Oregon
Tina Kotek, Governor

Department of Environmental Quality
Eastern Region Bend Office
475 NE Bellevue Dr., Suite 110
Bend, OR 97701
(541) 388-6146
FAX (541) 388-8283
TTY 711

December 10, 2025

Cascade Lake Properties LLC
56636 Lloyd Way
Bend, OR 97707

Re: WQ: Variance Approval: 248-25-000350-VAR: 16959 Upland Road; T.20S; R.10E; Sec. 13C; Tax Lot 9400; 0.51 Acres; Deschutes County.

Dear Cascade Lakes Properties LLC,

This correspondence verifies that a variance hearing provided for under Oregon Administrative Rules 340-071-0430, was held on the site at 9:00 am on November 6, 2025, for the subject property referenced above on Upland Road in Deschutes County. The purpose of the hearing was to provide a forum for the presentation of supportive facts to show that strict compliance with certain rules regulating onsite sewage disposal are inappropriate, or that special physical conditions at the site render strict compliance unreasonable, burdensome or impractical. The proposal and associated supporting information you provided with the application was presented during the recorded hearing.

Variance Decision:
Based on review and evaluation of the variance record and observations made during the variance hearing, I am pleased to inform you that the variance from the rules cited above is hereby granted. In my opinion, it would be unreasonable to prohibit this method of wastewater treatment by strictly following the administrative rules at this specific location at this time. It is my judgement that the proposed system is not likely to present a public health hazard risk or have any significant adverse impact to groundwater or surface water quality if properly operated and maintained.

Justification for this decision:

- The proposed Orenco® AdvanTex AX20N-Mode 3B system is currently approved as a system meeting DEQ's Treatment Standard 2; OAR 340-071-0100(168) "Treatment Standard 2".
- On average, the AX20N-Mode 3B system is one of the best available technologies for Total Nitrogen treatment that has been approved for use in Oregon and is expected to treat residential wastewater to 20 mg/L Total Nitrogen, which is about two thirds of a reduction from that of a standard system and about half from a sand filter system in this climate.
- Treatment Standard 2, for the reduction of fecal coliform, will be met or exceeded with pre-treated effluent from the AX20N-Mode 3B unit (proposed w/o UV disinfection) and the RidNOx™ unit that will discharge into a 250 square foot bottomless sand filter with an additional 12-inches of sand filter media (embedded 6-inches below ground surface) placed below the filter to meet or exceed the minimum 24-inch separation requirement to groundwater below. Note: The bottomless sand filter is assumed to meet Treatment Standard

2 criteria independently of the ATT, which is why UV disinfection was not included in the proposal.

- Overall Treatment: Treatment first occurs within the AX20N-Mode 3B system (w/o UV) for reductions in TSS, BOD_5 and Total Nitrogen (TN). The RidNOx™ unit is expected to further reduce TN (and Nitrate) as the effluent passes through and makes contact with the soluble carbon being released from the wood chip material. Final discharge will occur through the elevated bottomless sand filter, which may provide some additional reduction/treatment of BOD_5, TSS, Fecal Coliform and TN. It is expected that the final effluent being discharged shall meet or exceed that of the similar Nitrex unit, that was tested during the La Pine National Demonstration Project, which averaged a 96% reduction of TN. The final effluent Nitrate concentration is expected to be well under the EPA drinking water standard of 10 mg/L as well as local action levels set at 7 mg/L.
- The proposed system, with innovative technology, shall be required to be maintained by a certified maintenance provider for the life of the system. Additionally, the system shall be monitored and sampled at regular intervals to ensure that the system is performing as expected. The sampling, monitoring, and maintenance of the system shall be reported to Deschutes County on an annual basis.

Standards found in Oregon Administrative Rules Chapter 340, Division 071 & 073 have been developed to protect public health and the environment in Oregon. The variance officer's duty is to determine if in their professional judgement, the system proposed for this variance consideration is adequate to safeguard the public's health and the environment if variance from the standards noted above are granted. In my opinion, your proposal adequately addresses the limitations present at the site.

Other Considerations:
The effluent from the ATT and RidNOx™ system, discharging through a bottomless sand filter, will have a significant reduction in BOD, TSS, TN, and Fecal Coliform. In this proposal, treated ATT to RidNOx™ effluent will be discharged into a 250 square foot bottomless sand filter with an additional 12- inches (total of 18) of sand filter media embedded six inches into the native soil that will be used to exceed the 24-inch separation from the shallowest water table depth standard by providing a total separation of 30- inches. The additional media will mitigate the lack of vertical separation from the bottom of the sand filter to the highest level of groundwater on site. The RidNOx™ unit is expected to provide a significant reduction of Total Nitrogen (and Nitrate) before the treated effluent enters the bottomless sand filter with a basal area intersecting the native soil and ultimately the groundwater below.

This variance approval is being granted on the condition that requirements contained in the enclosed schedules are met. Schedules A and B (attached) include requirements and specifications for the design and location of the system approved through this variance. Failure to meet these conditions may cause the variance approval to become null & void.

Site History & Variance Proposal:
Deschutes County conducted a site evaluation with four test pits within the subject property on September 5, 2025, where a denial was issued for the use of an onsite wastewater system on September 10, 2025. The primary reason for denial was due to the predicted depth to the seasonally high permanent water table being less than 24- inches below the ground surface. Observed conditions

associated with saturation that are used to determine water table levels and site suitability were observed between 15- inches and 18-inches below ground surface (bgs), respectively.

The proposal to overcome the site limitations is by installing an Orenco® AdvanTex AX20N-Mode 3B Alternative Treatment Technology System followed by a RidNOx™ solid-phase carbon flow-through filter before discharging to a 250 sq. ft. elevated Bottomless Sand Filter system constructed on a 12-inch bed of sand filter media embedded six inches into the native soil, and contained in a re-inforced concrete berm. It is expected that the highest level of groundwater within the lowest point of the sand filter areas will come to 18- inches bgs. The proposal overcomes this limitation by providing additional sand filter media with six inches of extra vertical separation and providing a total 30-inch separation to the shallowest predicted groundwater depth. The rest of the sand filter will be "conventional" from there up, consisting of six inches of underdrain media, 24- inches of sand filter media, six inches of drain media (with the distribution laterals), filter fabric, and six - nine inches deep of final backfill on top.

You are seeking a variance from the following Oregon Administrative Rules (OAR):

340-071-0135(1) – which addresses DEQ approval of new or innovative technologies, materials, or designs for onsite systems. **This rule is being varied from due to deviating from the approved design for the AX20N in Mode 3B by not requiring UV disinfection. Treatment Standard 2 will still be met or exceeded without the UV disinfection by discharging the treated effluent through a bottomless sand filter.**

340-071-071-0150(4)(a)(B) - which requires all criteria for approving a specific type or types of systems, as described in this division are satisfied.

340-071-0290(4)(d) which states: Bottomless Sand Filter. Sites may use a conventional bottomless sand filter if the site meets the criteria in this section and section (3) of this rule. (d) The water table is at least 24- inches below the ground surface throughout the year, and a minimum 24-inch separation is maintained between a water table and the bottom of the sand filter.

Conclusion:
The decision to grant your variance request is a Final Order of DEQ. Any person who is adversely affected or aggrieved by this Order is entitled to a contested case hearing before the Environmental Quality Commission. A request for a hearing must be received by DEQ within twenty days from the date of certified mailing of this Order. The request must specifically describe how the Order fails to meet the requirements of Oregon Revised Statutes 454.657 and 454.660, and include the technical basis that supports the petition. The appeal must be directed to the Environmental Quality Commission, in care of Lindsay Trapp, EQC Assistant, Department of Environmental Quality, 700 NE Multnomah St., Suite 600, Portland, OR 97232-4100.

Deschutes County onsite staff is hereby authorized to issue a construction-installation permit, subject to all the conditions, upon their receipt of a complete permit application. The application must include a favorable land use compatibility statement issued by Deschutes County, a set of detailed plans and specifications for the onsite wastewater treatment system, a current maintenance service agreement and the appropriate application fee.

Please feel free to contact me if you have any questions concerning this decision. I can be reached by telephone at (541) 776-6130, or by email at david.hurley@deq.oregon.gov.

Sincerely,

David Hurley

David Hurley, REHS
Variance Officer – Onsite Wastewater Program

Encl: Schedule A- Special Conditions
Schedule B- Approved Plans
Approved Drawings / Schematics

cc: Todd Cleveland, REHS; Deschutes County Onsite Wastewater Division, 117 NW Lafayette Ave, Bend OR 97703
Brian T. Rabe, CPSS, WWS; Principal Soil Scientist, of Elkhorn Consulting LLC, 14833 Goodrich Creek Lane, Baker City, OR 97814
Thomas & Brigitte Bouret, PO Box 2966, Bend, OR 97707
Larry & Jacqueline Heer, 404 1st Ave SE, Albany, OR 97321
Lance & Shannon Lewis, 56880 Venture Ln #STE 104N Box 175, Sunriver, OR 97707
BGC Upland LLC, 3950 Fairview Industrial Dr SE #STE 240, Salem, OR 97302
Skyliner ATX LLC, 17006 Upland Road, Bend, OR 97707

Schedule A – Cascade Lakes Properties LLC
Variance Report - Special Conditions
T 20S, R 10E, Sec: 13C, TL 9400

Special Conditions and requirements for the Orenco® AX20N-Mode 3B Alternative Treatment Technology unit with a RidNOx™ system followed by an elevated 250 square foot Bottomless Sand Filter at 16959 Upland Rd.; T.20S; R.10E; Sec. 13C; Tax Lot 9400; 0.51 Acres; Deschutes County.

1. A person or business licensed by the Department of Environmental Quality in accordance with Oregon Revised Statutes, Chapter 454.695, must perform all work construction of this onsite wastewater treatment system.

2. Before starting with the actual construction of this system, the system installer shall submit, through a written statement to the Deschutes County Community Development Department, Onsite Wastewater Division (hereafter referred to as "County") that acknowledges that they have thoroughly reviewed the conditions of this variance approval with technical staff in that office, and they understand and will comply with all conditions associated with this variance approval.

3. This system incorporates the use of Sand Filter Media and Underdrain media, as defined in Oregon Administrative Rules (OAR) 340-071-0100(124) and OAR 340-071-0100(170). Prior to delivery to the site, a current sieve analysis, using testing requirements required in rule for the respective material, must be submitted for review and approval to the County. Special handling of the respective media is to occur, during transport, site storage, and construction of the sand filter.

4. This onsite wastewater treatment system shall serve a single-family residence with up to four bedrooms. The projected daily sewage flow must not exceed 450 gallons per day, and the average daily flow must not exceed 225 gallons per day. Where practical, low water-use plumbing fixtures and appliances should be used within the dwelling in conjunction with water conservation practices. **Use of a garbage disposal is not recommended.**

5. All construction of this system shall only occur under optimum soil moisture conditions. The soils must be nearly dry and not frozen. Typically, the ideal construction period begins at the end of spring run-off season and ends prior to the onset of winter weather.

6. The setback to all wells from the initial or replacement bottomless sand filters is to be at least 100 feet.

7. The County shall inspect the installation of this system at those stages of construction they identify as appropriate to ensure proper construction.

8. Except as specifically authorized, all requirements of the Oregon Administrative Rules (Chapter 340, Rules 071-0100 through 071-0650) must be met.

9. The permittee shall comply with all local planning, zoning and building ordinances.

10. A Certificate of Satisfactory Completion shall be issued for the completed installation only if all conditions of this variance approval are met.

11. Should the onsite wastewater treatment and disposal system, authorized through this variance fail, County staff may exercise professional discretion in effecting a repair, based upon an analysis of the possible causes of failure. An area next to the initial sand filter is to be designated for future repair or replacement and must be reserved for this use. The replacement system considered in this variance procedure is the installation of another sand filter.

APPROVED

By DEQ Variance Officer 12/09/25

David Hurley

TAX LOT 8200
BOTTOMLESS SAND FILTER (1995)

TAX LOT 8300
APPROVED (1978)
DENIED (1995)

UPLAND ROAD

50' TANK SETBACK

100' SETBACK FROM SAND FILTER

TAX LOT 9300
VARIANCE
ATT+CARBON ENHANCED SAND FILTER (2022)
INSTALLED (2023)

16959 UPLAND ROAD

100'

PROPOSED Ⓦ WELL

TAX LOT 9500
DENIED (1999)

I

R

PROPOSED 50'X50' HOUSE

PROPOSED RIDNOx™ UNIT

PROPOSED 25'X32' GARAGE

CLEANOUT

10'

PROPOSED PUMP BASIN

PROPOSED 10'X25' MODIFIED BOTTOMLESS SAND FILTER (CONCRETE CONTAINER)

220'

PROPOSED AVANTEX AX20N (MODE 3B) TREATMENT SYSTEM

PROPOSED 7'X36' REPLACEMENT AREA

PROPOSED 40'X50' SHOP

PROPOSED 1500 GAL SEPTIC TANK

CLEANOUT

54'

Ⓦ

WELL

TAX LOT 1300
DRAINFIELD (VIA EASEMENT)
FOR TAX LOT 15300 TO THE EAST
(2004)

100' SETBACK FROM SAND FILTER

0 50'

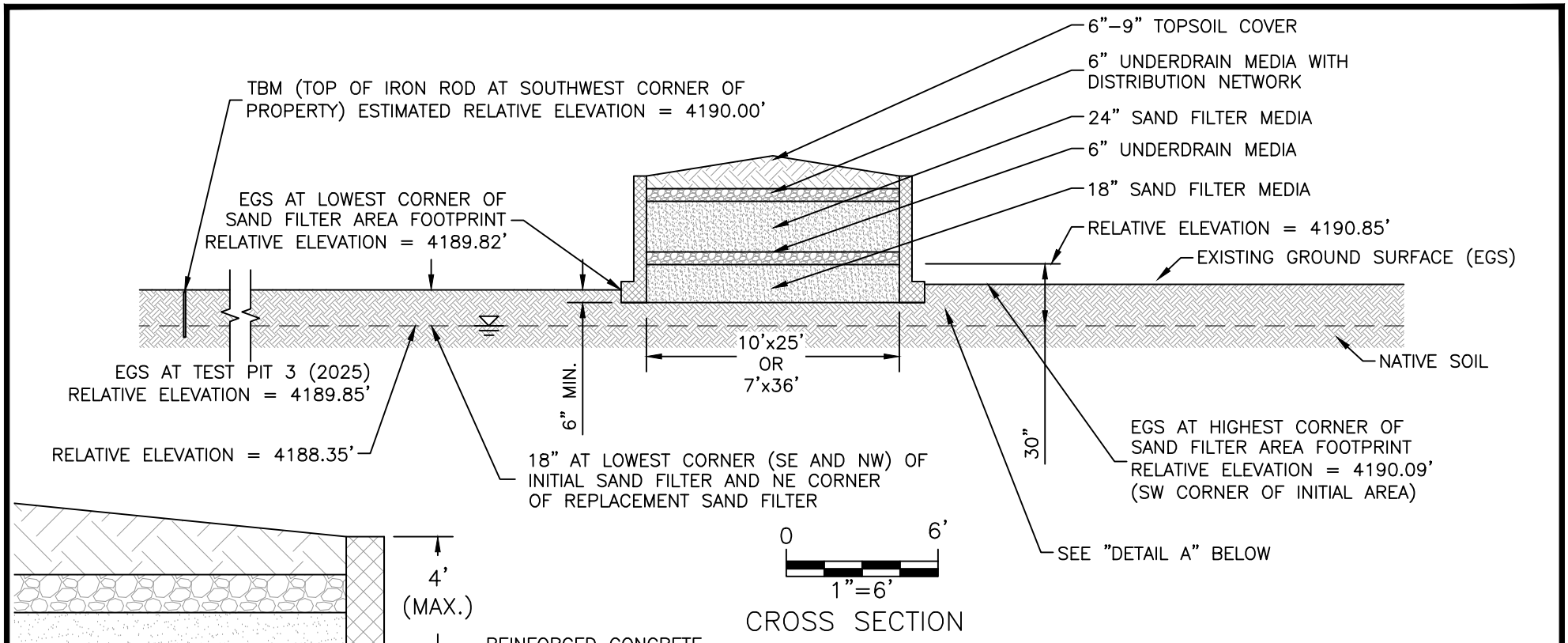
1"=50'

(SCALE AND LOCATIONS ARE APPROXIMATE)

Figure 2. Site Plan

PROJECT NUMBER: 2025026	Formal Variance T20S, R10E, Section 13C, Tax Lot 9400
DATE: 10/8/2025	
DWG NO: 2025026 F1-6.DWG	Cascade Lakes Properties LLC 16959 Upland Road Bend, OR 97707
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	
REVISED:	ELKHORN CONSULTING LLC

G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1-6.dwg October 8, 2025 DRABE



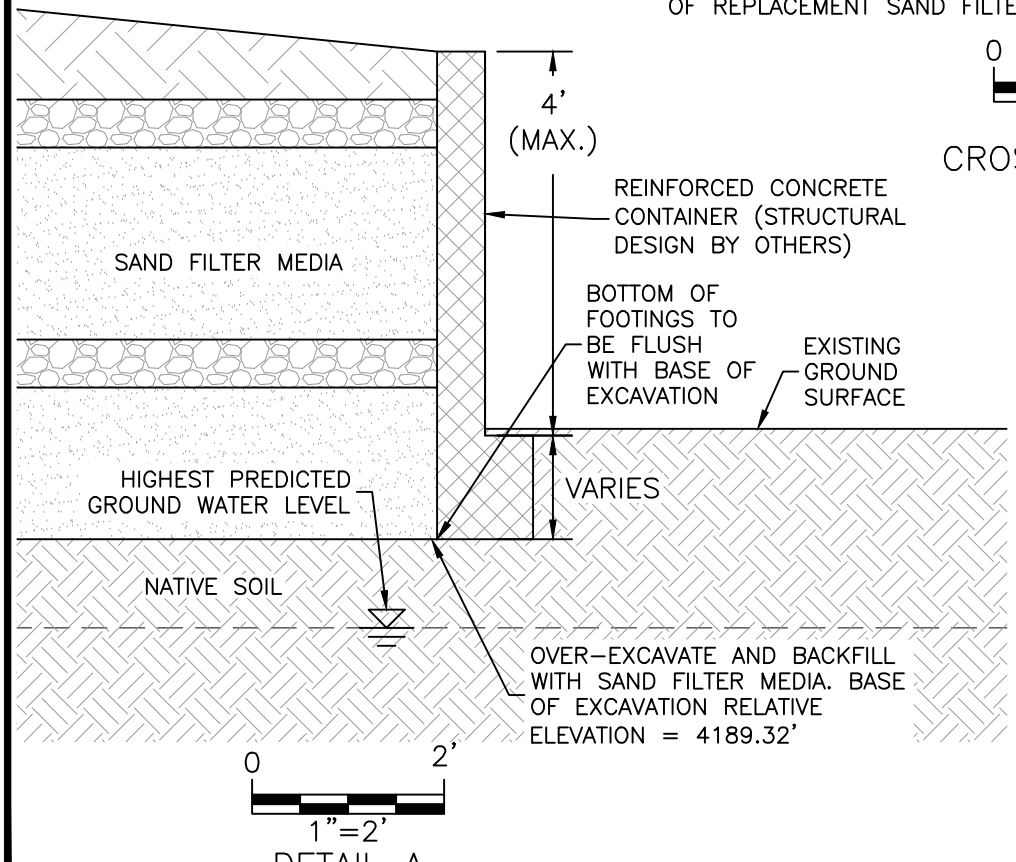


Figure 3. Modified Bottomless Sand Filter Section

PROJECT NUMBER: 2025026	Formal Variance
DATE: 10/8/2025	T20S, R10E, Section 13C, Tax Lot 9400
DWG NO: 2025026 F1–6.DWG	Cascade Lakes Properties LLC
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	16959 Upland Road
REVISED:	Bend, OR 97707
	ELKHORN CONSULTING LLC

G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1–6.dwg October 8, 2025 DRABE

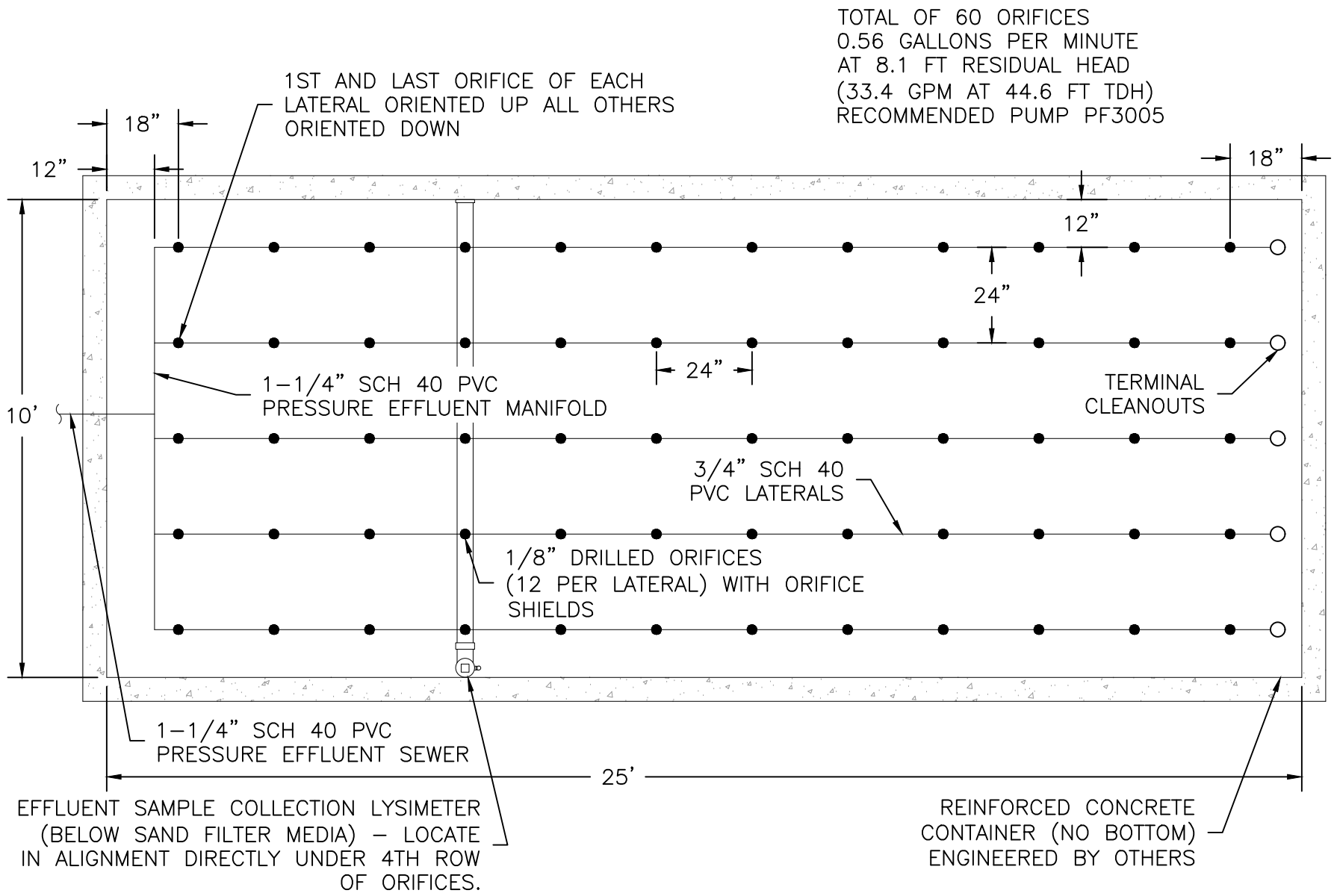


Figure 4A. Sand Filter Plan Detail – Initial

0 3'

1"=3'

PROJECT NUMBER: 2025026	Formal Variance T20S, R10E, Section 13C, Tax Lot 9400
DATE: 10/8/2025	
DWG NO: 2025026 F1-6.DWG	Cascade Lakes Properties LLC 16959 Upland Road Bend, OR 97707
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	
REVISED:	ELKHORN CONSULTING LLC

G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1-6.dwg October 8, 2025 DRABE

NOTE;
TOTAL OF 54 ORIFICES 0.64 GALLONS PER MINUTE AT 10.8 FT RESIDUAL HEAD (34.7 GPM AT 40.4 FT TDH) RECOMMENDED PUMP PF3005

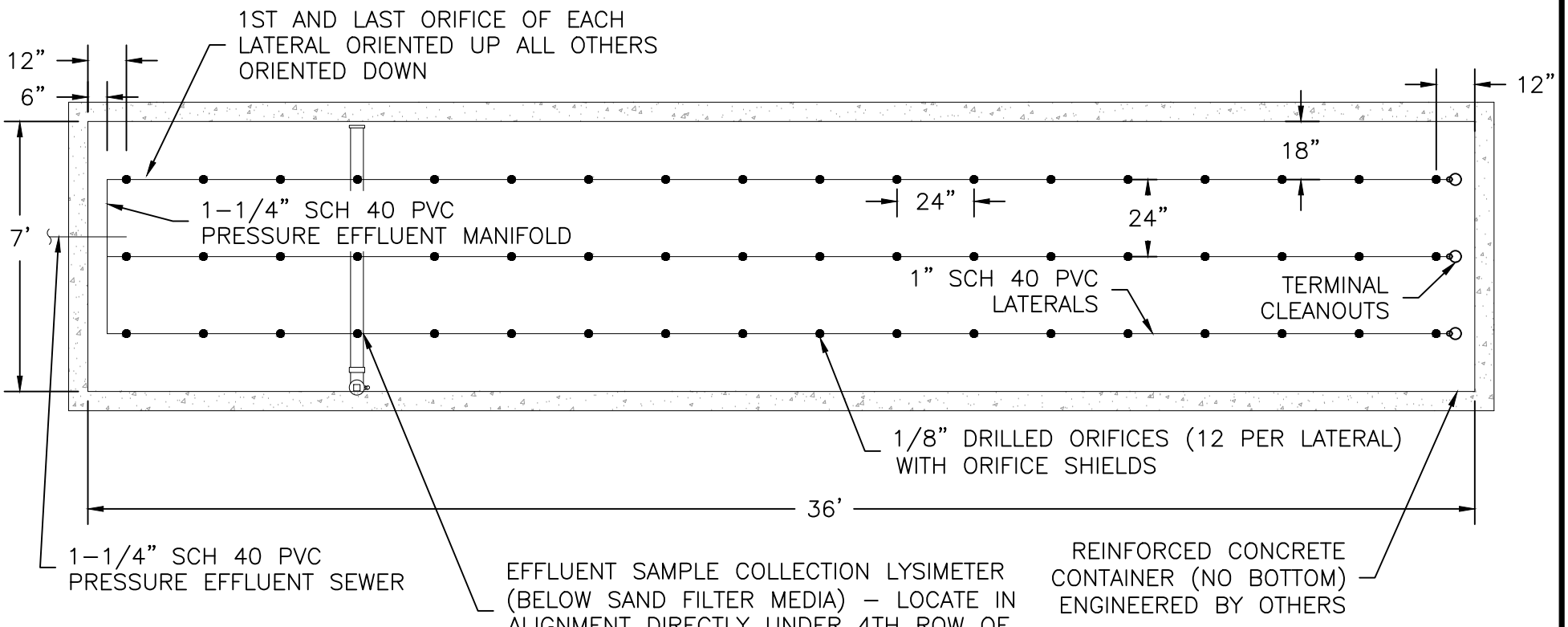
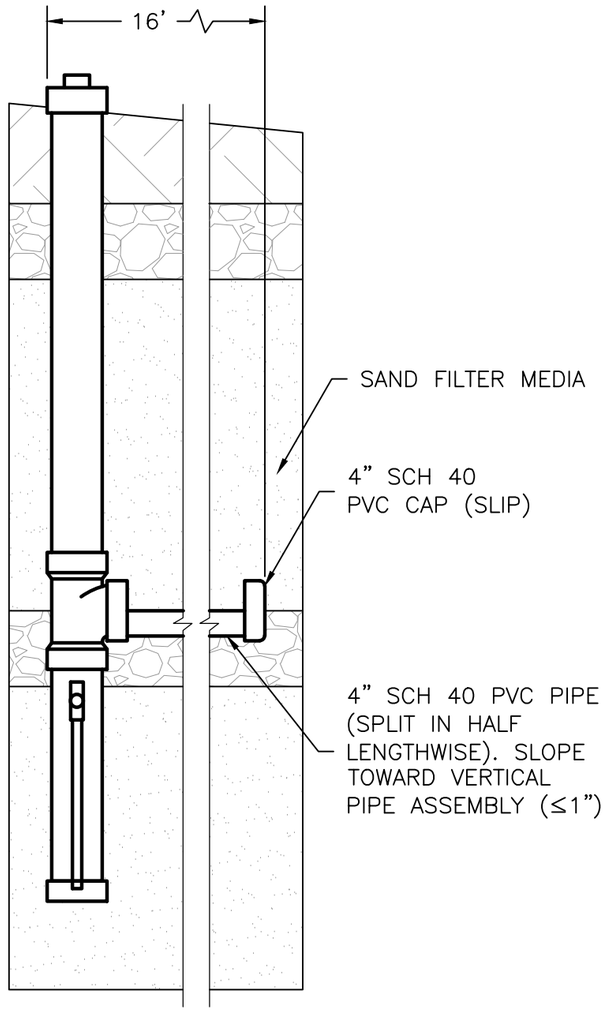


Figure 4B. Sand Filter Plan Detail – Replacement

0 4'
1"=4'

PROJECT NUMBER: 2025026	Formal Variance T20S, R10E, Section 13C, Tax Lot 9400
DATE: 10/8/2025	
DWG NO: 2025026 F1–6.DWG	Cascade Lakes Properties LLC 16959 Upland Road Bend, OR 97707
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	
REVISED:	ELKHORN CONSULTING LLC

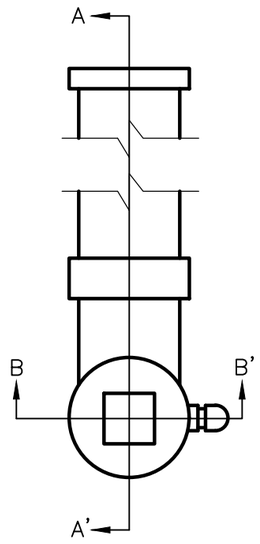
G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1–6.dwg October 8, 2025 DRABE



VIEW A–A'

0 1'

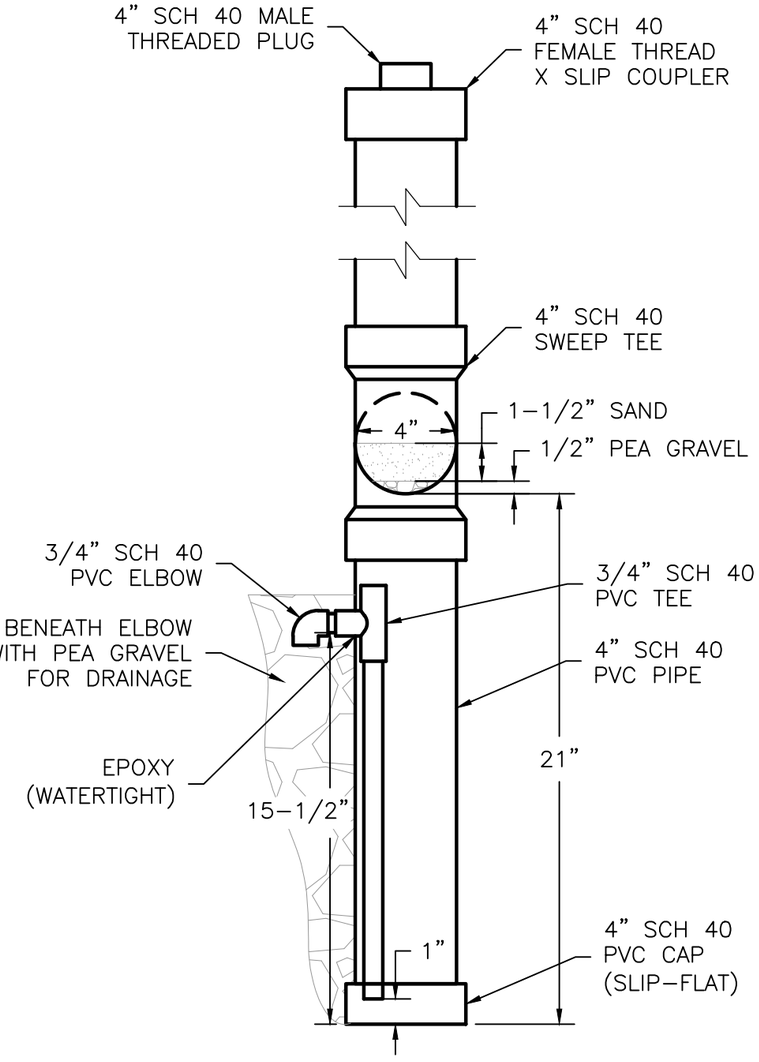
1"=1'



PLAN VIEW

0 0.5'

1"=0.5'



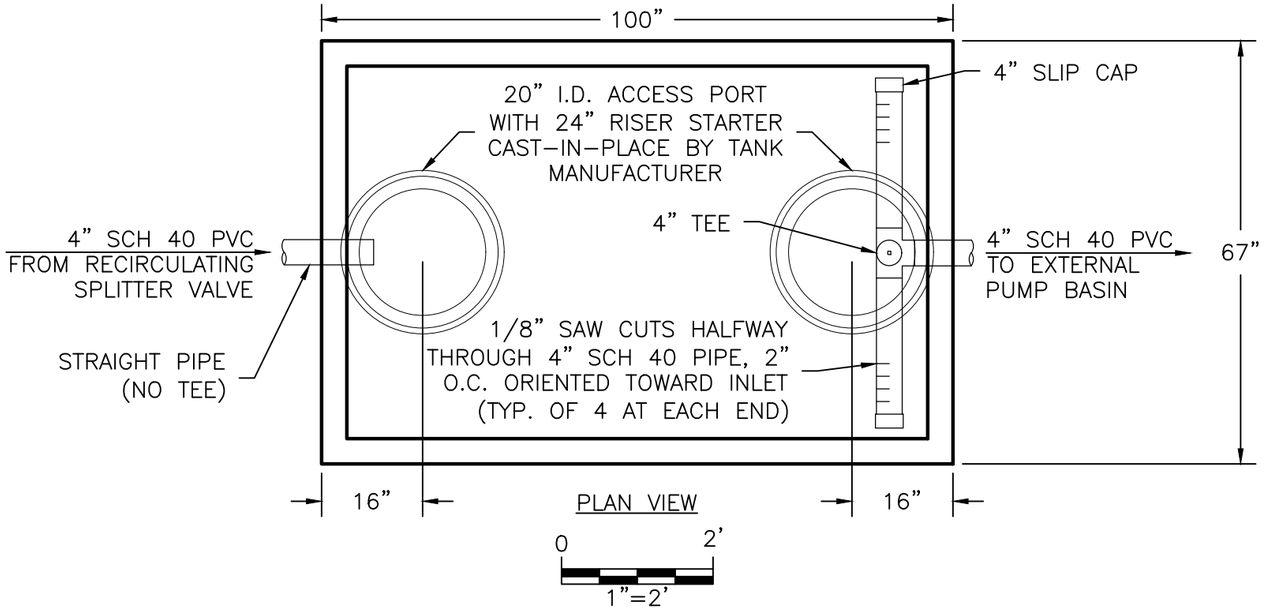
VIEW B–B'

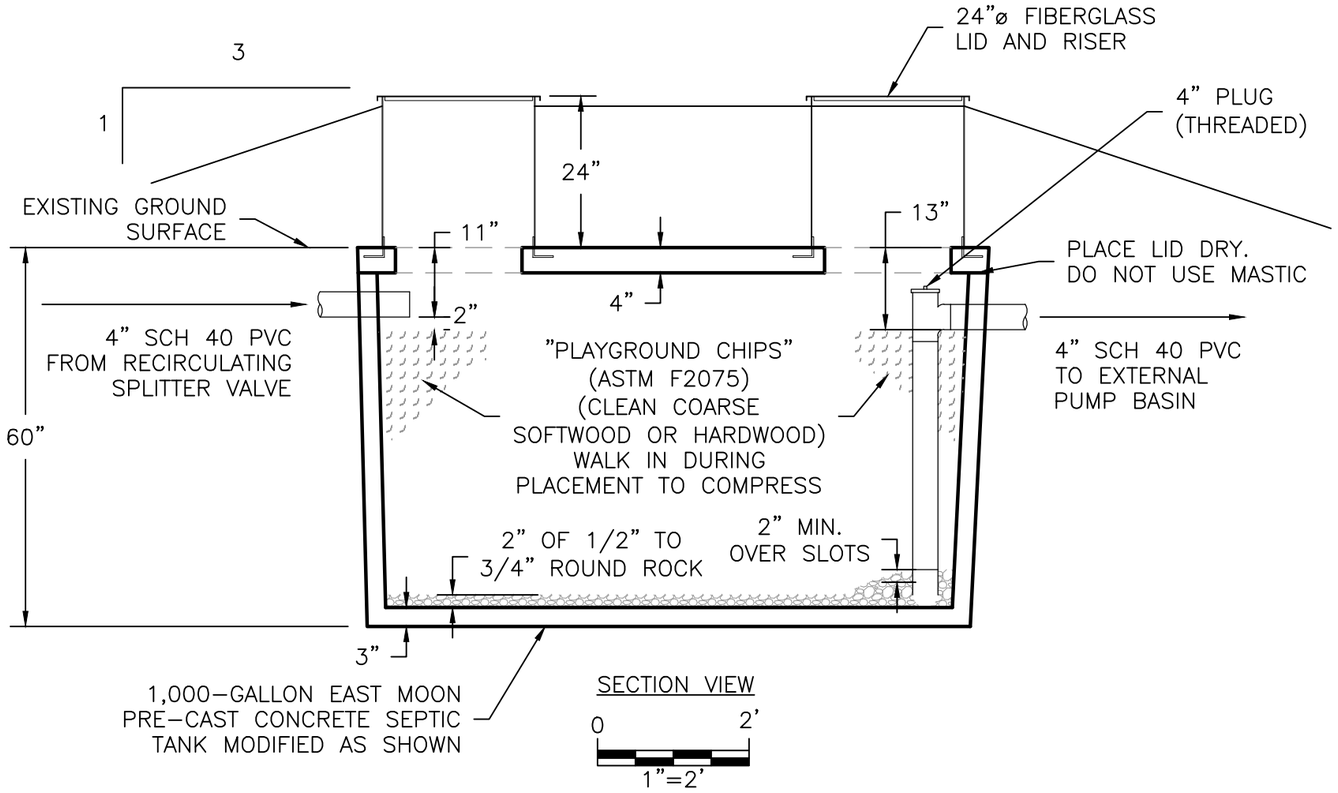
0 0.5'

1"=0.5'

Figure 5. Lysimeter Details

PROJECT NUMBER: 2025026	Formal Variance T20S, R10E, Section 13C, Tax Lot 9400
DATE: 10/8/2025	
DWG NO: 2025026 F1–6.DWG	Cascade Lakes Properties LLC 16959 Upland Road Bend, OR 97707
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	
REVISED:	ELKHORN CONSULTING LLC





NOTE: THE LOCATION/ELEVATION OF THE RECIRCULATION SPLITTER VALVE (RSV) SHALL BE ESTABLISHED PRIOR TO OR FIELD FIT TO ASSURE MINIMUM REQUIRED FALL FROM THE AX20 AND TO THE RIDNOX UNIT

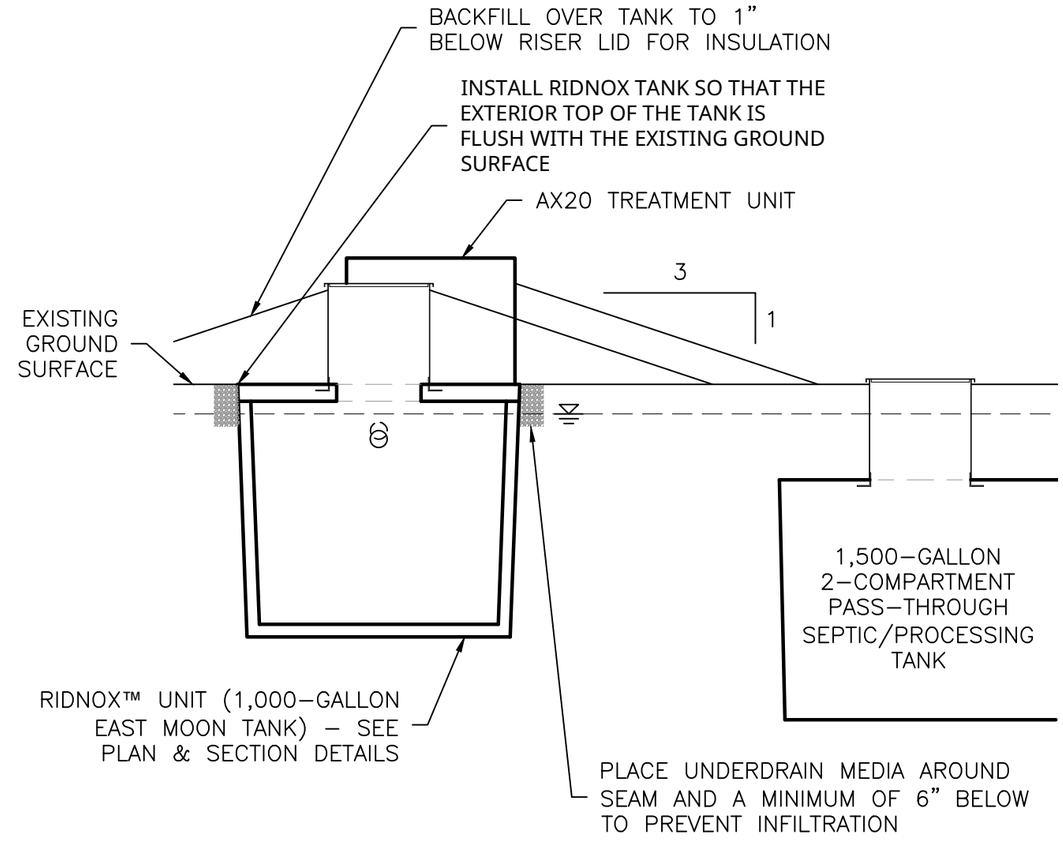


Figure 6. RidNOx™ Details

PROJECT NUMBER: 2025026	Formal Variance
DATE: 10/8/2025	T20S, R10E, Section 13C, Tax Lot 9400
DWG NO: 2025026 F1–6.DWG	Cascade Lakes Properties LLC
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	16959 Upland Road
REVISED:	Bend, OR 97707
	ELKHORN CONSULTING LLC

G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1–6.dwg October 8, 2025 DRABE

COMMUNITY DEVELOPMENT

MEMORANDUM

TO: Oregon Department of Environmental Quality Variance Officer

FROM: Peter Gutowsky, AICP, Director

DATE: November 6, 2025

SUBJECT: Onsite Septic System Variance Application / Groundwater Protection in Southern Deschutes County

---

I. REQUEST

The Community Development Department (CDD) is concerned about the implications of siting onsite septic systems in Southern Deschutes County through a variance process if future impacts to the aquifer cannot be mitigated. Variance approvals on naturally limited properties that do not meet minimum criteria undermine the goal of protecting a sole source aquifer. It also undercuts our collective efforts and public perception that Deschutes County and the Oregon Department of Environmental Quality (DEQ) are actively protecting the groundwater from nitrate loading.

If DEQ approves an onsite septic system variance for 16959 Upland Road, CDD respectfully requests documentation describing the basis for it, specifically in relation to Deputy Director Shannon Davis' recent letter to the Deschutes County Board of Commissioners (Board).

II. SITE EVALUATION REPORT

On September 10, 2025, Lindsey Holloway, Onsite Wastewater Specialist, issued a site evaluation report, denying a septic system proposal at 16959 Upland Road for the following reasons:

- Does not meet minimum separation from the permanent water table (OAR 340-071-0220, 0260, 0265,0275, 0280, 0285, 0290, 0302).
- Additional loading from septic system is likely to contaminate the ground water and develop a public health hazard particularly on sites with severely shallow water table. (OAR 340-071-130(1)

III. BACKGROUND

On December 19, 2023, Deputy Director, Shannon Davis provided a letter to the Board discussing groundwater pollution concerns from septic systems in Southern Deschutes County. It acknowledged:

- The Sunriver and La Pine area is vulnerable to nitrate contamination from septic systems and private wells are the primary drinking water source for most properties in this area.

- Conditions documented from past investigations and outlined in a U.S. Geological Survey (USGS) factsheet are still valid.

- Testing and research indicate most of the contamination in this region comes from septic systems. This means nutrients from septic systems are seeping into the area's porous, volcanic soil and the aquifer that is used as a primary drinking water source.

- Continued unrestricted development in the area will reach a tipping point that may be difficult or impossible to recover from due to groundwater contamination which will then require additional regulation and funding to address.

- Even with a septic design capable of producing high quality effluent, the treatment may not sufficiently minimize or eliminate nutrients and pathogens from the wastewater or future impacts to the aquifer system as outlined by a USGS model.

- Some parcels are not suitable for septic systems.

- DEQ still believes that conditions in South Deschutes County are a potential public health and ecological impact issue.

IV. DEQ VARIANCE PROCESS

As noted in a DEQ Fact Sheet, a variance officer will review the proposal and other application materials, conduct a site visit, consider site-specific conditions, and hold a public hearing. The variance hearing is not an opportunity to overturn the county agent's decision. It is an information gathering hearing. The decision to approve or deny a variance application is based on the information presented in the proposal and the requirements and purpose of DEQ's regulations. For this specific application, a variance officer must consider the cumulative impacts to approve a variance in relation to the conditions that exist in Southern Deschutes County, which as noted above, are at risk of contamination from onsite wastewater treatment systems. Factors include:

- Nitrogen loading from onsite wastewater treatment systems is the primary source of contamination; therefore, reducing loading from existing systems and limiting new additional sources is the simplest method to reduce overall loading. New loading from sites that do not meet minimum requirements for any system must be scrutinized to the greatest extent possible.
- Management area 9 has capacity if all properties employ nitrogen reducing systems. In management area 9, 56 developed properties need to be upgraded. Only four properties have been upgraded with a total of 20 existing nitrogen-reducing ATT systems installed for developed properties.

Oregon
Tina Kotek, Governor

Department of Environmental Quality
Eastern Region Bend Office
475 NE Bellevue Dr., Suite 110
Bend, OR 97701
(541) 388-6146
FAX (541) 388-8283
TTY 711

October 20, 2025

Cascade Lake Properties LLC
56636 Lloyd Way
Bend, OR 97707

Re: WQ: CAS: Variance Assignment: 248-25-000350-VAR; T.20S; R.10E; Sec. 13C; Tax Lot 9400; Lot 70, Block 53 Deschutes River Recreation Homesites Unit 9 Part 2, 0.51 Acres; Deschutes County.

Dear Cascade Lake Properties LLC,

The Department of Environmental Quality is in receipt of your onsite wastewater variance application and proposal. The application has been assigned to me for further action. I plan to hold an information gathering hearing (as provided under OAR 340-71-430) regarding your proposal on **Thursday, November 6, 2025, at 9:00 am** at the subject property. Your proposal and system plans have been prepared by Brian T. Rabe, CPSS, WWS; Principal Soil Scientist, of Elkhorn Consulting LLC. It is my understanding that Mr. Rabe will be present to answer any questions regarding the proposal.

Deschutes County conducted a site evaluation with four test pits at the subject property on September 5, 2025, where a denial was issued for the use of an onsite wastewater system on September 10, 2025. The primary reason for denial was due to the predicted depth to the seasonally high permanent water table being less than 24 inches below the ground surface. Observed conditions associated with saturation that are used to determine water table levels and site suitability and were observed between 14 and 18 inches below the ground surface.

Southern Deschutes County has a shallow water table that is typically unconfined in porous pumice soils and is susceptible to contamination from soluble and mobile constituents. The most common constituent of concern is nitrate-nitrogen from septic systems.

The proposal is to overcome the site limitations by installing an Orenco® AdvanTex AX20N-Mode 3B Alternative Treatment Technology (ATT) System followed by a reduced sized Bottomless Sand Filter (BSF) system constructed with a reinforced concrete berm. The nitrate-nitrogen is proposed to be further reduced with a post-anoxic RidNOx unit. You are seeking variance from the following Oregon Administrative Rules (OARs):

OAR 340-071-0135(1): which addresses Department of Environmental Quality approval of new or innovative technologies, materials, or designs for onsite systems.

OAR 340-071-0150(4)(a)(B) which states: All criteria for approving a specific type or types of systems, as described in this division are satisfied.

OAR 340-071-0290(4)(d) which states: Bottomless sand filter. Sites may use a conventional sand filter without a bottom (BSF) if the site meets the criteria in this section and section (3) of this rule. (d) The water table is at least 24 inches below the ground surface throughout the year, and a minimum 24-inch separation is maintained between a water table and the bottom of the sand filter.

Sometimes during a hearing, it can be determined that other rules or standards need to be considered in order to finalize a proposal. Should this occur, based on the proposal, site observations, and other considerations, I may or may not proceed with the hearing and my final decision process until further information is provided.

This notice of the hearing will also be mailed to the neighboring property owners and to the Deschutes County Onsite Wastewater Division staff, see. However, all persons who wish to attend the hearing are welcome. The hearing will provide an opportunity for you and others to offer additional facts or reasons either in support of or in opposition to the proposal and requested variance to the rules.

Please remember, it is the burden of the applicant to show that strict compliance to the rules or standards are inappropriate, or that special physical conditions render strict compliance with the rules or standards to be unreasonable, burdensome or impractical. Additionally, the applicant needs to provide prudent reasonable justification in how their proposal will still protect both public health and the environment.

Deschutes County Onsite Wastewater Division staff will get a copy of your proposal and will have an opportunity to provide both written and verbal comments on your proposal. Others wishing to review your proposal can contact me.

The Department is committed to accommodating people with disabilities. Please notify DEQ of any special physical or language accommodations needed as far in advance of the hearing date as possible. To make any of these arrangements please contact, David Hurley, at (541) 776-6130 or toll free at (866)-863-6668, or by email at: david.hurley@deq.oregon.gov. People with hearing impairments can call DEQ's TTY at (800)-735-2900.

If you have questions concerning the variance process or hearing arrangements, please give me a call. You may also visit https://ordeq.org/septicvariance for more information about variances.

Sincerely,

David Hurley

David Hurley, REHS
Natural Resource Specialist 4
Variance Officer – Onsite Wastewater Program

cc: Todd Cleveland, REHS; Deschutes County Onsite Wastewater Division, 117 NW Lafayette Ave, Bend OR 97703
Brian T. Rabe, CPSS, WWS; Principal Soil Scientist, of Elkhorn Consulting LLC, 14833 Goodrich Creek Lane, Baker City, OR 97814

In Addition, To The Following Adjacent Property Owners:

Thomas & Brigitte Bouret, PO Box 2966, Bend, OR 97707
Larry & Jacqueline Heer, 404 1st Ave SE, Albany, OR 97321
Lance & Shannon Lewis, 56880 Venture Ln #STE 104N Box 175, Sunriver, OR 97707
BGC Upland LLC, 3950 Fairview Industrial Dr SE #STE 240, Salem, OR 97302
Skyliner ATX LLC, 17006 Upland Road, Bend, OR 97707

Variance Protocol

Date: November 6, 2025
Time: 9:00 AM
Variance Officer: David Hurley

Applicant: Cascade Lakes Properties LLC

Address: 56636 Lloyd Way
Bend, OR 97707

WQ/O – Variance Assignment 248-25-000350-VAR
T. 20S, R. 10E, Sec. 13C, Tax Lot 9400, 0.51 acres
Site address: 16959 Upland Rd., Bend
Deschutes County

Variance location: **16959 Upland Rd., Bend OR**
Legal description: **T. 20S, R. 10E, Sec. 13C, Tax Lot 9400**
Acreage: **0.51 acres**

Attendance: See attached attendance record sheet and hearing introductory sheet.

Prior to recording start:
This is a public informational gathering hearing and is recorded. I will begin by introducing myself and reading the proposal narrative and exhibits of records submitted by Brian Rabe on behalf of Cascade Lakes Properties LLC. After completion, I will open it up for any questions or comments.

Good morning, it is now 9:00 am on Thursday, November 6, 2025.

My name is David Hurley, and I am a Department of Environmental Quality employee assigned as today's variance officer.

(Roll call)

We are conducting a public information hearing regarding at the subject property located at 16959 Upland Rd. in Bend owned by Cascade Lakes Properties LLC. The parcel is approximately 0.51 acres in size via Easement; described as Township 20 South, Range 10 East, Section 13C, Tax lot 9400, in Deschutes County.

I visited the site on October 23, 2025 as required by Oregon Administrative Rule Chapter 340 Division 71 Section 0430 subsection 4.

This is a public information gathering hearing which is being held pursuant to OAR 340-071-0430. This hearing is being held to gather testimony into the record that will demonstrate:

1) Why strict compliance with certain Oregon Administrative Rules is inappropriate for cause, or
2) Why specific physical conditions render strict compliance to rules unreasonable, burdensome, or impractical.

Since this is a public information gathering hearing rather than a contested case hearing, cross-examination of persons providing testimony will not be allowed.

As a variance officer, I may request that a person providing testimony expand upon information submitted into the record. I may also ask questions to clarify the record.

All persons wishing to testify must preface their remarks with their name and affiliation with the variance proposal.

Introduction

Deschutes County denied Site Evaluation 247-25-000707-EVAL for this property on September 10, 2025 because the water table rises to within 24 (14-18) inches of ground surface.

The site evaluation was denied due to the following reasons:

Does not meet minimum separation from permanent water table (OAR 340-071-0220, 0260, 0265,
0275, 0280, 0285, 0290, 0302).

• Installation of an onsite wastewater system in the area evaluated will likely lead to nitrate pollution of public waters. The Nitrate Loading Management Model indicates this area, Management Area 18, represents a moderate to high risk to groundwater and cannot sustain added loading from high groundwater lots if nitrate levels are to remain below the action level in groundwater over time (Morgan, Hinkle, Weick. USGS. 2007). Groundwater shall be protected from pollution that could impair existing and future beneficial uses, including domestic drinking water from wells (OAR 340-040-0020).

• Deschutes County may not authorize installation or use of a system that is likely to pollute public waters or create a public health hazard (OAR 340-071-0130(1)).

You are requesting a variance from the following Oregon Administrative Rules:

1) OAR 340-071-0135(1) which states: Coordination with listing of alternative treatment technologies, OAR 340-071-0345 (Alternative Treatment Technologies (ATTs)). Under OAR 340-071-0345 (Alternative Treatment Technologies (ATTs)), DEQ maintains a list of alternative treatment technologies (ATTs) that have been tested by an NSF/ANSI organization that meets the requirements of ISO/IEC 17025 – 2005. The ATT must meet the performance standards and other requirements in OAR 340-071-0345 (Alternative Treatment Technologies (ATTs)). ATTs are usually separate treatment units that are installed in onsite systems. Only listed ATTs may be installed under the siting criteria in OAR 340-071-0345 (Alternative Treatment Technologies (ATTs)). This rule provides a process for approving new or innovative technologies, materials, or designs for various components of onsite systems, such as drainfield products or appurtenances. Add-on treatment units, such as units to remove nitrogen following an ATT or sand filter, may also be approved under this rule. However, DEQ does not intend to approve alternatives to standard systems under this rule. Alternative systems will need to be listed as ATTs under OAR 340-071-0345 (Alternative Treatment Technologies (ATTs)) or approved under new rules in this division.
2) OAR 340-071-0150(4)(a)(B) which states: Approval or denial:
(a) A site must be approved for a system if the site evaluation report documents the following:
(A) The site evaluation report identifies the types of the initial and replacement systems for which the site is approved.
(B) All criteria for approving a specific type or types of systems, as described in this division are satisfied.
3) OAR 340-071-0290(4)(d) which states: Bottomless sand filter. Sites may use a conventional sand filter without a bottom (BSF) if the site meets the criteria in this section and section (3) of this rule. (d) The water table is at least 24 inches below the ground surface throughout the year, and a minimum 24-inch separation is maintained between a water table and the bottom of the sand filter.

I have identified an additional rule that requires a variance:

- OAR 340-071-0130(1) which states: Protection of public waters from public health hazards. An agent may not authorize installing or using a system that is likely to pollute public waters or create a public health hazard. If, in the judgment of the agent, the minimum standards in this division will not adequately protect

public waters or public health on a particular site, the agent must require a system to meet requirements that are protective. This may include but is not limited to increasing setbacks, increasing drainfield sizing, or using an alternative system. The agent must provide the applicant with a written statement of the specific reasons why more stringent requirements are necessary

Variance Description:

Brian Rabe, Elkhorn Consulting LLC, prepared your proposal and system plans to overcome the site limitations through the use of a recirculating textile filter system (AdvanTex AX20N-Mode 3B) prior to discharge through a RidNOx™ post-anoxic tank (solid-phase flow-through filter) and then into a 250 sqft elevated reduced sized Bottomless Sand Filter (BSF) system constructed on a 12-inch bed of sand filter media embedded at least 6 inches into the native soil, for a total of 18-inches. This will exceed the 24-inch separation by at least 6-inches for a total minimum separation of 30-inches. The proposal includes deviating from the ATT Mode 3B configuration slightly by not installing UV disinfection because it is assumed that discharging to a bottomless sand filter will meet treatment standard 2 criteria independently of the treatment unit.

Open up for discussion, comments, other input……

Any questions:

My Questions:

Leave room for additional questions

I will now review all of the exhibits and comments entered into the record and will make a decision within 45 days to grant the variance as presented or deny the variance. Approval of the variance may be appealed to the Environmental Quality Commission. Denial of the variance may be appealed in Circuit Court per ORS 183.484.

Last call for anyone wishing to enter testimony.

I then declare the hearing closed (or hold open for _____ days for the submission of additional testimony).

End recording.

Attendance list:

Variance Application from Oregon Administrative Rules Regulating Onsite Wastewater Treatment Systems

State of Oregon Department of Environmental Quality

Western and Northwest Regions:

Oregon Department of Environmental Quality
Onsite Program
165 East Seventh Ave, Ste 100
Eugene, Oregon 97401

Eastern Region:

Oregon Department of Environmental Quality
Onsite Program
475 NE Bellevue Dr, Ste 110
Bend, OR 97701

Please complete this application form and submit it with the fee and required attachments to one of the addresses above. The fees can be found in the current rule tables on DEQ's website here: https://ordeq.org/variancefees

Please note: Variance approval is not guaranteed, and fees are non-refundable. Learn more about the variance process at https://ordeq.org/septicvariance

Owner Information - Please Print:

Owner Name(s) (Last, First) Cascade Lake Properties LLC

Mailing Address 56636 Lloyd Way

City, State, Zip Bend, OR 97707

Phone (541) 280-5303 Email dan@dancookrealestate.com

Property Information:

County Deschutes

Township, Range, Section, Tax Lot T20S R10E S13C Tax Lot 9400

Lot and Block Number Lot 70, Block 53 Subdivision Name Deschutes River Recreation Homesites Unit 9 Part 2

Provide the Following Attachments:

1. A locator map showing accurate directions to the property. List the property's street address if the street address is known.

2. **Two copies** of the parcel's legal description (metes and bounds, warranty deed, sales contract or approved subdivision plat). Include copies of the protective covenants, deed restrictions and easements applicable to the property.

3. **Two copies** of the assessor's tax lot map showing the property or a surveyor's plat map.

4. **Two copies** of a land use compatibility statement from the appropriate land use authority that your proposed land use is compatible with the Land Conservation and Development Commission's acknowledged comprehensive plan or statewide planning goals.

5. **One copy** of the DEQ (or county agent) site evaluation report, field notes, and other correspondence relating to past evaluations for septic system development.

RECEIVED
OCT 14 2025
DEQ
Eastern Region Bend

6. **Two copies** of a narrative description for your variance proposal, including system construction specifications and the step-by-step procedures you propose to follow when installing the system. You must clearly describe how your proposal will overcome the limitations cited by DEQ or the county in the original denial.

7. **Two copies** of a plot plan drawn with the location and dimensions of all components of the proposed system. Use a defined scale that is not smaller than one-inch equals 30 feet. Also, be sure to include the replacement absorption facility in the plot plan drawing. Indicate separation distances between disposal trenches, springs, water courses, agricultural drainage tile, ditches, drainage ways, water lines, buildings, roads, embankments, and other identifying features, which help demonstrate parcel-to-drainfield relationships. Locate all wells within 200 feet of the proposed system and the replacement system.

8. The names and mailing addresses of all adjacent property owners and other known interested persons, for hearing notice.

9. The variance officer will request additional items be provided, if found necessary for the variance. The application will be deemed incomplete until the requested items are provided.

A minimum of two test pits must be provided within the specific area where the variance system is proposed, and should be approximately two feet wide, four feet long, and excavated to either bedrock or to a depth of five feet. Similar pits must be provided in the area of the repair system. The variance officer may require the proposed drainfield and the future replacement drainfield to be staked out.

Hardship Variances:

Hardship variances may be considered in cases of extreme and unusual hardship. The following factors may be considered: advanced age or bad health of applicant, need of applicant to care for aged, incapacitated or disabled relative, and the hardship variance will have relative, insignificant environmental impact. Documentation of hardship must be provided.

☐ MARK THIS BOX FOR HARDSHIP CONSIDERATION

By my (our) signature(s), I (we) request DEQ act on this application and hereby grant permission to enter onto the above-described property. I (we) also acknowledge that I (we) have read the Variance Process Fact Sheet found here: https://ordeq.org/septicvariance

10/06/2025 — Owner Signature
Date

10/6/2025 — Amanda J Cook — Owner Signature
Date

NOTE: All owners must sign this application form. If there are more than two owners, have them sign additional duplicate applications and include them with submittal.

* Pursuant to ORS 454.662, the applicant is not required to submit the application fee if, at the time of filing the application, the applicant is 65 years of age or older, is a resident of the State of Oregon, and has an annual household income, as defined in ORS 310.630, of $15,000 or less. Appropriate documentation must be submitted with the application.

ELKHORN CONSULTING LLC

14833 Goodrich Creek Lane
Baker City, OR 97814 • 503-881-1604
elkhornconsultingllc@gmail.com

RECEIVED

OCT 14 2025

DEQ
Eastern Region Bend

October 9, 2025

Variance Officer
Onsite Variance Program
DEQ - Eastern Region Water Quality
475 NE Bellevue, Ste. 110
Bend, Oregon 97701

SUBJECT: Formal Variance Request – Cascade Lakes Properties LLC – T20S, R10E, Section 13C Tax Lots 9400 (0.51 acres), Deschutes County, South of Bend, Oregon.

Dear Variance Officer:

A formal variance from selected onsite rules is hereby requested under the provisions of Oregon Administrative Rules, Chapter 340, Division 071, Section 0415 (OAR 340-071-0415).[1] The property is located at 16959 Upland Road, south of Bend in Deschutes County, Oregon (Site) (Figure 1) and consists of 0.51 acres. A Tax Lot map is attached in Appendix A and a copy of the Deed is attached in Appendix B.

Background

Deschutes County conducted a site evaluation on September 5, 2025, and was denied on September 10, 2025. A total of 4 test pits were evaluated in the northeast, northwest, southwest, and east central parts of the parcel that were described with water table indicators at a depth of 14 to 18 inches below the surface. The best test pits were in the southern part of the parcel (Test Pits 3 and 4), which had water table indicators at a depth of 18 inches below the surface. The primary reasons cited for the denial were the predicted depth to the highest level attained by a fluctuating permanent water table and the risk to groundwater quality that could result from increased nitrogen loading to the underlying aquifer. A copy of the site evaluation documentation from Deschutes County is attached in Appendix C.

Southern Deschutes County has a shallow water table that is typically unconfined in porous pumice soils and is susceptible to contamination from soluble and mobile constituents. The most common constituent of concern is nitrate-nitrogen from septic systems. The onsite rules require a minimum of 24 inches of separation from the upper limit of the water table to the bottom of a bottomless sand filter as well as being 24 inches below the ground surface.

Soils

The web soil survey shows the location of the Site and a copy of the output from the web soil survey is provided in Appendix D. The entire parcel is shown within a delineation of Map Unit 144A, Sunriver sandy loam 0 to 3 percent slopes. Sunriver soils are described as very deep, somewhat poorly drained soils that formed on pumice mantled stream terraces. The typical profile generally consists of the following:

[1] Onsite wastewater treatment systems, 340 OAR § 340.71. (2020).

- Up to 2 inches of organic material underlain by,
- 5 inches of very dark gray ashy sandy loam underlain by,
- 15 inches of dark gray ashy loamy coarse sand underlain by,
- 9 inches of light brownish gray ashy coarse sand underlain by,
- 31 inches of very dark gray sandy loam.

The Sunriver series is described as having a water table that rises to about 2 to 4 feet below the surface from April to June.

The characteristics observed at the Site are reasonably similar to the Sunriver series. The primary differences between the conditions noted in the 2025 soil notes and the conditions typical for the Sunriver series are related primarily to coloration (browner colors) that are more indicative of the Shanahan series.

Preliminary Assessment

The Site was reviewed by Brian Rabe, CPSS, WWS, on September 30, 2025. The purpose was to review the Site conditions and assess the potential to design a modified bottomless sand filter that incorporates additional fill to create adequate separation from the underlying water table following advanced secondary treatment meeting the criteria for Treatment Standard 2 (TS2). The proposed bottomless sand filter area is located on this highest ground, represented by Test Pit 3 in the 2025 site evaluation (western part of the lot - see Figure 2 and Appendix C).

Other Considerations

This parcel and developed parcels in the surrounding area are served by individual private wells. A search of the database of the Oregon Department of Water Resources was conducted for the section that the subject property lies within (Section 13 of Township 20 South, Range 10 East of the Willamette Meridian). There are about 405 records on file for this section. A total of 8 water well records (well logs) were identified in Section 12 that could be tied to specific parcels within about one-eighth of a mile of the subject property (Appendix E).

The closest existing well is on Tax Lot 9300. This well is at least 100 feet east-southeast of the proposed bottomless sand filter. The well was completed on November 30, 2023, to a depth of 150 feet. Water was described as being first found at a depth of 43 feet in a layer of "Green/ gray clay" and had a static water level of 43 feet bgs on the date of completion with a reported yield of 20 gallons per minute (gpm) after 1 hour with a pump.

The next closest existing well is on Tax Lot 8200 (described in the water well report as Tax Lot 8100 – later merged with Tax Lot 8200) and is about 360 feet north of the proposed bottomless sand filter area. This well was completed on October 19, 1994, to a depth of 97 feet. Water was described as being first found at a depth of 8 feet in a layer of "gravel." The well was cased and perforated in layers of "sand & clay" and "sand & gravel" between 86 and 96 feet bgs. The well had a static water level of 18 feet bgs on the date of completion with a reported yield of 25 gallons per minutes (gpm) with 10 feet of drawdown after 4 hours with a pump.

The next closest existing well is on Tax Lot 7900, about 370 feet northwest of the proposed bottomless sand filter area. This well was completed on May 2, 2022, to a depth of 100 feet. Water was described as being first found at a depth of 94 feet in a layer of "coarse black sand" and had a static water level of 21 feet bgs on the date of completion with a reported yield of 15 gpm with 24 feet of drawdown after hour with a pump.

The well for Tax Lot 9900 is at least 390 feet west of the proposed bottomless sand filter area. This well was completed on May 30, 1969, to a depth of 96 feet. There is no notation of where water was first found but the last layer is described as "green clay with fine gravel" beginning at a depth of 76 feet. The static water level was recorded at a depth of 20 feet bgs on the date of completion with a reported yield of 10 gpm with 5 feet of drawdown after 1 hour with a bailer.

The well on Tax Lot 7300 is about 440 feet north of the proposed bottomless sand filter area. This well was completed on June 6, 2024, to a depth of 96 feet. Water was described as being first found at a depth of 23 feet in a layer of "diatomite" and had a static water level of 23 feet bgs on the date of completion with a reported yield of 20 gpm with 50 feet of drawdown after 1 hour with a pump.

The well for Tax Lot 7400 is about 550 feet north-northwest of the proposed bottomless sand filter area. This well was completed on May 31, 2022, to a depth of 106 feet. Water was described as being first found at a depth of 88 feet in a layer of "coarse black sand" and had a static water level of 21 feet bgs on the date of completion with a reported yield of 8 gpm with 64 feet of drawdown after 1.5 hours with a pump.

The well for Tax Lot 7501 is about 580 feet north-northwest of the proposed bottomless sand filter area. This well was completed on May 16, 2007, to a depth of 98 feet. Water was described as being first found at a depth of 89.5 feet in a layer of "sand" and had a static water level of 16 feet bgs on the date of completion with a reported yield of 30 gpm with 44 feet of drawdown after 1.5 hours with a pump.

The well on Tax Lot 7000 is about 660 feet north-northeast of the proposed bottomless sand filter area. This well was completed on November 11, 1992, to a depth of 102 feet. Water was described as being first found at a depth of 85 feet in a layer of "brown sand" and had a static water level of 18 feet bgs on the date of completion with a reported yield of 15 gpm with 6 feet of drawdown after 5 hours with a pump.

The regional groundwater gradient, as indicated in a study published by the U.S. Geological Survey, is to the east-northeast toward the Deschutes River (Morgan & Hinkle, 2007)[2]. The subject property is located within Management Area 9, which recommends a 0 to 10 percent reduction from the base scenario loading (standard systems) for both existing homes and future homes. The results of the Nitrate Loading Management Model within the study (Figures 25 and 26) suggest that this area represents a low risk to adversely impact groundwater quality. According to the interactive map for Oregon Domestic Well Testing, this part of Deschutes County has an average nitrate-nitrogen

[2] Morgan, D. S., & Hinkle, R. S. (2007). *Evaluation of approaches for managing nitrate loading from on-site wastewater systems near La Pine, Oregon*, (Scientific Investigations Report 2007-5237). Reston, VA: U.S. Geologic Survey.

concentration in domestic wells of 0.51 milligrams per liter (mg/L) with 7.58% exceeding 3 mg/L and none exceeding 10 mg/L (based on 211 test results, viewed on October 8, 2025).[3]

Formal Variance Request

Variance is requested from the following rules:

1. OAR 340-071-0135(1) – which addresses Department of Environmental Quality (DEQ) approval of new or innovative technologies, materials, or designs for onsite systems.[1]
2. OAR 340-071-0150(4)(a)(B) – which requires all criteria for approval shall be met.[1]
3. OAR 340-071-0290(4)(d) – which states that the water table is at least 24 inches bgs throughout the year.[1]

This request seeks to overcome the limitations of this Site by treating the sewage using a recirculating textile filter system (AdvanTex® AX20N-Mode 3B) prior to discharge into an elevated bottomless sand filter. AdvanTex units do an effective job of reducing five-day biochemical oxygen demand and total suspended solids to below 10 mg/L. Nitrogen is often fully converted from ammonia-nitrogen to nitrate-nitrogen (greater than 90%). Operating in Mode 3, the AdvanTex unit reduces total nitrogen sufficiently to meet TS2 (less than 30 mg/L). The DEQ approval of the AX20N in Mode 3B includes an ultraviolet light to satisfy the pathogen reduction requirements of TS2. However, this request includes the use of a modified bottomless sand filter to achieve the pathogen reduction requirements of TS2 instead of an ultraviolet light and, therefore, this configuration does not have (or need) an ultraviolet disinfection unit. The "B" designation indicates the AdvanTex unit is configured with the second pump for the final discharge to the modified bottomless sand filter. A post-anoxic treatment process (RidNOx™) is proposed to reduce the total nitrogen concentration in the final effluent pumped to the modified bottomless sand filter to less than 2 mg/L.

The AX20 systems in the La Pine project produced effluent with an average total nitrogen (TN) concentration of 17 mg/L. A post-anoxic process similar to what is proposed, referred to at the time as Nitrex, was tested following treatment through a lined intermittent sand filter. The Nitrex unit consisted of a 2-compartment concrete tank filled with what was described as a proprietary carbon media (wood chips).

The sand filters produced an average TN of about 50 mg/L and the final effluent from the Nitrex units had an average TN of 2.4 mg/L, representing a 96% reduction from the 60 mg/L average TN concentration in the septic tank effluent. So long as there is sufficient soluble carbon being released from the wood chips, and the hydraulic loading rate is low enough to allow the dissolved oxygen in the effluent to approach zero, the NO_3-N concentration will typically be below the method detection limit. What nitrogen remains in the effluent will often be organic, as measured by the Total Kjeldahl Nitrogen (TKN) method. The organic nitrogen may be subsequently oxidized in the bottomless sand filter but is just as likely to be retained or recycled in the biomass that develops in the sand filter media.

[3] ARC GIS Online. (n.d.). Oregon domestic well testing, [Data file]. Retrieved August 11, 2025, from ARC GIS Online: https://www.arcgis.com/apps/MapSeries/index.html?appid=c0d7daea497049c1a686d07dab7106e5

Therefore, the concentration of nitrogen leaving the bottomless sand filter after treatment through both the AX20 and the RidNOx unit is expected to be even lower than the results from the La Pine project.

The RidNOx unit described in this proposal is configured similar to larger units used on several systems permitted under Water Pollution Control Facilities (WPCF) permits and monitored on a regular basis. Some of these units have been in tanks and some have been in lined basins. Typical results from the post-anoxic process (prior to discharge, typically to a soil absorption system) include NO_3-N concentrations near or below the method detection limit and TKN concentrations between 1 and 3 mg/L.

A recent test result (August 2022) from a similarly configured system (predominantly residential sources using AdvanTex treatment with Mode 3-style pre-anoxic denitrification, followed by post-anoxic treatment in tanks filled with wood chips) produced a TKN concentration of 0.68 mg/L and a NO_3-N concentration of 0.13 mg/L for a TN of 0.81 mg/L.

A recent test result (July 2022) from a high-nitrogen source (150 mg/L TKN treated by AdvenTex with alkalinity augmentation to support full nitrification, configured in a Mode 3-style pre-anoxic process, followed by post-anoxic treatment in lined wood-chip beds) produced a TKN concentration of 0.99 mg/L and a NO_3-N concentration of 0.05 mg/L for a TN of 1.04 mg/L.

Assuming a maximum 65 to 75% reduction from the starting concentration, the NO_3-N concentration entering the post-anoxic process is expected range between 40 and 45 mg/L, similar to the sand filter effluent from the La Pine Project and higher than what is expected from the AX20 in a residential scenario. Based on the performance of the commercial systems described above, and a typical residential total nitrogen concentration of 60 mg/L, the typical reduction from the base scenario presented in the groundwater study cited previously would be approximately 98 percent.

The initial and replacement bottomless sand filter areas are proposed on the highest ground near the western edge of the parcel. This represents an area with the appropriate spatial footprint and meets all required horizontal setback requirements.

Test Pit 3 (2025) was described as:

- Dark brown (10YR 3/3) loamy sand from 0 to 5 inches with weak fine subangular blocky structure and friable consistence; many very fine, common fine, and few medium and coarse roots; underlain by
- Dark brown (10YR 3/3) loamy coarse sand from 5 to 22 inches with weak fine subangular structure and friable consistence; with few very fine, fine, medium, and common coarse roots; with redoximorphic features (stripping and staining) described beginning at 18 inches; underlain by
- Very dark brown (10YR 2/2) gravelly sandy loam from 22 to 32 inches with weak medium subangular blocky structure and friable consistence; few roots; with redoximorphic features (iron concentrations) throughout.

Relative elevation measurements were made at all 4 corners of both the proposed initial and replacement bottomless sand filters as well as at the existing ground surface adjacent to the described profile for Test Pit 3 (2025). The highest level of the water table is expected to be 18 inches below the existing ground surface at the lowest point within the area proposed for the initial and replacement sand filters based on a depth of 18 inches to the redoximorphic features described in Test Pit 3 (2025).

The proposed system seeks to overcome this limitation by elevating the modified bottomless sand filter in a manner that provides an additional 6 inches of separation (Figure 3). The sod and underlying sandy soil to a depth of 6 inches within the footprint of the sand filter and replaced with sand filter media. An additional 12 inches of sand filter media (total of 18 inches) will be used to exceed the 24-inch separation from shallowest water table depth standard by providing a total separation of 30 inches. In order to optimize the use of the highest available ground and maximize separation from the underlying water table, the sand filters are proposed in a reinforced concrete container with inside dimensions of 10 feet by 25 with the south wall of the initial sand filter intended to serve as the north wall of the replacement sand filter at such time as it needs to be installed. The rest of the sand filter will be "conventional" from there up, consisting of 6 inches of underdrain media, 24 inches of sand filter media, 6 inches of drain media (with the distribution laterals), filter fabric, and 6 to 9 inches of backfill. The additional 6 inches of separation is intended to account for any potential mounding that may occur within the concrete container during an extreme weather event in conjunction with the highest predicted rise of the water table.

Brian Rabe will need to be involved during the construction of this system to install the lysimeter in the sand filter and oversee the installation of the RidNOx unit. Additional information regarding the installation of the AdvanTex AX20, RidNOx unit, and the lysimeter, as well as sampling instructions, are described in Appendix F and shown in Figures 4A, 4B, 5, and 6. The owner agrees to facilitate sampling of the RidNOx effluent in conjunction with routine service visits (twice per year for the first 2 years and annually thereafter) to monitor the performance. Samples will be collected from the pump basin between the RidNOx unit and the sand filter. When the media begins to show signs of depletion (as indicated by average nitrogen concentrations climbing to above 7 mg/L nitrate-nitrogen or 10 mg/L total nitrogen), the owner will schedule media replacement for the following summer when the water table is at least 30 inches below the top of the tank (to prevent displacement of the empty tank by buoyant forces). If this request is approved, a condition of approval will require access be allowed to the treatment system and sand filter by current and future property owners for periodic sampling.

In addition to the high level of treatment achieved by the AdvanTex treatment system and post-anoxic denitrification process, further treatment of the effluent will occur with predominantly unsaturated flow within the imported sand and native sandy soil beneath the bottomless sand filter (minimum of 24 inches above the highest predicted level of the underlying fluctuating water table). Small doses, coupled with substantial resting periods achieved with pressure distribution (see recommended sand filter plan detail in Figures 4A and 4B), will ensure unsaturated, thin-film flow through the soils above the water table. This will further reduce pathogens and other residual contaminants. The subsoil found beneath the sandy surface soils include evidence of both oxidation and reduction of iron. Conditions that support the reduction of iron will reduce nitrate-nitrogen to nitrogen gas since nitrate ions are used as electron acceptors preferentially over iron compounds. This will facilitate additional reduction of nitrate-nitrogen as the highly treated effluent is assimilated into the environment.

Additional Considerations for No Net Impact to Groundwater Nitrate Contribution

A letter from the Deputy Director of the Oregon Department of Environmental Quality dated December 19, 2023, to the Deschutes County Commissioners formally focused additional attention on the potential impacts to water quality in southern Deschutes County from onsite sewage treatment systems. It is important to consider a number of very conservative assumptions that were made in the USGS groundwater modeling effort that likely overestimated the potential impacts. The following addresses a few specific examples.

Plant Uptake of Nitrogen

The model specifically assumes no nitrogen removal from plant uptake. This may be appropriate for shallow rooted grasses, forbs, and other understory vegetation (e.g., bitterbrush). However, this is not appropriate for the overstory vegetation which is primarily lodgepole and ponderosa pine. These tree species have deeper root systems that can withstand periodic saturation. The model accounted for the impact of transpiration in the water balance but did not account for the impact of nutrient removal and storage in the nitrogen balance. The study concluded that there would be a concentration effect as a result. However, this is not realistic. Plants do not take up water without taking up nutrients that they need, if they are present.

Although studies of nutrient removal by lodgepole pine are limited, there are data available from peer-reviewed journal articles. One such article (T.J. Fahey, 1985)[4] documented total nitrogen uptake of 1.25 grams per square meter (g/m^2) with root turnover of 0.37 g/m^2 for a net uptake of 0.88 g/m^2. This corresponds to 7.85 pounds of nitrogen uptake per acre per year.

Another data source is a chapter from a publication by the United States Forest Service (USFS) which states that the pumice soils in the area are "very severely deficient" in nitrogen (Shainsky, 1992)[5]. Table 4 of that publication lists the average nitrogen concentrations for several components of the tree. Since yield estimates in the published soil survey are focused on the volume of merchantable wood produced over the typical rotation of a stand of timber, only the concentrations of the bolewood (0.06% N) and bark (0.25% N) are accounted for (the parts removed during harvest). The crowns, stumps, and roots are not removed during harvest and would contribute to nutrient cycling on site. The estimated yield of lodgepole pine for Shanahan soils in the published soil survey is 65 cubic feet per acre per year ($ft^3/ac/yr$). The dry density of lodgepole pine ranges from 22 to 53 pounds per cubic foot (lb/ft^3). For the purpose of calculation, an average of 37.5 lb/ft^3 will be used.

The smallest lots eligible for development in southern Deschutes County are about 0.5 acres in size. Assuming two thirds of the lot is developed (home, outbuildings, driveway, yard, etc.) the other third is typically maintained with native trees (lodgepole and/or ponderosa pine). Assuming one third the average annual growth (21.5 $ft^3/ac/yr$), an average density of 37.5 lb/ft^3, and the nitrogen content described previously, the annual amount of N taken up and stored in standing wood biomass on 0.17 acres (one third of a half-acre lot) is 0.8 pounds.

[4] T.J. Fahey, e. a. (1985). The Nitrogen Cycle in Lodgepole Pine Forests, Southeast Wyoming. *Biogeochemistry*

[5] Shainsky, S. N. (1992). *Distribution of Biomass and Nutrients in Lodgepole Pine/Bitterbrush Ecosystems in Central Oregon.* USFS Deschutes National Forest.

As described in the variance proposal, the proposed system represents the best currently available technology (AdvanTex + RidNOx + MBSF), which is expected to be comparable or better than the best system studied in the La Pine Demonstration Project (Sand Filter + Nitrex + Drainfield). Using expected average total nitrogen concentrations in the effluent leaving the bottomless sand filter after secondary treatment through AdvanTex unit in Mode 3B, followed by tertiary treatment through the RidNOx unit, and the data presented in the USGS groundwater loading and modeling study, the annual mass load to groundwater would be 0.7 lb N/yr (2 mg/L x 2.55 people per home x 45 gallons per person per day x 365 days per year). Even the conservative nitrogen uptake and retention from residual trees on this lot is greater than the contribution from the proposed system. Therefore, approval of this lot utilizing this treatment approach is not likely to make an additive contribution of nitrogen to groundwater.

Hydraulic Loading

The annual hydraulic contribution to groundwater (precipitation minus evapotranspiration) is based on the natural condition. As development occurs, the transpiration component is reduced by the amount of area covered in roofs, driveways, and other impervious or non-vegetated areas. Runoff is limited in these soils so a higher proportion of precipitation contributes to recharge on developed lots than was assumed in the model. This would have a slight positive impact on resulting concentrations.

The letter from the Deputy Director states that the credibility of the state and county could be called into question regarding protection of water quality if more variances are approved. I respectfully disagree, based on the data provided in the previous paragraphs. Use of systems that further reduce the contribution to groundwater, with some systems under certain conditions representing a net zero contribution in most situations, and a net negative contribution in areas with slightly elevated (or higher) nitrate concentrations, are protective of groundwater quality and public health. These systems are only currently available through the variance process.

Conclusions

As described, the proposed combination of treatment components is expected to produce a final effluent with very high quality and a low potential to impact water quality, human health, or the environment. Given the unique circumstances at this Site, strict compliance with the rules is considered to be unreasonable.

It is acknowledged that detailed plans and specifications will need to be submitted and approved before any construction can take place. It is also understood that if this request is approved, there will be language included that allows the county to allow or require a prescriptive system that is demonstrated to perform equal to or better than what is described in this proposal.

Directions to the Site as well as a map showing the ownership of adjacent parcels along with a list of names and addresses are attached in Appendix G. If you have any questions or comments, please do not hesitate to contact me directly at (503) 881-1604.

Sincerely,
ELKHORN CONSULTING LLC

Brian T. Rabe, CPSS, WWS
Principal Soil Scientist

BTR/ddr
Enc: Figures 1-6, Appendices A-G
c: Dan and Amanda Cook – Cascade Lakes Properties LLC
Todd Cleveland, REHS – Deschutes County

CPSS
Certified Professional
Soil Scientist
BRIAN T. RABE
15239 Exp. 31DEC25
Registered Wastewater Specialist
No. EH-W-448430 Exp. 30SEP26

FIGURES

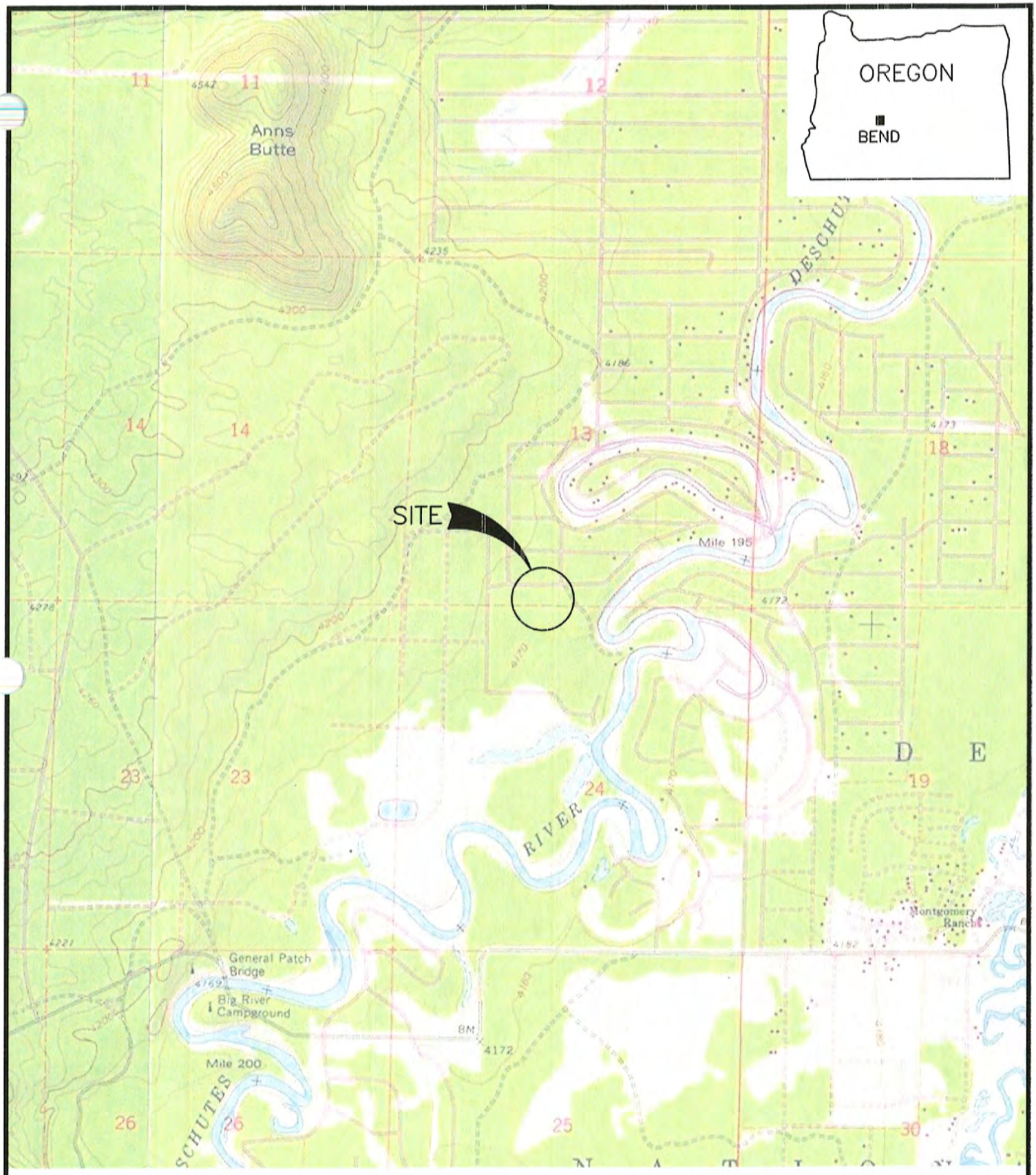


Figure 1. Vicinity Map

0 2,000'

1" = 2,000'

(LOCATIONS AND SCALE ARE APPROXIMATE)

N

(SOURCE: ©2013 National Geographic Society, i-cubed)

PROJECT NUMBER: 2025026	Formal Variance T20S, R10E, Section 13C, Tax Lot 9400
DATE: 10/8/2025	
DWG NO: 2025026 F1-6.DWG	Cascade Lakes Properties LLC 16959 Upland Road Bend, OR 97707
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	
REVISED:	ELKHORN CONSULTING LLC

G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1-6.dwg October 8, 2025 DRABE

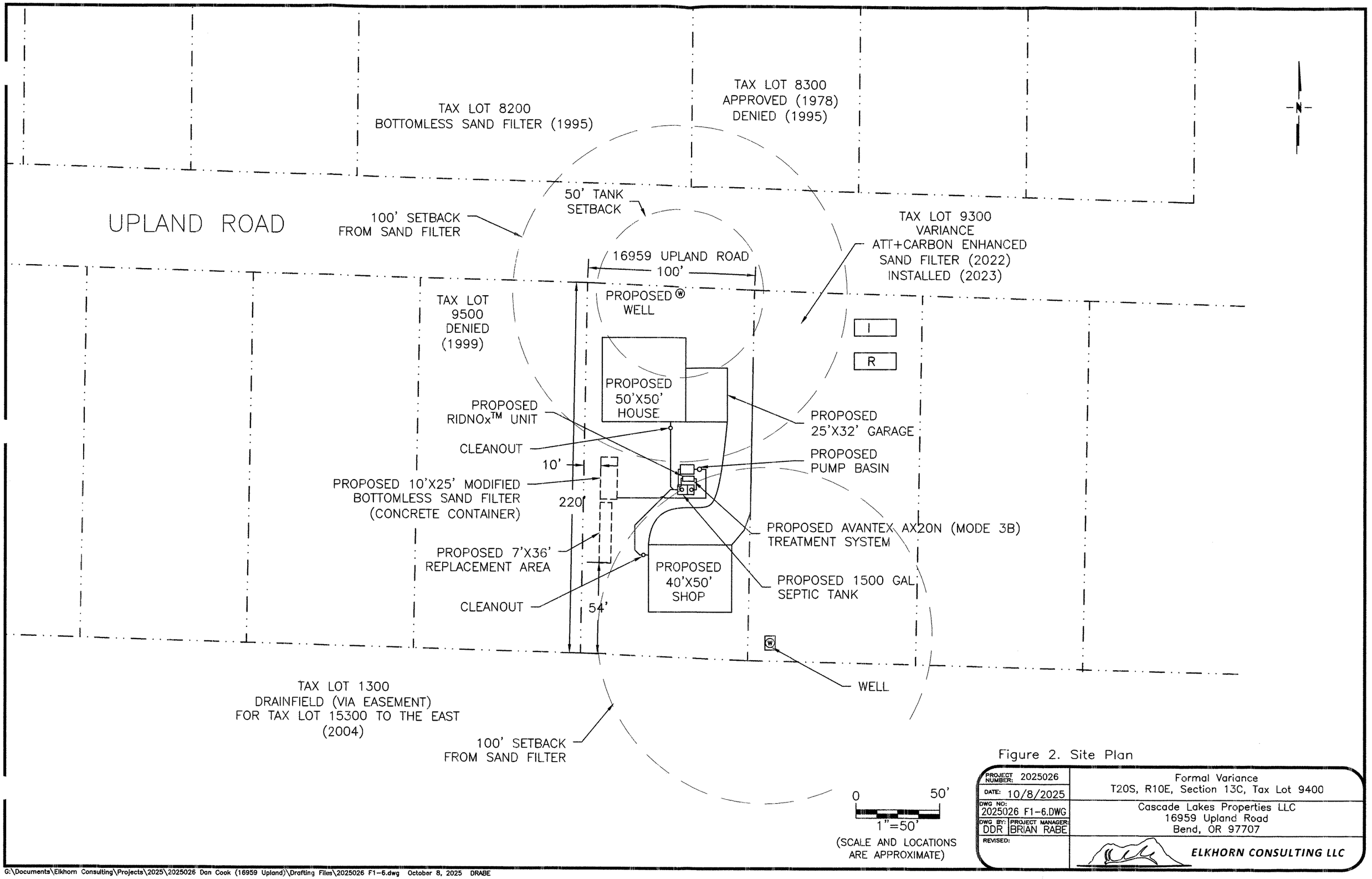


Figure 2. Site Plan

PROJECT NUMBER: 2025026	Formal Variance
DATE: 10/8/2025	T20S, R10E, Section 13C, Tax Lot 9400
DWG NO: 2025026 F1-6.DWG	Cascade Lakes Properties LLC
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	16959 Upland Road
REVISED:	Bend, OR 97707
	ELKHORN CONSULTING LLC

G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1-6.dwg October 8, 2025 DRABE

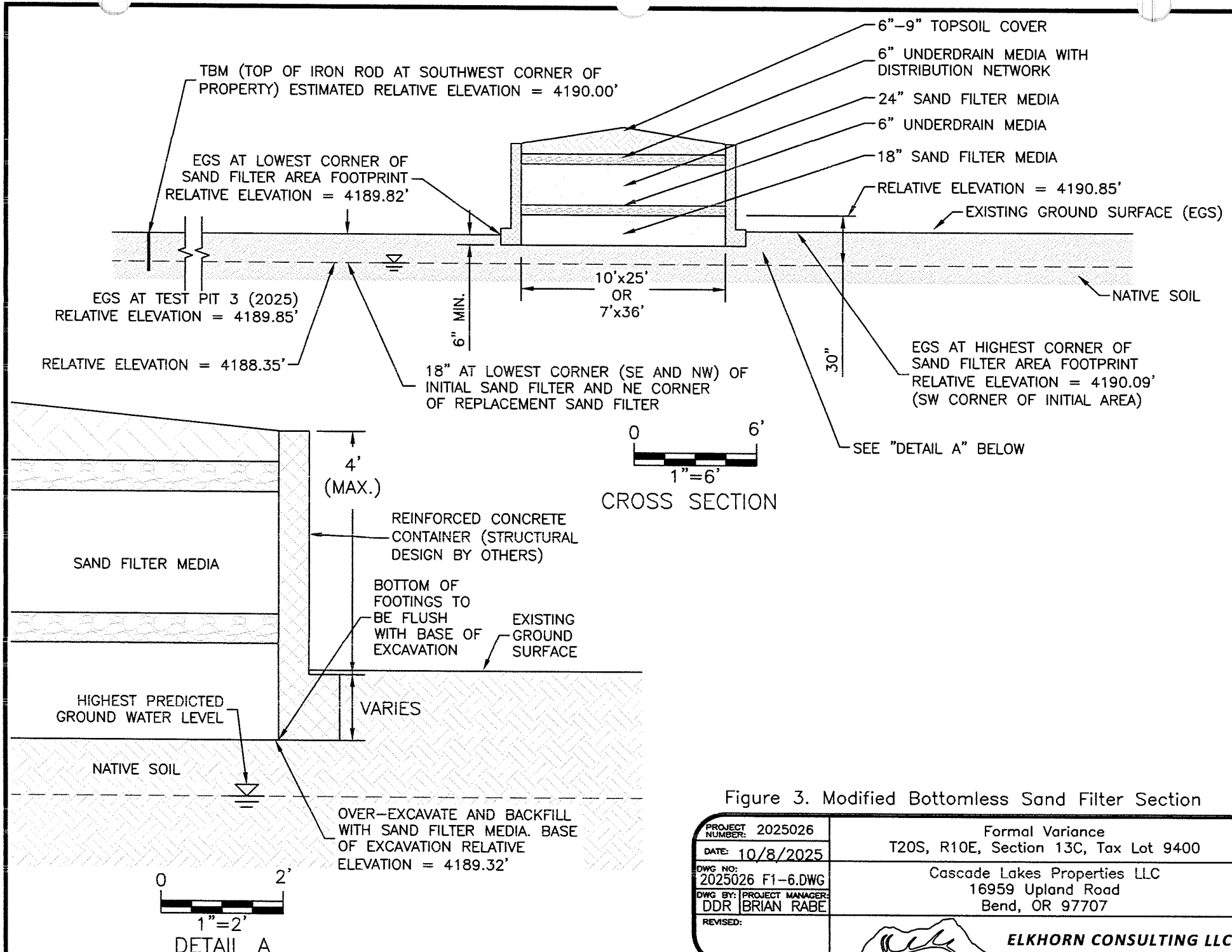


Figure 3. Modified Bottomless Sand Filter Section

PROJECT NUMBER: 2025026	Formal Variance
DATE: 10/8/2025	T20S, R10E, Section 13C, Tax Lot 9400
DWG NO: 2025026 F1–6.DWG	Cascade Lakes Properties LLC
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	16959 Upland Road
REVISED:	Bend, OR 97707
	ELKHORN CONSULTING LLC

G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1–6.dwg October 8, 2025 DRABE

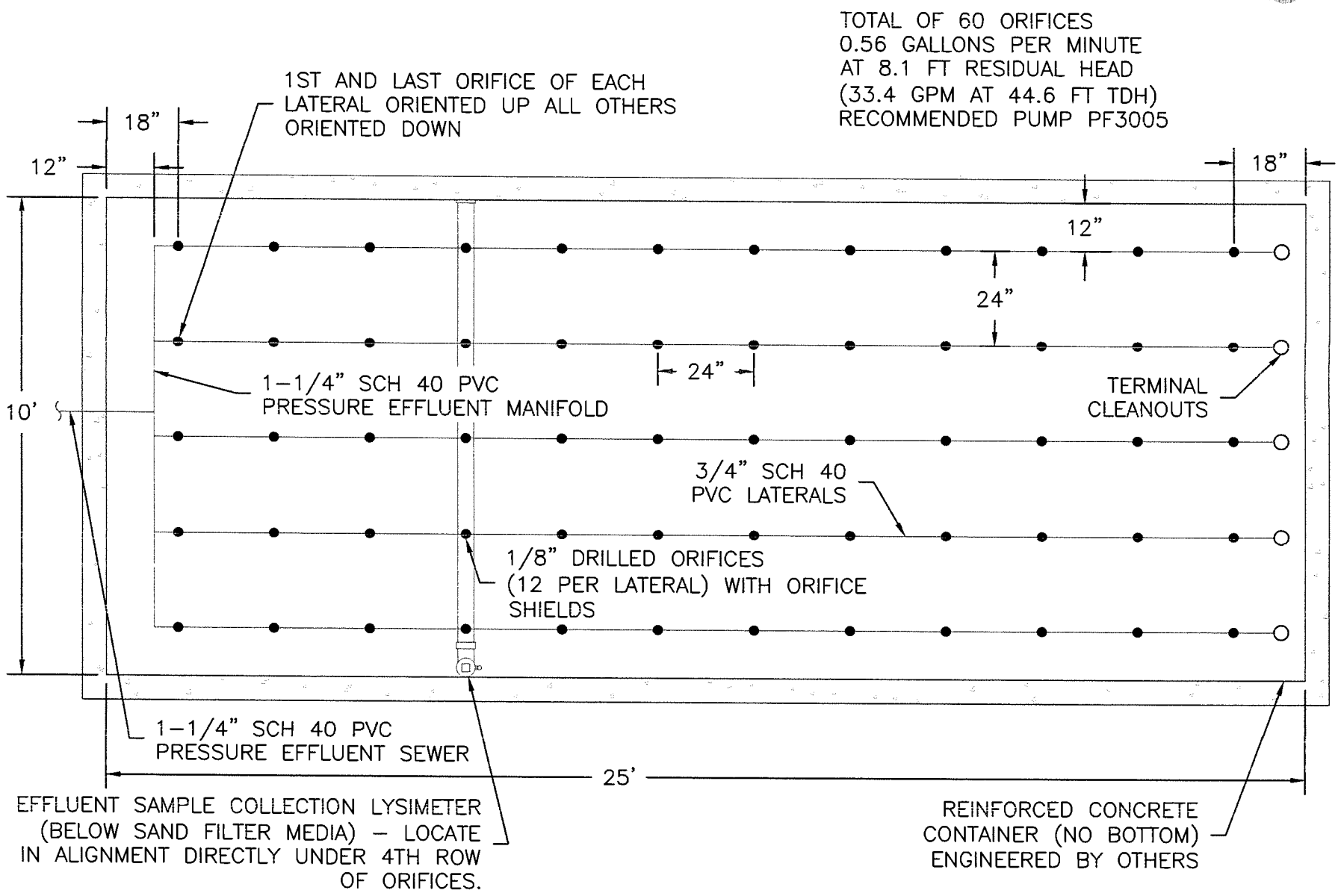


Figure 4A. Sand Filter Plan Detail – Initial

0 3'

1"=3'

PROJECT NUMBER: 2025026	Formal Variance
DATE: 10/8/2025	T20S, R10E, Section 13C, Tax Lot 9400
DWG NO: 2025026 F1-6.DWG	Cascade Lakes Properties LLC
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	16959 Upland Road
REVISED:	Bend, OR 97707
	ELKHORN CONSULTING LLC

G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1-6.dwg October 8, 2025 DRABE

NOTE;
TOTAL OF 54 ORIFICES 0.64 GALLONS PER MINUTE AT 10.8 FT RESIDUAL HEAD (34.7 GPM AT 40.4 FT TDH) RECOMMENDED PUMP PF3005

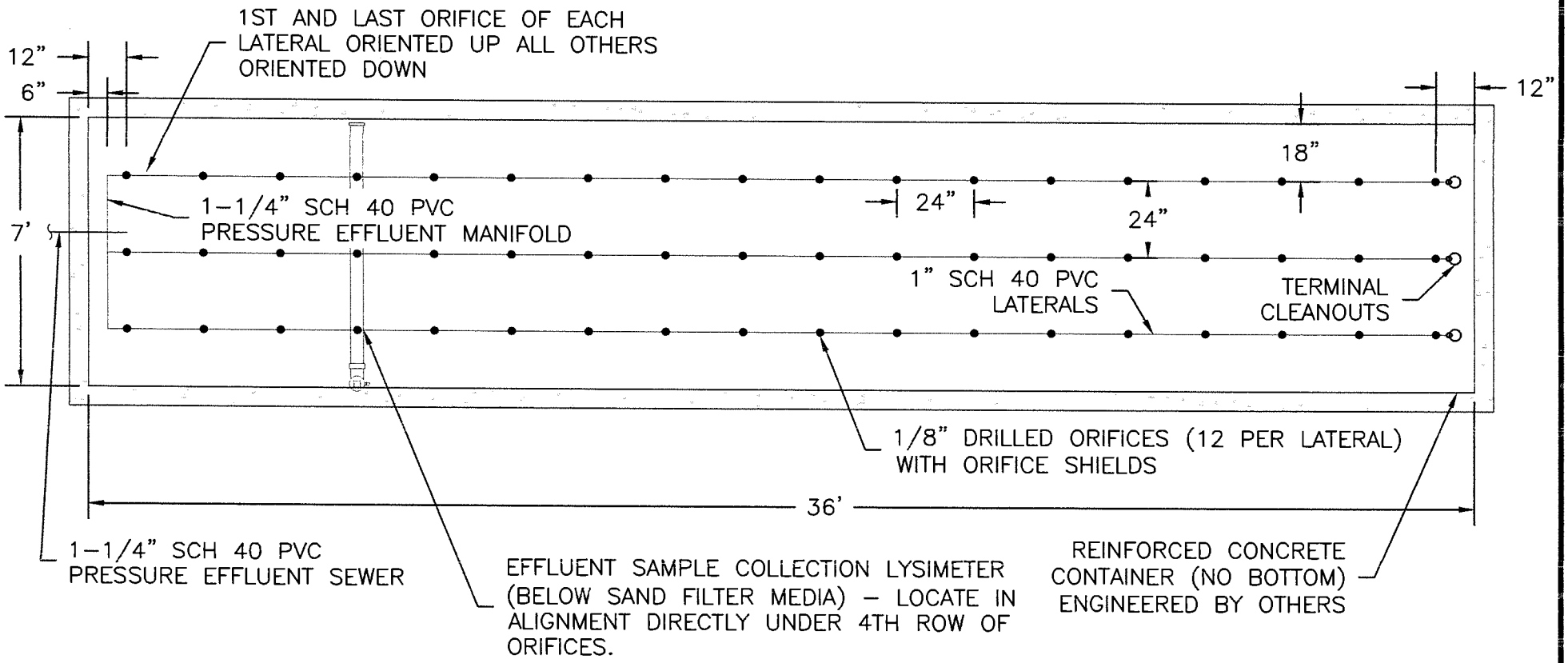
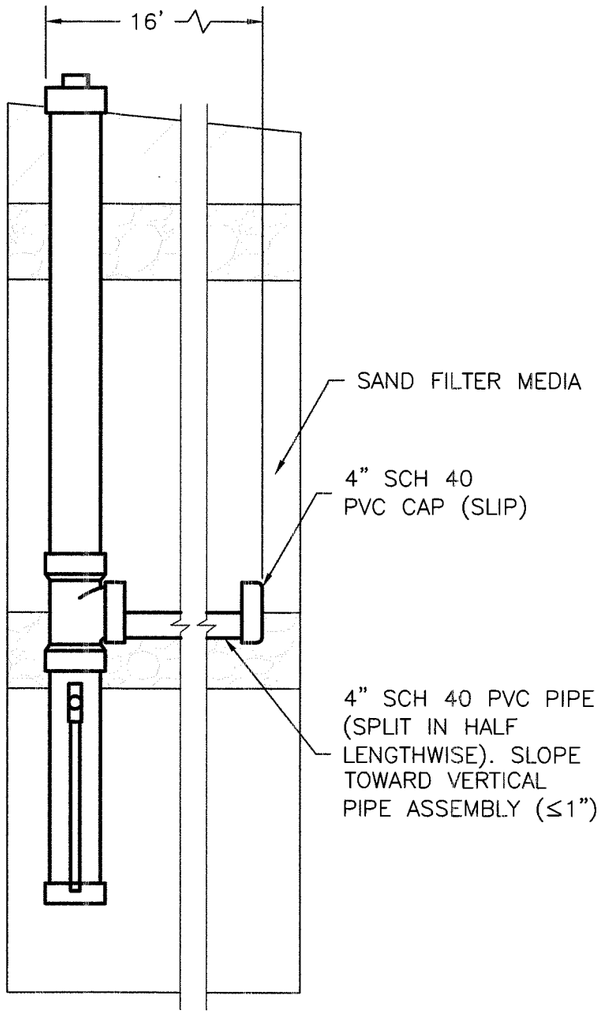


Figure 4B. Sand Filter Plan Detail – Replacement

0 4'
1"=4'

PROJECT NUMBER: 2025026	Formal Variance T20S, R10E, Section 13C, Tax Lot 9400
DATE: 10/8/2025	
DWG NO: 2025026 F1-6.DWG	Cascade Lakes Properties LLC 16959 Upland Road Bend, OR 97707
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	
REVISED:	ELKHORN CONSULTING LLC

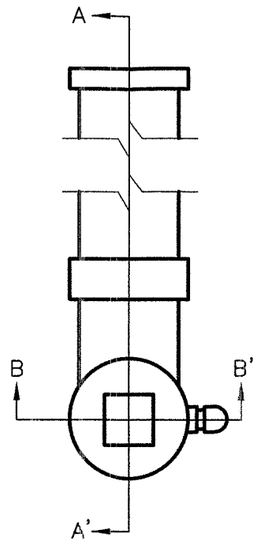
G:\Documents\Elkhorn Consulting\Projects\2025\2025026 Dan Cook (16959 Upland)\Drafting Files\2025026 F1-6.dwg October 8, 2025 DRABE



VIEW A–A'

0 1'

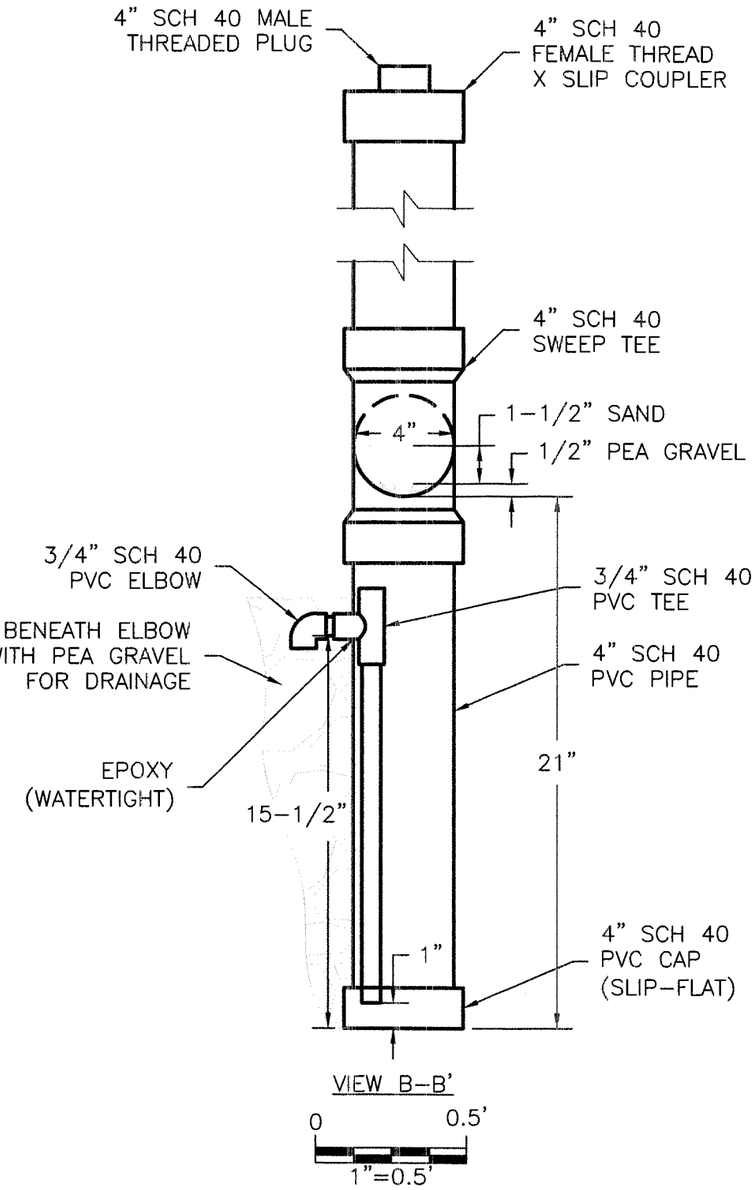
1"=1'



PLAN VIEW

0 0.5'

1"=0.5'



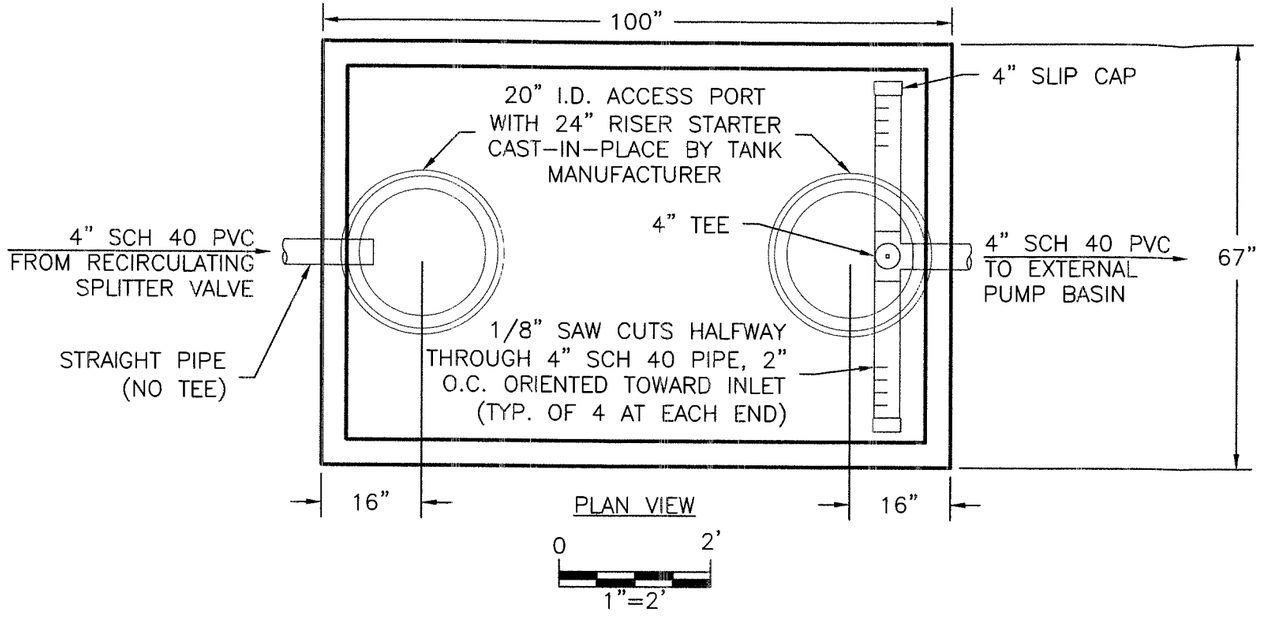
VIEW B–B'

0 0.5'

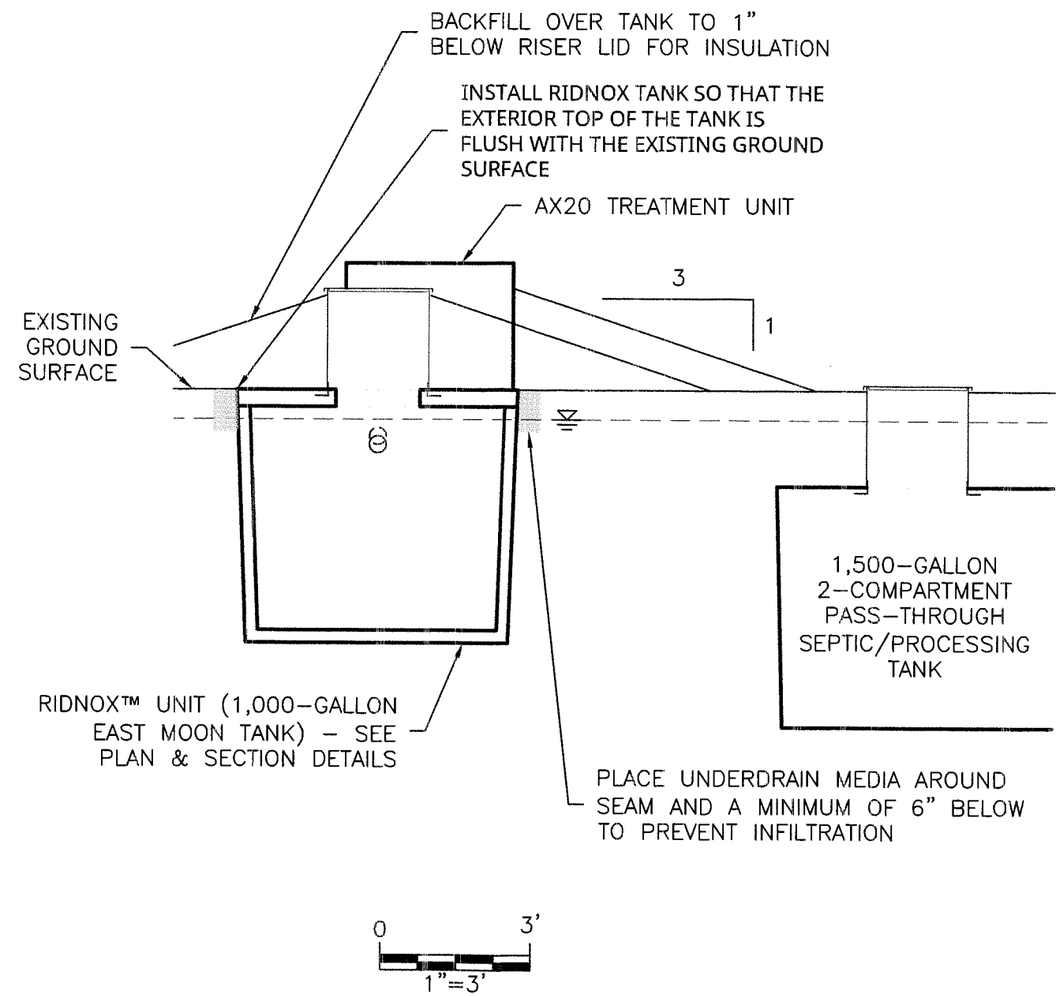
1"=0.5'

Figure 5. Lysimeter Details

PROJECT NUMBER: 2025026	Formal Variance
DATE: 10/8/2025	T20S, R10E, Section 13C, Tax Lot 9400
DWG NO: 2025026 F1–6.DWG	Cascade Lakes Properties LLC
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	16959 Upland Road
REVISED:	Bend, OR 97707
	ELKHORN CONSULTING LLC



NOTE: THE LOCATION/ELEVATION OF THE RECIRCULATION SPLITTER VALVE (RSV) SHALL BE ESTABLISHED PRIOR TO OR FIELD FIT TO ASSURE MINIMUM REQUIRED FALL FROM THE AX20 AND TO THE RIDNOX UNIT



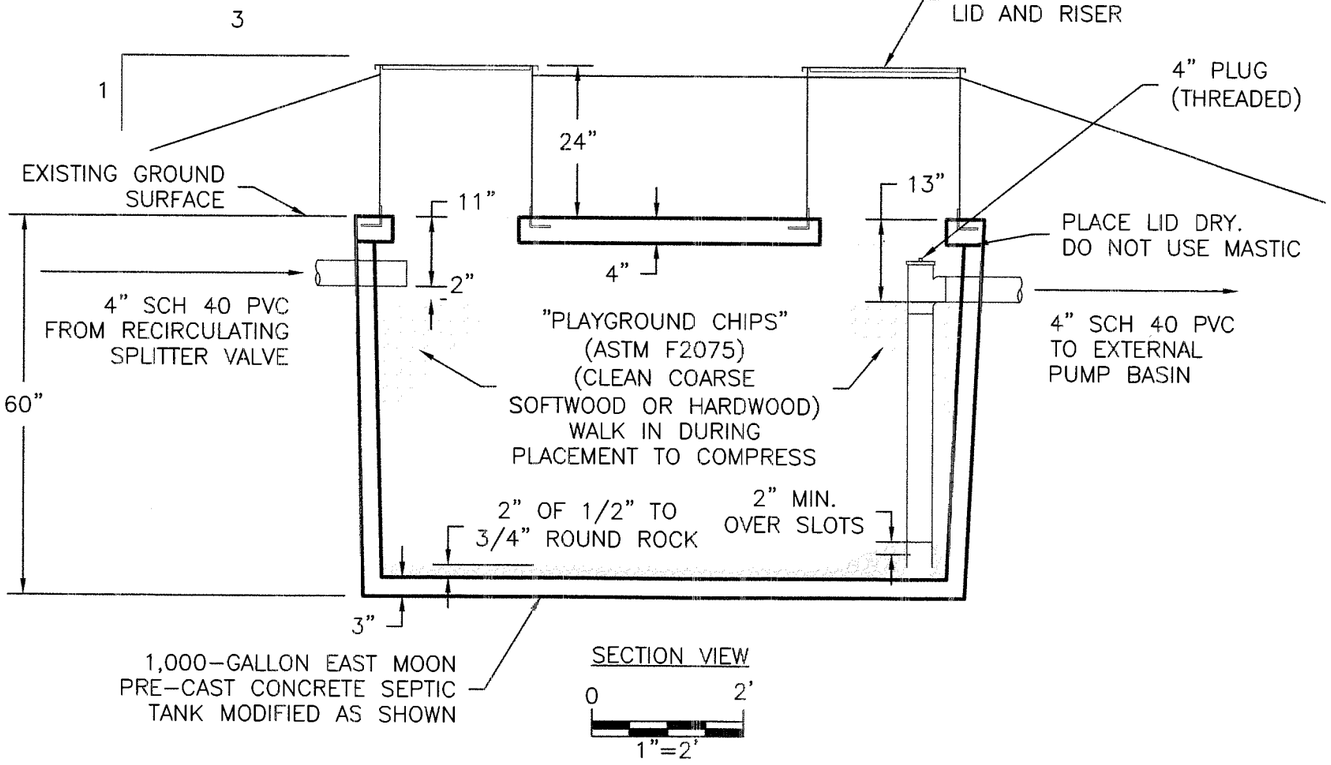


Figure 6. RidNOx™ Details

PROJECT NUMBER: 2025026	Formal Variance
DATE: 10/8/2025	T20S, R10E, Section 13C, Tax Lot 9400
DWG NO: 2025026 F1-6.DWG	Cascade Lakes Properties LLC
DWG BY: DDR / PROJECT MANAGER: BRIAN RABE	16959 Upland Road
REVISED:	Bend, OR 97707
	ELKHORN CONSULTING LLC

Appendix A.

Tax Lot Map

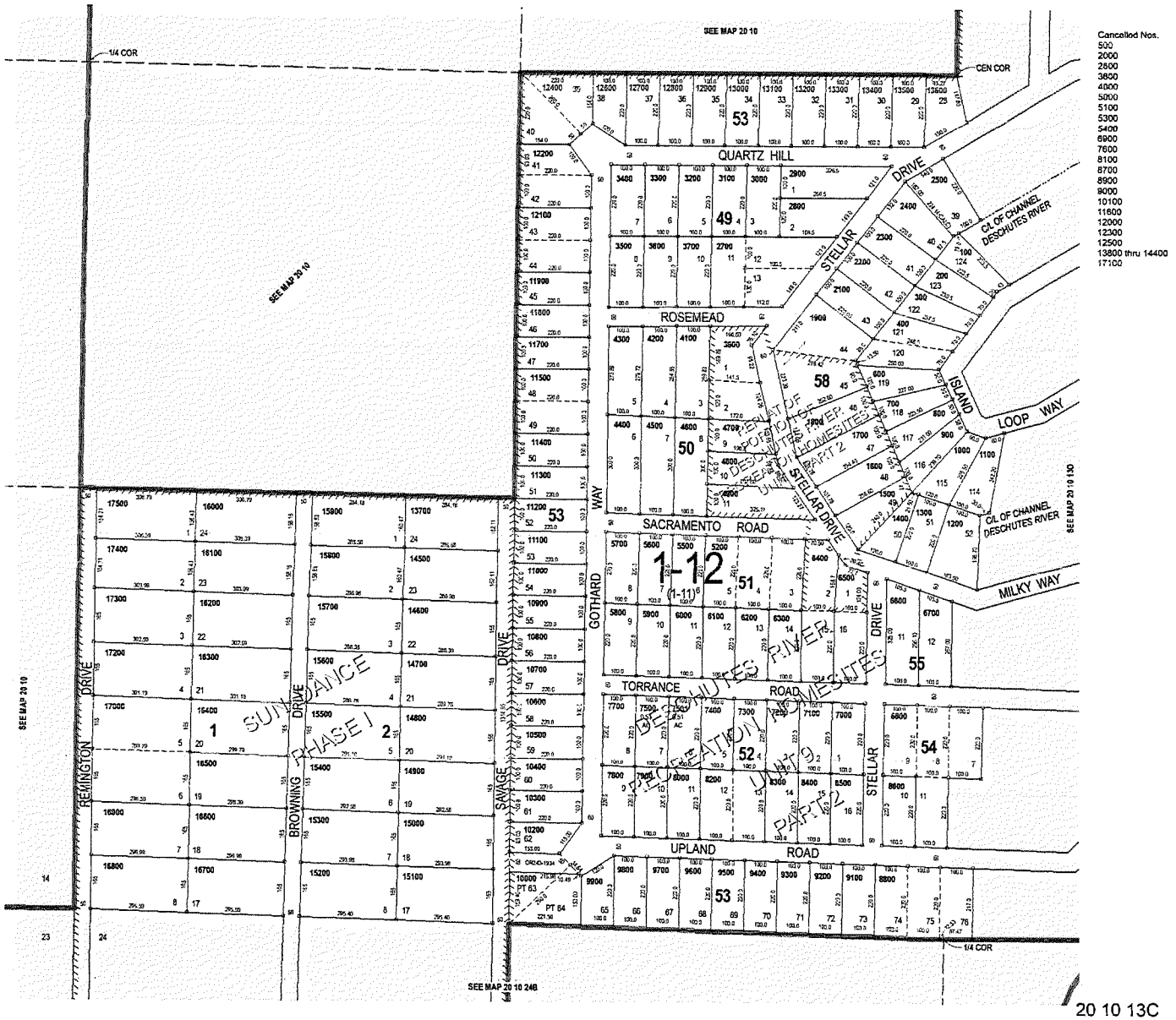
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

12/17/2024

S.W.1/4 SEC.13 T.20S. R.10E. W.M.
DESCHUTES COUNTY

1" = 200'

20 10 13C



20 10 13C

Appendix B.

Deed

THIS SPACE RESERVED FOR RECORDER'S USE

Deschutes County Official Records **2025-18655**
D-D
Stn=1 SH **07/17/2025 11:55 AM**
$25.00 $11.00 $10.00 $61.00 $10.00 **$117.00**

I, Steve Dennison, County Clerk for Deschutes County, Oregon, certify that the instrument identified herein was recorded in the Official Records.
Steve Dennison - County Clerk

After recording return to:
Cascade Lakes Properties LLC
56636 Lloyd Way
Bend, OR 97707

Until a change is requested all tax statements shall be sent to the following address:
Cascade Lakes Properties LLC
56636 Lloyd Way
Bend, OR 97707

File No.: 7064-4287215 (SNB)
Date: July 07, 2025

STATUTORY WARRANTY DEED

Bernd W. Scholz, Trustee of the Scholz Family Living Trust and Derrick R. Domann-Scholz, Grantor, conveys and warrants to **Cascade Lakes Properties LLC, an Oregon limited liability company**, Grantee, the following described real property free of liens and encumbrances, except as specifically set forth herein:

LEGAL DESCRIPTION: Real property in the County of Deschutes, State of Oregon, described as follows:

Lot Seventy (70), Block Fifty-Three (53), DESCHUTES RIVER RECREATION HOMESITES UNIT 9 PART 2, recorded March 5, 1965, in Cabinet A, Page 121, Deschutes County, Oregon

Subject to:

1. Covenants, conditions, restrictions and/or easements, if any, affecting title, which may appear in the public record, including those shown on any recorded plat or survey.
2. The **2025-2026** Taxes, a lien not yet payable.

The true consideration for this conveyance is **$77,500.00.** (Here comply with requirements of ORS 93.030)

After recording return to:
First American Title
395 SW Bluff Drive, Suite 100
Bend, OR 97702

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010.

Dated this 16 **day of** July, 20 25.

Bernd W. Scholz, Trustee of the Scholz Family Living Trust

Derrick R. Domann-Scholz

Bernd W. Scholz, Trustee

STATE OF Oregon)
)ss.
County of Clackamas)

This instrument was acknowledged before me on this 16 day of July, 2025 by Bernd W. Scholz as Trustee of ~~Bernd W. Scholz, Trustee of~~ the Scholz Family Living Trust, on behalf of the Trust.

OFFICIAL STAMP
SUSAN IRENE ROETHE
NOTARY PUBLIC - OREGON
COMMISSION NO. 1041353
MY COMMISSION EXPIRES SEPTEMBER 28, 2027

Susan Roethe

Notary Public for Oregon
My commission expires: 9/28/2027

STATE OF Oregon)
)ss.
County of)

This instrument was acknowledged before me on this _____ day of _____, 20____
by **Derrick R. Domann-Scholz.**

_____

Notary Public for Oregon
My commission expires:

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010.

Dated this 7th day of July, 2025.

Bernd W. Scholz, Trustee of the Scholz Family Living Trust

Derrick R. Domann-Scholz

Bernd W. Scholz, Trustee

STATE OF Oregon)
)ss.
County of)

This instrument was acknowledged before me on this _____ day of _____, 20____ by Bernd W. Scholz as Trustee of Bernd W. Scholz, Trustee of the Scholz Family Living Trust, on behalf of the Trust.

Notary Public for Oregon
My commission expires:

STATE OF Oregon)
)ss.
County of Clackamas)

This instrument was acknowledged before me on this 7th day of July, 2025
by **Derrick R. Domann-Scholz.**

Tamara R Dressel

OFFICIAL STAMP
TAMARA REBECCA DRESSEL
NOTARY PUBLIC - OREGON
COMMISSION NO. 1021399
MY COMMISSION EXPIRES JANUARY 26, 2026

Notary Public for Oregon
My commission expires: 1/26/26

Appendix C.

Site Evaluation Reports

September 10, 2025

CASCADE LAKES PROPERTIES LLC
56636 LLOYD WAY
BEND, OR 97707

RE: 247-25-000707-EVAL
16959 UPLAND RD, BEND, OR 97707

A site evaluation for an onsite wastewater treatment system for a single family dwelling was recently completed at the property noted above. Test pits were evaluated on 9/5/2025. Part of the evaluation is to determine the level to which the groundwater rises during the wet season of a normal weather year. Permanent water tables are present throughout the year although they may fluctuate in elevation seasonally. The soil indicators used to determine the level to which the water table rises are gray soils and mottling (discoloration of the soil).

In the test pits on the property the indicators suggest the water table may rise within 14 inches of the ground surface. Past observations and site evaluations in the surrounding area also verify the presence of a high water table. Extensive study and modeling of the groundwater in south Deschutes County has demonstrated that this area is sensitive to added loading from areas that do not meet separation to groundwater. **This site is denied due to high permanent groundwater and conditions associated with saturation.**

The site is denied based on the following:

- Does not meet minimum separation from permanent water table for any type of onsite wastewater system (OAR 340-071-0220, 0260, 0265, 0275, 0280, 0285, 0290, 0302).
- Installation of a system in the area evaluated will likely lead to pollution of public waters OAR 340-071-0130(1)
- Conditions associated with saturation OAR 340-071-0100(33)(g)

You have 90 days from the initial site visit to provide additional test pits for evaluation at no additional fee. However, it appears that other areas on the property would not be suitable due to the lack of topographical changes.

REVIEW AVAILABLE

Pursuant to Oregon Administrative rules (OAR 340-071). You may request a site evaluation report review if you believe this report to be in violation of the rules. The Oregon DEQ conducts report reviews upon submission of the appropriate application materials including: a written request that includes all information you have received from Deschutes County, the reason the report is in error including the specific Oregon Administrative Rules that conflict with the report, and the application fee. The DEQ will review the county's report and visit the site to determine the report's compliance with the appropriate rules.

Also pursuant to this rule, you may request a variance from these rules. The Oregon DEQ reviews variance requests upon application. This is not an automatic variance. You must provide technical justification that

demonstrates your proposed system will operate over an extended period of time, will not degrade the environment, and will provide public health protection.

An application, application fee, justification and exhibits, including this report, a land use compatibility statement and detailed plans of your proposed system are required for the application. Technical advice from a knowledgeable consultant is recommended. A Variance Officer from DEQ will review your application and the property and issue a written determination following an informational hearing.

Deschutes County recognizes your right to a variance request. This property, however, has severe limitations for onsite wastewater treatment as noted above. Unless public health and environmental protection can be assured, a variance request cannot be supported by the Deschutes County Onsite Wastewater Division and will not likely be approved by DEQ.

For further information regarding a report review for a variance request, please contact the Oregon Department of Environmental Quality at 471 NE Bellevue Dr., #110, Bend, OR 97701, phone 541-388-6146.

If you have any questions, please do not hesitate to call this office at 541-388-6519.

Sincerely,
Onsite Wastewater Division

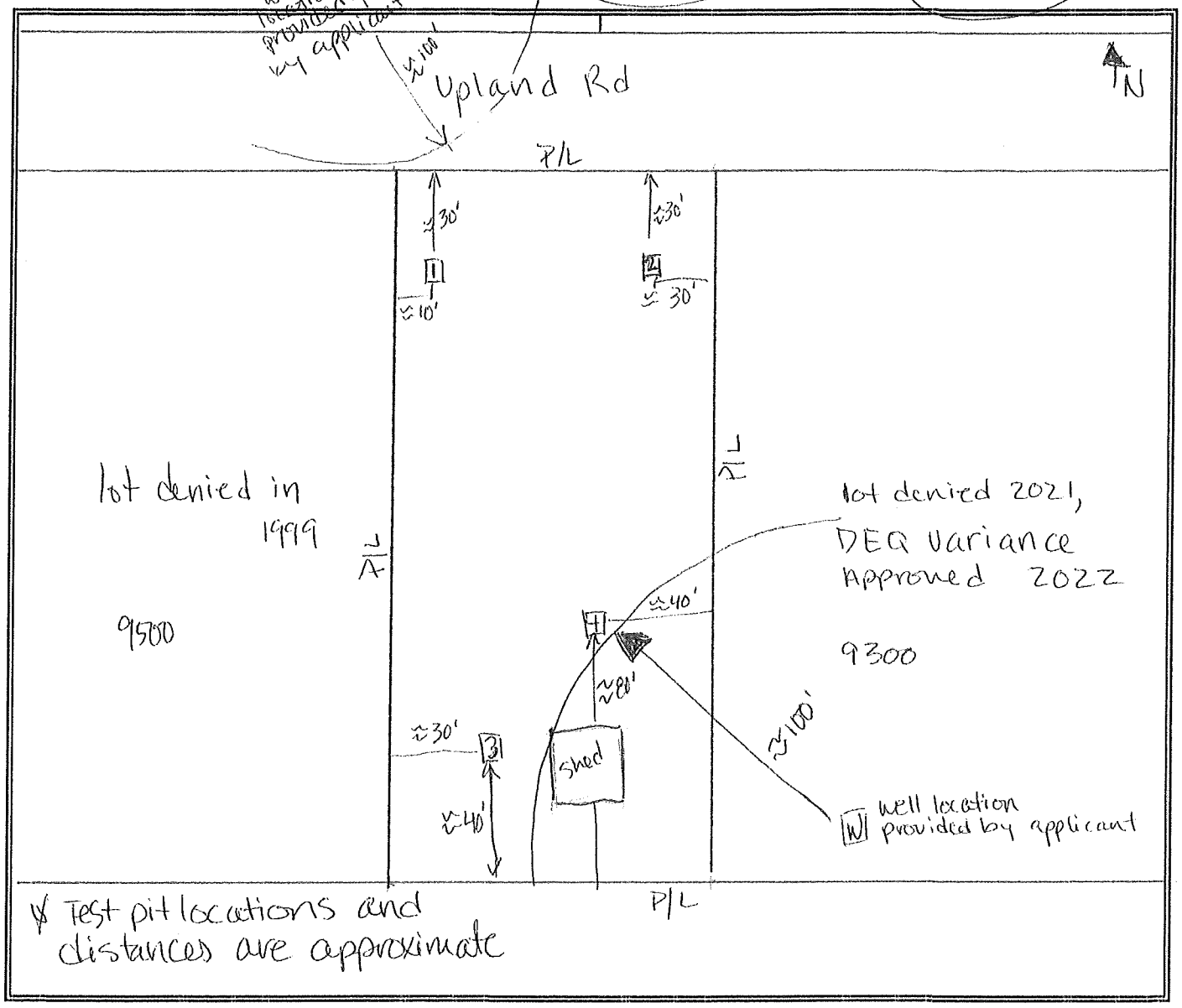
Lindsey Holloway

Lindsey Holloway, REHS
Onsite Wastewater Specialist II

SITE EVALUATION FIELD INSPECTION FORM

Applicant: Cascade Lakes Properties LLC Site Evaluation # 247-25-000707-EVAL
Evaluator: L. Holloway Date: 9/5/25 Parcel Size: >5
Subdivision: D.R.R.H. Unit 9 part 2 T 20 R 10 S 13C TL 9400 L 70 B 53

Suitable **Sketch/Not to Scale** **Unsuitable**



systems approved are the **minimum to meet current DEQ rules and are not design specifications*

System type approved: _____ Absorption facility:
Initial _____ Min. Size _____ Max. Depth _____ Min. Depth _____
Replacement _____ Min. Size _____ Max. Depth _____ Min. Depth _____
Tank Size _____ Sewage Flow _____
Special Conditions: _____

Denied

SITE EVALUATION FIELD INSPECTION FORM

Applicant: _____ Site Evaluation # 247-25-000707-SVAL

Evaluator: _____ Date: _____ Parcel Size: _____

Subdivision: _____ T ____ R ____ S ____ TL ____ L ____ B ____

	DEPTH	TEXTURE	COLOR	Notes on roots, structure, rock frag, redox, limiting layer type & depth
1	0-6	ls	10yr 3/3	3vf, 2f, 1m, 1co	1fsbk fr
	6-24	lcos	10yr 3/3	1vf f, m, 2co	1fsbk fr Stripping + Staining at 14"
	24-40	gr sl	10yr 7/2	few roots	1msbk fr cZP Fe throughout
2	0-6			Like 1 Stripping + Staining at 15"
	6-20			
	20-41			
3	0-5			Like 1 Stripping + Staining at 18"
	5-22			
	22-32			
4	0-8			Like 1 Stripping + Staining at 18"
	8-25			
	25-36			
5				
6				
7				

Landscape Note: lodgepole, bitterbrush, bunchgrass, rushes

Slope: 0-1% Aspect: SW Groundwater: permanent

Other site notes: _____

Comments: _____

Reason for Unsuitability: (Include Rule Reference)

OAR 340-071-0220, 0260, 0265, 0275, 0280, 0285, 0290, 0302

OAR 340-071-0130(1); OAR 340-071-0100(33)(y). See site evaluation letter for details.

Appendix D.

NRCS Soil Report

United States Department of Agriculture

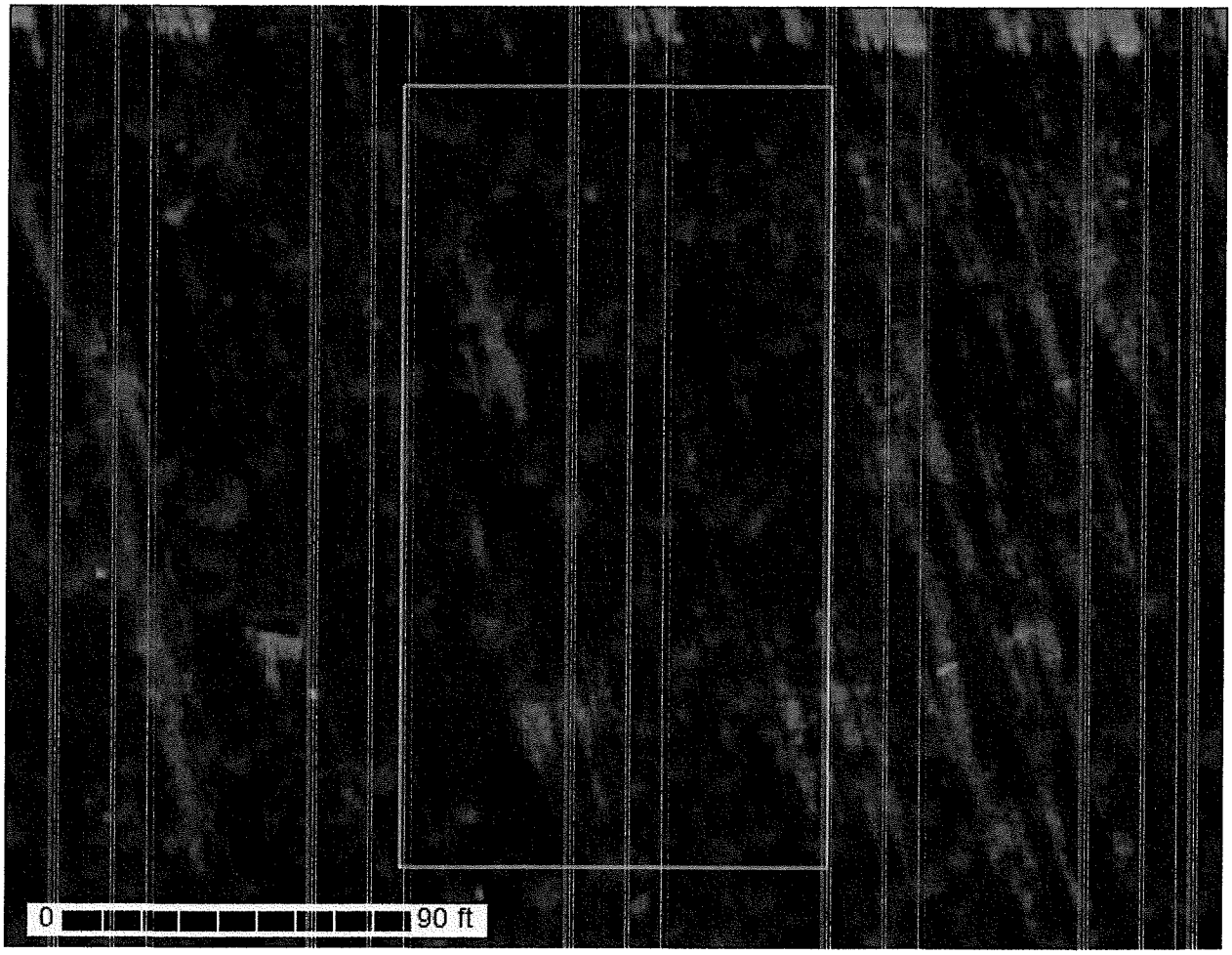
NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Upper Deschutes River Area, Oregon, Parts of Deschutes, Jefferson, and Klamath Counties

16959 Upland



October 8, 2025

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

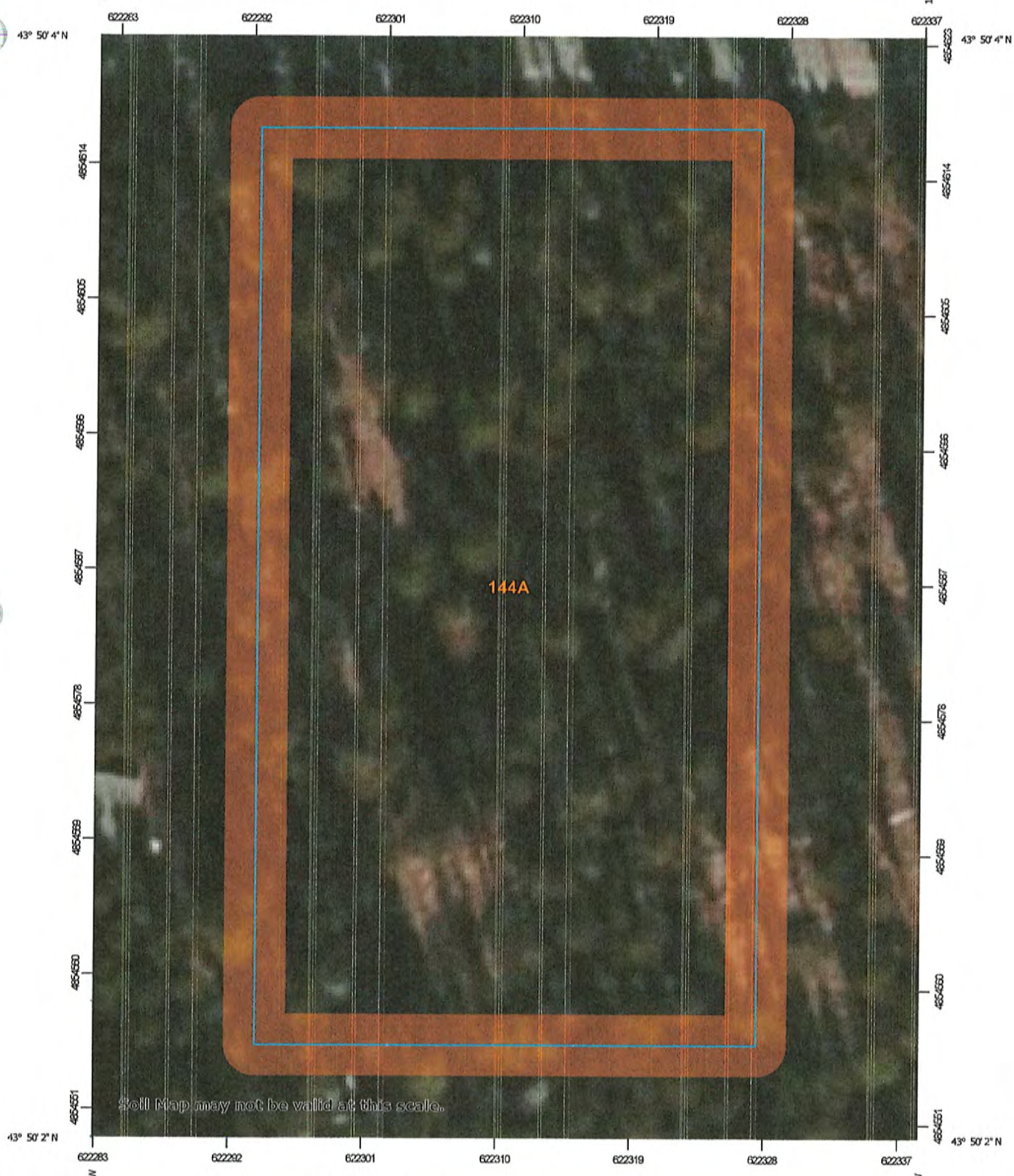
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map (16959 Upland)



Map Scale: 1:358 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 15 30 60 90

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Upper Deschutes River Area, Oregon, Parts of Deschutes, Jefferson, and Klamath Counties
Survey Area Data: Version 23, Sep 10, 2025

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

Date(s) aerial images were photographed: Nov 1, 2019—Nov 4, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (16959 Upland)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
144A	Sunriver sandy loam, 0 to 3 percent slopes	0.5	100.0%
Totals for Area of Interest		**0.5**	**100.0%**

Map Unit Descriptions (16959 Upland)

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

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

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

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

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

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

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

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

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

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

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

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

Upper Deschutes River Area, Oregon, Parts of Deschutes, Jefferson, and Klamath Counties

144A—Sunriver sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 241l
Elevation: 4,000 to 4,300 feet
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 40 to 44 degrees F
Frost-free period: 10 to 50 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Sunriver and similar soils: 85 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sunriver

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash over old alluvium

Typical profile

H1 - 0 to 5 inches: sandy loam
H2 - 5 to 20 inches: loamy coarse sand
H3 - 20 to 29 inches: coarse sand
H4 - 29 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: B
Ecological site: F006XE807OR - Pumice Plateau Wet Basins (Lodgepole Pine - Douglas Spirea)
Other vegetative classification: Pinus contorta/Vaccinium uliginosum/forb (CLM311)
Hydric soil rating: No

Minor Components

Cryaquolls

Percent of map unit: 8 percent
Landform: Mountains
Ecological site: R006XB102OR - Cold Wet Meadow
Hydric soil rating: Yes

References

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

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

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix E.

Water Well Reports

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.545 & 537.765 and OAR 690-205-0210)

DESC 64588
12/5/2023

WELL I.D. LABEL# L 152972
START CARD # 1072206
ORIGINAL LOG #

(1) LAND OWNER
Owner Well I.D.
First Name LEWIS Last Name LANCE & SHANNON
Company
Address 16967 UPLAND
City BEND State OR Zip 97707

(2) TYPE OF WORK
[X] New Well [ ] Deepening [ ] Conversion [ ] Alteration (complete 2a & 10) [ ] Abandonment(complete 5a)

(2a) PRE-ALTERATION

	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
Casing:									

	Material	From	To	Amt	sacks/lbs
Seal:					

(3) DRILL METHOD
[X] Rotary Air [ ] Rotary Mud [ ] Cable [ ] Auger [ ] Cable Mud
[ ] Reverse Rotary [ ] Other

(4) PROPOSED USE
[X] Domestic [ ] Irrigation [ ] Community
[ ] Industrial/ Commericial [ ] Livestock [ ] Dewatering
[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION
Special Standard [ ] (Attach copy)
Depth of Completed Well 144.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/lbs
12	0	50	Bentonite	0	50	42	S
8	50	150			Calculated	28.35	
					Calculated		

Seal placement method [ ] A [ ] B [ ] C [ ] D [ ] E [X] Other: BENTONITE DRY
Backfill placed from ft. to ft. Material
Filter pack from ft. to ft. Material Size
Explosives used: [ ] Type Amount
Seal Placement Begin Date 11/29/2023 Begin Time 15 40

(5a) ABANDONMENT USING UNHYDRATED BENTONITE
Proposed Amount Actual Amount

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
◉	○	8	[X]	2	135	.250	◉	○	[X]	[ ]
○	◉	6	[ ]	117	144	.188	◉	○	[X]	[ ]
○	○		[ ]				○	○	[ ]	[ ]
○	○		[ ]				○	○	[ ]	[ ]
○	○		[ ]				○	○	[ ]	[ ]

Shoe [ ] Inside [ ] Outside [ ] Other Location of shoe(s)
Temp casing [ ] Yes Dia From + [ ] To

(7) PERFORATIONS/SCREENS
Perforations Method
Screens Type STAINLESS STEEL Material STAINLESS STEEL

Perf/ Screen	Casing/ Screen Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen	Liner	6	124	144	.01	18	3360	

(8) WELL TESTS: Minimum testing time is 1 hour
( ) Pump ( ) Bailer (◉) Air ( ) Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
20		145	1

Temperature 42 °F Lab analysis [ ] Yes By
Water quality concerns? [ ] Yes (describe below) TDS amount 52 ppm

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)
County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM
Sec 13 SE 1/4 of the SW 1/4 Tax Lot 9300
Tax Map Number Lot
Lat ° ' " or 43.83399700 DMS or DD
Long ° ' " or -121.47843700 DMS or DD
(◉) Street address of well ( ) Nearest address
16967 UPLAND, BEND, OR 97707

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration			[ ]	
Completed Well	11/30/2023		[ ]	43

Flowing Artesian? [ ] Dry Hole? [ ]

WATER BEARING ZONES Depth water was first found

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
11/30/2023	43	144	20			43

(11) WELL LOG
Ground Elevation

Material	From	To
Brown sand & pumice	0	7
Gray clay w/ fine sand	7	41
Green/ gray clay	41	70
Gray clay w/ fine sand	70	110
Black sand w/ clay seems	110	150
natural backfill 144-150	110	150

Construction
Begin Date 11/29/2023 Begin Time 11 29 End Date 11/30/2023

(unbonded) Water Well Constructor Certification
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
License Number 2025 Date 12/4/2023
Signed SHAUN ALEXANDER (E-filed)

(bonded) Water Well Constructor Certification
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
License Number 1970 Date 12/5/2023
Signed NEIL FAGEN (E-filed)
Contact Info (optional) 541-548-1245

ORIGINAL - WATER RESOURCES DEPARTMENT
THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK Form Version:
New exempt use wells must be submitted with a map and recording fee.

WATER SUPPLY WELL REPORT - continuation page

DESC 64588

12/5/2023

WELL I.D. LABEL# L 152972
START CARD # 1072206
ORIGINAL LOG #

(2a) PRE-ALTERATION

Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd

Material	From	To	Amt	sacks/lbs

(5) BORE HOLE CONSTRUCTION

BORE HOLE Dia	From	To

SEAL Material	From	To	Amt	sacks/lbs
		Calculated		
		Calculated		
		Calculated		
		Calculated		

FILTER PACK

From	To	Material	Size

(6) CASING/LINER

Casing Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd

(7) PERFORATIONS/SCREENS

Perf/ Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size

(8) WELL TESTS: Minimum testing time is 1 hour

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)

Water Quality Concerns

From	To	Description	Amount	Units

(10) STATIC WATER LEVEL

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)

(11) WELL LOG

Material	From	To

Name of person(s) who assisted with construction and Trainee License # / Helper #

Assistant Name	Type	#

Comments/Remarks

Depth drilled was 150 feet, material caved and back filled to completed depth of 144 feet. 7 feet of 6" .188 steel liner plus Stainless steel sand screens and 1 clamshell trap placed at 117 were placed from ~117-144 feet.

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

DESC 64588

12/5/2023

Map of Hole

STATE OF OREGON
WELL LOCATION MAP

This map is supplemental to the WATER SUPPLY WELL REPORT

Oregon Water Resources Department
725 Summer St NE, Salem OR 97301
(503)986-0900

OREGON WATER RESOURCES DEPARTMENT

LOCATION OF WELL

Latitude: 43.83399700 Datum: WGS84

Longitude: -121.47843700

Township/Range/Section/Quarter-Quarter Section:
WM20.00S10.00E13SESW

Address of Well:
16967 UPLAND, BEND, OR 97707

Well Label: 152972

Printed: December 4, 2023

DISCLAIMER: This map is intended to represent the approximate location the well. It is not intended to be construed as survey accurate in any manner.

Provided by well constructor

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

DESC 9715

20s/10E/13ab

(START CARD) # 58298

(1) OWNER: Well Number

Name BUD & SALLY SHELLY

Address 16686 STAGE STOP DR.

City BEND State OR Zip 97707

(2) TYPE OF WORK:

☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD:

☐ Rotary Air ☐ Rotary Mud ☒ Cable

☐ Other

(4) PROPOSED USE:

☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation

☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval ☐ Yes ☒ No Depth of Completed Well 97 ft.

Explosives used ☐ Yes ☒ No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
10"	0	18'	PORTLAND	0	18'	8 SACKS
6"	18'	97'				

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other

Backfill placed from ft. to ft. Material

Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	+1'	97'	.250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:

☒ Perforations Method TORCH CUT

☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
86'	96'	12"	20	6"		☒	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
25GPM	10'		4 hr.

Temperature of Water 50° Depth Artesian Flow Found

Was a water analysis done? ☐ Yes By whom

Did any strata contain water not suitable for intended use? ☒ Too little

☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other

Depth of strata: 8' - 92'

(9) LOCATION OF WELL by legal description:

County DESCHUTES Latitude Longitude

Township 20S N or S. Range 10E E or W. WM.

Section 013C NW ¼ NE ¼

Tax Lot 08100 Lot Block Subdivision

Street Address of Well (or nearest address) 16956 UPLAND BEND, OR. 97707

(10) STATIC WATER LEVEL:

18 ft. below land surface. Date 10/19/94

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 8'

From	To	Estimated Flow Rate	SWL
8'	65'	3 GPM	8'
65'	92'	5 GPM	8'
92'	97'	25 GPM	18'

(12) WELL LOG:

Ground elevation

Material	From	To	SWL
PUMICE	0	7'	-
GRAVEL	7'	13'	8'
CLAY	13'	65'	8'
SAND & CLAY	65'	92'	8
SAND & GRAVEL	92'	97'	18

RECEIVED

JAN 30 1995

WATER RESOURCES DEPT.

SALEM, OREGON

Date started 10/15/94 Completed 10/19/94

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number

Signed Date

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 1584

Signed Dale L. Wynne Date 10/24/94

ORIGINAL & FIRST COPY - WATER RESOURCES DEPARTMENT SECOND COPY - CONSTRUCTOR THIRD COPY - CUSTOMER 9809C 10/91

DESC 9715

WELL IDENTIFICATION FORM

Owner's Well Number: _____

CURRENT WELL OWNER: Phone 541/593-9188

Name: Dale C & Barbara J Largent

Mailing Address: 16956 Upland Rd.

City: Bend State: OR Zip: 97707

WELL LOCATION: Desc 9715

County: Deschutes Latitude: _____ Longitude: _____

Township: _____ N or (S) Range: _____ (E) or W Section: _____ SE 1/4 SW 1/4

Tax Lot Number: 201013 CO 08200 Unit 9 Part 2 Lot: 12, 13 BLK 52 DRR H

Street Address of Well (if different from above): _____

_____

If a well report is available for this well, please attach a copy of it to this form and return. It is not necessary for you to complete the remainder of the form if the well report is attached. If a well report is not available, please complete the remainder of the form to the best of your ability.

WELL INFORMATION:

Start Card Number: _____ Approx. Construction Date: _____

RECEIVED
AUG 14 2000
WATER RESOURCES DEPT.
SALEM, OREGON

Well Constructor: _____

Name of Owner at Time of Construction: _____

Well Depth (in feet): _____ Static Water Level (in feet): _____

Diameter of Exposed Well Casing (in inches): _____

Does this well have a formal water right associated with it? Yes: _____ No: _____ If yes:

Application #: _____ Permit #: _____ Certificate #: _____

Please Return Completed Form to: **Oregon Water Resources Department**
158 12th Street NE
Salem, OR 97301-4172

(Office use only)

Well Identification Number: 44662

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.545 & 537.765 and OAR 690-205-0210)

DESC 63344
5/3/2022

WELL I.D. LABEL# L 144538
START CARD # 1056449
ORIGINAL LOG #

(1) LAND OWNER
Owner Well I.D.
First Name Last Name
Company 10 PEAKS LLC
Address PO BOX 1535
City WHITE SALMON State WA Zip 98672

(2) TYPE OF WORK
[X] New Well [ ] Deepening [ ] Conversion [ ] Alteration (complete 2a & 10) [ ] Abandonment(complete 5a)

(2a) PRE-ALTERATION
	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
Casing:									

	Material	From	To	Amt	sacks/lbs
Seal:					

(3) DRILL METHOD
[ ] Rotary Air [ ] Rotary Mud [X] Cable [X] Auger [ ] Cable Mud
[ ] Reverse Rotary [ ] Other

(4) PROPOSED USE
[X] Domestic [ ] Irrigation [ ] Community
[ ] Industrial/ Commericial [ ] Livestock [ ] Dewatering
[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION
Special Standard [ ] (Attach copy)
Depth of Completed Well 100.00 ft.

BORE HOLE

Dia	From	To
10	0	20
6	20	100

SEAL

Material	From	To	Amt	sacks/lbs
Bentonite Chips	0	20	15	S
		Calculated	15	
		Calculated		

How was seal placed: Method [ ] A [ ] B [ ] C [ ] D [ ] E
[X] Other POURED
Backfill placed from ft. to ft. Material
Filter pack from ft. to ft. Material Size
Explosives used: [ ] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE
Proposed Amount Actual Amount

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
◉	○	6	[X]	1	95	.250	◉	○	[X]	[ ]
○	◉	4	[ ]	10	90	.010	○	◉	[X]	[ ]
○	○		[ ]				○	○	[ ]	[ ]
○	○		[ ]				○	○	[ ]	[ ]
○	○		[ ]				○	○	[ ]	[ ]

Shoe [ ] Inside [ ] Outside [ ] Other Location of shoe(s)
Temp casing [ ] Yes Dia From + To

(7) PERFORATIONS/SCREENS
Perforations Method
Screens Type slotted Material pvc

Perf/ Screen	Casing/ Screen Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen	Liner	4	90	100	.01		3500	

(8) WELL TESTS: Minimum testing time is 1 hour
(◉) Pump ( ) Bailer ( ) Air ( ) Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
15	24	45	1

Temperature 47 °F Lab analysis [ ] Yes By
Water quality concerns? [ ] Yes (describe below) TDS amount 54 ppm

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)
County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM
Sec 13 SE 1/4 of the SW 1/4 Tax Lot 7900
Tax Map Number Lot
Lat ° ' " or 43.83506798 DMS or DD
Long ° ' " or -121.47983774 DMS or DD
(◉) Street address of well ( ) Nearest address
16932 UPLAND THREE RIVERS

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration				
Completed Well	5/2/2022			21

Flowing Artesian? [ ] Dry Hole? [ ]

WATER BEARING ZONES Depth water was first found 94.00

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
5/2/2022	94	100	15			21

(11) WELL LOG
Ground Elevation

Material	From	To
pumice and brown clay	0	5
black sand and gravel	5	7
gray clay	7	48
green diatamite	48	67
pink ash with gravel	67	68
yellow diatamite	68	94
coarse black sand	94	100

Date Started 4/29/2022 Completed 5/2/2022

(unbonded) Water Well Constructor Certification
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
License Number 2078 Date 5/3/2022
Signed RICK KING (E-filed)

(bonded) Water Well Constructor Certification
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
License Number 1528 Date 5/3/2022
Signed STEVE MATHERS (E-filed)
Contact Info (optional) 5413890743

ORIGINAL - WATER RESOURCES DEPARTMENT
THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK Form Version:
New exempt use wells must be submitted with a map and recording fee.

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

DESC 63344

5/3/2022

Map of Hole

STATE OF OREGON
WELL LOCATION MAP

This map is supplemental to the WATER SUPPLY WELL REPORT

Oregon Water Resources Department
725 Summer St NE, Salem OR 97301
(503)986-0900

OREGON WATER RESOURCES DEPARTMENT

LOCATION OF WELL

Latitude: 43.83506798 Datum: WGS84
Longitude: -121.47983774
Township/Range/Section/Quarter-Quarter Section:
WM20.00S10.00E13SESW
Address of Well:
16932 UPLAND THREE RIVERS

Well Label: 144538

Printed: May 3, 2022

DISCLAIMER: This map is intended to represent the approximate location the well. It is not intended to be construed as survey accurate in any manner.

Provided by well constructor

DESC 6011

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the STATE ENGINEER, SALEM, OREGON within 30 days from the date of well completion.

RECEIVED JUN 6 1969 STATE ENGINEER SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON
(Please type or print. Do not write above this line.)

RECEIVED FEB 24 1970 STATE ENGINEER SALEM, OREGON

State Well No. 20/10-13

State Permit No.

(1) OWNER:
Name Frank Aimonetti
Address 1137 Mc Glincess Ave San Jose Calif.

(2) TYPE OF WORK (check):
New Well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary [ ] Driven [ ]
Cable [X] Jetted [ ]
Dug [ ] Bored [ ]

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

(5) CASING INSTALLED:
Threaded [ ] Welded [X]
6" Diam. from 0 ft. to 80 ft. Gage .25
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

PERFORATIONS:
Perforated? [ ] Yes [X] No.
Type of perforator used
Size of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS:
Well screen installed? [ ] Yes [X] No
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(8) WATER LEVEL: Completed well.
Static level 20' ft. below land surface Date 7/24/69
Artesian pressure lbs. per square inch Date

(9) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? [ ] Yes [X] No If yes, by whom?
gal./min. with ft. drawdown after hrs.
" " "
" " "
Bailer test 10 gal./min. with 5 ft. drawdown after 1 hrs.
Artesian flow g.p.m. Date
Temperature of water 54 Was a chemical analysis made? [ ] Yes [X] No

(10) CONSTRUCTION:
Well seal—Material used Bentonite
Depth of seal 20 ft.
Diameter of well bore to bottom of seal 8 in.
Were any loose strata cemented off? [ ] Yes [X] No Depth
Was a drive shoe used? [ ] Yes [X] No
Did any strata contain unusable water? [ ] Yes [X] No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? [ ] Yes [X] No Size of gravel:
Gravel placed from ft. to ft.

(11) LOCATION OF WELL:
County Deschutes Driller's well number 57
¼ S.W. ¼ Section 13 T. 20S R. 10E W.M.
Bearing and distance from section or subdivision corner
Lot 65 Area 53 Deschutes Recreation Home Sites.

(12) WELL LOG:
Diameter of well below casing 6"
Depth drilled 95' ft. Depth of completed well 95' ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level as drilling proceeds. Note drilling rates.

MATERIAL	From	To	SWL
Pumice	0	6	
Blue Mud	6	30	
Black Sand	30	76	
Green Clay (With fine Gravel)	76	96	

Work started May 26 1969 Completed May 30 1969
Date well drilling machine moved off of well May 30 1969

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] Lloyd L. Mathers (Drilling Machine Operator) Date June 4, 1969
Drilling Machine Operator's License No. 134

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME Mathers Drilling Co. (Person, firm or corporation) (Type or print)
Address 905 S 4th Bend, Oregon
[Signed] Lloyd L. Mathers (Water Well Contractor)
Contractor's License No. 237 Date June 4, 1969

(USE ADDITIONAL SHEETS IF NECESSARY)

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.545 & 537.765 and OAR 690-205-0210)

DESC 64816
6/13/2024

WELL I.D. LABEL# L 154543
START CARD # 1073948
ORIGINAL LOG #

(1) LAND OWNER
Owner Well I.D.
First Name ERIC Last Name NIELSON
Company
Address 61481 LINTON LOOP
City BEND State OR Zip 97702

(2) TYPE OF WORK
[X] New Well [ ] Deepening [ ] Conversion [ ] Alteration (complete 2a & 10) [ ] Abandonment(complete 5a)

(2a) PRE-ALTERATION
	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
Casing:									

	Material	From	To	Amt	sacks/lbs
Seal:					

(3) DRILL METHOD
[ ] Rotary Air [ ] Rotary Mud [ ] Cable [X] Auger [ ] Cable Mud
[ ] Reverse Rotary [ ] Other

(4) PROPOSED USE
[X] Domestic [ ] Irrigation [ ] Community
[ ] Industrial/ Commericial [ ] Livestock [ ] Dewatering
[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION
Special Standard [ ] (Attach copy)
Depth of Completed Well 96.00 ft.

BORE HOLE

Dia	From	To
10	0	96

SEAL

Material	From	To	Amt	sacks/lbs
Bentonite Chips	0	54	45	S
		Calculated	10	
		Calculated		

Seal placement method [ ] A [ ] B [ ] C [ ] D [ ] E [X] Other: POURED
Backfill placed from 18 ft. to 91 ft. Material SAND
Filter pack from 91 ft. to 96 ft. Material FILTER SAN Size 10/20
Explosives used: [ ] Type Amount
Seal Placement Begin Date 6/6/2024 Begin Time 13 00

(5a) ABANDONMENT USING UNHYDRATED BENTONITE
Proposed Amount Actual Amount

(6) CASING/LINER

C/L	Dia	+	From	To	Gauge	Mat. Type	Wld	Thrd	Shoe	Shoe Location
C	6	X	1	5	.160	PL	X			
C	4		5	91	.160	PL	X			

Temp casing [ ] Yes Dia From + [ ] To

(7) PERFORATIONS/SCREENS
Perforations Method
Screens Type slotted Material pvc

Perf/ Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ Pipe size
Screen	Casing	4	91	96	.1		1750	

(8) WELL TESTS: Minimum testing time is 1 hour

Type of Test	Yield (gal/min)	Drawdown	Drill Stem/ Pump Depth	Duration (hr)
Pump	20	50	23	1

Temperature 50 °F Lab analysis [ ] Yes By
Water quality concerns? [ ] Yes (describe below) TDS amount 56 ppm

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)
County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM
Sec 13 SE 1/4 of the SW 1/4 Tax Lot 7300
Tax Map Number Lot
Lat ° ' " or 43.83531534 DMS or DD
Long ° ' " or -121.47883094 DMS or DD
(•) Street address of well ( ) Nearest address
16955 TORRANCE THREE RIVERS

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration				
Completed Well	6/6/2024			23

Flowing Artesian? [ ] Dry Hole? [ ]

WATER BEARING ZONES Depth water was first found 23.00

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
6/6/2024	23	96	20			23

(11) WELL LOG
Ground Elevation 4186.04 FT

Material	From	To
topsoil	0	1
pumie	1	4
gravel	4	8
fine dark brown sand	8	12
clay	12	19
diatomite	19	61
fine black silt	61	92
medium black sand	92	96

Construction Begin Date 6/5/2024 Begin Time 00 00 End Date 6/6/2024

(unbonded) Water Well Constructor Certification
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
License Number 2020 Date 6/13/2024
Signed TYLER MATHERS (E-filed)

(bonded) Water Well Constructor Certification
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
License Number 1528 Date 6/13/2024
Signed STEVE MATHERS (E-filed)
Drilling Company: mathers drilling

ORIGINAL - WATER RESOURCES DEPARTMENT
THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK Form Version:
New exempt use wells must be submitted with a map and recording fee.

WATER SUPPLY WELL REPORT - continuation page

DESC 64816

6/13/2024

WELL I.D. LABEL# L	154543
START CARD #	1073948
ORIGINAL LOG #	

(2a) PRE-ALTERATION

Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd

Material	From	To	Amt	sacks/lbs

Water Quality Concerns

From	To	Description	Amount	Units

(5) BORE HOLE CONSTRUCTION

BORE HOLE Dia	From	To

SEAL Material	From	To	Amt	sacks/lbs
		Calculated		
		Calculated		
		Calculated		
		Calculated		

FILTER PACK

From	To	Material	Size

(10) STATIC WATER LEVEL

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)

(11) WELL LOG

Material	From	To

(6) CASING/LINER

C/L	Dia	+	From	To	Gauge	Mat. Type	Wld	Thrd	Shoe	Shoe Location

(7) PERFORATIONS/SCREENS

Perf/ Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ Pipe size

Name of person(s) who assisted with construction and Trainee License # / Helper #

Assistant Name	Type	#
JESSE MACK	HELPER WATER	8888872

(8) WELL TESTS: Minimum testing time is 1 hour

Type of Test	Yield (gal/min)	Drawdown	Drill Stem/ Pump Depth	Duration (hr)

Comments/Remarks

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

DESC 64816

6/13/2024

Map of Hole

STATE OF OREGON
WELL LOCATION MAP

This map is supplemental to the WATER SUPPLY WELL REPORT

Oregon Water Resources Department
725 Summer St NE, Salem OR 97301
(503)986-0900

OREGON WATER RESOURCES DEPARTMENT

LOCATION OF WELL
Latitude: 43.83531534 Datum: WGS84
Longitude: -121.47883094
Township/Range/Section/Quarter-Quarter Section:
WM20.00S10.00E13SESW
Address of Well:
16955 TORRANCE THREE RIVERS

Well Label: 154543

Printed: June 13, 2024

DISCLAIMER: This map is intended to represent the approximate location the well. It is not intended to be construed as survey accurate in any manner.

Provided by well constructor

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.545 & 537.765 and OAR 690-205-0210)

DESC 63407
6/4/2022

WELL I.D. LABEL# L 146706
START CARD # 1056690
ORIGINAL LOG #

(1) LAND OWNER
Owner Well I.D.
First Name KEITH Last Name PETERSEN
Company
Address 16995 MILKY WAY
City THREE RIVERS State OR Zip 97707

(2) TYPE OF WORK
[X] New Well [ ] Deepening [ ] Conversion [ ] Alteration (complete 2a & 10) [ ] Abandonment(complete 5a)

(2a) PRE-ALTERATION

	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
Casing:									

	Material	From	To	Amt	sacks/lbs
Seal:					

(3) DRILL METHOD
[ ] Rotary Air [ ] Rotary Mud [X] Cable [X] Auger [ ] Cable Mud
[ ] Reverse Rotary [ ] Other

(4) PROPOSED USE
[X] Domestic [ ] Irrigation [ ] Community
[ ] Industrial/ Commericial [ ] Livestock [ ] Dewatering
[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION
Special Standard [ ] (Attach copy)
Depth of Completed Well 106.00 ft.

BORE HOLE

Dia	From	To
10	0	20
6	20	106	

SEAL

Material	From	To	Amt	sacks/lbs
Bentonite Chips	0	20	15	S
		Calculated	15	
		Calculated		

How was seal placed: Method [ ] A [ ] B [ ] C [ ] D [ ] E
[X] Other POURED
Backfill placed from ft. to ft. Material
Filter pack from ft. to ft. Material Size
Explosives used: [ ] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE
Proposed Amount Actual Amount

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
◉		6	X	1.5	98.5	.250	◉		X	

Shoe [ ] Inside [ ] Outside [ ] Other Location of shoe(s)
Temp casing [ ] Yes Dia From + To

(7) PERFORATIONS/SCREENS
Perforations Method
Screens Type slotted Material pvc

Perf/ Screen	Casing/ Screen Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen	Liner	4	86	106	.02		3500	

(8) WELL TESTS: Minimum testing time is 1 hour
◉ Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
8	64	85	1.5

Temperature 51 °F Lab analysis [ ] Yes By
Water quality concerns? [ ] Yes (describe below) TDS amount 46 ppm

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)
County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM
Sec 13 SE 1/4 of the SW 1/4 Tax Lot 7400
Tax Map Number Lot
Lat ° ' " or 43.83570092 DMS or DD
Long ° ' " or -121.47933938 DMS or DD
◉ Street address of well ○ Nearest address
16947 TORRENCE

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration				
Completed Well	5/31/2022			21

Flowing Artesian? [ ] Dry Hole? [ ]

WATER BEARING ZONES Depth water was first found 88.00

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
5/31/2022	88	106	8			21

(11) WELL LOG
Ground Elevation

Material	From	To
soil and pumice	0	3
black sand	3	9
pink ash	9	13
gray clay	13	40
yellow diatamite	40	88
coarse black sand	88	103
pumice and black sand	103	106

Date Started 5/19/2022 Completed 5/31/2022

(unbonded) Water Well Constructor Certification
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
License Number 2078 Date 6/3/2022
Signed RICK KING (E-filed)

(bonded) Water Well Constructor Certification
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
License Number 1528 Date 6/3/2022
Signed STEVE MATHERS (E-filed)
Contact Info (optional) 5413890743

ORIGINAL - WATER RESOURCES DEPARTMENT
THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK Form Version:
New exempt use wells must be submitted with a map and recording fee.

WATER SUPPLY WELL REPORT - continuation page

DESC 63407

6/4/2022

WELL I.D. LABEL# L 146706
START CARD # 1056690
ORIGINAL LOG #

(2a) PRE-ALTERATION

Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd

Material	From	To	Amt	sacks/lbs

Water Quality Concerns

From	To	Description	Amount	Units

(5) BORE HOLE CONSTRUCTION

BORE HOLE Dia	From	To

SEAL Material	From	To	Amt	sacks/lbs
		Calculated		
		Calculated		
		Calculated		
		Calculated		

FILTER PACK

From	To	Material	Size

(10) STATIC WATER LEVEL

SWL Date	From	To	Est Flow	SWL(psi)	+ SWL(ft)

(11) WELL LOG

Material	From	To

(6) CASING/LINER

Casing Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd

(7) PERFORATIONS/SCREENS

Perf/ Screen	Casing/ Screen Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size

(8) WELL TESTS: Minimum testing time is 1 hour

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)

Comments/Remarks

helper james king

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

DESC 63407

6/4/2022

Map of Hole

STATE OF OREGON
WELL LOCATION MAP

This map is supplemental to the WATER SUPPLY WELL REPORT

Oregon Water Resources Department
725 Summer St NE, Salem OR 97301
(503)986-0900

OREGON WATER RESOURCES DEPARTMENT

LOCATION OF WELL
Latitude: 43.83570092 Datum: WGS84
Longitude: -121.47933938
Township/Range/Section/Quarter-Quarter Section:
WM20.00S10.00E13SESW
Address of Well:
16947 TORRENCE

Well Label: 146706

Printed: June 3, 2022

DISCLAIMER: This map is intended to represent the approximate location of the well. It is not intended to be construed as survey accurate in any manner.

Provided by well constructor

DESC 58013

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

WELL I.D. # L 85157

START CARD # 188697

Instructions for completing this report are on the last page of this form.

(1) LAND OWNER Well Number
Name LAURA + PAT M^c MULDREN
Address 16939 TORRANCE RD.
City BEND State ORE Zip 97707

(2) TYPE OF WORK ☒ New Well
☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment ☐ Conversion

(3) DRILL METHOD
☐ Rotary Air ☐ Rotary Mud ☒ Cable ☒ Auger ☐ Cable Mud
☐ Other

(4) PROPOSED USE
☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☐ Other

(5) BORE HOLE CONSTRUCTION Special Construction: ☐ Yes ☐ No
Depth of Completed Well 98 ft.
Explosives used: ☐ Yes ☒ No Type Amount

BORE HOLE Diameter	From	To	SEAL Material	From	To	Sacks or Pounds
10"	0	19	BENTONITE	0	19	9
6"	19	98				

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☐ Other POURED
Backfill placed from — ft. to — ft. Material —
Gravel placed from — ft. to — ft. Size of gravel —

(6) CASING/LINER

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	+16	91.5	.250	☒	☐	☒	☐
Liner:	4½"	-16½	98	SDR26	☐	☒	☒	☐

Drive Shoe used ☐ Inside ☐ Outside ☒ None
Final location of shoe(s) NONE

(7) PERFORATIONS/SCREENS
☒ Perforations Method SLOTTED
☐ Screens Type Material

From	To	Slot Size	Number	Diameter	Tele/pipe size	Casing	Liner
92	96	.010	2800	4½"	SDR26	☐	☒

(8) WELL TESTS: Minimum testing time is 1 hour
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
30GPM	44 ft		1½ HRS

Temperature of water 48 °F Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom NONE
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata: 82 ft

(9) LOCATION OF WELL (legal description)
County DESCHUTES
Tax Lot 07501 Lot
Township 20 N or S Range 10 E or W WM
Section 13 SE 1/4 SW 1/4
Lat ° ' " or (degrees or decimal)
Long ° ' " or (degrees or decimal)
Street Address of Well (or nearest address) SAME AS OWNERS

(10) STATIC WATER LEVEL
16 ft. below land surface. Date 5-16-07
ft. below land surface. Date
Artesian pressure lb. per square inch Date

(11) WATER BEARING ZONES
Depth at which water was first found 89½ ft

From	To	Estimated Flow Rate	SWL
89½	98	30GPM	16

(12) WELL LOG Ground Elevation

Material	From	To	SWL
Dummy	0	5	
CLAY	5	89½	
Sand	89½	98	16

RECEIVED
MAY 21 2007
WATER RESOURCES DEPT
SALEM, OREGON

Date Started 5-14-07 Completed 5-16-07

(unbonded) Water Well Constructor Certification
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

WWC Number Date

Signed

(bonded) Water Well Constructor Certification
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 639 Date 5-16-07

Signed Gerald M. Moore

ORIGINAL – WATER RESOURCES DEPARTMENT FIRST COPY – CONSTRUCTOR SECOND COPY – CUSTOMER 06/16/2004

STATE OF OREGON
WATER WELL REPORT
(as required by ORS 537.765)

DESC 1560

RECEIVED
NOV 19 1992
WATER RESOURCES DEPT.
SALEM, OREGON

20S/10E/13ca

(START CARD) # W-45869

(1) OWNER: Well Number
Name KAREN MANNING
Address 17134 OXNARD.
City SUNRIVER State OR. Zip 97707

(2) TYPE OF WORK:
☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD:
☐ Rotary Air ☐ Rotary Mud ☒ Cable
☐ Other

(4) PROPOSED USE:
☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☐ No Depth of Completed Well 102 ft.
Explosives used ☐ Yes ☐ No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
10	0	18	CEMENT	0	18	5 SACKS
6	18	102				

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E
☐ Other
Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	+1	102	250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
☒ Perforations Method TORCH CUT
☐ Screens Type SAW Material STEEL

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
91	101	1/16	28	6"		☒	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
15	6		1 hr.
			5 HR.

Temperature of Water 53 Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County DESCHUTES Latitude Longitude
Township 20S N or S. Range 10E E or W. WM.
Section 13C NE ¼ S.W ¼
Tax Lot 5000 Lot Block Subdivision
Street Address of Well (or nearest address) 16979 TAMARACK RD. SUNRIVER OR. 97739

(10) STATIC WATER LEVEL:
18 ft. below land surface. Date 11-11-92
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found 85

From	To	Estimated Flow Rate	SWL
85	102	20	18

(12) WELL LOG:
Ground elevation

Material	From	To	SWL
PUMICE	0	3	
PUMICE CLAY	3	14	
BOULD	14	15	
CLAY	15	85	
BROWN SAND	85	95	
GRAVEL/BROWN SAND	95	102	18

Date started 11-6-92 Completed 11-11-92

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number
Signed Date

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 1525
Signed Date 11-11-92

ORIGINAL & FIRST COPY - WATER RESOURCES DEPARTMENT SECOND COPY - CONSTRUCTOR THIRD COPY - CUSTOMER 9809C 10/91

Appendix F.

RidNOx™ and Lysimeter Installation, and Sampling Instructions

AdvanTex® AX20N Mode 3B w/Concrete Tank

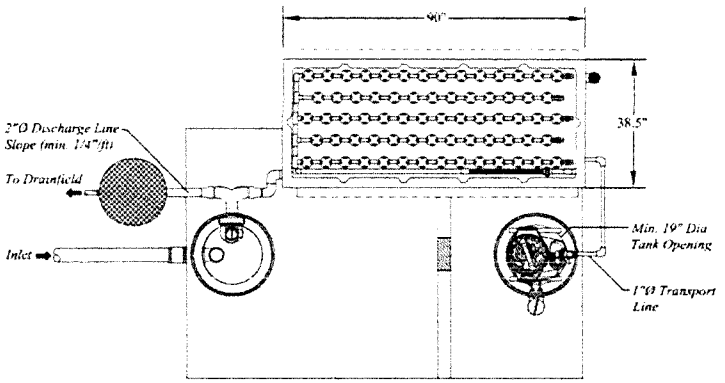
Approved by DEQ
9/14/2007

Design Notes

Expected Flows
- Q_{max} = 500 gpd
  Up To 4 Bedrooms

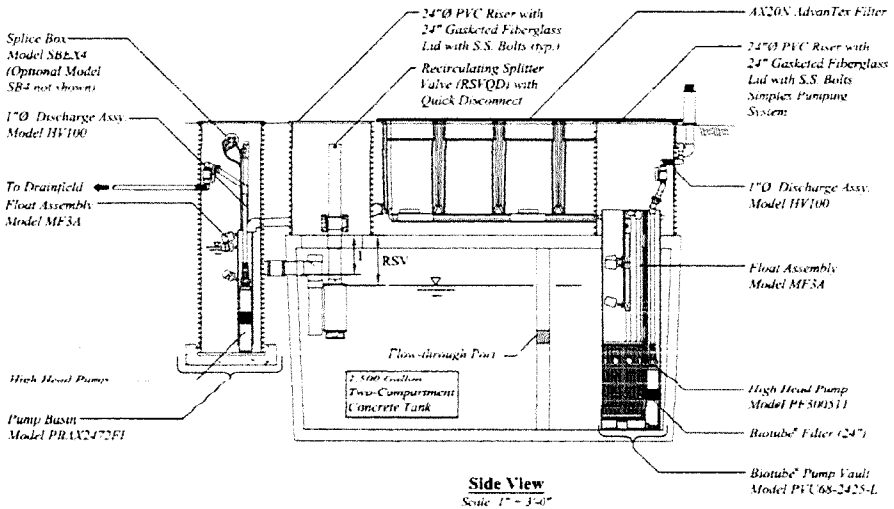
Expected Influent Quality
Grease & Oil: 20 mg/L
BOD: 150 mg/L
TSS: 40 mg/L
TKN: 65 mg/L

Typical Effluent Quality
BOD: < 10 mg/L
TSS: < 10 mg/L
TN: < 25 mg/L

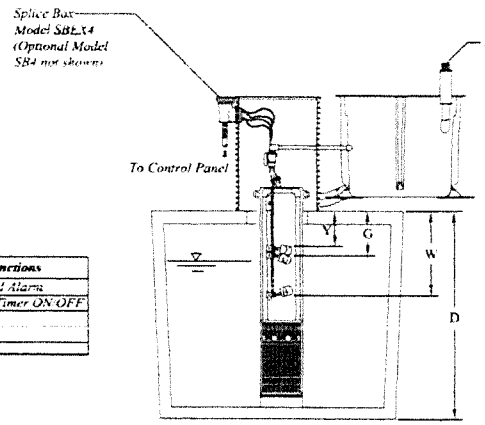


Top View
Scale: 1" = 3'-0"

Tank Manufacturer	Tank Size	I	D	Y (High Level)	G (Timer Override On/Off)	W (Low Level)	RSV
Oregon FRP	1500 Gal.	11"	64.5"	11"	13"	25"	15"
Willamette Graystone	1500 Gal.	11"	64.5"	11"	13"	25"	15"
Riverside Ready Mix	1500 Gal.	11"	60.5"	11"	13"	25"	15"
Waste Concrete Prod.	1500 Gal.	10"	64"	10"	12"	24"	14"
Advanpact PreCast	1500 Gal.	10"	58"	10"	12"	24"	14"
Hank's Concrete Prod.	1500 Gal.	10"	58"	10"	12"	24"	14"



Side View
Scale: 1" = 3'-0"



Float Functions	
Y	High Level Alarm
G	Override Timer ON/OFF
W	LLA/RO
B	Pump On
E	Pump Off

End View
Scale: 1" = 3'-0"

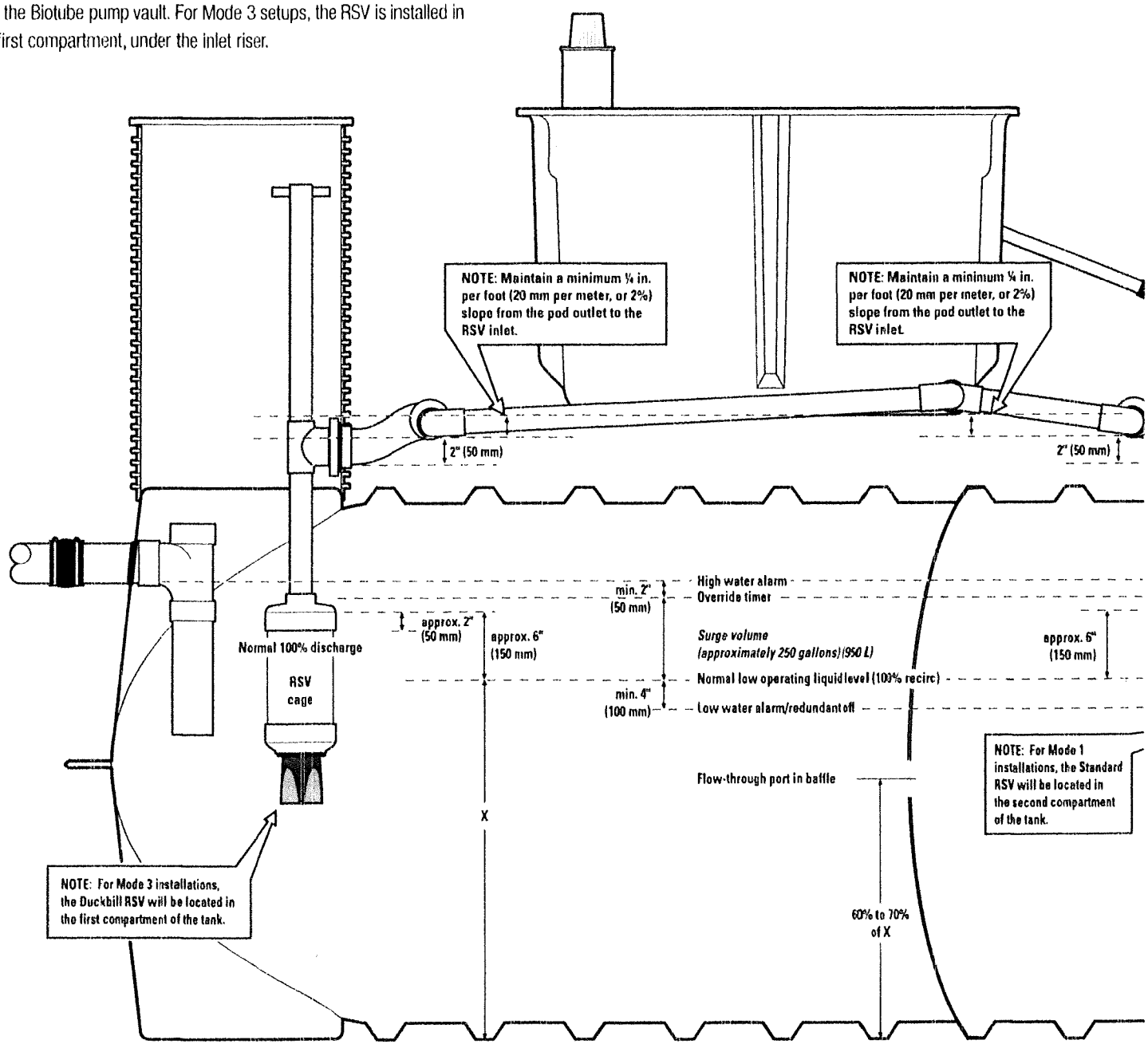
Orenco Systems® Incorporated

Title: AdvanTex® - AX20N Mode 3B
Drawing No: NDW-ATX-OR-B
Scale: 1" = 3'-0"
Date: 8/21/07
Drawn By: CHRIS JORDAN
Drawing: 1 OF 1
Revision: A-04
Designed By: ENGINEERING
Approved By: DARREN SIMHIE
Date Approved: 8/22/07

Appendix 2: Float and RSV Settings

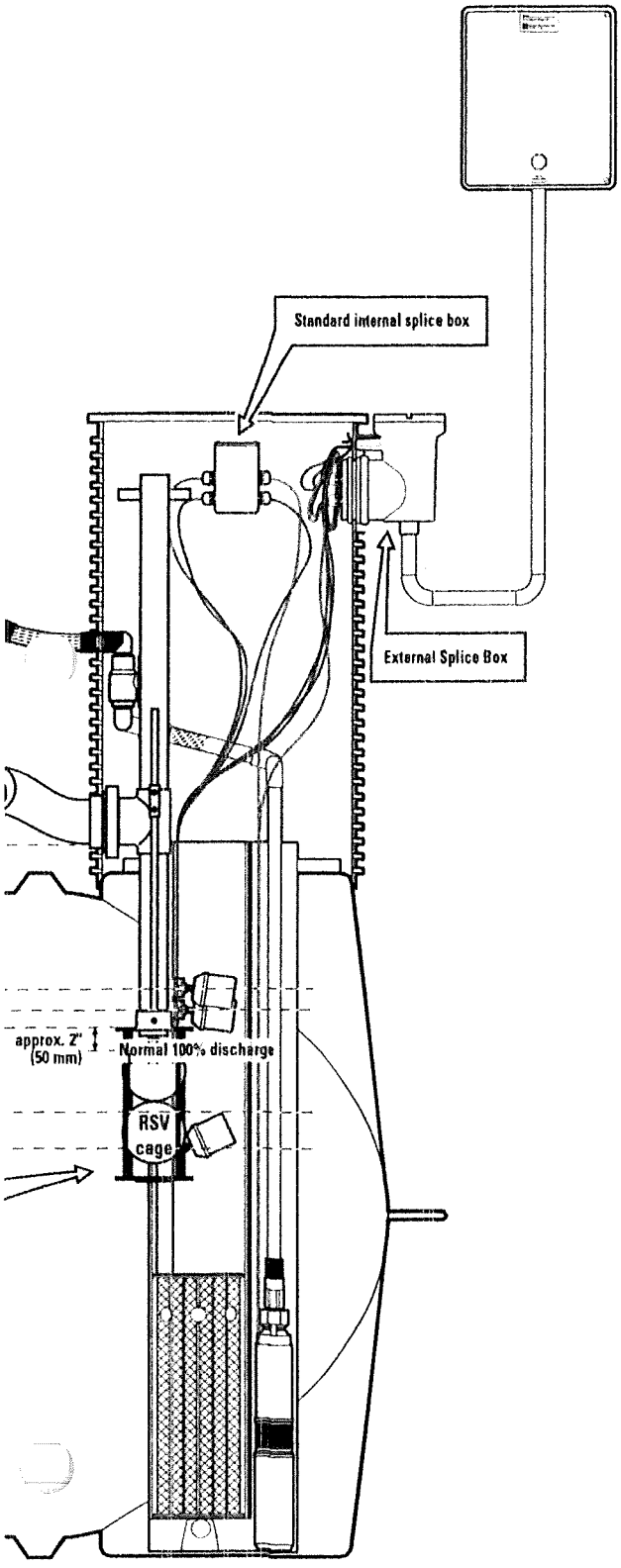
Orenco will provide the float and RSV settings for tanks that are approved for use with AdvanTex Treatment Systems in your area. Service Providers are simply required to verify that the float and RSV settings are correct.

This diagram shows how these settings are established for AdvanTex Treatment Systems that use a VeriComm® Control Panel. The diagram shows both a Mode 1 and a Mode 3 setup. For Mode 1 setups, the recirculating splitter valve (RSV) is installed in the second compartment, with the Biotube pump vault. For Mode 3 setups, the RSV is installed in the first compartment, under the inlet riser.



 •

Appendix 2: Float and RSV Settings (continued)



Typical RSV Levels

For stinger pipe lengths up to 24 inches (600 mm) long, the "normal low operating liquid level" will be approximately 5-6 inches (125-150 mm) below the top of the RSV cage. (The normal low operating liquid level is the level at which 100% of the filtrate returns to the tank.) For most residential applications, the recommended surge volume — the volume between the low liquid level and the high water alarm float — is approximately 250 gallons (950 L). For Mode 3 installations, the duckbill model RSV, which has a flexible PVC tube that vents the RSV cage to atmosphere, is required.

Typical Float Levels

Be sure to check the plans for any site-specific or tank-specific float settings. The top float is normally set equal with the tank's invert of inlet. The bottom float should be approximately 4 inches (100 mm) below the normal low operating level.

NOTE: *Before leaving the site, verify that the "low water alarm/redundant off" float is positioned at least 10 inches (250 mm) below the top of the RSV cage.*

ELKHORN CONSULTING LLC

14833 Goodrich Creek Lane
Baker City, OR 97814 • 503-881-1604
elkhornconsultingllc@gmail.com

RidNOx Installation Instructions

RidNOx Installation

1. Excavate to a depth that will result in the top of the RidNOx tank being at the same elevation as the existing ground surface.
2. Prepare a level, stable base.
3. Set the body of the tank in the hole.
4. Prepare and install inlet and outlet fittings as shown on the approved plans.
5. Place a 2-inch layer of ½ to ¾-inch round rock on the floor of the tank.
6. Cover the slotted outlet pipe with the same rock to a minimum depth of 2 inches.
7. Install the clean wood media (playground chips meeting ASTM F2075) in 6 inch lifts, walking in each lift to compress the media, to the bottom of the outlet fitting.
8. Set the lid on the tank. **Do not use mastic.**
9. Backfill the tank to 6 inches below the seam between the body and the lid.
10. Place underdrain media to the top of the tank.
11. Backfill over the tank with native soil after the risers are attached.

Media Replacement

- Pothole near tank to make sure the water table is at least 30" below the top of the tank to prevent buoyancy during replacement operations.
- Carefully remove the soil cover from over and around the tank to a level below the seam.
- Carefully remove the lid from the tank.
- Use a sump pump to transfer free water from the media to the pump basin.
- Scoop the media from the tank being careful not to damage the inlet and outlet piping or the underdrain media.
- After the excess moisture drains from the spent media, it can be loaded into a dump truck and hauled to a sanitary landfill.
- Install fresh media and re-install the lid as described in steps 7 through 11 above.

ELKHORN CONSULTING LLC

14833 Goodrich Creek Lane
Baker City, OR 97814 • 503-881-1604
elkhornconsultingllc@gmail.com

Lysimeter Installation Instructions

Lysimeter Installation in a Bottomless Sand Filter

- Remove duff and surface soil layer (typically 6 inches) to provide an infiltrative surface free of roots.
- When installing sampling devices (trough lysimeters), carefully mark the location of the orifice positions on each side of the sand filter container.
- Also mark the target elevations for each layer on the walls.
- Install the lower layer of medium sand and the underdrain media.
- Remove enough underdrain media from a 4-inch wide strip (trough) across the bottom aligned with a row of orifices (typically the 4th row from either end).
- With an auger or a tile spade, dig a hole at one end of the trough large enough and deep enough to set the vertical part of the lysimeter against the wall.
- Fine-grade the placement of the body of the lysimeter with the horizontal fitting of the sanitary tee aligned with the trough.
- Bed the half pipe with a slight slope (no more than 1 inch in 10 feet) toward the body of the lysimeter.
- Glue one end of the half pipe into the coupler extending from the sanitary tee with a cap glued at the opposite end.
- Place about one-half inch of underdrain media (pea gravel) in the bottom of the trough with enough ramped up inside the sanitary tee to cover the drilled holes in the debris cap.
- Backfill around the lysimeter with pea gravel to provide drainage from the self-emptying port.
- Secure the body of the lysimeter to the wall with a metal strap or other device to stabilize it during the placement of the various layers of media.
- The rest of the sand filter will be constructed in a customary fashion.

ELKHORN CONSULTING LLC

14833 Goodrich Creek Lane
Baker City, OR 97814 • 503-881-1604
elkhornconsultingllc@gmail.com

RidNOx and Bottomless Sand Filter Sampling Instructions

General

- Contact the laboratory to coordinate scheduling and acquire sample containers,
- Target parameters are total Kjeldahl nitrogen (TKN) and nitrate-nitrogen (NO_3-N).
- Make sure you have the proper sampling equipment, chain-of-custody forms, and a cooler with ice.
- Label all sample bottles in advance.

RidNOx Sampling Procedures

- Remove the lid from the pump basin.
- Use a bailer, peristaltic pump, or other appropriate sampler, to carefully collect a sample from the pump basin without disturbing and attached growth on the surfaces of pipes, floats, etc.
- Transfer sample into sample bottles.
- Repeat as necessary until all bottles are filled.
- Secure the caps on each bottle and place them immediately in a cooler with ice.
- Deliver samples to the laboratory (nitrate-nitrogen samples need to be analyzed within **48 hours** of sample collection).

Lysimeter Sampling Procedures (if/when desired)

- Loosen the square nut plug on the lysimeter.
- Shine a flashlight down the pipe to confirm the presence of filtrate.
- Use a bailer (disposable or cleaned) on a string to collect sample from the body of the lysimeter.
- Transfer sample into sample bottles.
- Repeat as necessary until all bottles are filled.
- Secure the caps on each bottle and place them immediately in a cooler with ice.
- Replace the square nut plug.
- If funding allows, collect sample of the AdvanTex-treated effluent as it flows into the RidNOx unit at the inlet of the tank.
- Deliver samples to the laboratory (nitrate-nitrogen samples need to be analyzed within **48 hours** of sample collection).

Appendix G.

Directions to Site, List of Names and Addresses for Neighboring Property Owners

Department of Environmental Quality, Bend office, 475 NE Bellevue Dr # 110, Bend, OR 97701 to 16959 Upland Rd, Bend, OR 97707

Drive 23.3 miles, 34 min

Google Maps

You can enter notes here.

Department of Environmental Quality, Bend office
475 NE Bellevue Dr # 110, Bend, OR 97701

Take NE Ballevue Dr and NE Dalton St to US-20

1 min (0.2 mi)

1. Head southwest toward NE Bellevue Dr

43 ft

2. Turn right toward NE Bellevue Dr

46 ft

3. Turn right toward NE Bellevue Dr

233 ft

4. Turn right onto NE Bellevue Dr

240 ft

5. Turn right onto NE Dalton St

367 ft

6. Turn right onto US-20

51 sec (0.2 mi)

Get on US-97 S/Bend Pkwy from SE 27th St and SE Reed Market Rd

10 min (3.9 mi)

7. Turn left onto SE 27th St

1.2 mi

8. Turn right onto SE Reed Market Rd

1.0 mi

9. At the traffic circle, take the 2nd exit and stay on SE Reed Market Rd

1.3 mi

10. Turn right onto the ramp to Klamath Falls

0.3 mi

Follow US-97 S to S Century Dr/Lava Cast Forest Rd/NF-9720. Take exit 153 from US-97 S

13 min (12.9 mi)

11. Merge onto US-97 S/Bend Pkwy
    Continue to follow US-97 S

12.7 mi

12. Take exit 153 for S Century Dr toward Sunriver

0.2 mi

Follow S Century Dr, Spring River Rd and Stellar Dr to Upland Rd in Three Rivers

10 min (6.0 mi)

13. Turn right onto S Century Dr/Lava Cast Forest Rd/NF-9720 (signs for Sunriver/Mt Bachelor)
    Continue to follow S Century Dr

1.5 mi

14. At the traffic circle, take the 2nd exit and stay on S Century Dr

0.6 mi

15. Continue onto Spring River Rd

1.7 mi

16. Turn left onto Stellar Dr

1.9 mi

17. Turn right to stay on Stellar Dr

0.2 mi

18. Turn right onto Upland Rd
    Destination will be on the left

351 ft

16959 Upland Rd
Bend, OR 97707

Adjacent Parcels Property Owners

16959 Upland Road, Bend, Oregon
(T20S, R10E, Section 13C, Tax Lot 9400, 0.51 acres

*	Tax Lot	9400	Cascade Lakes Properties LLC 8379 Westlawn Ave Los Angeles, CA 90045
A.	Tax Lot	8200	Bourret, Thomas E & Brigitte M PO Box 2966 Bend, OR 97707-2905
B.	Tax Lot	8300	Heer, Larry O & Jacqueline A 404 1st Ave SE Albany, OR 97321
C.	Tax Lot	9300	Lewis, Lance & Shannon 56880 Venture Ln #Ste 104N Box 175 Sunriver, OR 97707
D.	Tax Lot	1300	BGC Upland LLC 3950 Fairview Industrial Dr SE #Ste 240 Salem, OR 97302
E.	Tax Lot	9500	Skyliner ATX LLC 17006 Upland Road Bend, OR 97707


8200
8300
8400
12
13
14
15
220.0
100.0
A
B
ND
ROAD
9500
9400
9300
9200
E
53
*
C
68
69
70
71
72
1300
D