—
Durtash	0-5	10-20	—	6.1-7.8	0	0	0	0
	5-14	25-50	—	7.4-8.4	1-5	0	0.0-2.0	0-1
	14-19	30-50	—	7.4-8.4	1-5	0	0.0-2.0	0-1
	19-29	—	—	—	—	—	—	—
	29-60	—	—	—	—	—	—	—
Selah	0-9	10-20	—	6.1-7.3	0	0	0	0
	9-17	10-20	—	6.6-7.8	0	0	0	0
	17-21	20-30	—	7.4-7.8	0-3	0	0.0-2.0	0-2
	21-31	—	—	—	—	—	—	—
	31-60	—	—	—	—	—	—	—
570—Wipple cobbly clay loam, 15 to 30 percent slopes								
Wipple	0-7	20-30	—	6.6-7.3	0	0	0	0
	7-11	35-50	—	6.6-7.8	0	0	0	0
	11-30	35-50	—	7.4-8.4	0	0	0.0-2.0	0
	30-50	25-50	—	7.4-8.4	1-5	0	0.0-2.0	0-2
	50-60	—	—	—	—	—	—	—

Chemical Soil Properties–Kittitas County Area, Washington								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
618—Nitzel ashy silt loam, gravelly substratum, 0 to 2 percent								
Nitzel, gravelly substratum	0-8	15-25	—	6.1-7.3	0	0	0	0
	8-29	10-20	—	6.6-7.3	0	0	0	0
	29-46	10-20	—	6.6-7.3	0	0	0	0
	46-60	10-20	—	6.6-7.3	0	0	0	0
621—Mitta ashy silt loam, flooded, 0 to 2 percent slopes								
Mitta, flooded	0-6	20-30	—	7.9-9.0	0-1	0	0.0-4.0	1-10
	6-15	20-30	—	7.9-9.0	0-1	0	0.0-4.0	1-10
	15-34	20-30	—	7.4-8.4	0	0	0.0-2.0	0-5
	34-49	20-30	—	7.4-8.4	0	0	0.0-2.0	0-5
	49-60	20-30	—	7.4-7.8	0	0	0.0-2.0	0-5
674—Durtash gravelly loam, 3 to 10 percent slopes								
Durtash, gravelly	0-5	10-20	—	6.1-7.8	0	0	0	0
	5-14	25-50	—	7.4-8.4	1-5	0	0.0-2.0	0-1
	14-19	30-50	—	7.4-8.4	1-5	0	0.0-2.0	0-1
	19-29	—	—	—	—	—	—	—
	29-60	—	—	—	—	—	—	—

Chemical Soil Properties–Kittitas County Area, Washington								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
787—Terlan-Durtash-Selah complex, 2 to 5 percent slopes								
Terlan	0-7	10-20	—	5.6-7.3	0	0	0.0-2.0	0
	7-15	15-25	—	6.1-7.3	0	0	0.0-2.0	0
	15-18	15-25	—	7.4-8.4	5-15	0	0.0-2.0	0-2
	18-26	—	—	—	—	—	—	—
	26-60	—	—	—	—	—	—	—
Durtash	0-5	10-20	—	6.1-7.8	0	0	0	0
	5-14	25-50	—	7.4-8.4	1-5	0	0.0-2.0	0-1
	14-19	30-50	—	7.4-8.4	1-5	0	0.0-2.0	0-1
	19-29	—	—	—	—	—	—	—
	29-60	—	—	—	—	—	—	—
Selah	0-9	10-20	—	6.1-7.3	0	0	0	0
	9-17	10-20	—	6.6-7.8	0	0	0	0
	17-21	20-30	—	7.4-7.8	0-3	0	0.0-2.0	0-2
	21-31	—	—	—	—	—	—	—
	31-60	—	—	—	—	—	—	—

Chemical Soil Properties–Kittitas County Area, Washington								
Map symbol and soil name	**Depth**	**Cation-exchange capacity**	**Effective cation-exchange capacity**	**Soil reaction**	**Calcium carbonate**	**Gypsum**	**Salinity**	**Sodium adsorption ratio**
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
869—Weirman complex, drained, 0 to 5 percent slopes								
Weirman, very gravelly sandy loam	0-5	10-20	—	6.6-7.8	0	0	0	0
	5-15	10-15	—	6.6-7.8	0	0	0	0
	15-60	5.0-10	—	6.6-7.8	0	0	0	0
Weirman, very cobbly sandy loam	0-4	10-20	—	6.6-7.8	0	0	0	0
	4-15	10-15	—	6.6-7.8	0	0	0	0
	15-60	5.0-10	—	6.6-7.8	0	0	0	0

Soil Erosion

This folder contains a collection of tabular reports that present soil erosion factors and groupings. The reports (tables) include all selected map units and components for each map unit. Soil erosion factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

Conservation Planning

This report provides those soil attributes for the conservation plan for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. It provides the soil description along with the slope, runoff, T Factor, WEI, WEG, Erosion class, Drainage class, Land Capability Classification, and the engineering Hydrologic Group and the erosion factors Kf, the representative percentage of fragments, sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic surface layer. Further information on these factors can be found in the National Soil Survey Handbook section 618 found at the url http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054223#00 .

Soil properties and interpretations for conservation planning. The surface mineral horizon properties are displayed. Organic surface horizons are not displayed.

Conservation Planning–Kittitas County Area, Washington																		
Map symbol and soil name	Pct. of map unit	Slope RV	USLE Slope Length ft.	Runoff	T Factor	WEI	WEG	Erosion	Drainage	NIRR LCC	Hydrologic Group	Surface						
												Depths in.	Kf Factor	Fragments RV	Sand RV	Silt RV	Clay RV
503—Terlan-Durtash-Selah complex, 5 to 15 percent slopes																	
Terlan	40	10.0	—	—	1	48	6	—	Well drained	6s	D	0 - 7	.37	18	43	38	18
Durtash	35	10.0	—	—	1	38	7	—	Well drained	7s	D	0 - 5	.37	24	42	37	20
Selah	20	10.0	—	—	2	56	5	—	Well drained	3e	C	0 - 9	.32	6	43	39	17
570—Wipple cobbly clay loam, 15 to 30 percent slopes																	
Wipple	85	23.0	—	—	3	38	7	—	Well drained	4e	C	0 - 7	.24	30	35	33	31
618—Nitzel ashy silt loam, gravelly substratum, 0 to 2 percent																	
Nitzel, gravelly substratum	90	1.0	—	—	5	56	5	—	Moderately well drained	3w	C	0 - 7	.32	2	26	52	21
621—Mitta ashy silt loam, flooded, 0 to 2 percent slopes																	
Mitta, flooded	85	1.0	—	—	5	56	5	—	Somewhat poorly drained	3w	C	0 - 5	.32	2	7	70	22
674—Durtash gravelly loam, 3 to 10 percent slopes																	
Durtash, gravelly	80	7.0	—	—	1	38	7	—	Well drained	7s	D	0 - 5	.37	24	42	37	20

Conservation Planning–Kittitas County Area, Washington																		
Map symbol and soil name	**Pct. of map unit**	**Slope RV**	**USLE Slope Length ft.**	**Runoff**	**T Fact or**	**WEI**	**WEG**	**Erosion**	**Drainage**	**NIRR LCC**	**Hydro logic Group**	**Surface**						
												Depths in.	**Kf Fact or**	**Frag- ments RV**	**Sand RV**	**Silt RV**	**Clay RV**
787—Terlan-Durtash-Selah complex, 2 to 5 percent slopes																	
Terlan	40	4.0	—	—	1	48	6	—	Well drained	6s	D	0 - 7	.37	18	43	38	18
Durtash	30	4.0	—	—	1	38	7	—	Well drained	7s	D	0 - 5	.37	24	42	37	20
Selah	25	4.0	—	—	2	56	5	—	Well drained	3s	C	0 - 9	.32	6	43	39	17
869—Weirman complex, drained, 0 to 5 percent slopes																	
Weirman, very gravelly sandy loam	55	3.0	—	—	3	48	6	—	Somewhat excessively drained	4s	A	0 - 5	.20	40	69	24	6
Weirman, very cobbly sandy loam	40	3.0	—	—	3	48	6	—	Moderately well drained	4w	A	0 - 3	.20	43	69	24	6

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov)

Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Physical Soil Properties–Kittitas County Area, Washington														
Map symbol and soil name	**Depth**	**Sand**	**Silt**	**Clay**	**Moist bulk density**	**Saturated hydraulic conductivity**	**Available water capacity**	**Linear extensibility**	**Organic matter**	**Erosion factors**			**Wind erodibility group**	**Wind erodibility index**
										Kw	**Kf**	**T**		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
503—Terlan-Durtash-Selah complex, 5 to 15 percent slopes														
Terlan	0-7	-43-	-39-	15-19- 22	1.15-1.25-1.35	4.00-9.00-14.00	0.13-0.14-0.15	0.0- 1.5- 2.9	1.0- 1.5-2.0	.24	.37	1	6	48
	7-15	-34-	-38-	24-28- 32	1.25-1.35-1.45	4.00-9.00-14.00	0.11-0.15-0.18	3.0- 4.5- 5.9	1.0- 1.5-2.0	.20	.37			
	15-18	-38-	-36-	24-26- 32	1.25-1.35-1.45	4.00-9.00-14.00	0.10-0.12-0.14	3.0- 4.5- 5.9	0.5- 0.8-1.0	.15	.37			
	18-26	—	—	—	—	0.01-0.20-0.42	0.00-0.00-0.00	—	—					
	26-60	—	—	—	—	0.01-0.20-0.42	0.00-0.00-0.00	—	—					
Durtash	0-5	-42-	-38-	15-20- 25	1.15-1.23-1.30	4.00-9.00-14.00	0.13-0.15-0.17	0.0- 1.5- 2.9	1.0- 1.5-2.0	.20	.37	1	7	38
	5-14	-31-	-31-	35-38- 60	1.25-1.35-1.45	0.42-0.91-1.40	0.08-0.10-0.11	3.0- 4.5- 5.9	0.5- 1.3-2.0	.10	.32			
	14-19	-22-	-28-	40-50- 60	1.25-1.35-1.45	0.42-0.91-1.40	0.08-0.10-0.11	3.0- 4.5- 5.9	0.5- 1.3-2.0	.05	.24			
	19-29	—	—	—	—	0.07-0.25-0.42	0.00-0.00-0.00	—	—					
	29-60	—	—	—	—	0.07-0.25-0.42	0.00-0.00-0.00	—	—					
Selah	0-9	-43-	-40-	15-18- 20	1.10-1.23-1.35	4.00-9.00-14.00	0.17-0.19-0.20	0.0- 1.5- 2.9	1.0- 1.5-2.0	.32	.32	2	5	56
	9-17	-18-	-54-	22-28- 30	1.30-1.40-1.50	1.40-3.00-4.00	0.17-0.19-0.20	3.0- 4.5- 5.9	0.5- 1.3-2.0	.49	.49			

Physical Soil Properties–Kittitas County Area, Washington														
Map symbol and soil name	**Depth**	**Sand**	**Silt**	**Clay**	**Moist bulk density**	**Saturated hydraulic conductivity**	**Available water capacity**	**Linear extensibility**	**Organic matter**	**Erosion factors**			**Wind erodibility group**	**Wind erodibility index**
										Kw	**Kf**	**T**		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
	17-21	-34-	-32-	30-34- 38	1.30-1.40-1.50	1.40-3.00-4.00	0.13-0.15-0.17	3.0- 4.5- 5.9	0.5- 0.8-1.0	.17	.32			
	21-31	—	—	—	—	0.00-0.21-0.42	0.00-0.00-0.00	—	—					
	31-60	—	—	—	—	0.00-0.21-0.42	0.00-0.00-0.00	—	—					
570—Wipple cobbly clay loam, 15 to 30 percent slopes														
Wipple	0-7	-35-	-34-	27-31- 35	1.10-1.20-1.30	1.40-7.70-14.00	0.14-0.17-0.19	0.0- 1.5- 2.9	1.0- 1.5-2.0	.10	.24	3	7	38
	7-11	-33-	-32-	30-35- 40	1.25-1.38-1.50	0.42-0.91-1.40	0.04-0.07-0.10	3.0- 4.5- 5.9	0.5- 1.3-2.0	.10	.32			
	11-30	-17-	-28-	50-55- 60	1.25-1.38-1.50	0.42-0.91-1.40	0.04-0.07-0.10	3.0- 4.5- 5.9	0.5- 0.8-1.0	.05	.20			
	30-50	-33-	-32-	32-35- 60	1.25-1.40-1.55	0.42-2.21-4.00	0.06-0.09-0.12	3.0- 4.5- 5.9	0.0- 0.3-0.5	.10	.28			
	50-60	—	—	—	—	—	—	—	—					

Physical Soil Properties–Kittitas County Area, Washington														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
618—Nitzel ashy silt loam, gravelly substratum, 0 to 2 percent														
Nitzel, gravelly substratum	0-8	-26-	-53-	18-21- 24	1.10-1.20-1.30	4.00-9.00-14.00	0.17-0.19-0.20	0.0- 1.5- 2.9	2.0- 3.0-4.0	.32	.32	5	5	56
	8-29	-39-	-37-	20-24- 27	1.10-1.20-1.30	4.00-9.00-14.00	0.17-0.19-0.20	0.0- 1.5- 2.9	1.0- 2.0-3.0	.32	.32			
	29-46	-39-	-37-	20-25- 30	1.20-1.28-1.35	4.00-9.00-14.00	0.17-0.19-0.20	0.0- 1.5- 2.9	1.0- 2.0-3.0	.32	.32			
	46-60	-65-	-19-	14-16- 18	1.25-1.33-1.40	14.00-28.00-42.00	0.11-0.12-0.13	0.0- 1.5- 2.9	0.5- 1.8-3.0	.20	.20			
621—Mitta ashy silt loam, flooded, 0 to 2 percent slopes														
Mitta, flooded	0-6	- 7-	-70-	19-23- 25	1.00-1.15-1.30	4.00-9.00-14.00	0.19-0.20-0.21	0.0- 1.5- 2.9	3.0- 4.0-5.0	.32	.32	5	5	56
	6-15	- 7-	-70-	19-23- 25	1.00-1.15-1.30	4.00-9.00-14.00	0.19-0.20-0.21	0.0- 1.5- 2.9	2.0- 3.5-5.0	.37	.37			
	15-34	- 7-	-70-	19-23- 25	1.00-1.15-1.30	4.00-9.00-14.00	0.19-0.20-0.21	0.0- 1.5- 2.9	1.0- 1.5-2.0	.49	.49			
	34-49	- 9-	-64-	25-28- 30	1.15-1.28-1.40	1.40-3.00-4.00	0.17-0.19-0.21	3.0- 4.5- 5.9	0.5- 1.3-2.0	.43	.43			
	49-60	- 9-	-64-	25-28- 30	1.25-1.33-1.40	1.40-3.00-4.00	0.17-0.19-0.21	3.0- 4.5- 5.9	0.0- 0.3-0.5	.49	.49			

Physical Soil Properties–Kittitas County Area, Washington														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
674—Durtash gravelly loam, 3 to 10 percent slopes														
Durtash, gravelly	0-5	-42-	-38-	15-20- 25	1.15-1.23-1.30	4.00-9.00-14.00	0.13-0.15-0.17	0.0- 1.5- 2.9	1.0- 1.5-2.0	.20	.37	1	7	38
	5-14	-31-	-31-	35-38- 60	1.25-1.35-1.45	0.42-0.91-1.40	0.08-0.10-0.11	3.0- 4.5- 5.9	0.5- 1.3-2.0	.10	.32			
	14-19	-22-	-28-	40-50- 60	1.25-1.35-1.45	0.42-0.91-1.40	0.08-0.10-0.11	3.0- 4.5- 5.9	0.5- 1.3-2.0	.05	.24			
	19-29	—	—	—	—	0.07-0.25-0.42	0.00-0.00-0.00	—	—					
	29-60	—	—	—	—	0.07-0.25-0.42	0.00-0.00-0.00	—	—					

Physical Soil Properties–Kittitas County Area, Washington														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
787—Terlan-Durtash-Selah complex, 2 to 5 percent slopes														
Terlan	0-7	-43-	-39-	15-19- 22	1.15-1.25-1.35	4.00-9.00-14.00	0.13-0.14-0.15	0.0- 1.5- 2.9	1.0- 1.5-2.0	.24	.37	1	6	48
	7-15	-34-	-38-	24-28- 32	1.25-1.35-1.45	4.00-9.00-14.00	0.11-0.15-0.18	3.0- 4.5- 5.9	1.0- 1.5-2.0	.20	.37			
	15-18	-38-	-36-	24-26- 32	1.25-1.35-1.45	4.00-9.00-14.00	0.10-0.12-0.14	3.0- 4.5- 5.9	0.5- 0.8-1.0	.15	.37			
	18-26	—	—	—	—	0.01-0.20-0.42	0.00-0.00-0.00	—	—					
	26-60	—	—	—	—	0.01-0.20-0.42	0.00-0.00-0.00	—	—					
Durtash	0-5	-42-	-38-	15-20- 25	1.15-1.23-1.30	4.00-9.00-14.00	0.13-0.15-0.17	0.0- 1.5- 2.9	1.0- 1.5-2.0	.20	.37	1	7	38
	5-14	-31-	-31-	35-38- 60	1.25-1.35-1.45	0.42-0.91-1.40	0.08-0.10-0.11	3.0- 4.5- 5.9	0.5- 1.3-2.0	.10	.32			
	14-19	-22-	-28-	40-50- 60	1.25-1.35-1.45	0.42-0.91-1.40	0.08-0.10-0.11	3.0- 4.5- 5.9	0.5- 1.3-2.0	.05	.24			
	19-29	—	—	—	—	0.07-0.25-0.42	0.00-0.00-0.00	—	—					
	29-60	—	—	—	—	0.07-0.25-0.42	0.00-0.00-0.00	—	—					
Selah	0-9	-43-	-40-	15-18- 20	1.10-1.23-1.35	4.00-9.00-14.00	0.17-0.19-0.20	0.0- 1.5- 2.9	1.0- 1.5-2.0	.32	.32	2	5	56
	9-17	-18-	-54-	22-28- 30	1.30-1.40-1.50	1.40-3.00-4.00	0.17-0.19-0.20	3.0- 4.5- 5.9	0.5- 1.3-2.0	.49	.49			

Physical Soil Properties–Kittitas County Area, Washington															
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
	17-21	-34-	-32-	30-34- 38	1.30-1.40-1.50	1.40-3.00-4.00	0.13-0.15-0.17	3.0- 4.5- 5.9	0.5- 0.8-1.0	.17	.32			
	21-31	—	—	—	—	0.00-0.21-0.42	0.00-0.00-0.00	—	—					
	31-60	—	—	—	—	0.00-0.21-0.42	0.00-0.00-0.00	—	—					
869—Weirman complex, drained, 0 to 5 percent slopes														
Weirman, very gravelly sandy loam	0-5	-69-	-24-	5- 7- 8	1.20-1.30-1.40	4.00-23.00-42.00	0.07-0.09-0.10	0.0- 1.5- 2.9	1.0- 1.5-2.0	.10	.20	3	6	48
	5-15	-80-	-16-	2- 4- 5	1.35-1.45-1.55	42.00-92.00-141.00	0.07-0.09-0.10	0.0- 1.5- 2.9	1.0- 1.5-2.0	.10	.24			
	15-60	-82-	-17-	0- 1- 2	1.50-1.60-1.70	141.00-423.00-705.00	0.01-0.02-0.02	0.0- 1.5- 2.9	0.0- 0.3-0.5	.05	.28			
Weirman, very cobbly sandy loam	0-4	-69-	-24-	5- 7- 8	1.20-1.30-1.40	4.00-23.00-42.00	0.07-0.09-0.10	0.0- 1.5- 2.9	1.0- 1.5-2.0	.05	.20	3	6	48
	4-15	-80-	-16-	2- 4- 5	1.35-1.45-1.55	42.00-92.00-141.00	0.07-0.09-0.10	0.0- 1.5- 2.9	1.0- 1.5-2.0	.10	.24			
	15-60	-82-	-17-	0- 1- 2	1.50-1.60-1.70	141.00-423.00-705.00	0.01-0.02-0.02	0.0- 1.5- 2.9	0.0- 0.3-0.5	.05	.28			

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–Kittitas County Area, Washington														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
503—Terlan-Durtash-Selah complex, 5 to 15 percent slopes														
Terlan	40	D	0-7	Gravelly loam	CL, CL-ML, SC, SC-SM	A-4	0- 0- 0	0- 5- 10	75-80-85	70-75-80	60-68-75	40-50-60	25-28-30	5-7 -10
			7-15	Gravelly clay loam, gravelly loam	CL, GC, SC	A-6	0- 0- 0	0- 8- 15	70-78-85	65-73-80	55-65-75	40-50-60	30-33-35	10-13-15
			15-18	Gravelly loam, very gravelly loam, gravelly clay loam	CL, GC, SC	A-6	0- 0- 0	0-13- 25	60-70-80	50-63-75	45-58-70	35-45-55	30-33-35	10-13-15
			18-26	Cemented material	—	—	—	—	—	—	—	—	—	—
			26-60	Cemented material	—	—	—	—	—	—	—	—	—	—
Durtash	35	D	0-5	Gravelly loam	CL, GC, SC	A-4, A-6	0- 0- 0	0- 5- 10	65-75-85	60-68-75	55-63-70	45-53-60	25-30-35	5-10-15
			5-14	Very gravelly clay loam, very cobbly clay loam, extremely gravelly clay	GC, GP-GC	A-2	0- 5- 10	10-25-40	30-45-60	25-38-50	15-28-40	5-20- 35	40-53-65	20-30-40
			14-19	Extremely gravelly clay, very gravelly clay	GC	A-2	0- 5- 10	5-23- 40	30-50-70	25-43-60	15-25-35	5-15- 25	55-65-75	30-40-50
			19-29	Cemented material	—	—	—	—	—	—	—	—	—	—
			29-60	Cemented material	—	—	—	—	—	—	—	—	—	—
Selah	20	C	0-9	Loam	CL, CL-ML	A-4	0- 0- 0	0- 0- 0	95-98-100	85-93-100	75-88-100	55-70-85	20-23-25	5-7 -10
			9-17	Silty clay loam, clay loam, silt loam	CL	A-6	0- 0- 0	0- 3- 5	95-98-100	85-93-100	75-85-95	55-70-85	30-35-40	10-15-20

Engineering Properties–Kittitas County Area, Washington														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
			17-21	Clay loam, gravelly clay loam, cobbly clay loam	CL, GC, SC	A-6, A-7	0- 0- 0	0-10- 20	65-80-95	55-73-90	50-68-85	45-58-70	35-43-50	15-20-25
			21-31	Cemented material	—	—	—	—	—	—	—	—	—	—
			31-60	Cemented material	—	—	—	—	—	—	—	—	—	—
570—Wipple cobbly clay loam, 15 to 30 percent slopes														
Wipple	85	C	0-7	Cobbly clay loam	CL	A-6	0- 0- 0	25-33-40	80-90-100	70-85-100	65-83-100	50-65-80	30-35-40	10-13-15
			7-11	Very gravelly clay loam, very cobbly clay loam	GC	A-2, A-6	0- 5- 10	5-10- 15	50-58-65	40-48-55	35-43-50	30-38-45	30-35-40	10-15-20
			11-30	Very gravelly clay, very cobbly clay, extremely cobbly clay	GC	A-2, A-7	0- 5- 10	5-25- 45	45-58-70	35-48-60	25-43-60	20-36-50	65-70-75	40-45-50
			30-50	Very cobbly clay, extremely cobbly clay loam, very cobbly clay loam	GC	A-2, A-7	0- 5- 10	15-30-45	45-58-70	35-48-60	30-45-60	25-38-50	40-53-65	15-28-40
			50-60	Unweathered bedrock	—	—	—	—	—	—	—	—	—	—

Engineering Properties–Kittitas County Area, Washington														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
618—Nitzel ashy silt loam, gravelly substratum, 0 to 2 percent														
Nitzel, gravelly substratum	90	C	0-8	Ashy silt loam	CL	A-6	0- 0- 0	0- 0- 0	100-100 -100	95-98-1 00	90-95-1 00	65-75- 85	25-30 -35	10-13-1 5
			8-29	Ashy loam, ashy silt loam	CL	A-6	0- 0- 0	0- 0- 0	100-100 -100	95-98-1 00	85-93-1 00	60-70- 80	25-30 -35	10-13-1 5
			29-46	Loam, silt loam, clay loam	CL	A-6	0- 0- 0	0- 0- 0	100-100 -100	95-98-1 00	85-93-1 00	60-70- 80	25-30 -35	10-13-1 5
			46-60	Sandy loam	CL, CL-ML	A-4	0- 0- 0	0- 0- 0	100-100 -100	95-98-1 00	65-75- 85	50-60- 70	20-25 -30	5-7 -10
621—Mitta ashy silt loam, flooded, 0 to 2 percent slopes														
Mitta, flooded	85	C	0-6	Ashy silt loam	CL	A-6	0- 0- 0	0- 0- 0	100-100 -100	95-98-1 00	90-95-1 00	65-75- 85	25-30 -35	10-13-1 5
			6-15	Ashy silt loam	CL	A-6	0- 0- 0	0- 0- 0	100-100 -100	95-98-1 00	90-95-1 00	65-75- 85	25-30 -35	10-13-1 5
			15-34	Ashy silt loam, ashy loam	CL	A-6	0- 0- 0	0- 0- 0	100-100 -100	95-98-1 00	90-95-1 00	65-75- 85	25-30 -35	10-13-1 5
			34-49	Silty clay loam, clay loam, silt loam	CL	A-6	0- 0- 0	0- 0- 0	100-100 -100	90-95-1 00	85-93-1 00	60-70- 80	30-35 -40	15-18-2 0
			49-60	Silty clay loam, clay loam, loam	CL	A-6	0- 0- 0	0- 0- 0	100-100 -100	90-95-1 00	85-93-1 00	60-70- 80	30-35 -40	15-18-2 0

Engineering Properties–Kittitas County Area, Washington														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
674—Durtash gravelly loam, 3 to 10 percent slopes														
Durtash, gravelly	80	D	0-5	Gravelly loam	CL, GC, SC	A-4, A-6	0- 0- 0	0- 5- 10	65-75-85	60-68-75	55-63-70	45-53-60	25-30-35	5-10-15
			5-14	Very gravelly clay loam, very cobbly clay loam, extremely gravelly clay	GC, GP-GC	A-2	0- 5- 10	10-25-40	30-45-60	25-38-50	15-28-40	5-20- 35	40-53-65	20-30-40
			14-19	Extremely gravelly clay, very gravelly clay	GC	A-2	0- 5- 10	5-23- 40	30-50-70	25-43-60	15-25-35	5-15- 25	55-65-75	30-40-50
			19-29	Cemented material	—	—	—	—	—	—	—	—	—	—
			29-60	Cemented material	—	—	—	—	—	—	—	—	—	—

Engineering Properties–Kittitas County Area, Washington														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
787—Terlan-Durtash-Selah complex, 2 to 5 percent slopes														
Terlan	40	D	0-7	Gravelly loam	CL, CL-ML, SC, SC-SM	A-4	0- 0- 0	0- 5- 10	75-80-85	70-75-80	60-68-75	40-50-60	25-28-30	5-7 -10
			7-15	Gravelly clay loam, gravelly loam	CL, GC, SC	A-6	0- 0- 0	0- 8- 15	70-78-85	65-73-80	55-65-75	40-50-60	30-33-35	10-13-15
			15-18	Gravelly loam, very gravelly loam, gravelly clay loam	CL, GC, SC	A-6	0- 0- 0	0-13- 25	60-70-80	50-63-75	45-58-70	35-45-55	30-33-35	10-13-15
			18-26	Cemented material	—	—	—	—	—	—	—	—	—	—
			26-60	Cemented material	—	—	—	—	—	—	—	—	—	—
Durtash	30	D	0-5	Gravelly loam	CL, GC, SC	A-4, A-6	0- 0- 0	0- 5- 10	65-75-85	60-68-75	55-63-70	45-53-60	25-30-35	5-10-15
			5-14	Very gravelly clay loam, very cobbly clay loam, extremely gravelly clay	GC, GP-GC	A-2	0- 5- 10	10-25-40	30-45-60	25-38-50	15-28-40	5-20- 35	40-53-65	20-30-40
			14-19	Extremely gravelly clay, very gravelly clay	GC	A-2	0- 5- 10	5-23- 40	30-50-70	25-43-60	15-25-35	5-15- 25	55-65-75	30-40-50
			19-29	Cemented material	—	—	—	—	—	—	—	—	—	—
			29-60	Cemented material	—	—	—	—	—	—	—	—	—	—
Selah	25	C	0-9	Loam	CL, CL-ML	A-4	0- 0- 0	0- 0- 0	95-98-100	85-93-100	75-88-100	55-70-85	20-23-25	5-7 -10
			9-17	Silty clay loam, clay loam, silt loam	CL	A-6	0- 0- 0	0- 3- 5	95-98-100	85-93-100	75-85-95	55-70-85	30-35-40	10-15-20

Engineering Properties–Kittitas County Area, Washington														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
			17-21	Clay loam, gravelly clay loam, cobbly clay loam	CL, GC, SC	A-6, A-7	0- 0- 0	0-10- 20	65-80-95	55-73-90	50-68-85	45-58-70	35-43-50	15-20-25
			21-31	Cemented material	—	—	—	—	—	—	—	—	—	—
			31-60	Cemented material	—	—	—	—	—	—	—	—	—	—
869—Weirman complex, drained, 0 to 5 percent slopes														
Weirman, very gravelly sandy loam	55	A	0-5	Very gravelly sandy loam	GM, GP-GM	A-1	0- 3- 5	0- 3- 5	40-50-60	30-40-50	15-25-35	5-15- 25	15-18-20	NP-3 -5
			5-15	Very gravelly loamy sand	GP, GP-GM, SP, SP-SM	A-1	0- 3- 5	0- 8- 15	40-50-60	30-40-50	5-15- 25	0- 3- 5	0-5 -10	NP
			15-60	Extremely gravelly loamy sand, very gravelly loamy sand, very gravelly sand, extremely gravelly sand	GP, GP-GM	A-1	0- 3- 5	10-25-40	30-40-50	10-28-45	5-13- 20	0- 5- 10	0-5 -10	NP
Weirman, very cobbly sandy loam	40	A	0-4	Very cobbly sandy loam	GM, SM	A-1	10-15-20	20-23-25	50-58-65	40-48-55	15-23-30	10-18-25	15-18-20	NP-3 -5
			4-15	Very gravelly loamy sand	GP, GP-GM, SP, SP-SM	A-1	0- 3- 5	0- 8- 15	40-50-60	30-40-50	5-15- 25	0- 3- 5	0-5 -10	NP
			15-60	Extremely gravelly loamy sand, very gravelly loamy sand, very gravelly sand, extremely gravelly sand	GP, GP-GM	A-1	0- 3- 5	10-25-40	30-40-50	10-28-45	5-13- 20	0- 5- 10	0-5 -10	NP

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Kittitas County Area, Washington			
Map symbol and soil name	Pct. of map unit	Surface Runoff	Hydrologic Soil Group
503—Terlan-Durtash-Selah complex, 5 to 15 percent slopes			
Terlan	40	—	D
Durtash	35	—	D
Selah	20	—	C
570—Wipple cobbly clay loam, 15 to 30 percent slopes			
Wipple	85	—	C
618—Nitzel ashy silt loam, gravelly substratum, 0 to 2 percent			
Nitzel, gravelly substratum	90	—	C
621—Mitta ashy silt loam, flooded, 0 to 2 percent slopes			
Mitta, flooded	85	—	C
674—Durtash gravelly loam, 3 to 10 percent slopes			
Durtash, gravelly	80	—	D
787—Terlan-Durtash-Selah complex, 2 to 5 percent slopes			
Terlan	40	—	D
Durtash	30	—	D
Selah	25	—	C
869—Weirman complex, drained, 0 to 5 percent slopes			
Weirman, very gravelly sandy loam	55	—	A
Weirman, very cobbly sandy loam	40	—	A

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