For Office Use Only

RECORD No. 217 21 - 000573 PLNG
$8500

Crook County Community Development
Planning Division
300 NE 3rd Street, Room 12, Prineville Oregon 97754
541-447-3211
plan@co.crook.or.us
www.co.crook.or.us

Received by
CCCD
7/9/2021

Conditional Use Application

Mining and Aggregate

PROPERTY OWNER

Last Name: Vanier First Name: Robert J. and Lani

Mailing Address: P.O. Box 326

City: Dayville State: OR Zip: 97825

Day-time phone: (541) 462 - 3530 Cell Phone: ( ) -

Email: tricreekranch@hughes.net

AGENT / REPRESENTATIVE

Last Name: Ropp First Name: Matt

Mailing Address: 32260 Old Hwy 34

City: Tangent State: OR Zip: 97389

Day-time phone: (541) 918 - 5133 Cell Phone: (541) 223 - 1079

Email: matt.ropp@kniferiver.com

PROPERTY LOCATION

Township 14S South, Range 15E East WM, Section 14, Tax lot 103

Size of property: 77.98 Acres Zoning: EFU-2

Physical address: 6487 NW Lamonta Road, Prineville, Oregon

ACCESS / ROADS

(See attached Applicant's Burden of Proof Document)

Is there existing access to the property? Yes _____ No _____

If no, will the proposed access be from: County_____ Public_____ Private_____ State(ODOT) _____

*Please provide recorded easement or ODOT approval

FLOOD ZONE

Is the property located within a Flood Zone? Yes _____ No ___X_____
If yes, submit a "Special Flood Hazard Area Development Permit".

FIRE DISTRICT (See attached Applicant's Burden of Proof Document)

Is the property located within the Crook County Fire District? Yes _____ No _____
If no, please describe how fire suppression and prevention would be met.

_____
_____
_____
_____

IRRIGATION WATER (See attached Applicant's Burden of Proof Document)

Does the property have irrigation water right? Yes _____ No _____
If the property has irrigation water rights, who is the supplier:
_____Central Oregon Irrigation District - 541-548-6047

_____Ochoco Irrigation District - 541-447-6449

_____Water Resources Department - 541-306-6885

_____People's Irrigation District - 541-447-7797

_____Other: _____

Watermaster Signature: _____ Date: _____

Print Name Clearly: _____ Phone: _____

Irrigation District Signature: _____Date: _____

Print Name Clearly: _____ Phone: _____

COMMENTS:_____
_____
_____
_____
_____

WILDLIFE (See attached Applicant's Burden of Proof Document)

ODF&W, Prineville Field Office, 2042 SE Paulina Hwy Phone: (541) 447-5111

Is the subject property located within a "Winter Wildlife" overlay zone? Yes _____ No _____

Is the subject property located within a "Sensitive Bird Habitat" zone? Yes _____ No _____

COMMENTS:_____
_____
_____
_____
_____

ODF&W Signature: _____ Date: _____

Print Name: _____

WEED CONTROL (See attached Applicant's Burden of Proof Document)

1306 N. Main Street, Prineville Phone: (541) 447-7958 Email: kev.alexanian@co.crook.or.us

Weed Master Signature: _____ Date: _____

COMMENTS:

_____

_____

_____

SUPPLEMENTAL INFORMATION

IMPORTANT NOTICE: The Crook County Planning Department is required to review all applications for accuracy and to determine whether the staff and/or the Planning Commission have the information needed to make a decision. The County has 30 days to determine whether the application is complete. Within that 30-day period, the Planning Department will request additional information, if necessary. Please make sure your application is complete. The burden of proof lies with the applicant.

SIGNATURES

I agree to meet the standards governing the laws as outlined in the State of Oregon's OAR, ORS, Crook County Code, and Crook County – Prineville Comprehensive Plan. I agree that all the information contained in this application is true to the best of my knowledge.

Property Owner Signature: Robert J Vanier Date 5/30/21

Print name: Robert J. Vanier

Property Owner Signature: Lani Vanier Date 5/30/21

Print name: Lani Vanier

Agent/Representative Signature: Matt Ropp Date 07/09/2021

Print name: Matt Ropp, Manager of Land Planning, Knife River Corporation -Northwest

****

CHECK LIST OF REQUIREMENTS

- ❑ Complete and Signed application form
- ❑ Detailed explanation of the proposed use and how the applicable standards and criteria are satisfied, "Burden of Proof Statement". Crook County Code, Title 18 has the applicable standards and criteria. For questions on the applicable criteria, please contact plan@co.crook.or.us
- ❑ Copy of the Tax Lot Card
- ❑ A copy of the earliest deed or contract that describes the property in its current configuration
- ❑ Copy of the current owners Warranty Deed
- ❑ Signed Authorization Form; if applicable
- ❑ Detailed "Plot Plan/Site Plan" of the subject property
- ❑ A copy of the irrigation map for the area and historical water rights information on the subject property.
- ❑ Special Flood Hazard Area Development Permit; if applicable
- ❑ Supplemental Information

DETAILED PLOT PLAN REQUIREMENTS

The Plot Plan does not have to be drawn to scale, however, all dimensions, boundaries and information must be accurate.

The detailed "Plot Plan/Site Plan" must include the following:

- ❑ Scale of map – not greater than one inch per 400 feet.
- ❑ North arrow.
- ❑ Dimensions and boundaries of the property.
- ❑ Location of all easements and names, and the right-of-way widths of existing roads and easements or right-of-way for any proposed roads, utilities, bikeways, and access corridors.
- ❑ If the parcel or lot has irrigation water right, indicate the area of the water right with the number of irrigated acres. In addition, submit a copy of a water right map from the district.
- ❑ Names and locations of all roads adjacent to the property.
- ❑ Location of well or water source. The distance from the water source to nearest point of septic system drain field and / or replacement drain field area.
- ❑ Location of septic system test holes used for site evaluation during the feasibility process. The location of the proposed septic tank, drain field, and replacement drain field showing the dimensions and spacing of the leach lines. The distance from the septic tank and septic system to the property lines.
- ❑ Location of driveways or other roads on the property, existing and proposed.
- ❑ Location of all public utility easements. In addition, attach copies of the recorded utility easement that indicates easement widths.
- ❑ Distance (setbacks) from all structures to all property lines.
- ❑ Location of all major features (canals, irrigation ditches, rock ledges, etc.)
- ❑ Location of rimrock, if applicable.
- ❑ Location of all drainage, creeks, springs, etc., with distance to the proposed development site.
- ❑ Indicate location of all "EXISTING" and "PROPOSED" structures: Dwellings, Garage, shops, lean-to, barns, etc. Indicate on the plot plan if existing or proposed and dimension size.

Community Development Department
300 NE 3rd Street, Prineville, OR 97754
Phone: (541) 447.3211
plan@co.crook.or.us
www.co.crook.or.us

AUTHORIZATION FORM

Let it be known that _____

has been retained to act as my authorized agent to perform all acts for development on my property noted below: These acts include: Pre- application conference, filing applications and/or other required documents relative to all Permit applications.

Physical address of property: _____, and described in the records of CROOK COUNTY as:

Township _____ South, Range _____ East, Section _____, Tax lot _____

Township _____ South, Range _____ East, Section _____, Tax lot _____

The costs of the above actions, which are not satisfied by the agent, are the responsibility of the undersigned property owner.

PROPERTY OWNER

Signature: _____ Date: _____

Print Name: _____

Mailing address: _____

City: _____ State: _____ Zip: _____

Home Phone: (_____) _____-_____ Cell Phone: (_____) _____-_____

Email: _____

- ☐ Individual(s)
- ☐ Corporation;
- ☐ Limited Liability Corporation;
- ☐ Trust

IMPORTANT NOTE: Indicate whether property is owned in individual name(s), or by a business or other entity (e.g. Corporation, Limited Liability Company; or Trust). If property is owned by an entity, include names of all authorized signers. For Example:

If the owner is a Corporation, Limited Liability Corporation or Trust, the following information is required as part of this form.

If a Corporation ~ please provide the name of President or other authorized signor(s).
If a Limited Liability Corporation ~ provide names of ALL members & managers.
If a Trust ~ provide the name of current Trustee(s)

In addition, you will need to include a copy of Bylaws (Corporations); an Operating Agreement (Limited Liability Company); or Certificate of Trust (Trusts) that verifies authority to sign on behalf of the entity.

AGENT

Signature: _____ Date: _____

Print Name: _____

Mailing address: _____

City: _____ State: _____ Zip: _____

Home Phone: (_____) _____-_____ Cell Phone: (_____) _____-_____

Email: _____

KNIFE RIVER – NORTHWEST
APPLICANT'S BURDEN OF PROOF DOCUMENT
CONDITIONAL USE PERMIT – AGGREGATE MINING

Owner:	Robert J. Vanier and Lani Vanier P.O. Box 326 Dayville, OR 97825
Applicant:	Matt Ropp, Manager of Land Planning Knife River Corporation – Northwest 32260 Old Highway 34 Tangent, OR 97389
Site Address:	6487 NW Lamonta Road, Prineville, Oregon
Subject Property:	T14 R15 Section 14 tax lot 103
Location:	The subject property is located at the intersection of NW Stahancyk Lane and NW Lamonta Road on the north side of Stahancyk and west side of Lamonta, approximately 3 miles northwest of the City of Prineville.

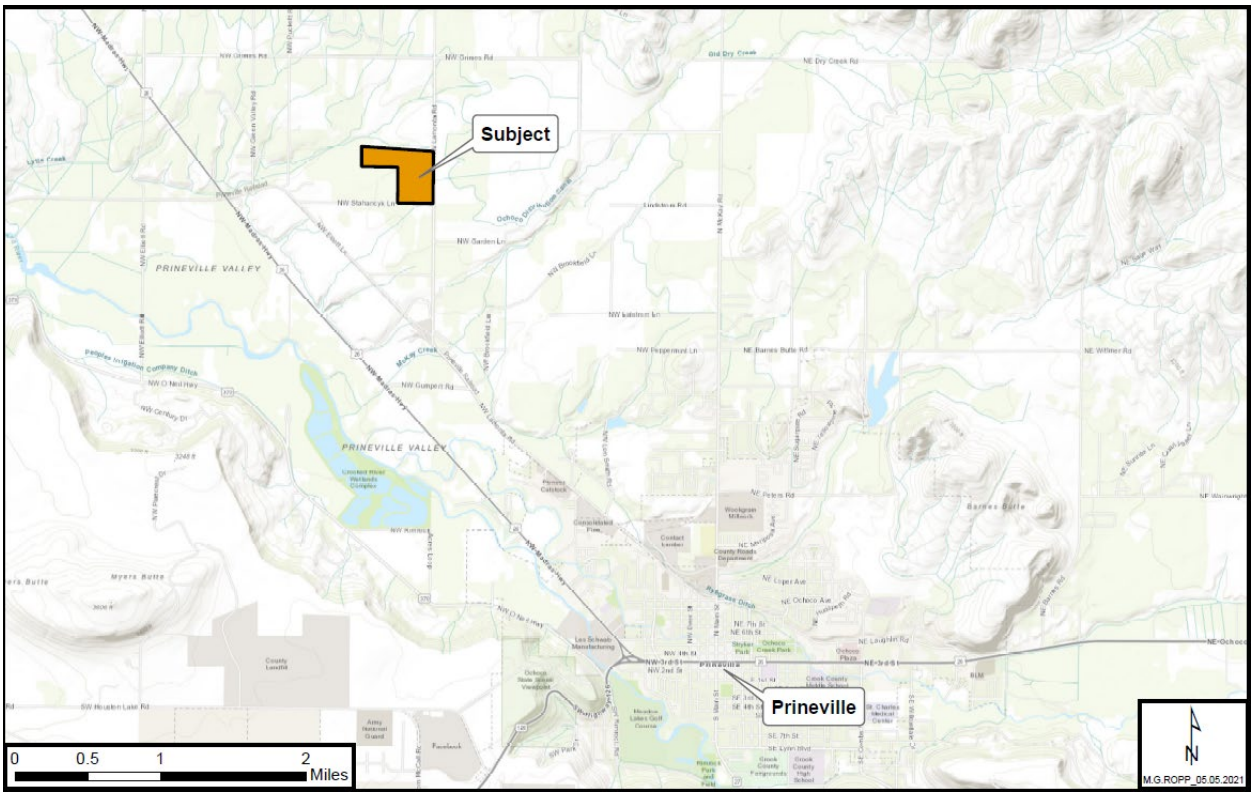

Figure 1. Property Location.

I. PROPERTY FACTS

1. **Subject Parcel Size:** 77.98 Acres

2. **Parcel Creation:** The subject was created in May of 2006 as Parcel 3 of Partition Plat 2006-22, approved by Crook County through Planning case number C-LP-568-06(F).

3. **Zoning:** Exclusive Farm Use – 2 (EFU-2)

4. **Comprehensive Plan Designation:** Agricultural Land

5. **Access:** The subject has direct frontage on NW Stahancyk Lane and NW Lamonta Road, both County owned and maintained roads. However, the property will be accessed for mining activities from Applicant's existing operations, to the west: mining activities will not require direct access to NW Stahancyk Lane or NW Lamonta Road.

6. **Current and Historic Land Use:** The subject property includes one single-family dwelling. The subject is currently - and has been for many years- employed for farm use – irrigated hay and pasture. Applicant has submitted a Plan Amendment application to add the subject property to the county's Goal 5 Inventory of Significant Mineral and Aggregate Sites (planning case# 217-21-000436).

7. **Property Class:** 551 – Farm Use.

8. **Soils:** According to United States Department of Agricultural (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey the subject is comprised of three soil mapping units (SMU), all with an Irrigated Land Capability Class (LCC) of 3. The subject is comprised of the following SMU: 020 – Boyce Silt Loam, 0 to 2 percent slopes, 0.2 acres; 123, Ochoco-Prineville complex, 0 to 3 percent slopes, 75.9 acres; Ochoco-Prineville complex, 3 to 8 percent slopes, 2 acres.

9. **Existing Improvements:** 2,326 sq.ft single family dwelling, est. 1920; 600 sq.ft. GP building; 480 sq.ft GP building; 3,420 machine shed.

10. **Natural Hazards:** There are no known natural hazards on the subject property. The subject property is not within a regulatory special flood hazard zone.

11. **Wetlands:** The National Wetlands Inventory (NWI) does not indicate any wetlands on the subject parcel.

II. INTRODUCTION

1. **Nature of Application:** Knife River Corporation – Northwest (the "Applicant") seeks a conditional use permit (CUP) authorizing aggregate mining on the subject parcel. Applicant currently operates a sand and gravel mine and construction aggregates processing facility on an abutting tract of land to the west of the subject parcel (T14 R15 Section 14 tax lots 702 & 703 - the "Woodward" property). As the aggregate reserve on the Woodward

property is depleted, Applicant intends to continue mining to the east onto the subject parcel (T14 R15 Section 14 tax lot 103 – the "Vanier" property). The subject parcel is zoned Exclusive Farm Use (EFU-2) and Applicant has applied for a plan amendment to add the subject parcel to the Crook County Comprehensive Plan (the "Comp Plan") Inventory of Significant Mineral and Aggregate Resources (the "Inventory"). Applicant does not intend to process aggregates on the Vanier property. Aggregates extracted from the Vanier property will be processed and exported to market from existing permitted facilities on the Woodward property. No significant change to the nature of operations or impacts resulting from activities occurring at the Woodward processing facility is expected.

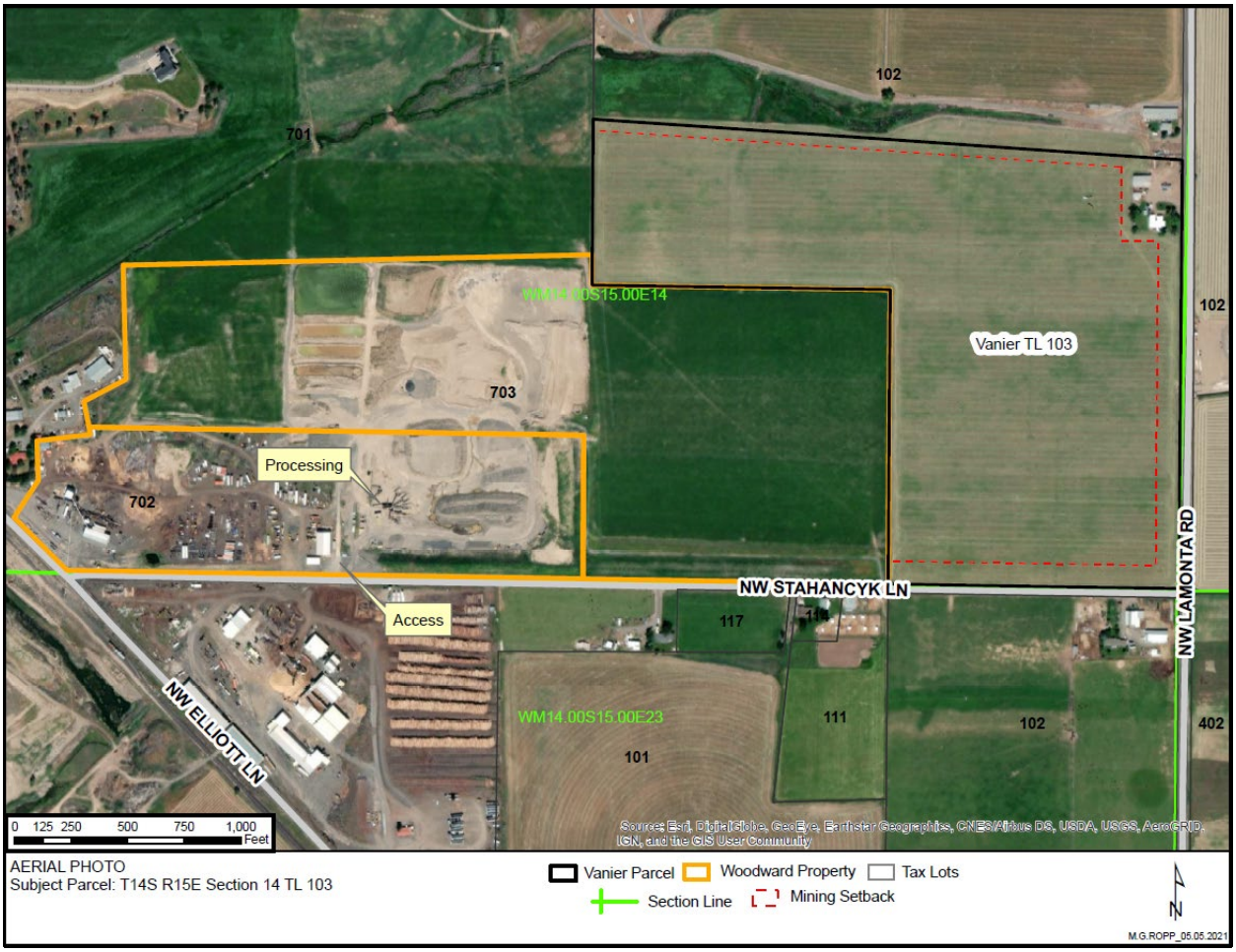

Figure 2. Woodward Processing Site.

2. **Mining Operation:** The Vanier property is currently used for grazing and hay production. Post-mining reclamation will return the Property to a condition suitable for agricultural use. Applicant intends to mine the Property in cells, approximately 60 feet in width. An average of 13 feet of overburden will be stripped from the surface using excavators and loaders. Topsoil will be saved for surface reclamation. Remaining overburden (silt, clay, fine sand) excavated from the initial cell(s) will be used to construct a 10-foot high berm along the east and south property boundaries. Recoverable aggregates (sand & gravel)- an expected average thickness of 12 feet - will be excavated and transported to the Woodward site for processing. Groundwater may be encountered during mining but is not expected to prevent

normal dry mining methods (i.e. excavators loading materials onto haul trucks). In the event groundwater infiltration complicates replacement of overburden during reclamation, Applicant intends to temporarily use pumps to transfer water from open cells to a recharge trench so that overburden may be replaced safely and efficiently without impacting nearby groundwater rights. Undisturbed areas will remain available for agricultural use until mining commences. As cells are completed, land will be returned to agricultural use as soon as possible. Reclamation will be completed in accordance with a Department of Geology and Mineral Industries' (DOGAMI) approved reclamation plan.

3. **Nearby and Adjacent Uses:** Figure 3. below depicts nearby and adjacent dwellings and properties. See Table 1. and Figure 4. on following page for details.

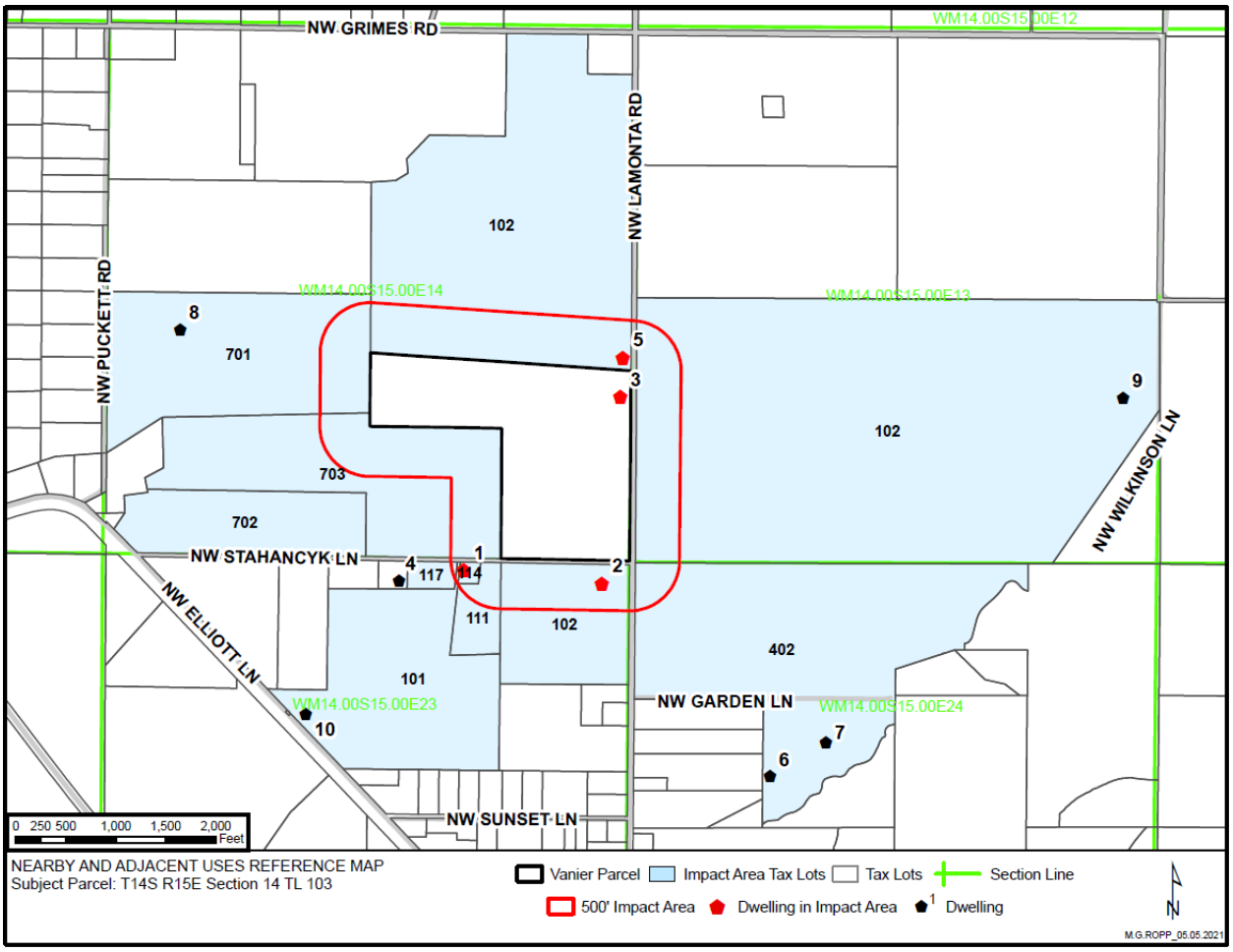

Figure 3. Nearby and Adjacent Uses Reference Map

T-R-S Tax Lot	Direction from Subject	Distance from Mining to Tax Lot	Site Address	Existing Dwelling	ID # on Map	Distance from Mining to Dwelling	Acres	Zoning	Primary Use	Land Owner
14-15-13 TL 102	East	160'	5777 NW Wilkinson Rd	Yes	9	5,010'	286.5	EFU-2	Farm Use - Hay	Mark & Casey McKinnon
14-15-14 TL 102	North	50'	6525 NW Lamonta Rd	Yes	5	245'	156.0	EFU-2	Farm Use - Hay	Dean & Teresa Davis
14-15-14 TL 701	West	0'	5950 NW Puckett Rd	Yes	8	1,845'	76.1	EFU-2	Farm Use - Hay	Scott & Crista Porfily
14-15-14 TL 702	West	1,350'	4755 NW Stahancyk Ln	No	-	-	35.4	HM	Industrial - Aggregate	Woodward Land & Timber LLC
14-15-14 TL 703	West	0'	Stahancyk Ln	No	-	-	76.1	EFU-2	Farm Use & Aggregate	Woodward Land & Timber LLC
14-15-23 TL 101	Southwest	425'	4243 NW Elliot Ln	Yes	10	2,560'	66.8	EFU-2	Farm Use - Hay	Samual Stafford
14-15-23 TL 102	South	140'	3320 NW Stahancyk Ln	Yes	2	320'	33.2	EFU-2	Farm Use - Pasture	Billie Johnson
14-15-23 TL 111	Southwest	140'	Stahancyk Ln	No	-	-	8.8	EFU-2	Farm Use - Pasture	Adam & Karen Mikulski
14-15-23 TL 114	Southwest	245'	3992 NW Stahancyk Ln	Yes	1	390'	0.9	EFU-2	Residential	Adam & Karen Mikulski
14-15-23 TL 117	Southwest	455'	Stahancyk Ln	*No	*4	-	3.0	EFU-2	Residential & Farm Use	Rick Kriege
14-15-24 TL 402	Southeast	205'	2720 NW Garden Ln	Yes (X2)	6 7	2,685' 2,780'	123.3	EFU-2	Farm Use - Hay & Pasture	Simmons Farm, LLC; Elsie & Henry Simmons
* Kriege owns 14-15-23 TL 116, west of TL 117. TL 116 is outside of the 500' impact area and includes a dwelling that is 1,000 feet from the mining area.										

Table 1. Nearby and Adjacent Tax Lot Details.

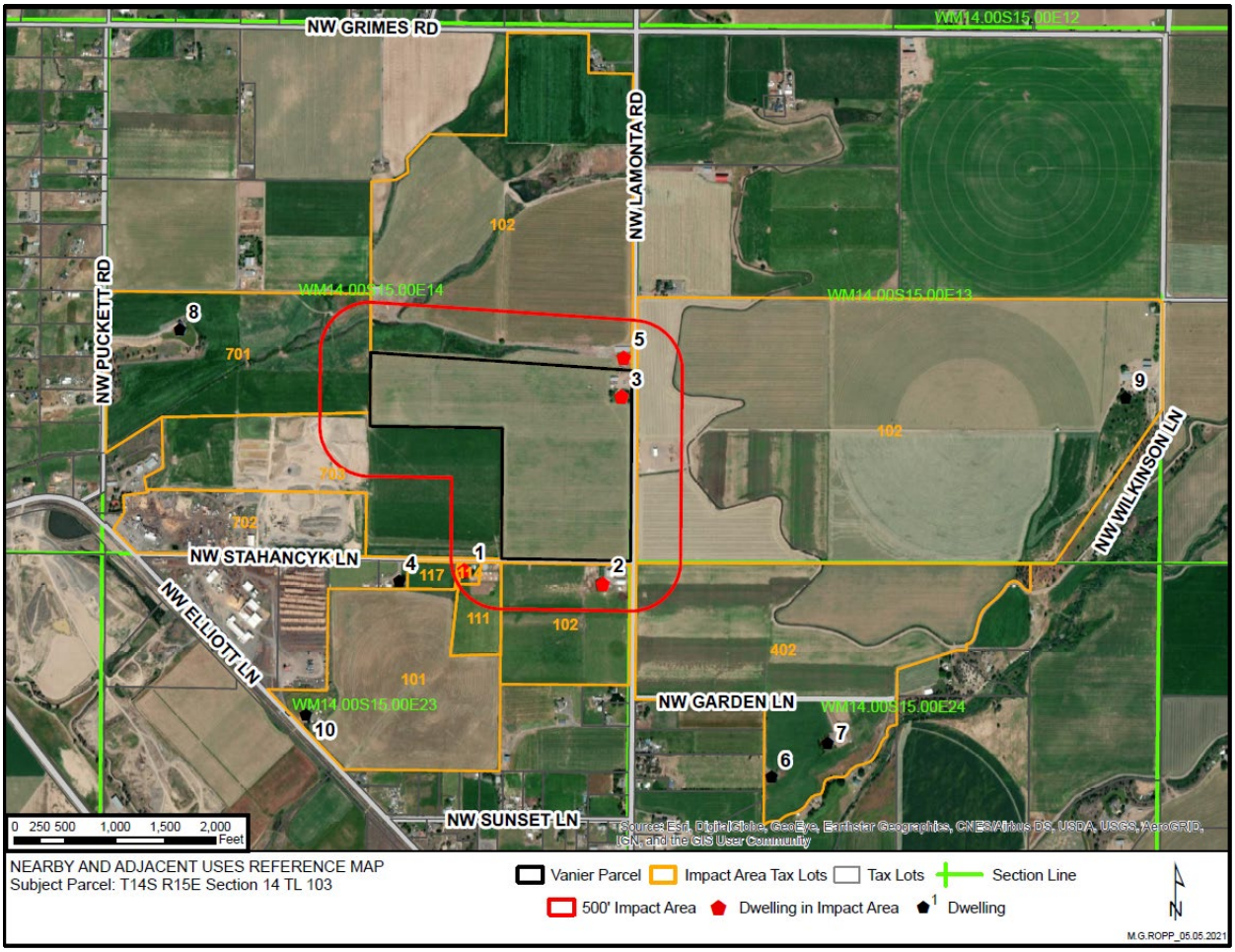

Figure 4. Nearby and Adjacent Uses Reference Map Aerial Photo

The above descriptions, figures and table provide an introduction and general orientation to the subject property, its surroundings and Applicant's intended use.

III. EVIDENCE IN SUPPORT OF APPLICATION

The following exhibits, forms and supporting documentation are attached:

1. Crook County Conditional Use Permit application form – 3 pages.
2. County Assessment Map T14S R15E Section 14 – 1 page
3. Partition Plat No. 2006-22, recorded as County Survey 2577- 2 pages.
4. Site Orientation Map Aerial Photo, by Applicant – 1 page
5. Goal 5 ESEE Impact Area Map Aerial Photo, by Applicant – 1 page
6. Impact Area Tax Lot Details table, by Applicant – 1 page
7. Nearby and Adjacent Uses Reference Map, by Applicant – 1 page
8. Nearby and Adjacent Uses Reference Map Aerial Photo, by Applicant – 1 page
9. National Wetlands Inventory map – 1 page
10. NRCS Soil map – 5 pages, with table and legend.
11. FEMA FIRMette (floodplain map) – 1 page
12. Traffic Analysis, by Michael Weishar, PE (Access Engineering) – 11 pages with exhibits.
13. Mine Area Sections: Sheet 1- recoverable aggregate volumes; Sheet 2 – cross sections (aggregate/overburden); Sheet 3 – cross sections (reclamation slopes); Sheet 4 – mine area slopes; Sheet 5 – property lines/setback slopes; Sheet 6 – operation details. By Applicant – 6 sheets.
14. Knife River – Woodward Land and Timber Haul/Processing Agreement – 1 page.
15. DOGAMI Inspection Report, Woodward Property, dated July 3, 2019 – 10 pages with photos.
16. Aggregate Resource Investigation, by Tim Marshall, Oregon Registered Professional Geologist - 11 pages, with exhibits.
17. Mine Hydrogeologic Characterization, includes post-reclamation agricultural soil suitability analysis, by WENCK (now part of Stantec Consulting Services) – 73 pages, with exhibits.

IV. APPLICABLE STANDARDS AND CRITERIA

- Crook County Code Chapter 18.16 Exclusive Farm Use Zones

- Crook County Code Chapter 18.144 Aggregate Resource Sites
- Crook County Code Chapter 18.160 Conditional Uses

V. FINDINGS OF COMPLIANCE WITH APPLICABLE STANDARDS AND CRITERIA

1. CCC Chapter 18.16 – Exclusive Farm Use Zones

Chapter 18.16 provides standards and criteria for permissible uses in the EFU zones. Applicant addresses relevant sections below:

18.16.010 Use Table.

Table 1 identifies the uses permitted in the EFU zone. This table applies to all new uses, expansions of existing uses, and changes of use when the expanded or changed use would require review, unless otherwise specified on Table 1. All uses are subject to the general provisions, special conditions, additional restrictions, and exceptions set forth in this chapter. Due to the limited amount of high-value farmland in Crook County, the uses for high-value farmland are not listed in this section. If a use permitted in Table 1 is located on high-value farmland, the requirements of this chapter and the requirements of OAR Division 33 shall be used for review.

As used in Table 1:

(1) Use Type.

(a) "A" means the use allowed.

(b) "STS" means the use is subject to site plan review and any other listed criteria.

(c) "C" means the use is a conditional use. Conditional uses are permitted subject to county review, any specific standards for the use set forth in CCC 18.16.015, the conditional use review criteria in CCC 18.16.020, the general standards for the zone, and specific requirements applicable to the use in Chapter 18.160 CCC.

(d) "X" means the use is not allowed.

(2) Review Procedures.

(a) "P" means the use is permitted outright; uses and activities and their accessory buildings and uses are permitted subject to the general provisions set forth by this chapter.

(b) "Administrative" are permitted by right, requiring only nondiscretionary staff review to demonstrate compliance with the standards in this chapter. Permits subject to administrative review are limited to actions that do not require interpretation or the exercise of policy or legal judgment.

(c) "Notice and opportunity for public hearing" involve permits for which the application of review criteria requires the exercise of limited discretion. Decisions are made by the planning director. These decisions require a notice of decision and opportunity for appeal and public hearing.

(d) "Planning commission hearing" uses require a public hearing. Decisions are made by the planning commission, usually with an opportunity to appeal to the board of commissioners. These decisions involve the exercise of discretion and judgment when applying applicable land use and development criteria but implement established policy. Uses that are subject to this review procedure may be allowed subject to findings of compliance with applicable approval criteria and development standards. These decisions require a public notice prior to, and after, a decision.

(3) The "Subject To" column identifies any specific provisions of CCC 18.16.015 and other local requirements to which the use is subject.

Table 1. Use Table for Exclusive Farm Use (EFU) District

	Use	Use Type	Review Procedure	Subject To
4	**Mineral, Aggregate, Oil and Gas Uses**			
4.1	Exploration for and production of geothermal, gas, oil and other associated hydrocarbons, including the placement and operation of compressors, separators and other customary production equipment for an individual well adjacent to the wellhead.	STS	Administrative	
4.2	Operations for the exploration for minerals as defined by ORS 517.750.	STS	Administrative	
4.3	Operations conducted for mining and processing of geothermal resources as defined by ORS 522.005 and oil and gas as defined by ORS 520.005 not otherwise permitted.	C	Planning Commission Hearing	
4.4	Operations conducted for mining, crushing or stockpiling of aggregate and other mineral and other subsurface resources.	C	Planning Commission Hearing	18.16.015(11) 18.144
4.5	Processing as defined by ORS 517.750 of aggregate into asphalt or Portland cement.	C	Planning Commission Hearing	18.16.015(10)
4.6	Processing of other mineral resources and other subsurface resources.	C	Planning Commission Hearing	

APPLICANT'S RESPONSE: Table 1, Section 4.4 lists aggregate mining as a use that may be permitted by conditional use permit, subject to Sections 18.16.015(11) and 18.144. A planning commission hearing is required. Applicant address Sections 18.16.015(11) and 18.144 below.

18.16.015(11)

(11) Mining, crushing or stockpiling of aggregate and other mineral and subsurface resources are subject to the following:

> *(a) A land use permit is required for mining more than 1,000 cubic yards of material or excavation preparatory to mining of a surface area of more than one acre.*
>
> *(b) A land use permit for mining of aggregate shall be issued only for a site included on the mineral and aggregate inventory in the Crook County comprehensive plan.*
>
> *(c) Mining, crushing, stockpiling and process of aggregate and other mineral subsurface resources are subject to the provisions of Chapter 18.144 CCC.*

APPLICANT'S RESPONSE: Applicant is requesting this land use permit because more than 1,000 cubic yards of material and more than 1-acre will be excavated. Applicant has submitted a plan amendment application (planning case# 217-21-000436) requesting the subject property be added to the mineral and aggregate inventory in the Crook County comprehensive plan. Applicant demonstrates feasibility of compliance with the provisions of Chapter 18.144 CCC below.

2. CCC 18.144

18.144.040 Approval and Review Criteria.

(1) Notwithstanding any provisions in this title to the contrary, an application for a permit for a use listed in CCC 18.144.030 shall be allowed if it meets the following criteria:

> *(a) The site must be designated as a mineral or aggregate resource site or an energy source site on an inventory of significant Goal 5 resources in the comprehensive plan;*

APPLICANT'S RESPONSE: Applicant has submitted a plan amendment application (planning case# 217-21-000436) requesting the subject property be added to the mineral and aggregate inventory in the Crook County comprehensive plan. A condition of approval of this application can require final approval of 217-21-000436.

> *(b) The proposed use must be consistent with the applicable ESEE analysis and conditions contained in the comprehensive plan. In the event conditions imposed on the mining use by the comprehensive plan to mitigate mining impacts on specific conflicting uses are less restrictive than conditions necessary to address these same impacts under the standards of this section, the conditions imposed by the comprehensive plan control;*

APPLICANT'S RESPONSE: Conditions of approval of this application can require consistency with applicable ESEE conditions of approval of 217-21-000436.

(c) The proposed use must be shown to not force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use;

(d) The proposed use must be shown to not significantly increase the cost of accepted farm or forest practices on surrounding lands devoted to farm or forest use; and

APPLICANT'S RESPONSE: The mining operation on the Vanier property will be an expansion – a continuation - of the current mining operation on the Woodward property. Applicant will construct a vegetated berm to serve as a visual and noise barrier. The mining operation of the Vanier property will be extraction only: all processing will continue to occur on the Woodward property. There will be no new access onto Stahancyk Lane or Lamonta Road: all aggregate materials will continue to be exported from the current access to/from the existing Woodward property processing site. Mining operations on the Woodward property have been occurring for several years and Applicant is not aware of any of its current operational activities that have caused adverse impacts to surrounding lands devoted to farm use to the extent that said impacts have forced a significant change in, or significant increase in the costs of, accepted farm practices. Applicant asserts that these criteria can be met.

(e) There must be adequate public facilities and services (street capacity, water supply, police protection, fire protection, energy and communications services) available to meet the additional demands created by the proposed use or that can be made available through the orderly and efficient extension or expansion of these facilities and services.

APPLICANT'S RESPONSE: Mining of the subject property will not require new- or change to-public facilities and services. There will be no new structures, points of access, or activities requiring increased street capacity, water supply, energy or communications services, fire or police protection. The subject property will provide additional aggregate reserve that will allow current operations to continue without change to current public facility and service needs/demands. This criterion is met.

(2) An applicant for a use allowed by CCC 18.144.030 may demonstrate that these standards for approval could be satisfied through the imposition of conditions. Any conditions so imposed shall be clear and objective.

APPLICANT'S RESPONSE: Applicant acknowledges that conditions of approval may be necessary to ensure consistency with applicable approval criteria.

(3) To the extent compliance with the approval criteria of this section has been determined as part of the identification and resolution of conflicting uses and development of a program to achieve goal compliance in the comprehensive plan, the determination shall be binding until changed by amendment to the plan.

APPLICANT'S RESPONSE: Applicant acknowledges that conditions of the site specific ESEE and program to achieve goal compliance will be adopted as part of the plan amendment and will be binding and applicable to all land use permits unless changed by an amendment to the plan.

(4) No application shall be approved to allow batching and blending of mineral and aggregate into asphalt cement within two miles of a planted vineyard. (Ord. 18 § 11.040, 2003)

APPLICANT'S RESPONSE: Applicant is unaware of existing planted vineyards within two miles of the subject property. Nevertheless, Applicant does not propose batching of asphalt cement on the subject property.

18.144.050 Approval Procedures.

(1) Each application for approval shall be processed in accordance with Chapter 18.172 CCC and this chapter.

(2) The hearing authority shall review the application and shall grant or deny approval based on conformance of the application with the requirements of this chapter and with the appropriate site-specific or generic ESEE analysis in the comprehensive plan.

(3) The hearing authority may only require modifications to the application as are necessary to fulfill the requirements of this chapter and the appropriate site-specific or generic ESEE analysis. Any modifications must be clear and objective.

(4) The hearing authority shall deny approval only if the requirements of this chapter or the ESEE analysis are not or cannot be satisfied by the proposed application.

(5) Prior to establishing a use authorized by this chapter, the property owner or agent must receive approval from the county.

APPLICANT'S RESPONSE: Applicant acknowledges that conditions of the site specific ESEE and program to achieve goal compliance will be adopted as part of the plan amendment and will be binding and applicable to all land use permits. Applicant acknowledges that approval from the county is required prior to mining the subject property.

(6) In addition to all information required for a site reclamation plan by DOGAMI, the applicant shall submit the following information:

> *(a) An application for a site plan approval shall contain suitable maps, drawings and narrative to assure the requirements of this chapter can and will be met. A complete application must contain the following information:*
>
> > *(i) A complete application form from the county.*

APPLICANT'S RESPONSE: An applicantion form, provided by the county, has been submitted with this application package.

> > *(ii) A list of known materials to be extracted or processed together with a general description of the excavation operations and the estimated duration of operation at the site.*

APPLICANT'S RESPONSE: A description of the materials to be extracted is provided in the "Aggregate Resource Investigation" report submitted with this application. A description of the excavation plan/operation is provided in the Mine Hydrogeologic Characterization report submitted with this application. A site plan and cross sections depicting the resource to be excavated and estimated resource volume calculations has been submitted with this application. The duration of the mining operation will depend on market conditions. However, Applicant estimates the aggregate resource will be depleted and reclamation will be completed within five to ten years.

(iii) A map of the site which shows existing trees and natural vegetation; existing water courses, including streams, rivers, ponds and lakes; adjacent ownerships, including the location of structures which relate to the setback or other requirements of this zone; and existing and proposed roads.

APPLICANT'S RESPONSE: A site plan depicting existing structures/improvements and proposed setbacks had been submitted with this application. There are no water courses, trees or other significant natural features on the subject property. This subject property is primarily comprised of cultivated hay/pasture land.

(iv) A surface water management plan for the site and all phases of the operation.

APPLICANT'S RESPONSE: There are no surface water features on the subject parcel. All storm water will be contained on site. A stormwater management plan will be required by DOGAMI as part of the Operating Permit. A copy of the stormwater plan/permit can be provided as a condition of approval.

(v) A map which shows the location of the surface mining area, the location of all processing and storage areas, the location of caretaker dwelling (if proposed), landscaping, screening and buffer areas.

APPLICANT'S RESPONSE: The subject property will be mined for its aggregate resource but there will be no onsite processing of aggregate materials. Aggregate materials may be temporarily stockpiled onsite but all processing will occur on the Woodward property to the west.

(vi) A landscape management and maintenance plan adequate to demonstrate compliance with provisions of this zone.

APPLICANT'S RESPONSE: Mined lands will be reclaimed consistent with the approved DOGAMI reclamation plan.

(vii) A map showing existing contours.

APPLICANT'S RESPONSE: A map showing existing contours has been submitted with this application.

(viii) A map or other drawing showing the contours of the site upon completion of the operation together with a description of the proposed end use of the reclaimed site.

APPLICANT'S RESPONSE: A map showing contours of the site upon completion of the operation has been submitted with this application.

> *(ix) An environmental report from an engineer or other qualified professional which is adequate to demonstrate that the operation can conform to county, DEQ, and DOGAMI requirements as outlined in the "development standards" section of this zone (CCC 18.144.060).*

APPLICANT'S RESPONSE: The aggregate resource and the mining operation is described in the Aggregate Resource Investigation and the Mine Hydrogeologic Investigation report submitted with this application. Evidence of approval of DEQ and DOGAMI requirements can be submitted as a condition of approval of this application.

> *(x) A security plan addressing the following issues:*
>
> *(A) Lighting;*
>
> *(B) Fencing;*
>
> *(C) Gates at access points;*
>
> *(D) Water impoundments;*
>
> *(E) Sloping; and*
>
> *(F) Security of vehicles and equipment.*

APPLICANT'S RESPONSE: The subject property will be surrounded by a vegetated berm. Mining of the property will occur during daylight hours; lighting will not be required. There will be no direct access from the subject property to adjacent public roads; aggregate materials will be exported from the Woodward property. Therefore, gate access points are not an issue. Applicant asserts fencing is not necessary and fencing is not proposed. There will be no water impoundments on the subject property. Sloping will be depicted in the approved DOGAMI reclamation plan. Security of vehicles and equipment is not a concern as equipment will be staged at the Woodward property.

> *(xi) A noxious weed control plan, acceptable to the Crook County weed master, to control the spread of noxious weeds within and arising from the aggregate resource site. This plan must be implemented in accordance with ORS 569.380 through 569.400 and 569.445 through 569.450 and Chapter 8.24 CCC. (Ord. 230 § 1, 2010; Ord. 18 § 11.050, 2003)*

APPLICANT'S RESPONSE: A noxious weed control plan is in effect for the Woodward site. Applicant will coordinate with the Weed Master to extend the current plan to the subject property. Applicant can provided approval of the extension of the current weed control plan to the subject property as a condition of approval.

18.144.060 Development Standards.

Upon approval of a conditional mining use application, all the following standards apply:

(1) Mining activities shall be located and conducted at least:

> *(a) One hundred feet from an existing noise or dust sensitive use, unless the owner of the residence or use signs and files an agreement which authorizes the mining to be conducted closer than 100 feet. In no case shall such mining be conducted closer than 50 feet of the boundary of an adjacent ownership.*

APPLICANT'S RESPONSE: Mining activities will be conducted at least 100 feet from all existing noise and dust sensitive uses.

> *(b) One hundred feet from a road not owned by the applicant and from the property line of the applicant unless that distance is not sufficient to protect the adjoining property from land movement, or the threat of land movement. In such cases, the setback shall be the minimum distance required by DOGAMI that will protect the adjoining property from movement or the threat of movement. This setback shall be reviewed and approved by DOGAMI prior to being approved by the hearing authority. In no case shall the setback be less than 100 feet.*

APPLICANT'S RESPONSE: Mining activities will be conducted at least 100 feet from adject public roads.

(2) Processing of resource material and the storage of equipment shall be at least 500 feet from an existing noise or dust sensitive use, unless the owner of the residence or use signs and files an agreement which authorizes the processing of resource material or storage of equipment closer than 500 feet. In no case shall such activities be located closer than 100 feet from any adjacent dwellings.

APPLICANT'S RESPONSE: Applicant is not proposing processing of resource material or storage of equipment on the subject property.

(3) Access. All private roads from mining sites to public highways, roads or streets shall be paved or graveled. All on-site roads and access roads from the site to a public road shall be designed, constructed, and maintained to accommodate the vehicles and equipment which use them. Whether paved or graveled, the roads shall be maintained by the applicant in accordance with county road standards. Before the applicant may exercise the privileges of the permit, the applicant shall provide a letter of agreement to the county to maintain the road to the applicable county road standards. If the applicant fails to provide the letter of agreement prior to exercising the privileges of the permit, or fails to so maintain the road, the applicant shall submit an agreement and security in accordance with CCC 17.40.080 and 17.40.090.

APPLICANT'S RESPONSE: Applicant is not proposing access to abutting public roads from the subject property. Aggregate materials will be hauled from the subject property to the Woodward site for processing. Aggregate materials from the subject property will replace aggregate materials currently being provided for processing at the Woodward plant from the Woodward

property. There will be no change to traffic volumes exiting or entering the Woodward site as a result of approval for mining at the subject property.

(4) Effective vehicle barriers or gates shall be required at all access points to the site.

APPLICANT'S RESPONSE: The subject property will be surrounded by a vegetated earthen berm. The berm will provide an effective vehicle barrier. There will be no vehicle access points to the site.

(5) Screening. Unless inconsistent with the conditions imposed to protect conflicting uses under the comprehensive plan, or of minimal value of effectiveness because of topography or other site features, the following requirements apply to the mining or resource site:

> *(a) Berms, fencing or vegetation shall be maintained or established to block the view of the mining or resource site from conflicting uses;*
>
> *(b) To the extent feasible, all natural vegetation and trees located within 100 feet of the mining site and that block the view of the mining area shall be preserved and fences maintained for the purpose of screening the operation.*

APPLICANT'S RESPONSE: A vegetated earthen berm will be established to provide screening for mining operations on the subject parcel. There is no significant existing vegetation that could be retained to provide sufficient screening for the proposed mining operation. Vegetative screening will be added upon establishment of the earthen berm.

(6) No alteration or removal of riparian vegetation located within 100 feet of the banks of a year-round stream shall occur.

APPLICANT'S RESPONSE: There are no year-round streams on the subject property. This standard does not apply.

(7) Mining, storage, and processing operations shall conform to all standards of the Department of Environmental Quality and to the requirements of the Department of Geology and Mineral Industries (DOGAMI). The county may require information, data and analyses which demonstrates the ability to meet state environmental standards.

APPLICANT'S RESPONSE: Evidence of DOGAMI permit approval – compliance with DOGAMI and DEQ requirements- can be provided as a condition of approval.

(8) Hours of Operation. All mining extraction, processing and equipment operation shall be subject to the following limitations unless waivers authorize operation at other times:

> *(a) June 1st through October 31st: 6:00 a.m. to 9:00 p.m., Monday through Friday. 8:00 a.m. to 5:00 p.m., Saturday.*
>
> *(b) November 1st through May 31st: 7:00 a.m. to 6:00 p.m., Monday through Friday. 8:00 a.m. to 5:00 p.m., Saturday.*

(c) No operations shall be conducted on Sundays or the following legal holidays: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, Christmas Day.

APPLICANT'S RESPONSE: Applicant acknowledges these standards and accepts compliance with these standards as a condition of approval.

(9) Blasting.

(a) A plan addressing the potential for earth movement, flying rock, and other effects on surrounding uses shall be submitted.

(b) Blasting shall be allowed unless prohibited by the comprehensive plan ESEE analysis.

(c) Blasting which is allowed and which is not to be conducted within 500 feet of any noise or dust sensitive use or agricultural use involving the raising of animals shall meet the following standards:

(i) DEQ noise control standards for blasting.

(ii) Blasting shall be restricted to the hours of 9:00 a.m. to 5:00 p.m., Monday through Friday. No blasting shall occur on Saturdays, Sundays or legal holidays.

(iii) The operator shall be responsible for notifying the owners and inhabitants of conflicting uses located within 500 feet of the blasting site by written notice delivered by certified mail to be received by each person entitled to notice at least 48 hours prior to the time the blasting will occur.

APPLICANT'S RESPONSE: Blasting is not required or proposed as part of this permit. Applicant acknowledges these standards as a condition of approval.

(10) Surface and Ground Water Management. Surface water shall be managed to provide protection against ground or surface water contamination and sediment discharge into streams, rivers and lakes. There shall also be adequate water available to the site for reclamation of the property, maintenance of screening and buffer, dust control, landscape maintenance, and processing of materials.

APPLICANT'S RESPONSE: Water management for the proposed operation is addressed in the Mine Hydrogeologic report submitted with this application. DOGAMI and DEQ will regulate and monitor conditions related to surface and groundwater management for mining operations on the subject property.

(11) For surface mining, which is not regulated by DOGAMI, the following requirements apply:

(a) A reclamation plan shall be submitted to the county at the time of site plan approval. The reclamation plan shall assure that the surface mining site will be restored or rehabilitated consistent with the requirements of the ESEE analysis.

(b) Upon abandonment of surface mining or termination of mineral extraction on each site, all buildings, vehicles, machinery, equipment and appurtenant structures accessory to the extraction, processing, stockpiling and manufacturing operations shall be removed from the site, except for buildings and structures which are permitted uses within the applicable zoning district.

(c) All excavations shall be backfilled, contoured, sloped, or terraced as outlined in the approved reclamation plan. Topsoil shall be replaced to a depth sufficient to allow a landscaping material to be installed.

(d) In the event the owner does not comply with the approved reclamation plan, the board may undertake, or cause to be undertaken, the required restoration or rehabilitation, and the chargeable cost therefor, if not paid by the owner, shall become a lien on the property due and payable taxes.

APPLICANT'S RESPONSE: Surface mining of the subject property is regulated by DOGAMI. These standards do not apply.

(12) All mining operations shall be subject to the dimensional standards, yard restrictions, sign limitations and all other substantive standards set out in the zoning district applicable to the property.

APPLICANT'S RESPONSE: Applicant acknowledges these standards.

(13) Noxious Weed Control. The operator, including all public agencies, shall document compliance with the noxious weed control plan submitted pursuant to CCC 18.144.050(6)(a)(xi) on a yearly basis by submittal of a written report to the Crook County weed master. The report shall be submitted not later than December 15th of each year. (Ord. 296 § 10 (Exh. H), 2016; Ord. 238 § 1, 2011; Ord. 230 § 2, 2010; Ord. 18 § 11.060, 2003)

APPLICANT'S RESPONSE: A noxious weed control plan is in effect for the Woodward site. Applicant will coordinate with the Weed Master to extend the current plan to the subject property. Applicant can provide approval of the extension of the current weed control plan to the subject property as a condition of approval.

3. CCC 18.160 Conditional Uses

18.160.020 General Criteria.

In judging whether or not a conditional use proposal shall be approved or denied, the planning director or planning commission shall weigh the proposal's appropriateness and desirability or the public convenience or necessity to be served against any adverse conditions that would result from authorizing the particular development at the location proposed and, to approve such use, shall find that the following criteria are either met, can be met by observance of conditions, or are not applicable:

(1) The proposal will be consistent with the comprehensive plan and the objectives of the zoning ordinance and other applicable policies and regulations of the county.

(2) Taking into account location, size, design and operation characteristics, the proposal will have minimal adverse impact on the (a) livability, (b) value and (c) appropriate development of abutting properties and the surrounding area compared to the impact of development that is permitted outright.

(3) The location and design of the site and structures for the proposal will be as attractive as the nature of the use and its setting warrant.

(4) The proposal will preserve assets of particular interest to the county.

(5) The applicant has a bona fide intent and capability to develop and use the land as proposed and has some appropriate purpose for submitting the proposal, and is not motivated solely by such purposes as the alteration of property values for speculative purposes. (Ord. 236 § 3 (Exh. C), 2010; Ord. 18 § 6.020, 2003)

APPLICANT'S RESPONSE: The subject property contains a significant aggregate resource. The citizens of the region will benefit from the county allowing mining of this resource. Impacts associated with mining of the subject property are minimal and the Applicant has the expertise and the resources necessary to deliver the aggregate resource to market. This criterion is met.

18.160.020 General Conditions.

In addition to the standards and conditions set forth in a specific zone, this chapter, and other applicable regulations, in permitting a new conditional use or the alteration of an existing conditional use, the planning director or planning commission may impose conditions which it finds necessary to avoid a detrimental impact and to otherwise protect the best interests of the surrounding area or the county as a whole. These conditions may include the following:

(1) Limiting the manner in which the use is conducted including restricting the time an activity may take place and restraints to minimize such environmental effects as noise, vibration, air pollution, glare and odor.

(2) Establishing a special yard or other open space or lot area or dimension.

(3) Limiting the height, size or location of a building or other structure.

(4) Designating the size, number, location and nature of vehicle access points.

(5) Increasing the amount of street dedication, roadway width or improvements within the street right-of-way.

(6) Designating the size, location, screening, drainage, surfacing or other improvement of a parking area or loading area.

(7) Limiting or otherwise designating the number, size, location, height and lighting of signs.

(8) Limiting the location and intensity of outdoor lighting and requiring its shielding.

(9) Requiring diking, screening, landscaping or another facility to protect adjacent or nearby property and designating standards for its installation and maintenance.

(10) Designating the size, height, location and materials for a fence.

(11) Protecting and preserving existing trees, vegetation, water resources, wildlife habitat or other significant natural resources.

(12) Other conditions necessary to permit the development of the county in conformity with the intent and purpose of this title and the policies of the comprehensive plan. (Ord. 236 § 3 (Exh. C), 2010; Ord. 18 § 6.030, 2003)

APPLICANT'S RESPONSE: Applicant acknowledges the county has the authority to impose conditions of approval. Applicant suggests that no additional conditions of approval are necessary to ensure that impacts associated with mining the subject property are minimized to an acceptable level.

18.160.040 Permit and Improvements Assurance.

The commission may require an applicant to furnish the county with an agreement and security in accordance with CCC 17.40.080 and 17.40.090 that the planning director or planning commission deems necessary to guarantee development in accordance with the standards established and the conditions attached in granting a conditional use permit. (Ord. 296 § 11 (Exh. I), 2016; Ord. 236 § 3 (Exh. C), 2010; Ord. 18 § 6.040, 2003)

APPLICANT'S RESPONSE: Applicant acknowledges the county can require Applicant to enter into an agreement with the county. Applicant suggests that the DOGAMI permit conditions and surety bond is sufficient to ensure the site is mined and reclaimed consistent with operating and reclamation requirements.

18.160.050 Standards Governing Conditional Uses.

A conditional use shall comply with the standards of the zones in which it is located and with the standards and conditions set forth in this section.

(9) Mining, Quarrying or Other Extraction Activity.

> *(a) Plans and specifications submitted to the planning director or planning commission for approval must contain sufficient information to allow the planning director or planning commission to consider and set standards pertaining to the following:*
>
> > *(i) The most appropriate use of the land.*
> >
> > *(ii) Setback from the property line.*
> >
> > *(iii) The protection of pedestrians and vehicles through the use of fencing and screening.*

(iv) The protection of fish and wildlife habitat and ecological systems through control of potential air and water pollutants.

(v) The prevention of the collection and the stagnation of water of all stages of the operation.

(vi) The rehabilitation of the land upon termination of the operation.

APPLICANT'S RESPONSE: These standards will be sufficiently addressed and conditioned through the DOGAMI operating permit.

(b) Surface mining equipment and necessary access roads shall be constructed, maintained and operated in such a manner as to eliminate, as far as is practicable, noise, vibration or dust which may be injurious or annoying to persons or other uses in the vicinity.

APPLICANT'S RESPONSE: These standards will be sufficiently addressed and conditioned through the DOGAMI operating permit.

(c) The comments and recommendations of all appropriate natural resource agencies of the state and federal government shall be sought.

APPLICANT'S RESPONSE: The county can solicit comments from affected agencies through the conditional use permit affected agencies notice process.

(d) A rock crusher, washer or sorter shall not be located closer than 500 feet from a residential or commercial use.

APPLICANT'S RESPONSE: Applicant does not intend to crush or wash aggregate on the subject property. Processing will occur on the Woodward property to the west.

VI. CONCLUSION

Applicant respectfully asserts that substantial evidence in this record proves consistency and/or feasibility of consistency with applicable provisions of the Crook County Code and requests that this application be approved.

Prepared and Submitted by Knife River Corporation – Northwest

Matt Ropp

By: Matt Ropp, Manager of Land Planning

07/09/2021

Date

THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

0 200 400 600 800 Feet

SECTION 14 T.14S. R.15E. W.M.
CROOK COUNTY
1" = 400'

14S15E14
Cancelled
200
300
401
402
501
502
600
601

SEE MAP 14S 15E 11C

SEE MAP 14S 15E 11D

SEE MAP 14S 15E 15A

SEE MAP 14S 15E 15D

SEE MAP 14S 15E 13

SEE MAP 14S 15E 23

602
4.70 AC

500
41.19 AC
PARCEL 1

101
77.98 AC
PARCEL 1

102
155.97 AC
PARCEL 2

100
4.09 AC

400
2.60 AC

503
67.54 AC
PARCEL 2

701
76.09 AC
PARCEL 1

103
77.98 AC
PARCEL 3

703
76.08 AC
PARCEL 2

700
7.53 AC

702
35.36 AC

704
0.56 AC
PARCEL 1

PARTITION PLAT 1993-16

PARTITION PLAT 2006-22

PARTITION PLAT 2009-07

PARTITION PLAT 2016-02

12 PLAT

CS 475

CS 973

CS 2-23-88

CS 2000
CS 2614
CS 4131

CANAL

GRASS

RYE

PUCKETT RD

CITY OF LAMONTA RD

LAMONTA RD

PRINEVILLE - RR

Revised:
3/29/2016

Map Produced:
03/29/2016

14S15E14

PARTITION PLAT NO. 2006-22

PARTITION PLAT OF A PARCEL OF LAND LOCATED IN SECTION 14, TOWNSHIP 14 SOUTH, RANGE 15 EAST OF THE WILLAMETTE MERIDIAN, CROOK COUNTY, OREGON

C-LP-568-06(F)

W.O. 06-3233

SURVEY FOR

DEAN O. DAVIS
TERESA L. DAVIS
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(541) 447-1032

SURVEY FOR

ARMSTRONG SURVEYING
& ENGINEERING, INC.
267 NE SECOND STREET
PRINEVILLE, OR 97754
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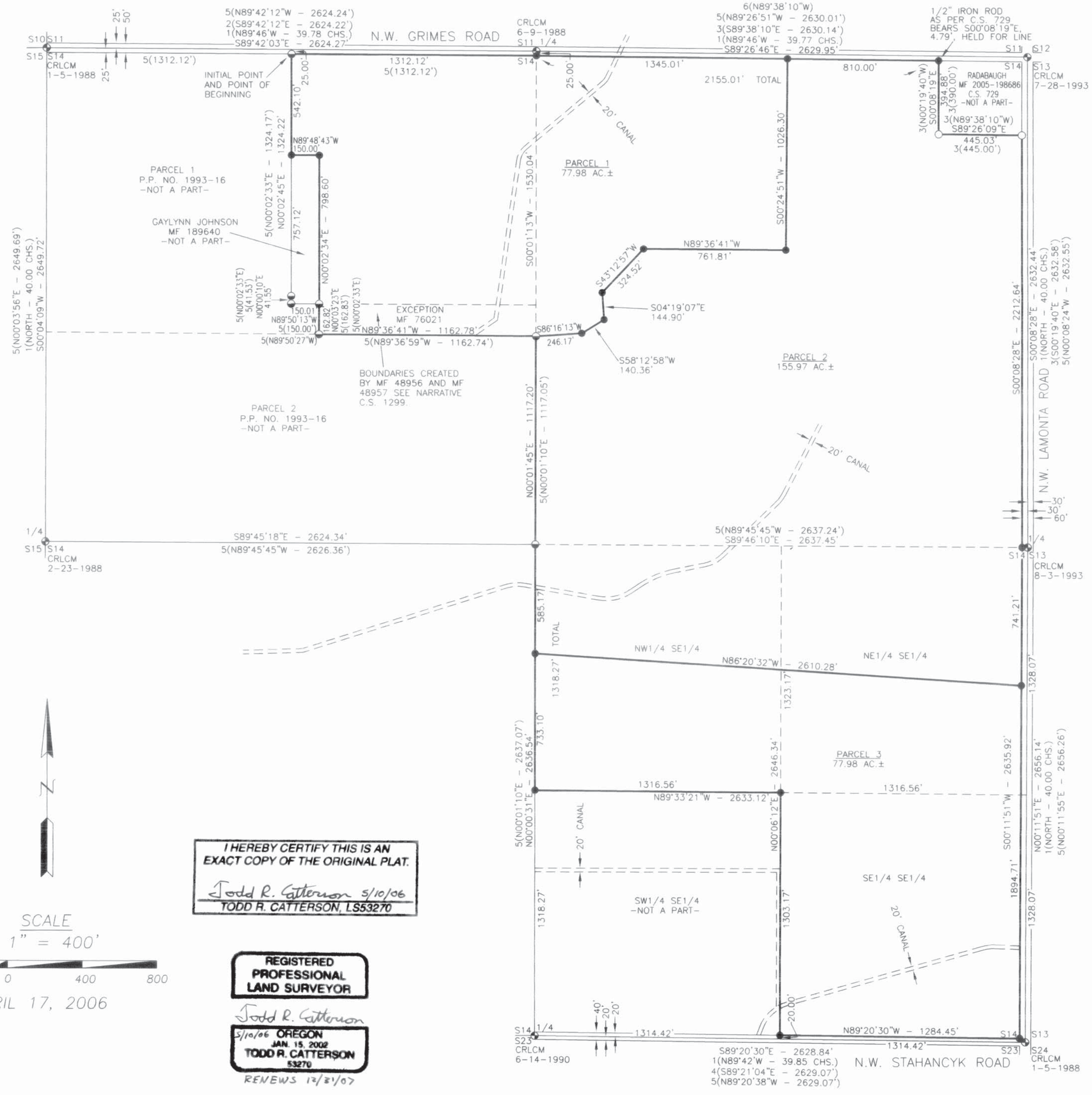

LEGEND

- ● SET 5/8" X 30" LONG IRON ROD WITH YELLOW PLASTIC CAP MARKED "ARMSTRONG S&E".
- ◔ FOUND 2-1/2" ALUMINUM CAP AS PER CRLCM FORM BY DAVID B. ARMSTRONG, CROOK COUNTY SURVEYOR, LS 1026, RECORDED DATE SHOWN.
- ◔ FOUND 2" ALUMINUM CAP AS PER CRLCM FORM BY DAVID B. ARMSTRONG, CROOK COUNTY SURVEYOR, LS 1026, RECORDED DATE SHOWN.
- ○ FOUND 5/8" IRON ROD WITH YELLOW PLASTIC CAP MARKED "LS 1122" AS PER C.S. 729 BY EMILE P. BACHAND, LS 1122, RECORDED JANUARY 29, 1982.
- ◒ FOUND 5/8" IRON ROD WITH YELLOW PLASTIC CAP MARKED "ARMSTRONG LS1026" AS PER PARTITION PLAT NO. 1993-16, C.S. 1299, BY DAVID B. ARMSTRONG, LS 1026, RECORDED AUGUST 19, 1993.

1( ) RECORD AS PER GENERAL LAND OFFICE SURVEY UNDER CONTRACT NO. 129 BY JOHN W. MELDRUM, DEPUTY SURVEYOR, DATED JUNE 7, 1869 AND PERFORMED THAT YEAR.

2( ) RECORD AS PER C.S. 475 BY DAVID B. ARMSTRONG, LS 1026, RECORDED JULY, 1978.

3( ) RECORD AS PER C.S. 729 BY EMILE P. BACHAND, LS 1122, RECORDED JANUARY 29, 1982.

4( ) RECORD AS PER C.S. 932 BY DAVID B. ARMSTRONG, LS 1026, RECORDED APRIL 14, 1987.

5( ) RECORD AS PER PARTITION PLAT NO. 1993-16, C.S. 1299, BY DAVID B. ARMSTRONG, LS 1026, RECORDED AUGUST 19, 1993.

6( ) RECORD AS PER THE PLAT OF VISTA VIEW ESTATES BY EMILE P. BACHAND, PE 3700, RECORDED FEBRUARY 5, 1974.

CRLCM CERTIFIED RECORD OF LAND CORNER MONUMENTATION

WATER RIGHTS

WATER RIGHTS UNDER CERTIFICATE NO. 68395 ARE APPORTIONED AS FOLLOWS:

PARCEL 1:
NE1/4 NW1/4 - 36.8 AC.
SE1/4 NW1/4 - 5.5 AC.
NW1/4 NE1/4 - 34.8 AC.
NE1/4 NE1/4 - 0.7 AC.
TOTAL - 77.8 AC.

PARCEL 2:
NE1/4 NE1/4 - 31.4 AC.
SE1/4 NE1/4 - 33.6 AC.
NW1/4 NE1/4 - 4.5 AC.
SW1/4 NE1/4 - 39.8 AC.
NW1/4 SE1/4 - 13.5 AC.
NE1/4 SE1/4 - 16.8 AC.
TOTAL - 139.6 AC.

PARCEL 3:
SE1/4 SE1/4 - 38.3 AC.
NW1/4 SE1/4 - 21.0 AC.
NE1/4 SE1/4 - 17.3 AC.
TOTAL - 76.6 AC.
TOTAL FOR ENTIRE PARTITION - 294.0 AC.

N

SCALE
1" = 400'
400 0 400 800

APRIL 17, 2006

I HEREBY CERTIFY THIS IS AN EXACT COPY OF THE ORIGINAL PLAT.
Todd R. Catterson 5/10/06
TODD R. CATTERSON, LS53270

REGISTERED PROFESSIONAL LAND SURVEYOR
Todd R. Catterson
5/10/06 OREGON JAN. 15, 2002 TODD R. CATTERSON 53270
RENEWS 12/31/07

SHEET 1 OF 2
DRG. NO. 06-3233
W.O. 06-3233

25772

PARTITION PLAT NO. 2006-22
PARTITION PLAT OF A PARCEL OF LAND LOCATED IN SECTION 14, TOWNSHIP 14 SOUTH, RANGE 15 EAST OF THE WILLAMETTE MERIDIAN, CROOK COUNTY, OREGON

C-LP-568-06(F)
W.O. 06-3233

SURVEYOR'S CERTIFICATE

I, TODD R. CATTERSON, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF OREGON, ON THE BASIS OF MY KNOWLEDGE, INFORMATION, AND BELIEF DO HEREBY CERTIFY THAT I HAVE PERFORMED A PARTITION SURVEY OF THE PROPERTY SHOWN HEREON TO THE NORMAL STANDARD OF CARE OF PROFESSIONAL LAND SURVEYORS PRACTICING IN OREGON AND HAVE FOUND OR SET THE CORNERS SHOWN HEREON AND HAVE PREPARED THIS MAP AND NARRATIVE TO REPRESENT SAID SURVEY, LOCATED IN SECTION 14, TOWNSHIP 14 SOUTH, RANGE 15 EAST, W.M., CROOK COUNTY, OREGON, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTHEAST CORNER OF PARCEL 1 OF PARTITION PLAT NO. 1993-16, RECORDS OF CROOK COUNTY, OREGON, SAID POINT ALSO BEING ON THE SOUTH RIGHT-OF-WAY LINE OF N.W. GRIMES ROAD; THENCE SOUTH 89°42'03" EAST ALONG SAID RIGHT-OF-WAY LINE A DISTANCE OF 1312.12 FEET; THENCE SOUTH 89°26'46" EAST ALONG SAID RIGHT-OF-WAY LINE A DISTANCE OF 2155.01 FEET TO THE NORTHWEST CORNER OF A PARCEL CONVEYED TO RONALD S. RADABAUGH AND WIFE IN DEEDS MF 2005-198686, RECORDS OF CROOK COUNTY, OREGON; THENCE SOUTH 00°08'19 EAST ALONG THE WEST LINE OF SAID PARCEL A DISTANCE OF 394.88 FEET TO THE SOUTHWEST CORNER OF SAID PARCEL; THENCE SOUTH 89°26'09" EAST ALONG THE SOUTH LINE OF SAID PARCEL A DISTANCE OF 445.03 TO THE SOUTHEAST CORNER OF SAID PARCEL, POINT ALSO BEING LOCATED ON THE WEST RIGHT-OF-WAY LINE OF N.W. LAMONTA ROAD; THENCE SOUTH 00°08'28 EAST ALONG SAID RIGHT-OF-WAY LINE A DISTANCE OF 2212.64 FEET; THENCE SOUTH 00°11'51" WEST ALONG SAID RIGHT-OF-WAY LINE A DISTANCE OF 2635.92 FEET TO A POINT ON THE NORTH RIGHT-OF-WAY LINE OF N.W. STAHANCYK ROAD; THENCE NORTH 89°20'30" WEST ALONG SAID RIGHT-OF-WAY LINE A DISTANCE OF 1284.45 FEET TO A POINT ON THE WEST LINE OF THE SOUTHEAST ONE-QUARTER OF THE SOUTHEAST ONE-QUARTER (SE1/4 SE1/4) OF SAID SECTION 14; THENCE LEAVING SAID RIGHT-OF-WAY LINE NORTH 00°06'12" EAST ALONG SAID WEST LINE A DISTANCE OF 1303.17 FEET; THENCE NORTH 89°33'21" WEST ALONG THE SOUTH LINE OF THE NORTHWEST ONE-QUARTER SOUTHEAST ONE-QUARTER (NW1/4 SE1/4) OF SAID SECTION 14 A DISTANCE OF 1316.56 FEET; THENCE NORTH 00°00'31" EAST ALONG THE WEST LINE OF SAID NW1/4 SE1/4 A DISTANCE OF 1318.27 FEET TO THE SE CORNER OF PARCEL 2 OF P.P. NO. 1993-16, POINT ALSO BEING LOCATED ON THE NORTH-SOUTH CENTERLINE OF SAID SECTION 14; THENCE NORTH 00°01'45" EAST ALONG THE WEST LINE OF SAID PARCEL 2 AND NORTH-SOUTH CENTERLINE A DISTANCE OF 1117.20 FEET; THENCE NORTH 89°36'41" WEST ALONG THE NORTH LINE OF SAID PARCEL 2 A DISTANCE OF 1162.78 FEET; THENCE LEAVING SAID NORTH LINE NORTH 00°03'23" EAST A DISTANCE OF 162.82 FEET TO THE SOUTHEAST CORNER OF A PARCEL OF LAND CONVEYED TO GAYLYNN JOHNSON IN DEEDS MF 189640, RECORDS OF CROOK COUNTY, OREGON; THENCE NORTH 00°02'34" EAST ALONG THE EAST LINE OF SAID JOHNSON PARCEL A DISTANCE OF 798.60 FEET TO THE NORTHEAST CORNER OF SAID JOHNSON PARCEL; THENCE NORTH 89°48'43" WEST ALONG THE NORTH LINE OF SAID JOHNSON PARCEL A DISTANCE OF 150.00 FEET TO THE NORTHWEST CORNER OF SAID JOHNSON PARCEL, SAID POINT ALSO BEING ON THE EAST LINE OF PARCEL 1 OF SAID P.P. NO. 1996-13; THENCE NORTH 00°02'45" EAST ALONG THE EAST LINE OF SAID PARCEL 1 A DISTANCE OF 542.10 FEET TO THE POINT OF BEGINNING, CONTAINING 311.93 ACRES, MORE OR LESS.

SUBJECT TO ANY EXISTING EASEMENTS AND RIGHTS-OF-WAY.

TAX CERTIFICATES

I HEREBY CERTIFY THAT ALL AD VALOREM TAXES, SPECIAL ASSESSMENTS, FEES, AND OTHER CHARGES REQUIRED BY LAW TO BE PLACED ON THE 2005-2006 TAX ROLL WHICH BECAME A LIEN OR WILL BECOME A LIEN ON THIS PARTITION DURING THIS TAX YEAR BUT NOT YET CERTIFIED TO THE TAX COLLECTOR FOR COLLECTION HAVE BEEN PAID TO ME.

Tom W. Dan — 5/12/06
COUNTY ASSESSOR — DATE

I HEREBY CERTIFY THAT ALL TAXES ARE PAID AS OF THIS DATE

Laura Gladung/Deputy — 5/12/06
COUNTY TAX COLLECTOR — DATE

APPROVALS

Doug S. DeJonett — 5/11/06
COUNTY SURVEYOR — DATE
JEFFERSON COUNTY SURVEYOR
O.R.S. 92.100(4)

Gordon Moore for — 5/12/06
CROOK COUNTY PLANNING DIRECTOR — DATE

Renee L. Thom — 5-11-06
OCHOCO IRRIGATION DISTRICT — DATE

I HEREBY CERTIFY THIS IS AN EXACT COPY OF THE ORIGINAL PLAT.
Todd R. Catterson 5/10/06
TODD R. CATTERSON, LS53270

REGISTERED PROFESSIONAL LAND SURVEYOR
Todd R. Catterson
5/9/06 OREGON JAN. 15, 2002 TODD R. CATTERSON 53270
RENEWS 12/31/07

RECORDATION - CLERK

STATE OF OREGON } SS
COUNTY OF CROOK } SS 211040
I CERTIFY THAT THE WITHIN INSTRUMENT WAS RECEIVED FOR RECORD ON THE 12TH DAY OF MAY, 2006, AT 2:24 PM, AND RECORDED IN DEED/PART RECORDS OF SAID COUNTY MF NO. 211040
DEANNA E. BERMAN, CROOK COUNTY CLERK
BY: Anita A Green DEPUTY

RECORDATION - SURVEYOR

STATE OF OREGON } SS
COUNTY OF CROOK } SS
I CERTIFY THAT THE WITHIN INSTRUMENT WAS RECEIVED FOR RECORD ON THE 12TH DAY OF MAY A.D. 2006, AND RECORDED IN SURVEYS # 2577, OF SAID COUNTY.
DAVID B. ARMSTRONG
Todd R. Catterson, DEPUTY
COUNTY SURVEYOR

SURVEY NARRATIVE

WE WERE EMPLOYED BY DEAN O. DAVIS AND TERESA L. DAVIS TO COMPLETE THE SURVEYING AND MAPPING REQUIREMENTS OF THIS APPROVED PARTITION. A PORTION OF SUBJECT PROPERTY IS DESCRIBED BY ALIQUOT PART DESCRIPTIONS. DAVID B. ARMSTRONG, LS 1026, IN P.P. NO. 1993-16, C.S. 1299, PERFORMED A BREAKDOWN SURVEY OF SECTION 14. I FOUND ALL OF THE CORNERS FROM SAID SURVEY AND HELD THEM FOR CONTROL FOR THIS SURVEY TO DEFINE THE ALIQUOT PART LINES. EMILE P. BACHAND IN C.S. 729 SURVEYED ONE OF THE EXCEPTION PARCELS IN SUBJECT PROPERTY'S' DEED. I FOUND ALL OF THE CORNERS AROUND SAID SURVEY THAT WERE NEEDED FOR THIS SURVEY. I HELD THE SOUTHEAST AND SOUTHWEST CORNERS AS THEY WERE WITHIN THE SURVEY TOLERANCES OF LOCATION OF SUBJECT PROPERTY'S' DESCRIPTION. THE NORTHWEST CORNER OF SAID C.S. 729 WAS SET 30 FEET OFF THE NORTH SECTION LINES AS BACHAND STATED THAT N.W. GRIMES ROAD HAD A 60 FOOT RIGHT-OF-WAY. N.W. GRIMES ROAD HAS ONLY A 50 FOOT RIGHT-OF-WAY SO TO ESTABLISH THE PROPER NORTHWEST CORNER LOCATION I HELD A LINE BETWEEN SAID FOUND NORTHWEST AND SOUTHWEST MONUMENTS AND EXTENDED IT NORTH TO THE INTERSECTION OF A LINE OFFSET 25 FEET SOUTH OF THE NORTH SECTION LINE. A PORTION OF THE SUBJECT PROPERTY LIES IN THE NW1/4 SW1/4 NW1/4 OF SAID SECTION 14. THE EXTERIOR BOUNDARIES FOR THIS PARCEL WERE RESOLVED DURING SAID P.P. NO. 1993-16, C.S. 1299. SEE NARRATIVE FROM SAID SURVEY FOR BOUNDARY RESOLUTION. I TIED THE MONUMENTS AROUND SAID PARCEL FROM SAID SURVEY ALONG SUBJECT PROPERTY'S BOUNDARY AND HELD THEM AS FOUND. I SURVEYED THE EXTERIOR OF THE PARCEL OF LAND CONVEYED TO GAYLYNN JOHNSON IN DEEDS MF 189640, WHICH IS ANOTHER EXCEPTION IN SUBJECT PROPERTY'S DEED, BY HOLDING RECORD DEED DIMENSION OF 567.10 FEET SOUTH OF THE NORTHWEST CORNER OF THE NE1/4 NW1/4 TO ESTABLISH THE NORTHWEST CORNER OF SAID PARCEL. THE SOUTHWEST AND SOUTHEAST CORNERS WERE ESTABLISHED DURING SAID P.P. NO. 1993-16 AND I FOUND AND HELD THEM FOR THIS SURVEY. THE NORTHEAST CORNER OF SAID PARCEL WAS ESTABLISHED BY RECORD DEED DIMENSION DISTANCE-DISTANCE INTERSECTION HOLDING BEFORE SAID SOUTHEAST AND NORTHWEST CORNERS. THE INTERIOR PARCEL LINES ARE FREE LINES AS DESIRED BY THE CLIENT. THIS SURVEY WAS PERFORMED USING A TRIMBLE 4800 GPS SYSTEM IN RTK MODE. BEARINGS ARE BASED ON A GPS CALIBRATION OF CONTROL FROM C.S. 1299 BY DAVID B. ARMSTRONG, LS 1026.

DECLARATION

KNOW ALL BY THESE PRESENTS THAT DEAN O. DAVIS AS TO AN UNDIVIDED 25% INTEREST; TERESA L. DAVIS AS TO AN UNDIVIDED 25% INTEREST, AND OCHOCO FARMS, A PARTNERSHIP, AS TO AN UNDIVIDED 50% INTEREST ARE THE OWNERS OF THE LANDS REPRESENTED ON THIS PLAT AND MORE PARTICULARLY DESCRIBED IN THE ACCOMPANYING SURVEYOR'S CERTIFICATE AND HAVE CAUSED SAID LANDS TO BE SURVEYED AND PLATTED INTO PARCELS AS SHOWN HEREON IN ACCORDANCE WITH OREGON REVISED STATUTES, CHAPTER 92. WATER RIGHTS APPURTENANT TO THIS PROPERTY UNDER CERTIFICATE NO. 68395 ARE APPORTIONED AS SHOWN.

Dean O. Davis
DEAN O. DAVIS

Teresa L. Davis
TERESA L. DAVIS

Dean O. Davis
OCHOCO FARMS
BY: DEAN O. DAVIS, PARTNER

Teresa L. Davis
OCHOCO FARMS
BY: TERESA L. DAVIS, PARTNER

ACKNOWLEDGEMENTS

KNOW ALL PEOPLE BY THESE PRESENTS THAT ON THIS 12th DAY OF May, 2006, BEFORE ME A NOTARY PUBLIC IN AND FOR THE COUNTY OF CROOK, STATE OF OREGON, PERSONALLY APPEARED THE ABOVE NAMED DEAN O. DAVIS, AND WHO ACKNOWLEDGED TO ME THAT HE EXECUTED THE FOREGOING DECLARATION FREELY AND VOLUNTARILY.

Anita Edgerly
NOTARY PUBLIC FOR
THE STATE OF OREGON

OFFICIAL SEAL
ANITA EDGERLY
NOTARY PUBLIC - OREGON
COMMISSION NO. 383636
MY COMMISSION EXPIRES AUGUST 10, 2006

KNOW ALL PEOPLE BY THESE PRESENTS THAT ON THIS 12th DAY OF May, 2006, BEFORE ME A NOTARY PUBLIC IN AND FOR THE COUNTY OF CROOK, STATE OF OREGON, PERSONALLY APPEARED THE ABOVE NAMED TERESA L. DAVIS, AND WHO ACKNOWLEDGED TO ME THAT SHE EXECUTED THE FOREGOING DECLARATION FREELY AND VOLUNTARILY.

Anita Edgerly
NOTARY PUBLIC FOR
THE STATE OF OREGON

OFFICIAL SEAL
ANITA EDGERLY
NOTARY PUBLIC - OREGON
COMMISSION NO. 383636
MY COMMISSION EXPIRES AUGUST 10, 2006

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Anita Edgerly
NOTARY PUBLIC FOR
THE STATE OF OREGON

OFFICIAL SEAL
ANITA EDGERLY
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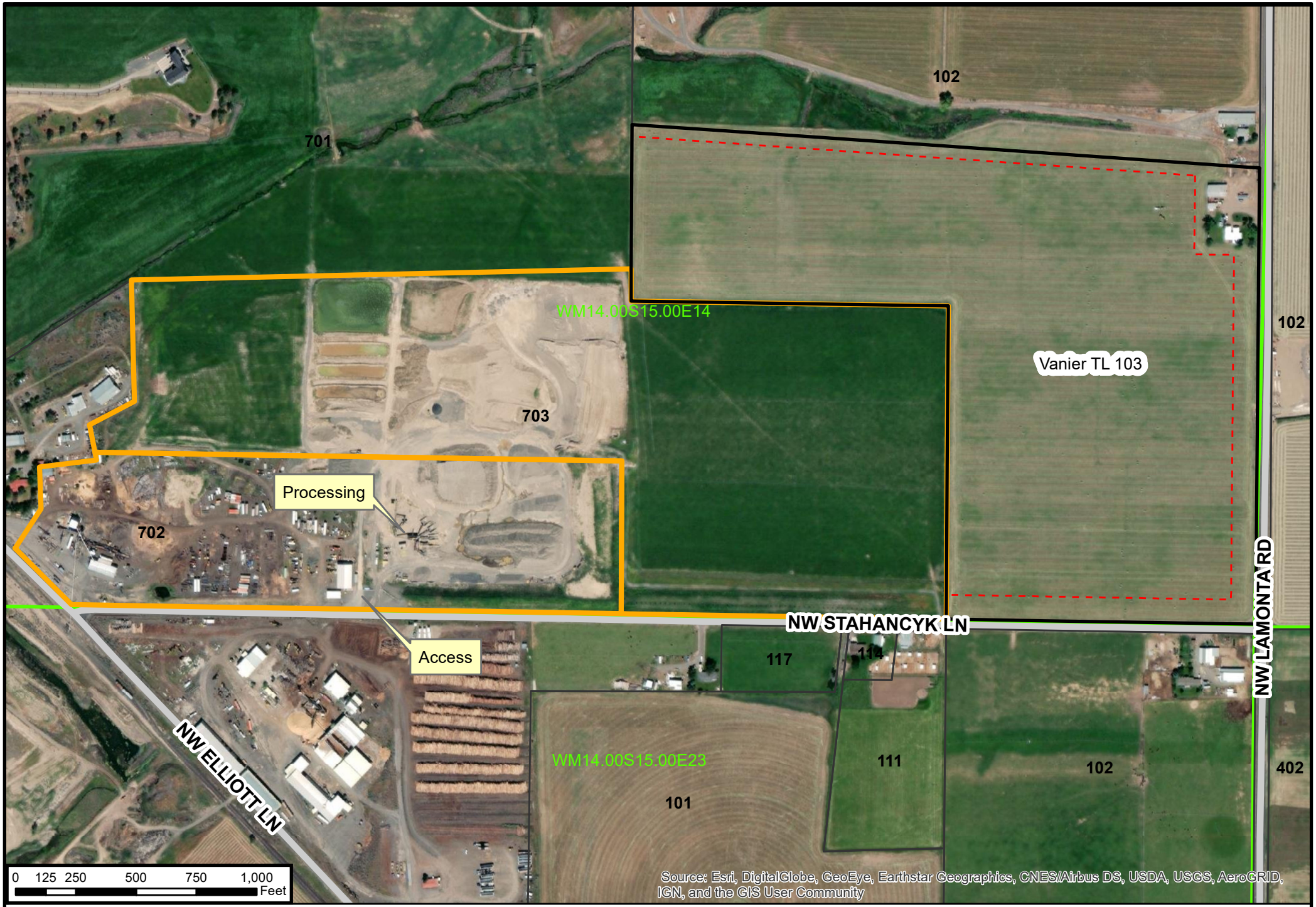
Anita Edgerly
NOTARY PUBLIC FOR
THE STATE OF OREGON

OFFICIAL SEAL
ANITA EDGERLY
NOTARY PUBLIC - OREGON
COMMISSION NO. 383636
MY COMMISSION EXPIRES AUGUST 10, 2006

2577-2

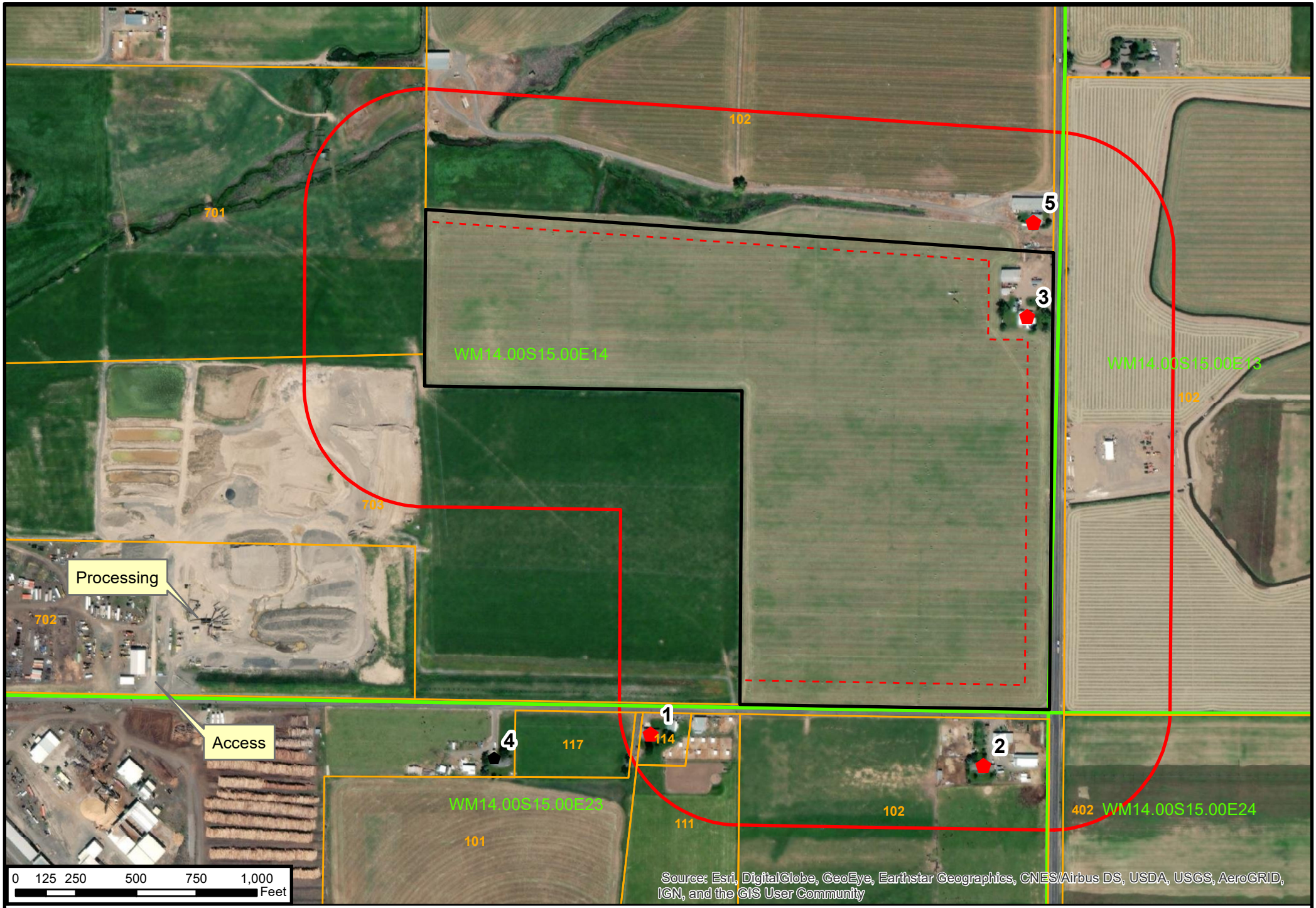


SITE ORIENTATION MAP - AERIAL PHOTO
Subject Parcel: T14S R15E Section 14 TL 103

Vanier Parcel | Woodward Property | Tax Lots
Section Line | Mining Setback

N

M.G.ROPP_05.05.2021



ESEE IMPACT AREA MAP - AERIAL PHOTO
Subject Parcel: T14S R15E Section 14 TL 103

Vanier Parcel | 500' Impact Area | Impact Area Tax Lots | Tax Lots

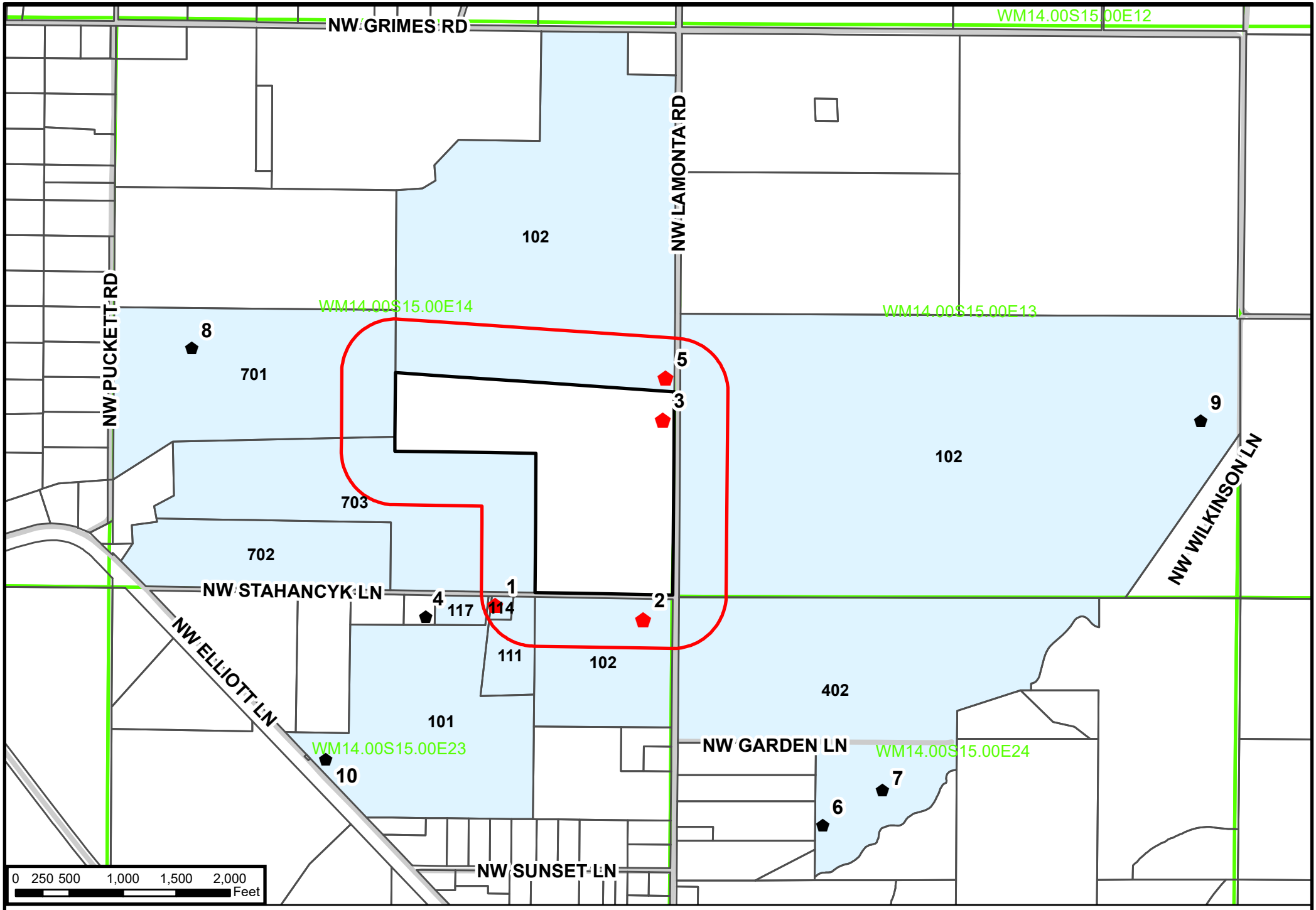
Dwelling in Impact Area | 1 Dwelling | Section Line | Mining Setback

N

M.G.ROPP_05.05.2021

T-R-S Tax Lot	Direction from Subject	Distance from Mining to Tax Lot	Site Address	Existing Dwelling	ID # on Map	Distance from Mining to Dwelling	Acres	Zoning	Primary Use	Land Owner
14-15-13 TL 102	East	160'	5777 NW Wilkinson Rd	Yes	9	5,010'	286.5	EFU-2	Farm Use - Hay	Mark & Casey McKinnon
14-15-14 TL 102	North	50'	6525 NW Lamonta Rd	Yes	5	245'	156.0	EFU-2	Farm Use - Hay	Dean & Teresa Davis
14-15-14 TL 701	West	0'	5950 NW Puckett Rd	Yes	8	1,845'	76.1	EFU-2	Farm Use - Hay	Scott & Crista Porfily
14-15-14 TL 702	West	1,350'	4755 NW Stahancyk Ln	No	-	-	35.4	HM	Industrial - Aggregate	Woodward Land & Timber LLC
14-15-14 TL 703	West	0'	Stahancyk Ln	No	-	-	76.1	EFU-2	Farm Use & Aggregate	Woodward Land & Timber LLC
14-15-23 TL 101	Southwest	425'	4243 NW Elliot Ln	Yes	10	2,560'	66.8	EFU-2	Farm Use - Hay	Samual Stafford
14-15-23 TL 102	South	140'	3320 NW Stahancyk Ln	Yes	2	320'	33.2	EFU-2	Farm Use - Pasture	Billie Johnson
14-15-23 TL 111	Southwest	140'	Stahancyk Ln	No	-	-	8.8	EFU-2	Farm Use - Pasture	Adam & Karen Mikulski
14-15-23 TL 114	Southwest	245'	3992 NW Stahancyk Ln	Yes	1	390'	0.9	EFU-2	Residential	Adam & Karen Mikulski
14-15-23 TL 117	Southwest	455'	Stahancyk Ln	*No	*4	-	3.0	EFU-2	Residential & Farm Use	Rick Kriege
14-15-24 TL 402	Southeast	205'	2720 NW Garden Ln	Yes (X2)	6 7	2,685' 2,780'	123.3	EFU-2	Farm Use - Hay & Pasture	Simmons Farm, LLC; Elsie & Henry Simmons

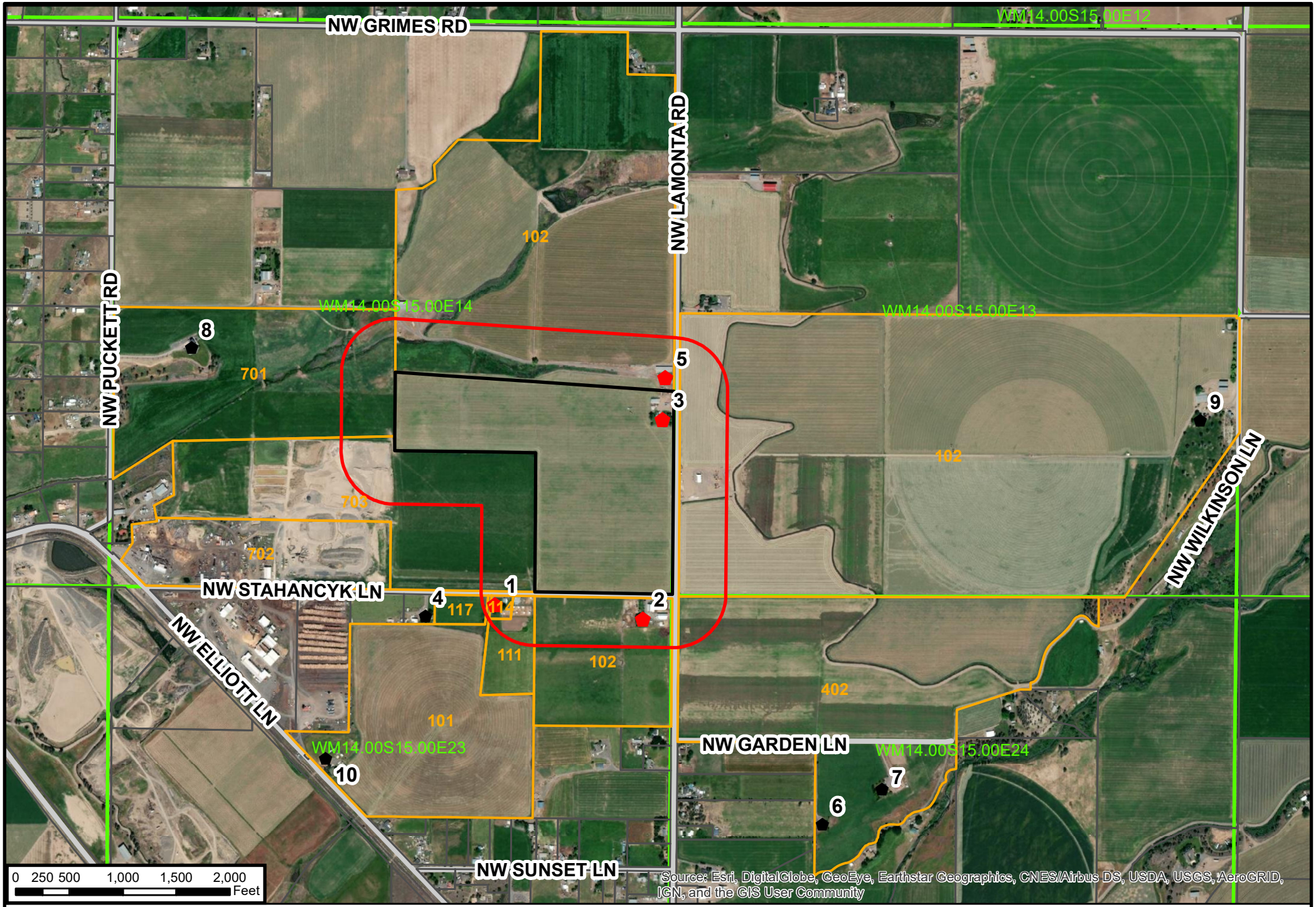
* Kriege owns 14-15-23 TL 116, west of TL 117. TL 116 is outside of the 500' impact area and includes a dwelling that is 1,000 feet from the mining area.



NEARBY AND ADJACENT USES REFERENCE MAP
Subject Parcel: T14S R15E Section 14 TL 103

Vanier Parcel | Impact Area Tax Lots | Tax Lots | Section Line
500' Impact Area | Dwelling in Impact Area | 1 Dwelling

M.G.ROPP_05.05.2021



NEARBY AND ADJACENT USES REFERENCE MAP - AERIAL PHOTO
Subject Parcel: T14S R15E Section 14 TL 103

Vanier Parcel | Impact Area Tax Lots | Tax Lots | Section Line
500' Impact Area | Dwelling in Impact Area | 1 Dwelling

N

M.G.ROPP_05.05.2021

U.S. Fish and Wildlife Service
National Wetlands Inventory

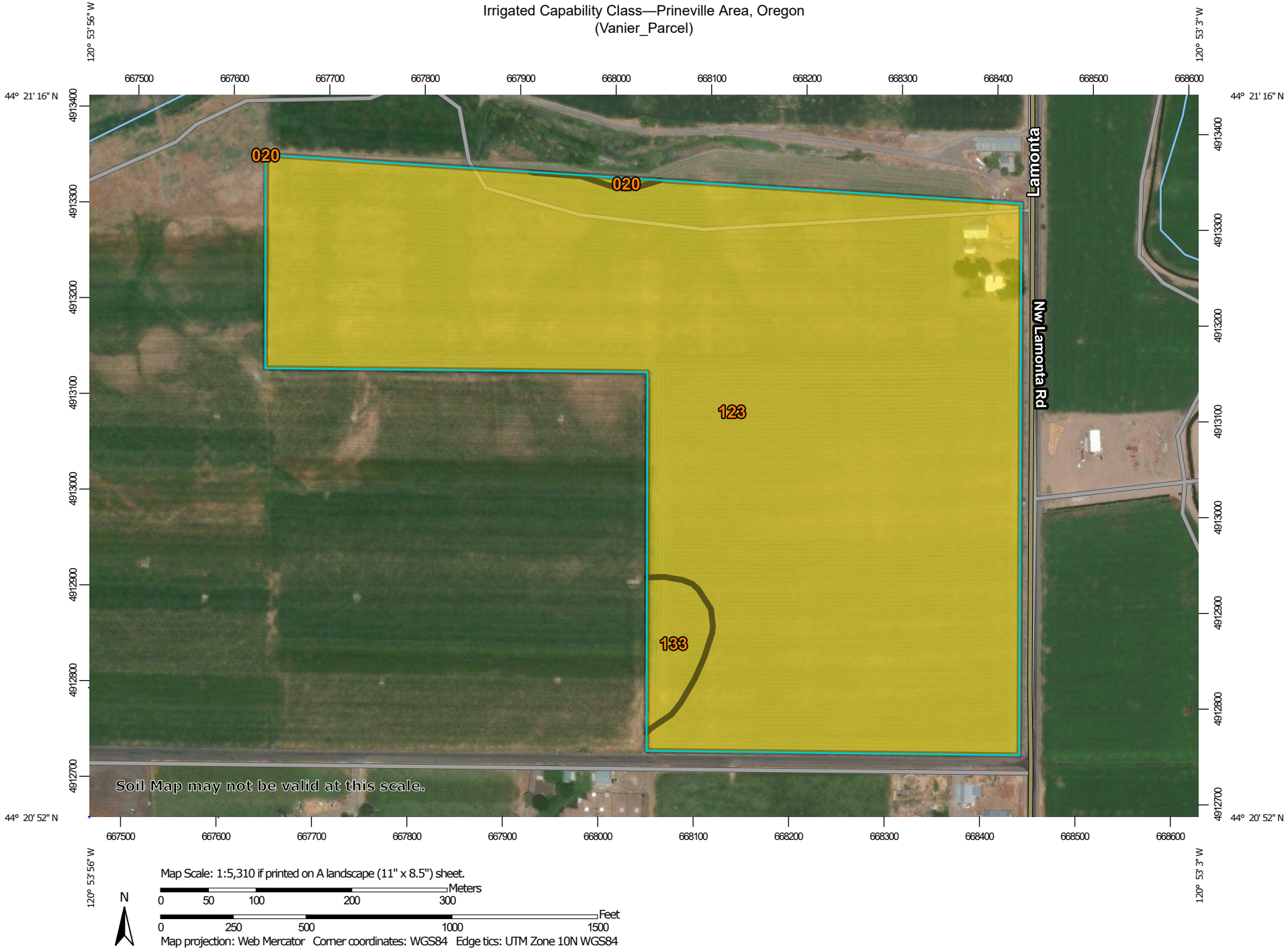
Vanier Property Wetlands Map

May 26, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

Irrigated Capability Class—Prineville Area, Oregon
(Vanier_Parcel)



Map Scale: 1:5,310 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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 Rating Polygons

- Capability Class - I
- Capability Class - II
- Capability Class - III
- Capability Class - IV
- Capability Class - V
- Capability Class - VI
- Capability Class - VII
- Capability Class - VIII
- Not rated or not available

Soil Rating Lines

- Capability Class - I
- Capability Class - II
- Capability Class - III
- Capability Class - IV
- Capability Class - V
- Capability Class - VI
- Capability Class - VII
- Capability Class - VIII
- Not rated or not available

Soil Rating Points

- Capability Class - I
- Capability Class - II
- Capability Class - III
- Capability Class - IV
- Capability Class - V
- Capability Class - VI
- Capability Class - VII
- Capability Class - VIII
- Not rated or not available

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: Prineville Area, Oregon
Survey Area Data: Version 19, Sep 14, 2020

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

Date(s) aerial images were photographed: Mar 11, 2014—Aug 17, 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.

Irrigated Capability Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
020	Boyce silt loam, 0 to 2 percent slopes	3	0.2	0.2%
123	Ochoco-Prineville complex 0 to 3 percent slopes	3	75.9	97.2%
133	Ochoco-Prineville complex, 3 to 8 percent slopes	3	2.0	2.6%
Totals for Area of Interest			**78.0**	**100.0%**

Description

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels-capability class, subclass, and unit. Only class and subclass are included in this data set.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

National Flood Hazard Layer FIRMette

FEMA

120°53'47"W 44°21'18"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

120°53'10"W 44°20'53"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/27/2021 at 12:48 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

AGGREGATE RESOURCE INVESTIGATION
VANIER SITE
PRINEVILLE, OREGON
2019-2020

July 2020

By
Timothy B. Marshall
Oregon Registered Professional Geologist
G1164 Exp. 12/31/2020

Introduction

A geologic investigation was conducted on the property in Crook County, Oregon described below to determine the quantity and quality of the construction aggregates (sand and gravel) that might be reasonably recovered by mining. The evaluation was overseen by a Professional Geologist registered in the State of Oregon.

The subject property is located on the north side of Stahancyk Lane and west of Lamonta Road in the S½ Sec. 14, T. 14 S., R. 15 E., Willamette Meridian. The property consists of one tax lot, 103 (Map Lot ID 1415140000103), which is owned by Robert and Lani Vanier and will be referred to as the Vanier Site in this document. The Vanier Site comprises 77.98 acres. The location of the Vanier Site is shown northwest of Prineville on the Vicinity Map in Figure 1.

Property Description

The Vanier Site has a slight ridge crest trending northeast to southwest across the southern portion of the lot and is mostly sloping gently towards the northwest over most of the property. Just north of the Vanier Site is an unnamed drainage flowing towards the west and southwest. The unnamed drainage is a part of the irrigation system maintained by the Ochoco Irrigation District, and it carries water from the northeast towards the southwest and flows into the Rye Grass Canal system. The Vanier Site is owned and operated by the landowner for growing alfalfa and livestock grazing. There is a residence on the northeast corner of the Vanier Site on Lamonta Road. The "Mining Area" proposed for the significant aggregate inventory designation in Crook County will have setbacks from the property boundary as determined in the application process, but the quantity presented herein includes the entire Vanier Site.

Geologic Setting

The Vanier Site is located at the western edge of the Blue Mountains Physiographic Province[1] adjacent to the Deschutes-Umatilla Plateau. Published geologic surface mapping at the Vanier Site indicates that it is entirely covered with Quaternary Terrace Deposits consisting of mixed grain sediments[2]. These sediments were believed to contain the desired sand and gravel at the Vanier Site due to the proximity of several gravel mining operations that are all producing within this unit such as

[1] Orr, Elizabeth L. and William N., 2012, *Geology of Oregon, Sixth Edition*, Oregon State University Press, Corvallis, Oregon, 304 p.

[2] Ma, Lina, Madin, Ian P., Olson, Keith V., and Watzig, Rudie J., 2009, *Oregon Geologic Data Compilation (OGDC) Release 5 (Statewide),* Oregon Department of Geology and Mineral Industries.

the adjacent Woodward Site and Grizzly Rock Products that is immediately west of the Woodward Site. The exploration confirmed this interpretation. The terrace sand and gravel deposits resulted from Quaternary backwater deposits that occurred after Newbery Lava flows erupted 1.2 million years ago[3] and dammed the Crooked River canyon[4] downstream from the site. As the Crooked River basin was filling with sediment the coarser sands and gravels advanced from the mountains that are to the north and northeast of Prineville creating the large terraces north of Prineville on which these aggregate deposits are located.

Site Investigation

The Vanier Site is shown in Figure 2 along with the marked locations of the test borings that were used to evaluate the aggregate resource. The site investigation was conducted by drilling bore holes and collecting continuous samples in order to determine aggregate resource thickness, overburden thickness, and to provide samples for resource quality analyses. The locations prefixed with 'VAN' were drilled on June 12-13, 2019. All drilling and sample collection was overseen by an Oregon Registered Professional Geologist. The topography shown with 2-foot contours on Figure 2 was obtained from publicly available Lidar data[5].

There are three basic units identified for this investigation that are described as follows –

- Overburden – This is the topsoil (Ochoco – Prineville Complex) and generally fine-grained subsoil material that overlies the aggregate resource. There are some overburden material layers interbedded within the aggregate resource.
- Aggregate Resource – This consists of sand and gravel with variable gradations over the Woodward Site. In many places the top of this unit is slightly cemented and light-colored.
- Silt – The material underlying the Aggregate Resource is fine-grained consisting of brown silts and clays with some fine sand.

The Aggregate Resource unit is the primary target of the exploration of the Vanier Site. Its location and variation across the property is documented and the volume quantified in this report along with the

[3] Smith, Gary, 1998, *Geology along U.S. Highways 197 and 97 between The Dalles and Sunriver, Oregon*, Oregon Geology, Vol. 60, Number 1, January/February 1998.

[4] McClaughry, Jason D. and Ferns, Mark L., 2006, *Field Trip Guide to the Geology of the Lower Crooked River Basin*, Oregon Geology, Vol. 67, Number 1, Fall 2006.

[5] DOGAMI, 2007 – 2010, Oregon Department of Geology and Mineral Industries Lidar Program Data, Funded by Oregon Lidar Consortium, Collected by Watershed Sciences, Inc., Vertical datum is NAVD88.

analyses for its suitability for use in Portland Cement Concrete. A fraction of the Aggregate Resource will be too coarse for use directly as concrete aggregates, but it can be crushed and assimilated into the concrete aggregates. The topsoil (uppermost 18 inches) over the mined portion of the Vanier Site will be retained on the property for use in reclaiming the top surface of the mining area within lot 103 back to its use for agricultural purposes after mining is completed. Most of the fine-grained subsoil material will be used in grading the final reclamation slopes.

The results of the drilling are shown in the table below. Water was encountered in all borings except for VAN-5.

Location	Latitude	Longitude	Aggregate Base Depth (ft)	Overburden (ft)	Aggregate Resource (ft)
VAN-1	44.349034	-120.887610	29	15	14
VAN-2	44.351837	-120.887410	27	18	9
VAN-3	44.351850	-120.890828	18.5	9	9.5
VAN-4	44.349004	-120.890781	29	18	11
VAN-5[6]	44.349523	-120.889380	33	12	21
VAN-6	44.352281	-120.895501	15	6	9
VAN-7	44.352805	-120.889870	23	12	11
			Average Resource Thickness		**12**

Aggregate Resource Quantity

The volume of the Aggregate Resource was determined for the Vanier Site by using the Average Resource Thickness indicated above and multiplying it times the Vanier lot acreage of 77.98 acres. This yields a potential aggregate volume of 1,509,381 cubic yards. Once the property setbacks are defined the volume of the aggregate in the Mining Area can be similarly calculated using the Average Resource Thickness.

[6] The resource layer at VAN-5 contains 8.5 feet of interbedded non-aggregate silty material that was not included in the resource thickness.

Aggregate Resource Quality

The primary target on the Woodward Site is high-quality sand and gravel suitable for use in Portland Cement Concrete ("PCC Concrete"). The cobbles larger than normally used in PCC Concrete can be crushed and added to the PCC Concrete in some instances, used as base rock or used as a component for asphaltic concrete. PCC Concrete specifications require the sand fraction to be graded within specific limits, and both the fine and coarse PCC aggregate must meet durability and other criteria. The specifications used for determining the suitability of the aggregates on the Woodward Site were obtained from the Oregon Department of Transportation ("ODOT")[7]. Some of the aggregate quality tests were performed in a Knife River Corporation – Northwest facility in Tumalo, Oregon and other tests were performed by an ODOT laboratory. All tests were performed by Certified Aggregate Technicians, and the results are presented in the Aggregate Quality Exhibits and summarized below.

Gradation

Representative samples of the aggregate collected from the test pits were used to determine the gradation (relative percentages of different sizes of aggregate) of the aggregate deposit. The sample gradations are presented in a table format in Aggregate Quality Exhibits. These measurements were made in a quality control facility operated by Knife River Corporation – Northwest in Tumalo, Oregon. The measurements were conducted by ODOT certified aggregate technicians. Specifications require that there not be greater than 4% by weight of the fine aggregates passing the No. 200 Sieve (Section 02690.30(c)). An average of 7.7% of the unwashed material passed the No. 200 sieve. Since the aggregates are to be washed during processing, it is reasonable to conclude that the processed aggregates will be able to meet this specification. Due to the variation in the gradations present, the processing system will be designed using the data collected to produce a product that complies with the aggregate gradation requirements.

The average percent of gravel that was greater than ¾" from the tested samples was 14%. This fraction is too coarse, generally, for use in PCC Concrete. It would, however, be crushed and incorporated into the concrete aggregates as has been done with the oversize coarse aggregate on the Woodward site.

Sand Equivalent

The results for the Sand Equivalent tests are also shown in Exhibit E ranging from a low of 9 to a high of 64 for unwashed samples. The specifications require that the Sand Equivalent results be greater than

[7] Oregon Department of Transportation, 2015, "Oregon Standard Specification for Construction – Section 02690 – PCC Aggregates," Salem, Oregon.

68 (Section 02690.30(f)). However, the tests were conducted on unwashed samples, and the range of results measured is indicative of being able to meet the specification once the fine aggregate is washed.

The following results are included in the Aggregate Quality Exhibits on the ODOT laboratory reports.

Sodium Sulfate Soundness

Coarse and fine aggregates to be used for PCC Concrete must be tested for Soundness using sodium sulfate salt. The weighted percentage loss for the coarse aggregates (5%) and fine aggregates (7%) do not exceed the specification thresholds of 12 percent and 10 percent by weight respectively, so they pass.

Durability – Abrasion

Coarse aggregates to be used for PCC Aggregates shall be tested for Abrasion with a maximum allowable result of 30%. The sample tested for Abrasion had a result of 17.5%. The sample passes for the Abrasion test.

Durability – Oregon Air Aggregate Degradation

Coarse aggregates to be used for PCC Aggregates shall be tested for Oregon Air Aggregate Degradation ("Degradation") with a maximum allowable amount passing the No. 20 sieve of 30% and a maximum Sediment Height of 3.0 inches. The representative sample had results of 19.9% and 1.1 inches. The sample passes the Degradation test.

Lightweight Pieces

A coarse aggregate sample was analyzed for Lightweight Pieces. The result reported in Exhibit E was 0.2%, which is less than the required 1% maximum for coarse PCC aggregates.

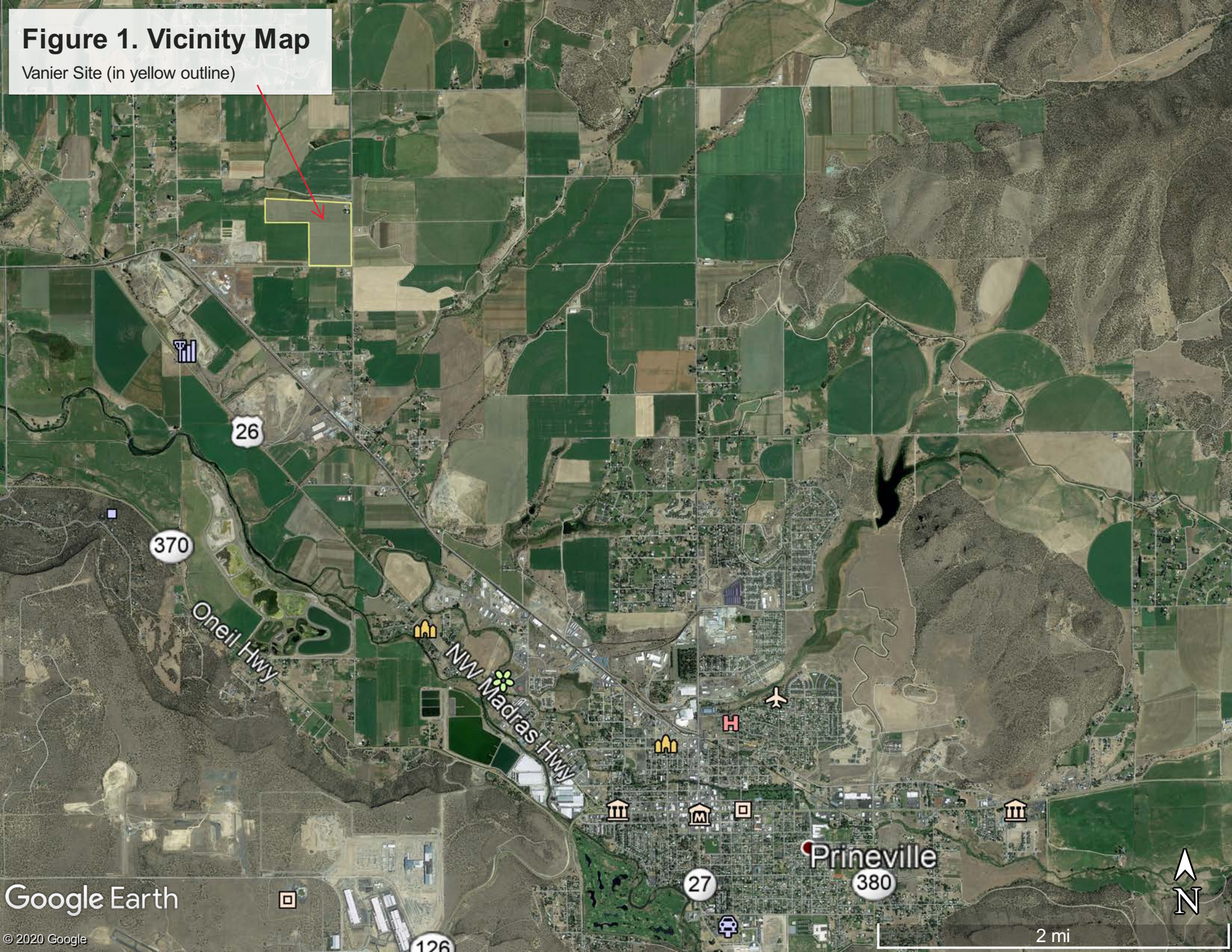
A fine aggregate sample was analyzed for Lightweight Pieces. The result reported in Exhibit E was 0.6%, which is less than the required 2% maximum.

Conclusions

Based on the data gathered in the investigation described herein, it is concluded that there is an aggregate resource consisting of sand and gravel with a potential volume of 1,509,381 Cubic Yards within the Vanier Site. This volume is expected to be reduced slightly by the anticipated setbacks from the property boundaries. The processed aggregate resource will be able to meet the ODOT specifications for PCC Concrete including the criteria for resistance to abrasion, sodium sulfate soundness, and air degradation.

Figure 1. Vicinity Map

Vanier Site (in yellow outline)



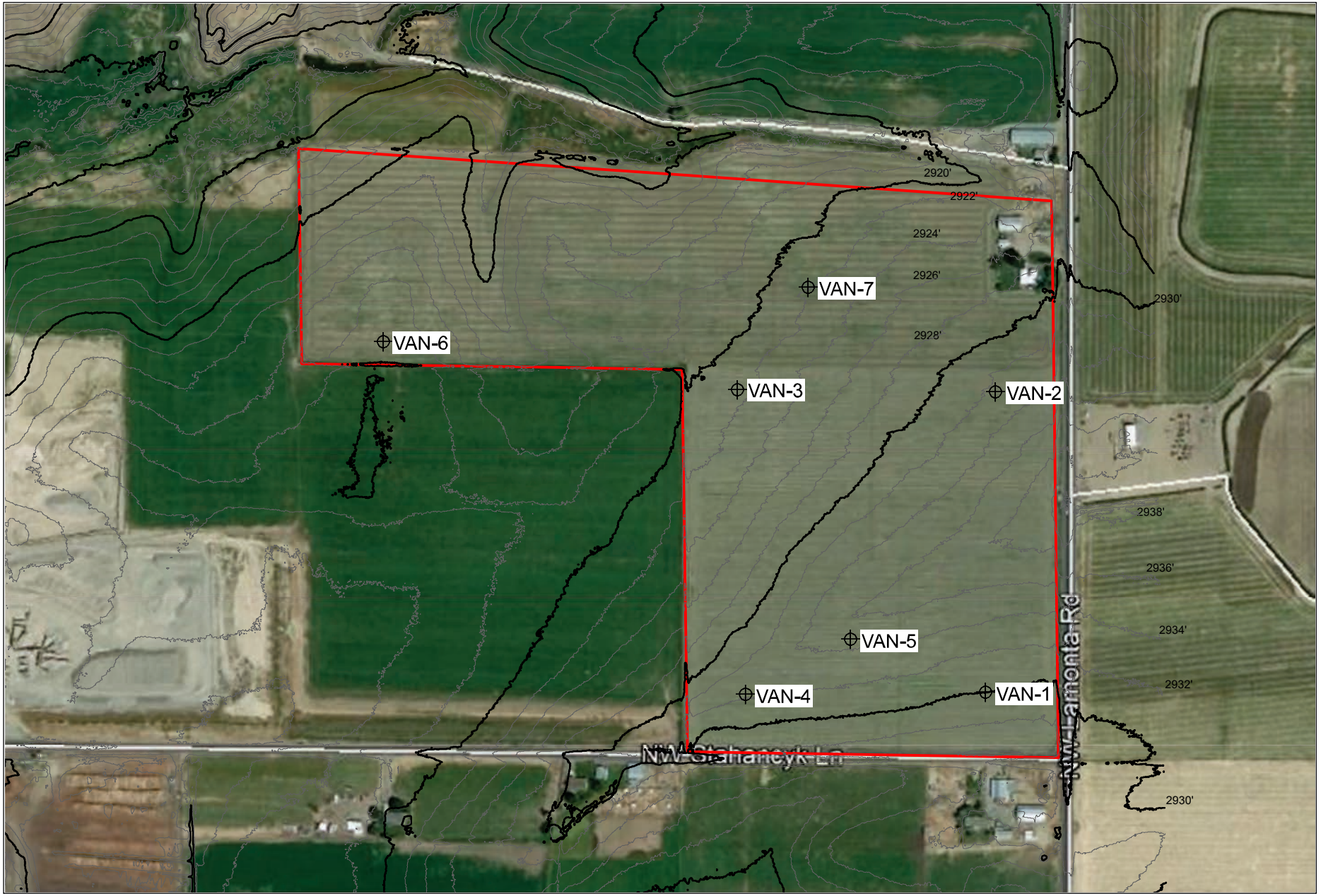


Figure 2. Drill Locations
Vanier Site
July 2020

Statistical Analysis 06/14/2019 - 06/14/2019
Knife River Corporation 250410-Woodward Agg 25024-Pit Run

Vanier Site
Aggregate Quality Exhibit
Page 1 of 3

Date Sampled	Type	Note	3" %	1 1/2" %	1" %	3/4" %	1/2" %	3/8" %	1/4" %	#4 %	#8 %	#16 %	#30 %	#50 %	#100 %	#200 %	PAN %	FM	SE-Wet %
06/14/2019 14:30	Investigative	VAN-05 30' - 33'	100.00	89.00	76.00	70.00	59.00	53.00	45.00	40.00	33.00	28.00	22.00	14.00	7.00	3.9	0.0	5.43	40.00
06/14/2019 14:30	Investigative	VAN-04 22' - 25'	100.00	98.00	94.00	85.00	74.00	68.00	60.00	55.00	47.00	40.00	31.00	15.00	8.00	4.6	0.0	4.52	61.00
06/14/2019 14:30	Investigative	VAN-07 20' - 23'	100.00	100.00	95.00	90.00	77.00	70.00	60.00	54.00	45.00	37.00	27.00	11.00	4.00	2.8	0.0	4.61	
06/14/2019 14:30	Investigative	VAN-03 15' - 18.5'	100.00	100.00	97.00	94.00	88.00	84.00	77.00	72.00	62.00	51.00	35.00	16.00	8.00	4.9	0.0	3.78	46.00
06/14/2019 14:30	Investigative	VAN-06 10' - 15'	100.00	94.00	86.00	80.00	68.00	62.00	54.00	48.00	39.00	32.00	24.00	15.00	10.00	7.0	0.0	4.96	23.00
06/14/2019 14:30	Investigative	VAN-07 12' - 15'	100.00	89.00	81.00	74.00	61.00	53.00	44.00	40.00	32.00	27.00	19.00	8.00	4.00	2.3	0.0	5.55	57.00
06/14/2019 14:30	Investigative	VAN-05 25' - 30'	100.00	96.00	86.00	82.00	73.00	68.00	61.00	56.00	45.00	37.00	30.00	21.00	16.00	12.8	0.0	4.48	20.00
06/14/2019 14:30	Investigative	VAN-02 18' - 20'	100.00	100.00	94.00	89.00	76.00	69.00	58.00	52.00	43.00	36.00	28.00	13.00	7.00	5.2	0.0	4.63	57.00
06/14/2019 14:30	Investigative	VAN-01 7' - 10'	100.00	100.00	100.00	99.00	95.00	90.00	82.00	75.00	60.00	47.00	39.00	31.00	23.00	17.1	0.0	3.34	27.00
06/14/2019 14:30	Investigative	VAN-03 9' - 13'	100.00	100.00	90.00	85.00	74.00	68.00	59.00	54.00	44.00	38.00	31.00	19.00	11.00	8.2	0.0	4.51	38.00
06/14/2019 14:30	Investigative	VAN-01 25' - 29'	100.00	94.00	82.00	72.00	60.00	53.00	44.00	38.00	29.00	23.00	17.00	8.00	4.00	2.6	0.0	5.63	62.00
06/14/2019 14:30	Investigative	VAN-03 13' - 15'	100.00	98.00	91.00	82.00	69.00	61.00	51.00	46.00	35.00	28.00	22.00	11.00	5.00	2.8	0.0	5.12	62.00
06/14/2019 14:30	Investigative	VAN-02 25' - 27'	100.00	100.00	89.00	81.00	68.00	60.00	50.00	43.00	33.00	25.00	19.00	12.00	6.00	4.1	0.0	5.20	61.00
06/14/2019 14:30	Investigative	VAN-01 20' - 25'	100.00	99.00	85.00	76.00	60.00	52.00	42.00	37.00	28.00	22.00	14.00	7.00	3.00	2.2	0.0	5.62	58.00
06/14/2019 14:30	Investigative	VAN-01 15' - 20'	100.00	100.00	97.00	94.00	87.00	82.00	73.00	67.00	55.00	47.00	38.00	25.00	16.00	11.8	0.0	3.75	26.00
06/14/2019 14:30	Investigative	VAN-02 20' - 25'	100.00	85.00	74.00	68.00	57.00	51.00	42.00	37.00	27.00	22.00	17.00	8.00	4.00	2.5	0.0	5.81	57.00
06/14/2019 14:30	Investigative	VAN-05 20' - 23'	100.00	100.00	100.00	99.00	97.00	95.00	92.00	90.00	85.00	79.00	68.00	40.00	20.00	12.1	0.0	2.24	31.00
06/14/2019 14:30	Investigative	VAN-04 25' - 29'	100.00	96.00	89.00	83.00	72.00	65.00	55.00	49.00	38.00	27.00	18.00	10.00	6.00	4.4	0.0	5.07	42.00
06/14/2019 14:30	Investigative	VAN-05 8' - 12'	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.00	97.00	92.00	87.00	77.00	61.00	40.7	0.0	0.87	9.00
06/14/2019 14:30	Investigative	VAN-05 3.5' - 7'	100.00	100.00	100.00	100.00	99.00	99.00	98.00	98.00	96.00	94.00	90.00	70.00	35.00	7.5	0.0	1.19	38.00
06/14/2019 14:30	Investigative	VAN-07 15' - 20'	100.00	95.00	88.00	82.00	71.00	64.00	56.00	51.00	43.00	36.00	26.00	11.00	5.00	3.4	0.0	4.87	36.00
06/14/2019 14:30	Investigative	VAN-04 18' - 22'	100.00	100.00	99.00	97.00	94.00	90.00	85.00	82.00	74.00	65.00	48.00	21.00	9.00	5.7	0.0	3.14	64.00
06/14/2019 14:30	Investigative	VAN-06 6' - 10'	100.00	100.00	100.00	97.00	92.00	88.00	81.00	77.00	69.00	61.00	46.00	25.00	14.00	8.4	0.0	3.22	28.00
Count			23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	22
Min			100	85	74	68	57	51	42	37	27	22	14	7	3	2.2	0	0.87	9
Max			100	100	100	100	100	100	100	99	97	94	90	77	61	40.7	0	5.81	64
Mean			100	97	91	86	77	72	64	59	50	43	35	21	12	7.7	0	4.24	43
SD			0	4.3	7.9	10.1	14.1	16	18.3	19.5	21.1	21.4	21	18.4	13.1	8.22	0	1.372	16.5
CV			0	4.4	8.7	11.8	18.3	22.4	28.7	33	41.9	49.6	60.8	86.7	105	106.79		32.348	38.6
Pay Factor																			
Targets																			
Specification																			

OREGON DEPARTMENT OF TRANSPORTATION
MATERIALS LABORATORY
800 AIRPORT RD. SE SALEM, OR 97301-4792

(503)986-3000
FAX(503)986-3096

Contract No.: PRIVATE **EA No.: PRIVATE TESTING** **Lab No.: 20-000161**
Project: PRIVATE AGGREGATE TESTING - KNIFE RIVER WOODWARD PIT (07-
Highway: County: **Data Sheet No.: F49910 030**
Contractor: KNIFE RIVER - BEND FA No.:
Project Manager: Org Unit: Bid Item No.:
Submitted By: JOSHUA MORGAN Org Unit: KRB Sample No.:
Material Source: 07-097-4 Woodward Aggregate Qty Represented:
Sampled At: VANIER FIELD SAMPLE Sampled By: Witnessed By:
DATE-Sampled: 20/ 1/17 Received: 20/ 1/17 Tested: 20/ 2/ 6 Date Reported: 20/ 2/ 6
Class/Type: COMPLIANCE **Use: FINE PCC AGGR**

Q or G: GRAVEL **AGGREGATE LABORATORY REPORT - FPCCAG** **Size: SAND**

Test	Field	Lab
T 176 S.E.		
T 89 L.L.		
T 90 P.I.		
Fineness Modulus		
TM 226 Dust/Clay		
TM 227 Cleanness		
TM 229 Elong pcs		
308 Incin/Ga A/C		
Total A/C		
Retention		
T 329 Moisture		
T 27/11		
Sieve	Passing	Passing
2.5		
2		
1.5		
1		
3/4		
1/2		
3/8		
1/4		
# 4		
# 8		
# 10		
# 16		
# 30		
# 40		
# 50		
#100		
#200		

T 84 F. Grav.
Bulk:
S.S.D.:
Appar.:
Absorp.:

T 85 C. Grav.
Bulk:
S.S.D.:
Appar.:
Absorp.:

T 104 Soundness
C A: F A: 7%
1.5-3/4: <10%
3/4-3/8:
3/8- #4:
#4- #8: 10.9 %
#8-#16: 6.5 %
#16-#30: 5.9 %
#30-#50: 5.1 %

TM 208 Degrade
Crse Ht:
P20:
Fine Ht:
P20:

T 96 Abrasion

T 21 Impurity
Plate #: 1

T 335 Fracture
3/4:
1/2:
3/8:
1/4:
#10:

T 112 Friables
Wt'd Avg :
1.5-3/4:
3/4-3/8:
3/8- #4:
#4-#16:

T 113 Lightweight
Coarse:
Fine: 0.6 % <2.0%

TM 225 Woodwaste
Lab:
Field:

AASHTO T 288/289
Resist: Ω
pH:

AASHTO T 267
Organic:

AASHTO T 291
Chloride:

AASHTO T 290
Sulfate:

T 327 Micro Deval ===> Grading: Loss: %

1 @ t21 =$ 21.00
5 @ t104 = 38.00
1 @ t113 = 44.00

NSM = Not Sufficient Material
REMARKS:
INFORMATION ONLY

TOTAL CHARGES: $ 255.00

KEVIN BROPHY - LABORATORY SERVICES MANAGER

C: FILES ; KNIFE RIVER - BEND ; A JOHNSON - CONCRETE QUALITY ; J CIESLAK - AGGREGATE

Vanier Site
Aggregate Quality Exhibit
Page 2 of 3

OREGON DEPARTMENT OF TRANSPORTATION
MATERIALS LABORATORY
800 AIRPORT RD. SE SALEM, OR 97301-4792
(503)986-3000
FAX(503)986-3096

Contract No.: PRIVATE **EA No.: PRIVATE TESTING** **Lab No.: 20-000160**
Project: PRIVATE AGGREGATE TESTING - KNIFE RIVER WOODWARD PIT (07-
Highway: County: **Data Sheet No.: F49910 030**
Contractor: KNIFE RIVER - BEND FA No.:
Project Manager: Org Unit: Bid Item No.:
Submitted By: JOSHUA MORGAN Org Unit: KRB Sample No.:
Material Source: 07-097-4 Woodward Aggregate Qty Represented:
Sampled At: Sampled By: Witnessed By:
DATE-Sampled: 20/ 1/17 Received: 20/ 1/17 Tested: 20/ 2/ 6 Date Reported: 20/ 2/ 6
Class/Type: COMPLIANCE **Use: COARSE PCC AGGR**

Q or G: GRAVEL **AGGREGATE LABORATORY REPORT - CPCCAG** **Size: 3/4"-#4**

Test	Field	Lab
T 176 S.E.		
T 89 L.L.		
T 90 P.I.		
T 335 Ttl Frac.		
TM 226 Dust/Clay		
TM 227 Cleanness		
TM 229 Elong pcs		
308 Incin/Ga A/C		
Total A/C		
Retention		
T 329 Moisture		
T 27/11		
Sieve	Passing	Passing
2.5		
2		
1.5		
1		
3/4		
1/2		
3/8		
1/4		
# 4		
# 8		
# 10		
# 16		
# 30		
# 40		
# 50		
#100		
#200		

T 84 F. Grav.
Bulk:
S.S.D.:
Appar.:
Absorp.:

T 85 C. Grav.
Bulk:
S.S.D.:
Appar.:
Absorp.:

T 104 Soundness
C A: 5% <12% F A:
1.5-3/4: 4.6 %
3/4-3/8: 4.8 %
3/8- #4: 6.8 %
#4- #8:
#8-#16:
#16-#30:
#30-#50:

TM 208 Degrade
Crse Ht: 1.1 in
P20: 19.9 %
Fine Ht: <3.0"
P20: <30.0%

T 96 Abrasion
<30.0% 17.5 %
Type B

T 21 Impurity
Plate #:

T 335 Fracture
3/4:
1/2:
3/8:
1/4:
#10:

T 112 Friables
Wt'd Avg :
1.5-3/4:
3/4-3/8:
3/8- #4:
#4-#16:

T 113 Lightweight
Coarse: 0.2 % <1.0%
Fine:

TM 225 Woodwaste
Lab:
Field:

AASHTO T 288/289
Resist: Ω
pH:

AASHTO T 267
Organic:

AASHTO T 291
Chloride:

AASHTO T 290
Sulfate:

T 327 Micro Deval ===> Grading: Loss: %

1 @ t96 =$125.00
4 @ t104 = 38.00
1 @ t113 = 44.00
1 @ tm208 = 96.00

NSM = Not Sufficient Material

TOTAL CHARGES: $ 417.00

REMARKS:
INFORMATION ONLY

KEVIN BROPHY - LABORATORY SERVICES MANAGER

C: FILES ; KNIFE RIVER - BEND ; A JOHNSON - CONCRETE QUALITY ; J CIESLAK - AGGREGATE

Vanier Site
Aggregate Quality Exhibit
Page 3 of 3

Access Engineering LLC

134 E. 13th Ave. Suite 2
Eugene, Oregon 97401
Phone & Fax
541-485-3215
info@accesseng.com

Transportation Engineering
Traffic Design
Trip Generation
Access Management
Traffic Counts
Street Lighting

November 19, 2020

Ann Beier, Assistant Planning Director
Crook County Courthouse
300 NE 3rd St, Rm. 12
Prineville, OR 97754

RE: Traffic Assessment Letter for Woodward Aggregate Site

The purpose of this traffic assessment letter is to document the expected trips generated by the proposed change in operation of the Knife River's Woodward Aggregate Site. Knife River is requesting to add a new area for extracting material.

Location and Area Description

The Woodward Aggregate Site is located on the north side of NW Stahancyk Lane and east of NW Elliot Lane and N Puckett Road in Crook County, Oregon. The site is approximately 3.5 miles northwest of the City of Prineville. Figure 1, attached, shows the location. The Woodward Aggregate Site has mined, processed, and stockpiled aggregate on approximately 18.2 acres on portions of tax lots 702 and 703 on Map 14S 15E 14. Currently the portion of tax lot 702 south and west of the aggregate operation is the Woodward Lumber Mill which will continue in operation.

Stahancyk Lane is a local county road running between NW Elliot Lane and NW Lamonta Road. The roadway is paved to 24 feet in width and has 3-foot gravel shoulders on each side. The areas north and east of the aggregate site are currently in agricultural use. South of Stahancyk Lane are two large parcels in industrial use south of the site with rural residential and agricultural uses further to the east.

Existing Operation

The aggregate site currently is approved to run 80 truck loads of aggregate material per day resulting in 160 total daily trips. Assuming uniform trips per hour during a standard 10-hour da, the site generates an average of 8 truck trips per hour in each direction. Trucks enter and exit the site from a driveway on Stahancyk Lane approximately 1180 feet east of the intersection with NW Elliot Lane. The majority of outbound trucks head west on Stahancyk Lane to Elliot Lane and then northwest to Highway 26, and ODOT Regional Highway and Truck Route.

Proposed Operation

The reason for the proposed expansion is that the previous extraction area has been depleted. The new extraction area is tax lot 00103 immediately north and east of tax lot 00702 (see Figure 2 attached). The new operation will not result in an increase in truck traffic nor will it change the existing access point on Stahancyk Lane. Material will be hauled west then south to the processing area on an on-site haul road.

Sight Distance

Intersection sight distance (ISD) is the recommended distance that should be provided at a Stop controlled intersection. For outbound right turns from minor road (the access driveway), Case B2 in Chapter 9 of the AASHTO A Policy on Geometric Design of Highways and Streets provides a chart in Exhibit 9-59 showing the recommended ISD. For the worst case of a combination truck making a right turn, an ISD of 1000 feet provides adequate sight distance for major road speeds of up to 65 MPH. For outbound left turns from the driveway, Exhibit 9-56 shows that for a combination truck making a left turn, an ISD of 1100 feet also provides adequate sight distancefor major road speeds of up to 65 MPH.

For inbound trucks only those making a left turn will cross potential on-coming traffic. For left turns from the major road, Case F and Exhibit 9-68 shows that 1000 feet is more than adequate sight distance for a combination truck to turn left from the major road for approaching speeds of more than 70 MPH. Clearly, all movements at the access driveway intersection have clear vision that exceeds the recommended ISD for the speeds expected on Stahancyk Lane.

Sight distance at the site driveway was assessed in July 2015 when the operation was started. There have been no changes to Stahancyk Lane or its surroundings that would effect sight distance from the access point since that time. The following is exerpted from the 2015 Traffic Assessment Letter:

Sight distance for the access driveway approach to Stahancyk Lane is excellent in both directions. Most trucks will be entering and exiting the site from the west, however local deliveries may enter and exit to the east. Figures 2 and 3, attached, show no obstructions to sight distance east or west of the access intersection. On Figure 2, Photo 1 is taken from 1000 feet east of the access looking west and Photo 2 is taken from the access looking east. The photos show that there is more than 1000 feet of sight distance. On Figure 3, Photo 3 is taken from 1100 feet west of the access looking east and Photo 4 is taken from the access looking west. The photos show that there is more than 1100 feet of sight distance. The photos are from Google Earth street view dated June 2012. We know of no changes on the road since that time that would affect sight distance. Figure 4 attached, shows the access driveway location and the locations of the photos on Stahancyk Lane.

Crash History

Crash records for Stahancyk Lane and Elliot Lane for the five-year period January 1, 2015 through December 31, 2019 were obtained from the ODOT Crash Analysis and Reporting Unit. There have been no crashes on Stahancyk Lane during that period. There were five reported crashes on Elliot Lane, all of which appear to have occurred on the section of Elliot Lane west of OR 26. It appears that there have been no crashes on the haul route using Stahancyk Lane to Elliot Lane to OR 26 since the site started hauling aggregate in 2015.

Roadway Design Standards

Stahancyk Lane is classified as a local road. It has 24-feet of pavement width with gravel shoulders, meeting the standards for a local road with an ADT of 100 or greater. There are no other accesses on the north side of Stahancyk Lane other than the site driveways.

Conclusions and Recommendations

- No new traffic will be generated by the expansion of the aggregate extraction area since the existing area has been depleted. The site will continue to generate 80 daily trips and 8 peak hour trips. Therefore a Traffic Impact Analysis is not required.
- There are no Crook County intersections or roadways listed in the Transportation System Plan that would be impacted by the existing traffic from the site.
- Sight distance is excellent at the site driveway intersection with Stahancyk Lane.
- No Crook County intersections along the haul route are identified as high crash locations or areas that contain a high concentration of pedestrians or bicyclists such as school zones.

Based on the assessment above, the proposed expansion of the of the extraction area to the adjacent tax lot because of depletion of the existing areas should be approved. No full traffic impact analysis is needed.

Very truly yours,

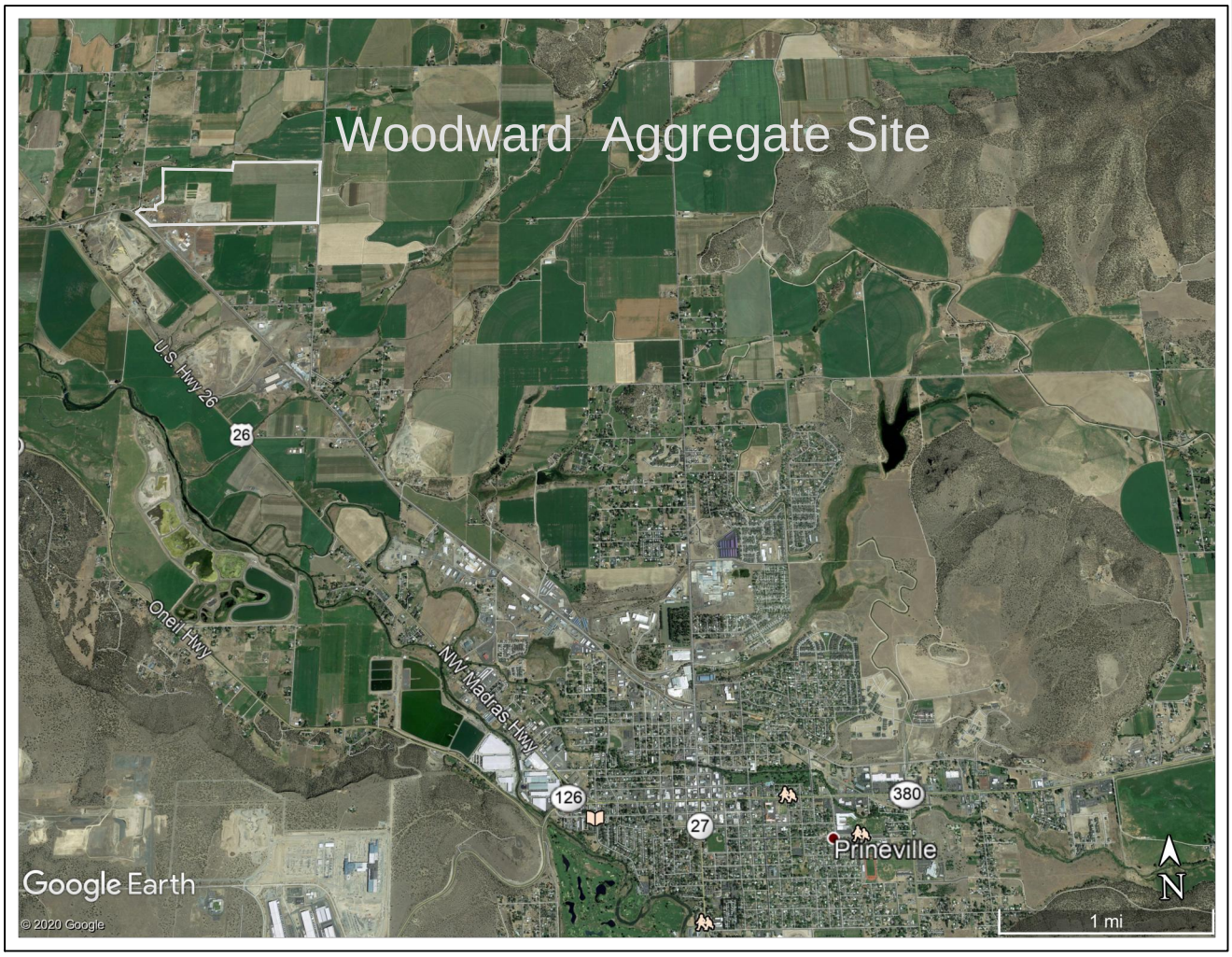
Michael Weishar, PE
Access Engineering LLC

Attachments

Figure 1

Woodward Aggregate Site Expansion Traffic Impact Study

Vicinity Map

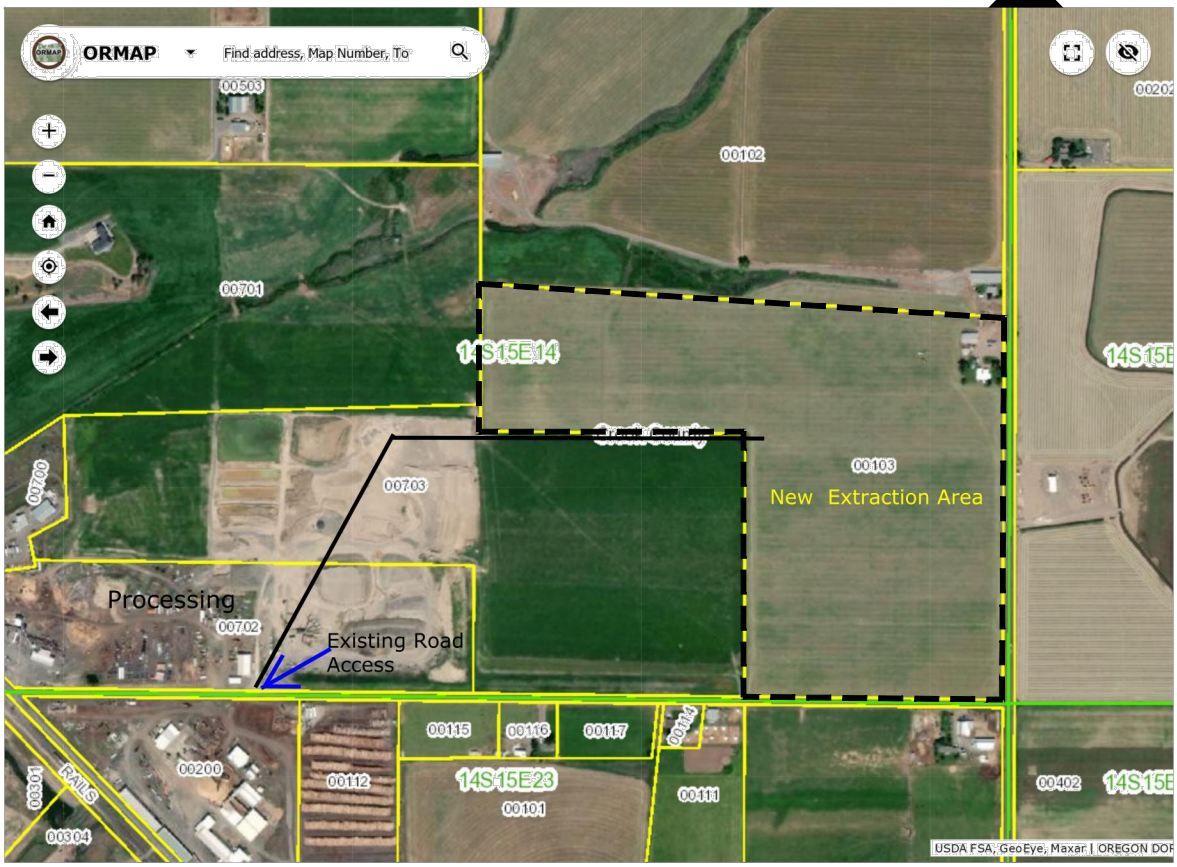


Access Engineering

Figure 2

Woodward Aggregate Site Expansion Traffic Impact Study

New Extraction Area



-120.883 44.358 Degrees

200m

600ft

Access Engineering

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

STAHANCYK LN, MP -999.99 to 999.99, 01/01/2015 to 12/31/2019

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
FINAL TOTAL														

Disclaimer: The information contained in this report is compiled from individual driver and police crash reports submitted to the Oregon Department of Transportation as required in ORS 811.720. The Crash Analysis and Reporting Unit is committed to providing the highest quality crash data to customers. However, because submittal of crash report forms is the responsibility of the individual driver, the Crash Analysis and Reporting Unit can not guarantee that all qualifying crashes are represented nor can assurances be made that all details pertaining to a single crash are accurate. Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

CROOK COUNTY

ELLIOTT LN, MP -999.99 to 999.99, 01/01/2015 to 12/31/2019

1 - 5 of 5 Crash records shown.

SER# / INVEST / RD DPT / UNLOC?	S P E D	A L C	D R G S	M J U V	S I N L	W C H K	O R	DATE / DAY / TIME / LAT	MILEPNT / DIST FROM / INTERSECT / LONG	COUNTY ROADS / FIRST STREET / SECOND STREET / LRS	RD CHAR / DIRECT / LOCTN	INT-TYPE (MEDIAN) / LEGS (#LANES)	INT-REL / TRAF- / CONTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH / COLL / SVRTY	V#	SPCL USE / TRLR QTY / OWNER	MOVE / FROM / TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS / RES	PED LOC	ERROR	ACT	EVENT	CAUSE
00213	Y	N	N		N	N		09/08/2016	0.98	ELLIOTT LN	ALLEY		N	N	CLR	S-1TURN	01	NONE 9	STRGHT										06,01
COUNTY								TH			UN	(NONE)	UNKNOWN	N	DRY	TURN		N/A	S -N								031		00
N								1P			05			N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
N								44 20 40.69	-120 55 36.71			(02)													UNK					
																	02	NONE 9	TURN-L											
																		N/A	S -W								019		00
																		TRUCK		01	DRVR	NONE	00	Unk	UNK		000	000		00
																									UNK					
00182	Y	N	N		N	N		09/01/2015	1.25	ELLIOTT LN	CURVE		Y	Y	CLR	FIX OBJ	01	NONE 0	TURN-L										015,053	01,08,14
COUNTY								TU			UN	(NONE)	REG-SIGN	N	DRY	FIX		PRVTE	E -S								000	053	00
N								9P			01			N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	22	M	OR-Y		047,001,081	017		01,08,14
N								44 20 54.8	-120 55 36.59			(02)													OR>25					
00266	Y	N	N		N	N		12/07/2017	1.26	ELLIOTT LN	INTER	3-LEG	N	Y	FOG	FIX OBJ	01	NONE 9	TURN-R										121,074,124	01,08
COUNTY								TH			N		STOP SIGN	N	ICE	FIX		N/A	S -E								000		00
N								5P			05	0		N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
N								44 20 55.35	-120 55 36.58																UNK					
00007	Y	N	N					01/16/2015	1.70	ELLIOTT LN	STRGHT		N	Y	FOG	FIX OBJ	01	NONE 0	STRGHT										079,096,124	01
NONE								FR			UN	(NONE)	UNKNOWN	N	ICE	FIX		PRVTE	E -W								000	124,079,096	00
Y								6A			07			N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	27	M	OR-Y		047,083,081	017		01
N								44 20 55.33	-120 55 5.63			(02)													OR<25					
00224	N	N	N		N	N		10/06/2019	2.07	ELLIOTT LN	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											27,29
COUNTY								SU			S		UNKNOWN	N	DRY	REAR		PRVTE	S -N								000		00
N								7P			06	0		N	DARK	INJ		PSNGR CAR		01	DRVR	INJC	20	F	OR-Y		016,026	038		27,29
N								44 15 35.7	-120 49 1.83																OR<25					
																	01	NONE 0	STRGHT											
																		PRVTE	S -N								000		00
																		PSNGR CAR		02	PSNG	INJB	04	F			000	000		00
																	02	NONE 0	STOP											
																		PRVTE	S -N								012		00
																		PSNGR CAR		01	DRVR	INJB	34	F	OR-Y		000	000		00
																									OR<25					

Figure 2

Woodward Aggregate Site Assessment

Sight Distance Photos

Photo 1 1000 Feet East of Driveway Looking West

Photo 2 From Driveway Intersection Looking East

Access Engineering

Figure 3

Woodward Aggregate Site Assessment

Sight Distance Photos

Photo 3 1000 Feet West of Driveway Looking East

Photo 2 From Driveway Intersection Looking West

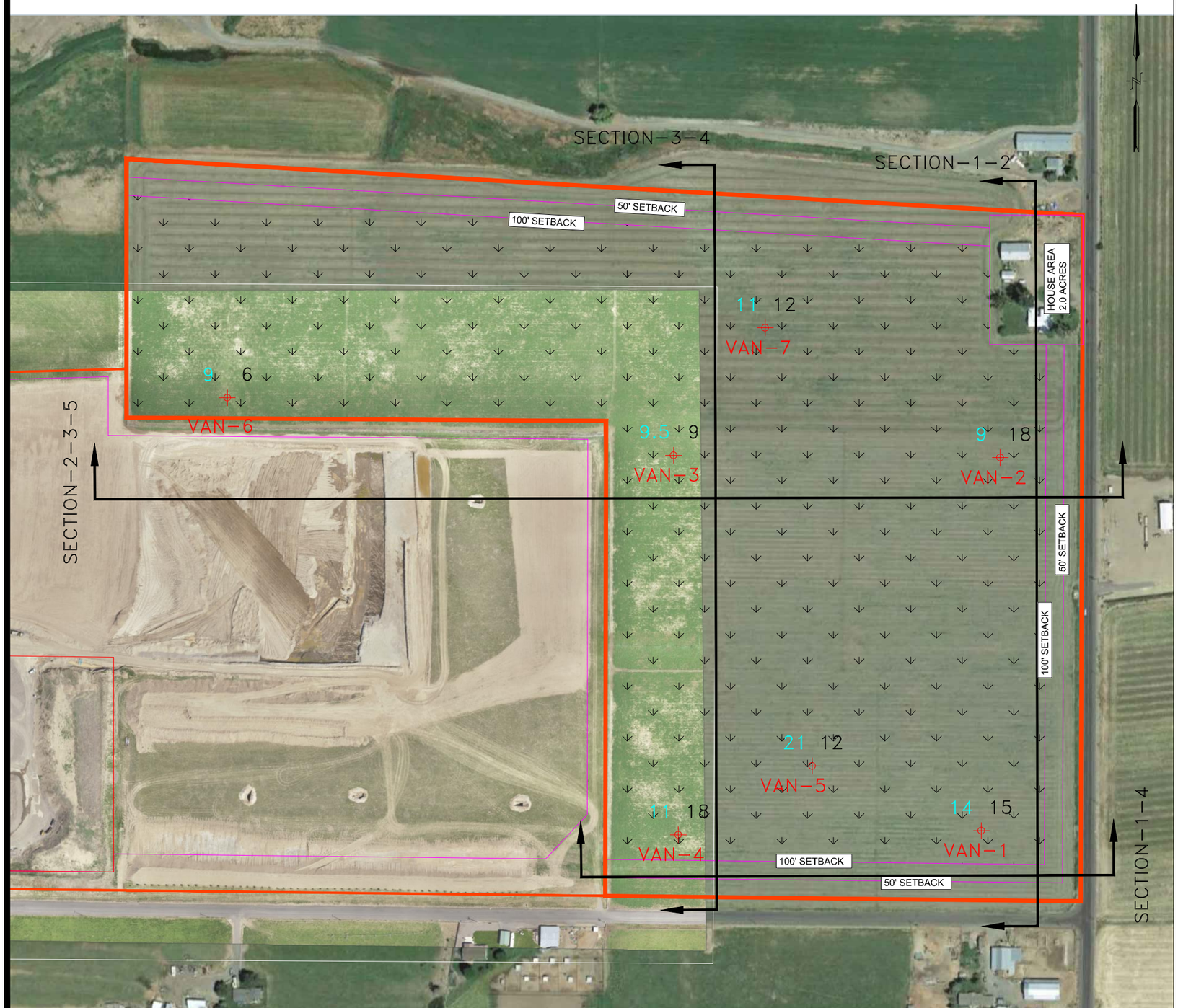
Access Engineering

Figure 4

Woodward Aggregate Site Assessment

Sight Distance

Access Engineering



MINING DATA					
DESCRIPTION	AREA (SF)	AGG VOLUME (CY)	CONVERSION	AGG TONS	OVERBURDON (CY)
RESERVE Calc with 50ft Setback	3,031,214	1,087,088	1.6 TN/CY	1,739,341	1,226,691
RESERVE Calc with 100ft Setback	2,778,927	996,451		1,594,322	1,124,842
AGGREGATE = 9.7FT THICK AVERAGE OVERBURDON = 10.9 FT THICK AVERAGE					

SEE SHEET 2 AND 3 FOR CROSS SECTIONS

14 - POSSIBLE AGGREGATE THICKNESS (FT) - Blue

15 - OVERBURDEN THICKNESS (FT) - Black

VAN–X BORING NUMBER - RED

POSSIBLE MINING AREA SETBACKS

APPROXIMATE PROPERTY BOUNDARY

Scale in Feet

75 0 75 150

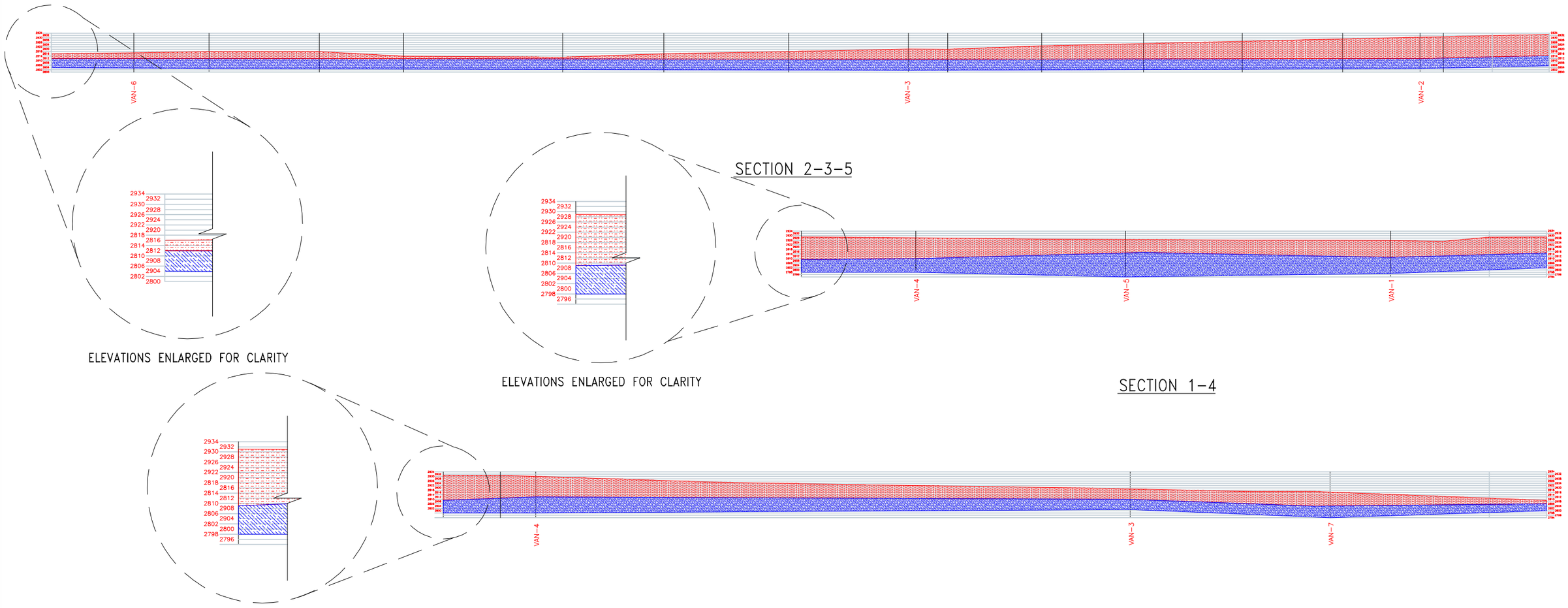
KNIFE RIVER
AN MDU RESOURCES COMPANY

KNIFE RIVER CORPORATION – NORTHWEST
3959 HAMRICK ROAD
CENTRAL POINT, OR

VANIER
MINE AREA SECTIONS Sheet 1
NWR–COR

DATE	REVISION SCHEDULE
6/12/2020	REVISED VOLUMES AND SETBACKS

	DATE	NAME
DRAWN BY:	8/27/19	GIBSON
SURVEYED BY:	8/27/19	..
DATUM/SPC:	..	..
FILENAME:		Field Survey 8-27-19.dwg



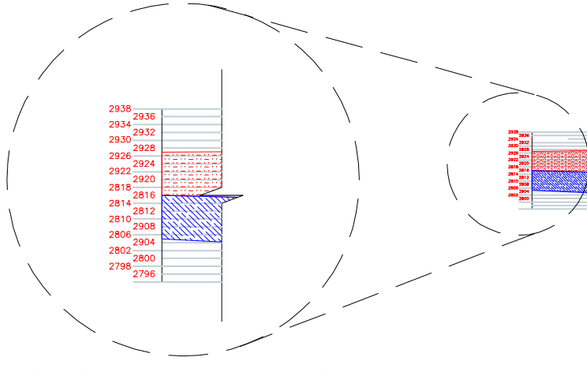
SECTION 2-3-5

ELEVATIONS ENLARGED FOR CLARITY

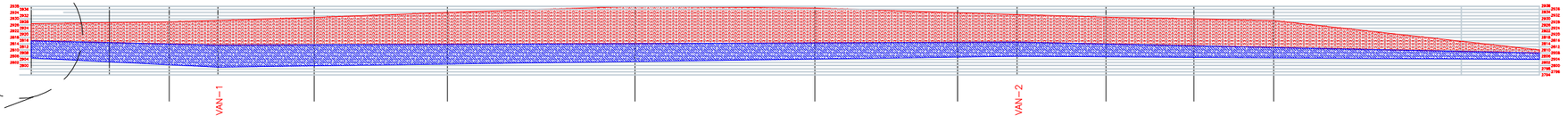
ELEVATIONS ENLARGED FOR CLARITY

SECTION 1-4

SECTION 3-4



ELEVATIONS ENLARGED FOR CLARITY



SECTION 1-2

– AGGREGATE (Blue)

– OVERBURDEN (Red)

Scale in Feet

75 0 75 150

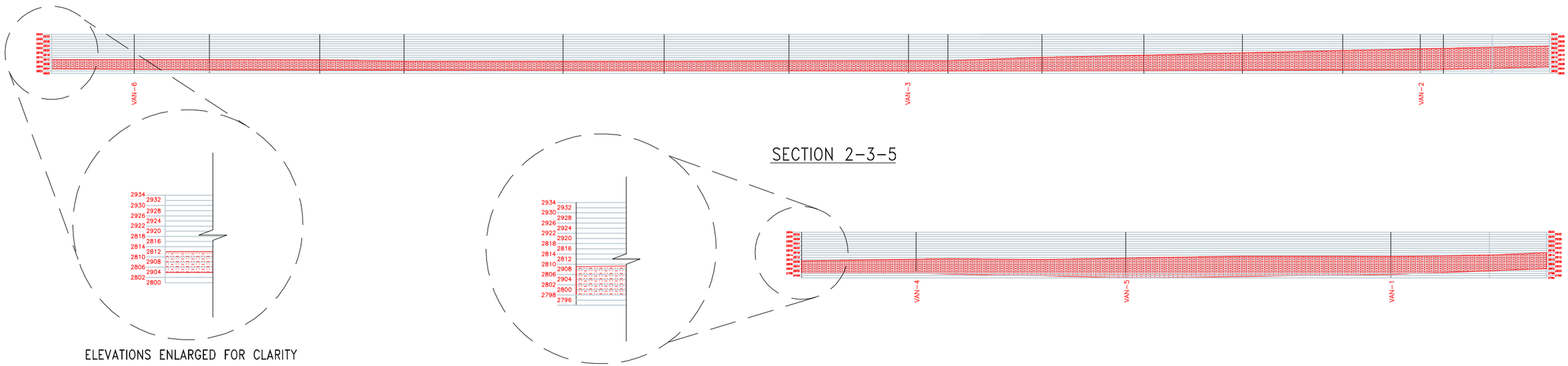
KNIFE RIVER
AN MDU RESOURCES COMPANY

KNIFE RIVER CORPORATION – NORTHWEST
3959 HAMRICK ROAD
CENTRAL POINT, OR

VANIER
MINE AREA SECTIONS Sheet 2
NWR-COR

DATE	REVISION SCHEDULE

	DATE	NAME
DRAWN BY:	8/27/19	GIBSON
SURVEYED BY:	8/27/19	..
DATUM/SPC:	..	..
FILENAME:		Field Survey 8-27-19.dwg



SECTION 2-3-5

ELEVATIONS ENLARGED FOR CLARITY

ELEVATIONS ENLARGED FOR CLARITY

SECTION 1-4

SECTION 3-4

ELEVATIONS ENLARGED FOR CLARITY

SECTION 1-2

– AGGREGATE (Blue)

– OVERBURDEN (Red)

Scale in Feet

75 0 75 150

KNIFE RIVER
AN MDU RESOURCES COMPANY

KNIFE RIVER CORPORATION – NORTHWEST
3959 HAMRICK ROAD
CENTRAL POINT, OR

VANIER
APPROX RECLAIMED SECT Sheet 3
NWR-COR

DATE	REVISION SCHEDULE

	DATE	NAME
DRAWN BY:	8/27/19	GIBSON
SURVEYED BY:	8/27/19	..
DATUM/SPC:	..	..
FILENAME:		Field Survey 8-27-19.dwg

14 – POSSIBLE AGGREGATE THICKNESS (FT) – Blue

15 – OVERBURDEN THICKNESS (FT) – Black

VAN-X BORING NUMBER – RED

POSSIBLE MINING AREA

APPROXIMATE PROPERTY BOUNDARY

Scale in Feet

75 0 75 150

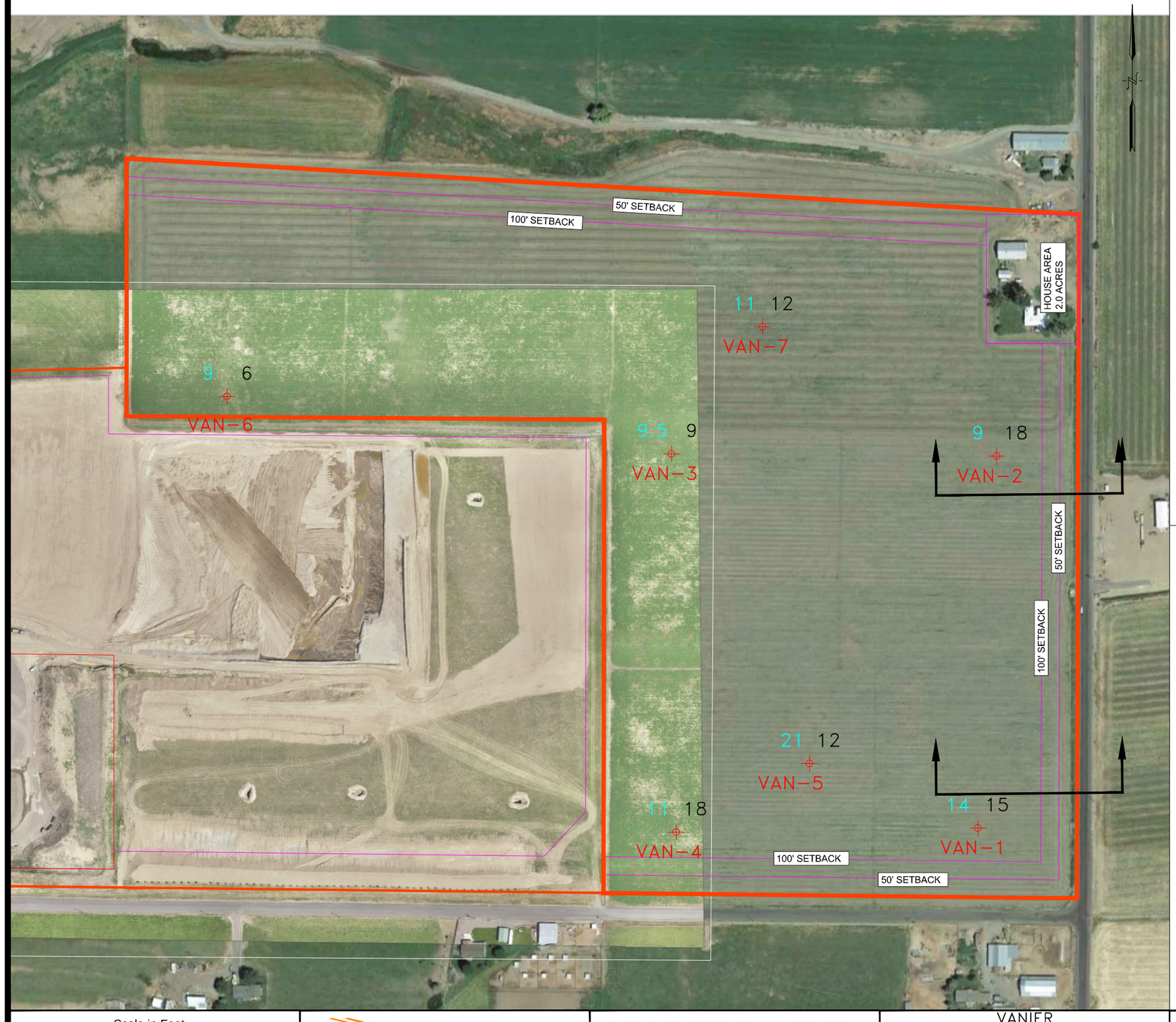
KNIFE RIVER
AN MDU RESOURCES COMPANY

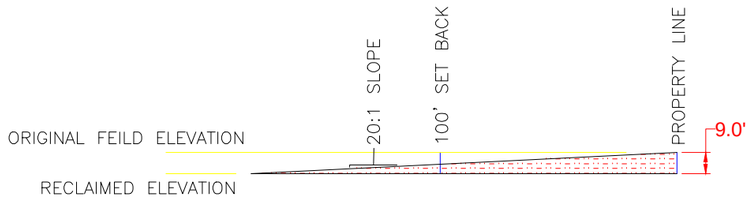
KNIFE RIVER CORPORATION – NORTHWEST
3959 HAMRICK ROAD
CENTRAL POINT, OR

VANIER
MINE AREA SLOPES Sheet-4
NWR-COR

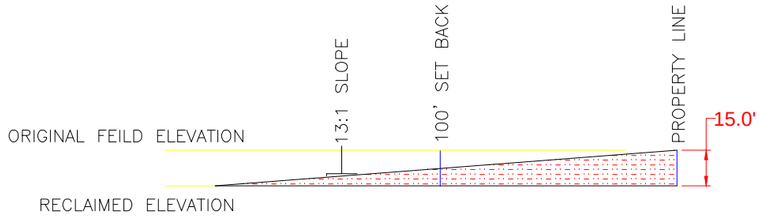
DATE	REVISION SCHEDULE

	DATE	NAME
DRAWN BY:	8/27/19	GIBSON
SURVEYED BY:	8/27/19	..
DATUM/SPC:	..	..
FILENAME:		Field Survey 8-27-19.dwg





VAN-2 TEST PIT CROSS SECTION



VAN-1 TEST PIT CROSS SECTION

14 - POSSIBLE AGGREGATE THICKNESS (FT) - Blue

15 - OVERBURDEN THICKNESS (FT) - Black

VAN-X BORING NUMBER - RED

POSSIBLE MINING AREA SETBACKS

APPROXIMATE PROPERTY BOUNDARY

Scale in Feet

150 0 150 300

KNIFE RIVER
AN MDU RESOURCES COMPANY

KNIFE RIVER CORPORATION – NORTHWEST
3959 HAMRICK ROAD
CENTRAL POINT, OR

VANIER
PROPERTY LINE SLOPES Sheet 5
NWR-COR

DATE	REVISION SCHEDULE

	DATE	NAME
DRAWN BY:	9/26/19	GIBSON
SURVEYED BY:	....	...
DATUM/SPC:	..	..
FILENAME:		Field Survey 8-27-19.dwg

MINING DATA

DESCRIPTION	AREA (SF)	AGG VOLUME (CY)	CONVERSION	AGG TONS	OVERBURDON (CY)
Resource at 50ft Setback	3,031,214	1,087,088	1.6 TN/CY	1,739,341	1,226,691
Resource at 100ft Setback	2,778,927	996,451		1,594,322	1,124,842

AGGREGATE = 9.7FT THICK AVERAGE
OVERBURDON = 10.9 FT THICK AVERAGE

MINE AREAS AVERAGE AGGREGATE VOLUME BETWEEN 78,300 CY AND 97,000 CY

MINE AREAS AVERAGE OVERBURDON VOLUME BETWEEN 88,000 CY AND 109,000 CY

SETBACKS ASSUMED TO BE MINED THROUGH AT WOODWARD PROPERTY BOUNDARY

AREA 13
6.2 acres

AREA 12
6.2 acres

AREA 11
6.5 acres

AREA 10
5.0 acres

AREA 9
5.0 acres

PROPOSED HAUL ROUTE

AREA 8
5 acres

AREA 7
5 acres

AREA 6
5.8 acres

VANIER PROPERTY

WOODWARD PROPERTY

AREA 4
5 acres

AREA 5
5 acres

PLANT AREA

AREA 3
5 acres

AREA 2
5 acres

AREA1
5 acres

MINING SETBACK AREA

APPROXIMATE PROPERTY BOUNDARY

Scale in Feet
75 0 75 150

KNIFE RIVER
AN MDU RESOURCES COMPANY

KNIFE RIVER CORPORATION – NORTHWEST
3959 HAMRICK ROAD
CENTRAL POINT, OR

VANIER
OPERATION DETAILS Sheet 6
NWR–COR

DATE	REVISION SCHEDULE

	DATE	NAME
DRAWN BY:	6/5/2020	GIBSON
SURVEYED BY:	.	..
DATUM/SPC:	..	..
FILENAME:		Field Survey 8-27-19.dwg

KNIFE RIVER
AN MDU RESOURCES COMPANY

www.kniferiver.com

Knife River Corporation – Northwest
32260 Old Hwy 34
Tangent, OR 97389-9770
Ph: (541) 918-5100

Corporate Office: Fax (541) 918-5375
AR Dept.: Fax (541) 918-5376
HR/Payroll Dept.: Fax (541) 918-5378
Willamette Valley: Fax (541) 928-6490

May 24, 2021

Crook County
Planning Commission
300 NE 3rd St., Room 12
Prineville OR 97754

Re: Haul/Processing Acknowledgment

To the Commissioners:

This letter is to acknowledge that the applicant, Knife River Corporation – Northwest ("Knife River"), and Woodward Land & Timber, LLC ("Woodward"), successor in interest to Craig and Lucy Woodward, have mutually agreed to allow Knife River to haul aggregate mined on adjacent tax lot 103, Map 14S-15E- 14 (Assessor's Acct. No. 17737) through Woodward's tax lots 702 and 703, Map No. 14S-15E-14 (Assessor's Acct. Nos. 19653 and 19179, respectively). This agreement also authorizes Knife River to process that material at its existing plant on tax lot 702.

Acknowledged:

Woodward Land & Timber, LLC

Clay Woodward, Managing Member

Date: 5/25/21

Knife River Corporation - Northwest

Steve Mote, Vice President of Operations

Date: 5-27-21

Oregon
Kate Brown, Governor

Department of Geology and Mineral Industries
Mineral Land Regulation and Reclamation
229 Broadalbin Street SW
Albany, OR 97321-2246
(541) 967-2039
Fax: (541) 967-2075
www.oregongeology.org

July 3, 2019

Knife River Corp. NW - Tangent
32260 Old Highway 34
Tangent OR 97389-9770

MLRR ID: 07-0159
Woodward Site
Inspection Conducted May 29, 2019

On May 29, 2019, Ben Mundie, DOGAMI Reclamationist, completed an onsite visit to DOGAMI Surface Mine Site No. 07-0159.

Enclosed you will find the completed inspection report for your review and records. Please note that if DOGAMI field staff noted any concerns or compliance issues at the site, you will be contacted separately by the Compliance Lead for follow-up. If you have any questions pertaining to the site visit, please contact Ben Mundie at (541) 967-2149 or Ben.Mundie@oregon.gov.

c: Crook County Planning Department
Craig Woodward Prineville

Oregon Department of Geology and Mineral Industries
Mineral Land Regulation and Reclamation Program
229 Broadalbin Street SW
Albany, OR 97321-2246
(541) 967-2039
Fax (541) 967-2075

Mine Site Inspection Report

Site Info

Permit ID:	07-0159	Permit Type:	OP
Meeting Type:	Scheduled	Inspection Type:	Request
Inspected By:	Ben Mundie	Date Inspected:	5/29/2019
Contact Person:	Glenn Morgan	Date Contacted:	5/28/2019
Accompanied By:	Glenn Morgan	Not Accompanied:	☐

Comprehensive Review Completed: N/A By: Date:

Survey Map Approved: Yes Survey Map Acres: 112 Date: 12/18/2015

Survey boundary marked in the field: Yes Site conditions reviewed with the permittee: Yes

Aerial Review

Most Recent DOGAMI Aerial(Date): 5/12/2014 Disturbed Acres on Aerial: 0

On-site Disturbance Area/Acreage appears to: Be consistent with referenced aerial. No

Have expanded. Yes

Have been reduced via reclamation/revegetation. N/A

The DOGAMI GIS disturbance coincides with the disturbance as seen on Google Earth: No

Most Recent Google Earth(Date): 7/27/2019

Site Conditions

On-site Operations (including stockpiling and processing) appear to:

Be within the boundaries of the permit. Yes

Have encroached on the setbacks. No

Excavation Slope Information: Excavation Type: Continuous Slope

Interim slopes appear to be approximately: 0.25 H: 1 V (e.g. 1½H:1V)

Fill Slope Information: Are there fill slopes on-site? Yes

Interim slopes appear to be approximately: 4 H: 1 V (e.g. 2H:1V)

Excavation Highwall height is estimated to be 15 ft. tall.

Bench Configuration N/A # of established benches: 0

Soil and Overburden materials have been salvaged: Yes

Soil stockpiles appear to be stabilized against wind and water erosion: Yes

Overburden stockpiles appear to be stabilized against wind and water erosion: Yes

Is there any evidence of erosion or rilling? No Was there observable track-out? No

Stormwater

Does the site have a DEQ NPDES 1200-A stormwater permit? No NPDES 1200-A File No:

Were the designated discharge points checked?

If yes, was the off-site discharge less turbid than the receiving waters of the state?

Does the site have a DEQ WPCF-1000 permit? Yes WPCF-1000 File No: 124758

Was the process water pond/system checked? Yes

Do BMPs appear to be in good working order? Yes

BMPs observed on-site:

- ☑ Paved Entry
- ☐ Wheel Wash
- ☑ Graveled Roads
- ☑ Graveled Floors
- ☐ Conveyance Ditches
- ☑ Retention Berms
- ☐ Rock Check Dams
- ☑ Settling/Inf. Ponds
- ☑ Infiltration
- ☑ Sloping
- ☑ Vegetation

Other: Other:

Reclamation Security

The reclamation security calculation was based on 15 acres, utilizing a calculation of $ 3000 for the first acre and $ 2000 for each additional acre.

Were the reclamation obligations reviewed with permittee/representative? Yes

Does the current reclamation security appear adequate for the current site conditions Yes

Conclusion

Were concerns noted during the site visit? No

Concerns noted:

- ☐ Operation/mining outside of approved area
- ☐ Observable track-out
- ☐ Sedimentation/Erosion
- ☐ BMP maintenance required
- ☐ Turbid water discharge into waters of the state
- ☐ Discharge without a DEQ permit
- ☐ Generation of process water without a DEQ permit
- ☐ Inadequate reclamation security

Other:

Other:

Has the permittee been notified of any on-site concerns noted above N/A

Is a follow-up site visit anticiapted or required? No

Inspection Notes:

June 5, 2019
07-0159 Knife River Corp. Woodward Site
Site Inspection

On May 29, 2019, I met with Glenn Morgan of Knife River Corporation Northwest at the Woodward site. This inspection was scheduled to review operations after this site was nominated for the MLR Awards Program.

DOGAMI issued an operating permit for the Woodward Site in April 2016, and mine operations began soon thereafter. The DOGAMI Operating Permit boundary had been surveyed and clearly marked in the field.

A sound and visual berm has been constructed along the eastern permit boundary adjacent to Sthahancyk Lane. Noise and visual berms are required by the Crook County land use authorization Conditional Use Permit. However, the construction of the berms and establishment of native vegetation and successful planting of trees is an outstanding example of exceeding requirements.

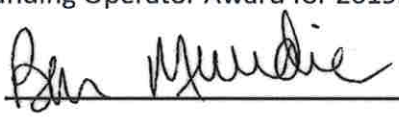
Initially a 12-acre area was opened up to set up a processing plant and stockpile area. Soils and overburden were utilized to construct a noise and visual berm along the southern operating permit boundary adjacent to Stahancyk Lane. 4 process water ponds were constructed within a 4-acre area, and an initial excavation area of 7 acres was opened in the northwest corner of the permit boundary.

The initial 7-acre excavation area has been reclaimed and returned to irrigated alfalfa production. The process water ponds are a closed loop system that allows process water to be recycled. A new 6-acre excavation cell has been opened just north of the processing area. This excavation cell will be reclaimed concurrently as a new cell is developed.

The depth of mining varies based on the elevation of hard pan clay layer but averages 15 feet below original ground level. Ground water has not been encountered within the excavation. The site is internally drained, there is no evidence or reports of storm water discharge beyond the DOGAMI Operating permit boundary. Knife River Corporation Northwest completed a new irrigation well in the southeast corner of the permit boundary. This well provides irrigation to the trees planted along the berm and is also available to neighboring irrigated fields.

Dust suppression is a county and state requirement. During this site visit, excavation was active as well as the processing plant. Fugitive dust was not visible.

The Woodward site has been developed to a level that exceeds the county and state permit conditions. Knife River Corp. will be nominated for the Outstanding Operator Award for 2019.

Reclamationist Name: Ben Mundie Signature: 











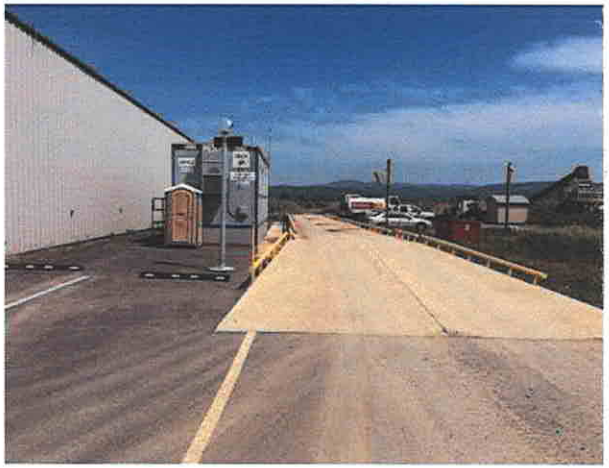












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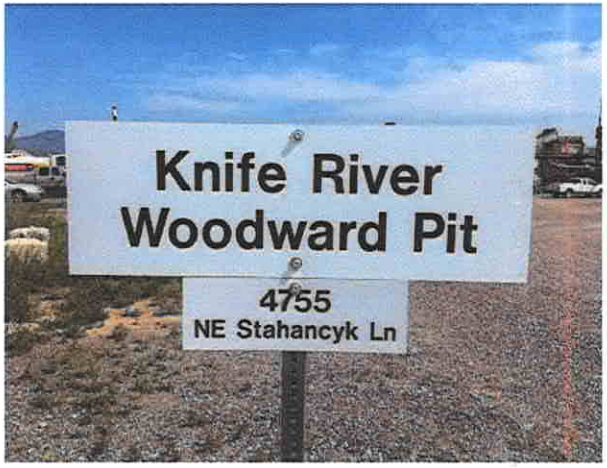
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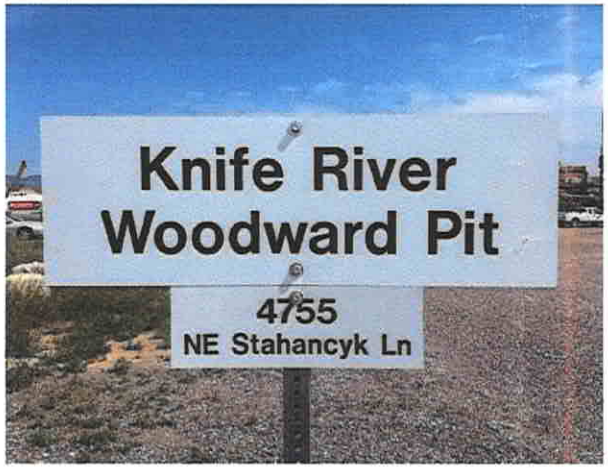
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Woodward/Vanier Aggregate Mine Hydrogeologic Characterization

March 2021

Prepared for:

Prepared for: Knife River Corporation
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Table of Contents

1.0 INTRODUCTION 1.1

2.0 REGIONAL GEOLOGICAL AND HYDROGEOLOGICAL SETTING 2.1

3.0 LOCAL GEOLOGIC AND HYDROGEOLOGICAL SETTING 3.1

4.0 TEST WELL DRILLING AND GROUNWATER CONDITIONS 4.1

5.0 AQUIFER TESTING AND HYDROGEOLOGICAL DATA 5.1

6.0 GROUNDWATER INFLOW ANALYSIS - WOODWARD 6.1

7.0 GROUNDWATER INFLOW ANALYSIS - VANIER 7.1

8.0 WATER RIGHTS IMPACT ANALYSIS 8.1

9.0 RECOMMENDED WATER MANAGEMENT TO MITIGATE IMPACT TO ADJACENT WATER RESOURCES 9.1

10.0 RECLAMATION CONSIDERATIONS 10.1

11.0 CONCLUSIONS AND RECOMMENDATIONS 11.1

12.0 REFERENCES 12.1

WOODWARD/VANIER AGGREGATE MINE HYDROGEOLOGIC CHARACTERIZATION
MARCH 2021
Table of Contents

TABLES

1 Groundwater Inflow Scenario at Mining Cell Area 10 for Woodward Property
2 Groundwater Inflow Scenario at the Vanier Property
3 Wells Within a One-Half Mile and 1000-Foot Buffer

FIGURES

1 Geology Near the Woodward and Vanier Property
2 As-drilled Test Wells and Test Pits
3 Groundwater Elevations
4 Woodward and Vanier Mining Cells
5 Proposed Mining Approach – Inflow Analysis
6 Water Rights Within 1000 and 2640 Feet

APPENDICES

A Well Completion Reports
B Aquifer Testing Results
C Soil Testing Results

1.0 INTRODUCTION

Wenck, now part of Stantec (Wenck) has completed a hydrogeologic investigation and groundwater inflow analysis at the Woodward and Vanier properties located near Prineville, Oregon, for the Knife River Corporation (Knife River). Both properties are located on the north side of Stahancyk Lane and east of Elliot Lane in the southern ½ of Section 14 Township 14 South, Range 15 East along the Crooked River in Crook County. Comprised of 112 acres, the Woodward property (Woodward) lies within two tax lots, 702 and 703, and are owned by Woodward Land & Timber. Comprised of 77.98 acres, the Vanier property (Vanier) lies just east of Woodward in tax lot 103 and is owned by Robert J. Vanier Jr. and Lani Vanier. Knife River is currently mining the sand and gravel resources at Woodward and expects to finish mining the remaining cells at Woodward by the end of 2021. Knife River anticipates mining will continue into Vanier in 2022. Wenck understands Knife River is in the process of preparing a Goal V application to submit to Crook County and will also submit an Operating Permit application to the Oregon Department of Geology and Mineral Industries (DOGAMI) for Vanier.

As mining has progressed to the east across Woodward, Knife River has encountered increasing amounts of groundwater near the eastern boundary between Woodward and Vanier. While this water has not adversely affected mining efforts, it has hindered reclamation in the blocks that have been mined out. Wenck understands the landowners want these properties reclaimed to farm fields or hay meadows and supplemental imported materials are prohibited for reclamation efforts. The groundwater encountered in the area is making it difficult to meet this reclamation objective. The water was not expected nor in the quantities observed. Knife River's permit to mine at Woodward includes a mining depth limitation of only 20 feet below ground surface (bgs) and prohibits dewatering. In addition to addressing the groundwater issues at Woodward, this report will address the local area groundwater setting, groundwater handling at Vanier and a proposed mine and reclamation plan that will allow maximum resource recovery with no impact to area groundwater rights. The data and technical discussions of this report can be submitted as part of the Goal V application to Crook County and the permit application to DOGAMI.

The purpose of our work has been to answer the following questions and provide solutions:

- Can we reduce or eliminate the presence of groundwater during backfill and reclamation?
- Can we meet the landowner's proposed and desired final land use: pasture and hay meadow?
- If we dewater (pump and discharge), can we do so with no impact to surrounding water rights and resources?
- Are there alternative means to pump and discharge that will protect area wells and water rights?
- Can we develop a backfill plan that will allow successful farm field reclamation?

To address these questions, Wenck completed a multi-phased scope of work which included evaluating geologic and hydrogeologic literature; locating water rights in the surrounding areas; drilling of test wells at Woodward and aquifer testing; evaluating water management strategies; estimating potential groundwater inflows; and evaluating reclamation plans and options.

2.0 REGIONAL GEOLOGICAL AND HYDROGEOLOGICAL SETTING

Woodward and Vanier are located near the intersection of the High Cascades, High Lava Plains, and Blue Mountains geologic provinces in central Oregon (McClaughry & Ferns, 2006). The property lies within the Lower Crooked River Basin which formed due to regional explosive volcanism and basalt lava flows. The present basin is centered on the Crooked River Caldera, a semi-elliptical, northwest-southeast elongated depression consisting of a large vent complex that collapsed and filled with a rhyolitic ash-flow tuff (McClaughry et al., 2009). Broadly speaking, the rocks comprising the Prineville area consist of a succession of Tertiary volcanic and sedimentary strata and including lava flows of the Clarno Formation; rhyolite, tuff, and sedimentary rocks of the John Day Formation; basalt flows of the Prineville Basalt; sediments and lava flows of the Deschutes Formation; and Quaternary surficial and valley fill deposits.

As shown on **Figure 1**, geologic mapping of the area indicates that Woodward and Vanier are entirely covered with Quaternary Terrace Deposits. The deposits resulted from backwater deposition occurring after lava flows dammed the Crooked River Canyon downstream of the site**.** As the Crooked River Basin filled with sediment, the coarser sands and gravels prograded out from the Ochoco Mountains to the northeast creating large terraces north of Prineville on which Woodward and Vanier are located. Surficial sediments near the site mainly consist of stream alluvium (Qal) deposited in active stream channels and flood plains underlain by terrace deposits (Qs) consisting of abandoned terraces of the Crooked River (Swanson, 1968) and fluviolacustrine deposits. Alluvial sediments are deposits of recent geologic age underlying the present flood plains of the Crooked River consisting of unconsolidated gravel, sand, and silt, generally less than 40 feet thick. The gravel and sand in the alluvium yield small to moderate amounts of water to wells in the area. (Robinson and Price, 1968). The underlying terrace and fluviolacustrine deposits are described as thick beds of silt and clay alternating with thin beds of sand and fine gravel. These units have been observed as thick as 300 feet near Prineville (Swanson, 1968). A stratum of sand and gravel, ranging in thickness between 10 and 30 feet, constitutes the most productive aquifer in the Prineville area (Robinson and Price, 1968). This aquifer unit yields moderate to large amounts of water to the wells and is described as confined with artesian pressures. The terrace and fluviolacustrine units were deposited on an eroded surface of the Madras Formation, though the contact between these two units is difficult to distinguish in well logs (Robinson and Price, 1968).

3.0 LOCAL GEOLOGIC AND HYDROGEOLOGICAL SETTING

To assess the geologic resources of Woodward, Knife River conducted two investigations using test pit excavation methods. In October 2014, Knife River conducted an aggregate resource investigation of the sand and gravel (construction aggregates) at Woodward that could reasonably be recovered through mining. The site investigation was performed by digging test pits with an excavator to determine aggregate resource and overburden thicknesses and collect samples for materials testing. A total of 27 test pits were dug between October 20 and October 27, 2014. The locations of these test pits are noted on **Figure 2**.

Knife River identified three basic units from this investigation:

- Overburden – topsoil and generally fine-grained subsoil material that overlie the aggregate resource. The overburden unit varied in thickness between 1 and 16 feet at the site with thicknesses generally increasing to the east.
- Aggregate Resource – sand and gravel, the primary target of the exploration at the Woodward site. The aggregate resource was thickest at TP-21 in the center of the site and was not present at TP-16 and XP-5 located at the north-northwest and south-southwest ends of the property, respectively. There is no observable correlation between the location of the test pit and aggregate resource thickness.
- Silt – silts and clays underlying the aggregate resource. The silt unit described above was encountered below the aggregate resource in all cases where the exploration pit was dug to a depth below the target sand and gravel unit. The silt was observed as shallow as 2 feet bgs at TP-18 approximately 700 feet north of the property boundary and as deep as 18 feet bgs at TP-21 in the center of the site. There is no strong correlation between the depth at which the silt unit was observed and its location, though, the depth tended to be deeper in the center of the site.

After groundwater was encountered in mine blocks (Areas 7 and 8) to the east at Woodward, Knife River conducted an additional investigation to assess conditions by excavating four test holes. The purpose of this investigation was to quantify groundwater at the eastern Woodward/western Vanier boundary for the remainder of the mining efforts at Woodward. The data could provide initial information for future mining considerations at Vanier. The test holes were dug on December 1, 2020 and logged by Bill Gibson of Knife River. The locations of these test holes are also noted on **Figure 2.** Overburden was observed to a depth of 8, 5, and 10 feet at Test Holes 1 through 3, respectively. Below this unit, 7 to 8 feet of sand was observed at Test Holes 1 and 2 but was not present at Test Hole 3. Seven feet of gravel was noted at Test Hole 1, 1 foot at Test Hole 2, and 6 feet at Test Hole 3. However, Test Hole 2 was not excavated to the bottom of the gravel unit, suggesting a greater gravel thickness could be present. Test Hole 1 was likely dug deeper than the gravel unit but was difficult to observe due to groundwater flow through the unit. Test Hole 3 was dug past the gravel unit and encountered a silt unit at 16 feet.

During Knife River's 2014 test pit investigation, groundwater was noted in seven of the 27 test pits. Groundwater flow was not quantified during logging, though units that appeared to be wet or water yielding were recorded. Water bearing units consisted primarily of gravel with varying amounts of sand. Water was encountered as shallow as 9 feet at TP-5 on the northeastern edge of the property and as deep as 17 feet bgs at TP-13 located centrally towards the eastern side of the property. All test pits which encountered water were located on the eastern half of the property. This observation is consistent with

the locations where Knife River began encountering water during mining. During Knife River's test hole investigation in 2020, groundwater was encountered in all three test holes at depths ranging from 7 to 15 feet bgs. The most water was present at Test Hole 1 where Knife River visually estimated nearly 100 gallons per minute (gpm) of inflow between 15 and 22 feet bgs. Similarly Knife River estimated approximately 25 gpm of inflow at Test Hole 2 between 13 and 14 feet. Since Test Hole 2 was not dug entirely through the gravel unit, it is possible that a greater flow rate is present. Knife River noted less than 5 gpm at Test Hole 3, where water was flowing through the gravel unit between 15 and 19 feet. Based on the test hole logs, groundwater flow appears to increase moving from west to east.

To assess the aggregate resources at Vanier, Knife River conducted a site investigation in June 2019. Seven soil borings were drilled to depths between 30 and 35 feet to assess the lateral continuity of the sand and gravel resources. The locations of these borings are noted on **Figure 2**. The overburden unit consists of topsoil and silt which transitions into silty fine to medium grained sand with occasional gravel. Overburden depths varied from 6 to 18 feet. The aggregate resource consisted primarily of sand and gravel with occasional silt and varied in thickness between 9 and 21 feet. Aggregate resource thickness tended to be slightly greater in the southern portion of Vanier. A silt unit similar to that encountered at Woodward was encountered below the aggregate resource unit. This unit generally consisted of silt and clay with occasional fine sand and was found at depths between 15 and 33 feet bgs. The silt unit appears to be found deeper toward the southern end of the site. Groundwater flow was not quantified during this site investigation, though the depths and intervals at which sediments appeared to be wet were reported. Water was typically present in the sand and gravel unit in all soil borings found at depths between 6 and 33 feet, apart from soil boring VAN-05. The sand and gravel unit in soil boring VAN-06 was dry at the time of drilling but became wet overnight.

Based on these investigations and local water well records, Wenck prepared a water table map. Wenck prepared this map by plotting groundwater elevations measured at nearby shallow wells drilled or screened to a maximum depth of 40 feet. This distinction in shallow well depth was made based on the thickness of alluvial deposits specified by Robinson and Price in *Ground Water in the Prineville Area, Oregon* (1968). Groundwater was found to flow generally from the northeast towards the southwest. Groundwater elevations were also plotted based on water level observations made by Tim Marshall during test pit logging at both the Woodward and Vanier property. Only water level measurements recorded between June and October were considered in part to reduce error caused by seasonal fluctuations in the water table and an abundant amount of available data recorded during these months. Water level observations made by Knife River during their test hole investigation at the Woodward property were omitted due to this investigation occurring in December. Groundwater contours were generated based on reported groundwater elevations measured at each well and water levels noted during each site investigations. The location of these shallow wells and test pits, their groundwater elevations, and water table contours are noted in **Figure 3**. Based on the configuration of the groundwater table, Wenck anticipates that Knife River will continue to encounter groundwater as it mines into Vanier. This map was also prepared to estimate the saturated thickness of sand and gravel that would potentially need to be dewatered at the Vanier property.

4.0 TEST WELL DRILLING AND GROUNWATER CONDITIONS

In collaboration with Yellow Jacket Drilling (Yellow Jacket), Wenck completed three test wells: WW-1A, WW-2A, and WW-3A. These wells were drilled and installed between January 18 and 20, 2021, along the southeastern edge of the Woodward property, bordering the southwestern edge of Vanier, as shown on **Figure 2.** The objective of this aspect of the investigation was to obtain the hydrogeologic properties of the shallow aquifer. Knife River was particularly interested in the volume of groundwater that might be encountered as they mine the remaining two Woodward cells: Areas 9 and 10. The test wells were also drilled to provide Knife River with insight regarding potential groundwater conditions at Vanier, east of the wells.

Wenck observed the drilling, completion, and development for each test well. The wells were drilled using sonic drilling methods. Sonic drilling uses high-frequency vibrations to advance a core barrel into the subsurface formations, allowing for continuous coring. Wenck logged the continuous 8-inch core sample during drilling at each hole. All three wells fully penetrate the surficial aquifer and were completed to the top of the silt/clay unit below the sands and gravels. Based on water level data collected at the site, groundwater encountered during mining operations at Woodward is transmitted through the alluvial sands and gravels. The clay unit was encountered at 30 feet bgs at WW-2A and WW-3A, and 32 feet bgs at WW-1A. Because of this, the wells were completed to 30, 25, and 28 feet at WW-1A, WW-2A, and WW-3A, respectively. Test wells WW-1A through 3A were developed and completed as 4-inch diameter PVC wells. Well construction details are included in **Appendix A.**

Geologic drill log data for WW-1A through 3A indicated that shallow subsurface sediments consist of both fine- and coarse-grained sediments overlying the John Day Formation. The upper 15 feet at each well generally consisted of tan to brown silty sand and sandy clay with varying amounts of carbonaceous material. Below that layer, 0.5 to 2-inch diameter subrounded gravel with medium grained sand with varying amounts of silt is generally present between 15 and 27 feet bgs. This gravel laden unit is the source of mineable rock at the site. The silty sand and sandy clay unit above the sand and gravel resource is overburden. The upper 2 to 4 feet is topsoil. A silty sand unit that transitions into a lean clay underlies the sand and gravel and was the completion depth of each well. The top of the silty sand unit (base of the sand and gravel resource) was encountered at 29, 26, and 28 feet at WW-1A, WW-2A, and WW-3A, respectively.

Moist sediments were observed at the time of drilling between 9 and 11 feet bgs at each well. A PVC monitor/test well was completed at each site (WW-1A, WW-2A, and WW-3A) and static water levels were measured to be 20.6, 21.4 and 17.5 feet bgs, respectively, on January 21, 2021. These data suggest that localized groundwater flow is from WW-3A to WW-1A, or from north to south. The water table map on **Figure 3** presents a broader picture of the local area groundwater flow.

5.0 AQUIFER TESTING AND HYDROGEOLOGICAL DATA

Wenck collaborated with Yellow Jacket to conduct aquifer testing of the surficial aquifer. Stepped Rate and Constant Rate tests were conducted using submersible pumping equipment. Stepped Rate testing was conducted at WW-1A and WW-3A. Constant rate testing was conducted at WW-1A in conjunction with WW-2A and WW-3A acting as observation wells. During the pumping and recovery portions of these tests, Wenck acquired water level data using both downhole pressure transducers and water level tapes. Discharge measurements were collected using a calibrated bucket and a stopwatch. The aquifer testing graphs, and associated analysis are included in **Appendix B**.

Stepped and Constant Rate tests were completed on WW-1A on January 19, 2021. Prior to the initiation of pumping, the static water level at the well was recorded to be 21.06 feet bgs. The Stepped Rate test was completed at discharge rates of 2 and 2.5 gpm. A third step was not completed due to the well's water yield limitations. Discharge rates were increased at the end of the first step without allowing water level recovery between steps. The maximum drawdown from the initiation of pumping through the second step was 8.92 feet. Following the second step, the pump was shut off and the well recovered to pre-pumping water levels after approximately 25 minutes. Following the Stepped Rate test, Constant Rate testing was conducted at WW-1A on January 20, 2021. Prior to testing, the static water level was recorded to be 21.13 feet bgs. Based on stepped rate testing, a target flow rate of 2 gpm was selected given pump and well capabilities. The constant rate test was conducted for 12 hours at an average flow rate of 2.2 gpm. At the end of this constant rate test, drawdown was 8.43 feet.

Due to lower than expected well yields observed at WW-1A and WW-2A, a third well, WW-3A, was drilled to assess the lateral continuity of the surficial aquifer and to see if a well completed further north and towards Kinfe River Test Hole 1 may yield more water. Knife River's Test Hole 1 is described further in Section 3 yielded large water inflow rates (+/- 100gpm). Prior to the initiation of pumping, the static water level was recorded at 17.58 feet bgs. Stepped rate testing on WW-3A was completed on January 21, 2021 and yielded discharge rates of 1 and 2 gpm. A third step was not performed due to the well's limited water yield capabilities. The maximum drawdown from the initiation of pumping through the second step was 9.27 feet. Following the second step, the pump was shut off and the well recovered to pre-pumping water levels after approximately 15 minutes.

A second Constant Rate test (January 22, 2021) was conducted on WW-1A to observe pumping impacts to water levels in the observation wells (WW-2A and WW-3A). WW-3A is located approximately 144 feet to the north of WW-2A. WW-2A is approximately 18 feet north of WW-1A. Prior to testing, water levels were recorded to be 21.16, 20.67, and 17.52 feet bgs at WW-1A, WW-2A, and WW-3A, respectively. A target flow rate of 2 gpm was originally selected, though, the target flow rate was increased to 3 gpm halfway through the test to ensure the opportunity to impact (observe drawdown) nearby observation wells. The Constant Rate test was conducted for 11 hours at an average flow rate 2.5 gpm. At the end of constant rate pumping, drawdown was measured to be 8.13 and 0.04 feet at WW-1A and WW-2A, respectively. No observable change in water levels was noted at WW-3A.

Based on data collected during stepped rate testing at WW-1A and WW-3A and constant rate testing at WW-1A, the following conclusions were made:

- Aquifer test analyses using Waterloo's AquiferTest Pro 10.0 revealed a range in transmissivity values between 2,215 and 9,195 gallons per day per foot (gpd/ft).

- Hydraulic conductivity values varied between 218 and 903 gallons per day per square foot (gpd/ft^2). Hydraulic conductivity values in this range are typical of silty sand or fine to medium grained clean sand (Heath, 1983).
- The storage coefficient was estimated to be 0.285 which is typical of an unconfined aquifer (Lohman, 1972).

6.0 GROUNDWATER INFLOW ANALYSIS - WOODWARD

Based on the data acquired from monitoring well drilling and aquifer test analysis, Wenck estimated the groundwater inflow volumes that could be produced from Area 10 as Knife River continues mining to the east toward Vanier. Only Area 10 was considered for this inflow analysis because minimal groundwater is expected in Area 9. It is to Wenck's knowledge that Knife River reported minimal groundwater influence when Area 6 and 7 (mining cells directly north of Area 9) were mined. Areas 9 and 10 are located at the southeastern edge of the property and are illustrated in **Figure 4** along with other, previously mined cells.

Mine plan drawings provided by Knife River were used to identify the remaining two cells to be mined at Woodward and were used in this analysis. Areas 9 and 10, 7.3 and 9.3 acres respectively, are the remaining mining cells expected to be mined during the summer of 2021. Knife River's 2014 test pit investigation indicates minimal groundwater will be present within Area 9 based on a series of nearby test holes yielding no water. Area 10 was analytically modeled under three mining approaches, extracting the resource from (1) the mine block as a whole; (2) from ten individual 66-foot-wide mining cells, which are mined from west to east and backfilled in a contemporaneous fashion; and (3) ten 55-foot-wide mining cells, which are mined from north to south and backfilled in a contemporaneous fashion. Each mining approach is illustrated on **Figure 5**. These mining approaches were chosen for the purpose of providing Knife River alternatives for extracting the remaining aggregate resources at Woodward with the least potential groundwater production. Analytical groundwater equations (modified Theim equations for unconfined aquifer conditions (Driscoll, 1986)) were applied to the individual mine cells under each mining approach. Groundwater inflow equations describing inflows to a rectangle were used for the first mining approach assuming the entire mine block is being mined and is open to groundwater inflow. Groundwater inflow equations describing inflow to a trench were used to describe inflows under mining Approaches 2 and 3. The distinction between a rectangle and a trench depends on the ratio between the length and the width of a particular mining cell. A summary of the model's results is presented in **Table 1**.

Because the analytical flow results are sensitive to the radius of influence or R-value, Wenck considered two scenarios for each mining approach to estimate the groundwater inflows to Area 10. Scenario 1 uses an R-value of 1,000-feet and assumes both a low and high hydraulic conductivity generated from aquifer testing. Scenario 2 uses an R-value of 4,000-feet and similarly assumes a low and high hydraulic conductivity value. By using different hydraulic conductivity values, Wenck was able to estimate the range in groundwater inflows that could be encountered given varying hydrogeologic conditions across the site. Modeled values produced by evaluating mining approach 1, which considers mining cell Area 10 in its entirety, estimated a range of inflows between 19.9 and 189.2 gpm. For mining approach 2, which considers a series of individual trenches mined from east to west, the model estimated inflow values between 15.7 and 99.9 gpm. For mining approach 3, which similarly considers a series of trenches but mined from north to south, did not produce significantly different results compared to mining approach 2. The model predicted a range in inflows between 15.7 and 100.2 gpm. All scenarios assume the individual mining cells were open. Although, in the case of mining approaches 2 and 3, the previously mined trenches are expected to be backfilled. For mine planning purposes, the higher inflow estimates should be used. Although modeled inflow values for mining approaches 2 and 3 do not significantly differ, Wenck anticipates mining approach 2 (mining cells mined from east to west) would be the most favorable mining strategy for reducing the impacts of groundwater. Due to a general groundwater flow from northeast towards the southwest (**Figure 3**), Knife River could mine the aggregate resource and backfill with low permeability material to the east effectively sealing off/rerouting the flow of groundwater. This strategy is explained in greater detail in section 9.0.

7.0 GROUNDWATER INFLOW ANALYSIS - VANIER

Based on the aquifer testing results and using the same equations used on Woodward, Wenck estimated the groundwater inflows that could be produced as Knife River continues mining at Vanier. Wenck utilized several values for the aquifer hydraulic conductivity as well as different extents of dewatering influence. These scenarios were selected to assess groundwater inflow variations due to changes in local aquifer characteristics, pumping rates, and associated dewatering requirements for individual cells. Mine plan drawings initially provided by Knife River and later modified by Wenck were used to identify the 14 areas that might be at Vanier. Mining cells used in this analysis vary in size between 5 and 6.5 acres and are shown on **Figure 4**.

Only one mining approach was considered at Vanier. Each mining area was analyzed as a whole, rather than separating each mining cell into a series of trenches as discussed for the Woodward property. Contemporaneous reclamation (backfill of the previously mined cell) was assumed. Analytical groundwater equations (modified Theim equations for unconfined aquifer conditions (Driscoll, 1986)) were applied to the individual mine cells and used to estimate groundwater inflows to a rectangular mine block. Two scenarios were considered for this mining approach. Scenario 1 used an R-value of 1,000 feet and used a low and high hydraulic conductivity. Scenario 2 uses an R-value of 4,000 feet and similarly used a low and high hydraulic conductivity value. By using different hydraulic conductivity values, Wenck was able to estimate the range in groundwater inflows that could be encountered given varying hydrogeologic conditions across the site. The results of our analysis are summarized in **Table 2**. Of the 14 mining cells analyzed, the modeling effort predicted a maximum inflow value of 288 gpm within Area 8, located in the northwest portion of the site. As shown by groundwater contours on **Figure 3**, increasing amounts of groundwater can be expected from southwest to northeast. The lowest inflow estimates were predicted by the model to be present within mining cell Area 11 with a range between 1.6 and 14.5 gpm. Inflow values are expected to be low in this area since it is the most westerly mining cell and groundwater increases towards the east. Knife River did encounter minimal inflows as they were mining Area 6 at Woodward. For mine planning purposes, these estimates do not consider the mitigative effects of backfilling to predicted inflow values and are reflective of worst-case scenarios.

8.0 WATER RIGHTS IMPACT ANALYSIS

Wenck researched, mapped, and analyzed water rights in the areas surrounding Woodward and Vanier for the purposes of assessing potential impacts of dewatering to nearby shallow wells. Based on data available information from the Oregon Water Resources Department's Well Report query tool, the results of this search were separated into two categories: (1) wells located within a one-half mile buffer of the Woodward/Vanier boundary and (2) wells located within a 1,000-foot buffer. Details on these wells are presented in **Table 3**, and both deep and shallow well locations are shown on **Figure 6.** Wells were categorized as 'shallow' if drilled or perforated above 40 feet, all other wells were considered 'deep'. Wells drilled and completed to a depth of 40 feet or shallower are of particular interest because they are completed in the same aquifer and similar depth as that being mined. Knife River's proposed mine plan includes resource extraction to a depth of 20 feet at Woodward and potentially 35 feet at Vanier. The distinction between shallow and deep wells was made based on the reported thickness of alluvial deposits by Robinson and Price in *Groundwater in the Prineville Area, Oregon* (1968). These alluvial deposits are separated from underlying sediments by thick layers of clay and silt (Robinson and Price, 1968) which are detected at the site by a low permeability, brown sandy clay unit. The presence of this unit is evidenced by well logs CROO-50140 (located in the Woodward plant area, **Figure 6**), CROO-53661, and the three test wells drilled at the southeastern edge of the Woodward property, to name a few. Water extraction from the overlying aquifer is expected to have little hydrogeologic impact on the underlying units.

To assess the potential effects of water mitigation to nearby shallow wells, Wenck used AquiferTest Pro 10.0 to conduct a simplified Theis analysis. Based on these modeling efforts, there is a possibility that nearby water rights could be affected. However, this analysis does not consider any mitigative actions taken by Knife River. In the section below, Wenck presents several mitigation approaches with the goal of protecting water rights in the vicinity of the mine. Furthermore, Wenck proposes an approach where Knife River will implement continuous monitoring strategies to assess the efficacy of their mitigation efforts.

9.0 RECOMMENDED WATER MANAGEMENT TO MITIGATE IMPACT TO ADJACENT WATER RESOURCES

Wenck, in conjunction with Knife River, proposes an adjustment to the Mine and Reclamation plan at both the Woodward and Vanier property. Currently the DOGAMI permit, and Crook County land use do not allow dewatering at the Woodward property.

Wenck believes the best approach to mining the final mining cells at Woodward will be to mine Area 9 as historically done, but to mine discrete cells within Area 10. The discrete mine cells should be oriented in a north-south direction. Once mining is completed, the overburden will be stripped from the new mine cell and used for backfilling at the adjacent mined out cell. The mine direction should start with the easternmost cell in Area 10 and progress west towards Area 9. This mining and backfilling approach will effectively "cut off" the upgradient inflow and divert groundwater flow to the south and north around the backfill. It may not "cut off" all groundwater but will significantly reduce groundwater inflow and the impact related to a dewatering approach as discussed in Section 8.0.

At the Vanier property, Wenck recommends Knife River request an increased depth of mining and the ability to dewater in their Goal V application to Crook County. The increased depth of mining will be required to completely mine the available resource. Wenck believes that pit dewatering and injection into a "recharge trench" will eliminate any impact to area groundwater resources. This protocol has been successfully implemented at numerous floodplain mines throughout Oregon and is a viable solution at Vanier. Wenck recommends that Knife River commence mining in the northeast corner of the Vanier Property (**Figure 4**, Area 1) and construct a recharge trench within Areas 4-7. Backfilling along the eastern property boundary is again recommended to seal off water and divert it to the south. A recharge trench is a linear feature that effectively pre-strips the overburden within these mine cells to the top of gravels. All dewatering from Areas 1-3 is pumped to this recharge trench. Two observation wells would be drilled within Areas 4-7 (**Figure 4**), which will include continuous monitoring using a downhole pressure transducer. These data would establish the efficacy of the recharge trench and its ability to balance dewatering with aquifer recharge. After mining is completed in Areas 1-3, a new recharge trench would be constructed south of Areas 4, 5 and 6 (**Figure 4**). Mining would continue throughout Areas 4-11 and a new observation well within Area 14 would characterize the efficacy of the approach.

In conclusion, dewatering of the mine cells at the Vanier property can be accomplished with minimal impact to nearby water rights. The use of recharge trenches is a proven method, and the installation of observation wells will minimize and/or eliminate the negative impacts of dewatering.

10.0 RECLAMATION CONSIDERATIONS

Wenck addressed post mining land use emphasizing the impacts of a high post mining water table on overlying soil and vegetative growth. Where alkaline and/or sodic soils are subjected to a high-water table, capillary rise will leach salts from below and transfer them to the rooting zone of plants. From an agronomic perspective, this leaching can have an adverse impact on crops. On January 18, 2021 Wenck collected three overburden samples from test hole WW-1A and one composite overburden sample from WW-2A. Sample analyses were completed by Pace Analytical in Sheridan, Wyoming. Parameters tested included grain size analysis, soil pH, Saturation Percentage, Sodium Absorption Ratio (SAR) and Exchangeable Sodium Percentage. Results from the chemical analysis performed on the soil samples were used to characterize the overburden, which would be used as reclamation backfill and placed below the salvaged topsoil. The results of these laboratory analyses are presented in **Appendix C**.

Sieve analysis data indicate the overburden material contains a mixture of silt and sand with some clay intermixed. The clay content ranged from 3 to 13% and silt generally averaged nearly 50%. Samples collected at WW-1A during drilling were separated into three intervals: 4 to 6 feet, 6 to 8 feet, and 10 to 12 feet bgs. The sample collected at WW-2A was composted 2 to 10 feet. Texture tended to increase (become finer) with depth. Sieve data collected at WW-2A can be summarized as follows: a median (D50) particle size of 0.071 mm or very fine sand. Forty six percent (46%) of the sample consisted of sand sized grains (the majority of which were fine grained) and 54% was dominated by silt and clay fraction material.

The agronomic suitability tests were generally favorable. While SAR increased with depth, all materials were suitable as a growth medium. SAR ranged from 1.06 at the surface to 2.09 at depth. Agronomic suitability ranged from 0 to 10. Soil pH were slightly alkaline and averaged 7.8 su. Electrical conductivity (EC), like SAR increased with depth. Again, EC met all suitability criteria (0-8) and there were no marginal characteristics of the overburden. It is important to note that the composite sample from WW-2A reflected the fact that the overburden could be composited with no detrimental change in agronomic suitability.

Based on the seven test pit logs at Vanier, Knife River will be removing approximately 15 feet of combined topsoil and overburden. Although the test pit logs do not differentiate between topsoil and silt (overburden), our field observations during the drilling of test wells at Woodward suggest topsoil may range from 2 to 4 feet. Reclamation will be vastly improved if Knife River were to strip and separately stockpile the topsoil from the overburden. For simplicity, Wenck recommends stripping 2 feet of topsoil. Overburden depth below the topsoil is variable and ranges from 6 to 18 feet. Overburden depths become shallower near the northwestern edge of the property, evidenced by VAN-3 and VAN-6, 9 and 6 feet, respectively. The anticipated pit floor elevation at the Vanier property is predicted to be relatively consistent with an average elevation of 2,900 feet. This suggests that the groundwater recovery elevation will average 2,910 to 2,915 feet across the site. Generally speaking, the water table will recover close to and within 5 feet of the reclaimed surface.

Assuming dewatering takes place as discussed in this report, mine cell backfill should take place in reverse order: overburden first and topsoil second. Selective handling of the overburden is not required and can be placed directly in the floor of the mine pit. Dewatering during backfilling is likely required, though less dewatering may be required as mining approaches the westernmost cell blocks. Once the overburden is placed, the uppermost overburden lift should be ripped and perhaps disked before

placement of the topsoil. Topsoil can be placed directly on the overburden. Because sodium and SAR levels are reasonably low, Wenck is not concerned with the upward movement of salts. The final ground surface will be close to the recovery elevation of the groundwater and should be acceptable for growing hay and similar forage crops.

11.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our hydrogeologic investigation of the Woodward and Vanier properties, Wenck has the following conclusions and recommendations:

1. Knife River will continue to encounter groundwater in Area 10 at Woodward and throughout the Vanier property. Given the water table configuration and groundwater flow to the southwest, Knife River will find additional water is present in varying quantities to the east and depend upon local permeabilities and preferred groundwater flow paths.

2. Although the test wells did not yield significant volumes of groundwater, aquifer testing of these wells indicated the shallow aquifer has a relatively high permeability. Transmissivity values range from 2,215 and 9,195 gpd/ft, hydraulic conductivity values varied between 218 and 903 gpd/ft^2, and the storage coefficient was estimated to be 0.285. These values and water level recovery immediately following cessation of pumping suggest that the saturated sand and gravel beds are capable of yielding significant volumes of groundwater to individual mine blocks during dewatering operations. The amount of groundwater encountered will also vary with the saturated thickness of local sand and gravel deposits.

3. Potential groundwater inflows to Area 10 at Woodward range up to approximately 190 gpm for the whole mine block and 100 gpm for individual mine cells within this area. Lesser flows may be encountered, and modeling suggests these lesser flows may range from 15 to 50 gpm.

4. Potential groundwater inflows to Vanier range up to approximately 290 gpm on the eastern edge of the property and diminish to the west. Lesser flows may be encountered, and modeling suggests these lesser flows may range from 13 to 60 gpm.

5. In order to avoid dewatering at the Woodward property, Wenck recommends Knife River mine Area 10 using a backfill and plug method in north-south oriented mine blocks. This approach will minimize impact on area water rights.

6. To minimize the potential impacts to local water resources and water rights by mining the Vanier property, Wenck recommends Knife River establish recharge trenches and observation wells between the mine area and adjacent water rights. Assuming Crook County and DOGAMI approve mine dewatering at Vanier, reinjection should take place in a downgradient direction. Knife River can likely mine this area in the wet but dewatering for reclamation will likely be an ongoing need.

7. Should Knife River proceed with dewatering as described in this report, Wenck suggests backfilling mine cells by placing overburden first followed by topsoil. Overburden can be placed directly on the mine floor with negligible impacts to the soil as suggested by its favorable agronomic characteristics. Wenck recommends ripping and or/discing the surface of the overburden once it is placed to encourage root development post-reclamation. Stockpiled topsoil should be distributed across the reclaimed surface to best mimic pre-mining surface elevations. The final ground surface will be close to the recovery elevation of the groundwater but should be acceptable for growing hay and similar forage crops.

12.0 REFERENCES

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TABLES

Table 1. Groundwater Inflow Scenario at MiningCcell Area 10 for the Woodward Property

Mining Approach	Scenario	Hydraulic Conductivity (gpd/ft^2)	Radius of Influence (ft)	Estimated Inflow (gpm)
1, entire cell	1	218	1000	45.58
		903	1000	189.20
	2	218	4000	19.95
		903	4000	82.83
2, east-west, 66-foot-wide trenches	1	218	1000	30.57
		903	1000	99.97
	2	218	4000	15.73
		903	4000	58.55
3, north-south, 55-foot-wide trenches	1	218	1000	30.63
		903	1000	100.22
	2	218	4000	15.75
		903	4000	58.64

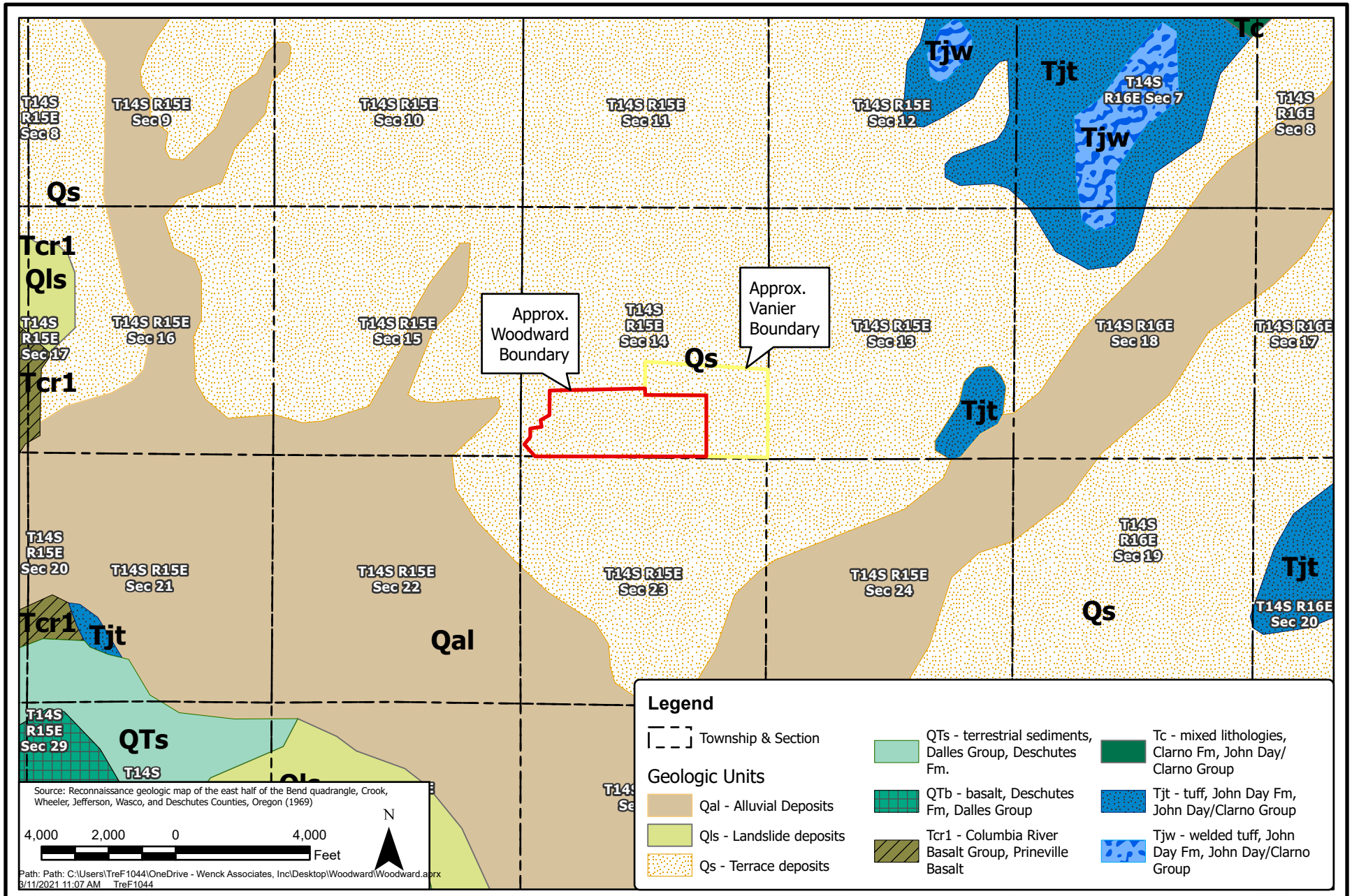
Table 2. Groundwater Inflow Scenario at the Vanier Property

Mining Cell	Scenario	Hydraulic Conductivity (gpd/ft^2)	Radius of Influence (ft)	Estimated Inflow (gpm)	Mining Cell	Scenario	Hydraulic Conductivity (gpd/ft^2)	Radius of Influence (ft)	Estimated Inflow (gpm)
Area 1	1	218	1000	54.9	Area 8	1	218	1000	69.4
		903	1000	228.2			903	1000	288.4
	2	218	4000	26.3		2	218	4000	33.9
		903	4000	109.5			903	4000	141
Area 2	1	218	1000	39.2	Area 9	1	218	1000	29.9
		903	1000	162.7			903	1000	124.4
	2	218	4000	20.4		2	218	4000	13.9
		903	4000	84.7			903	4000	58.1
Area 3	1	218	1000	43.2	Area 10	1	218	1000	33.19
		903	1000	179.5			903	1000	137.7
	2	218	4000	21.1		2	218	4000	15.5
		903	4000	87.64			903	4000	64.3
Area 4	1	218	1000	18.1	Area 11	1	218	1000	3.5
		903	1000	75.1			903	1000	14.5
	2	218	4000	9.4		2	218	4000	1.6
		903	4000	39.3			903	4000	6.8
Area 5	1	218	1000	65.1	Area 12	1	218	1000	35.5
		903	1000	270.2			903	1000	147.6
	2	218	4000	31.8		2	218	4000	17.4
		903	4000	132.3			903	4000	72.2
Area 6	1	218	1000	46.3	Area 13	1	218	1000	16.8
		903	1000	192.3			903	1000	70.1
	2	218	4000	22.7		2	218	4000	8.27
		903	4000	94.2			903	4000	34.33
Area 7	1	218	1000	15.4	Area 14	1	218	1000	51.34
		903	1000	63.9			903	1000	213.09
	2	218	4000	7.5		2	218	4000	25.15
		903	4000	31.2			903	4000	104.41

Table 3. Wells Within a One-Half Mile and 1000-foot Buffer of the Woodward and Vanier Property

Buffer from Woodward/Vanier Property Boundary	Well #	Owner Name	Primary Use	Tax Lot	Top of Perforations (ft bgs)	Completed Depth (ft bgs)	Township & Range	Section	Potential Adverse Impacts
1000-foot buffer	86	MRS WILLIS STAFFORD	Domestic	115	35	50	T14S R15E	23	Possible
	951	BEN KOOPS	Domestic	801	20	40	T14S R15E	15	Possible
	953	CARL SHUMWAY	Domestic	801	30	50	T14S R15E	15	Possible
	970	RAY FOX	Domestic	801	20	40	T14S R15E	15	Possible
	972	WILLIS STAFFORD	Domestic	801	35	50	T14S R15E	15	Possible
	977	ELMER SELF	Domestic	108	30	50	T14S R15E	23	Possible
	329	RON WILKINSON	Domestic	116	255	260	T14S R15E	23	Not Likely
	907	L M DAIRY	Domestic	--	235	257	T14S R15E	14	Not Likely
	915	ED HUNT	Domestic	103	220	220	T14S R15E	14	Not Likely
	931	LESLIE PAYNE	Domestic	602	225	235	T14S R15E	15	Not Likely
	946	RAY MCLAMB	Domestic	600	210	220	T14S R15E	15	Not Likely
	50140		Industrial	702	250	255	T14S R15E	14	Not Likely
	50577		Irrigation	112	175	275	T14S R15E	23	Not Likely
	53568	JOHN WOERNER	Domestic	102	200	300	T14S R15E	23	Not Likely
	53661	SCOTT PROFILEY	Domestic	701	240	260	T14S R15E	14	Not Likely
	54339	ADAM MIKULSKI	Domestic	114	100	281	T14S R15E	23	Not Likely
	54660	TAUNDY BYRD	Domestic	600	140	220	T14S R15E	15	Not Likely
	54787		Domestic	200	245	255	T14S R15E	23	Not Likely
One-half Mile	81	JOHN COLLIN	Domestic	202	30	45	T14S R15E	13	Possible
	82	JOHN MITTS	Domestic	1000	30	60	T14S R15E	15	Possible
	83	N L MATHEWS	Domestic	1200	31	50	T14S R15E	15	Possible
	86	MRS WILLIS STAFFORD	Domestic	115	35	50	T14S R15E	23	Possible
	900	ARNOLD EVANS	Domestic	202	40	60	T14S R15E	13	Possible
	903	JACK BRIGGS	<Null>	104	18	34	T14S R15E	14	Possible
	904	CECIL HARNDEN	Domestic	503	30	50	T14S R15E	14	Possible
	906	JOHN DEMERITT	Domestic	503	30	50	T14S R15E	14	Possible
	909	VIRGIL W SHARP	Domestic	809	30	50	T14S R15E	15	Possible
	912	JACK BRIGGS	UNKNOWN	1300	20	50	T14S R15E	15	Possible
	916	JOHN MITTS	Domestic	1000	40	60	T14S R15E	15	Possible
	918	DALE BANNON	Domestic	2500	40	60	T14S R15E	15	Possible
	923	JIM HALSEY	Domestic	1100	20	55	T14S R15E	15	Possible
	924	TIM COOLEY	Domestic	802	40	60	T14S R15E	15	Possible
	926	PHILLIP R POWELL	UNKNOWN	800	34	54	T14S R15E	15	Possible
	927	IRA O FINLEY	Domestic	804	40	60	T14S R15E	15	Possible
	934	JOHN G PRUNER	Domestic	2400	21	42	T14S R15E	15	Possible
	939	JERRY PAYNE	Domestic	600	31	51	T14S R15E	15	Possible
	940	LARRY CHAMBERLAIN	Domestic	900	35	50	T14S R15E	15	Possible
	941	LLOYD DYMOND	Domestic	500	34	50	T14S R15E	15	Possible
	942	BASAL TURNER	Domestic	802	40	60	T14S R15E	15	Possible
	945	DAVE TURNER	Domestic	200	35	55	T14S R15E	15	Possible
	951	BEN KOOPS	Domestic	400	20	40	T14S R15E	15	Possible
	952	RICHARD FULTON	Domestic	807	36	48	T14S R15E	15	Possible
	953	CARL SHUMWAY	Domestic	601	30	50	T14S R15E	15	Possible
	970	RAY FOX	Domestic	102	20	40	T14S R15E	23	Possible
	972	WILLIS STAFFORD	Domestic	116	35	50	T14S R15E	23	Possible
	977	ELMER SELF	Domestic	111	30	50	T14S R15E	23	Possible
	980	TOM PAYNE	Domestic	110	30	42	T14S R15E	23	Possible
	983	AL BUSTILLIO	Domestic	113	30	50	T14S R15E	23	Possible
	1001	CAL CATLETT	UNKNOWN	504	30	50	T14S R15E	24	Possible
	1002	GLENN A CHEEK	Domestic	501	34	48	T14S R15E	24	Possible
	51597	MARK FLEMING	Domestic	1900	40	60	T14S R15E	23	Possible
	51786	RHETT SHULTZ	Domestic	807	32	52	T14S R15E	15	Possible
	54367	MARK FLEMING	Domestic	1900	40	80	T14S R15E	23	Possible
	55017	--	Unknown	703	10	30	T14S R15E	14	Possible
	55018	--	Unknown	703	10	25	T14S R15E	14	Possible
	55019	--	Unknown	703	10	28	T14S R15E	14	Possible
	329	RON WILKINSON	Domestic	116	255	260	T14S R15E	23	Not Likely
	416	CARROL RICE	Domestic	503	60	82	T14S R15E	24	Not Likely
	438	GERALD L WHALEY	Domestic	809	196	206	T14S R15E	15	Not Likely
	458	WAYNE ROBISON	Domestic	700	192	200	T14S R15E	15	Not Likely
	460	W K TICHENOR	Domestic	1100	193	204	T14S R15E	15	Not Likely
	530	JERRY HILL	Domestic	300	220	230	T14S R15E	15	Not Likely
	548	CHARLES MERIDITH	Domestic	800	207	215	T14S R15E	15	Not Likely
	907	L M DAIRY	Domestic	--	235	257	T14S R15E	14	Not Likely
	910	BEN OWENS	Domestic	100	196	206	T14S R15E	15	Not Likely
	915	ED HUNT	Domestic	103	220	220	T14S R15E	14	Not Likely
	925	BIFFLY TURNER	Domestic	803	240	250	T14S R15E	15	Not Likely
	931	LESLIE PAYNE	Domestic	602	225	235	T14S R15E	15	Not Likely
	932	COLE STILL	Domestic	805	250	260	T14S R15E	15	Not Likely
	946	RAY MCLAMB	Domestic	600	210	220	T14S R15E	15	Not Likely
	947	--	Domestic	809	50	70	T14S R15E	15	Not Likely
	948	TERRY HILD	Domestic	801	55	75	T14S R15E	15	Not Likely
	955	M D COLAHAN	Domestic	801	210	210	T14S R15E	15	Not Likely
	974	FLOYD FITCH	Domestic	108	45	60	T14S R15E	23	Not Likely
	985	ERNEST E FORTNER	Irrigation	103	45	80	T14S R15E	23	Not Likely
	988	CLAUDE F WILLIAMS	Irrigation	405	298	320	T14S R15E	23	Not Likely
	993	CALVIN CATLETT	Domestic	502	50	62	T14S R15E	24	Not Likely
	3154	ROY PAZK	Domestic	808	180	210	T14S R15E	15	Not Likely
	3177	KEITH TAYLOR	Domestic	503	222	230	T14S R15E	14	Not Likely
	3252	GLEN HOPFER	Domestic	810	225	235	T14S R15E	15	Not Likely
	50140	--	Industrial	702	250	255	T14S R15E	14	Not Likely
	50576	--	Irrigation	200	250	<Null>	T14S R15E	23	Not Likely
	50577	--	Irrigation	112	175	275	T14S R15E	23	Not Likely
	50830	DONALD SHELTON	Domestic	900	220	230	T14S R15E	15	Not Likely
	50851	LEONARD CHANDLER	Domestic	200	235	<Null>	T14S R15E	15	Not Likely
	52281	ELSIE M SIMMONS	Domestic	402	220	325	T14S R15E	24	Not Likely
	52344	LAWRENCE E ADAMSON	Domestic	504	41	240	T14S R15E	24	Not Likely
	52453	KERMIT MCGREW	Domestic	100	65	335	T14S R15E	23	Not Likely
	53206	JULIE THOMPSON	Domestic	809	200	240	T14S R15E	15	Not Likely
	53346	DON WORTHING	Domestic	2400	232	232	T14S R15E	15	Not Likely
	53457	ILOMAE ZEHNER	Domestic	1100	190	260	T14S R15E	23	Not Likely
	53568	JOHN WOERNER	Domestic	102	200	300	T14S R15E	23	Not Likely
	53661	SCOTT PROFILEY	Domestic	701	240	260	T14S R15E	14	Not Likely
	54339	ADAM MIKULSKI	Domestic	114	100	281	T14S R15E	23	Not Likely
	54660	TAUNDY BYRD	Domestic	600	140	220	T14S R15E	15	Not Likely
	54787	--	Domestic	200	245	255	T14S R15E	23	Not Likely

FIGURES



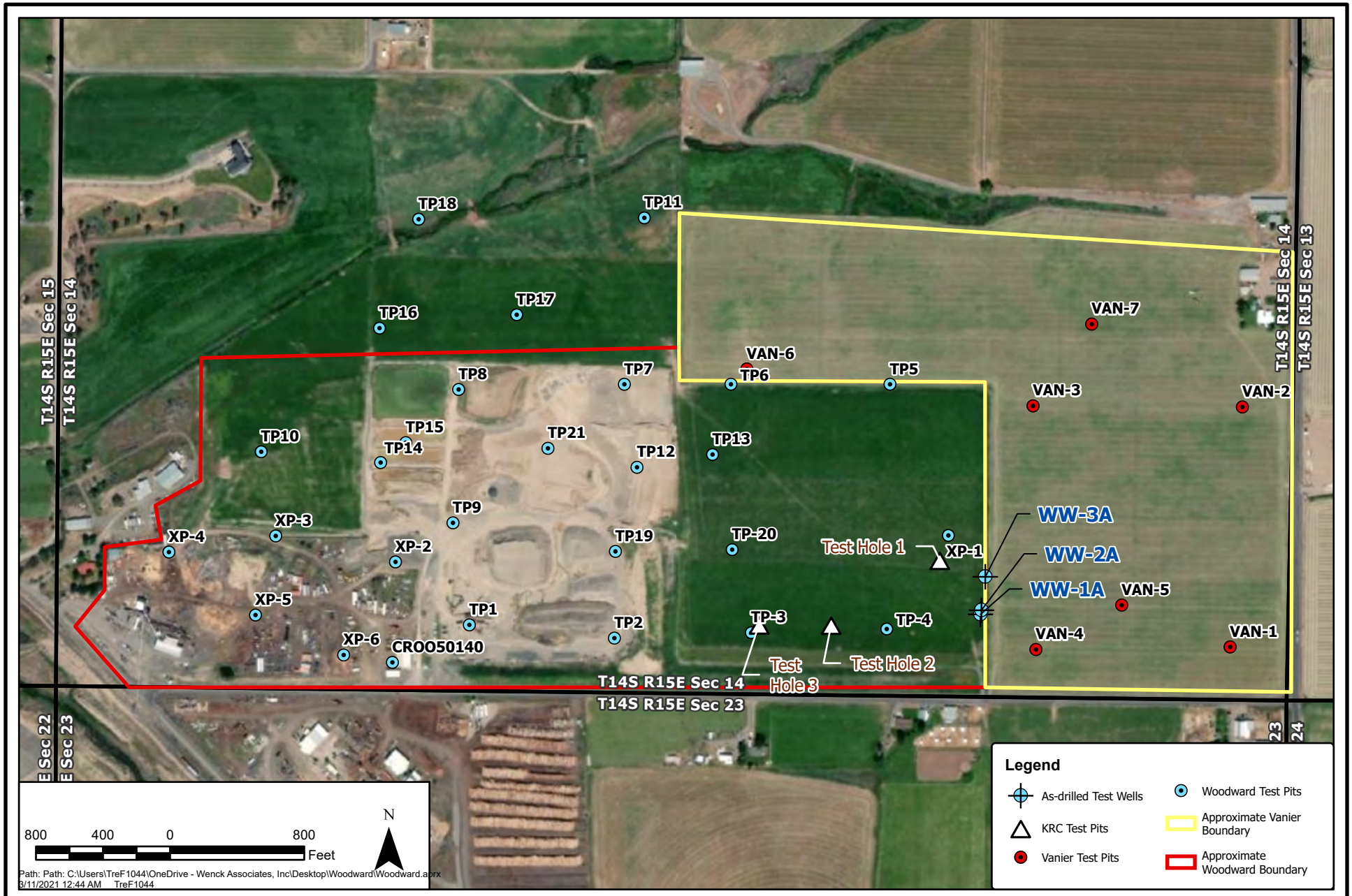
KNIFE RIVER

Geology near the Woodward and Vanier Property

WENCK now part of Stantec

MAR 2021

Figure 1



KNIFE RIVER

As-drilled Test Wells and Test Pits

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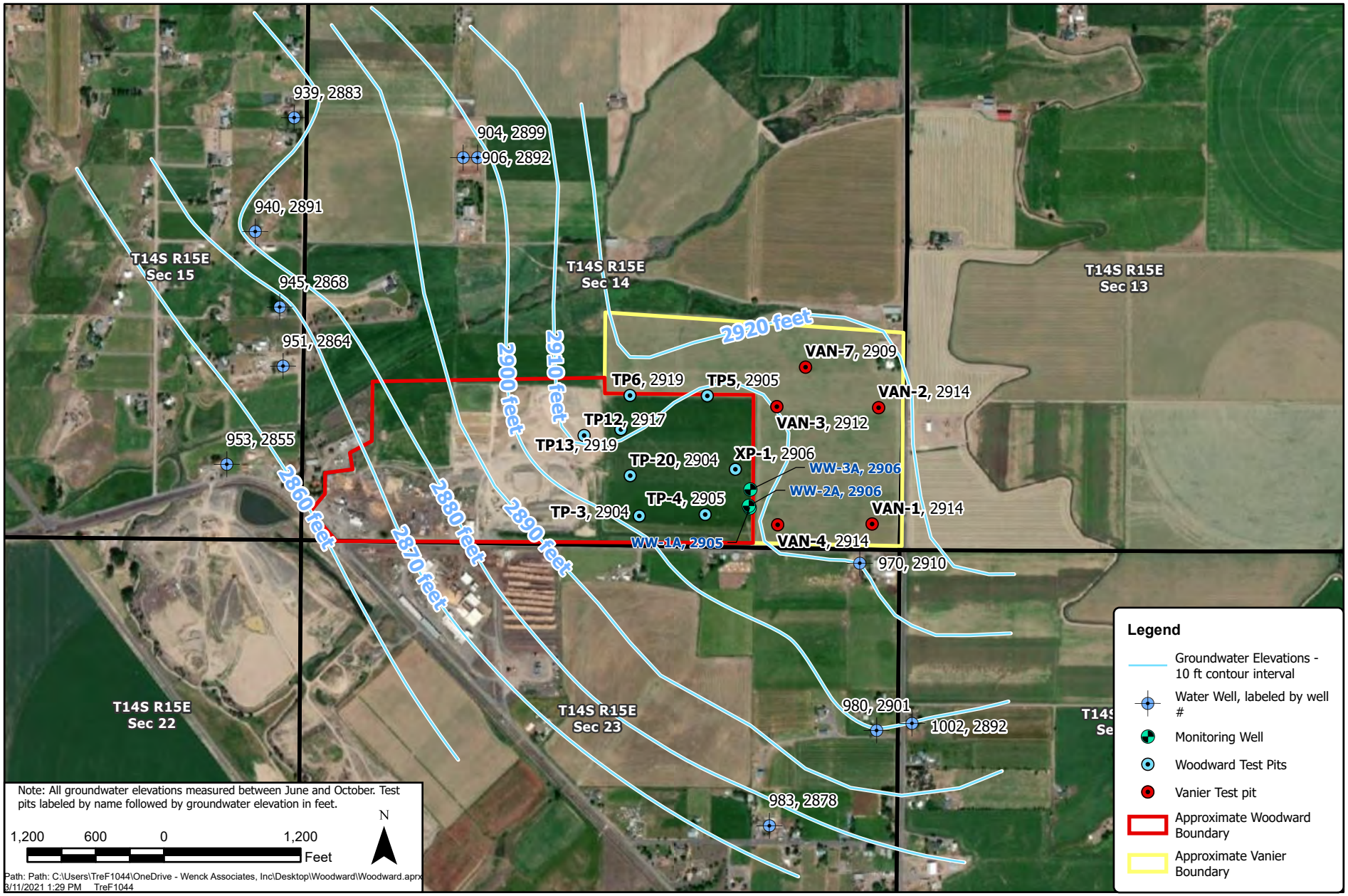
MAR 2021

Figure 2



KNIFE RIVER

Groundwater Elevations - based on local well and test pit data

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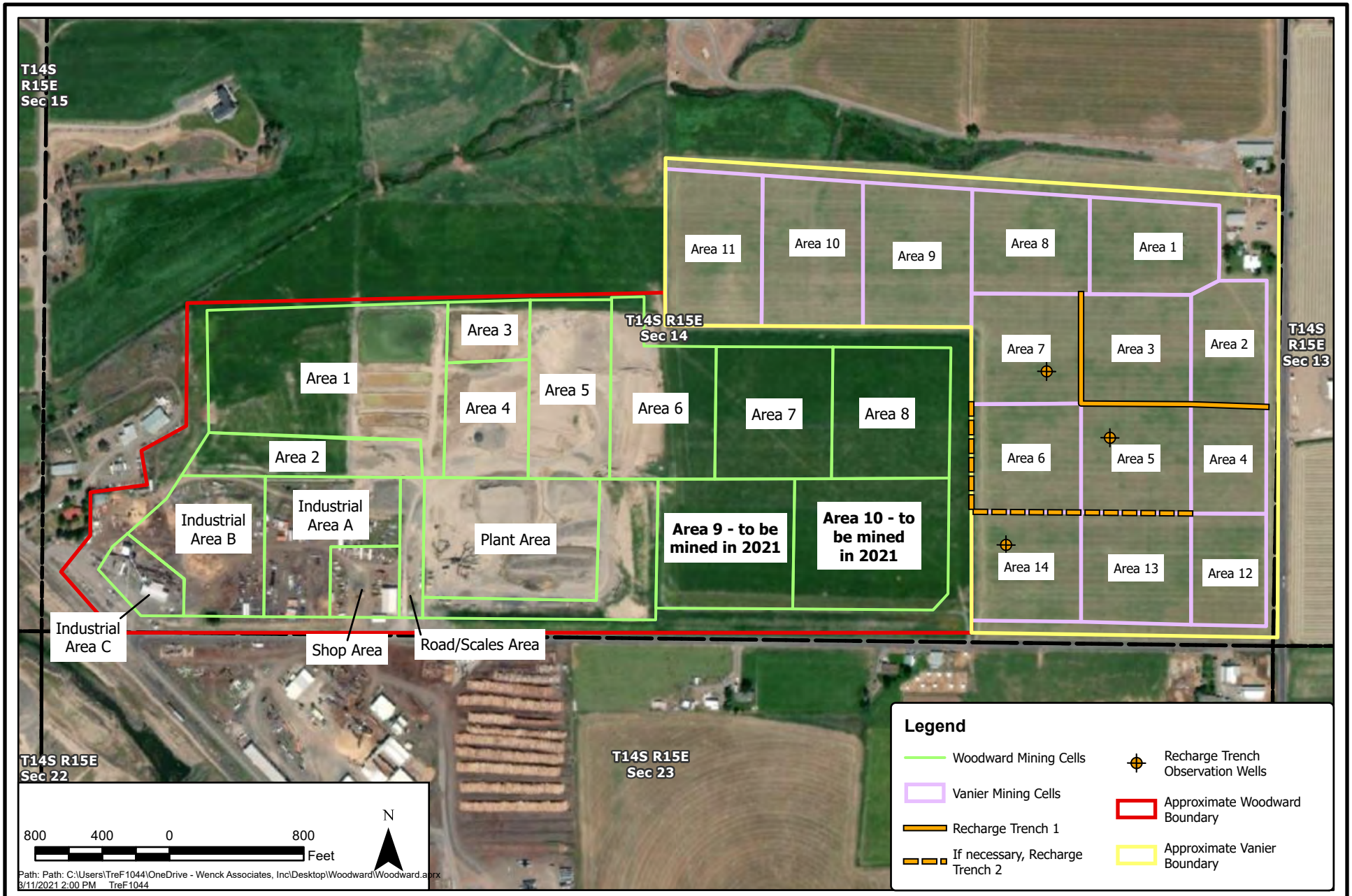
MAR 2021

Figure 3



KNIFE RIVER

Woodward and Vanier Mining Cells

WENCK now part of Stantec

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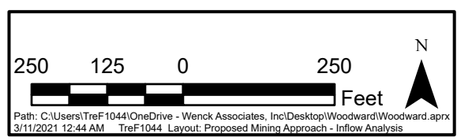
Figure 4

Mining Approach 1: Total Mine Block

Mining Approach 2: Trenches mined from East to West

Mining Approach 3: Trenches mined from North to South



Legend

- Woodward Mining Cells
- Approximate Woodward Boundary
- Approximate Vanier Boundary
- Vanier Mining Cells
- Township & Section

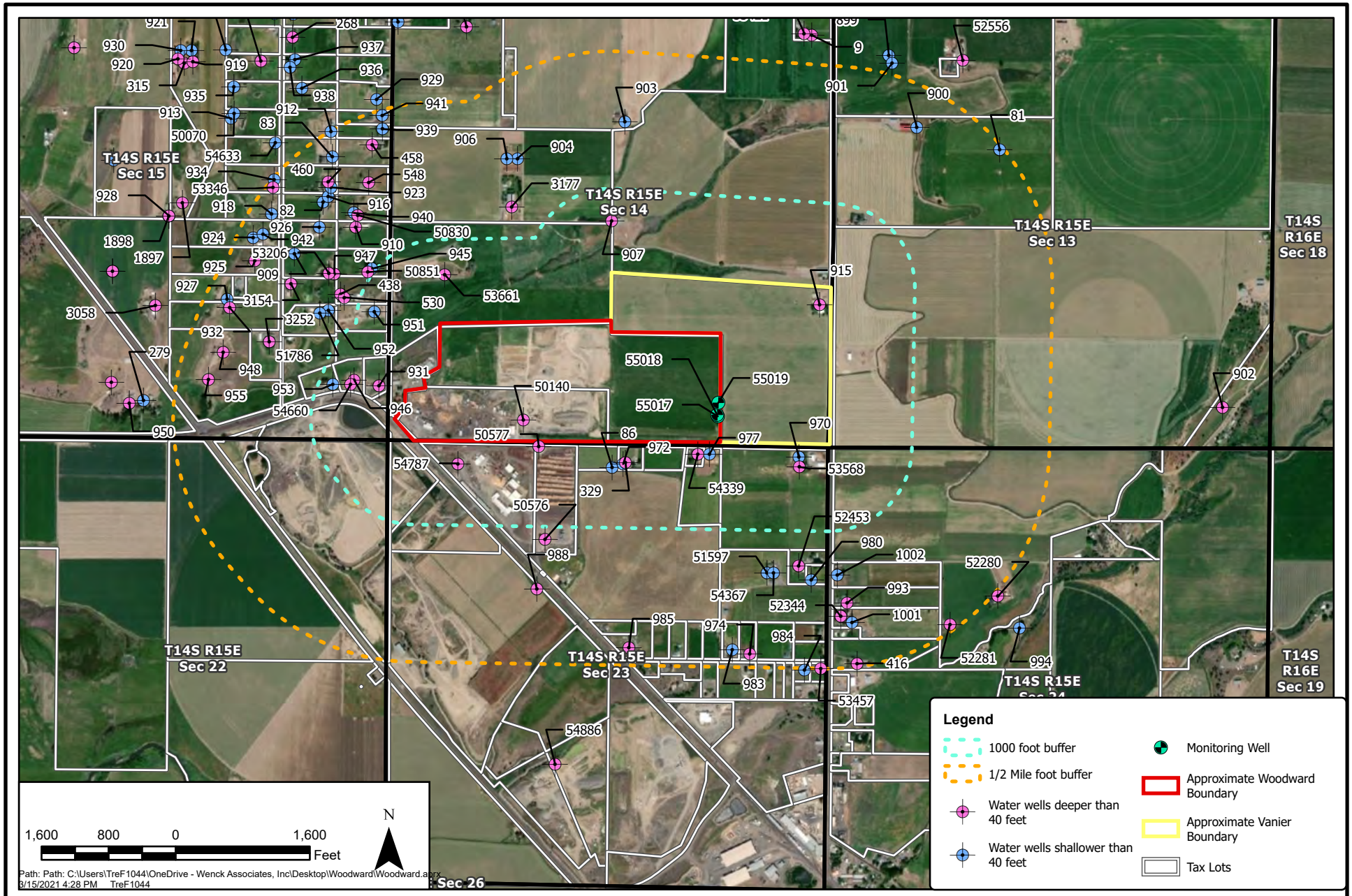
KNIFE RIVER

Proposed Mining Approach - Inflow Analysis

WENCK now part of Stantec

MAR 2021

Figure 5



KNIFE RIVER

Water Rights Within 1000- and 2,640-feet

WENCK now part of Stantec

MAR 2021

Figure 6

APPENDIX A

Well Completion Reports

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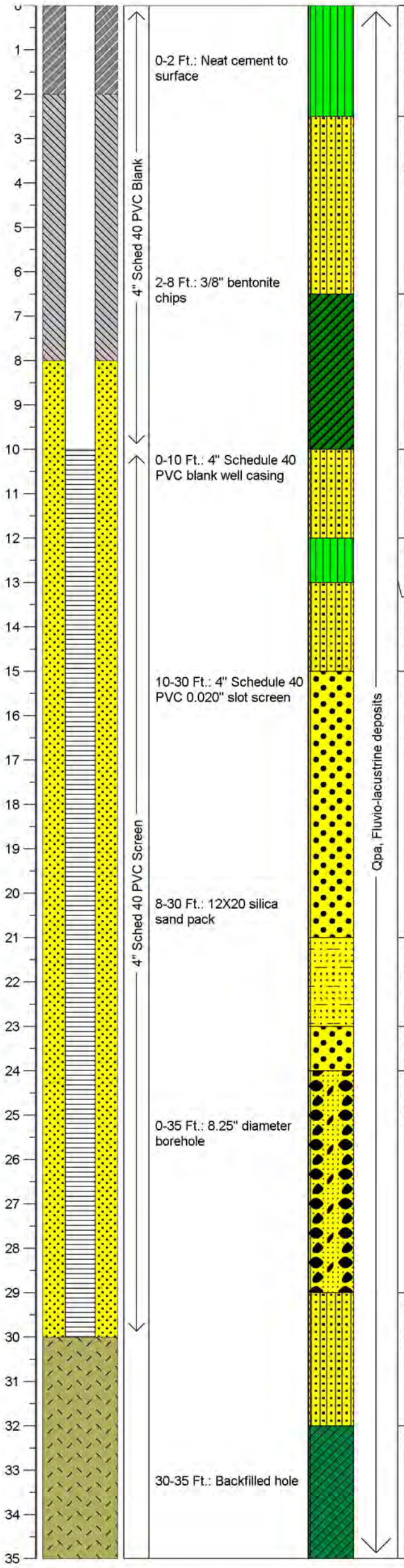
Project:	Woodward	Well Name:	WW-1A
Location:	44.34941°, -120.89169°	Drilling Method:	Sonic
Drilled by:	Yellow Jacket Drilling Services	Logged by:	F. Tremblay
Date started:	1/18/2021	Total depth:	35 Ft.
Date completed:	1/18/2021	Elevation:	2928 Ft.



Well Construction	Lithology	Remarks
	0-3 Ft.: **SILT W/ SAND (ML)**: dark brown, rooted and moist with some organic content to 1.5', dries out below, fine sand well graded sand, low plasticity, somewhat cohesive, carbonate concretions at 3', silt is very carbonaceous, trace amounts of gravel at 4'	
	3-7 Ft.: **SILTY SAND (SM):** brown, medium to low plasticity, dry, fine sand in a carbonaceous silt, massive, carbonaceous concretions, sand is well sorted, poorly graded, platy structure and consolidated at 5', slightly to very carbonaceous, 0.25-0.5" bedding	
	7-10 Ft.: **FAT CLAY (CH):** brown, high plasticity, little to no coarse sediments, platy, medium to dense, cohesive, thinly bedded, non to slightly carbonaceous, 12" layer of medium grained poorly sorted sand at 8.5', some trace gravel, subrounded, back to clay at 9.5'	
	10-12 Ft.: **SILTY SAND (SM):** loose, moist, fine to medium grained sand, non plastic, noncohesive, blocky and semiconsolidated to 11', granular and unconcolidated below that, trace gravel ~1 cm in diameter	Water level measured at 20.73 feet bgs on 1/19/2021.
	12-13 Ft.: **SILT W/ SAND (ML):** brown, fine sand in a calcareous silt, loose, low to medium plasticity, cohesive, granular, brittle carbonaceous concretions, very carbonaceous	
	13-15 Ft.: **SILTY SAND (SM)**: noncalcareous, similar to 10-12' interval, moist, silt content decreases below 14', medium sorted, medium grained, sub rounded, noncalcareous, trace amounts of gravel ~1cm diameter	
	15-21 Ft.: **WELL GRADED SAND W/ SAND (SW):** brown, loose to medium dense, moist, nonplastic, noncohesive, granular, gravel between 0.5-1.5" in diameter, subrounded, 20-30%, gravel content decreases below 18', silty sand dominates below 19', noncalcareous	
	21-23 Ft.: **WELL GRADED SAND W/ SILT & GRAVEL (SW-SM):** loose, dry, fine sand in a calcareous silt, low plasticity, granular, gravel conetent 15-20%, 0.5-2" diameter	
	23-24 Ft.: **WELL GRADED SAND W/ GRAVEL (SW):** loose, moist, medium grained sand, nonplastic, noncohesive, granular	
	24-29 Ft.: **WELL GRADED GRAVEL W/ SAND (GW):** some silt and medium grained sand, gravel between 0.5-3" in diameter, well rounded, wet, sand and silt below 27', mostly gravel, sharp contact with clay layer below	
	29-32 Ft.: **SILTY SAND (SM):** wet, fine sand in a noncalcareous silt, gravel is gone, low to medium plasticity, massive, silt sontent increases significantly below 30', blocky, sand gone below 32'	
	32-35 Ft.: **LEAN CLAY (CL):** wet, medium plasticity, little to no coarse sediments	

Notes: This figure presents the as-built details for WW-1A located near Knife River's ISR Woodward Property in the SESW of Section 14 of T14S, R15E. This well was drilled and completed by Yellow Jacket Drilling Services of Sandy, OR using sonic drilling methods to assess shallow subsurface alluvial groundwater. Upon completion, the well was developed for three hours via surge block and pumping techniques. Water quality parameters at the end of development were as follows: pH=7.63; EC=571 uS; and T= 11.7 degrees Celsius.

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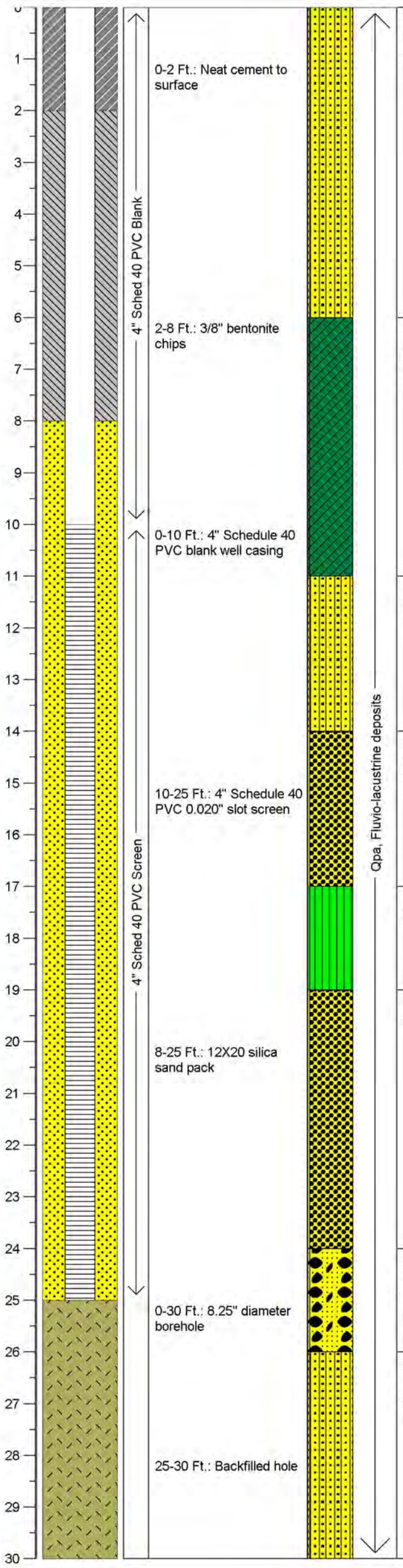
Project:	Woodward	Well Name:	WW-2A
Location:	44.349494°, -120.891692°	Drilling Method:	Sonic
Drilled by:	Yellow Jacket Drilling Services	Logged by:	F. Tremblay
Date started:	1/18/2021	Total depth:	30 Ft.
Date completed:	1/18/2021	Elevation:	2930 Ft.



Well Construction	Lithology	Remarks
	0-6 Ft.: **SILTY SAND (SM)**: rooted from 0-1', moist form surface moisture, fine well sorted sand, medium plasticity, carbonate concretions at 2', silt is calcareous from 2-5', clay content increases below 2-5'	
	6-11 Ft.: **LEAN CLAY W/ SAND (CL):** moist at 6', platy, medium plasticity, carbonate leaching, trace fine sand, calcite content decreases below 5', coincides with fine sand increase between 5-7', increases again between 10-11', platy carbonate concretions	Water level measured at 21.35 feet bgs on 1/21/2021.
	11-14 Ft.: **SILTY SAND (SM):** low plasticity, non calcareous, granular, moist, fine to medium grained sand, silt between 12-13', decreases below 13'	
	14-17 Ft.: **POORLY GRADED SAND W/ GRAVEL (SP)** moist, granular, nonplastic, noncohesive, medium grained sand, gravel content 10-15% between 14-15', 0.5-1" diameter, gravel decreases from 15-16'	
	17-19 Ft.: **SANDY SILT (ML):** moist, calcareous, medium plasticity, cohesive, some trace gravel, trace roots, massive	
	19-24 Ft.: **POORLY GRADE SAND W/ GRAVEL (SP):** D.O. as 14-17', gravel content low from 20-21.5', noncalcareous	
	24-26 Ft.: **WELL GRADED GRAVEL W/ SAND (GW):** medium to coarse sand, trace silts, gravel betwene 0.5-3" in diameter, well rounded, wet, sharp contact with unit below	
	26-30 Ft.: **SILTY SAND (SM):** wet, medium to low plasticity, cohesive, noncalcareous, clay content increases with depth, prismatic, sand is fine grained and well sorted	

Notes: This figure presents the as-built details for WW-2A located near Knife River's Woodward Property in the SESE of Section 14 of T14S, R15E. This well was drilled and completed by Yellow Jacket Drilling Services of Sandy, OR using sonic drilling methods to assess shallow subsurface alluvial groundwater. Upon completion, the well was developed for two hours via surge block and pumping techniques. Water quality parameters at the end of development were as follows: pH=7.58; EC=598 uS; and T= 13.1 degrees Celsius.

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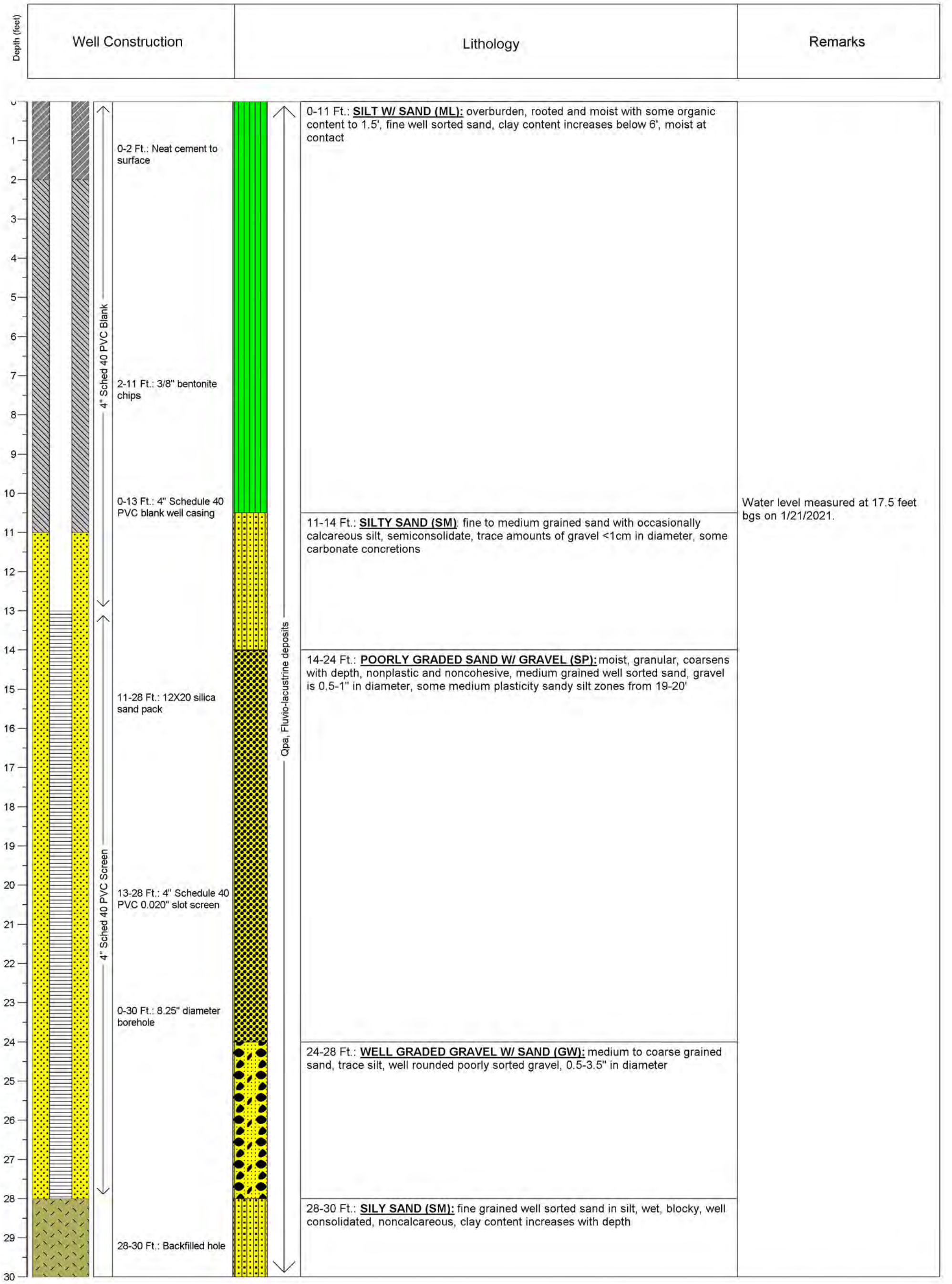
Project:	Woodward	Well Name:	WW-3A
Location:	44.349629°, -120.891684°	Drilling Method:	Sonic
Drilled by:	Yellow Jacket Drilling Services	Logged by:	F. Tremblay
Date started:	1/20/2021	Total depth:	30 Ft.
Date completed:	1/20/2021	Elevation:	2929 Ft.



Notes: This figure presents the as-built details for WW-3A located near Knife River's Woodward Property in the SESE of Section 14 of T14S, R15E. This well was drilled and completed by Yellow Jacket Drilling Services of Sandy, OR using sonic drilling methods to assess shallow subsurface alluvial groundwater. Upon completion, the well was developed for 3 hours via surge block and pumping techniques. Water quality parameters at the end of development were as follows: pH=7.62; EC=338 uS; and T= 12.1 degrees Celsius.

APPENDIX B

Aquifer Testing Results

WENCK

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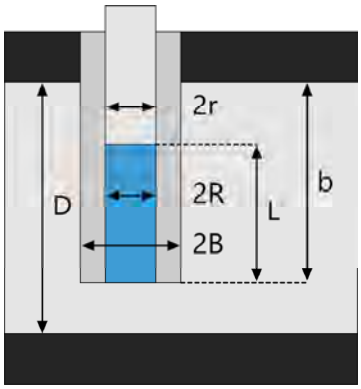
Site Plan
Project: Woodward/Vanier
Number: ORKRC131
Client: Knife River

Location: Prineville, OR | Scale 1:15000 | Origin [ft] X: -44158581.68 Y: 18105011.59

WENCK now part of Stantec	**Wells**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

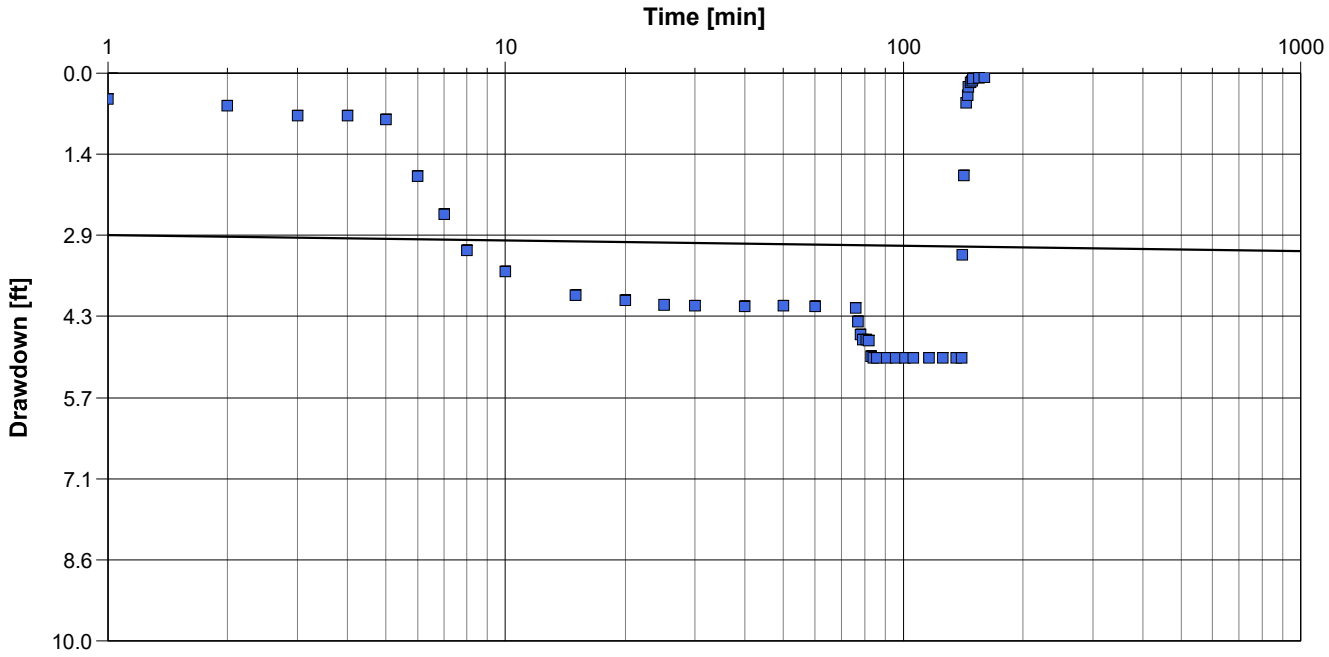
Location: Prineville, OR



	Name	X [ft]	Y [ft]	Penetration	L [ft]	B [ft]
1	WW-1A	-44152234.44	18109169.95	Fully	9.44	0.1875
2	WW-2A	-44152222.87	18109192.92	Fully	3.65	0.1875
3	WW-3A	-44152207.21	18109393.05	Fully	10.5	0.1875
4	Model Well 1	-44152940.6	18109415.6	Fully		
5	Model Well 2	-44152475.59	18109412.52	Fully		
6	Model Well 3	-44152934.42	18109027.72	Fully		
7	Model Well 4	-44152474.64	18109026.03	Fully		
8	Model Well 1v	-44151324.5808825	18110899.7479265	Fully		
9	Model Well 2v	-44150921.9945013	18111157.9736089	Fully		
10	Model Well 3v	-44151307.7736089	18111183.1804331	Fully		
11	Model Well 4v	-44150950.5867802	18110893.3731714	Fully		

WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Step Test	Pumping Well: WW-1A
Test Conducted by: FT		Test Date: 1/19/2021
Analysis Performed by: FT	WW-1A Step 1: Cooper-Jacob	Analysis Date: 2/9/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 1.8821 [U.S. gal/min]	

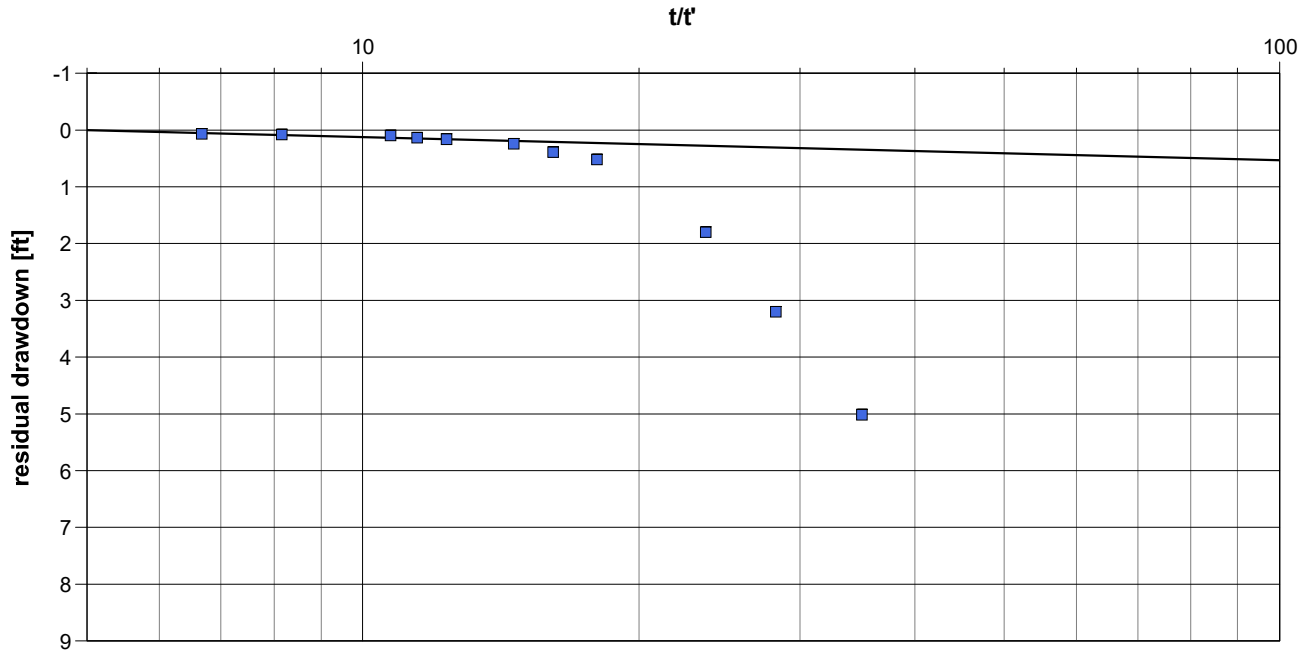


Calculation using COOPER & JACOB

Observation Well	Transmissivity [U.S. gal/d-ft]	Hydraulic Conductivity [U.S. gal/d-ft²]	Storage coefficient	Radial Distance to PW [ft]	
WW-1A	5.33×10^{3}	5.23×10^{2}	1.00×10^{-29}	0.17	

WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Step Test	Pumping Well: WW-1A
Test Conducted by: FT		Test Date: 1/19/2021
Analysis Performed by: FT	WW-1A Step Test Theis Recovery	Analysis Date: 2/9/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 1.8821 [U.S. gal/min]	

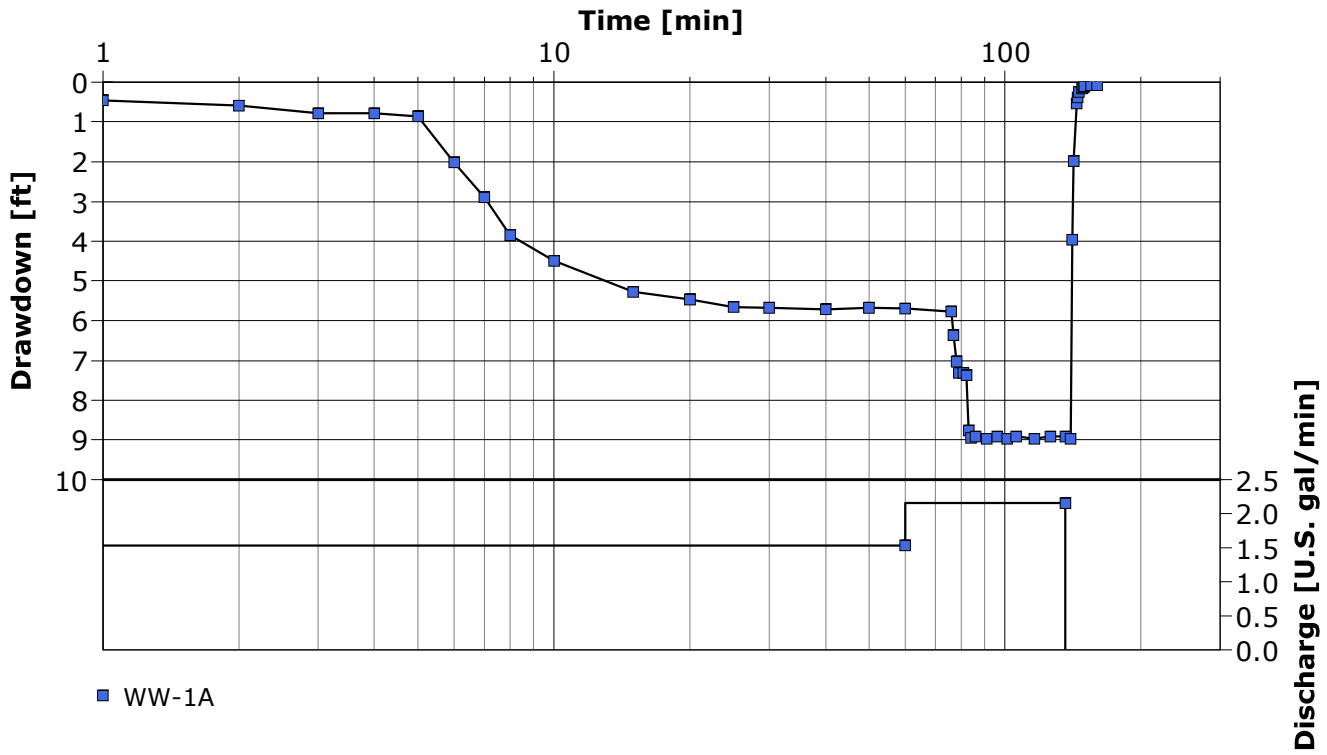


Calculation using THEIS & JACOB

Observation Well	Transmissivity [U.S. gal/d-ft]	Hydraulic Conductivity [U.S. gal/d-ft²]	Radial Distance to PW [ft]	
WW-1A	1.22×10^{3}	1.20×10^{2}	0.17	

WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Step Test	Pumping Well: WW-1A
Test Conducted by: FT		Test Date: 1/19/2021
Analysis Performed by: FT	WW-1A Step Test Time-Drawdown	Analysis Date: 2/9/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 1.8821 [U.S. gal/min]	



WENCK

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Stantec

Pumping Test Analysis Report

Project: Woodward/Vanier

Number: ORKRC131

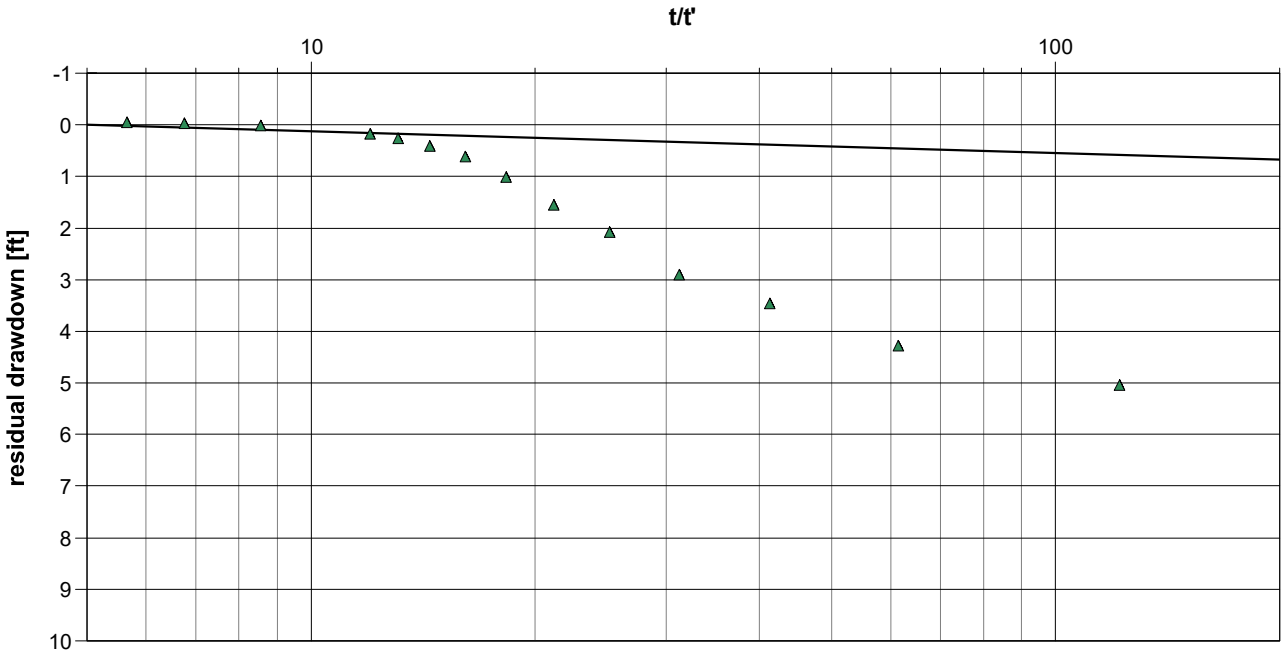
Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Step Test	Pumping Well: WW-1A
Test Conducted by: FT		Test Date: 1/19/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 1.8821 [U.S. gal/min]	

	Analysis Name	Method name	Well	T [U.S. gal/d-ft]	K [U.S. gal/d-ft²]	S
1	WW-1A Step 1: Cooper-Jaco	Cooper & Jacob I	WW-1A	5.33×10^{3}	5.23×10^{2}	1.00×10^{-29}
2	WW-1A Step Test Theis Rec	Theis Recovery	WW-1A	1.22×10^{3}	1.20×10^{2}	

WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-3A Step Test	Pumping Well: WW-3A
Test Conducted by: FT		Test Date: 1/21/2021
Analysis Performed by: FT	WW-3A Step Test Theis Recovery	Analysis Date: 2/9/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 1.4911 [U.S. gal/min]	

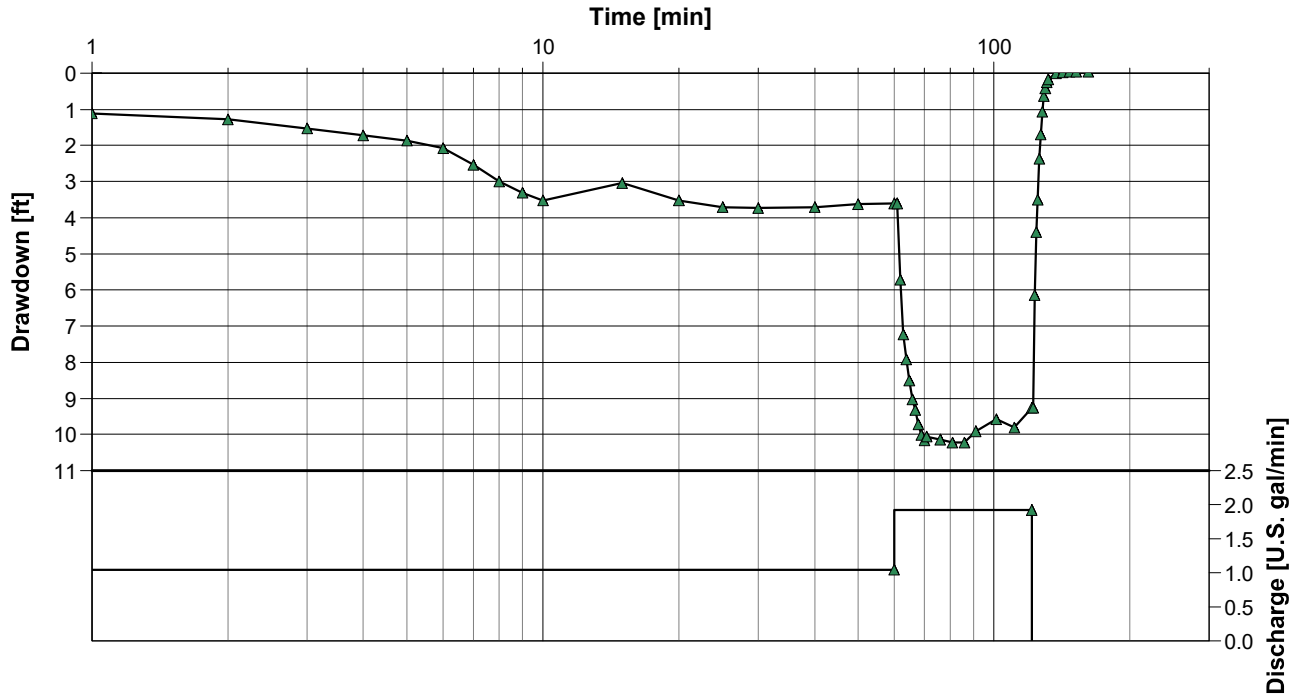


Calculation using THEIS & JACOB

Observation Well	Transmissivity [U.S. gal/d-ft]	Hydraulic Conductivity [U.S. gal/d-ft²]	Radial Distance to PW [ft]	
WW-3A	9.34×10^{2}	9.17×10^{1}	0.17	

WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-3A Step Test	Pumping Well: WW-3A
Test Conducted by: FT		Test Date: 1/21/2021
Analysis Performed by: FT	WW-3A Step Test Time-Drawdown	Analysis Date: 2/9/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 1.4911 [U.S. gal/min]	



WENCK

now part of

Stantec

Pumping Test Analysis Report

Project: Woodward/Vanier

Number: ORKRC131

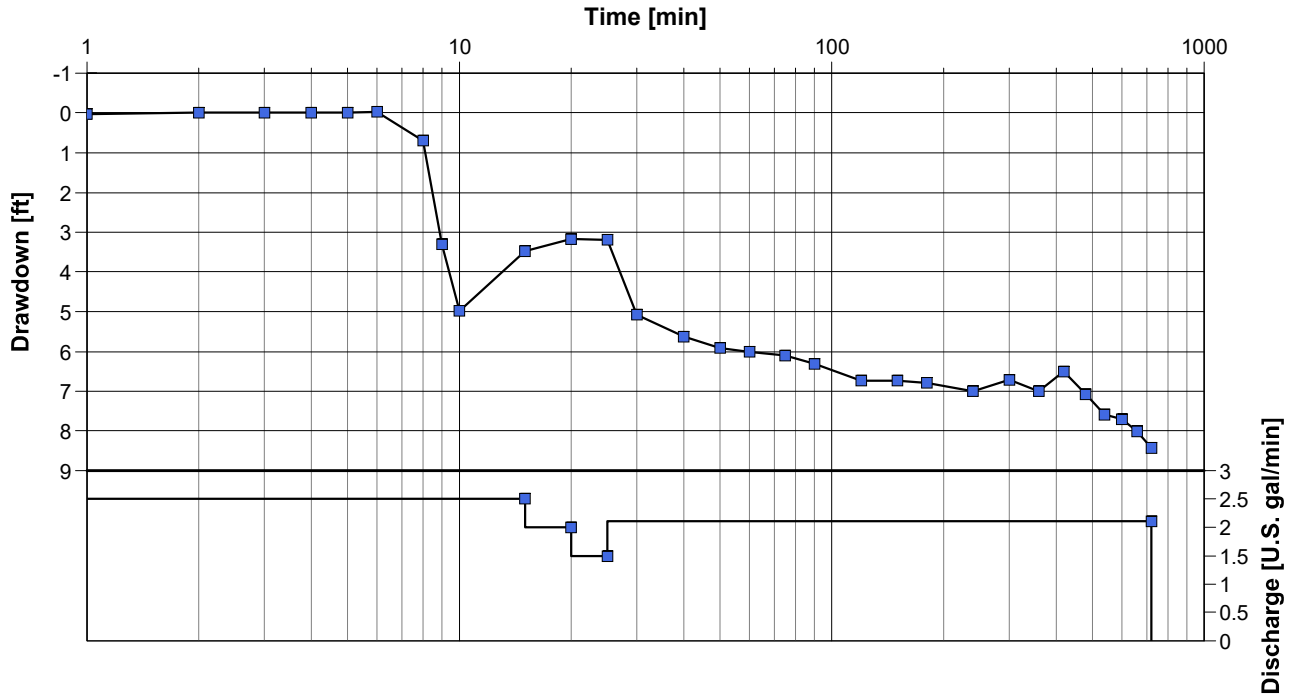
Client: Knife River

Location: Prineville, OR	Pumping Test: WW-3A Step Test	Pumping Well: WW-3A
Test Conducted by: FT		Test Date: 1/21/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 1.4911 [U.S. gal/min]	

	Analysis Name	Method name	Well	T [U.S. gal/d-ft]	K [U.S. gal/d-ft²]	S
1	WW-3A Step Test Theis Rec	Theis Recovery	WW-3A	9.34×10^{2}	9.17×10^{1}	

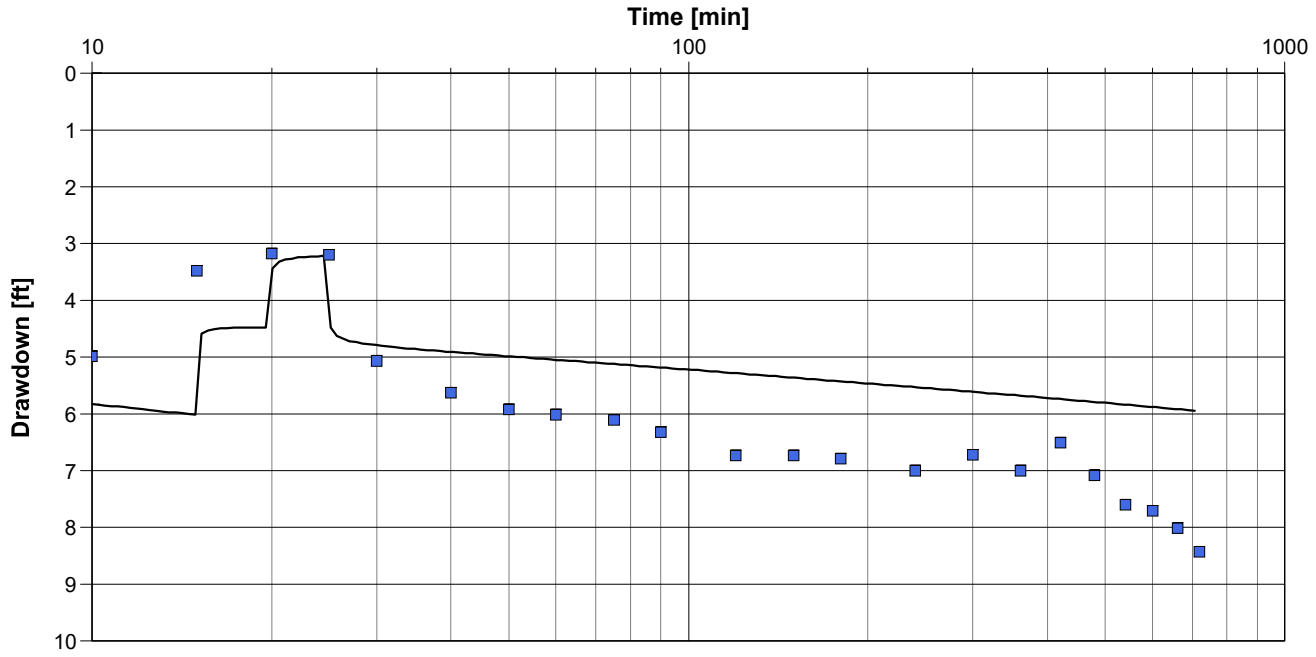
WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Constant Rate	Pumping Well: WW-1A
Test Conducted by:		Test Date: 1/20/2021
Analysis Performed by: FT	WW-1A Constant Rate Time-drawdown	Analysis Date: 2/9/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 2.1035 [U.S. gal/min]	



WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Constant Rate	Pumping Well: WW-1A
Test Conducted by:		Test Date: 1/20/2021
Analysis Performed by: FT	WW-1A Constant Rate: Theis w/ Jacob Correction	Analysis Date: 2/9/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 2.1035 [U.S. gal/min]	



Calculation using Theis with Jacob Correction

Observation Well	Transmissivity [U.S. gal/d-ft]	Hydraulic Conductivity [U.S. gal/d-ft²]	Storage coefficient	Radial Distance to PW [ft]	
WW-1A	1.43×10^{3}	1.41×10^{2}	1.00×10^{-7}	0.17	

WENCK

now part of

Stantec

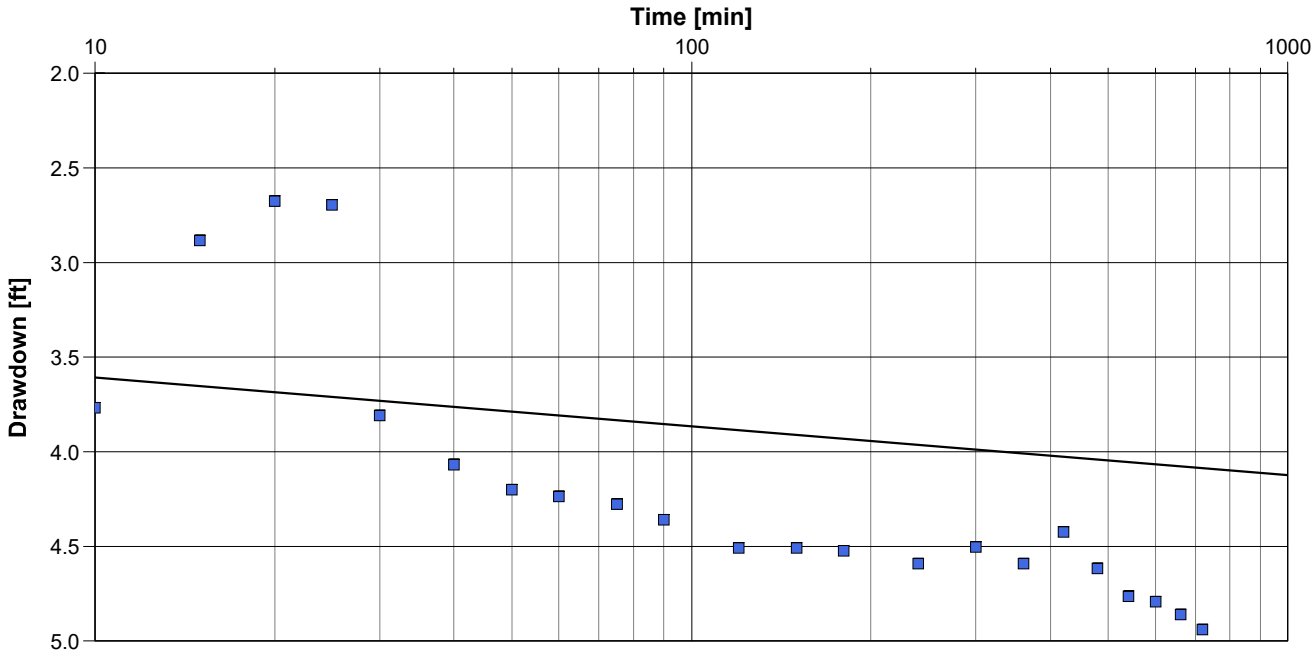
Pumping Test Analysis Report

Project: Woodward/Vanier

Number: ORKRC131

Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Constant Rate	Pumping Well: WW-1A
Test Conducted by:		Test Date: 1/20/2021
Analysis Performed by: FT	WW-1A Constant Rate: Cooper-Jacob	Analysis Date: 2/9/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 2.1035 [U.S. gal/min]	



Calculation using COOPER & JACOB

Observation Well	Transmissivity [U.S. gal/d-ft]	Hydraulic Conductivity [U.S. gal/d-ft²]	Storage coefficient	Radial Distance to PW [ft]	
WW-1A	2.16×10^{3}	2.12×10^{2}	1.52×10^{-12}	0.17	

WENCK

now part of

Stantec

Pumping Test Analysis Report

Project: Woodward/Vanier

Number: ORKRC131

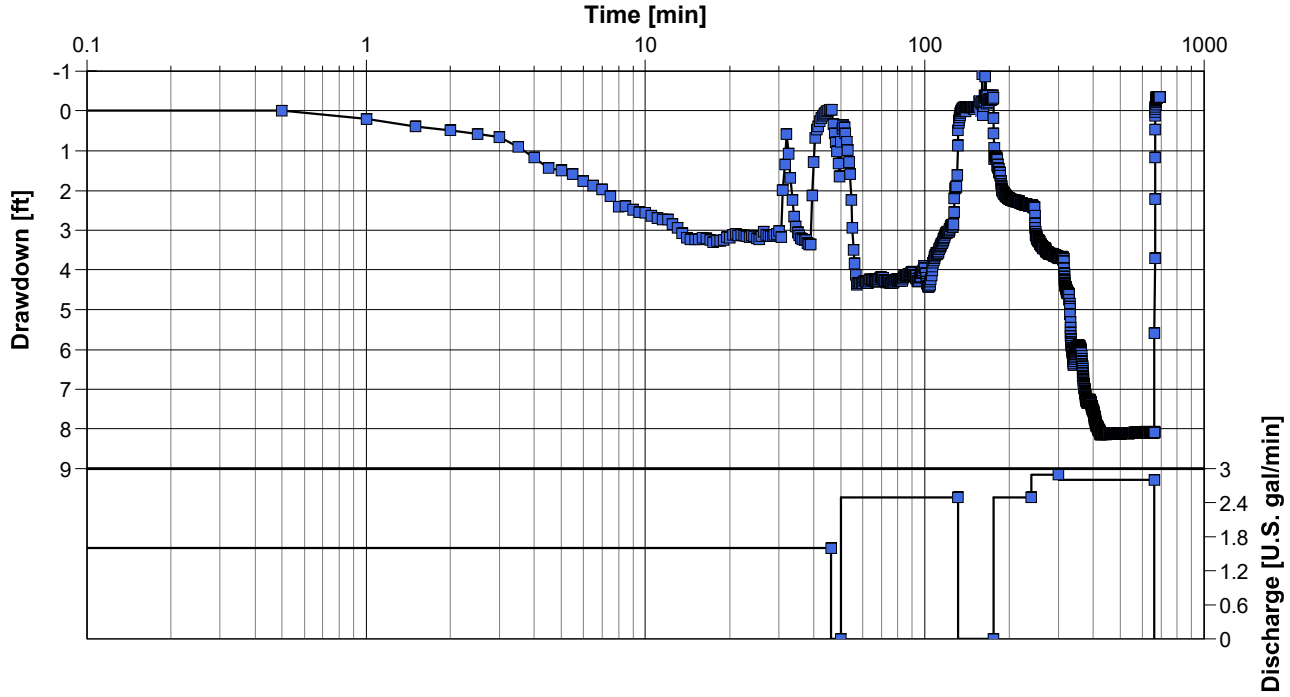
Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Constant Rate	Pumping Well: WW-1A
Test Conducted by:		Test Date: 1/20/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 2.1035 [U.S. gal/min]	

	Analysis Name	Method name	Well	T [U.S. gal/d-ft]	K [U.S. gal/d-ft²]	S
1	WW-1A Constant Rate: Theis	Theis with Jacob Correction	WW-1A	1.43×10^{3}	1.41×10^{2}	1.00×10^{-7}
2	WW-1A Constant Rate: Coop	Cooper & Jacob I	WW-1A	2.16×10^{3}	2.12×10^{2}	1.52×10^{-12}

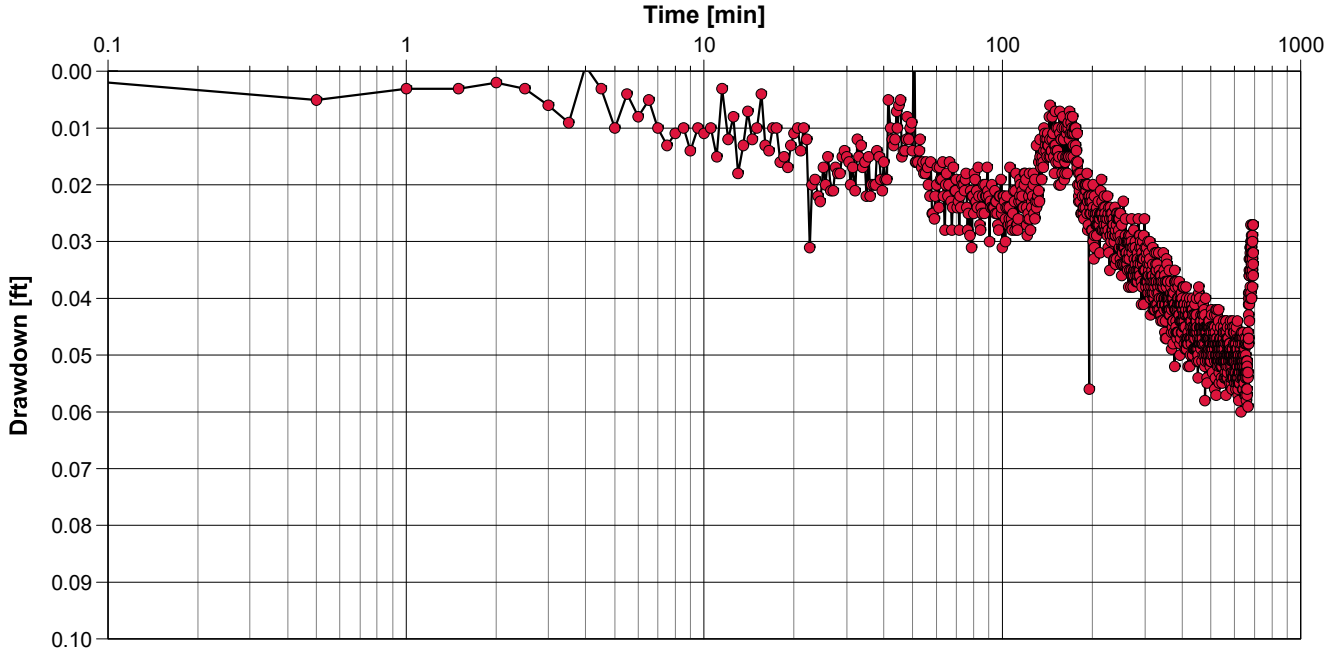
WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Constant Rate Re-Test	Pumping Well: WW-1A
Test Conducted by: F. Tremblay		Test Date: 1/22/2021
Analysis Performed by: FT	WW-1A Constant Rate Re-Test Time-drawdown	Analysis Date: 2/15/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 2.4538 [U.S. gal/min]	



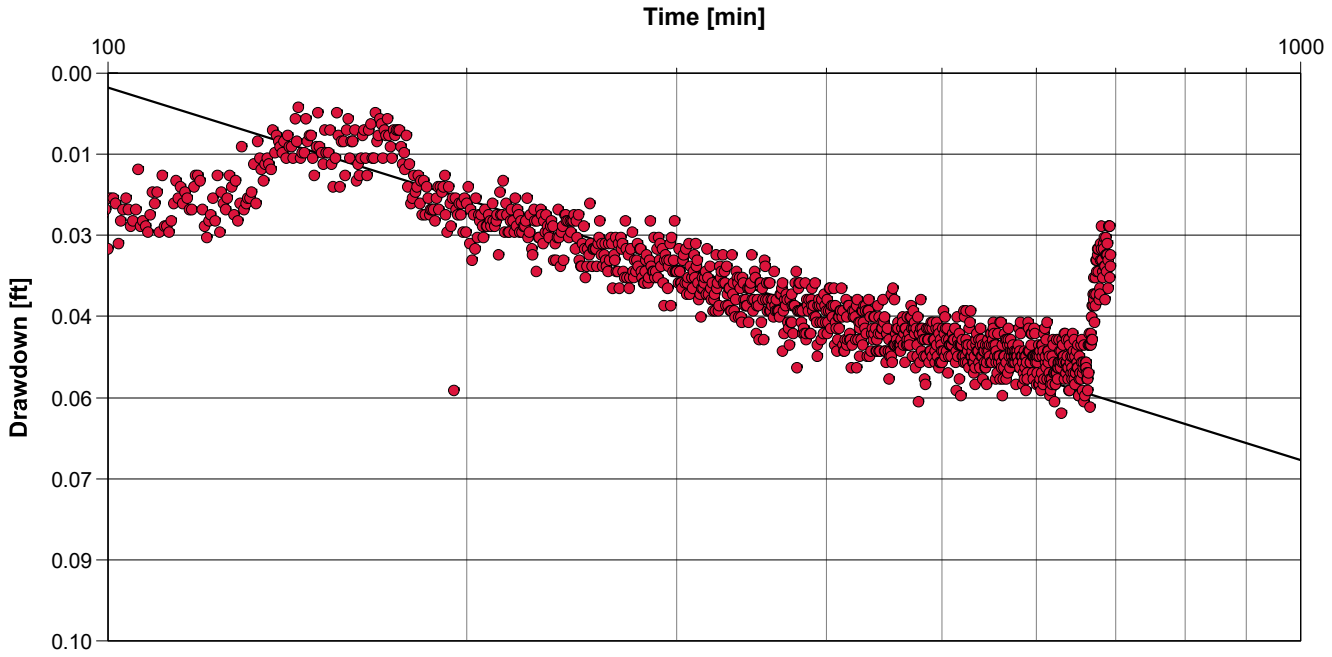
WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Constant Rate Re-Test	Pumping Well: WW-1A
Test Conducted by: F. Tremblay		Test Date: 1/22/2021
Analysis Performed by: FT	WW-2A Constant Rate Re-Test Time-Drawdown	Analysis Date: 2/15/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 2.4538 [U.S. gal/min]	



WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Constant Rate Re-Test	Pumping Well: WW-1A
Test Conducted by: F. Tremblay		Test Date: 1/22/2021
Analysis Performed by: FT	WW-2A Cooper-Jacob 2	Analysis Date: 2/15/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 2.4538 [U.S. gal/min]	

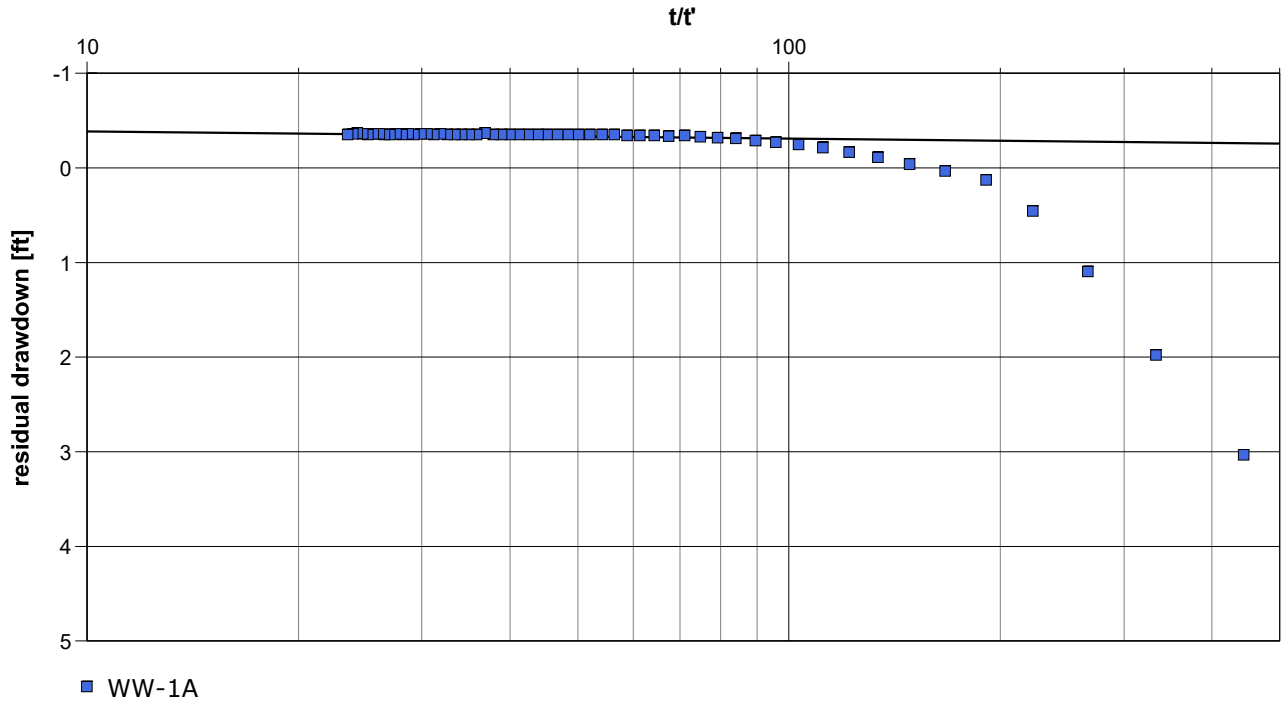


Calculation using COOPER & JACOB

Observation Well	Transmissivity [U.S. gal/d-ft]	Hydraulic Conductivity [U.S. gal/d-ft²]	Storage coefficient	Radial Distance to PW [ft]	
WW-2A	9.84×10^{3}	9.67×10^{2}	2.85×10^{-1}	25.72	

WENCK now part of Stantec	**Pumping Test Analysis Report**
	Project: Woodward/Vanier
	Number: ORKRC131
	Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Constant Rate Re-Test	Pumping Well: WW-1A
Test Conducted by: F. Tremblay		Test Date: 1/22/2021
Analysis Performed by: FT	WW-1A Theis Recovery	Analysis Date: 2/22/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 2.4538 [U.S. gal/min]	



Calculation using THEIS & JACOB

Observation Well	Transmissivity [U.S. gal/d-ft]	Hydraulic Conductivity [U.S. gal/d-ft²]	Radial Distance to PW [ft]	
WW-1A	8.55×10^{3}	8.39×10^{2}	0.17	

WENCK

now part of

Stantec

Pumping Test Analysis Report

Project: Woodward/Vanier

Number: ORKRC131

Client: Knife River

Location: Prineville, OR	Pumping Test: WW-1A Constant Rate Re-Test	Pumping Well: WW-1A
Test Conducted by: F. Tremblay		Test Date: 1/22/2021
Aquifer Thickness: 10.18 ft	Discharge: variable, average rate 2.4538 [U.S. gal/min]	

	Analysis Name	Method name	Well	T [U.S. gal/d-ft]	K [U.S. gal/d-ft²]	S
1	WW-2A Cooper-Jacob 2	Cooper & Jacob I	WW-2A	9.84×10^{3}	9.67×10^{2}	2.85×10^{-1}
2	WW-1A Theis Recovery	Theis Recovery	WW-1A	8.55×10^{3}	8.39×10^{2}	

APPENDIX C

Soil Testing Results

Pace Analytical® Formerly Inter-Mountain Laboratories
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Date: 2/24/2021

CLIENT: Wenck Associates
Project: ORKRC131
Lab Order: S2102046

CASE NARRATIVE

Report ID: S2102046001

Samples WW1A and WW2A were received on February 2, 2021.

Samples were analyzed using the methods outlined in the following references:

U.S.E.P.A. 600/2-78-054 "Field and Laboratory Methods Applicable to Overburden and Mining Soils", 1978
American Society of Agronomy, Number 9, Part 2, 1982
USDA Handbook 60 "Diagnosis and Improvement of Saline and Alkali Soils", 1969
Wyoming Department of Environmental Quality, Land Quality Division, Guideline No. 1, 1984
New Mexico Overburden and Soils Inventory and Handling Guideline, March 1987
State of Utah, Division of Oil, Gas, and Mining: Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining, April 1988
Montana Department of State Lands, Reclamation Division: Soil, Overburden, and Regraded Spoil Guidelines, December 1994
State of Nevada Modified Sobek Procedure
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition

All Quality Control parameters met the acceptance criteria defined by EPA and Pace Analytical (Formerly Inter-Mountain Laboratories) except as indicated in this case narrative.

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Pace Analytical
Formerly Inter-Mountain Laboratories
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Sample Analysis Report

CLIENT: Wenck Associates
4025 Automation Way
Bldg E
Fort Collins, CO 80525

Date Reported: 2/24/2021
Report ID: S2102046001

Work Order: S2102046
Collection Date: 1/18/2021 10:00:00 AM
Date Received: 2/2/2021 10:15:00 AM
Sampler: FT
Matrix: Soil
COC:

Project: ORKRC131
Lab ID: S2102046-001
Client Sample ID: WW1A
Depths: 4 - 6 Feet

Analyses	Result	RL	Qual	Units	Date Analyzed/Init	Method
General Parameters-Soil						
pH	7.8	0.1		s.u.	02/17/2021 09:11 CH	USDA 60-21a
Saturation Percent	36.8	0.1		%	02/17/2021 08:57 NLG	USDA 60-27a
Electrical Conductivity	0.42	0.01		dS/m	02/18/2021 13:27 CH	USDA 60-4
Saturated Paste Cations						
Calcium	2.20	0.05		meq/L	02/23/2021 19:32 DG	EPA 200.7
Magnesium	0.99	0.05		meq/L	02/23/2021 19:32 DG	EPA 200.7
Sodium	1.34	0.05		meq/L	02/23/2021 19:32 DG	EPA 200.7
Sodium Adsorption Ratio	1.06	0.05			02/24/2021 11:00 KS	Calculation
Exchangeable Cations						
Cation Exchange Capacity	34.2	0.1		meq/100g	02/23/2021 20:11 DG	EPA 9081
Available Sodium	0.72	0.16		meq/100g	02/22/2021 18:46 DG	ASA9 9-3.1
Exchangeable Sodium	0.67	0.05		meq/100g	02/24/2021 11:00 KS	USDA 60-18
Exchangeable Sodium % (ESP)	1.96	0.05		%	02/24/2021 11:00 KS	USDA 60-20

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
D	Report limit raised due to dilution
G	Analyzed at IML Gillette laboratory
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
U	Analyte below method detection limit
C	Calculated Value
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits
X	Matrix Effect

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Pace Analytical
Formerly Inter-Mountain Laboratories
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Sample Analysis Report

CLIENT: Wenck Associates
4025 Automation Way
Bldg E
Fort Collins, CO 80525

Date Reported: 2/24/2021
Report ID: S2102046001

Work Order: S2102046
Collection Date: 1/18/2021 10:15:00 AM
Date Received: 2/2/2021 10:15:00 AM
Sampler: FT
Matrix: Soil
COC:

Project: ORKRC131
Lab ID: S2102046-002
Client Sample ID: WW1A
Depths: 6 - 8 Feet

Analyses	Result	RL	Qual	Units	Date Analyzed/Init	Method
General Parameters-Soil						
pH	7.8	0.1		s.u.	02/17/2021 09:12 CH	USDA 60-21a
Saturation Percent	37.5	0.1		%	02/17/2021 08:58 NLG	USDA 60-27a
Electrical Conductivity	0.36	0.01		dS/m	02/18/2021 13:28 CH	USDA 60-4
Saturated Paste Cations						
Calcium	1.40	0.05		meq/L	02/23/2021 19:35 DG	EPA 200.7
Magnesium	0.69	0.05		meq/L	02/23/2021 19:35 DG	EPA 200.7
Sodium	1.05	0.05		meq/L	02/23/2021 19:35 DG	EPA 200.7
Sodium Adsorption Ratio	1.02	0.05			02/24/2021 11:00 KS	Calculation
Exchangeable Cations						
Cation Exchange Capacity	39.2	0.1		meq/100g	02/23/2021 20:13 DG	EPA 9081
Available Sodium	0.81	0.16		meq/100g	02/22/2021 18:48 DG	ASA9 9-3.1
Exchangeable Sodium	0.78	0.05		meq/100g	02/24/2021 11:00 KS	USDA 60-18
Exchangeable Sodium % (ESP)	1.98	0.05		%	02/24/2021 11:00 KS	USDA 60-20

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
D	Report limit raised due to dilution
G	Analyzed at IML Gillette laboratory
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
U	Analyte below method detection limit
C	Calculated Value
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits
X	Matrix Effect

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Pace Analytical
Formerly Inter-Mountain Laboratories
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Sample Analysis Report

CLIENT: Wenck Associates
4025 Automation Way
Bldg E
Fort Collins, CO 80525

Date Reported: 2/24/2021
Report ID: S2102046001

Work Order: S2102046
Collection Date: 1/18/2021 10:30:00 AM
Date Received: 2/2/2021 10:15:00 AM
Sampler: FT
Matrix: Soil
COC:

Project: ORKRC131
Lab ID: S2102046-003
Client Sample ID: WW1A
Depths: 10 - 12 Feet

Analyses	Result	RL	Qual	Units	Date Analyzed/Init	Method
General Parameters-Soil						
pH	7.6	0.1		s.u.	02/17/2021 09:13 CH	USDA 60-21a
Saturation Percent	22.9	0.1		%	02/17/2021 08:59 NLG	USDA 60-27a
Electrical Conductivity	0.82	0.01		dS/m	02/18/2021 13:29 CH	USDA 60-4
Saturated Paste Cations						
Calcium	1.55	0.05		meq/L	02/23/2021 19:37 DG	EPA 200.7
Magnesium	3.25	0.05		meq/L	02/23/2021 19:37 DG	EPA 200.7
Sodium	3.24	0.05		meq/L	02/23/2021 19:37 DG	EPA 200.7
Sodium Adsorption Ratio	2.09	0.05			02/24/2021 11:00 KS	Calculation
Exchangeable Cations						
Cation Exchange Capacity	23.5	0.1		meq/100g	02/23/2021 20:20 DG	EPA 9081
Available Sodium	0.63	0.16		meq/100g	02/22/2021 18:51 DG	ASA9 9-3.1
Exchangeable Sodium	0.56	0.05		meq/100g	02/24/2021 11:00 KS	USDA 60-18
Exchangeable Sodium % (ESP)	2.37	0.05		%	02/24/2021 11:00 KS	USDA 60-20

These results apply only to the samples tested.

RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
D	Report limit raised due to dilution
G	Analyzed at IML Gillette laboratory
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
U	Analyte below method detection limit
C	Calculated Value
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits
X	Matrix Effect

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Pace Analytical
Formerly Inter-Mountain Laboratories
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

Sample Analysis Report

CLIENT: Wenck Associates
4025 Automation Way
Bldg E
Fort Collins, CO 80525

Date Reported: 2/24/2021
Report ID: S2102046001

Work Order: S2102046
Collection Date: 1/18/2021 11:30:00 AM
Date Received: 2/2/2021 10:15:00 AM
Sampler: FT
Matrix: Soil
COC:

Project: ORKRC131
Lab ID: S2102046-004
Client Sample ID: WW2A
Depths: 2 - 10 Feet

Analyses	Result	RL	Qual	Units	Date Analyzed/Init	Method
General Parameters-Soil						
pH	7.8	0.1		s.u.	02/17/2021 09:14 CH	USDA 60-21a
Saturation Percent	36.1	0.1		%	02/17/2021 09:00 NLG	USDA 60-27a
Electrical Conductivity	0.34	0.01		dS/m	02/18/2021 13:30 CH	USDA 60-4
Saturated Paste Cations						
Calcium	1.64	0.05		meq/L	02/23/2021 19:39 DG	EPA 200.7
Magnesium	0.91	0.05		meq/L	02/23/2021 19:39 DG	EPA 200.7
Sodium	0.84	0.05		meq/L	02/23/2021 19:39 DG	EPA 200.7
Sodium Adsorption Ratio	0.74	0.05			02/24/2021 11:00 KS	Calculation
Exchangeable Cations						
Cation Exchange Capacity	34.9	0.1		meq/100g	02/23/2021 20:22 DG	EPA 9081
Available Sodium	0.70	0.16		meq/100g	02/22/2021 18:53 DG	ASA9 9-3.1
Exchangeable Sodium	0.67	0.05		meq/100g	02/24/2021 11:00 KS	USDA 60-18
Exchangeable Sodium % (ESP)	1.92	0.05		%	02/24/2021 11:00 KS	USDA 60-20

These results apply only to the samples tested.

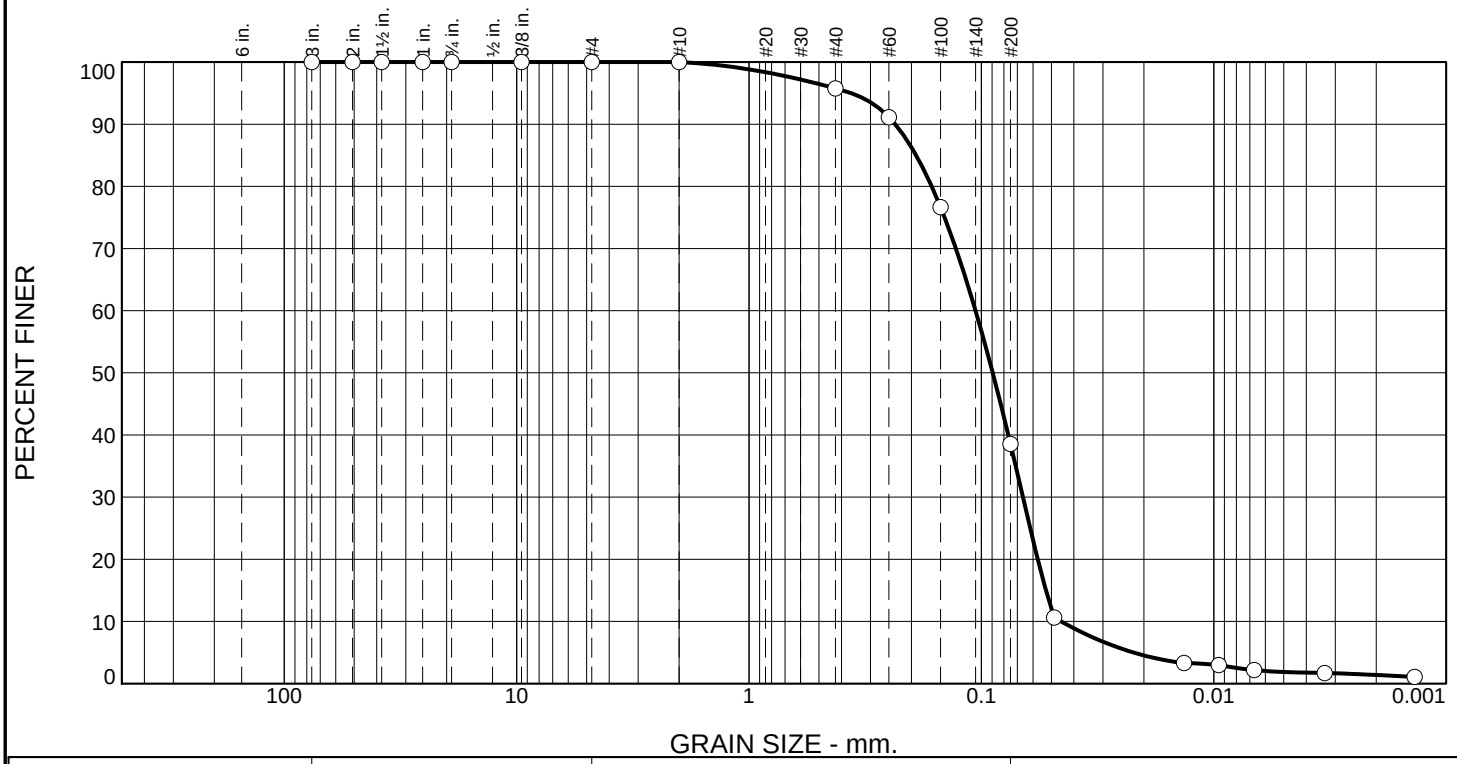
RL - Reporting Limit

Qualifiers:

B	Analyte detected in the associated Method Blank
D	Report limit raised due to dilution
G	Analyzed at IML Gillette laboratory
J	Analyte detected below quantitation limits
M	Value exceeds Monthly Ave or MCL or is less than LCL
O	Outside the Range of Dilutions
U	Analyte below method detection limit
C	Calculated Value
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
L	Analyzed by another laboratory
ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits
X	Matrix Effect

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	4	57	37	2

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.375	100		
#4	100		
#10	100		
#40	96		
#60	91		
#100	77		
#200	39		
0.0486 mm.	11		
0.0134 mm.	3.3		
0.0095 mm.	3.0		
0.0067 mm.	2.2		
0.0033 mm.	1.7		
0.0014 mm.	1.1		

* (no specification provided)

Material Description

WW1A Silty Sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.2349 D_{85}= 0.1910 D_{60}= 0.1060
D_{50}= 0.0894 D_{30}= 0.0663 D_{15}= 0.0527
D_{10}= 0.0455 C_u= 2.33 C_c= 0.91

Remarks

Date Received: 2/2/2021 **Date Tested:** 2/16/2021

Tested By: Karen Secor

Checked By:

Title:

Sample Number: S2102046-001 **Depth:** 4-6ft **Date Sampled:** 1/18/2021

Pace Analytical Services, Inc.

Sheridan, Wyoming

Client: Wenck Associates, Inc.

Project: ORKRC131

Project No: S2102046 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

2/24/2021

Client: Wenck Associates, Inc.
Project: ORKRC131
Project Number: S2102046
Depth: 4-6ft **Sample Number:** S2102046-001
Material Description: WW1A Silty Sand
Sample Date: 1/18/2021
Date Received: 2/2/2021 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: SM **AASHTO Classification:** A-4(0)
Grain Size Test Method: ASTM D 422
Tested By: Karen Secor **Test Date:** 2/16/2021

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
240.00	0.00	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	0.00	0.00	100
		#4	0.00	0.00	100
		#10	0.00	0.00	100
60.53	0.00	#40	2.56	0.00	96
		#60	2.81	0.00	91
		#100	8.75	0.00	77
		#200	23.07	0.00	39

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 39
Weight of hydrometer sample =60.53
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = -3.5
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	21.0	20.0	16.7	0.0135	20.0	13.0	0.0486	10.6
15.00	21.0	8.5	5.2	0.0135	8.5	14.9	0.0134	3.3
30.00	21.0	8.0	4.7	0.0135	8.0	15.0	0.0095	3.0
60.00	22.0	6.5	3.4	0.0133	6.5	15.2	0.0067	2.2
240.00	23.0	5.5	2.7	0.0132	5.5	15.4	0.0033	1.7
1440.00	23.0	4.5	1.7	0.0132	4.5	15.6	0.0014	1.1

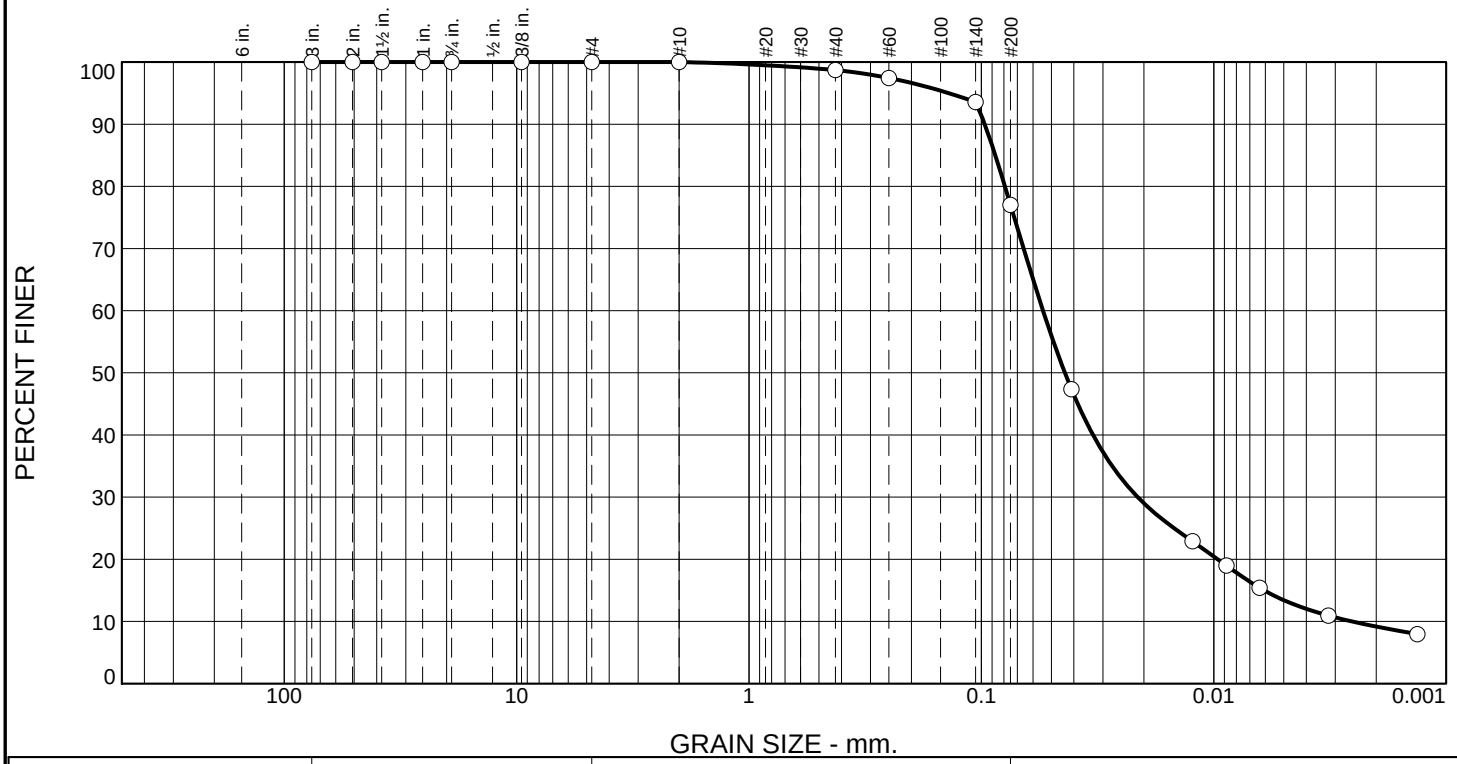
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	0	4	57	61	37	2	39

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0222	0.0455	0.0527	0.0572	0.0663	0.0766	0.0894	0.1060	0.1637	0.1910	0.2349	0.3639

Fineness Modulus	C_u	C_c
0.33	2.33	0.91

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	22	64	13

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.375	100		
#4	100		
#10	100		
#40	99		
#60	97		
#140	94		
#200	77		
0.0410 mm.	47		
0.0124 mm.	23		
0.0088 mm.	19		
0.0064 mm.	15		
0.0032 mm.	11		
0.0013 mm.	8.0		

* (no specification provided)

Material Description

WW1A Silt with Sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.0968 D_{85}= 0.0871 D_{60}= 0.0543
D_{50}= 0.0437 D_{30}= 0.0213 D_{15}= 0.0061
D_{10}= 0.0025 C_u= 21.30 C_c= 3.27

Remarks

Date Received: 2/2/2021 **Date Tested:** 2/16/2021

Tested By: Karen Secor

Checked By:

Title:

Sample Number: S2102046-002 **Depth:** 6-8ft **Date Sampled:** 1/18/2021

Pace Analytical Services, Inc.

Sheridan, Wyoming

Client: Wenck Associates, Inc.
Project: ORKRC131

Project No: S2102046 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

2/24/2021

Client: Wenck Associates, Inc.
Project: ORKRC131
Project Number: S2102046
Depth: 6-8ft **Sample Number:** S2102046-002
Material Description: WW1A Silt with Sand
Sample Date: 1/18/2021
Date Received: 2/2/2021 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: ML **AASHTO Classification:** A-4(0)
Grain Size Test Method: ASTM D 422
Tested By: Karen Secor **Test Date:** 2/16/2021

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
225.71	0.00	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	0.00	0.00	100
		#4	0.00	0.00	100
		#10	0.00	0.00	100
64.52	0.00	#40	0.82	0.00	99
		#60	0.83	0.00	97
		#140	2.50	0.00	94
		#200	10.68	0.00	77

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 77
Weight of hydrometer sample =64.52
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = -3.5
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	21.0	43.0	39.7	0.0135	43.0	9.2	0.0410	47.4
15.00	21.0	22.5	19.2	0.0135	22.5	12.6	0.0124	22.9
30.00	22.0	19.0	15.9	0.0133	19.0	13.2	0.0088	19.0
60.00	22.0	16.0	12.9	0.0133	16.0	13.7	0.0064	15.4
240.00	23.0	12.0	9.2	0.0132	12.0	14.3	0.0032	10.9
1440.00	23.0	9.5	6.7	0.0132	9.5	14.7	0.0013	8.0

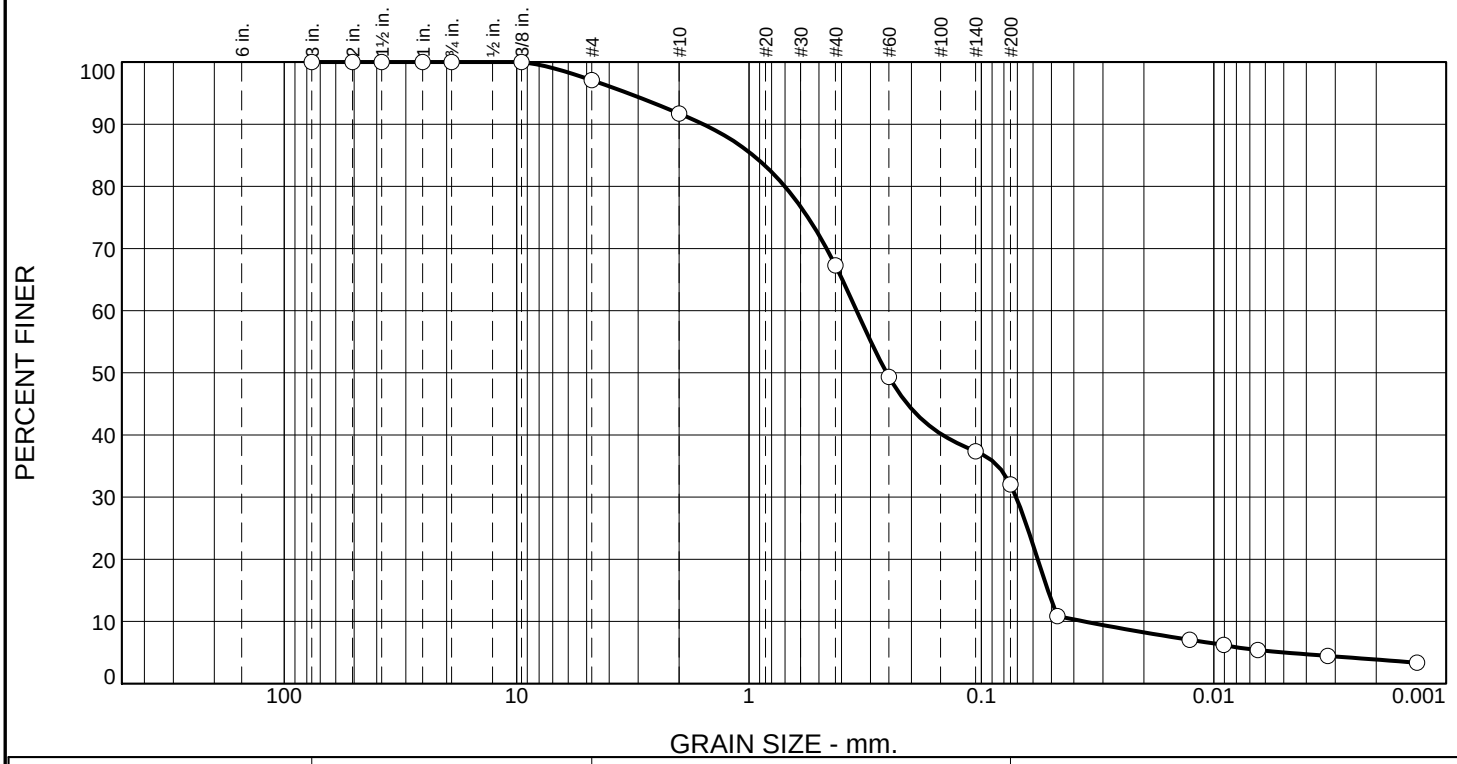
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	0	1	22	23	64	13	77

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0025	0.0061	0.0096	0.0213	0.0331	0.0437	0.0543	0.0792	0.0871	0.0968	0.1381

Fineness Modulus	C_u	C_c
0.08	21.30	3.27

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	3	5	25	35	27	5

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.375	100		
#4	97		
#10	92		
#40	67		
#60	49		
#140	37		
#200	32		
0.0471 mm.	11		
0.0127 mm.	7.0		
0.0091 mm.	6.2		
0.0065 mm.	5.4		
0.0032 mm.	4.4		
0.0013 mm.	3.4		

* (no specification provided)

Material Description

WW1A Silty Sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 1.5749 D_{85}= 0.9589 D_{60}= 0.3446
D_{50}= 0.2557 D_{30}= 0.0708 D_{15}= 0.0517
D_{10}= 0.0362 C_u= 9.52 C_c= 0.40

Remarks

Date Received: 2/2/2021 **Date Tested:** 2/16/2021

Tested By: Karen Secor

Checked By:

Title:

Sample Number: S2102046-003 **Depth:** 10-12ft **Date Sampled:** 1/18/2021

Pace Analytical Services, Inc.

Sheridan, Wyoming

Client: Wenck Associates, Inc.
Project: ORKRC131

Project No: S2102046 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

2/24/2021

Client: Wenck Associates, Inc.
Project: ORKRC131
Project Number: S2102046
Depth: 10-12ft **Sample Number:** S2102046-003
Material Description: WW1A Silty Sand
Sample Date: 1/18/2021
Date Received: 2/2/2021 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: SM **AASHTO Classification:** A-2-4(0)
Grain Size Test Method: ASTM D 422
Tested By: Karen Secor **Test Date:** 2/16/2021

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
338.09	0.00	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	0.00	0.00	100
		#4	9.83	0.00	97
		#10	18.16	0.00	92
58.80	0.00	#40	15.67	0.00	67
		#60	11.49	0.00	49
		#140	7.69	0.00	37
		#200	3.41	0.00	32

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 32
Weight of hydrometer sample =58.8
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = -3.5
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	22.0	23.0	19.9	0.0133	23.0	12.5	0.0471	10.8
15.00	22.0	16.0	12.9	0.0133	16.0	13.7	0.0127	7.0
30.00	22.0	14.5	11.4	0.0133	14.5	13.9	0.0091	6.2
60.00	22.0	13.0	9.9	0.0133	13.0	14.2	0.0065	5.4
240.00	23.0	11.0	8.2	0.0132	11.0	14.5	0.0032	4.4
1440.00	23.0	9.0	6.2	0.0132	9.0	14.8	0.0013	3.4

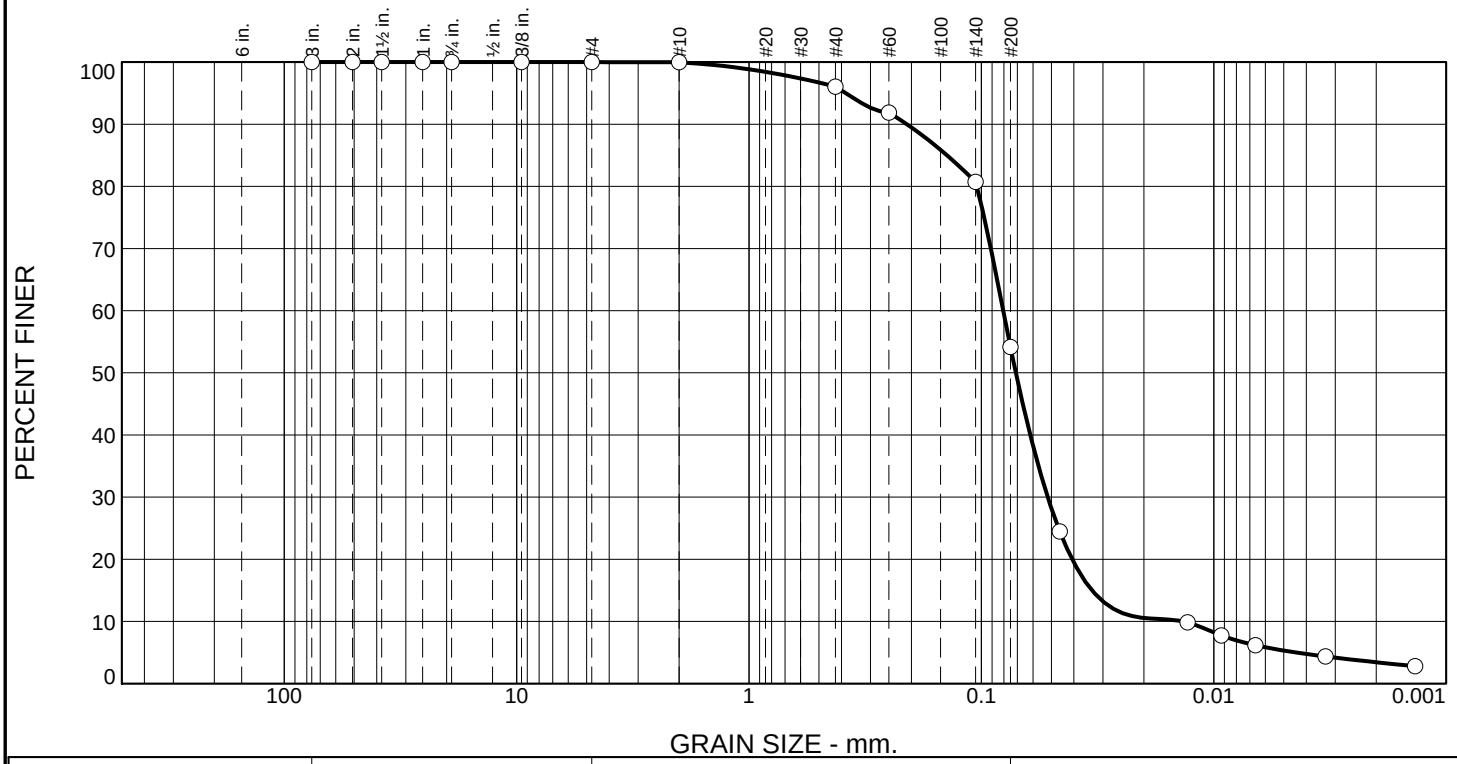
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	3	3	5	25	35	65	27	5	32

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0050	0.0362	0.0517	0.0572	0.0708	0.1470	0.2557	0.3446	0.7014	0.9589	1.5749	3.3213

Fineness Modulus	C_u	C_c
1.51	9.52	0.40

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	4	42	49	5

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	100		
2	100		
1.5	100		
1	100		
.75	100		
.375	100		
#4	100		
#10	100		
#40	96		
#60	92		
#140	81		
#200	54		
0.0460 mm.	24		
0.0130 mm.	9.8		
0.0093 mm.	7.7		
0.0066 mm.	6.2		
0.0033 mm.	4.4		
0.0014 mm.	2.8		

* (no specification provided)

Material Description

WW2A Sandy Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.2092 D_{85}= 0.1407 D_{60}= 0.0806
D_{50}= 0.0711 D_{30}= 0.0519 D_{15}= 0.0334
D_{10}= 0.0136 C_u= 5.94 C_c= 2.46

Remarks

Date Received: 2/2/2021 **Date Tested:** 2/16/2021

Tested By: Karen Secor

Checked By:

Title:

Sample Number: S2102046-004 **Depth:** 2-10ft **Date Sampled:** 1/18/2021

Pace Analytical Services, Inc.

Sheridan, Wyoming

Client: Wenck Associates, Inc.
Project: ORKRC131

Project No: S2102046 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

2/24/2021

Client: Wenck Associates, Inc.
Project: ORKRC131
Project Number: S2102046
Depth: 2-10ft **Sample Number:** S2102046-004
Material Description: WW2A Sandy Silt
Sample Date: 1/18/2021
Date Received: 2/2/2021 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: ML **AASHTO Classification:** A-4(0)
Grain Size Test Method: ASTM D 422
Tested By: Karen Secor **Test Date:** 2/16/2021

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
364.16	0.00	3	0.00	0.00	100
		2	0.00	0.00	100
		1.5	0.00	0.00	100
		1	0.00	0.00	100
		.75	0.00	0.00	100
		.375	0.00	0.00	100
		#4	0.00	0.00	100
		#10	0.09	0.00	100
51.81	0.00	#40	2.03	0.00	96
		#60	2.17	0.00	92
		#140	5.78	0.00	81
		#200	13.76	0.00	54

Hydrometer Test Data

Hydrometer test uses material passing #200
Percent passing #200 based upon complete sample = 54
Weight of hydrometer sample =51.81
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = -3.5
Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	22.0	26.5	23.4	0.0133	26.5	11.9	0.0460	24.5
15.00	22.0	12.5	9.4	0.0133	12.5	14.2	0.0130	9.8
30.00	22.0	10.5	7.4	0.0133	10.5	14.6	0.0093	7.7
60.00	22.0	9.0	5.9	0.0133	9.0	14.8	0.0066	6.2
240.00	23.0	7.0	4.2	0.0132	7.0	15.1	0.0033	4.4
1440.00	23.0	5.5	2.7	0.0132	5.5	15.4	0.0014	2.8

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	0	4	42	46	49	5	54

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0044	0.0136	0.0334	0.0407	0.0519	0.0616	0.0711	0.0806	0.1047	0.1407	0.2092	0.3832

Fineness Modulus	C_u	C_c
0.25	5.94	2.46

Pace Analytical
Formerly Inter-Mountain Laboratories
1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT

CLIENT: Wenck Associates
Work Order: S2102046
Project: ORKRC131

Date: 2/24/2021
Report ID: S2102046001

Available Metals - meq Sample Type **MBLK** Units: meq/100g

AVA BLK (02/22/21 19:20) RunNo: 186947

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Available Sodium	ND	0.16					

Available Metals - meq Sample Type **LCS** Units: meq/100g

AVA QC (02/22/21 19:18) RunNo: 186947

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Available Sodium	1.73	0.16	2.36		73.4	70 - 130	

Cation Exchange Capacity Sample Type **MBLK** Units: meq/100g

CEC BLK (02/23/21 20:31) RunNo: 186999

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Cation Exchange Capacity	ND	0.1					

Cation Exchange Capacity Sample Type **LCS** Units: meq/100g

CEC QC (02/23/21 20:29) RunNo: 186999

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Cation Exchange Capacity	16.4	0.1	20.6		80.0	80 - 120	

Electrical Conductivity - Soil Sample Type **LCS** Units: dS/m

CONTROL (02/18/21 13:39) RunNo: 186882

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Electrical Conductivity	4.30	0.01	4.05		106	80 - 120	

pH-Soil Sample Type **LCS** Units: s.u.

CONTROL (02/17/21 09:23) RunNo: 186837

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
pH	7.3	0.1	7.1		103	96 - 104	

Saturated Paste Cations by EPA 200.7 Sample Type **MBLK** Units: meq/L

SAR BLK (02/23/21 20:06) RunNo: 186998

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Calcium	ND	0.05					
Magnesium	ND	0.05					
Sodium	ND	0.05					

Saturated Paste Cations by EPA 200.7 Sample Type **LCS** Units: meq/L

SAR QC (02/23/21 20:04) RunNo: 186998

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Calcium	27.6	0.05	26		106	80 - 120	
Magnesium	14.0	0.05	13.4		104	80 - 120	
Sodium	16.5	0.05	17.2		96.1	80 - 120	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Report limit raised due to dilution
E	Value above quantitation range	G	Analyzed at IML Gillette laboratory
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
L	Analyzed by another laboratory	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits	X	Matrix Effect

Pace Analytical
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1673 Terra Avenue Sheridan, WY 82801 ph: (307) 672-8945

ANALYTICAL QC SUMMARY REPORT

CLIENT: Wenck Associates
Work Order: S2102046
Project: ORKRC131

Date: 2/24/2021
Report ID: S2102046001

Saturation Percent Sample Type **LCS** Units: %

CONTROL (02/17/21 09:09) RunNo: 186865

Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
Saturation Percent	43.1	0.1	51		84.5	80 - 120	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Report limit raised due to dilution
E	Value above quantitation range	G	Analyzed at IML Gillette laboratory
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
L	Analyzed by another laboratory	ND	Not Detected at the Reporting Limit
O	Outside the Range of Dilutions	R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits	X	Matrix Effect

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

ALL BOLD OUTLINED AREAS are for LAB USE ONLY

Company: Wenck Associates, Inc.

Address: 4025 Automation Way, Bldg. E

Billing Information: Same

Report To: Mark Stacy

Email To: mstacy@wenck.com

Copy To:

Site Collection Info/Address: Prineville, Oregon

Customer Project Name/Number: ORKRC131

State: OR / County/City: Crook / Time Zone Collected: [x]PT [ ]MT [ ]CT [ ]ET

Phone: 970-893-4812

Email: mstacy@wenck.com

Site/Facility ID #: None

Compliance Monitoring? [ ] Yes [x] No

Collected By (print): Freddy Tremblay

Purchase Order #:

Quote #: 89196

DW PWS ID #:

DW Location Code:

Collected By (signature): Freddy Tremblay

Turnaround Date Required: Standard TAT

Immediately Packed on Ice: [ ] Yes [x] No

Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: ______ [ ] Hold: ______

Rush: (Expedite Charges Apply) [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day

Field Filtered (if applicable): [ ] Yes [ ] No

Analysis: ______

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Container Preservative Type **: U

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ______

Lab Project Manager:

Analyses: Analyze each sample bag per quote

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Container Type: Plastic (P) or Glass (G)	Analyze each sample bag per quote	Lab Sample # / Comments
WW1A-4-6 feet	SL	Grab	1/18/21	1000				1		X	52102046-001
WW1A-6-8 feet	SL	Grab	1/18/21	1015				1		X	-002
WW1A-10-12 feet	SL	Grab	1/18/21	1030				1		X	-003
WW2A-2-10 feet	SL	Grab	1/18/21	1130				1		X	-004

Lab Profile/Line:

Lab Sample Receipt Checklist:
- Custody Seals Present/Intact Y N NA
- Custody Signatures Present Y N NA
- Collector Signature Present Y N NA
- Bottles Intact Y N NA
- Correct Bottles Y N NA
- Sufficient Volume Y N NA
- Samples Received on Ice Y N NA
- VOA - Headspace Acceptable Y N NA
- USDA Regulated Soils Y N NA
- Samples in Holding Time Y N NA
- Residual Chlorine Present Y N NA
- Cl Strips: ______
- Sample pH Acceptable Y N NA
- pH Strips: ______
- Sulfide Present Y N NA
- Lead Acetate Strips: ______

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards: None

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #:

Samples received via: FEDEX UPS Client Courier Pace Courier

LAB Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: ______
Cooler 1 Temp Upon Receipt: ___oC
Cooler 1 Therm Corr. Factor: ___oC
Cooler 1 Corrected Temp: ___oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Mark Stacy/Wenck [signature]	1/29/21 1400	Karen Sea Pace [signature]	2/2/21 1015

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: ____ of: ____