



Oregon

Tina Kotek, Governor

Department of Environmental Quality

Eastern Region Bend Office

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Bend, OR 97701

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TTY 711

July 31, 2025

Petra St John and Aaron McGrath
Nuevo Dia Adventures, LLC
17074 Cooper Dr
Bend, OR 97707

Re: WQ: Variance Approval: 248-23-000454-VAR: 5576 Big River Dr; T.20S; R.10E; Sec. 25BB;
Tax Lot 3600; 0.53 Acres; Deschutes County.

Dear Petra St John and Aaron McGrath,

This correspondence verifies that a variance hearing provided for under Oregon Administrative Rules 340-071-0430, was held on the site at 8:30 am on June 3, 2025, for the subject property referenced above on Big River Drive 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 impacts 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 7-inches (9-inches for replacement) 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 is not included in the proposal.

- Overall Treatment: Treatment first occurs within the AX20N-Mode 3B system (w/o UV) for reductions in TSS, BOD₅ 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 BOD₅, 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 7- inches (9 inches for replacement) of sand filter media embedded 6 - 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 27- 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 2 test pits within the subject property on April 24, 2013, where a denial was issued for the use of an onsite wastewater system on April 26, 2013 . 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 19- inches and 23-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 6 inches into the native soil. It is expected that the highest level of groundwater within the lowest point of the sand filter areas will come to 21- inches bgs. The proposal overcomes this limitation by providing additional sand filter media with 3- inches of extra vertical separation and providing a total 27-inch separation to the shallowest predicted groundwater depth. 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 6-9 inches deep of final backfill on top. The sand filter will be contained within a supporting berm with a slope no steeper than 3:1.

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.

Should future ATT technologies for treatment of Total Nitrogen be approved for use in Oregon before issuance of a construction-installation permit for this site, Deschutes County may allow installation of equal or better technology instead of the type noted in this approval.

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, 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
Hensley Family Revocable Trust, 1465 NW 123rd Ave, Portland, OR 97229

Sharon M Wendell, 3620 Spring Blvd, Eugene, OR 97405

Haley Heather & David Stewart Kramer, 55710 Big River Dr, Bend, OR 97707

Darren Joseph Staduhar, 16826 Brenda Dr, Bend, OR 97707

John F McManus, 1 Nantucket Place, Manhattan Beach, CA 90266

John R & Gail Gibson, 1210 W Wilshire Blvd, Nichols Hills, OK 73116

Schedule A – Nuevo Dia Adventures LLC
Variance Report - Special Conditions
T 20S, R 10E, Sec: 25BB, TL 3600

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 17062 Indio Road; T.20S; R.10E; Sec. 25BB; Tax Lot 3600; 0.53 Acres; Deschutes County.

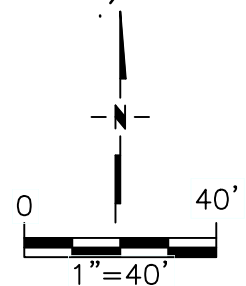
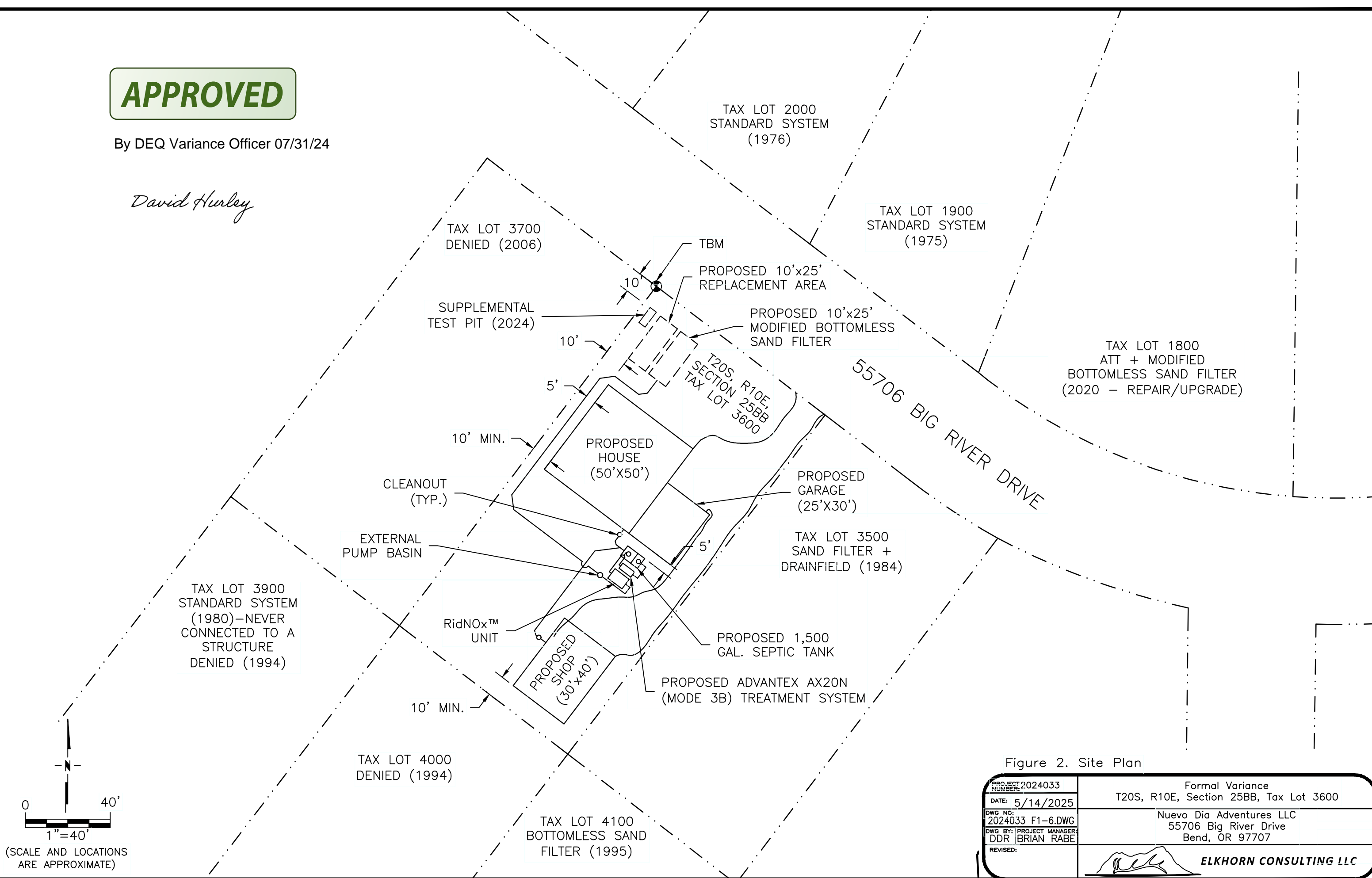
1. A person or business licensed by the Department of Environmental Quality in accordance with Oregon Revised Statutes, Chapter 454.695, must perform all work construction of this onsite wastewater treatment system.
2. Before starting with the actual construction of this system, the system installer 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 07/31/24

David Hurley



(SCALE AND LOCATIONS ARE APPROXIMATE)

Figure 2. Site Plan

PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 5/14/2025	
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG BY: PROJECT MANAGER: DDR BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC

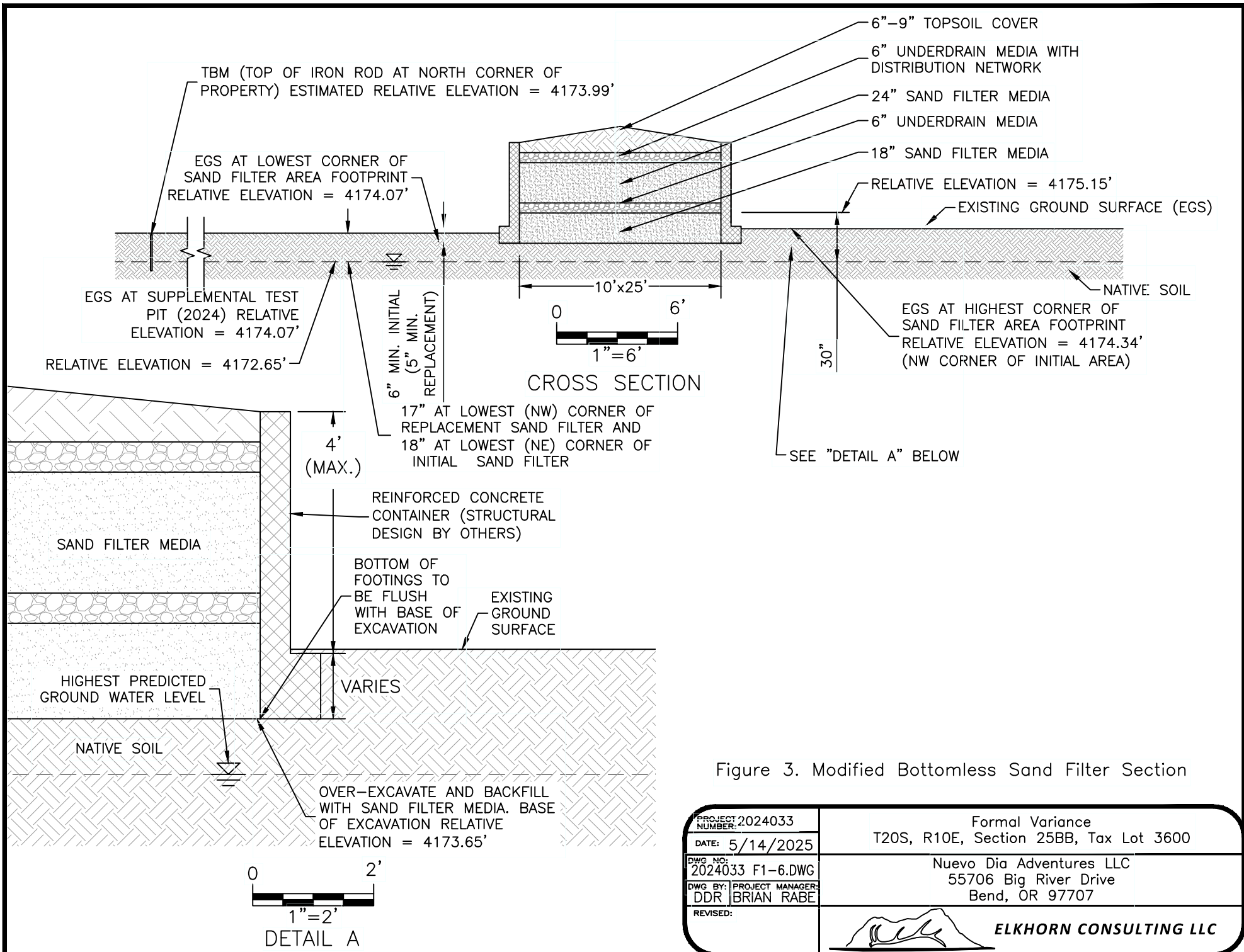



Figure 3. Modified Bottomless Sand Filter Section

PROJECT NUMBER: 2024033	Formal Variance
DATE: 5/14/2025	T20S, R10E, Section 25BB, Tax Lot 3600
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC
DWG BY: DDR	55706 Big River Drive
PROJECT MANAGER: BRIAN RABE	Bend, OR 97707
REVISED:	 ELKHORN CONSULTING LLC

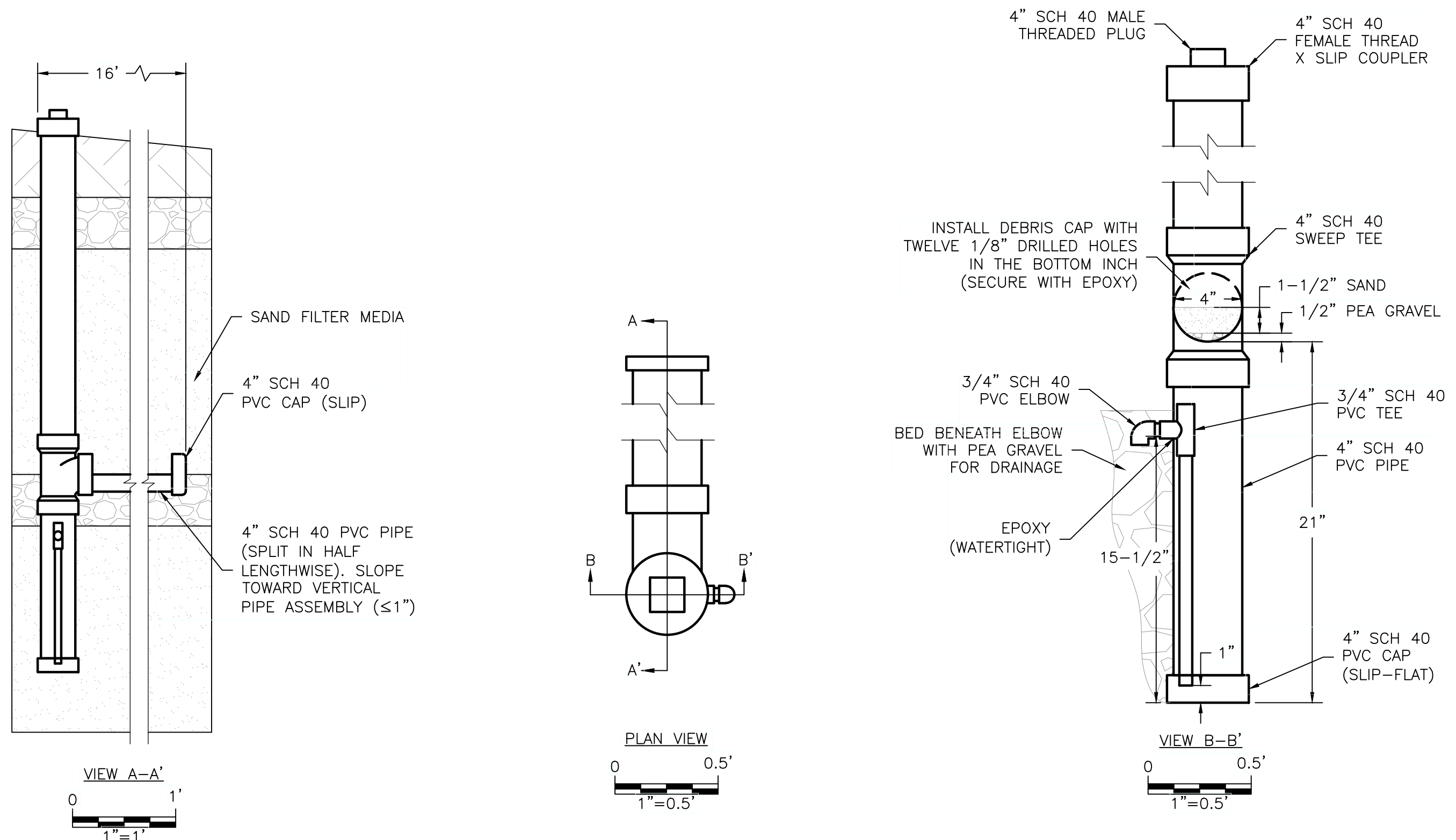
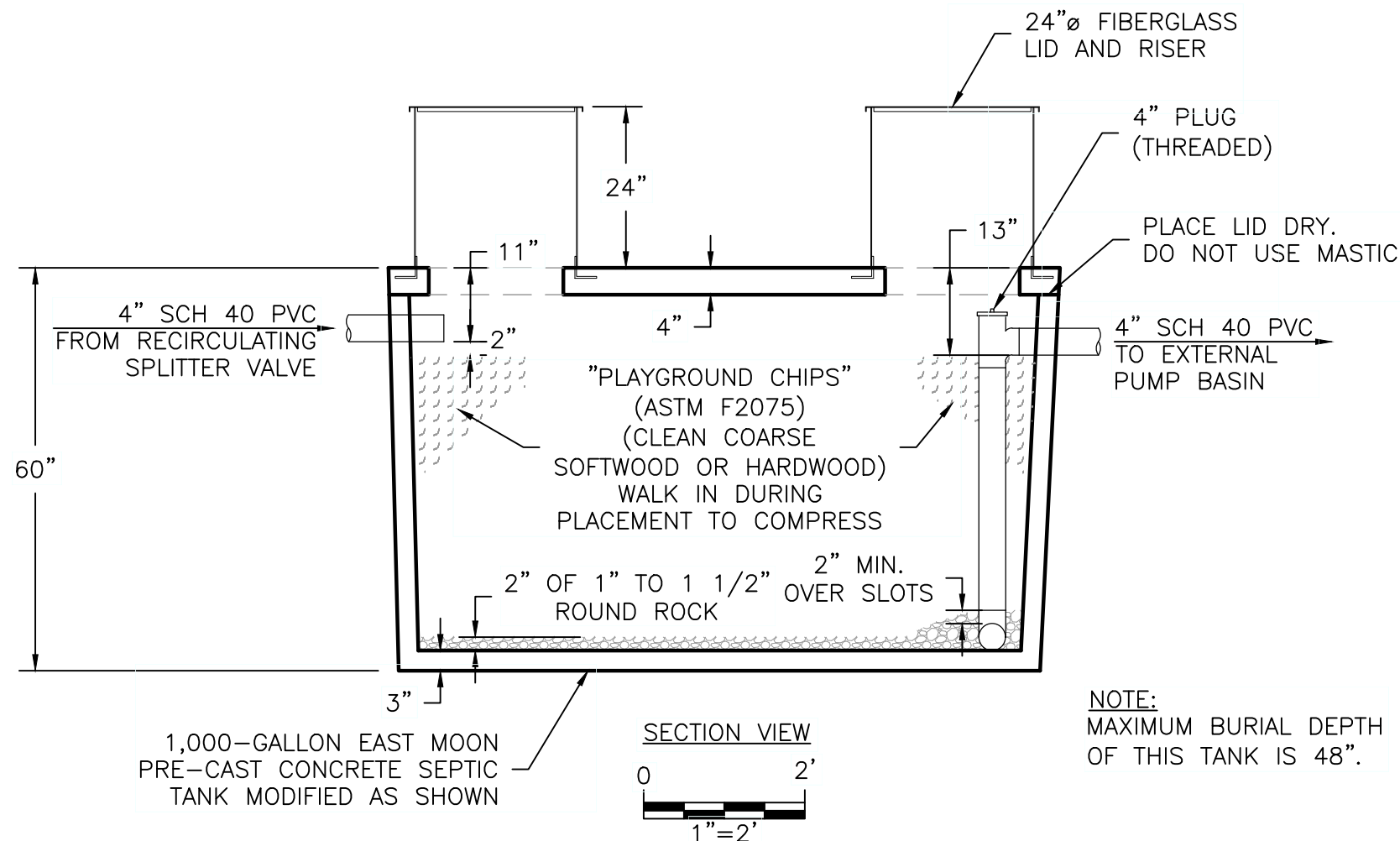
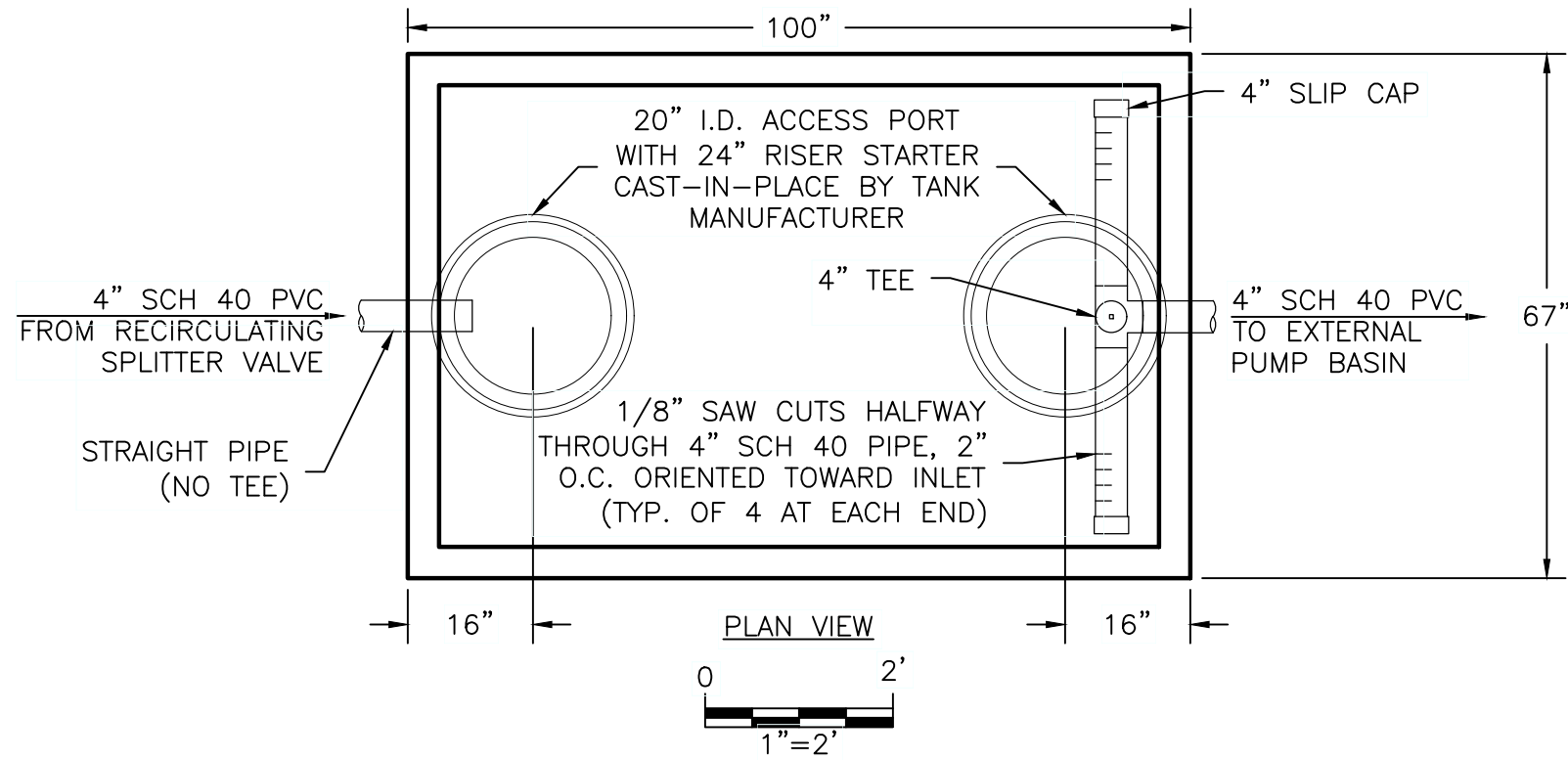


Figure 5. Lysimeter Details

PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 5/14/25	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG NO: 2024033 F1-6.DWG	
DWG BY: PROJECT MANAGER: DDR BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC



NOTE:
MAXIMUM BURIAL DEPTH OF THIS TANK IS 48".

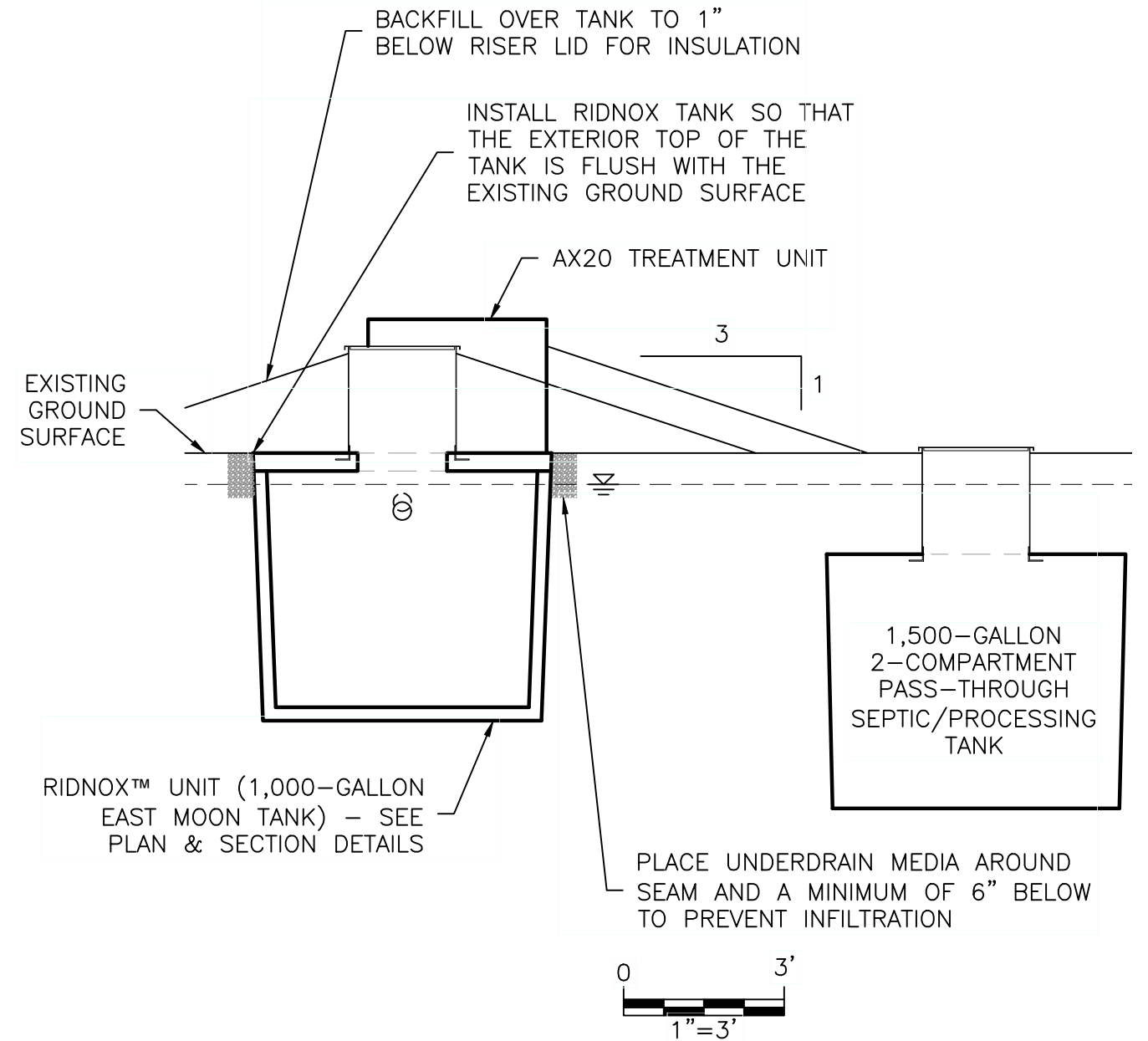


Figure 6. RidNOx™ Details

PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 5/14/25	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG NO: 2024033 F1-6.DWG	
DWG BY: PROJECT MANAGER: DDR BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC



ELKHORN CONSULTING LLC

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December 30, 2024

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

SUBJECT: Formal Variance Request – Petra St John and Aaron McGrath – T20S, R10E, Section 25BB Tax Lot 3600 (0.53 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 55706 Big River Drive, south of Bend in Deschutes County, Oregon (Site) (Figure 1) and is shown on the Deschutes County property information website (Dial) as consisting of 0.53 acres. However, the dimensions of the lot (100 feet by 200.57 feet) indicate the true size at 0.46 acres. A Tax Lot map is attached in Appendix A and a copy of the Deed is attached in Appendix B.

Background

The site was approved in the late 1970's and a standard system, consisting of a 1,000-gallon steel septic tank and 150 linear feet of rock-and-pipe drainfield trenches were installed and approved in 1980. However, since a home was not constructed within 5 years, the existing system was not recognized for alteration or repair by Deschutes County. Deschutes County subsequently conducted a site evaluation on April 24, 2013, and issued a denial on April 26, 2013. The denial was based on conditions associated with saturation noted at 19 to 23 inches below the ground surface in 2 test pits. Test Pit 1, near the middle of the lot and just north of the existing steel septic tank, represented the best conditions as described. The primary reasons cited for the denial was 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. Copies of the previous permit and subsequent site evaluation documentation from Deschutes County are 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.

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



Soils

The web soil survey shows the location of the Site and a copy of the output is provided in Appendix D. The north end of the parcel is within a delineation of Map Unit 29A, Cryaquolls, 0 to 3% slopes, that are also shown as wetlands on the Deschutes County property information website (Dial). The rest of the Site (represented by Test Pits 1 and 2) is within a delineation of Map Unit 144A, Sunriver sandy loam, 0 to 3% slopes (Appendix C and Appendix D). 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:

- 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 2013 soil notes for Test Pit 2 (southern part of the lot) and the conditions typical for the Sunriver series are related primarily to coloration (brownier colors) in the surface horizons that are more indicative of the Shanahan series.

Preliminary Assessment

The Site was reviewed by Brian Rabe, CPSS, WWS, on September 12, October 3, and October 30, 2024. 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 2 (2013) in the site evaluation and a supplementary test pit (2024) (southern part of the lot - see Figure 2 and Appendix C).

Other Considerations

This parcel and developed parcels in the surrounding area are primarily served by a public water system, operated by Oregon Water Wonderland Unit I Sanitary District.

A search of the database of the Oregon Department of Water Resources was conducted for the section that the subject property lies within (Section 25 of Township 20 South, Range 10 East of the Willamette Meridian). There are about 18 records on file for this section. A total of 7 water well records (well logs) were identified that could be tied to specific parcels within about one-quarter mile of the subject property (Appendix F). All 7 well logs are related to wells located on Tax Lot 4100 at least 775 feet east of the area proposed for the bottomless sand filters. Some of these well logs pertain to deepening of existing wells with no reference to the original log or enough data to correlate to other



found logs. The log for the primary well serving the public water utility (Oregon Water Wonderland) is summarized below.

The primary well was completed on August 20, 1999 to a depth of 650 feet. Water was described as being first found at a depth of 6 feet within a layer of “top soil + small gravel” and had a static water level of 6 feet bgs representing the shallow unconfined aquifer that extended down to a depth of 10 feet. The next water bearing zone was described as beginning at a depth of 517 feet in a layer of “black sand + pumice” with several clay layers described between the water bearing zones. A third water bearing zone was described as beginning at a depth of 585 feet within a layer of “fractured gray lava.” The first and second water bearing zones were isolated with cement and the well was completed in the third water bearing zone with a static water level of 13 feet bgs on the date of completion with a reported yield of 600 gallons per minute (gpm) with 50 feet of drawdown after 1 hour with air. A review of the public drinking water system test results indicate that the nitrate-nitrogen concentrations are very low with the highest recent result being 0.14 milligrams per liter (mg/L) in 2019.

The regional groundwater gradient, as indicated in a study published by the U.S. Geological Survey², is to the north or northeast toward or parallel to the Deschutes River. The subject property is located within Management Area 11, which recommends a 79% to 100% reduction from the base scenario loading (standard systems) for existing and future homes. The results of the Nitrate Loading Management Model within the study (Figures 25 and 26) suggest that this area represents a moderate to high risk of adverse impacts to groundwater quality unless a high level of treatment is achieved. According to the interactive map for Oregon Domestic Well Testing, this part of Deschutes County has an average nitrate-nitrogen concentration in domestic wells of 1.71 milligrams per liter (mg/L) with 18.83% exceeding 3 mg/L and 1.17% exceeding 10 mg/L (based on 1,200 test results, viewed on November 13, 2024).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(2)(c) - which states that sand filter system installed in soils with rapid or very rapid permeability in areas with permanent water tables may not discharge more than 450 gallons per half-acre per day, with certain exceptions.¹
4. 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

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.

³ ARC GIS Online. (n.d.). Oregon domestic well testing. [Data file]. Retrieved November 13, 2024, from ARC GIS Online: <https://www.arcgis.com/apps/MapSeries/index.html?appid=c0d7daea497049c1a686d07dab7106e5>



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 (RidNOxTM) 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 an effluent with an average total nitrogen (TN) concentration of 17 mg/L. A post-anoxic process, similar to the RidNOx unit that 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 in the La Pine project 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 NO₃-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. 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 NO₃-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 NO₃-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 AdvanTex 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 NO₃-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 NO₃-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 TN concentration of 60 mg/L, an average TN concentration in the AX20 effluent of 17 mg/L, the TN concentration leaving the RidNOx unit and going to the modified bottomless sand filter the typical reduction from the base scenario presented in the groundwater study cited previously is expected to be approximately 98 percent.

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

The supplemental test pit (2024) was described by Brian Rabe as:

- Very dark grayish brown (10YR 3/2) sandy loam from 0 to 7 inches with weak medium subangular blocky structure; many very fine, fine, medium, and coarse roots; underlain by
- Very dark grayish brown (10YR 3/2) sandy loam from 7 to 17 inches with moderate medium subangular blocky structure; common fine and medium roots; underlain by
- Very dark grayish brown (10YAR 3/2) sandy loam from 17 to 26 inches with moderate medium subangular blocky structure; common fine and medium roots; with faint redoximorphic features throughout; underlain by
- Very dark brown (10YR 2/2) sandy loam with silt loam from 26 to 30 to 33 inches with moderate medium subangular blocky structure; few fine and medium roots; with redoximorphic features throughout; underlain by
- White (10YR 8/1) silt (ash) from 30 to 33 to 38 inches; structureless (massive); with few fine roots; and redoximorphic features (yellow (5Y 8/4) iron masses) throughout; underlain by
- Very dark grayish brown (2.5Y 3/2) sandy loam from 38 to 47 inches; structureless (massive); with few fine roots; and redoximorphic features throughout; underlain by
- Very dark gray (7.5YR 3/1) sandy loam from 47 to 53 inches, structureless (massive); no roots; with redoximorphic features (dark brown (7.5YR 3/3) iron masses) 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 the supplemental test pit adjacent to the lowest of the 8 corner stakes. The highest level of the water table is expected to be 20 inches below the existing ground surface at the lowest point within the area proposed for the initial sand filter and 18 inches at the lowest point within the area proposed for the replacement sand filter based on the depth to the redoximorphic features described in the supplemental test pit (2024).



The proposed system seeks to overcome this limitation by elevating the modified bottomless sand filter in a manner that provides an additional 3 inches of separation (Figures 3A and 3B). The sod and underlying sandy soil to a depth of 6 inches within the footprint of the sand filter will be excavated and replaced with sand filter media. An additional 7 inches (initial sand filter) or 9 inches (replacement sand filter) of sand filter media (total of 13 and 15 inches, respectively) will be used to exceed the 24-inch separation from shallowest water table depth standard by providing a total separation of 27 inches. 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.

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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 RidNOx unit and the lysimeter, as well as sampling instructions, are described in Appendix F and shown in Figures 4, 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 Figure 4), 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, forbes, 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 is data available from peer-reviewed journal articles. One such article titled *The Nitrogen Cycle in Lodgepole Pine Forests, Southeast Wyoming* by T.J. Fahey, et al, published in *Biogeochemistry* in September 1985 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 1992 publication by the United States Forest Service (USFS) titled *Distribution of Biomass and Nutrients in Lodgepole Pine/Bitterbrush Ecosystems in Central Oregon* by Susan N. Little and Lauri J. Shainsky. They stated that the pumice soils in the area are “very severely deficient” in nitrogen. Table 4 of that publication lists the average nitrogen concentrations for several components of the tree. Since yield estimates for 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 ($\text{ft}^3/\text{ac}/\text{yr}$). 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 $37.5 \text{ lb}/\text{ft}^3$ will be used.



The smallest lots eligible for development in southern Deschutes County are about 0.5 acres in size. Assuming half the lot is developed (home, outbuildings, driveway, yard, etc.) the other half is typically maintained with native trees (lodgepole and/or ponderosa pine). Assuming half the average annual growth ($32.5 \text{ ft}^3/\text{ac}/\text{yr}$), an average density of $37.5 \text{ lb}/\text{ft}^3$, and the nitrogen content described previously, the annual amount of N taken up and stored in standing wood biomass on 0.25 acres (half of a half-acre lot) is 1.2 pounds.

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 $0.7 \text{ lb N}/\text{yr}$ ($2 \text{ mg}/\text{L} \times 2.55 \text{ people per home} \times 45 \text{ gallons per person per day} \times 365 \text{ days per year}$). 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: Petra St John and Aaron McGrath
Todd Cleveland, REHS – Deschutes County

Disclaimer: The contents of this document are confidential to the intended recipient at the location to which it is addressed. The contents may not be changed, edited, and/or deleted. The information contained in this document is only valid on the date indicated on the original project file report retained by Elkhorn Consulting LLC. By accepting this document, you understand that Elkhorn Consulting LLC does not accept any responsibility for liability resulting from unauthorized changes, edits, and/or deletions to the information in this document.

FIGURES

- Figure 1. Vicinity Map**
- Figure 2. Site Plan**
- Figure 3A. Modified Bottomless Sand Filter - Initial**
- Figure 3B. Modified Bottomless Sand Filter - Replacement**
- Figure 4. Sand Filter Plan Detail**
- Figure 5. Lysimeter Details**
- Figure 6. RidNO_xTM Details**

APPENDICES

- Appendix A. Tax Lot Map**
- Appendix B. Deed**
- Appendix C. Site Evaluation Reports**
- Appendix D. NRCS Soil Report**
- Appendix E. Water Well Reports**
- Appendix F. RidNOxTM and Lysimeter Installation
and Sampling Instructions**
- Appendix G. Directions to Site, List of Names and Addresses
for Neighboring Property Owners**

Appendix A.

Tax Lot Map

Appendix B.

Deed

Appendix C.

Site Evaluation Reports

Appendix D.
NRCS Soil Report

Appendix E.

Water Well Reports

Appendix F.

**RidNO_xTM and
Lysimeter Installation,
and Sampling Instructions**

Appendix G.

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



ELKHORN CONSULTING LLC

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December 30, 2024

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

SUBJECT: Formal Variance Request – Petra St John and Aaron McGrath – T20S, R10E, Section 25BB Tax Lot 3600 (0.53 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 55706 Big River Drive, south of Bend in Deschutes County, Oregon (Site) (Figure 1) and is shown on the Deschutes County property information website (Dial) as consisting of 0.53 acres. However, the dimensions of the lot (100 feet by 200.57 feet) indicate the true size at 0.46 acres. A Tax Lot map is attached in Appendix A and a copy of the Deed is attached in Appendix B.

Background

The site was approved in the late 1970's and a standard system, consisting of a 1,000-gallon steel septic tank and 150 linear feet of rock-and-pipe drainfield trenches were installed and approved in 1980. However, since a home was not constructed within 5 years, the existing system was not recognized for alteration or repair by Deschutes County. Deschutes County subsequently conducted a site evaluation on April 24, 2013, and issued a denial on April 26, 2013. The denial was based on conditions associated with saturation noted at 19 to 23 inches below the ground surface in 2 test pits. Test Pit 1, near the middle of the lot and just north of the existing steel septic tank, represented the best conditions as described. The primary reasons cited for the denial was 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. Copies of the previous permit and subsequent site evaluation documentation from Deschutes County are 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.

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



Soils

The web soil survey shows the location of the Site and a copy of the output is provided in Appendix D. The north end of the parcel is within a delineation of Map Unit 29A, Cryaquolls, 0 to 3% slopes, that are also shown as wetlands on the Deschutes County property information website (Dial). The rest of the Site (represented by Test Pits 1 and 2) is within a delineation of Map Unit 144A, Sunriver sandy loam, 0 to 3% slopes (Appendix C and Appendix D). 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:

- 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 2013 soil notes for Test Pit 2 (southern part of the lot) and the conditions typical for the Sunriver series are related primarily to coloration (brownier colors) in the surface horizons that are more indicative of the Shanahan series.

Preliminary Assessment

The Site was reviewed by Brian Rabe, CPSS, WWS, on September 12, October 3, and October 30, 2024. 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 2 (2013) in the site evaluation and a supplementary test pit (2024) (southern part of the lot - see Figure 2 and Appendix C).

Other Considerations

This parcel and developed parcels in the surrounding area are primarily served by a public water system, operated by Oregon Water Wonderland Unit I Sanitary District.

A search of the database of the Oregon Department of Water Resources was conducted for the section that the subject property lies within (Section 25 of Township 20 South, Range 10 East of the Willamette Meridian). There are about 18 records on file for this section. A total of 7 water well records (well logs) were identified that could be tied to specific parcels within about one-quarter mile of the subject property (Appendix F). All 7 well logs are related to wells located on Tax Lot 4100 at least 775 feet east of the area proposed for the bottomless sand filters. Some of these well logs pertain to deepening of existing wells with no reference to the original log or enough data to correlate to other



found logs. The log for the primary well serving the public water utility (Oregon Water Wonderland) is summarized below.

The primary well was completed on August 20, 1999 to a depth of 650 feet. Water was described as being first found at a depth of 6 feet within a layer of “top soil + small gravel” and had a static water level of 6 feet bgs representing the shallow unconfined aquifer that extended down to a depth of 10 feet. The next water bearing zone was described as beginning at a depth of 517 feet in a layer of “black sand + pumice” with several clay layers described between the water bearing zones. A third water bearing zone was described as beginning at a depth of 585 feet within a layer of “fractured gray lava.” The first and second water bearing zones were isolated with cement and the well was completed in the third water bearing zone with a static water level of 13 feet bgs on the date of completion with a reported yield of 600 gallons per minute (gpm) with 50 feet of drawdown after 1 hour with air. A review of the public drinking water system test results indicate that the nitrate-nitrogen concentrations are very low with the highest recent result being 0.14 milligrams per liter (mg/L) in 2019.

The regional groundwater gradient, as indicated in a study published by the U.S. Geological Survey², is to the north or northeast toward or parallel to the Deschutes River. The subject property is located within Management Area 11, which recommends a 79% to 100% reduction from the base scenario loading (standard systems) for existing and future homes. The results of the Nitrate Loading Management Model within the study (Figures 25 and 26) suggest that this area represents a moderate to high risk of adverse impacts to groundwater quality unless a high level of treatment is achieved. According to the interactive map for Oregon Domestic Well Testing, this part of Deschutes County has an average nitrate-nitrogen concentration in domestic wells of 1.71 milligrams per liter (mg/L) with 18.83% exceeding 3 mg/L and 1.17% exceeding 10 mg/L (based on 1,200 test results, viewed on November 13, 2024).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(2)(c) - which states that sand filter system installed in soils with rapid or very rapid permeability in areas with permanent water tables may not discharge more than 450 gallons per half-acre per day, with certain exceptions.¹
4. 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

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.

³ ARC GIS Online. (n.d.). Oregon domestic well testing, [Data file]. Retrieved November 13, 2024, from ARC GIS Online: <https://www.arcgis.com/apps/MapSeries/index.html?appid=c0d7daea497049c1a686d07dab7106e5>



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 (RidNOxTM) 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 an effluent with an average total nitrogen (TN) concentration of 17 mg/L. A post-anoxic process, similar to the RidNOx unit that 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 in the La Pine project 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 NO₃-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. 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 NO₃-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 NO₃-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 AdvanTex 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 NO₃-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 NO₃-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 TN concentration of 60 mg/L, an average TN concentration in the AX20 effluent of 17 mg/L, the TN concentration leaving the RidNOx unit and going to the modified bottomless sand filter the typical reduction from the base scenario presented in the groundwater study cited previously is expected to be approximately 98 percent.

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

The supplemental test pit (2024) was described by Brian Rabe as:

- Very dark grayish brown (10YR 3/2) sandy loam from 0 to 7 inches with weak medium subangular blocky structure; many very fine, fine, medium, and coarse roots; underlain by
- Very dark grayish brown (10YR 3/2) sandy loam from 7 to 17 inches with moderate medium subangular blocky structure; common fine and medium roots; underlain by
- Very dark grayish brown (10YAR 3/2) sandy loam from 17 to 26 inches with moderate medium subangular blocky structure; common fine and medium roots; with faint redoximorphic features throughout; underlain by
- Very dark brown (10YR 2/2) sandy loam with silt loam from 26 to 30 to 33 inches with moderate medium subangular blocky structure; few fine and medium roots; with redoximorphic features throughout; underlain by
- White (10YR 8/1) silt (ash) from 30 to 33 to 38 inches; structureless (massive); with few fine roots; and redoximorphic features (yellow (5Y 8/4) iron masses) throughout; underlain by
- Very dark grayish brown (2.5Y 3/2) sandy loam from 38 to 47 inches; structureless (massive); with few fine roots; and redoximorphic features throughout; underlain by
- Very dark gray (7.5YR 3/1) sandy loam from 47 to 53 inches, structureless (massive); no roots; with redoximorphic features (dark brown (7.5YR 3/3) iron masses) 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 the supplemental test pit adjacent to the lowest of the 8 corner stakes. The highest level of the water table is expected to be 20 inches below the existing ground surface at the lowest point within the area proposed for the initial sand filter and 18 inches at the lowest point within the area proposed for the replacement sand filter based on the depth to the redoximorphic features described in the supplemental test pit (2024).



The proposed system seeks to overcome this limitation by elevating the modified bottomless sand filter in a manner that provides an additional 3 inches of separation (Figures 3A and 3B). The sod and underlying sandy soil to a depth of 6 inches within the footprint of the sand filter will be excavated and replaced with sand filter media. An additional 7 inches (initial sand filter) or 9 inches (replacement sand filter) of sand filter media (total of 13 and 15 inches, respectively) will be used to exceed the 24-inch separation from shallowest water table depth standard by providing a total separation of 27 inches. 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.

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The smallest lots eligible for development in southern Deschutes County are about 0.5 acres in size. Assuming half the lot is developed (home, outbuildings, driveway, yard, etc.) the other half is typically maintained with native trees (lodgepole and/or ponderosa pine). Assuming half the average annual growth ($32.5 \text{ ft}^3/\text{ac}/\text{yr}$), an average density of $37.5 \text{ lb}/\text{ft}^3$, and the nitrogen content described previously, the annual amount of N taken up and stored in standing wood biomass on 0.25 acres (half of a half-acre lot) is 1.2 pounds.

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 $0.7 \text{ lb N}/\text{yr}$ ($2 \text{ mg}/\text{L} \times 2.55 \text{ people per home} \times 45 \text{ gallons per person per day} \times 365 \text{ days per year}$). 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.

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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.

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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: Petra St John and Aaron McGrath
Todd Cleveland, REHS – Deschutes County



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No. EH-W-448430 Exp. 30SEP25

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FIGURES

- Figure 1. Vicinity Map**
- Figure 2. Site Plan**
- Figure 3A. Modified Bottomless Sand Filter - Initial**
- Figure 3B. Modified Bottomless Sand Filter - Replacement**
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- Figure 6. RidNO_xTM Details**



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November 13, 2024

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

SUBJECT: Formal Variance Request – Petra St John and Aaron McGrath – T20S, R10E, Section 25BB Tax Lot 3600 (0.53 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 55706 Big River Drive, south of Bend in Deschutes County, Oregon (Site) (Figure 1) and consists of 0.53 acres. A Tax Lot map is attached in Appendix A and a copy of the Deed is attached in Appendix B.

Background

The site was approved in the late 1970's and a standard system, consisting of a 1,000-gallon steel septic tank and 150 linear feet of rock-and-pipe drainfield trenches were installed and approved in 1980. However, since a home was not constructed within 5 years, the existing system was not recognized for alteration or repair by Deschutes County. Deschutes County subsequently conducted a site evaluation on April 24, 2013, and issued a denial on April 26, 2013. The denial was based on conditions associated with saturation noted at 19 to 23 inches below the ground surface in 2 test pits. Test Pit 1, near the middle of the lot and just north of the existing steel septic tank, represented the best conditions as described. The primary reasons cited for the denial was 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. Copies of the previous permit and subsequent site evaluation documentation from Deschutes County are 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.

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



Soils

The web soil survey shows the location of the Site and a copy of the output is provided in Appendix D. The north end of the parcel is within a delineation of Map Unit 29A, Cryaquolls, 0 to 3% slopes, that are also shown as wetlands on the Deschutes County property information website (Dial). The rest of the Site (represented by Test Pits 1 and 2) is within a delineation of Map Unit 144A, Sunriver sandy loam, 0 to 3% slopes (Appendix C and Appendix D). 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:

- 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 2013 soil notes for Test Pit 2 (southern part of the lot) and the conditions typical for the Sunriver series are related primarily to coloration (brownier colors) in the surface horizons that are more indicative of the Shanahan series.

Preliminary Assessment

The Site was reviewed by Brian Rabe, CPSS, WWS, on September 12, October 3, and October 30, 2024. 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 2 (2013) in the site evaluation and a supplementary test pit (2024) (southern part of the lot - see Figure 2 and Appendix C).

Other Considerations

This parcel and developed parcels in the surrounding area are primarily served by a public water system, operated by Oregon Water Wonderland Unit I Sanitary District.

A search of the database of the Oregon Department of Water Resources was conducted for the section that the subject property lies within (Section 25 of Township 20 South, Range 10 East of the Willamette Meridian). There are about 18 records on file for this section. A total of 7 water well records (well logs) were identified that could be tied to specific parcels within about one-quarter mile of the subject property (Appendix F). All 7 well logs are related to wells located on Tax Lot 4100 at least 775 feet east of the area proposed for the bottomless sand filters. Some of these well logs pertain to deepening of existing wells with no reference to the original log or enough data to correlate to other



found logs. The log for the primary well serving the public water utility (Oregon Water Wonderland) is summarized below.

The primary well was completed on August 20, 1999 to a depth of 650 feet. Water was described as being first found at a depth of 6 feet within a layer of “top soil + small gravel” and had a static water level of 6 feet bgs representing the shallow unconfined aquifer that extended down to a depth of 10 feet. The next water bearing zone was described as beginning at a depth of 517 feet in a layer of “black sand + pumice” with several clay layers described between the water bearing zones. A third water bearing zone was described as beginning at a depth of 585 feet within a layer of “fractured gray lava.” The first and second water bearing zones were isolated with cement and the well was completed in the third water bearing zone with a static water level of 13 feet bgs on the date of completion with a reported yield of 600 gallons per minute (gpm) with 50 feet of drawdown after 1 hour with air. A review of the public drinking water system test results indicate that the nitrate-nitrogen concentrations are very low with the highest recent result being 0.14 milligrams per liter (mg/L) in 2019.

The regional groundwater gradient, as indicated in a study published by the U.S. Geological Survey², is to the north or northeast toward or parallel to the Deschutes River. The subject property is located within Management Area 11, which recommends a 79% to 100% reduction from the base scenario loading (standard systems) for existing and future homes. The results of the Nitrate Loading Management Model within the study (Figures 25 and 26) suggest that this area represents a moderate to high risk of adverse impacts to groundwater quality unless a high level of treatment is achieved. According to the interactive map for Oregon Domestic Well Testing, this part of Deschutes County has an average nitrate-nitrogen concentration in domestic wells of 1.71 milligrams per liter (mg/L) with 18.83% exceeding 3 mg/L and 1.17% exceeding 10 mg/L (based on 1,200 test results, viewed on November 13, 2024).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

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.

³ ARC GIS Online. (n.d.). Oregon domestic well testing, [Data file]. Retrieved November 13, 2024, from ARC GIS Online: <https://www.arcgis.com/apps/MapSeries/index.html?appid=c0d7daea497049c1a686d07dab7106e5>



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 (RidNOxTM) 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 an effluent with an average total nitrogen (TN) concentration of 17 mg/L. A post-anoxic process, similar to the RidNOx unit that 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 in the La Pine project 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 NO₃-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. 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 NO₃-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 NO₃-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 AdvanTex 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 NO₃-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 NO₃-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 TN concentration of 60 mg/L, an average TN concentration in the AX20 effluent of 17 mg/L, the TN concentration leaving the RidNOx unit and going to the modified bottomless sand filter the typical reduction from the base scenario presented in the groundwater study cited previously is expected to be approximately 98 percent.

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

The supplemental test pit (2024) was described by Brian Rabe as:

- Very dark grayish brown (10YR 3/2) sandy loam from 0 to 7 inches with weak medium subangular blocky structure; many very fine, fine, medium, and coarse roots; underlain by
- Very dark grayish brown (10YR 3/2) sandy loam from 7 to 17 inches with moderate medium subangular blocky structure; common fine and medium roots; underlain by
- Very dark grayish brown (10YAR 3/2) sandy loam from 17 to 26 inches with moderate medium subangular blocky structure; common fine and medium roots; with faint redoximorphic features throughout; underlain by
- Very dark brown (10YR 2/2) sandy loam with silt loam from 26 to 30 to 33 inches with moderate medium subangular blocky structure; few fine and medium roots; with redoximorphic features throughout; underlain by
- White (10YR 8/1) silt (ash) from 30 to 33 to 38 inches; structureless (massive); with few fine roots; and redoximorphic features (yellow (5Y 8/4) iron masses) throughout; underlain by
- Very dark grayish brown (2.5Y 3/2) sandy loam from 38 to 47 inches; structureless (massive); with few fine roots; and redoximorphic features throughout; underlain by
- Very dark gray (7.5YR 3/1) sandy loam from 47 to 53 inches, structureless (massive); no roots; with redoximorphic features (dark brown (7.5YR 3/3) iron masses) 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 the supplemental test pit adjacent to the lowest of the 8 corner stakes. The highest level of the water table is expected to be 20 inches below the existing ground surface at the lowest point within the area proposed for the initial sand filter and 18 inches at the lowest point within the area proposed for the replacement sand filter based on the depth to the redoximorphic features described in the supplemental test pit (2024).

The proposed system seeks to overcome this limitation by elevating the modified bottomless sand filter in a manner that provides an additional 3 inches of separation (Figures 3A and 3B). The sod and underlying sandy soil to a depth of 6 inches within the footprint of the sand filter will be excavated and replaced with sand filter media. An additional 7 inches (initial sand filter) or 9 inches (replacement



sand filter) of sand filter media (total of 13 and 15 inches, respectively) will be used to exceed the 24-inch separation from shallowest water table depth standard by providing a total separation of 27 inches. 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.

Deschutes County has noted that the results of the Nitrate Management Loading Model indicated that there was no surplus capacity within Management Area 11 to accommodate additional lots that were denied or otherwise not expected to be approved. In a recent variance hearing for another parcel within Management Area 11, Deschutes County stated that about 20 parcels have been approved through the formal variance process in this area and expressed concern about the cumulative effects of the additional nutrient load on groundwater and surface water quality.

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 RidNOx unit and the lysimeter, as well as sampling instructions, are described in Appendix F and shown in Figures 4, 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 Figure 4), 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, forbes, 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 is data available from peer-reviewed journal articles. One such article titled *The Nitrogen Cycle in Lodgepole Pine Forests, Southeast Wyoming* by T.J. Fahey, et al, published in *Biogeochemistry* in September 1985 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.

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Petra St John and Aaron McGrath
Formal Variance – 55706 Big River
November 13, 2024
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Sincerely,
ELKHORN CONSULTING LLC

Brian T. Rabe, CPSS, WWS
Principal Soil Scientist

BTR/ddr
Enc: Figures 1-6, Appendices A-G
c: Petra St John and Aaron McGrath
Todd Cleveland, REHS – Deschutes County

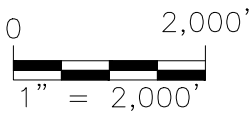
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Figure 1. Vicinity Map



(LOCATIONS AND SCALE ARE APPROXIMATE)

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

PROJECT NUMBER: 2024033	Formal Variance
DATE: 11/12/2024	T20S, R10E, Section 25BB, Tax Lot 3600
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC
DWG BY: PROJECT MANAGER: 6DJR	55706 Big River Drive
REVISOR: BRIAN RABE	Bend, OR 97707
REVISOR:	 ELKHORN CONSULTING LLC

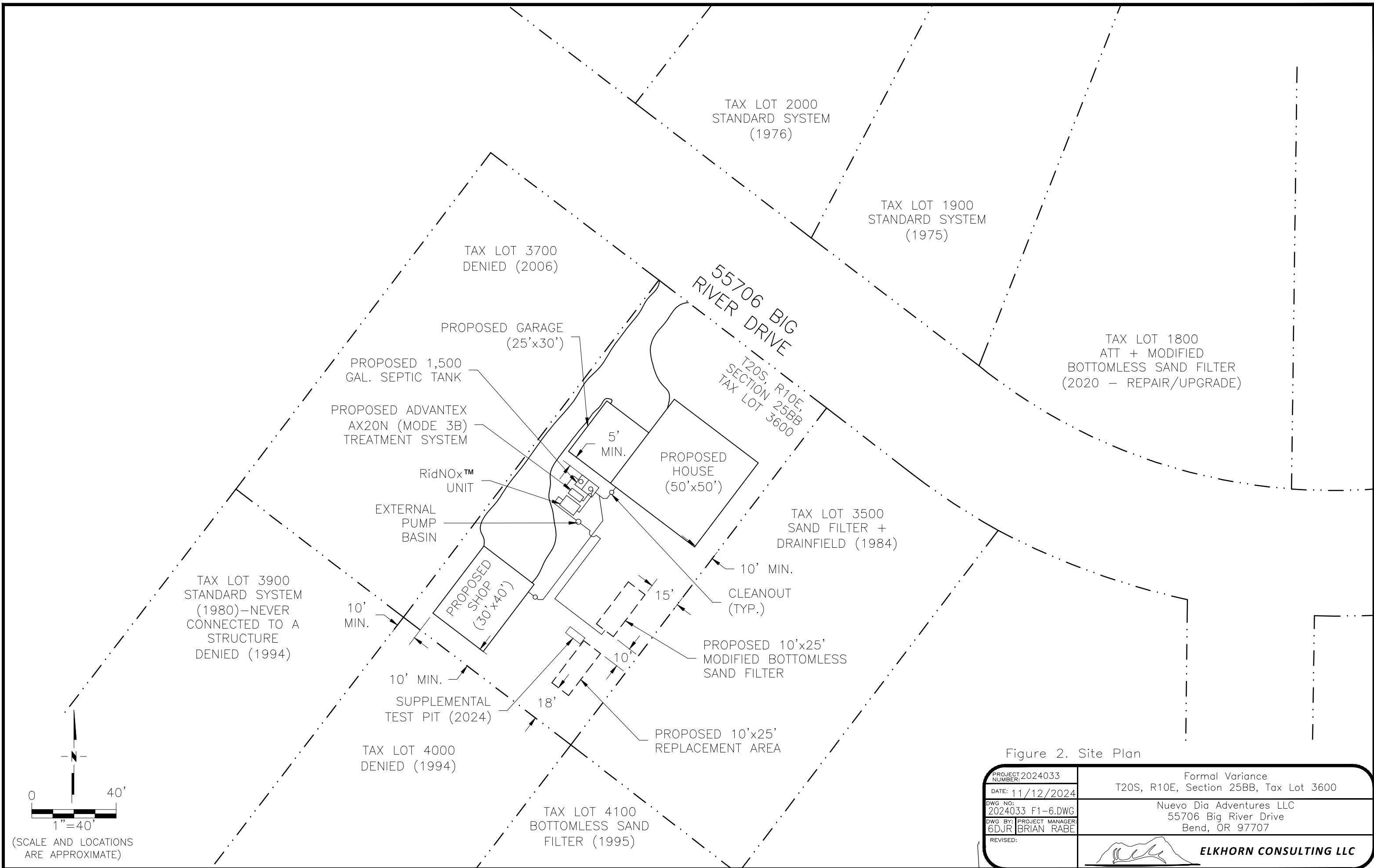



Figure 2. Site Plan

PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 11/12/2024	
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG BY: PROJECT MANAGER: 6DJR BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC

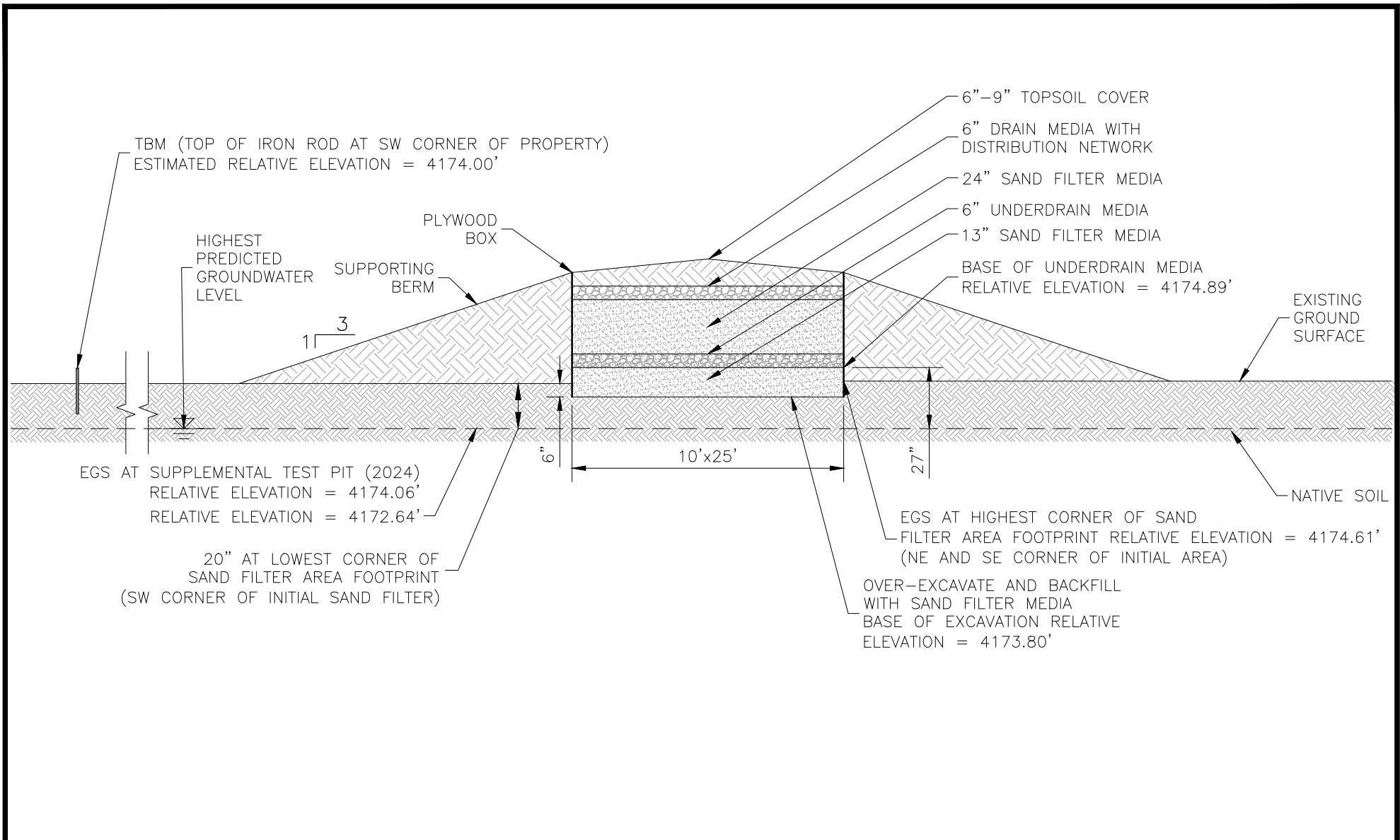


Figure 3A. Modified Bottomless Sand Filter Section – Initial



PROJECT NUMBER: 2024033	Formal Variance
DATE: 11/12/2024	T20S, R10E, Section 25BB, Tax Lot 3600
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC
DWG BY: 6DJR PROJECT MANAGER: BRIAN RABE	55706 Big River Drive
REVISED:	Bend, OR 97707
	 ELKHORN CONSULTING LLC

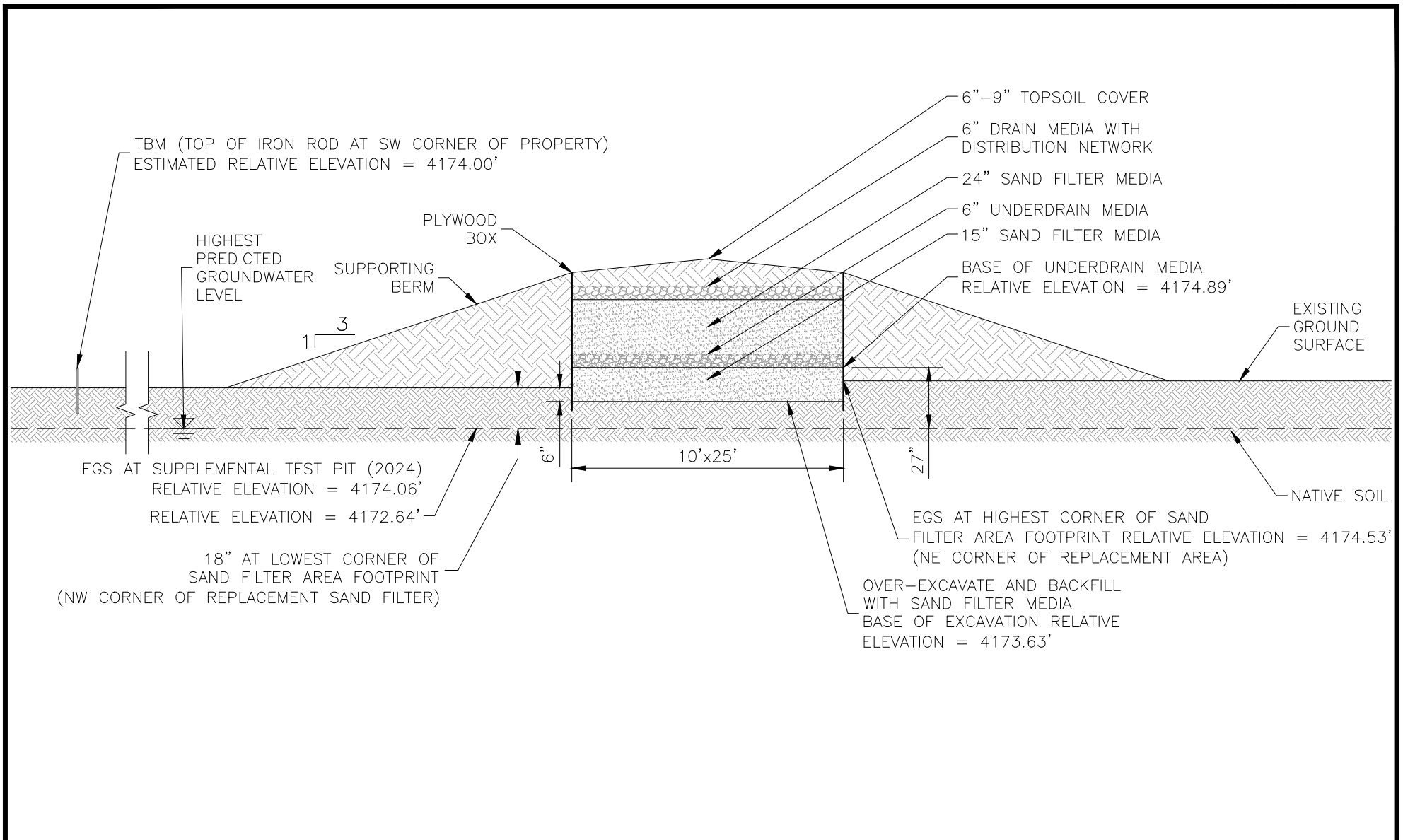
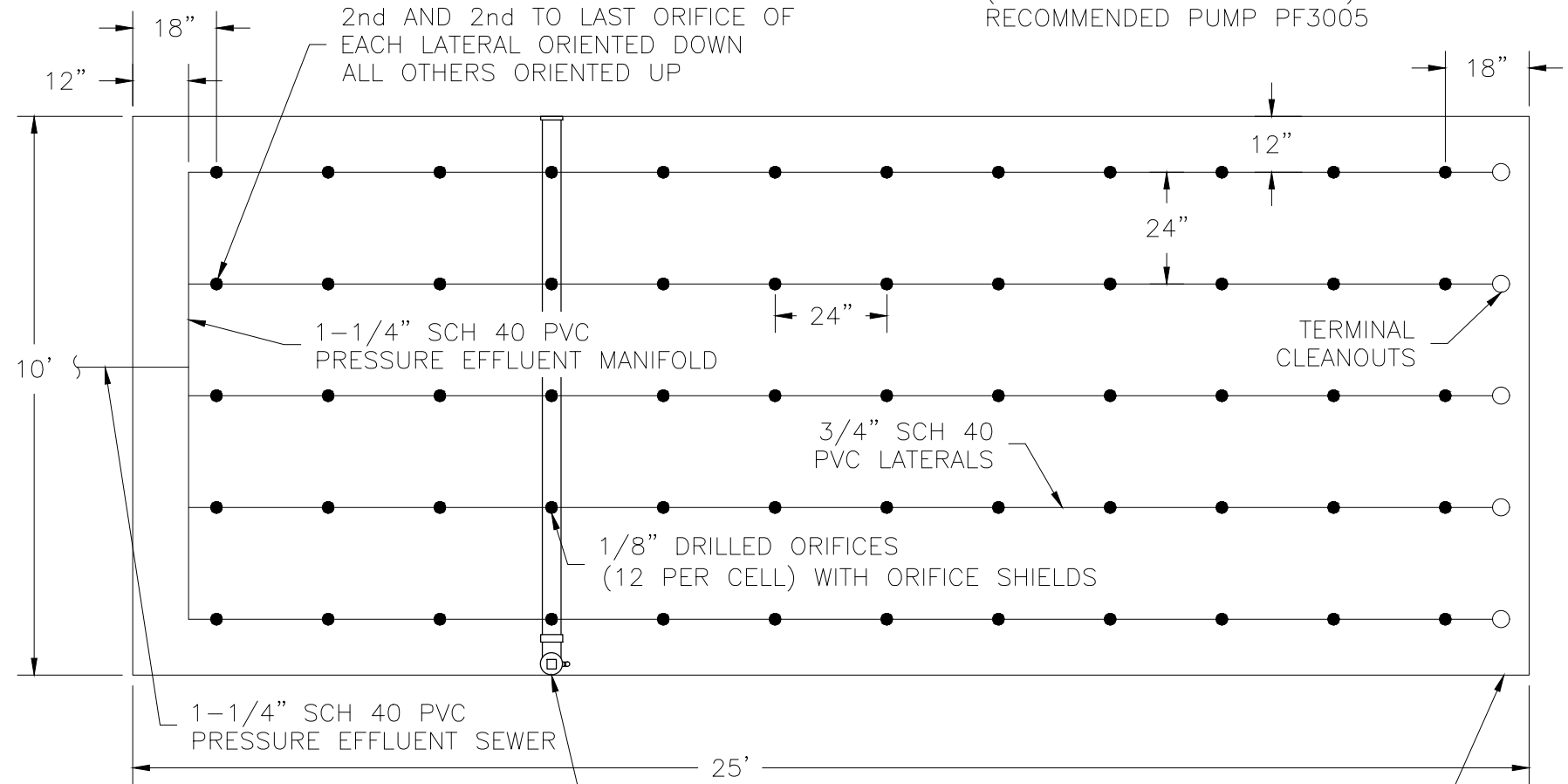


Figure 3B. Modified Bottomless Sand Filter Section – Replacement



PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 11/12/2024	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG NO: 2024033 F1-6.DWG	
DWG BY: 6DJR PROJECT MANAGER: BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC

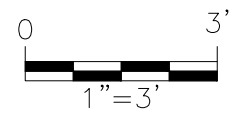
TOTAL OF 60 ORIFICES
 0.56 GALLONS PER MINUTE
 AT 8.1 FT RESIDUAL HEAD
 (33.4 GPM AT 44.6 FT TDH)
 RECOMMENDED PUMP PF3005




BOX CONSTRUCTED OF 3/4" (NOMINAL) 23/32" (ACTUAL) PLYWOOD WITH 2x4 FRAMEWORK NO MORE THAN 4 FT O.C.

EFFLUENT SAMPLE COLLECTION LYSIMETER (BELOW SAND FILTER MEDIA) – LOCATE IN ALIGNMENT DIRECTLY UNDER 4TH ROW OF ORIFICES.

Figure 4. Sand Filter Plan Detail



PROJECT NUMBER: 2024033	Formal Variance
DATE: 11/12/2024	T20S, R10E, Section 25BB, Tax Lot 3600
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC
DWG BY: 6DJR PROJECT MANAGER: BRIAN RABE	55706 Big River Drive
REVISED:	Bend, OR 97707
 ELKHORN CONSULTING LLC	

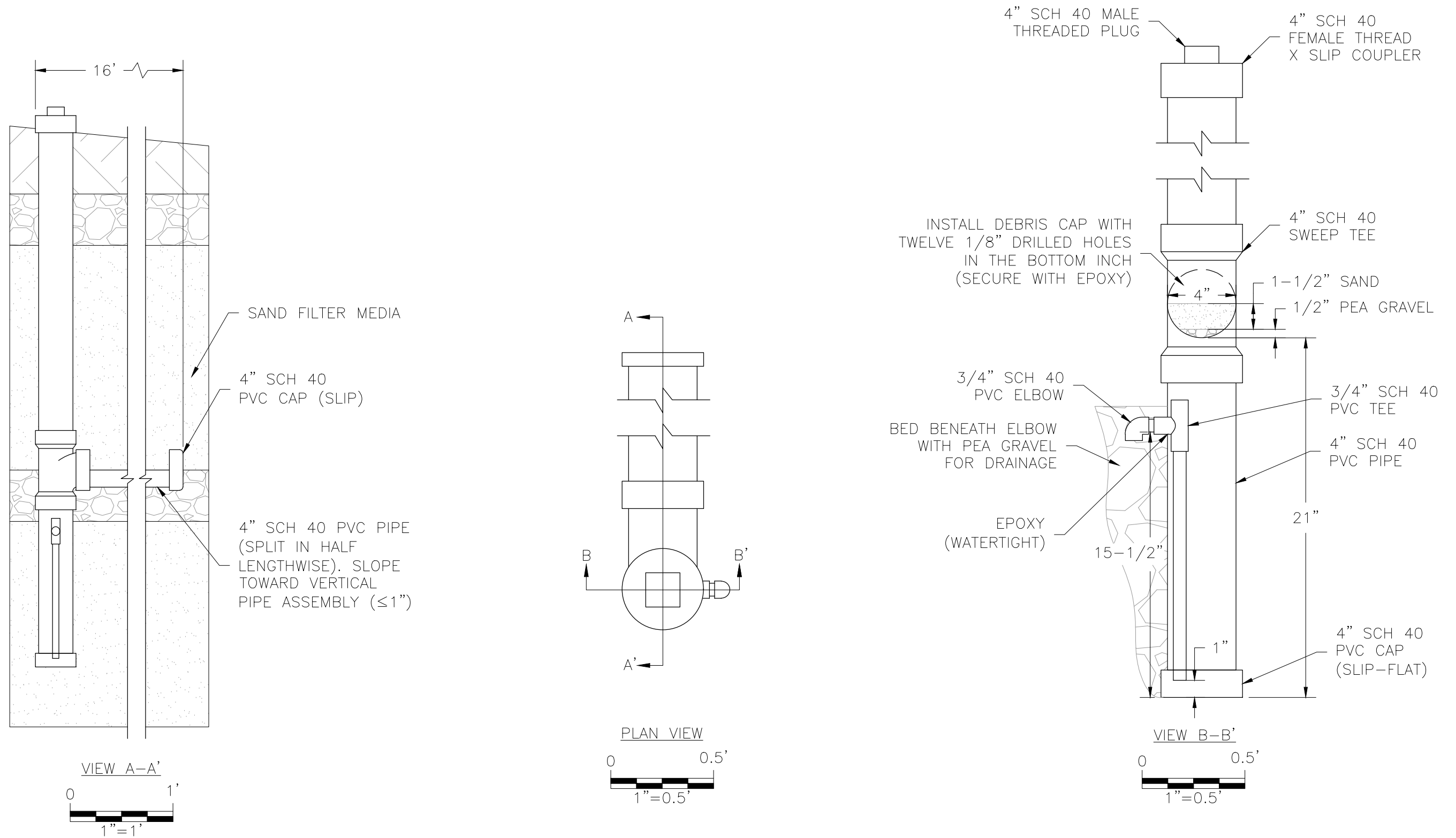
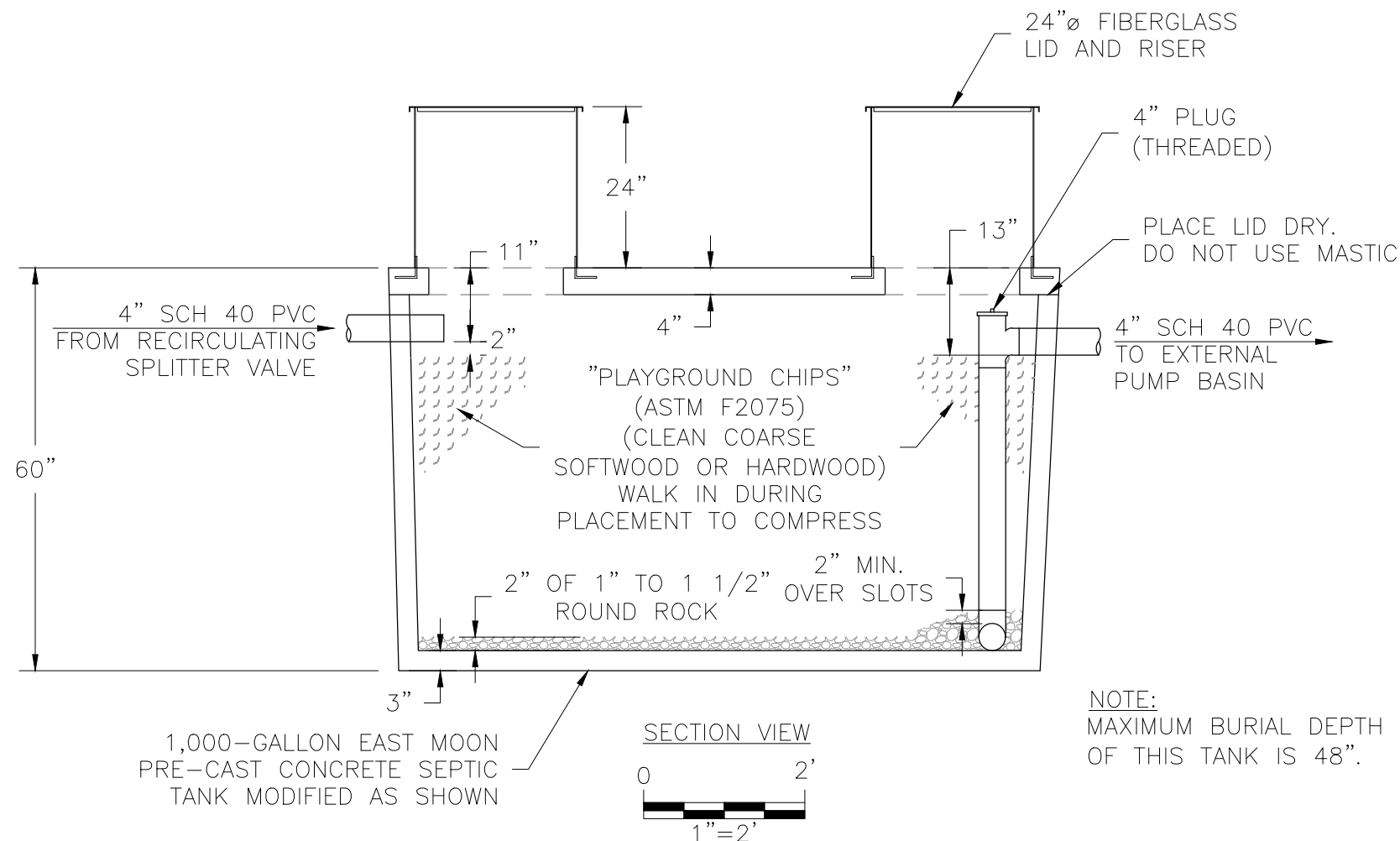
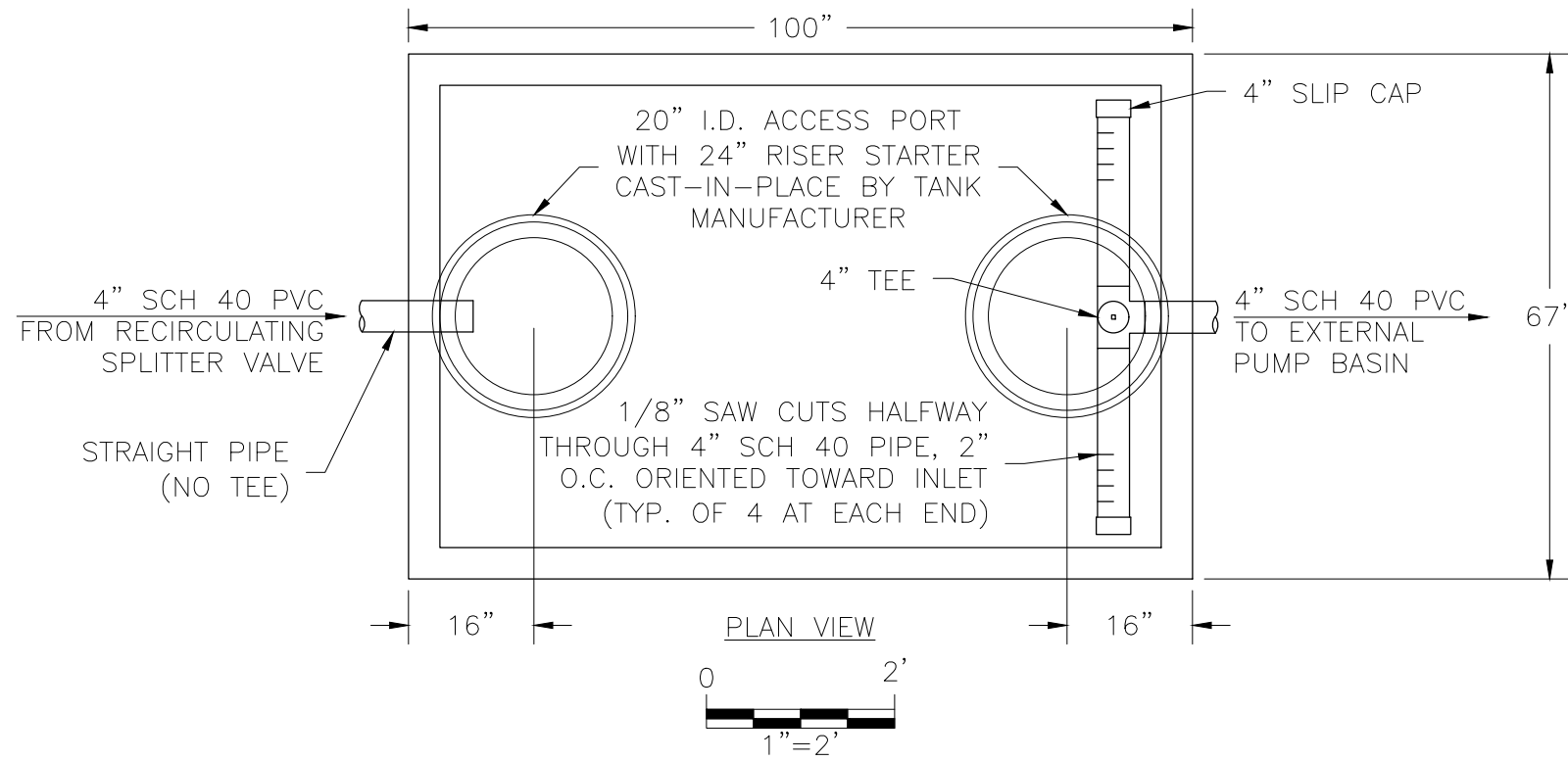


Figure 5. Lysimeter Details

PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 11/12/2024	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG NO: 2024033 F1-6.DWG	
DWG BY: PROJECT MANAGER: 6DJR BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC



NOTE:
MAXIMUM BURIAL DEPTH OF THIS TANK IS 48".

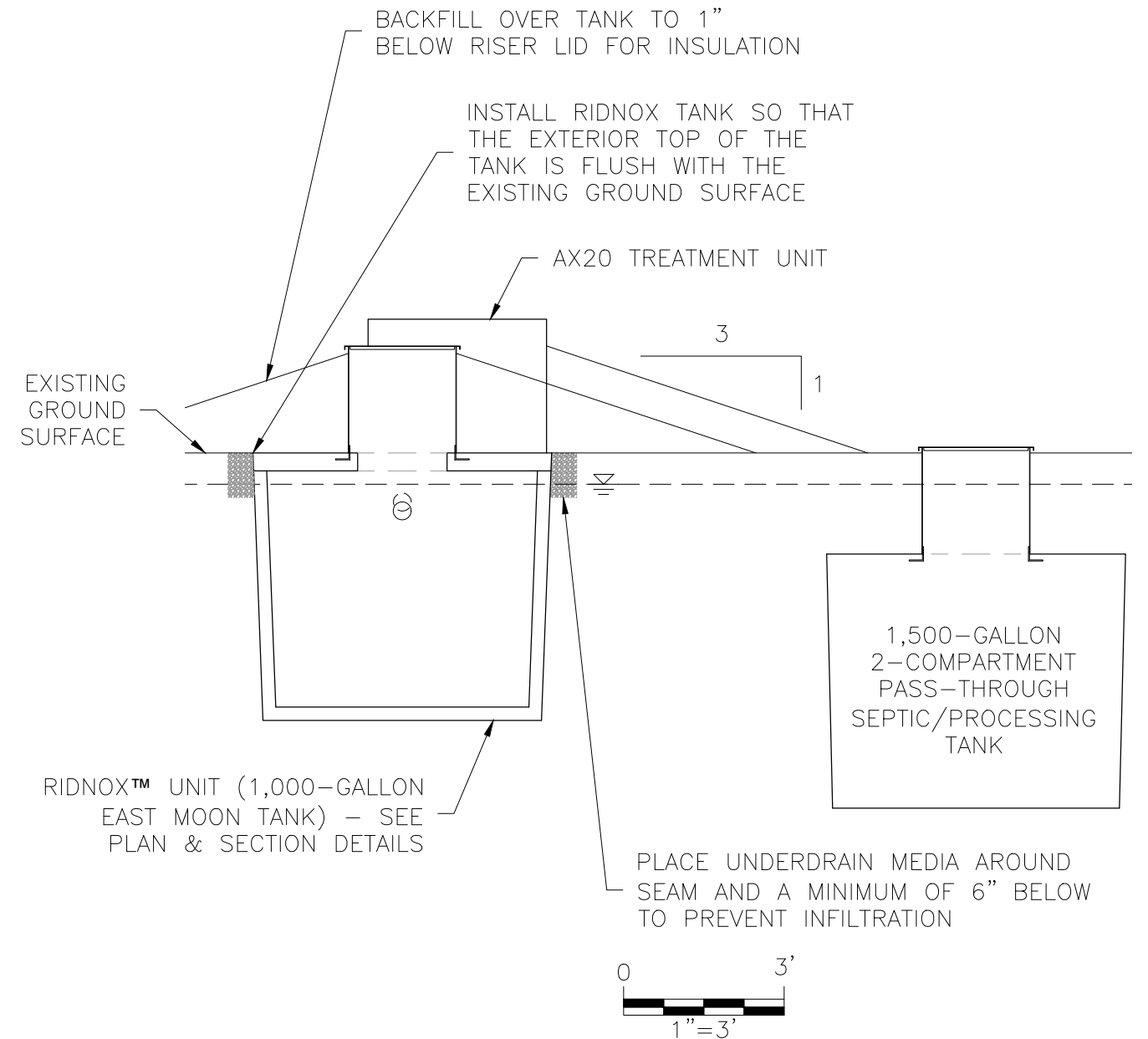


Figure 6. RidNOx™ Details

PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 11/12/2024	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG NO: 2024033 F1-6.DWG	
DWG BY: 6DJR	PROJECT MANAGER: BRIAN RABE
REVISED:	



ELKHORN CONSULTING LLC

APPENDICES

- Appendix A. Tax Lot Map**
- Appendix B. Deed**
- Appendix C. Site Evaluation Reports**
- Appendix D. NRCS Soil Report**
- Appendix E. Water Well Reports**
- Appendix F. RidNOxTM and Lysimeter Installation
and Sampling Instructions**
- Appendix G. Directions to Site, List of Names and Addresses
for Neighboring Property Owners**

Appendix A.

Tax Lot Map

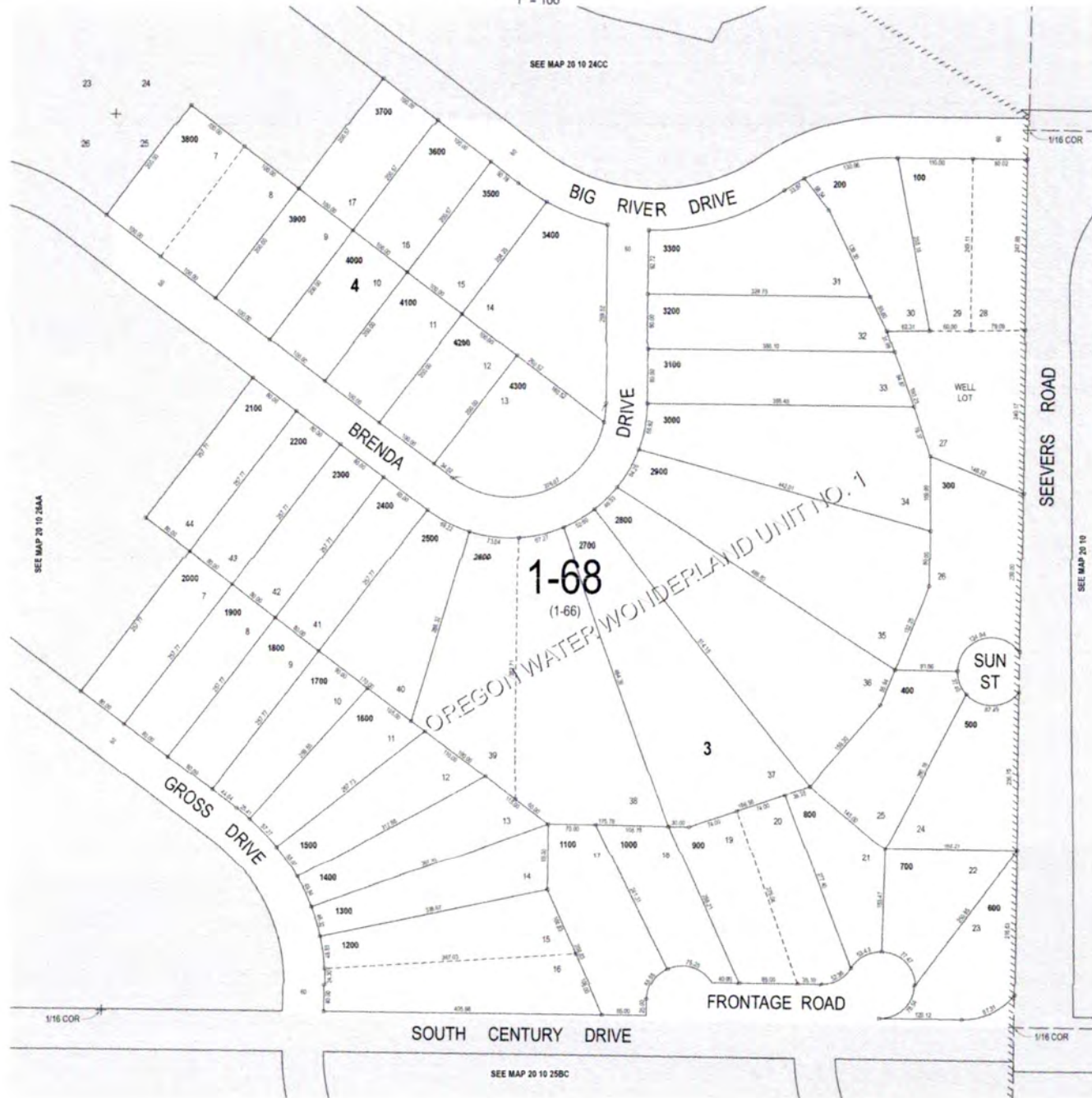
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

N.W. 1/4 N.W. 1/4 SEC. 25 T. 20S. R. 10E. W.M.
DESCHUTES COUNTY

20 10 25BB

8/23/2022

1" = 100'



20 10 25BB

Appendix B.

Deed

After Recording Return to:
First American Title



After recording return to:
Nuevo Dia Adventures, LLC
17074 Cooper Drive
Bend, OR 97707

Until a change is requested all tax
statements shall be sent to the
following address:
Nuevo Dia Adventures, LLC
17074 Cooper Drive
Bend, OR 97707

File No.: 7061-4194953 (SJN)
Date: August 16, 2024

THIS SPACE RESERVED FOR RECORDER'S USE

Deschutes County Official Records **2024-22576**
D-D **08/30/2024 09:44 AM**
Stn=53 SRB
\$25.00 \$11.00 \$10.00 \$61.00 \$6.00 **\$113.00**

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

STATUTORY WARRANTY DEED

Entrust Administration, Inc., FBO Harry E. Covert, IRA 35825 as to an undivided 50% interest and Entrust Administration, Inc., FBO Nancy J. Covert, IRA 35826 as to an undivided 50% interest, Grantor, conveys and warrants to Nuevo Dia Adventures, 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 Sixteen (16), Block Four (4), OREGON WATER WONDERLAND Unit No. 1, recorded July 17, 1969, in Cabinet A, Page 343, 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 **2024-2025** Taxes, a lien not yet payable.

The true consideration for this conveyance is **\$99,000.00**. (Here comply with requirements of ORS 93.030)

APN: **137514**

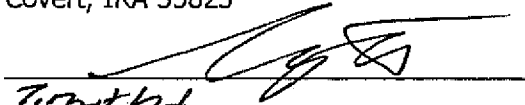
Statutory Warranty Deed
- continued

File No.: **7061-4194953 (SJN)**

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.

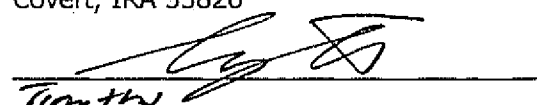
Dated this 28th day of August, 2024.

Entrust Administration, Inc., FBO Harry E.
Covert, IRA 35825



Timothy
Leary, Authorized Signer

Entrust Administration, Inc., FBO Nancy J.
Covert, IRA 35826



Timothy
Leary, Authorized Signer

APN: **137514**

Statutory Warranty Deed
- continued

File No.: **7061-4194953 (SJM)**

STATE OF _____)
County of _____) ss.

See attached

This instrument was acknowledged before me on this _____ day of _____, 20____
by _____ as _____ of Entrust Administration, Inc.,
FBO Harry E. Covert, IRA 35825, on behalf of the IRA.

Notary Public for _____
My commission expires:

STATE OF _____)
County of _____) ss.

See attached

This instrument was acknowledged before me on this _____ day of _____, 20____
by _____ as _____ of Entrust Administration, Inc.,
FBO Nancy J. Covert, IRA 35826, on behalf of the IRA.

Notary Public for _____
My commission expires:

ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California
County of Alameda)

On August 28th, 2024 before me, Charniece McGregory, Notary Public

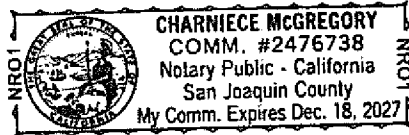
(insert name and title of the officer)
Timothy Liang, as the Authorizer Signor of Entrust Administration, Inc. FBO

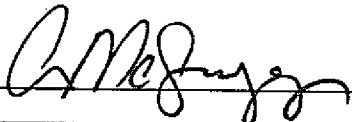
personally appeared Nancy J. Covert, IRA 35826, on behalf of the IRA.

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature  (Seal)

ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California
County of Alameda)

On August 28th, 2024 before me, Charniece McGregory, Notary Public

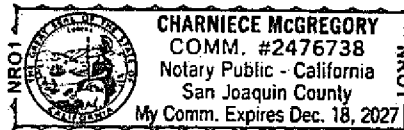
(insert name and title of the officer)
Timothy Liang, as the Authorizer Signor of Entrust Administration, Inc. FBO

personally appeared Harry E. Covert, IRA 35825, on behalf of the IRA.

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature

Charniece McGregory

(Seal)

Appendix C.

Site Evaluation Reports

CDD ARCHIVE COVER SHEET FOR MAS
07/21/2000 15:22:56 1 of 1

EH 001 ARCHIVE



FILE ID	201025B001500EH20000721999001
TAXMAP	201025B001500
SERIAL	137514
DIVISION	EH
SITUS	55706 BIG RIVER DR
HOUSE#	55706
STREET	BIG RIVER
CONTENT	ARCHIVE

09-870-76

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY

CERTIFICATE OF SATISFACTORY COMPLETION

SUBSURFACE OR ALTERNATIVE SEWAGE SYSTEM

09-870-76

Permit Number 09-~~870~~-76 Date 6-3-80

Name of owner Mark Halverson Installer's name Dick Cooper

Mailing address PO 4337 Sewage-Cesspool license No. 35771

Sumner, Or. Business address 53607 Deep Woods Lane

Exact location of proposed sewage disposal system OLUS U1 L16 R4

Total number: Living Units 1 Bedrooms 3 Baths _____

Water supply: Public system Community system Well Spring Cistern

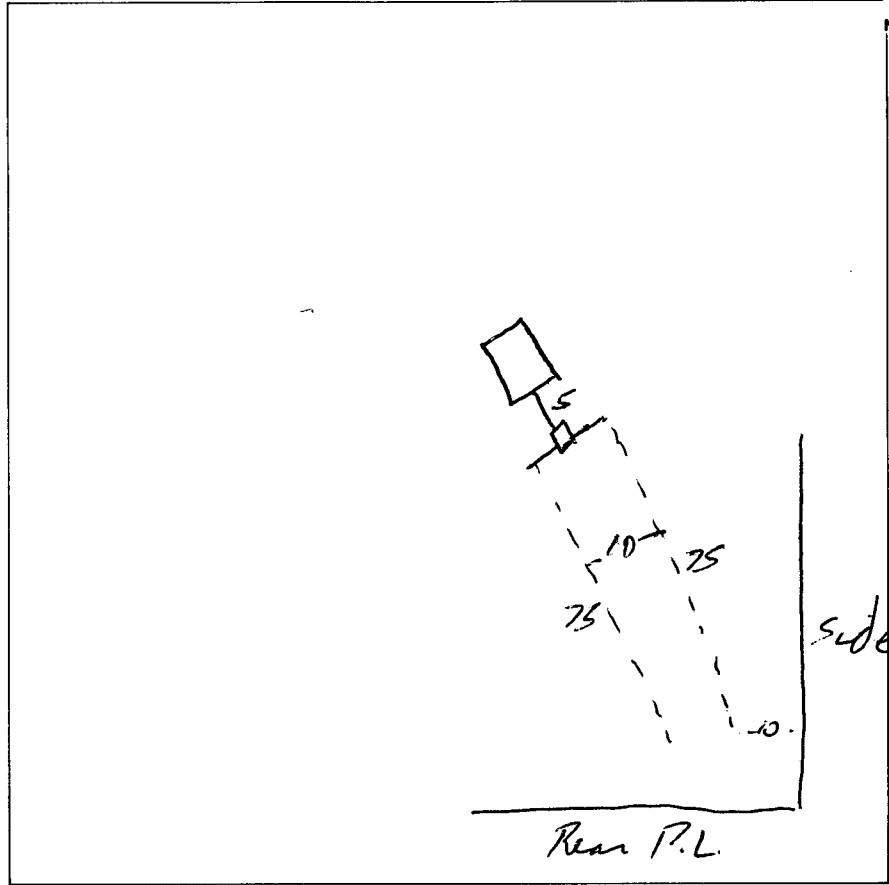
Septic tank: Material Steel Total liquid capacity 100 gal.

Distance from: Well, springs, or cistern _____ ft. Building foundation _____ ft.

Sub-surface tile or perforated pipe disposal field Other _____

Distribution box: Yes No
Length each line: _____ 75 75 ft.
Total length: _____ 150 ft.
Width of trench: _____ 2 ft.
Total square footage: _____ 300 ft.

Distance between lines: _____ 10 ft.
Filler material: Type RK Size 2 in.
Distance of sub-surface or other type of system from:
Water line _____ ft. Cistern _____ ft.
Well _____ ft. Spring _____ ft.
Nearest:
River _____ ft. Stream _____ ft. Lake _____ ft.
Nearest lot line:
Front _____ Side 10 Rear 10 ft.
Nearest foundation _____ ft.



In accordance with Oregon Revised Statute 454.665 this certificate is issued as evidence of satisfactory completion of a subsurface or alternative sewage disposal system at the above location.

Date of preliminary site approval 5-12-80 Soil conditions observed SL
Date of final inspection NOT approved Approved 6-4-80

REMARKS **This** septic tank permit was issued under the "Prior Approval Rule".
The system is substantial and therefore may not operate satisfactorily.
If the system fails and necessary repairs cannot be made in accordance
with current rules of the Commission, the system may have to be
abandoned.

Steven G. Holt
SANITARIAN DESCHUTES COUNTY 382-4000 ext. 236

address

Deschutes County Health Department

Permit No. 09-870-76

Courthouse Annex

Bend, Oregon 97701, Phone 382-4000, Ext. 60

Application for Individual Sewage Disposal System Permit

TO BE COMPLETED BY APPLICANT

(MARK HAKVORSON) P.O. 4337, SUNRIVER, ORE-97701

Property Owner: _____ Phone No. _____

Mailing Address: _____ 9 _____

Number of Bedrooms _____

Exact Location of System: _____

Lot 16 - B1K4

20-10-25B-1500

16 = 4

55712 Big River Dr. LHP

Applicant to furnish plot plan showing proposed type and size of building, lot lines, water supply, and irrigation canals or streams.

Permit

TO BE COMPLETED BY HEALTH DEPARTMENT

Permission is/is not granted for construction or installation provided the following conditions are met:

- () Septic tank _____ gallons (minimum).
- () Subsurface disposal field _____ square feet absorption area (minimum).
- () Other

THIS PERMIT ISSUED IN ACCORDANCE WITH PRIOR APPROVAL RULES OAR CHAPTER 340 PART 71-015 (8). PERMIT EXPIRES JULY 1, 1980. PLOT PLAN TO BE SUBMITTED AND APPROVED PRIOR TO INSTALLATION.

PLOT PLAN OK
J on M J on 5-12-80

MAXIMUM TRENCH DEPTH 18"

All work shall comply with the provisions of Oregon Administrative Rules governing the subsurface disposal of sewage.

"Record of Individual Sewage Disposal System" form to be completed by installer and delivered to Deschutes County Health Department prior to final inspection.

Fee paid: \$ _____

Date of issue: _____

Authorized by: _____

Department of Environmental Quality
1234 S. W. Morrison
Portland, Oregon 97205

RECEIVED JUN 30 1976

09-870-76

Land Quality
Deschutes County

Application to the Department of Environmental Quality
for a Permit to Construct a
New or Repair a Subsurface Sewage
Disposal System

Permit Fees: New \$50.00 Repair, Alteration \$15.00

A. REFERENCE INFORMATION

Oregon Water Wonderland Unit I

Harvey A Jerome
Name of Applicant

Lot #16 Block #4

48 Valleso ST
Address

Tax Lot or Account # 1500

Petaluma, Calif 94952
City

Location Deschutes County

Installers Name

B. GENERAL DESCRIPTION

Plot Plan UNKNOWN AT THIS TIME

New Construction _____ Repair _____

Installation will serve: House _____ Mobile Home _____ Mobile Home Park _____

Commercial Building _____ Other (Explain) _____

No. of Living Units _____ No. Bedrooms _____

Water Supply: Public _____ Community _____ Private _____ Garbage Disposal? _____

C. REQUIRED EXHIBITS

1. Proposed Subsurface Sewage Disposal System DEQ Interim Form #2

2. Planning Evaluation - Building Permit (Local Option)

3. Other (Local Option) _____

I hereby certify that the information contained in this application is true and correct to the best of my knowledge and belief.

Harvey A Jerome
Signature (Owner/Installer)

Permit No. _____

Date 6-25-76

Issued _____
Date

Interim Form #1

09-870-76

Deschutes County Planning Commission

DESCHUTES COUNTY COURTHOUSE ANNEX, ROOM 102 • PHONE 382-4000, EXT. 75
BEND, OREGON 97701

DESCHUTES COUNTY PLANNING COMMISSION

IN APPLYING FOR A PERMIT TO INSTALL A SEPTIC TANK
AND DRAINFIELD ON LOT 4 BLOCK 16, Oregon
Water Wonderland Unit I OR ATTACHED EXHIBIT "A", _____

I Harvey A Jerome CERTIFY THAT NO RECREATIONAL
OR RESIDENTIAL UNIT WILL BE PLACED ON THE ABOVE SAID PROPERTY
FOR A PERIOD OF MORE THAN THIRTY CONSECUTIVE DAYS (30); AND
THAT NO RECREATIONAL OR RESIDENTIAL USE OF A PERMANENT
NATURE WILL BE ESTABLISHED ON THE PROPERTY, ABOVE DESCRIBED,
UNLESS MOBILE HOME STANDARDS AND/OR BUILDING PERMITS HAVE
BEEN APPLIED FOR AS A PERMANENT RESIDENCE.

DATE 6-25-76

SIGNED Harvey A. Jerome
X

BEFORE ME THIS _____ DAY OF _____, 1975,

APPEARED _____.

NOTARY PUBLIC FOR OREGON
MY COMMISSION EXPIRES: _____

(SEAL)

09-870-76

Deschutes County Health Department

ENVIRONMENTAL HEALTH SECTION
COURTHOUSE ANNEX BEND, OREGON 97701

April 25, 1980

Harvey A. Jerome
48 Vallejo St.
Petaluma, CA 94952

Dear Sir:

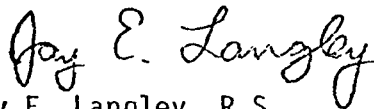
This office has a septic tank permit issued under your name. The permit was issued under the prior approval rule and expires on July 1, 1980. The septic tank and drainfield must be installed by that date or the use of the property may be lost.

If the property is approvable under Department of Environmental Quality rules, the drainfield would not need to be installed by July 1, 1980. This could be determined by applying for a feasibility statement at this office. The cost would be \$65.00 and two five foot deep backhoe test holes on the lot would have to be provided for our evaluation. If the lot is approvable you would receive a statement in writing which would allow you to install a drainfield at a future date. If the lot was denied you could still install the septic system before July 1, 1980 under the current permit.

If you are planning to install the septic system before July 1, 1980, please submit a plot plan for our approval prior to construction. The plot plan should include the house, well, water lines, driveway and the septic tank and drainfield.

If there are any questions, please contact this office.

Sincerely,



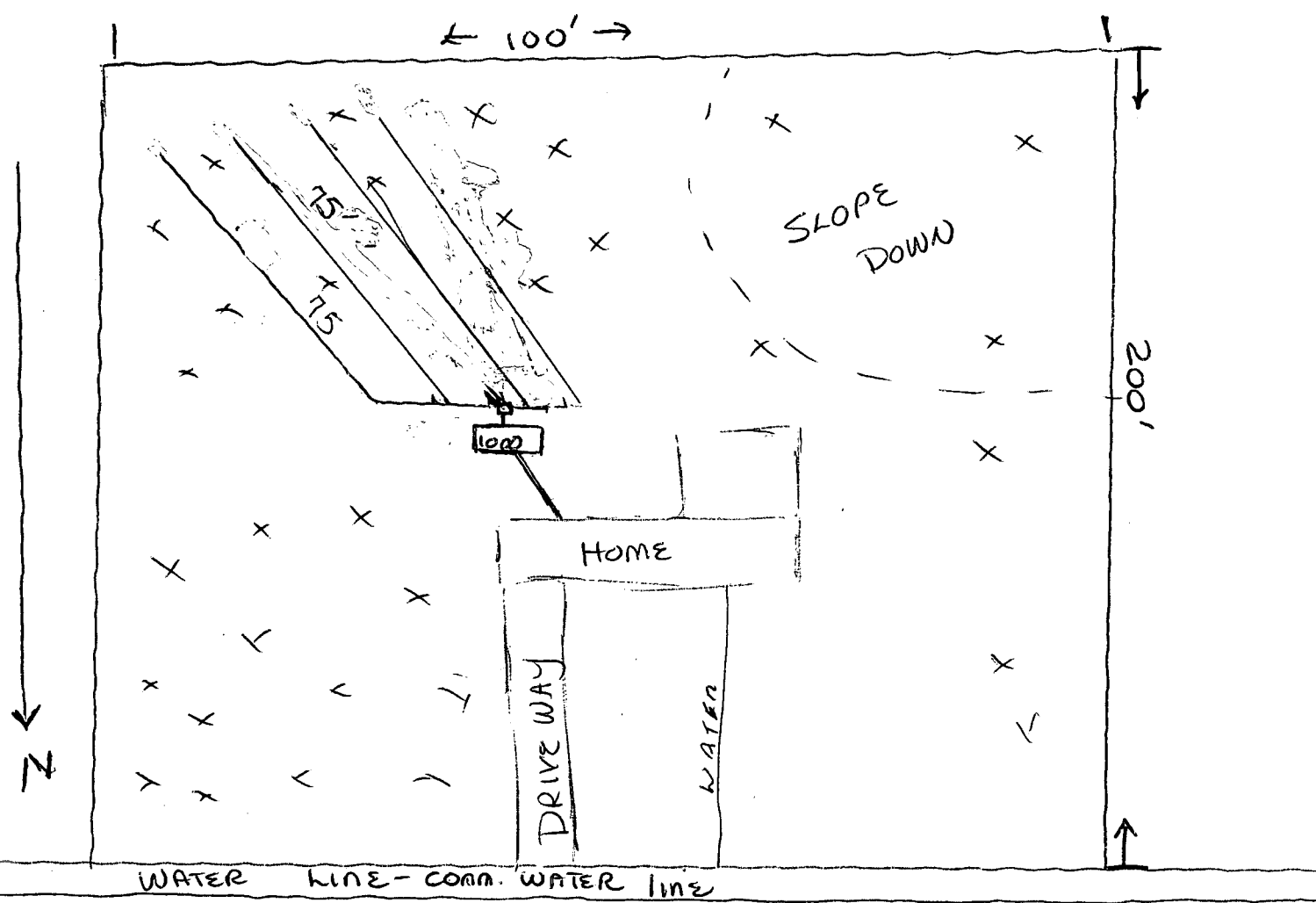
Jay E. Langley, R.S.
Field Supervisor

JEL:mr

W.W. UNIT. ①

X-TREES

Price Approval
09-870-76



Big River Dr.

Block 4 MAP 201025 B
LOT 16 TAX LOT 1500

Permit # 09-870-76

RECEIVED MAY 9 1980

09-870-76

N ↑

(1) Individual sub-surface sewage disposal system not allowed closer than 150 feet of the river.
 (2) Community sewer system not to be installed in all lots for buildings from South and East lines of Sec. 23 per survey made by John W. Hammons.
 All lot frontage on roadways shall be 10 to 100 foot utility easement.

**MOUNTAIN VIEW
 PROPERTIES
 REAL ESTATE**



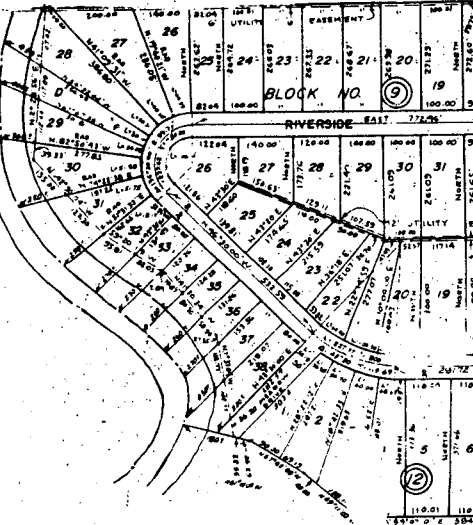
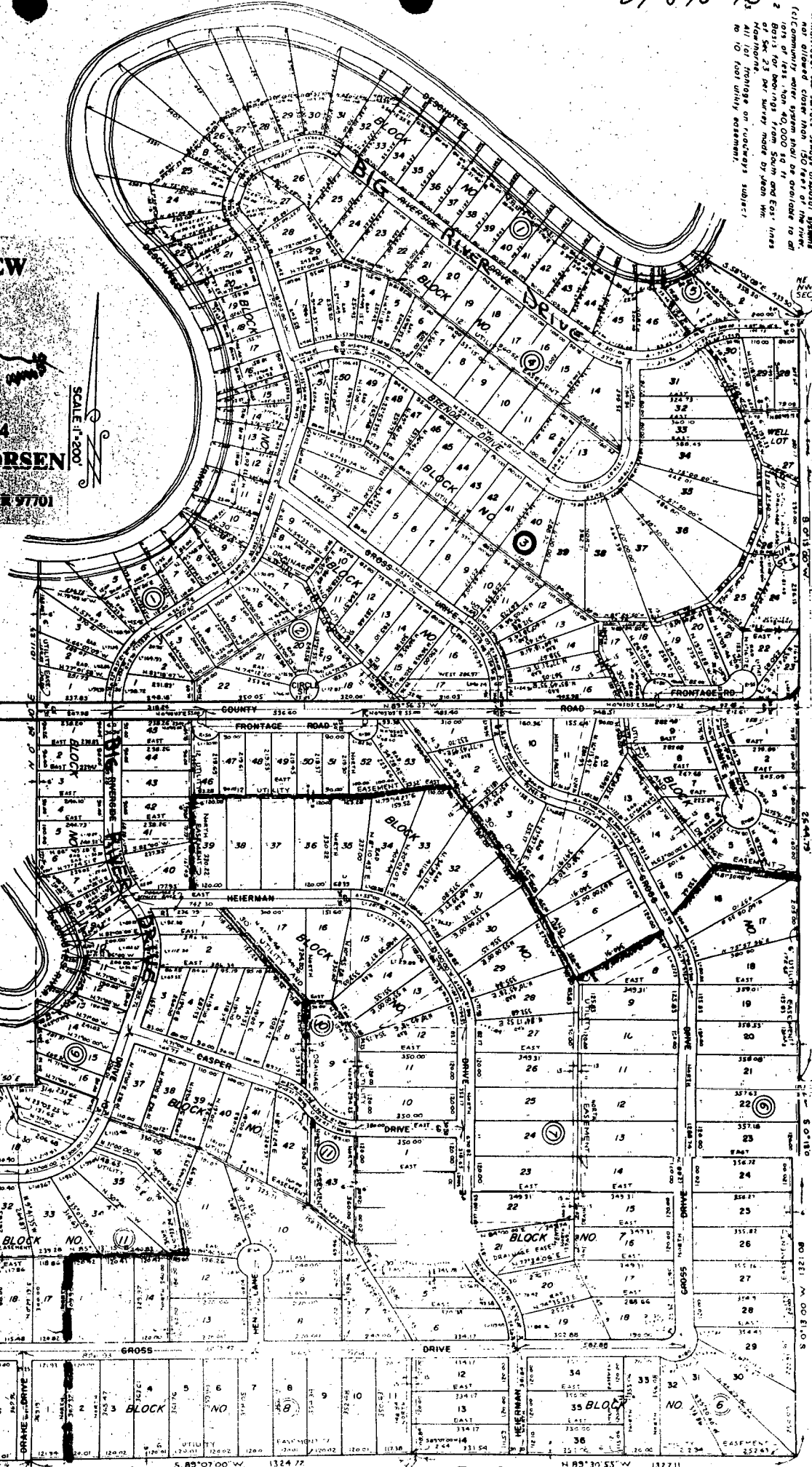
(503) 593-1274

MARK HALVORSEN

Bus. Park • Sunriver, OR 97701

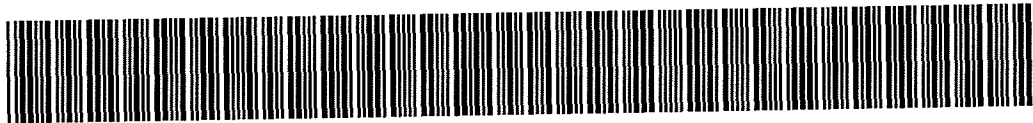
SCALE 1"=200'

General Patch Bridge



CDD COVER SHEET FOR JKH
05/07/2013 14:41:26

EH
6 PAGES



FILE ID	201025B001500EH20130507144126
TAXMAP	201025B001500
SERIAL	137514
DIVISION	EH
SITUS	55706 BIG RIVER DR
HOUSE#	55706
STREET	BIG RIVER
CONTENT	F24046 SITE EVAL
RECORD ID	F24046

Cover Sheet Identifier
AHJKMTWX



COMMUNITY DEVELOPMENT
PO Box 6005, Bend, Oregon 97708
117 NW Lafayette Avenue, Bend, OR 97701
Telephone (541)388-6575, Fax (541)385-1764
<http://www.deschutes.org/cdd>

April 26, 2013

ENTRUST ADMINISTRATION INC FB
113 Batista Ct.
Palm Desert, CA. 92211

RE: F-24046
55706 Big River Dr. Bend, Or,
201025B 01500

Dear Sirs:

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 April 24, 2013. Part of the evaluation is to determine the level to which the ground water 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 this property the indicators suggest the water table may rise to within **19-23 inches** of the ground surface. Past observations and 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 observed and conditions associated with saturation within 19-23 inches of the ground surface. Water monitoring on the lot to the west in spring of 2006 showed the permanent water table did rise from 17 inches to 22 inches below ground surface. Both lots are on same landscape position.**

DEQ rules do not allow installation of a Standard Drainfield, Capping Fill Drainfield, Pressurized Distribution System or Sand Filter System in these circumstances. [OAR 340-71-290(b)]. Installation of an Alternative Treatment Technology (ATT) requires a standard, capping fill, pressurized drainfield, or sand filter system for final treatment and dispersal. Therefore, if a conventional drainfield or sand filter system cannot be installed on the property, an ATT cannot be used.

Oregon Department of Environmental Quality Rules (DEQ) require a minimum 4-foot separation between the bottom of a wastewater dispersal trench and the highest level a permanent water

Quality Services Performed with Pride

table may reach. Drainfields must be installed a minimum of 12 inches into the ground. Drainfields can only be installed, therefore, where the water table does not rise closer than 5 feet from the ground surface. This allows for the 4-foot separation from the bottom of the trench to the water. [OAR Chapter 340-71-220(1)(d) and (2)(b)(A), copy enclosed.] These rules also require 24 inches of separation between the highest level reached by the water table and the bottom of a surface mounted sand filter system. A sand filter is an alternative onsite system that provides high quality wastewater treatment.

Because the property does not meet any of the criteria for onsite wastewater treatment and dispersal areas, this property is denied for an onsite wastewater treatment system.

You have 90 days to provide additional test pits for evaluation at no additional fee. However, it appears that other areas on this 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.

Pursuant to Oregon Administrative Rules (OAR Chap. 340-071), 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 Environmental Health 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 475 NE Bellevue Dr., Suite 110, Bend OR 97701, phone 541-388-6146.

Quality Services Performed with Pride

If you have any questions, please do not hesitate to call this office at 541-388-6575.
Sincerely,

ENVIRONMENTAL SOILS DIVISION



Todd Cleveland, REHS
Registered Environmental Health Specialist

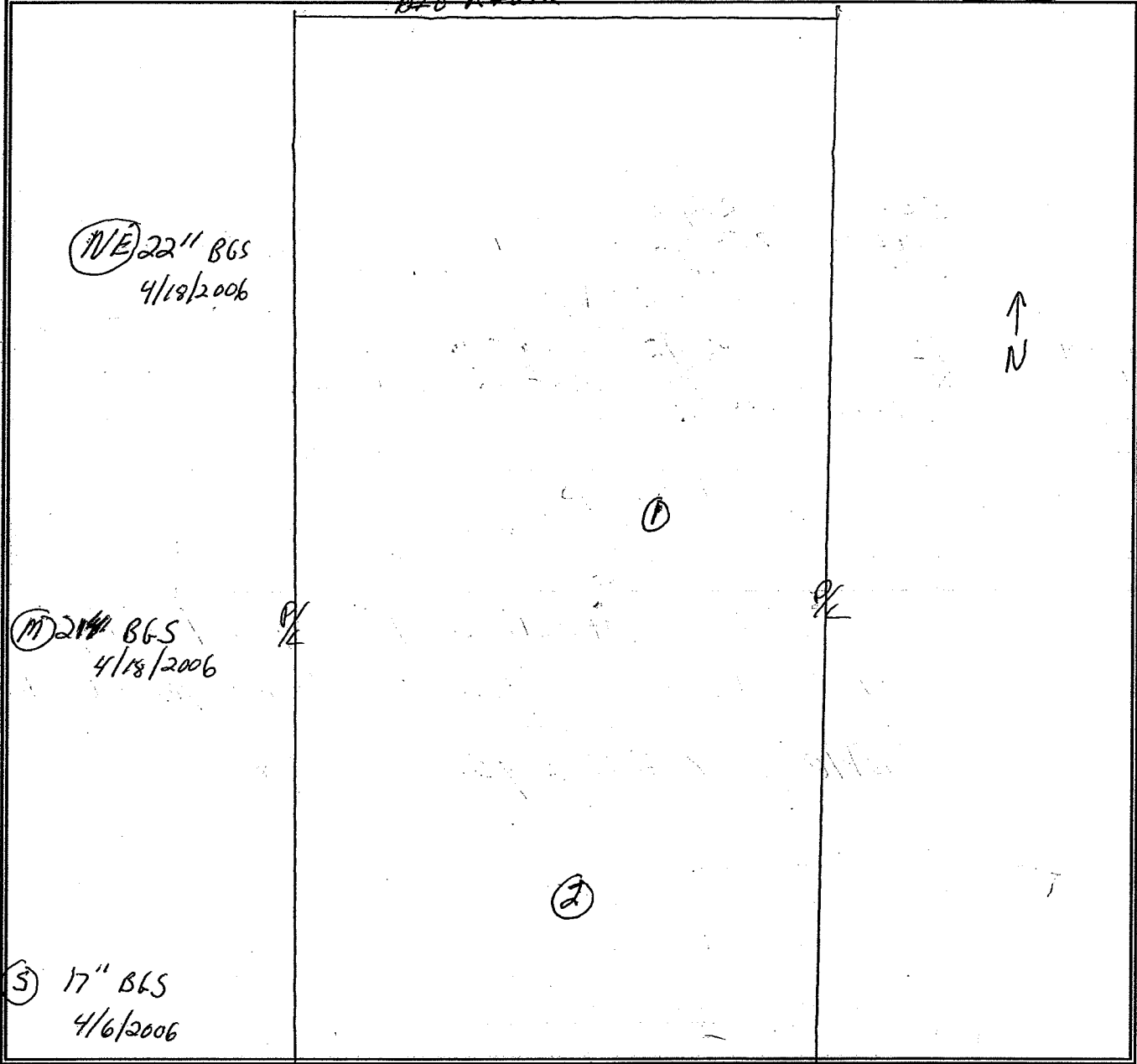
cc: Bob Baggett (Department of Environmental Quality)

SITE EVALUATION FIELD INSPECTION FORM

Applicant: Entrust Administration Site Evaluation # F24046
 Date: 4/24/13 Subdivision: _____ L _____ B _____ Parcel Size: 0.5
 Evaluator: DWH T 20 R 10 S 25B TL 1500
 Suitable _____ Sketch/Not to Scale _____ **Unsuitable**

B76 RTUER

Unsuitable



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

Special Conditions: Denied due to conditions of Saturation less than
24 inches, Monitored 2006 next lot over all spots
Rose to over

SITE EVALUATION FIELD INSPECTION FORM

Applicant: _____ Site Evaluation # F 24046

Evaluator: DWH Date: 4/19/13 Parcel Size: .53

Subdivision: _____ T 20 R 10 S 25B TL 1500 L _____ B _____

DEPTH	TEXTURE	COLOR	Notes on mottling, roots, structure, layer limiting effective soil depth, % loose rock, etc.
-------	---------	-------	--

0-23	SL	10VR 2/2	sq, 2mt roots
23-33	Silt/Loam	7.5VR 5/2	2shk, 1 f roots, m. d. (5/6) conc.
33-40	silt	white	no roots
H ₂ O at 41" bgs			

0-19	SL	10VR 3/2	sq 12mt roots
19-23	SL	3/2	2ft (1/2) m. d. conc.
23-35	Silt/Loam	7.5VR 3/2	

Heat 38" bgs			
--------------	--	--	--

Conditions of saturation at 23" bgs and 19" bgs water obs on lot to west confirms ground water			
---	--	--	--

table 17-22" bgs. -2006			
-------------------------	--	--	--

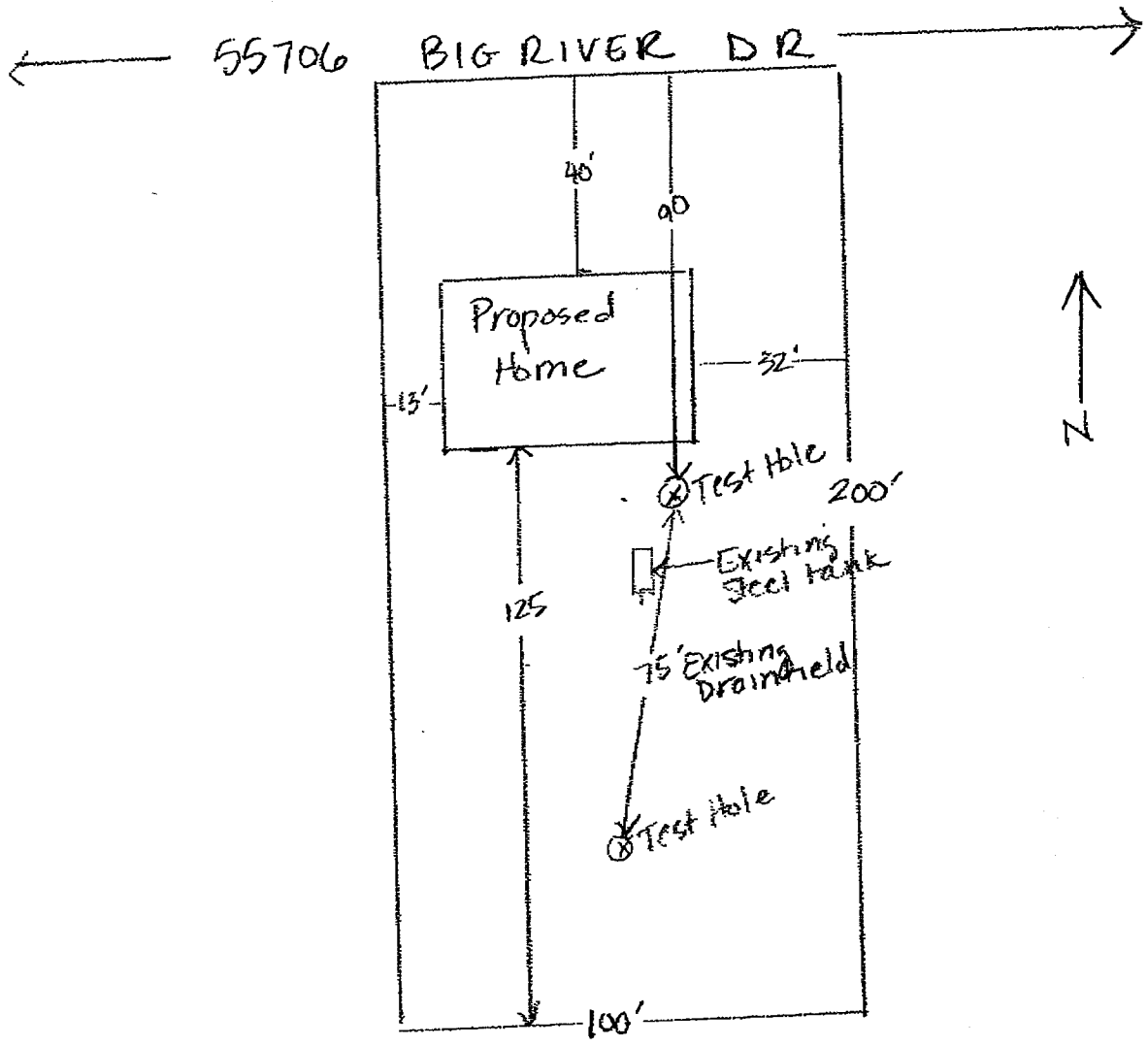
Landscape Note: Vegetation indicates moist Region

Slope: _____ Aspect: _____ Groundwater: perched

Other site notes: _____

Comments: _____

Reason for Unsuitability: (Include Rule Reference) _____



Harry & Nancy Covert
 113 Batista Ct.
 Palm Desert, CA 92211
 760-200-0094

55706 Big River Dr.
 20-10-25th BO - 01500
 OWLW 1 - Lot 16 BK 4
 Bend, OR 97707

Scale: 1/4" = 10'

SRC, Inc.
 PO Box 2099 La Pine, OR 97739
 Ph (541) 536-9735 Fx (541) 536-7445
 Lic #156878 DEQ #36839

APPLICATION FOR
INDIVIDUAL SITE
EVALUATION

DESCHUTES COUNTY
COMMUNITY DEVELOPMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
117 NW LAFAYETTE AVE., BEND, OR 97701 (541) 388-6574
737 SW Cascade Ave, Redmond, OR (541) 386-1713

Evaluation Number

F 24046

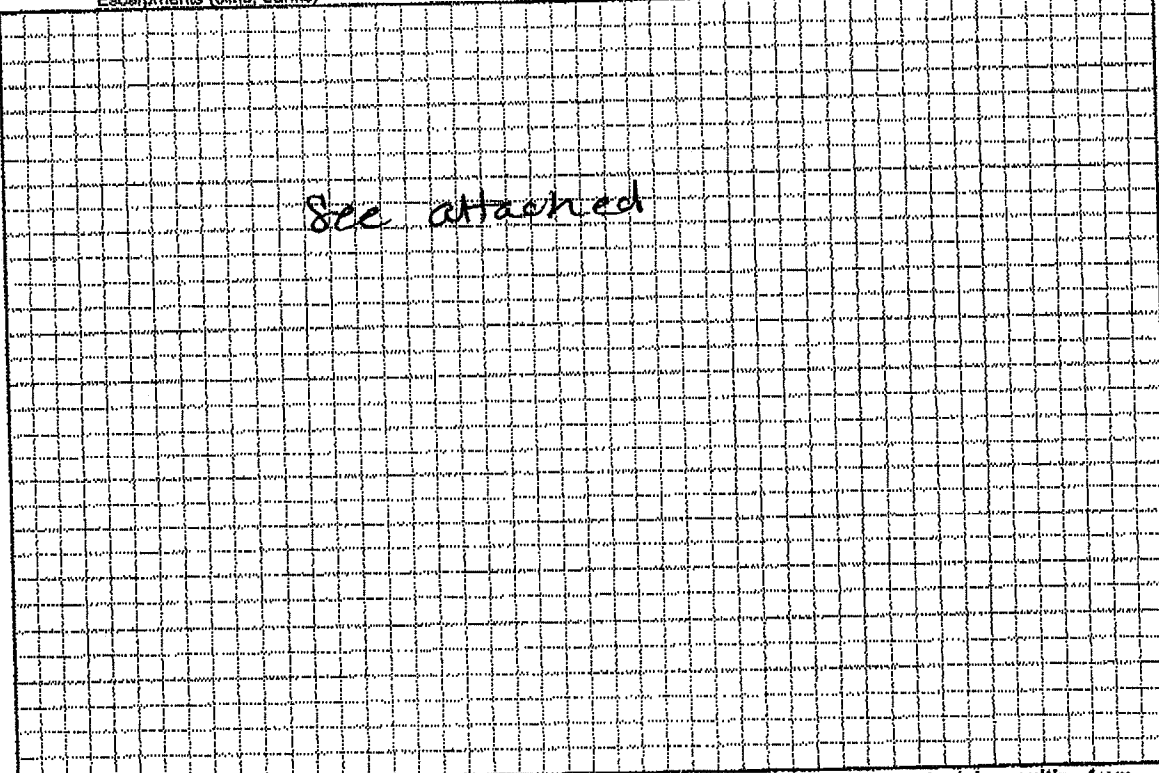
The following information is required to complete an application for a site evaluation. Please be as accurate and complete as possible.

TOWNSHIP	205	RANGE	10E	SECTION	25	TAX LOT	1500	LEGAL LOT	16	ZONING	WA, RR10, LM
SUBDIVISION	OWN 1										
ADDRESS OF PARCEL	55706 Big River Dr., Bend										
PARCEL SIZE IN SQ FT			NUMBER OF BEDROOMS	3		WATER SOURCE		OWN water			
OR ACRES											
NAME OF OWNER	Hang + Nancy Covert					AUTHORIZED REPRESENTATIVE			TELEPHONE		
						SRC, Inc.					
MAILING ADDRESS	113 Batista Ct					MAILING ADDRESS			P.O. Box 2097		
CITY	Palm Desert	STATE	CA	ZIP	92211	CITY	LaBine	STATE	OR	ZIP	97137
COMMENTS/REMARKS						PLANNING NOTIFICATION					

FOR COMMERCIAL USE ONLY		DAILY FLOW	FEE
TYPE OF USE			
Please answer the following questions:		YES	NO
1. Are there any bodies of water on or adjacent to this property?		<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Are there existing wells on the property?		<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Are there any proposed wells on the property?		<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Are there existing wells on adjacent property?		<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Will this property be served by a community water supply?		<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Are there any encumbrances which could prevent or effect the installation of a subsurface sewage disposal system? (Liens, easements)		<input type="checkbox"/>	<input checked="" type="checkbox"/>
TEST HOLES ARE READY?	<input checked="" type="radio"/> YES <input type="radio"/> NO		

In this area below, sketch the parcel showing the location of:
Adjoining roads or streets
Property lines and dimensions
Location of test pits
Escarpments (cliffs, banks)

Existing and proposed wells
All bodies of water (rivers, canals, ponds)
Wells on adjacent properties
Reservoirs and/or cisterna
Waterlines



The Applicant agrees that Deschutes County will not be responsible for any problems or denials resulting from incorrect or incomplete information supplied by the applicant.

READ BEFORE SIGNING	DATE	AMOUNT
SIGNATURE OF OWNER/AUTHORIZED REPRESENTATIVE		
x Lorie Ruxey	4/19/13	

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



Preface

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

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

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

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

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

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

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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

Custom Soil Resource Report

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

Custom Soil Resource Report

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 (55706 Big River)



Map Scale: 1:507 if printed on A portrait (8.5" x 11") sheet.


0 5 10 20 30 Meters

0 20 40 80 120 Feet

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 22, Aug 30, 2024

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 (55706 Big River)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
29A	Cryaquolls, 0 to 3 percent slopes	0.1	24.7%
144A	Sunriver sandy loam, 0 to 3 percent slopes	0.4	75.3%
Totals for Area of Interest		0.5	100.0%

Map Unit Descriptions (55706 Big River)

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,

Custom Soil Resource Report

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

29A—Cryaquolls, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 245b

Elevation: 3,000 to 4,500 feet

Mean annual precipitation: 15 to 35 inches

Mean annual air temperature: 40 to 45 degrees F

Frost-free period: 10 to 50 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Cryaquolls and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cryaquolls

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Pumice over mixed alluvium

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

H1 - 1 to 3 inches: silt loam

H2 - 3 to 15 inches: loam

H3 - 15 to 19 inches: sandy loam

H4 - 19 to 23 inches: loamy sand

H5 - 23 to 61 inches: sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: About 0 to 24 inches

Frequency of flooding: Rare

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: B/D

Ecological site: R006XB102OR - Cold Wet Meadow

Hydric soil rating: Yes

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

Map Unit Setting

National map unit symbol: 2411

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 - Cryic Aquic Pumice Basins (PICO/SPDO-VAUL)

Other vegetative classification: Pinus contorta/Vaccinium uliginosum/forb (CLM311)

Hydric soil rating: No

Custom Soil Resource Report

Minor Components

Cryaquolls

Percent of map unit: 8 percent

Landform: Mountains

Ecological site: R006XB102OR - Cold Wet Meadow

Hydric soil rating: Yes

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Custom Soil Resource Report

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Appendix E.

Water Well Reports

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PAGE 1 of 2

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NOV 24 1999

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

DESC 52615

SEP 13 1999 WELL I.D.# L 36273 WATER RESOURCES DEPT SALEM, OREGON

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

(1) OWNER: Well Number Oregon Water Wonderland Name P.O. Box 3584 Address Sun River State OR Zip 97707

(2) TYPE OF WORK: [X] New Well [] Deepening [] Alteration (repair/recondition) [] Abandonment

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

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

(5) BORE HOLE CONSTRUCTION: Special Construction approval [] Yes [X] No Depth of Completed Well 650ft. Explosives used [] Yes [X] No Type Amount

Table with columns: Diameter, From, To, Material, From, To, Sacks or pounds. Includes entries for Cement and other materials.

How was seal placed: Method [] A [] B [X] C [] D [] E Backfill placed from ft. to ft. Material Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER: Table with columns: Diameter, From, To, Gauge, Steel, Plastic, Welded, Threaded. Includes entries for 14", 12", 10" casing and 8" liner.

(7) PERFORATIONS/SCREENS: Table with columns: From, To, Slot size, Number, Diameter, Tele/pipe size, Casing, Liner. Includes entry for Factory cut.

(8) WELL TESTS: Minimum testing time is 1 hour. [] Pump [] Bailer [X] Air [] Artesian. Yield gal/min 600, Drawdown 50, Drill stem at 630, Time 1 hr.

Temperature of water 49.0 Depth Artesian Flow Found Was a water analysis done? [] Yes [] No By whom Did any strata contain water not suitable for intended use? [] Too little [] Salty [] Muddy [] Odor [] Colored [] Other Depth of strata

LOCATION OF WELL by legal description: County Desc Latitude Longitude Township 20 S N or S Range 10 E E or W. WM. Section 25 NW 1/4 NW 1/4 Tax Lot 4100 Lot Block 3 Subdivision OWW Street Address of Well (or nearest address) Big River Or

(10) STATIC WATER LEVEL: 13 ft. below land surface. Date 8-18-99 Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES: Depth at which water was first found 6

Table with columns: From, To, Estimated Flow Rate, SWL. Includes entries for 6, 517, 585 and flow rates like 10 gpm, 200 gpm, 600 gpm.

(12) WELL LOG: Ground Elevation

Table with columns: Material, From, To, SWL. Lists soil layers like Sandy loam top soil, Hard brown clay, Yellow clay, etc.

Date started Completed (unbonded) Water Well Constructor Certification: I certify that the work I performed on the construction, alteration, or abandonment of this well... Signed Mark Kuhn WWC Number Trainer Date 8-28-

(bonded) Water Well Constructor Certification: I accept responsibility for the construction, alteration, or abandonment work performed on this well... Signed David Kuhn WWC Number 1568 Date 9-8-

DESC 52615

SEP 13 1999

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

WATER RESOURCES DEPT. SALEM, OREGON

WELL I.D. # L START CARD #

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

(1) OWNER: Well Number Name Address City State Zip

(2) TYPE OF WORK: New Well Deepening Alteration Abandonment

(3) DRILL METHOD: Rotary Air Rotary Mud Cable Auger Other

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

(5) BORE HOLE CONSTRUCTION: Special Construction approval Yes No Depth of Completed Well

HOLE SEAL table with columns for Diameter, From, To, Material, Sacks or pounds

How was seal placed: Method A B C D E Backfill placed from Gravel placed from

(6) CASING/LINER: table with columns for Diameter, From, To, Gauge, Steel, Plastic, Welded, Threaded

(7) PERFORATIONS/SCREENS: table with columns for From, To, Slot size, Number, Diameter, Material, Casing, Liner

(8) WELL TESTS: Minimum testing time is 1 hour. Pump Bailer Air Flowing Artesian. Yield gal/min Drawdown Drill stem at Time Temperature of water Depth Artesian Flow Found

(9) LOCATION OF WELL by legal description: County Latitude Longitude Township N or S Range E or W. WM. Section 1/4 1/4 Tax Lot Lot Block Subdivision Street Address of Well

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

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

Table with columns: From, RECEIVED, Estimated Flow Rate, SWL. Date: NOV 24 1999

(12) WELL LOG: SALEM, OREGON Ground Elevation

Table with columns: Material, From, To, SWL. Handwritten entries: Hard grey clay + Pumice, Grey Bagelt, Fractured gray lava, 22 sack slurry mix was used to seal 10" liner pipe at 565-, K-Packers were placed between the 12" and 14" pipes at 26" and 29", K-Packers between the 10" and 12" pipes are at 75" and 85", K-Packers between the 8" and 10" pipes are at 455", 460", 465" and 470"

Date started May 17, 99 Completed August 20, 99 (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 water supply well construction standards.

(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 water supply well construction standards.

RECEIVED

STATE OF OREGON WATER WELL REPORT (as required by ORS 537.799) WATER RESOURCES DEPT

JUL 18 1986

DESC 6092

20s/10E-2566 Deep.

(1) OWNER: SALEM, OREGON 97308-86-10 Name Ore. Water Wonderland Water Imp. Dist. Address 55579 S. Century Drive City Bend State Oregon Zip 97707

(2) TYPE OF WORK: [X] Deepen [] Recondition [] Abandon [] New Well [] Rotary Air [] Rotary Mud [X] Cable [] Other

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

(4) PROPOSED USE: [X] Community [] Industrial [] Irrigation [] Domestic [] Thermal [] Injection [] Other

(5) BORE HOLE CONSTRUCTION: Depth of Completed Well 642 ft. Special Standards date of approval --

Table with columns: HOLE Diameter, SEAL Material, Amount sacks or pounds. Row 1: 8, 385-647, UNDISTURBED

How was seal placed? Method [] A [] B [] C [] D [] E [] Other

Backfill placed from NO ft. to NO ft. Material Gravel placed from NO ft. to NO ft. Size of gravel

(6) CASING/LINER: Table with columns: Diameter, From, To, Gauge, Steel, Plastic, Welded, Threaded. Casing: 8", 385-575, .250, [X] Steel, [] Plastic, [X] Welded, [] Threaded

(7) PERFORATIONS/SCREENS: NONE [] Perforations [] Screens

Table for Perforations/Screen details with columns: From, To, Slot size, Number, Diameter, Tele/pipe size, Casing, Liner

(8) WELL TESTS: Minimum testing time is 1 hour [X] Pump [] Bailer [] Air [] Flowing Artesian Yield gal/min 160 Pumping level 148 Drill stem at Time 24hrs

Temperature of water 56° Depth Artesian Flow Found Was a water analysis done? [X] Yes By whom Sun Country Eng. Did any strata contain water not suitable for intended use? [] Too little [] Salty [] Muddy [] Odor [] Colored [] Other

(9) LOCATION OF WELL by legal description: County Deschutes Latitude Longitude Township 20S Range 10E or W, WM. Section 25 NW NW Tax Lot Street Address of Well (or nearest address) Oregon Water Wonderland

(10) STATIC WATER LEVEL: 5.5 ft. below land surface. Date 6-20-86 Artesian pressure lb. per square inch. Date

(11) WELL LOG: Table with columns: Material, From, To, WB?, SWL. Rows include: Fine Blk Sand/Pumice, Greenish Gray clay/sand, Heaving blk sand, Hard pink/gray clay, Hard Gray clay, Gray clay/pumice, Gray Lava, Pumice/broken rock, Broken gray Lava, Coarse blk sand/Sgravel, Brkn blk rock/tan clay

Date started 5-27-86n Completed 7-10-86

(unbonded) Water Well Constructor Certification: I constructed this well in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief. Signed Date

(bonded) Water Well Constructor Certification: I accept responsibility for construction of this well and its compliance with all Oregon water well standards. This report is true to the best of my knowledge and belief. Signed [Signature] Date 7/13/86 Company Big Three Drilling Co. Job No. 398-86-10

NOTICE TO WATER WELL CONTRACTOR

The original and first copy of this report are to be filed with the

STATE ENGINEER, SALEM, OREGON 97310 within 30 days from the date of well completion.

RECEIVED WATER WELL REPORT STATE OF OREGON (Please type or print) Do not write above this line) STATE ENGINEER SALEM, OREGON

DESC 6096

20/10/25 20/10-26

State Well No.

State Permit No.

(1) OWNER:

Name Oregon Water Wonderland Address 538 W. Highland Redmond, Ore.

(2) TYPE OF WORK (check):

New Well [] Deepening [x] 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 [] Industrial [] Municipal [] Irrigation [] Test Well [x] Other []

CASING INSTALLED:

Threaded [] Welded []

Diam. from None ft. to ft. Gage

PERFORATIONS:

Perforated? [] Yes [x] No.

Type of perforator used

Size of perforations in. by in. 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.

(8) WATER LEVEL: Completed well.

Static level 3 ft. below land surface Date 11/3/69 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? Bailor test 20 gal./min. with 120 ft. drawdown after 1 hrs. Artesian flow g.p.m. Date Temperature of water 51 degrees Was a chemical analysis made? [] Yes [x] No

(10) CONSTRUCTION:

Well seal—Material used See # 12 Depth of seal ft. Diameter of well bore to bottom of seal 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? [x] Yes [] No Size of gravel: 3/4 Gravel placed from 370 ft. to 686 ft.

(11) LOCATION OF WELL:

County Deschutes Driller's well number Section 26 T. 20-S. R. 10-E W.M. Bearing and distance from section or subdivision corner

(12) WELL LOG:

Diameter of well below casing 6

Depth drilled 271 ft. Depth of completed well 686 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.

Table with columns: MATERIAL, From, To, SWL. Rows include: Gravel (small) Black sand (fine), Brown clay, Black sand (fine), Brown clay, Black sand (med), Green clay, Brown clay, Bkk. Hard Rock, Brn. clay strips of sand.

This well was already cased to 374 - Seal undisturbed.

Work started 10/14 1969 Completed 11/3 1969 Date well drilling machine moved off of well 11/3 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] W. M. Cunningham Date 11/3, 1969 (Drilling Machine Operator)

Drilling Machine Operator's License No. 370-522

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 Cunningham Well Drilling (Person, firm or corporation) (Type or print) Address P.O. Box 104 Bend, Ore. [Signed] W. M. Cunningham (Water Well Contractor) Contractor's License No. 474 Date 11/3, 1969

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

AUG 17 1992

DBSC
 1441

20s/10e/25b

WATER RESOURCES DEPARTMENT
 SALEM, OREGON 97331

(START CARD) # 33160

(1) **OWNER:** Well Number 577-20-92
 Name Oregon Water Wonderland Water Imp. Dist.
 Address P.O. Box 3584
 City Sun River State Oregon 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 753 ft.
 Explosives used Yes No Type _____ Amount _____

Diameter	HOLE		Material	SEAL		Amount sacks or pounds
	From	To		From	To	
8"	410	745	undisturbed			
6"	745	753				

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:				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liner:	6"	+2	-745	.188	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Final location of shoe(s) _____

(7) **PERFORATIONS/SCREENS:**
 Perforations Method Machine
 Screens Type _____ Material _____

From	To	Slot size	Number	Diameter	Tel./pipe size	Casing	Liner
-720	-740	1/8x3	239	6		<input type="checkbox"/>	<input checked="" type="checkbox"/>

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

Pump Bailer Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
200	60	630	1 hr.
100	30	745	1hr
30	0	615 & 738	1 hr. each

Temperature of Water 46° 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: 575 to 600

(9) **LOCATION OF WELL by legal description:**
 County Deschutes Latitude _____ Longitude _____
 Township 20 ~~XXX~~ S. Range 10 E ~~XXX~~ W. M.
 Section 25 NW 1/4 NW 1/4
 Tax Lot 4100 Lot 27 Block 3 Subdivision OWW#1
 Street Address of Well (or nearest address) Big River Drive
 Unit 1 Well #2

(10) **STATIC WATER LEVEL:**
11 ft. below land surface. Date 7-16-92
 Artesian pressure _____ lb. per square inch. Date _____

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

From	To	Estimated Flow Rate	SWL
685	753	200+	11

(12) **WELL LOG:** Ground elevation _____

Material	From	To	SWL
Cement	410	685	
Red Cinder, Boulders & Sand	685	753	11
IK&H formation packers	640		
"	645		
"	590		
"	595		

Date started 7-16-92 Completed 8-12-92

(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.

Signed David J. Kulan WWC Number 1568
 Date 8-12-92

(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.

Signed [Signature] WWC Number 685
 Date 8-12-92

Pump

Appendix F.

**RidNOx™ and
Lysimeter Installation,
and Sampling Instructions**



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.



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.



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 (NO₃-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**



475 NE Bellevue Dr, Bend, OR 97701 to 55706 Big River Dr, Bend, OR 97707

You can enter notes here.

475 NE Bellevue Dr

Bend, OR 97701

Take NE Dalton St to US-20

- ↑ 1. Head north toward NE Dalton St 35 sec (463 ft)
- ↪ 2. Turn right toward NE Dalton St 79 ft
- ↪ 3. Turn right onto NE Dalton St 148 ft
- ↪ 236 ft

Take SE 27th St, Knott Rd, US-97 S and S Century Dr to Big River Dr

- ↪ 4. Turn right onto US-20 32 min (23.7 mi)
- ↶ 5. Turn left onto SE 27th St 0.2 mi
- ↶ 6. Slight left to stay on SE 27th St 1.4 mi
- ↑ 7. Continue onto Knott Rd 1.9 mi
- ↻ 8. At the traffic circle, take the 2nd exit and stay on Knott Rd 1.2 mi
- ↶ 9. Slight right 3.0 mi
- ↶ 10. Merge onto US-97 S 0.3 mi
- ↶ 11. Slight right onto Vandevent Rd 12.0 mi
- ↶ 12. Turn left onto S Century Dr 1.0 mi
- ↪ 13. Turn right to stay on S Century Dr 1.1 mi
- ↪ 1.5 mi
- ↪ 14. Turn right onto Big River Dr 2 min (0.6 mi)
📍 Destination will be on the left

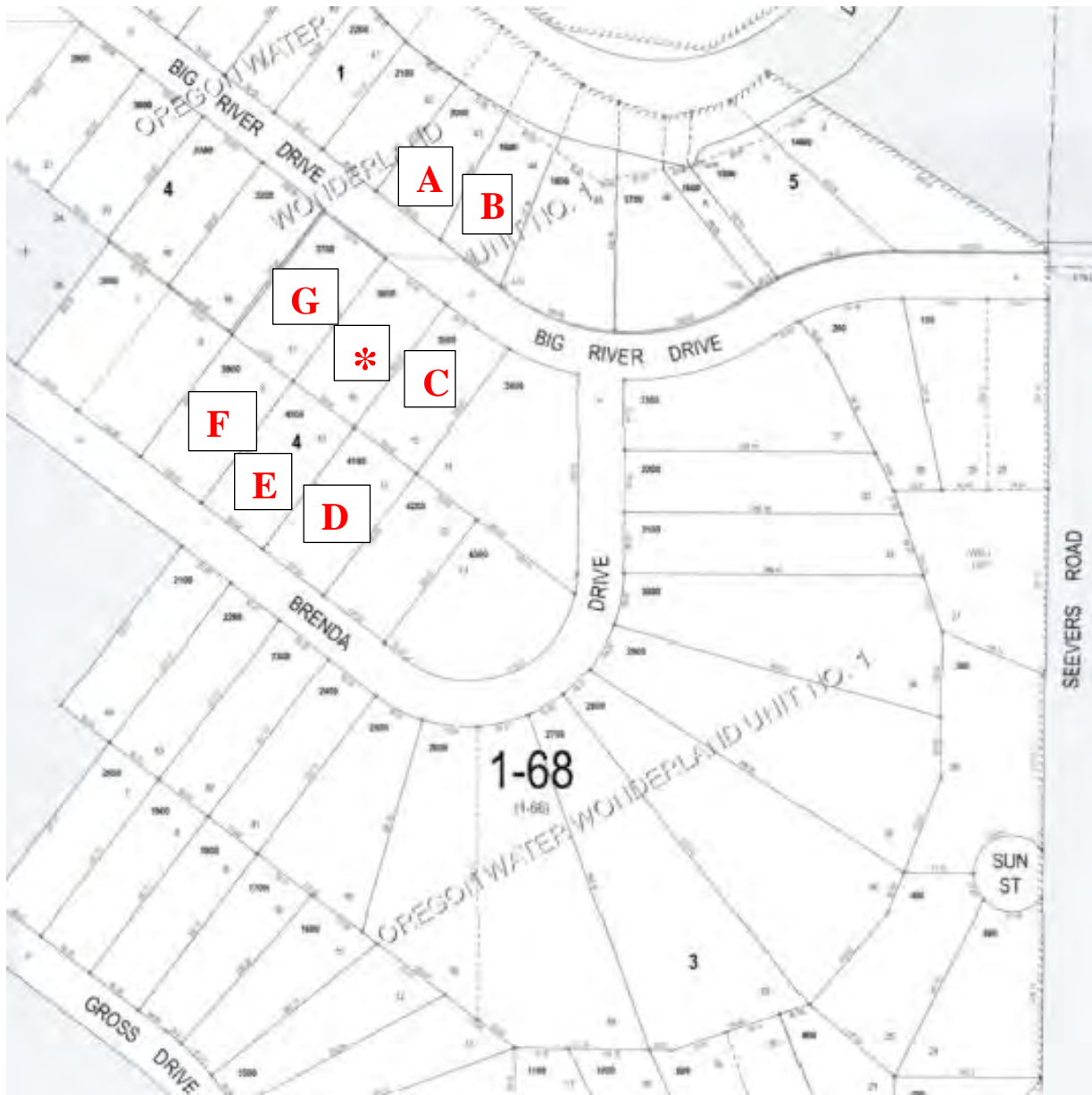
55706 Big River Dr

Bend, OR 97707

Adjacent Parcels Property Owners

55706 Big River Drive, Bend, Oregon
(T20S, R10E, Section 25BB, Tax Lot 3600, 0.53 acres)

* Tax Lot	3600	Nuevo Dia Adventures LLC 17074 Cooper Drive Bend, OR 97707
A. Tax Lot	2000	Hensley Fam Rev Trust 1465 NW 123 rd Avenue Portland, OR 97229
B. Tax Lot	1900	Wendell, Sharon M 3620 Spring Blvd Eugene, OR 97405
C. Tax Lot	3500	Kramer, Haley Heather & David Stewart 55710 Big River Drive Bend, OR 97707
D. Tax Lot	4100	Staduhar, Darren Joseph et al 16826 Brenda Drive Bend, OR 97707
E. Tax Lot	4000	McManus, John F 1 Nantucket Place Manhattan Beach, CA 90266
F. Tax Lot	3900	McManus, John F 1 Nantucket Place Manhattan Beach, CA 90266
G. Tax Lot	3700	Gibson, John R & Gail 1210 W Wilshire Blvd Nichols Hills, OK 73116



Business Name Search

[New Search](#)

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Business Entity Data

11-26-2024 15:22

Registry Nbr	Entity Type	Entity Status	Jurisdiction	Registry Date	Next Renewal Date	Renewal Due?
1309783-98	DLLC	ACT	OREGON	03-30-2017	03-30-2025	
Entity Name NUEVO DIA ADVENTURES, LLC						
Foreign Name						

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Associated Names

Type	PPB		PRINCIPAL PLACE OF BUSINESS		Country	UNITED STATES OF AMERICA
Addr 1	17074 COOPER DR					
Addr 2						
CSZ	BEND	OR	97707			

Please click [here](#) for general information about registered agents and service of process.

Type	AGT	REGISTERED AGENT		Start Date	03-13-2019	Resign Date
Name	PETRA		STJOHN			
Addr 1	17074 COOPER DR					
Addr 2						
CSZ	BEND	OR	97707			

Type	MAL	MAILING ADDRESS		Country	UNITED STATES OF AMERICA
Addr 1	13101 AMBER PLACE				
Addr 2					
CSZ	LAKE OSWEGO	OR	97034		

Type	MEM	MEMBER		Resign Date
Name	PETRA	D	ST JOHN	
Addr 1	17074 COOPER DR			
Addr 2				
CSZ	BEND	OR	97707	

Type	MEM	MEMBER		Resign Date
Name	AARON	W	MCGRATH	
Addr 1	17074 COOPER DR			
Addr 2				
CSZ	BEND	OR	97707	

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Name History









Business Entity Name	Name Type	Name Status	Start Date	End Date
NUEVO DIA ADVENTURES, LLC	EN	CUR	03-30-2017	

Please [read](#) before ordering [Copies](#).

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Summary History

Image Available	Action	Transaction Date	Effective Date	Status	Name/Agent Change	Dissolved By
	AMENDED ANNUAL REPORT	02-21-2024		FI		
	AMENDED ANNUAL REPORT	03-01-2023		FI		
	AMENDED ANNUAL REPORT	03-08-2022		FI		
	AMENDED ANNUAL REPORT	02-23-2021		FI		
	AMENDED ANNUAL REPORT	02-19-2020		FI		
	AMENDED ANNUAL REPORT	03-13-2019		FI	Agent	
	AMENDED ANNUAL REPORT	02-28-2018		FI		
	ARTICLES OF ORGANIZATION	03-30-2017		FI	Agent	

For comments or suggestions regarding the operation of this site,
please contact : corporation.division@sos.oregon.gov

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ELKHORN CONSULTING LLC

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

November 13, 2024

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

SUBJECT: Formal Variance Request – Petra St John and Aaron McGrath – T20S, R10E, Section 25BB Tax Lot 3600 (0.53 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 55706 Big River Drive, south of Bend in Deschutes County, Oregon (Site) (Figure 1) and consists of 0.53 acres. A Tax Lot map is attached in Appendix A and a copy of the Deed is attached in Appendix B.

Background

The site was approved in the late 1970's and a standard system, consisting of a 1,000-gallon steel septic tank and 150 linear feet of rock-and-pipe drainfield trenches were installed and approved in 1980. However, since a home was not constructed within 5 years, the existing system was not recognized for alteration or repair by Deschutes County. Deschutes County subsequently conducted a site evaluation on April 24, 2013, and issued a denial on April 26, 2013. The denial was based on conditions associated with saturation noted at 19 to 23 inches below the ground surface in 2 test pits. Test Pit 1, near the middle of the lot and just north of the existing steel septic tank, represented the best conditions as described. The primary reasons cited for the denial was 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. Copies of the previous permit and subsequent site evaluation documentation from Deschutes County are 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.

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



Soils

The web soil survey shows the location of the Site and a copy of the output is provided in Appendix D. The north end of the parcel is within a delineation of Map Unit 29A, Cryaquolls, 0 to 3% slopes, that are also shown as wetlands on the Deschutes County property information website (Dial). The rest of the Site (represented by Test Pits 1 and 2) is within a delineation of Map Unit 144A, Sunriver sandy loam, 0 to 3% slopes (Appendix C and Appendix D). 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:

- 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 2013 soil notes for Test Pit 2 (southern part of the lot) and the conditions typical for the Sunriver series are related primarily to coloration (brownier colors) in the surface horizons that are more indicative of the Shanahan series.

Preliminary Assessment

The Site was reviewed by Brian Rabe, CPSS, WWS, on September 12, October 3, and October 30, 2024. 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 2 (2013) in the site evaluation and a supplementary test pit (2024) (southern part of the lot - see Figure 2 and Appendix C).

Other Considerations

This parcel and developed parcels in the surrounding area are primarily served by a public water system, operated by Oregon Water Wonderland Unit I Sanitary District.

A search of the database of the Oregon Department of Water Resources was conducted for the section that the subject property lies within (Section 25 of Township 20 South, Range 10 East of the Willamette Meridian). There are about 18 records on file for this section. A total of 7 water well records (well logs) were identified that could be tied to specific parcels within about one-quarter mile of the subject property (Appendix F). All 7 well logs are related to wells located on Tax Lot 4100 at least 775 feet east of the area proposed for the bottomless sand filters. Some of these well logs pertain to deepening of existing wells with no reference to the original log or enough data to correlate to other



found logs. The log for the primary well serving the public water utility (Oregon Water Wonderland) is summarized below.

The primary well was completed on August 20, 1999 to a depth of 650 feet. Water was described as being first found at a depth of 6 feet within a layer of “top soil + small gravel” and had a static water level of 6 feet bgs representing the shallow unconfined aquifer that extended down to a depth of 10 feet. The next water bearing zone was described as beginning at a depth of 517 feet in a layer of “black sand + pumice” with several clay layers described between the water bearing zones. A third water bearing zone was described as beginning at a depth of 585 feet within a layer of “fractured gray lava.” The first and second water bearing zones were isolated with cement and the well was completed in the third water bearing zone with a static water level of 13 feet bgs on the date of completion with a reported yield of 600 gallons per minute (gpm) with 50 feet of drawdown after 1 hour with air. A review of the public drinking water system test results indicate that the nitrate-nitrogen concentrations are very low with the highest recent result being 0.14 milligrams per liter (mg/L) in 2019.

The regional groundwater gradient, as indicated in a study published by the U.S. Geological Survey², is to the north or northeast toward or parallel to the Deschutes River. The subject property is located within Management Area 11, which recommends a 79% to 100% reduction from the base scenario loading (standard systems) for existing and future homes. The results of the Nitrate Loading Management Model within the study (Figures 25 and 26) suggest that this area represents a moderate to high risk of adverse impacts to groundwater quality unless a high level of treatment is achieved. According to the interactive map for Oregon Domestic Well Testing, this part of Deschutes County has an average nitrate-nitrogen concentration in domestic wells of 1.71 milligrams per liter (mg/L) with 18.83% exceeding 3 mg/L and 1.17% exceeding 10 mg/L (based on 1,200 test results, viewed on November 13, 2024).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

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.

³ ARC GIS Online. (n.d.). Oregon domestic well testing, [Data file]. Retrieved November 13, 2024, from ARC GIS Online: <https://www.arcgis.com/apps/MapSeries/index.html?appid=c0d7daea497049c1a686d07dab7106e5>



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 (RidNOxTM) 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 an effluent with an average total nitrogen (TN) concentration of 17 mg/L. A post-anoxic process, similar to the RidNOx unit that 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 in the La Pine project 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 NO₃-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. 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 NO₃-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 NO₃-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 AdvanTex 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 NO₃-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 NO₃-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 TN concentration of 60 mg/L, an average TN concentration in the AX20 effluent of 17 mg/L, the TN concentration leaving the RidNOx unit and going to the modified bottomless sand filter the typical reduction from the base scenario presented in the groundwater study cited previously is expected to be approximately 98 percent.

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

The supplemental test pit (2024) was described by Brian Rabe as:

- Very dark grayish brown (10YR 3/2) sandy loam from 0 to 7 inches with weak medium subangular blocky structure; many very fine, fine, medium, and coarse roots; underlain by
- Very dark grayish brown (10YR 3/2) sandy loam from 7 to 17 inches with moderate medium subangular blocky structure; common fine and medium roots; underlain by
- Very dark grayish brown (10YAR 3/2) sandy loam from 17 to 26 inches with moderate medium subangular blocky structure; common fine and medium roots; with faint redoximorphic features throughout; underlain by
- Very dark brown (10YR 2/2) sandy loam with silt loam from 26 to 30 to 33 inches with moderate medium subangular blocky structure; few fine and medium roots; with redoximorphic features throughout; underlain by
- White (10YR 8/1) silt (ash) from 30 to 33 to 38 inches; structureless (massive); with few fine roots; and redoximorphic features (yellow (5Y 8/4) iron masses) throughout; underlain by
- Very dark grayish brown (2.5Y 3/2) sandy loam from 38 to 47 inches; structureless (massive); with few fine roots; and redoximorphic features throughout; underlain by
- Very dark gray (7.5YR 3/1) sandy loam from 47 to 53 inches, structureless (massive); no roots; with redoximorphic features (dark brown (7.5YR 3/3) iron masses) 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 the supplemental test pit adjacent to the lowest of the 8 corner stakes. The highest level of the water table is expected to be 20 inches below the existing ground surface at the lowest point within the area proposed for the initial sand filter and 18 inches at the lowest point within the area proposed for the replacement sand filter based on the depth to the redoximorphic features described in the supplemental test pit (2024).

The proposed system seeks to overcome this limitation by elevating the modified bottomless sand filter in a manner that provides an additional 3 inches of separation (Figures 3A and 3B). The sod and underlying sandy soil to a depth of 6 inches within the footprint of the sand filter will be excavated and replaced with sand filter media. An additional 7 inches (initial sand filter) or 9 inches (replacement



sand filter) of sand filter media (total of 13 and 15 inches, respectively) will be used to exceed the 24-inch separation from shallowest water table depth standard by providing a total separation of 27 inches. 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.

Deschutes County has noted that the results of the Nitrate Management Loading Model indicated that there was no surplus capacity within Management Area 11 to accommodate additional lots that were denied or otherwise not expected to be approved. In a recent variance hearing for another parcel within Management Area 11, Deschutes County stated that about 20 parcels have been approved through the formal variance process in this area and expressed concern about the cumulative effects of the additional nutrient load on groundwater and surface water quality.

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 RidNOx unit and the lysimeter, as well as sampling instructions, are described in Appendix F and shown in Figures 4, 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 Figure 4), 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, forbes, 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 is data available from peer-reviewed journal articles. One such article titled *The Nitrogen Cycle in Lodgepole Pine Forests, Southeast Wyoming* by T.J. Fahey, et al, published in *Biogeochemistry* in September 1985 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 1992 publication by the United States Forest Service (USFS) titled *Distribution of Biomass and Nutrients in Lodgepole Pine/Bitterbrush Ecosystems in Central Oregon* by Susan N. Little and Laurl J. Shainsky. They stated that the pumice soils in the area are “very severely deficient” in nitrogen. Table 4 of that publication lists the average nitrogen concentrations for several components of the tree. Since yield estimates for 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 ($\text{ft}^3/\text{ac}/\text{yr}$). 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 $37.5 \text{ lb}/\text{ft}^3$ will be used.

The smallest lots eligible for development in southern Deschutes County are about 0.5 acres in size. Assuming half the lot is developed (home, outbuildings, driveway, yard, etc.) the other half is typically maintained with native trees (lodgepole and/or ponderosa pine). Assuming half the average annual growth ($32.5 \text{ ft}^3/\text{ac}/\text{yr}$), an average density of $37.5 \text{ lb}/\text{ft}^3$, and the nitrogen content described previously, the annual amount of N taken up and stored in standing wood biomass on 0.25 acres (half of a half-acre lot) is 1.2 pounds.

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: Petra St John and Aaron McGrath
Todd Cleveland, REHS – Deschutes County



Certified Professional
Soil Scientist
BRIAN T. RABE
15239 Exp. 31DEC24
Registered Wastewater Specialist
No. EH-W-448430 Exp. 30SEP25

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FIGURES

- Figure 1. Vicinity Map**
- Figure 2. Site Plan**
- Figure 3A. Modified Bottomless Sand Filter - Initial**
- Figure 3B. Modified Bottomless Sand Filter - Replacement**
- Figure 4. Sand Filter Plan Detail**
- Figure 5. Lysimeter Details**
- Figure 6. RidNO_xTM Details**

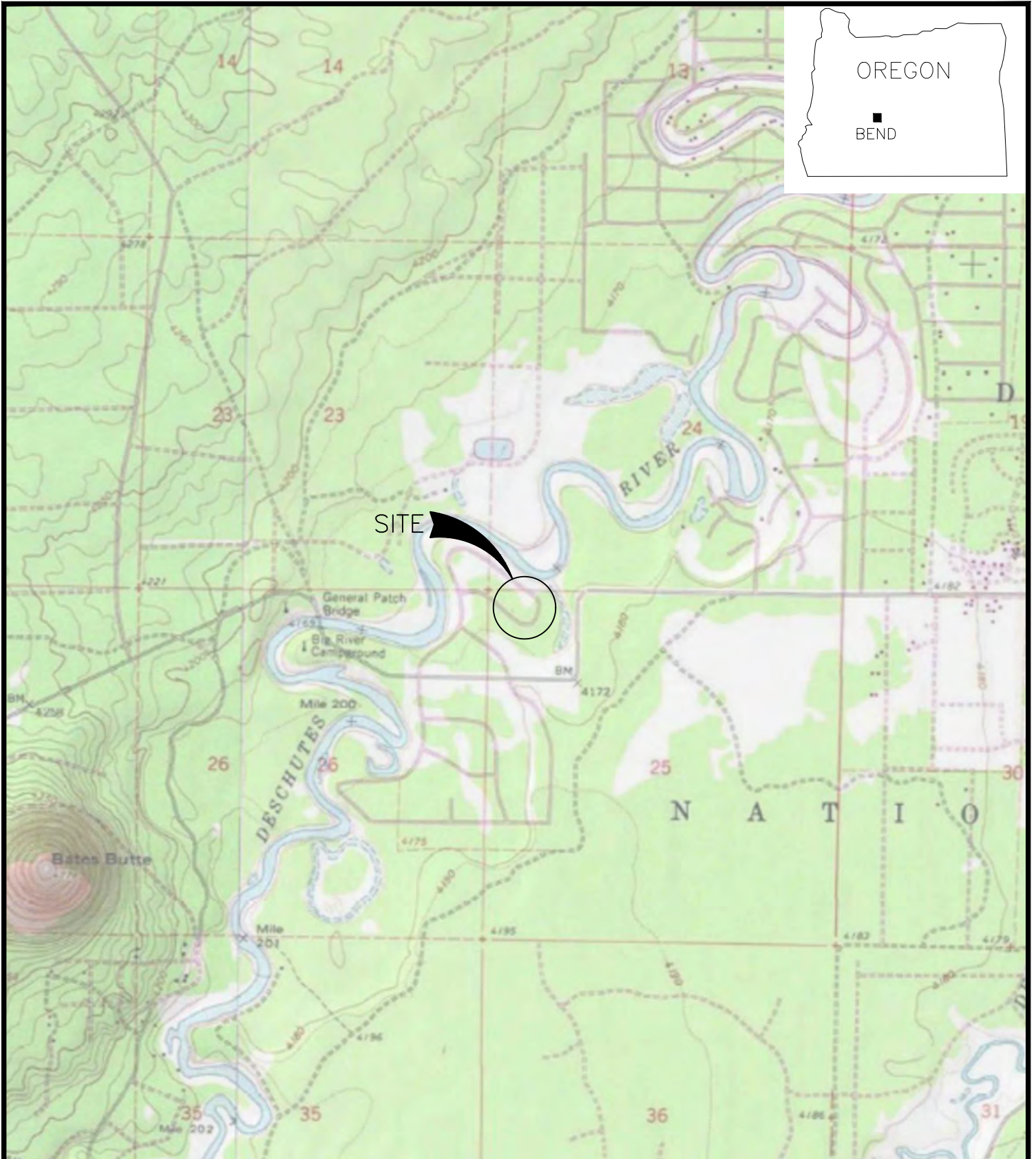
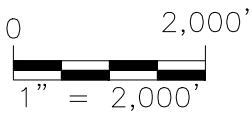


Figure 1. Vicinity Map



(LOCATIONS AND SCALE ARE APPROXIMATE)

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

PROJECT NUMBER: 2024033	Formal Variance
DATE: 11/12/2024	T20S, R10E, Section 25BB, Tax Lot 3600
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC
DWG BY: PROJECT MANAGER: 6DJR	55706 Big River Drive
REVISOR: BRIAN RABE	Bend, OR 97707
REVISOR:	 ELKHORN CONSULTING LLC

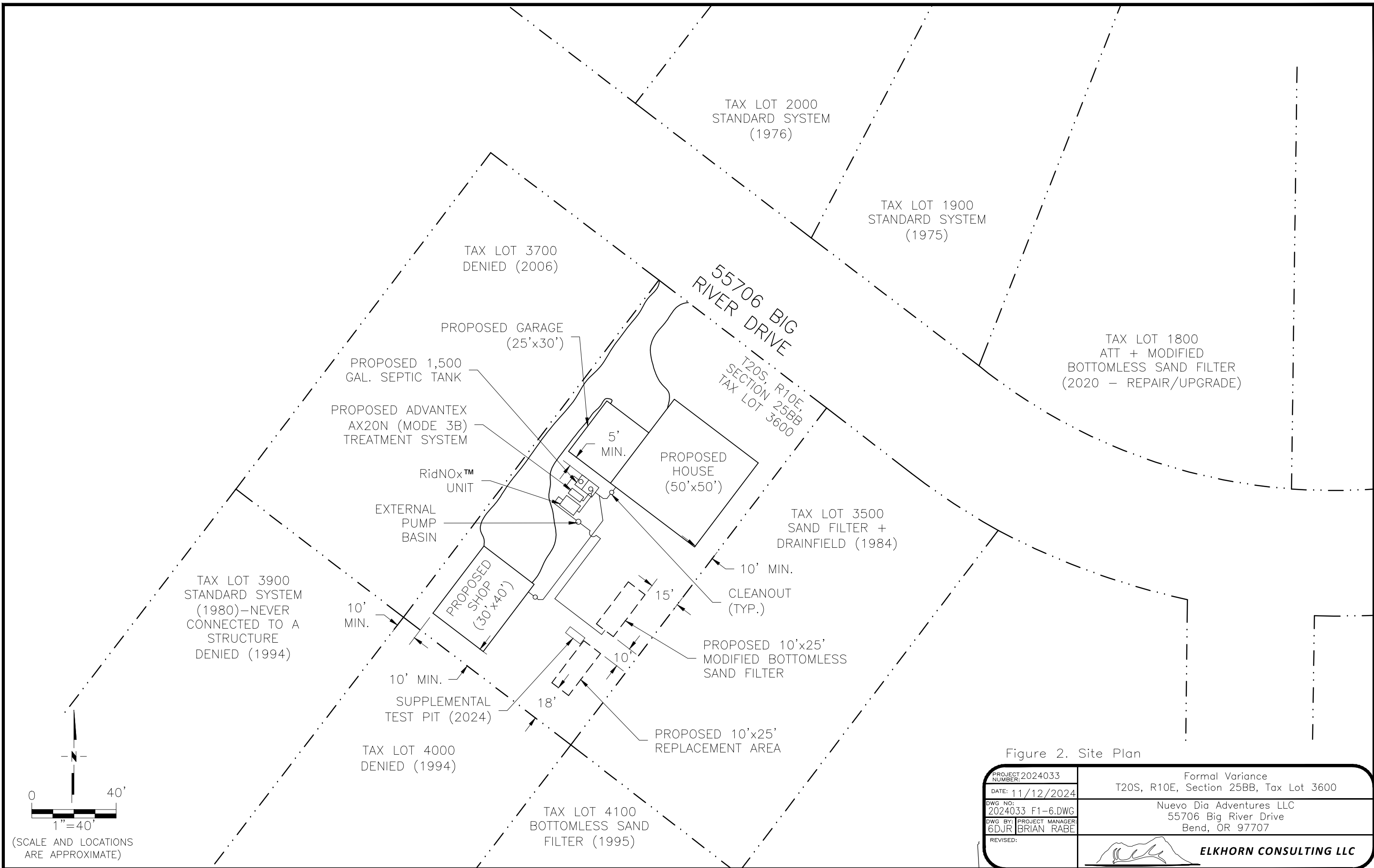



Figure 2. Site Plan

PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 11/12/2024	
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG BY: PROJECT MANAGER: 6DJR BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC

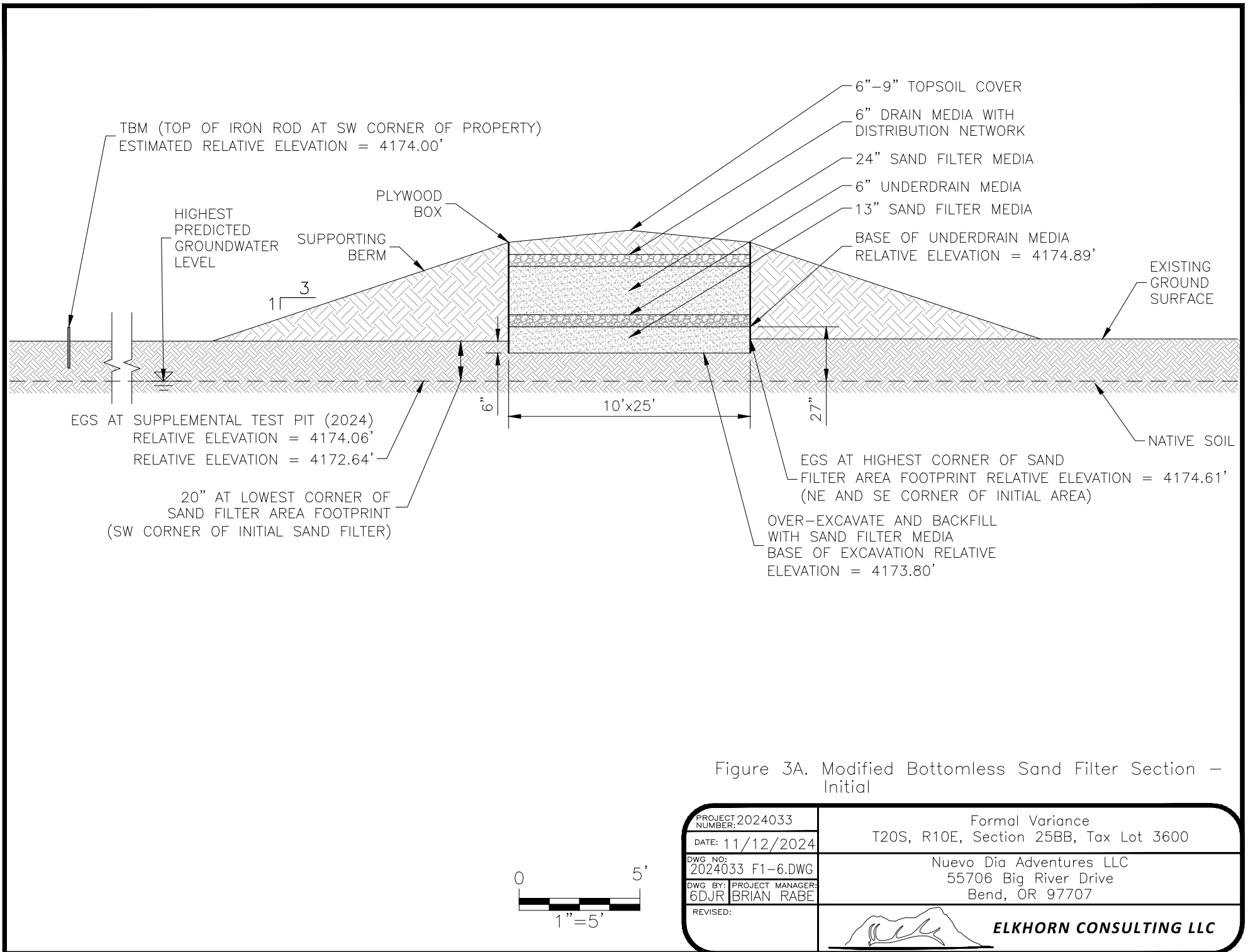


Figure 3A. Modified Bottomless Sand Filter Section – Initial



PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 11/12/2024	
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG BY: 6DJR PROJECT MANAGER: BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC

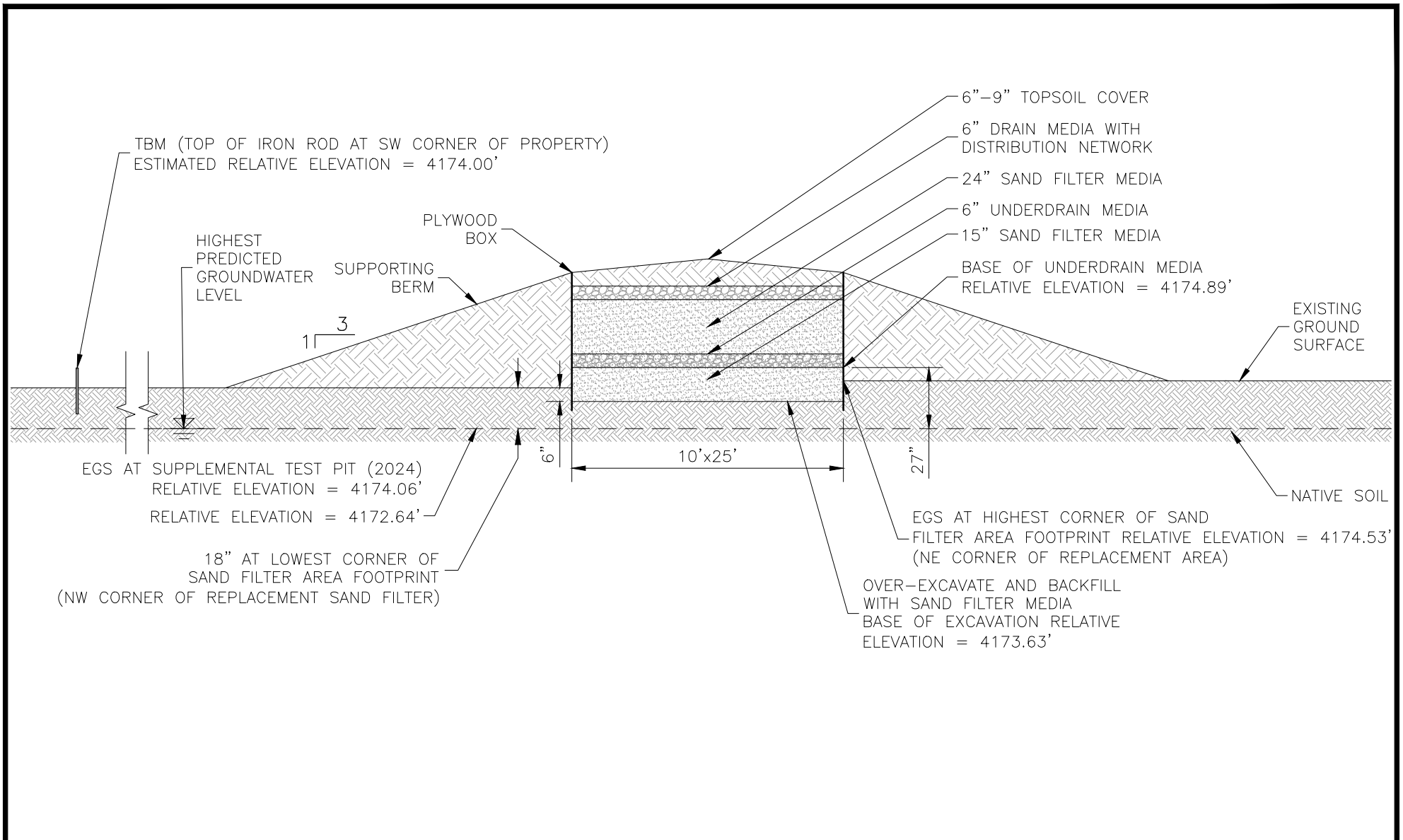


Figure 3B. Modified Bottomless Sand Filter Section – Replacement



PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 11/12/2024	
DWG NO: 2024033 F1-6.DWG	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG BY: 6DJR PROJECT MANAGER: BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC

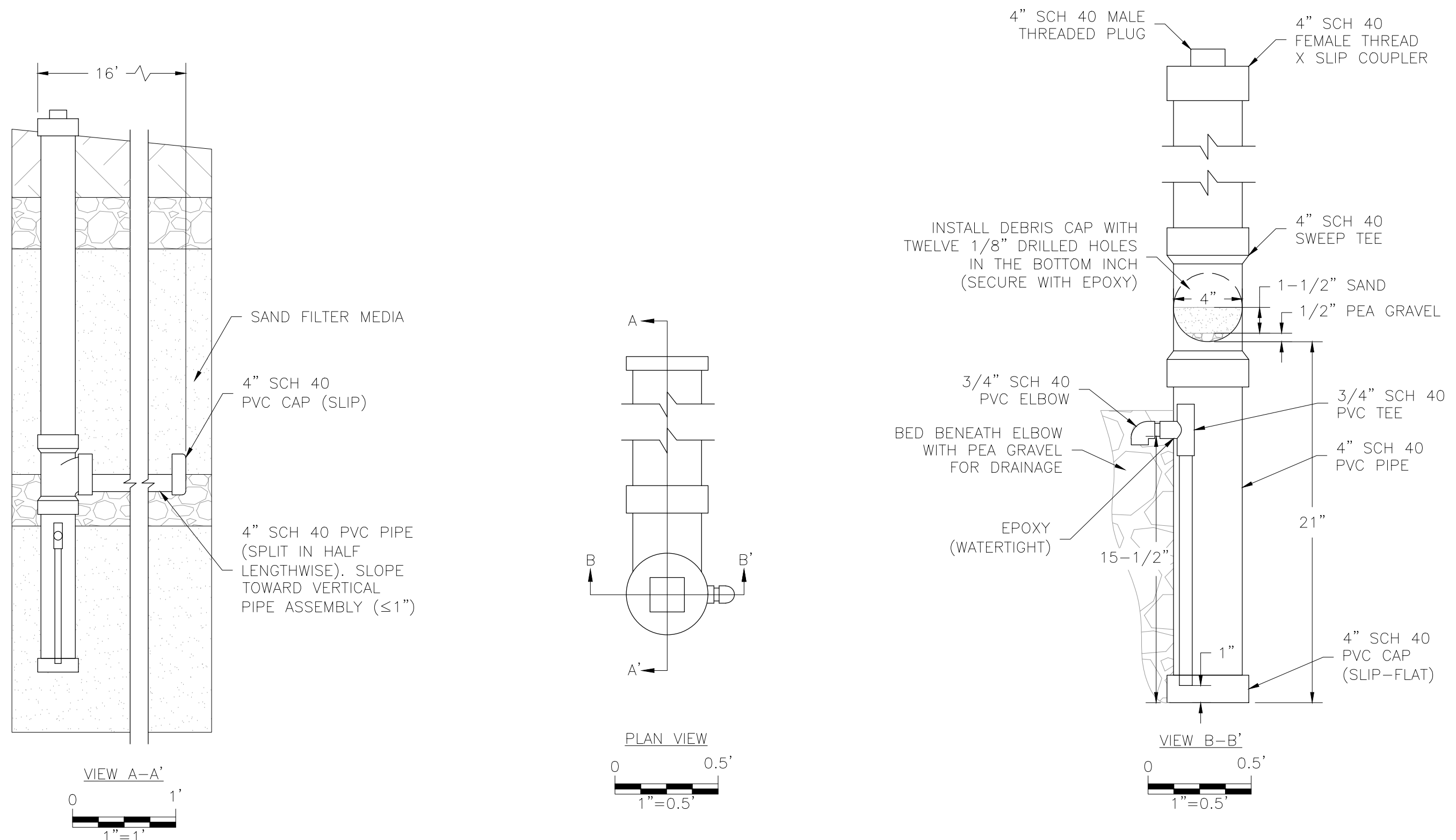
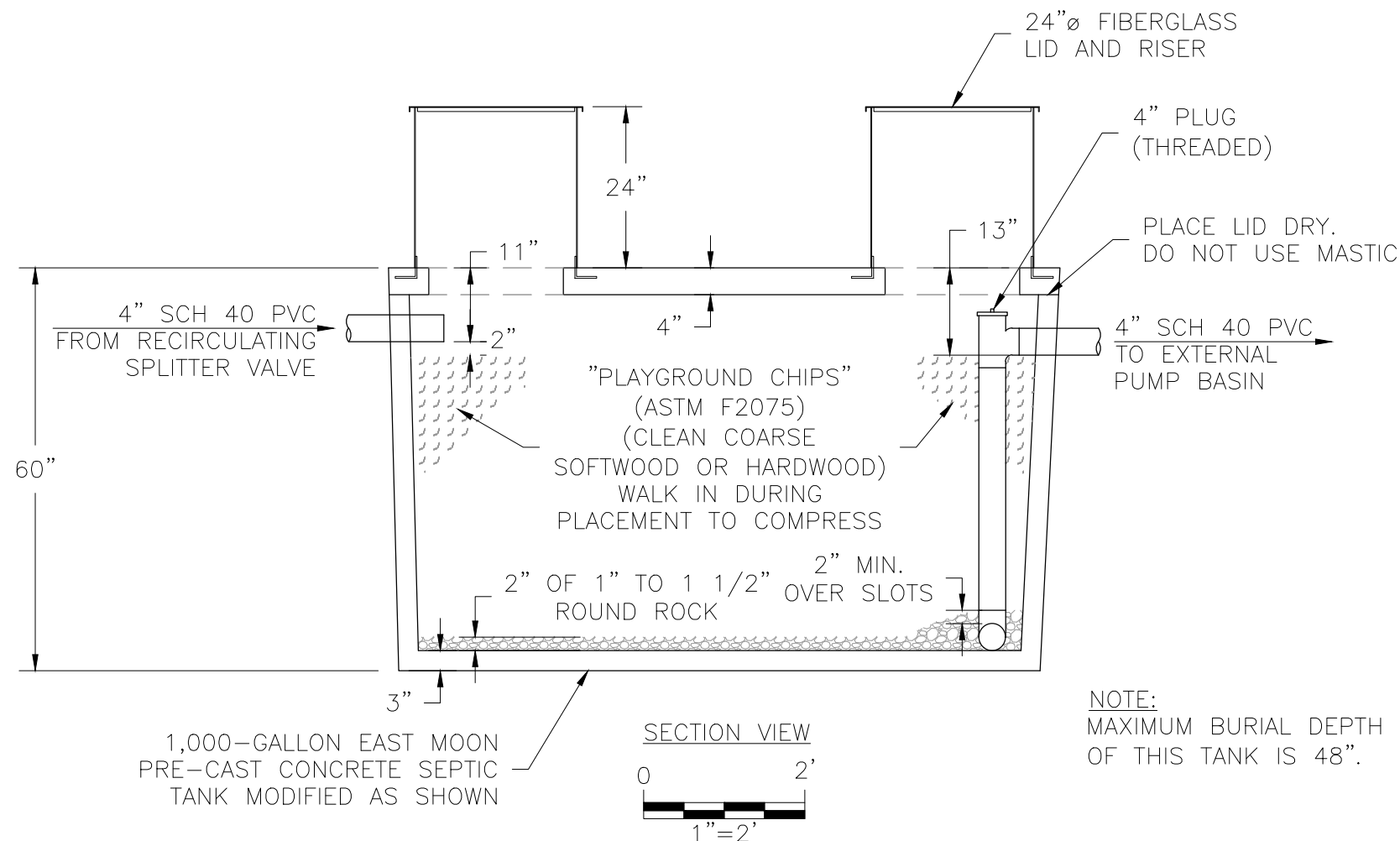
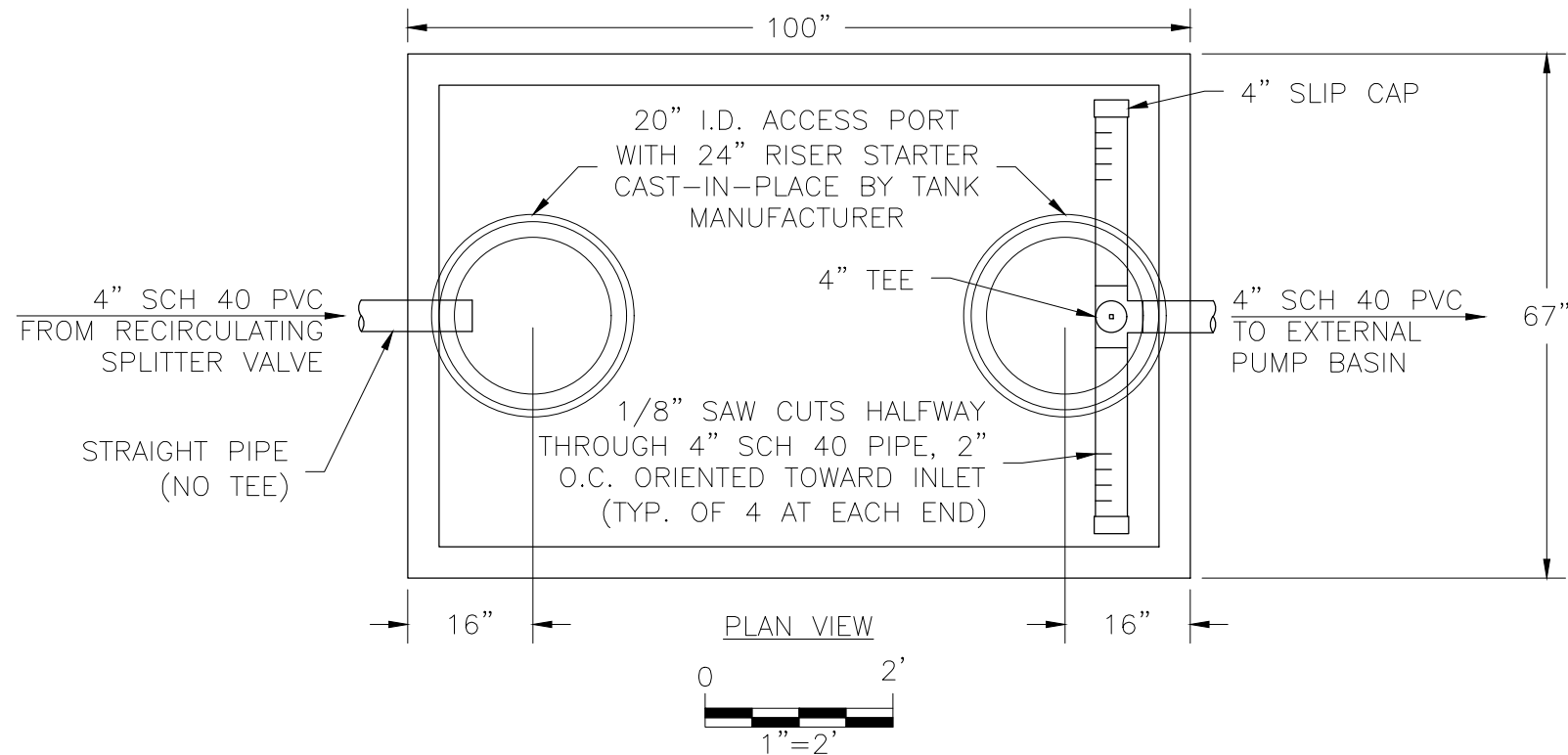


Figure 5. Lysimeter Details

PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 11/12/2024	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG NO: 2024033 F1-6.DWG	
DWG BY: PROJECT MANAGER: 6DJR BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC



NOTE:
MAXIMUM BURIAL DEPTH OF THIS TANK IS 48".

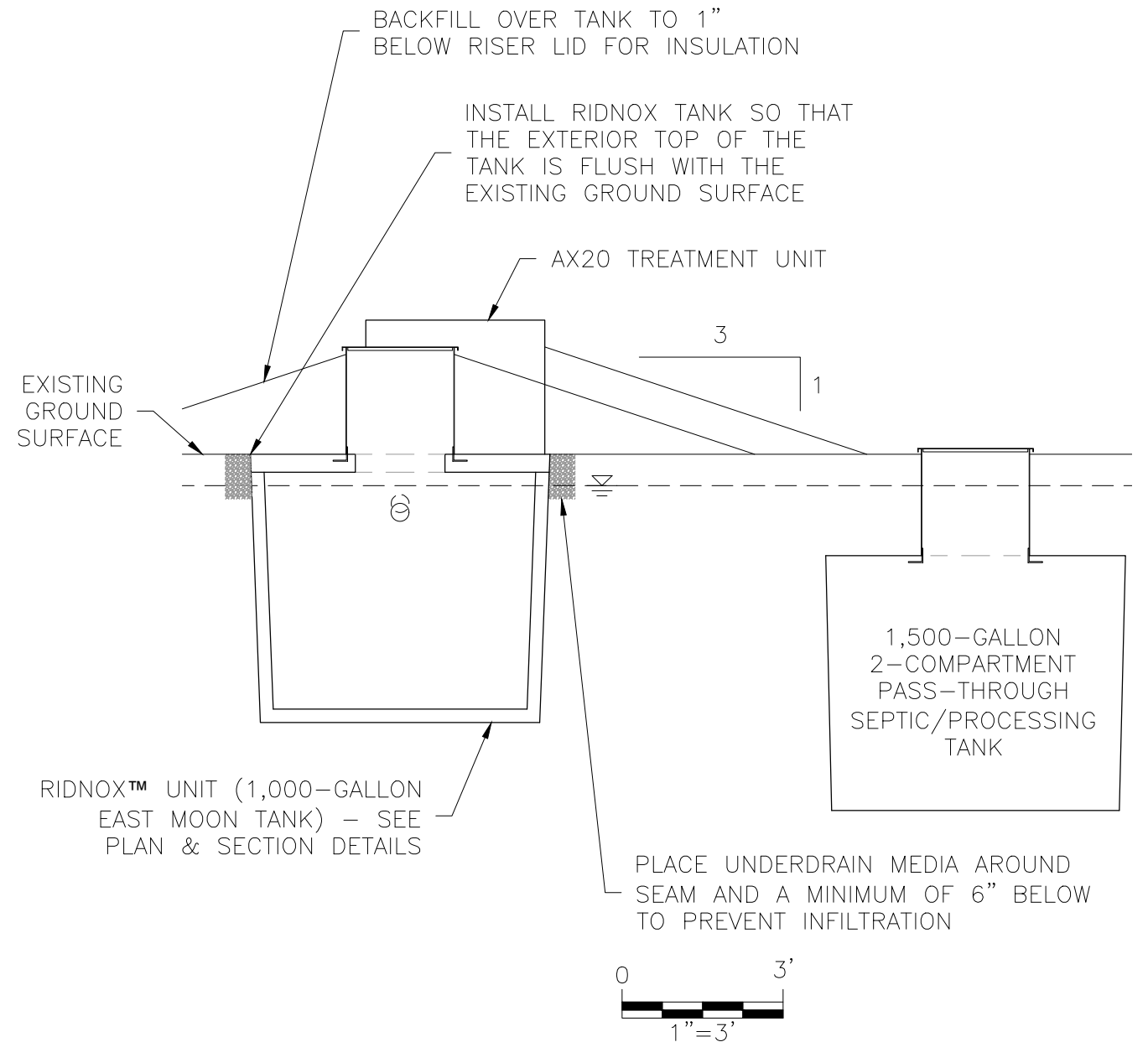


Figure 6. RidNOx™ Details

PROJECT NUMBER: 2024033	Formal Variance T20S, R10E, Section 25BB, Tax Lot 3600
DATE: 11/12/2024	Nuevo Dia Adventures LLC 55706 Big River Drive Bend, OR 97707
DWG NO: 2024033 F1-6.DWG	
DWG BY: PROJECT MANAGER: 6DJR BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC

APPENDICES

- Appendix A. Tax Lot Map**
- Appendix B. Deed**
- Appendix C. Site Evaluation Reports**
- Appendix D. NRCS Soil Report**
- Appendix E. Water Well Reports**
- Appendix F. RidNOxTM and Lysimeter Installation
and Sampling Instructions**
- Appendix G. Directions to Site, List of Names and Addresses
for Neighboring Property Owners**

Appendix A.

Tax Lot Map

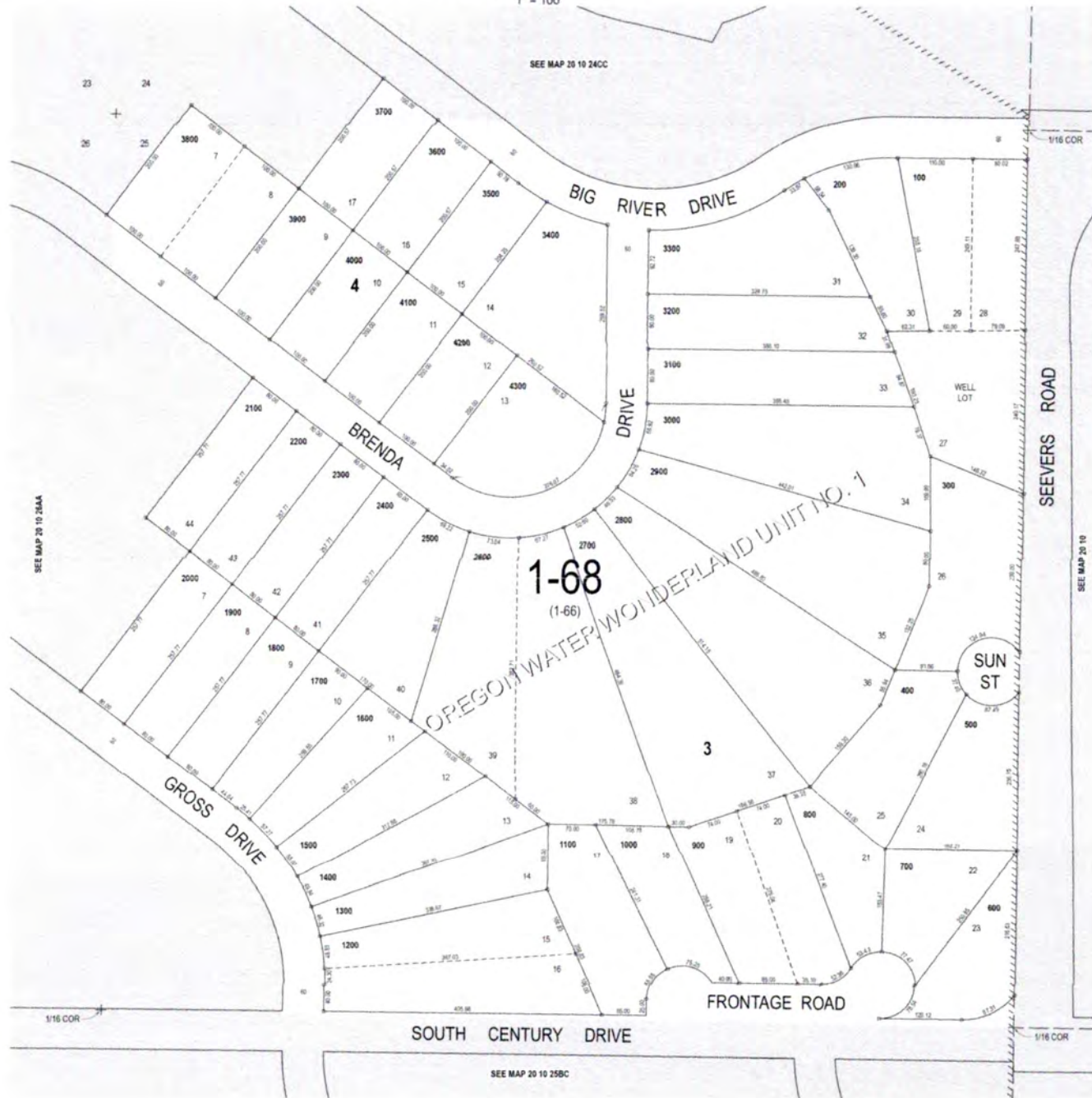
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

N.W. 1/4 N.W. 1/4 SEC. 25 T. 20S. R. 10E. W.M.
DESCHUTES COUNTY

20 10 25BB

8/23/2022

1" = 100'



20 10 25BB

Appendix B.

Deed

After Recording Return to:
First American Title



After recording return to:
Nuevo Dia Adventures, LLC
17074 Cooper Drive
Bend, OR 97707

Until a change is requested all tax
statements shall be sent to the
following address:
Nuevo Dia Adventures, LLC
17074 Cooper Drive
Bend, OR 97707

File No.: 7061-4194953 (SJN)
Date: August 16, 2024

THIS SPACE RESERVED FOR RECORDER'S USE

Deschutes County Official Records **2024-22576**
D-D **08/30/2024 09:44 AM**
Stn=53 SRB
\$25.00 \$11.00 \$10.00 \$61.00 \$6.00 **\$113.00**

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

STATUTORY WARRANTY DEED

Entrust Administration, Inc., FBO Harry E. Covert, IRA 35825 as to an undivided 50% interest and Entrust Administration, Inc., FBO Nancy J. Covert, IRA 35826 as to an undivided 50% interest, Grantor, conveys and warrants to Nuevo Dia Adventures, 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 Sixteen (16), Block Four (4), OREGON WATER WONDERLAND Unit No. 1, recorded July 17, 1969, in Cabinet A, Page 343, 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 **2024-2025** Taxes, a lien not yet payable.

The true consideration for this conveyance is **\$99,000.00**. (Here comply with requirements of ORS 93.030)

APN: **137514**

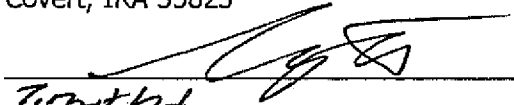
Statutory Warranty Deed
- continued

File No.: **7061-4194953 (SJN)**

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.

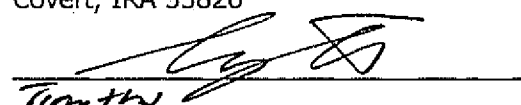
Dated this 28th day of August, 2024.

Entrust Administration, Inc., FBO Harry E.
Covert, IRA 35825



Timothy
Leary, Authorized Signer

Entrust Administration, Inc., FBO Nancy J.
Covert, IRA 35826



Timothy
Leary, Authorized Signer

APN: **137514**

Statutory Warranty Deed
- continued

File No.: **7061-4194953 (SJM)**

STATE OF _____)
County of _____) ss.

See attached

This instrument was acknowledged before me on this _____ day of _____, 20____
by _____ as _____ of Entrust Administration, Inc.,
FBO Harry E. Covert, IRA 35825, on behalf of the IRA.

Notary Public for _____
My commission expires:

STATE OF _____)
County of _____) ss.

See attached

This instrument was acknowledged before me on this _____ day of _____, 20____
by _____ as _____ of Entrust Administration, Inc.,
FBO Nancy J. Covert, IRA 35826, on behalf of the IRA.

Notary Public for _____
My commission expires:

ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California
County of Alameda)

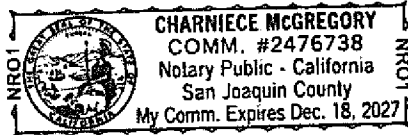
On August 28th, 2024 before me, Charniece McGregory, Notary Public

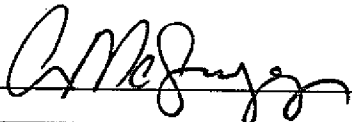
(insert name and title of the officer)
Timothy Liang, as the Authorizer Signor of Entrust Administration, Inc. FBO

personally appeared Nancy J. Covert, IRA 35826, on behalf of the IRA.
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature  (Seal)

ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California
County of Alameda)

On August 28th, 2024 before me, Charniece McGregory, Notary Public

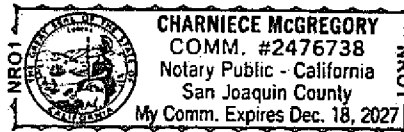
(insert name and title of the officer)
Timothy Liang, as the Authorizer Signor of Entrust Administration, Inc. FBO

personally appeared Harry E. Covert, IRA 35825, on behalf of the IRA.

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature

Charniece McGregory

(Seal)

Appendix C.

Site Evaluation Reports

CDD ARCHIVE COVER SHEET FOR MAS
07/21/2000 15:22:56 1 of 1

EH 001 ARCHIVE



FILE ID	201025B001500EH20000721999001
TAXMAP	201025B001500
SERIAL	137514
DIVISION	EH
SITUS	55706 BIG RIVER DR
HOUSE#	55706
STREET	BIG RIVER
CONTENT	ARCHIVE

09-870-76

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY

CERTIFICATE OF SATISFACTORY COMPLETION

SUBSURFACE OR ALTERNATIVE SEWAGE SYSTEM

09-870-76

Permit Number ~~09-870-76~~ Date 6-3-80

Name of owner Mark Halverson Installer's name Dick Cooper

Mailing address PO 4337 Sewage-Cesspool license No. 35771

Sumner, Or. Business address 53607 Deep Woods Lane

Exact location of proposed sewage disposal system OLUS U1 L16 R4

Total number: Living Units 1 Bedrooms 3 Baths _____

Water supply: Public system Community system Well Spring Cistern

Septic tank: Material Steel Total liquid capacity 100 gal.

Distance from: Well, springs, or cistern _____ ft. Building foundation _____ ft.

Sub-surface tile or perforated pipe disposal field Other _____

Distribution box: Yes No

Length each line: _____ 75 75 ft.

Total length: _____ 150 ft.

Width of trench: _____ 2 ft.

Total square footage: _____ 300 ft.

Distance between lines: _____ 10 ft.

Filler material: Type RK Size 2 in.

Distance of sub-surface or other type of system from:

Water line _____ ft. Cistern _____ ft.

Well _____ ft. Spring _____ ft.

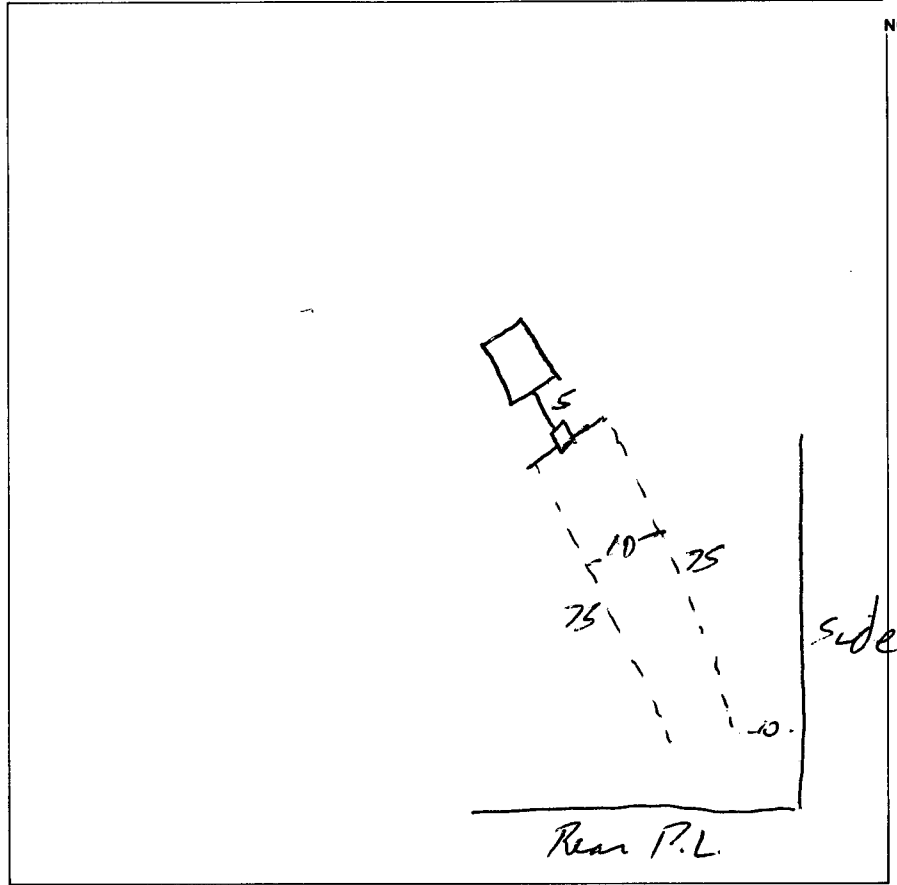
Nearest:

River _____ ft. Stream _____ ft. Lake _____ ft.

Nearest lot line:

Front _____ Side 10 Rear 10 ft.

Nearest foundation _____ ft.



In accordance with Oregon Revised Statute 454.665 this certificate is issued as evidence of satisfactory completion of a subsurface or alternative sewage disposal system at the above location.

Date of preliminary site approval 5-12-80 Soil conditions observed SL
Date of final inspection NOT approved Approved 6-4-80

REMARKS **This** septic tank permit was issued under the "Prior Approval Rule".
The system is substantial and therefore may not operate satisfactorily.
If the system fails and necessary repairs cannot be made in accordance
with current rules of the Commission, the system may have to be
abandoned.

Steven G. Holt
SANITARIAN DESCHUTES COUNTY 382-4000 ext. 236

address

Deschutes County Health Department

Permit No. 09-870-76

Courthouse Annex

Bend, Oregon 97701, Phone 382-4000, Ext. 60

Application for Individual Sewage Disposal System Permit

TO BE COMPLETED BY APPLICANT

(MARK HAKVORSON) P.O. 4337, SUNRIVER, ORE-97701

Property Owner: _____ Phone No. _____

Mailing Address: _____ 9 _____

Number of Bedrooms _____

Exact Location of System: _____

Lot 16 - 8124

20-10-25B-1500

$\frac{16}{=} = 4$

55712 Big River Dr. LHP

Applicant to furnish plot plan showing proposed type and size of building, lot lines, water supply, and irrigation canals or streams.

Permit

TO BE COMPLETED BY HEALTH DEPARTMENT

Permission is/is not granted for construction or installation provided the following conditions are met:

- () Septic tank _____ gallons (minimum).
- () Subsurface disposal field _____ square feet absorption area (minimum).
- () Other

THIS PERMIT ISSUED IN ACCORDANCE WITH PRIOR APPROVAL RULES OAR CHAPTER 340 PART 71-015 (8). PERMIT EXPIRES JULY 1, 1980. PLOT PLAN TO BE SUBMITTED AND APPROVED PRIOR TO INSTALLATION.

PLOT PLAN OK
J on M J on 5-12-80

MAXIMUM TRENCH DEPTH 18"

All work shall comply with the provisions of Oregon Administrative Rules governing the subsurface disposal of sewage.

"Record of Individual Sewage Disposal System" form to be completed by installer and delivered to Deschutes County Health Department prior to final inspection.

Fee paid: \$ _____

Date of issue: _____

Authorized by: _____

Department of Environmental Quality
1234 S. W. Morrison
Portland, Oregon 97205

RECEIVED JUN 30 1976

09-870-76

Land Quality

Deschutes County

Application to the Department of Environmental Quality
for a Permit to Construct a
New or Repair a Subsurface Sewage
Disposal System

Permit Fees: New \$50.00 Repair, Alteration \$15.00

A. REFERENCE INFORMATION

Oregon Water Wonderland Unit I

Harvey A Jerome
Name of Applicant

Lot #16 Block #4

48 Valleso ST
Address

Tax Lot or Account # 1500

Petaluma, Calif 94952
City

Location Deschutes County

Installers Name

B. GENERAL DESCRIPTION Plot Plan UNKNOWN AT THIS TIME

New Construction _____ Repair _____

Installation will serve: House _____ Mobile Home _____ Mobile Home Park _____

Commercial Building _____ Other (Explain) _____

No. of Living Units _____ No. Bedrooms _____

Water Supply: Public _____ Community _____ Private _____ Garbage Disposal? _____

C. REQUIRED EXHIBITS

1. Proposed Subsurface Sewage Disposal System DEQ Interim Form #2

2. Planning Evaluation - Building Permit (Local Option)

3. Other (Local Option) _____

I hereby certify that the information contained in this application is true and correct to the best of my knowledge and belief.

Harvey A Jerome
Signature (Owner/Installer)

Permit No. _____

Date 6-25-76

Issued _____
Date

Interim Form #1

09-870-76

Deschutes County Planning Commission

DESCHUTES COUNTY COURTHOUSE ANNEX, ROOM 102 • PHONE 382-4000, EXT. 75
BEND, OREGON 97701

DESCHUTES COUNTY PLANNING COMMISSION

IN APPLYING FOR A PERMIT TO INSTALL A SEPTIC TANK
AND DRAINFIELD ON LOT 4 BLOCK 16, Oregon
Water Wonderland Unit I OR ATTACHED EXHIBIT "A", _____

I Harvey A Jerome CERTIFY THAT NO RECREATIONAL
OR RESIDENTIAL UNIT WILL BE PLACED ON THE ABOVE SAID PROPERTY
FOR A PERIOD OF MORE THAN THIRTY CONSECUTIVE DAYS (30); AND
THAT NO RECREATIONAL OR RESIDENTIAL USE OF A PERMANENT
NATURE WILL BE ESTABLISHED ON THE PROPERTY, ABOVE DESCRIBED,
UNLESS MOBILE HOME STANDARDS AND/OR BUILDING PERMITS HAVE
BEEN APPLIED FOR AS A PERMANENT RESIDENCE.

DATE 6-25-76

SIGNED Harvey A. Jerome
X

BEFORE ME THIS _____ DAY OF _____, 1975,

APPEARED _____.

NOTARY PUBLIC FOR OREGON
MY COMMISSION EXPIRES: _____

(SEAL)

09-870-76

Deschutes County Health Department

ENVIRONMENTAL HEALTH SECTION
COURTHOUSE ANNEX BEND, OREGON 97701

April 25, 1980

Harvey A. Jerome
48 Vallejo St.
Petaluma, CA 94952

Dear Sir:

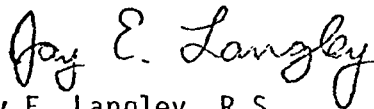
This office has a septic tank permit issued under your name. The permit was issued under the prior approval rule and expires on July 1, 1980. The septic tank and drainfield must be installed by that date or the use of the property may be lost.

If the property is approvable under Department of Environmental Quality rules, the drainfield would not need to be installed by July 1, 1980. This could be determined by applying for a feasibility statement at this office. The cost would be \$65.00 and two five foot deep backhoe test holes on the lot would have to be provided for our evaluation. If the lot is approvable you would receive a statement in writing which would allow you to install a drainfield at a future date. If the lot was denied you could still install the septic system before July 1, 1980 under the current permit.

If you are planning to install the septic system before July 1, 1980, please submit a plot plan for our approval prior to construction. The plot plan should include the house, well, water lines, driveway and the septic tank and drainfield.

If there are any questions, please contact this office.

Sincerely,



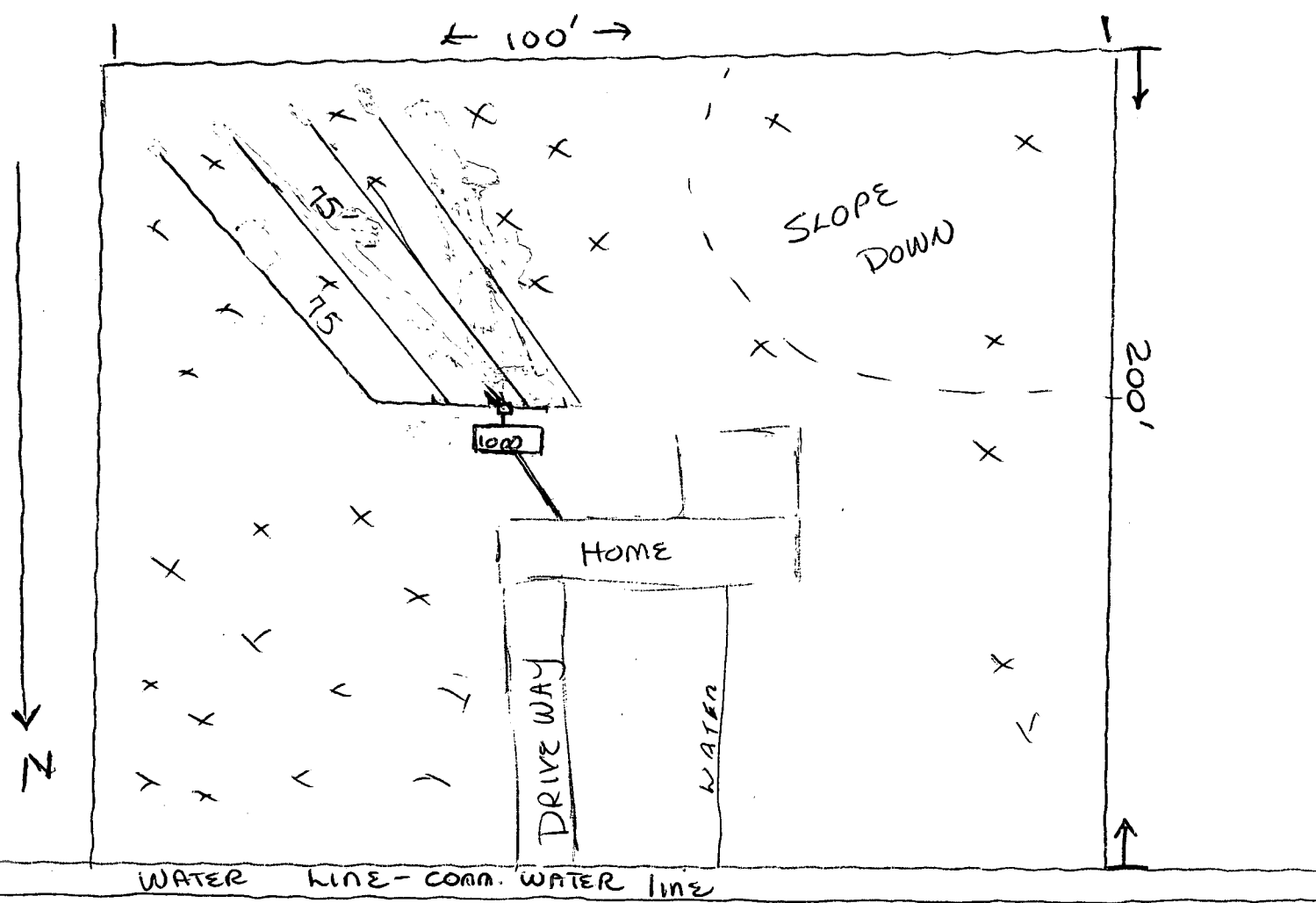
Jay E. Langley, R.S.
Field Supervisor

JEL:mr

①. W.W. UNIT. ①

X-TREES

Price Approval
09-870-76



Big RIVER DR.

Block 4 MAP 201025 B
LOT 16 TAX LOT 1500

Permit # 09-870-76

RECEIVED MAY 9 1980

09-870-76

N ↑

(1) Individual sub-surface sewage disposal system not allowed closer than 150 feet of the river.
 (2) Community sewer system not to be installed in all lots for buildings from South and East lines of Sec. 23 per survey made by John W. Hammons.
 All lot frontage on roadways shall be 10 to 100 feet minimum.

**MOUNTAIN VIEW
 PROPERTIES
 REAL ESTATE**



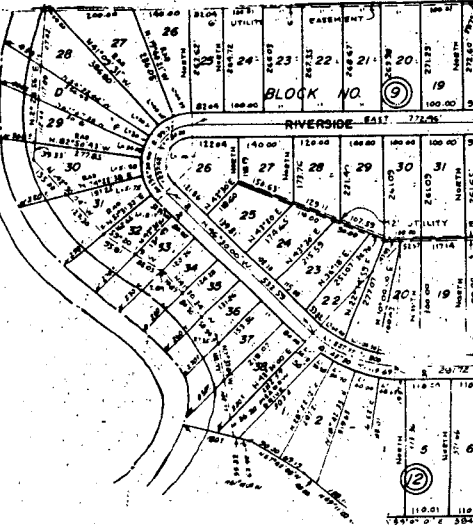
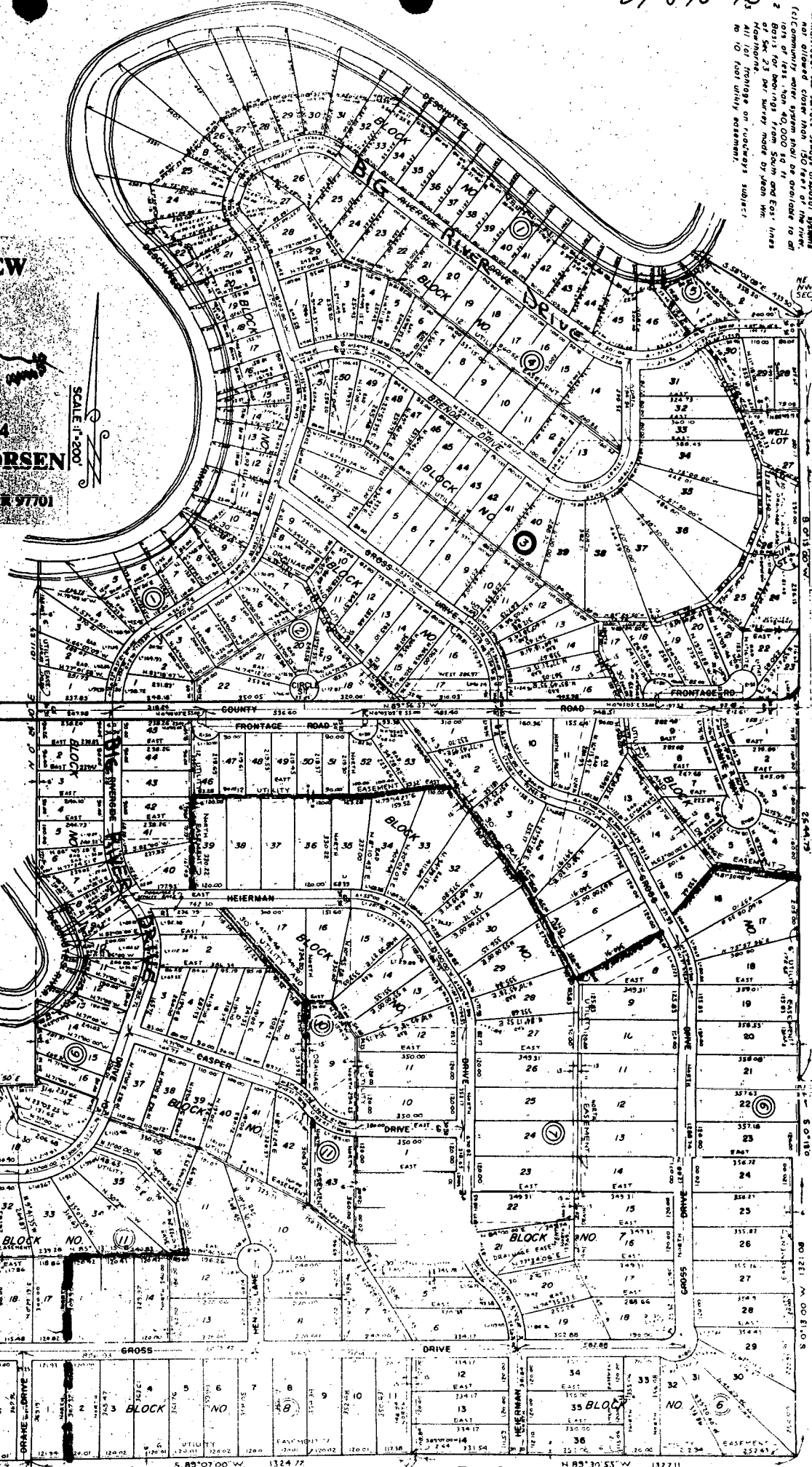
(503) 593-1274

MARK HALVORSEN

Bus. Park • Sunriver, OR 97701

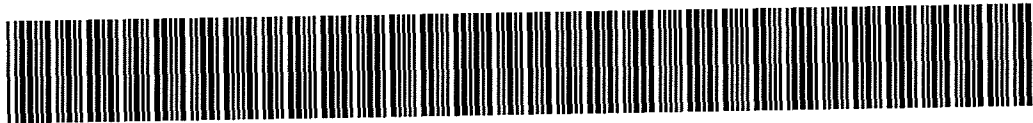
SCALE 1"=200'

General Patch Bridge



CDD COVER SHEET FOR JKH
05/07/2013 14:41:26

EH
6 PAGES



FILE ID	201025B001500EH20130507144126
TAXMAP	201025B001500
SERIAL	137514
DIVISION	EH
SITUS	55706 BIG RIVER DR
HOUSE#	55706
STREET	BIG RIVER
CONTENT	F24046 SITE EVAL
RECORD ID	F24046

Cover Sheet Identifier
AHJKMTWX



COMMUNITY DEVELOPMENT
PO Box 6005, Bend, Oregon 97708
117 NW Lafayette Avenue, Bend, OR 97701
Telephone (541)388-6575, Fax (541)385-1764
<http://www.deschutes.org/cdd>

April 26, 2013

ENTRUST ADMINISTRATION INC FB
113 Batista Ct.
Palm Desert, CA. 92211

RE: F-24046
55706 Big River Dr. Bend, Or,
201025B 01500

Dear Sirs:

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 April 24, 2013. Part of the evaluation is to determine the level to which the ground water 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 this property the indicators suggest the water table may rise to within **19-23 inches** of the ground surface. Past observations and 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 observed and conditions associated with saturation within 19-23 inches of the ground surface. Water monitoring on the lot to the west in spring of 2006 showed the permanent water table did rise from 17 inches to 22 inches below ground surface. Both lots are on same landscape position.**

DEQ rules do not allow installation of a Standard Drainfield, Capping Fill Drainfield, Pressurized Distribution System or Sand Filter System in these circumstances. [OAR 340-71-290(b)]. Installation of an Alternative Treatment Technology (ATT) requires a standard, capping fill, pressurized drainfield, or sand filter system for final treatment and dispersal. Therefore, if a conventional drainfield or sand filter system cannot be installed on the property, an ATT cannot be used.

Oregon Department of Environmental Quality Rules (DEQ) require a minimum 4-foot separation between the bottom of a wastewater dispersal trench and the highest level a permanent water

Quality Services Performed with Pride

table may reach. Drainfields must be installed a minimum of 12 inches into the ground. Drainfields can only be installed, therefore, where the water table does not rise closer than 5 feet from the ground surface. This allows for the 4-foot separation from the bottom of the trench to the water. [OAR Chapter 340-71-220(1)(d) and (2)(b)(A), copy enclosed.] These rules also require 24 inches of separation between the highest level reached by the water table and the bottom of a surface mounted sand filter system. A sand filter is an alternative onsite system that provides high quality wastewater treatment.

Because the property does not meet any of the criteria for onsite wastewater treatment and dispersal areas, this property is denied for an onsite wastewater treatment system.

You have 90 days to provide additional test pits for evaluation at no additional fee. However, it appears that other areas on this 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.

Pursuant to Oregon Administrative Rules (OAR Chap. 340-071), 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 Environmental Health 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 475 NE Bellevue Dr., Suite 110, Bend OR 97701, phone 541-388-6146.

Quality Services Performed with Pride

If you have any questions, please do not hesitate to call this office at 541-388-6575.
Sincerely,

ENVIRONMENTAL SOILS DIVISION



Todd Cleveland, REHS
Registered Environmental Health Specialist

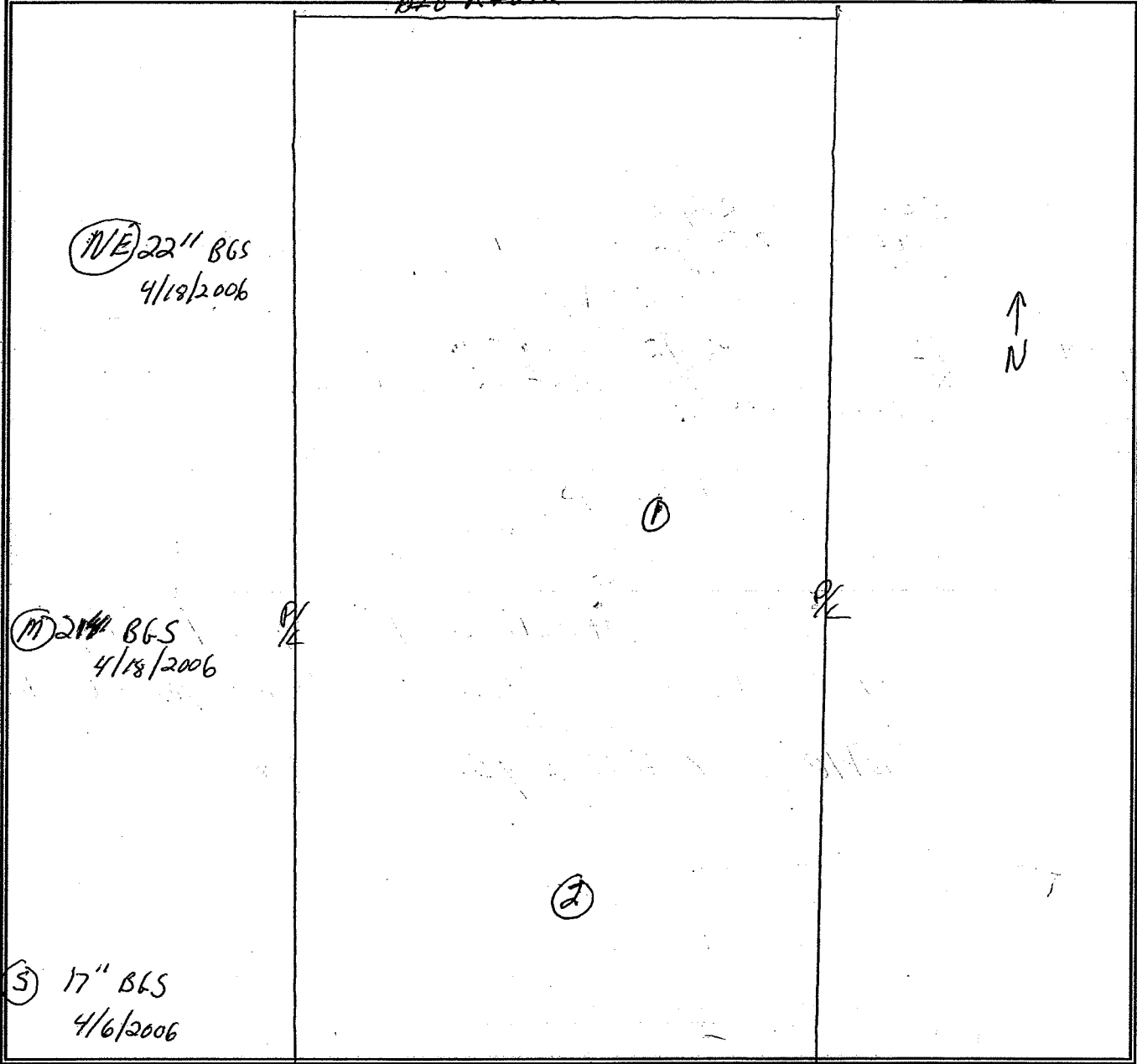
cc: Bob Baggett (Department of Environmental Quality)

SITE EVALUATION FIELD INSPECTION FORM

Applicant: Entrust Administration Site Evaluation # F24046
 Date: 4/24/13 Subdivision: _____ L _____ B _____ Parcel Size: 0.5
 Evaluator: DWH T 20 R 10 S 25B TL 1500
 Suitable _____ Sketch/Not to Scale _____ **Unsuitable**

B76 RTUER

Unsuitable



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

Special Conditions: Denied due to conditions of Saturation less than
24 inches, Monitored 2006 next lot over all spots
Rose to over

SITE EVALUATION FIELD INSPECTION FORM

Applicant: _____ Site Evaluation # F 24046

Evaluator: DWH Date: 4/19/13 Parcel Size: .53

Subdivision: _____ T 20 R 10 S 25B TL 1500 L _____ B _____

DEPTH	TEXTURE	COLOR	Notes on mottling, roots, structure, layer limiting effective soil depth, % loose rock, etc.
-------	---------	-------	--

0-23	SL	10VR 2/2	sq, 2mt roots
23-33	Silt/Loam	7.5VR 5/2	2shk, 1 f roots, m. d. (5/6) conc.
33-40	silt	white	no roots
H ₂ O at 41" bgs			

0-19	SL	10VR 3/2	sq 12mt roots
19-23	SL	3/2	2ft (1/2) m. d. conc.
23-35	Silt/Loam	7.5VR 3/2	

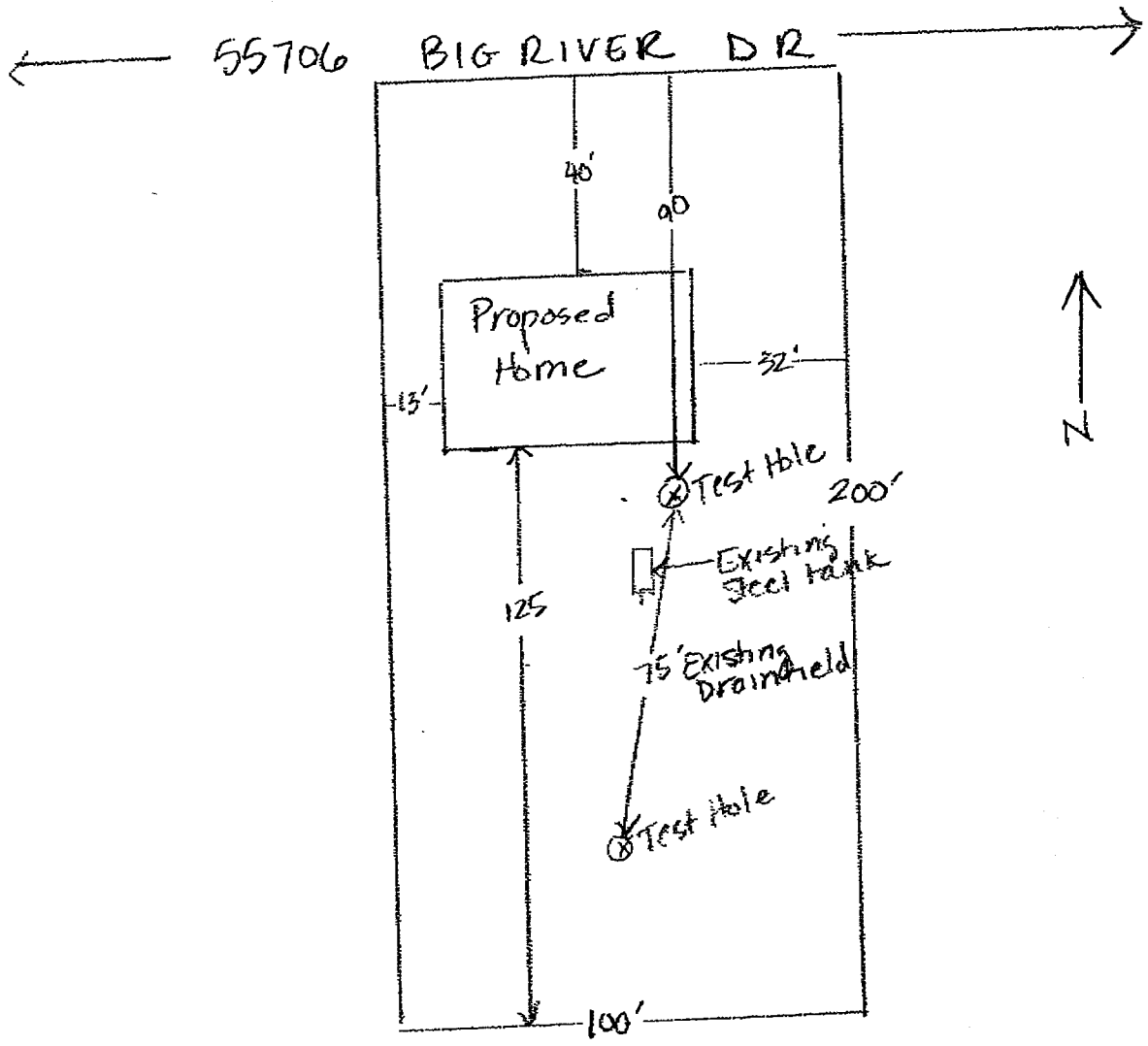
Heat 38" bgs			
--------------	--	--	--

Conditions of saturation at 23" bgs and 19" bgs water obs on lot to west confirms ground water			
---	--	--	--

table 17-22" bgs. -2006			
-------------------------	--	--	--

Landscape Note: Vegetation indicates moist Region
 Slope: _____ Aspect: _____ Groundwater: perched
 Other site notes: _____

Comments: _____
 Reason for Unsuitability: (Include Rule Reference) _____



Harry & Nancy Covert
 113 Batista Ct.
 Palm Desert, CA 92211
 760-200-0094

55706 Big River Dr.
 20-10-25th BO - 01500
 OWLW 1 - Lot 16 BK 4
 Bend, OR 97707

Scale: 1/4" = 10'

SRC, Inc.
 PO Box 2099 La Pine, OR 97739
 Ph (541) 536-9735 Fx (541) 536-7445
 Lic #156878 DEQ #36839

APPLICATION FOR
INDIVIDUAL SITE
EVALUATION

DESCHUTES COUNTY
COMMUNITY DEVELOPMENT DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
117 NW LAFAYETTE AVE., BEND, OR 97701 (541) 388-6574
737 SW Cascade Ave, Redmond, OR (541) 386-1713

Evaluation Number

F 24046

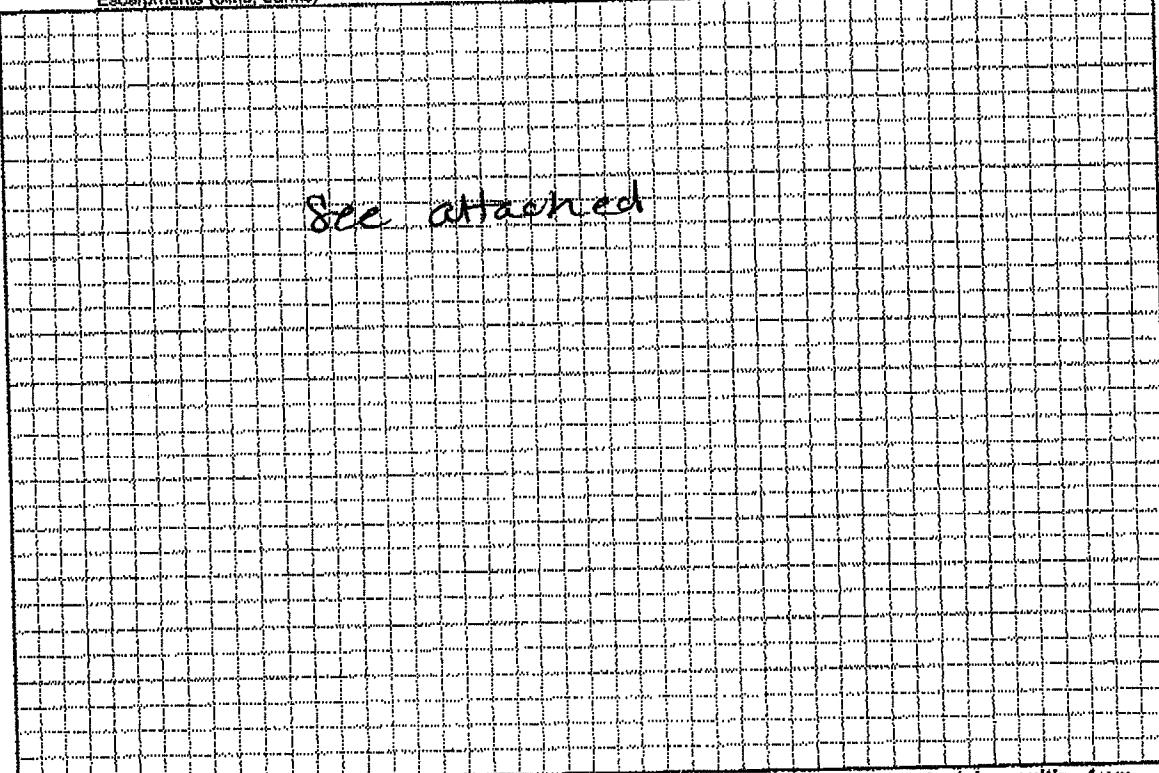
The following information is required to complete an application for a site evaluation. Please be as accurate and complete as possible.

TOWNSHIP	205	RANGE	10E	SECTION	25	TAX LOT	1500	LEGAL LOT	16	ZONING	WA, RR10, LM	
SUBDIVISION	OWN 1											
ADDRESS OF PARCEL	55706 Big River Dr., Bend											
PARCEL SIZE IN SQ FT			NUMBER OF BEDROOMS	3		WATER SOURCE		OWN water				
OR ACRES			TELEPHONE	AUTHORIZED REPRESENTATIVE				TELEPHONE				
NAME OF OWNER	Hang + Nancy Covert				SRC, Inc.							
MAILING ADDRESS	113 Batista Ct				MAILING ADDRESS		P.O. Box 2097					
CITY	Palm Desert	STATE	CA	ZIP	92211	CITY	LaPine	STATE	OR	ZIP	97137	
COMMENTS/REMARKS	PLANNING NOTIFICATION											

FOR COMMERCIAL USE ONLY		DAILY FLOW	FEE
TYPE OF USE			
Please answer the following questions:			
1. Are there any bodies of water on or adjacent to this property?			YES <input type="checkbox"/>
2. Are there existing wells on the property?			<input type="checkbox"/>
3. Are there any proposed wells on the property?			<input type="checkbox"/>
4. Are there existing wells on adjacent property?			<input type="checkbox"/>
5. Will this property be served by a community water supply?			<input type="checkbox"/>
6. Are there any encumbrances which could prevent or effect the installation of a subsurface sewage disposal system? (Liens, easements)			<input type="checkbox"/>
TEST HOLES ARE READY?	<input checked="" type="radio"/> YES	<input type="radio"/> NO	

In this area below, sketch the parcel showing the location of:
Adjoining roads or streets
Property lines and dimensions
Location of test pits
Escarpments (cliffs, banks)

Existing and proposed wells
All bodies of water (rivers, canals, ponds)
Wells on adjacent properties
Reservoirs and/or cisterns
Waterlines



The Applicant agrees that Deschutes County will not be responsible for any problems or denials resulting from incorrect or incomplete information supplied by the applicant.

READ BEFORE SIGNING	DATE	AMOUNT
SIGNATURE OF OWNER/AUTHORIZED REPRESENTATIVE		
x Lorie Ruxey	4/19/13	

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



Preface

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

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

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

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

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

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

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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

Custom Soil Resource Report

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

Custom Soil Resource Report

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 (55706 Big River)



Map Scale: 1:507 if printed on A portrait (8.5" x 11") sheet.


0 5 10 20 30 Meters

0 20 40 80 120 Feet

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 22, Aug 30, 2024

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 (55706 Big River)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
29A	Cryaquolls, 0 to 3 percent slopes	0.1	24.7%
144A	Sunriver sandy loam, 0 to 3 percent slopes	0.4	75.3%
Totals for Area of Interest		0.5	100.0%

Map Unit Descriptions (55706 Big River)

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,

Custom Soil Resource Report

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

29A—Cryaquolls, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 245b

Elevation: 3,000 to 4,500 feet

Mean annual precipitation: 15 to 35 inches

Mean annual air temperature: 40 to 45 degrees F

Frost-free period: 10 to 50 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Cryaquolls and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cryaquolls

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Pumice over mixed alluvium

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

H1 - 1 to 3 inches: silt loam

H2 - 3 to 15 inches: loam

H3 - 15 to 19 inches: sandy loam

H4 - 19 to 23 inches: loamy sand

H5 - 23 to 61 inches: sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: About 0 to 24 inches

Frequency of flooding: Rare

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: B/D

Ecological site: R006XB102OR - Cold Wet Meadow

Hydric soil rating: Yes

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

Map Unit Setting

National map unit symbol: 2411

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 - Cryic Aquic Pumice Basins (PICO/SPDO-VAUL)

Other vegetative classification: Pinus contorta/Vaccinium uliginosum/forb (CLM311)

Hydric soil rating: No

Custom Soil Resource Report

Minor Components

Cryaquolls

Percent of map unit: 8 percent

Landform: Mountains

Ecological site: R006XB102OR - Cold Wet Meadow

Hydric soil rating: Yes

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Appendix E.

Water Well Reports

RECEIVED

PAGE 1 of 2

RECEIVED

NOV 24 1999

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

DESC 52615

SEP 13 1999 WELL I.D.# L 36273 WATER RESOURCES DEPT SALEM, OREGON

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

(1) OWNER: Well Number Oregon Water Wonderland Name P.O. Box 3584 Address Sun River State OR Zip 97707

(2) TYPE OF WORK [X] New Well [] Deepening [] Alteration (repair/recondition) [] Abandonment

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

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

(5) BORE HOLE CONSTRUCTION: Special Construction approval [] Yes [X] No Depth of Completed Well 650ft. Explosives used [] Yes [X] No Type Amount

Table with columns: Diameter, From, To, Material, From, To, Sacks or pounds. Includes entries for Cement and seal materials.

How was seal placed: Method [] A [] B [X] C [] D [] E Backfill placed from ft. to ft. Material Gravel placed from ft. to ft. Size of gravel

Table for CASING/LINER with columns: Diameter, From, To, Gauge, Steel, Plastic, Welded, Threaded. Includes entries for 14", 12", 10" casing and 8" liner.

(7) PERFORATIONS/SCREENS: [X] Perforations Method Factory cut [] Screens Type Material

Table for PERFORATIONS/SCREENS with columns: From, To, Slot size, Number, Diameter, Tele/pipe size, Casing, Liner. Includes entry for 550-650 ft range.

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

Table for WELL TESTS with columns: Yield gal/min, Drawdown, Drill stem at, Time. Includes entry for 600 yield and 50' drawdown.

Temperature of water 49.0 Depth Artesian Flow Found Was a water analysis done? [] Yes [] No

LOCATION OF WELL by legal description: County Desc Latitude Longitude Township 20 S N or S Range 10 E E or W. WM. Section 25 NW 1/4 NW 1/4 Tax Lot 4100 Lot Block 3 Subdivision OWW Street Address of Well (or nearest address) Big River Or

(10) STATIC WATER LEVEL: 13 ft. below land surface. Date 8-18-99 Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES: Depth at which water was first found 6

Table for WATER BEARING ZONES with columns: From, To, Estimated Flow Rate, SWL. Includes entries for 6-10, 517-530, 585-650.

(12) WELL LOG: Ground Elevation

Table for WELL LOG with columns: Material, From, To, SWL. Includes entries for Sandy loam top soil, Top soil + small gravel, Hard brown clay, etc.

Date started Completed (unbonded) Water Well Constructor Certification: I certify that the work I performed on the construction, alteration, or abandonment of this well...

(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...

DESC 52615

SEP 13 1999

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

WATER RESOURCES DEPT. SALEM, OREGON

WELL I.D. # L START CARD #

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

(1) OWNER: Well Number Name Address City State Zip

(2) TYPE OF WORK: New Well Deepening Alteration Abandonment

(3) DRILL METHOD: Rotary Air Rotary Mud Cable Auger Other

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

(5) BORE HOLE CONSTRUCTION: Special Construction approval Yes No Depth of Completed Well

Table with columns: HOLE Diameter, SEAL Material, Sacks or pounds. Includes handwritten entries for 12" and 10" diameters.

How was seal placed: Method A B C D E Backfill placed from Gravel placed from

(6) CASING/LINER: Table with columns: Diameter, From, To, Gauge, Steel, Plastic, Welded, Threaded. Includes handwritten entries for Casing and Liner.

(7) PERFORATIONS/SCREENS: Table with columns: From, To, Slot size, Number, Diameter, Material, Casing, Liner. Includes handwritten entries for Perforations and Screens.

(8) WELL TESTS: Minimum testing time is 1 hour. Includes checkboxes for Pump, Bailer, Air, Flowing Artesian and data entry fields for Yield, Drawdown, etc.

(9) LOCATION OF WELL by legal description: County, Latitude, Longitude, Township, Range, Section, Tax Lot, Block, Subdivision, Street Address

(10) STATIC WATER LEVEL: ft. below land surface, Date, Artesian pressure, lb. per square inch, Date

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

Table with columns: From, Estimated Flow Rate, SWL. Includes a large 'RECEIVED' stamp and date 'NOV 24 1999'.

(12) WELL LOG: SALEM, OREGON. Ground Elevation

Table with columns: Material, From, To, SWL. Includes handwritten entries for Hard grey clay + Pumice, Grey Basalt, Fractured gray lava, and K-Packers.

Date started May 17, 99 Completed August 20, 99

(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 water supply well construction standards.

(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.

WATER WELL REPORT
STATE OF OREGON

DESC
60911

RECEIVED
MAR 11 1985
WATER RESOURCES DEPT
SALEM, OREGON

State Well No. 20910E-2566
State Permit No. Deep

(1) OWNER:

Name Oregon Water Wonderland Imp. Dist.
Address 55579 S. Century Drive
City Bend State Oregon

(2) TYPE OF WORK (check):

New Well Deepening Reconditioning Abandon
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary Air Driven
Rotary Mud Dug
 Bored

(4) PROPOSED USE (check):

Domestic Industrial Municipal
Irrigation Test Well Other
Thermal: Withdrawal Reinjection

(5) CASING INSTALLED:

Steel Plastic
Threaded Welded

...8... " Diam. from +1.5 ft. to -383.5 ft. Gauge ...250...
... " Diam. from ... ft. to ... ft. Gauge ...

LINER INSTALLED:

... " Diam. from ... ft. to ... ft. Gauge ...

(6) PERFORATIONS:

Perforated? Yes No

Type of perforator used

Size of perforations in. by in.
... perforations from ... ft. to ... ft.
... perforations from ... ft. to ... ft.
... perforations from ... ft. to ... ft.

(7) SCREENS:

Well screen installed? Yes No

Manufacturer's Name
Type Model No.
Diam. Slot Size Set from ... ft. to ... ft.
Diam. Slot Size Set from ... ft. to ... ft.

(8) WELL TESTS:

Drawdown is amount water level is lowered below static level

Was a pump test made? Yes No If yes, by whom Big 3 Drill.
... 19 gal./min. with 335 ft. drawdown after 24 hrs.
Air test gal./min. with drill stem at ... ft. hrs.
Bailer test gal./min. with ... ft. drawdown after ... hrs.
Artesian flow g.p.m.
Temperature of water 47° Depth artesian flow encountered ... ft.

(9) CONSTRUCTION:

Special standards: Yes No

Well seal—Material used Undisturbed
Well sealed from land surface to ... ft.
Diameter of well bore to bottom of seal ... in.
Diameter of well bore below seal ... in.
Number of sacks of cement used in well seal ... sacks
How was cement grout placed?

Was pump installed? Yes No Type ... HP ... Depth ... ft.
Was a drive shoe used? Yes No Plugs ... Size: location ... ft.
Did any strata contain unusable water? Yes No
Type of Water Silt depth of strata 126-370
Method of sealing strata off Cased Off
Was well gravel packed? Yes No Size of gravel: ...
Gravel placed from ... ft. to ... ft.

(10) LOCATION OF WELL: See # 354-84-4

County Deschutes Driller's well number 366-85-3
NW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 25 T. 20S R. 10E W.M.
Tax Lot # Lot 27 Blk 3 Subdivision OWW
Address at well location: Oregon Water Wonderland

(11) WATER LEVEL: Completed well.

Depth at which water was first found 14 ft.
Static level 3 ft. below land surface. Date 2-18-85
Artesian pressure lbs. per square inch. Date

(12) WELL LOG:

Diameter of well below casing

Depth drilled 390 ft. Depth of completed well 385 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 and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Gray Clay	126	160	
Black Silt	160	175	
Gray Clay	175	210	
Black Silt	210	225	
Green Clay & Silt	225	240	
Pink Clay & Silt	240	337	
Tan Pumice/Ash/Cinder	337	341	
Thin layer Clay/Pumice & Silt	341	370	
Fine Black Sand	370	375	
Coarse Pumice	375	380	
Black Sand	380	390	3

Work started 2-11 19 85 Completed 2-22 19 85
Date well drilling machine moved off of well 2-22 19 85

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] [Signature] Date, 19.....
(Drilling Machine Operator)

Drilling Machine Operator's License No. 759

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 Big Three Drilling & Pump Service
(Person, firm or corporation) (Type or print)

Address 1990 NW 35th, Redmond, Or. 97756

[Signed] [Signature] (Water Well Contractor)

Contractor's License No. 685 Date 2-22 19 85

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the

WATER RESOURCES DEPARTMENT,
SALEM, OREGON 97310
within 30 days from the date of well completion.

SP-12658-690

RECEIVED

DESC 6092

20s/10E-2566
Deep.

STATE OF OREGON
WATER WELL REPORT JUL 18 1986
(as required by ORS 537.799) WATER RESOURCES DEPT

(1) OWNER: SALEM, OREGON 97308-86-10
Name Ore. Water Wonderland Water Imp. Dist.
Address 55579 S. Century Drive
City Bend State Oregon 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:
Depth of Completed Well 642 ft.
Special Standards date of approval --

HOLE		SEAL		Amount sacks or pounds
Diameter	From To	Material	From To	
8	385	647	UNDISTURBED	

How was seal placed? Method A B C D E
 Other
Backfill placed from NO ft. to ft. Material
Gravel placed from NO ft. to ft. Size of gravel

(6) CASING/LINER:

Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
8"	385	575	.250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Liner:

Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Final location of shoe(s)
(7) PERFORATIONS/SCREENS: NONE

Perforations Method
 Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						<input type="checkbox"/>	<input type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour
 Pump Bailor Air Flowing Artesian
Yield gal/min 160 Pumping level 148 Drill stem at Time 24hrs
1 hr

Temperature of water 56° Depth Artesian Flow Found
Was a water analysis done? Yes By whom Sun Country Eng.
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 " Longitude
Township 20S XXX Range 10E E or W, WM.
Section 25 NW 1/4 NW 1/4
Tax Lot Lot Block Subdivision
Street Address of Well (or nearest address)
Oregon Water Wonderland

(10) STATIC WATER LEVEL:
5.5 ft. below land surface. Date 6-20-86
Artesian pressure lb. per square inch. Date

(11) WELL LOG: Ground elevation

Material	From	To	WB?	SWL
Fine Blk Sand/Pumice	385	395		
Greenish Gray clay/sand	395	425		
Heaving blk sand	425	435		
Hard pink/gray clay	435	515		
Hard Gray clay	515	555		
Gray clay/pumice	555	570		
Gray Lava	570	597		
Pumice/broken rock	597	602		20
Broken gray Lava	602	610		10
Coarse blk sand/Sgray	610	618		5.5
Brkn blk rock/tan clay	618	647		

Date started 5-27-86n Completed 7-10-86

(unbonded) Water Well Constructor Certification:
I constructed this well in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.
Signed Date

(bonded) Water Well Constructor Certification:
I accept responsibility for construction of this well and its compliance with all Oregon water well standards. This report is true to the best of my knowledge and belief.
Signed [Signature] Date 7/13/86
Company Big Three Drilling Co. Job No. 398-86-10

NOTICE TO WATER WELL CONTRACTOR

The original and first copy of this report are to be filed with the

STATE ENGINEER, SALEM, OREGON 97310 within 30 days from the date of well completion.

RECEIVED WATER WELL REPORT STATE OF OREGON (Please type or print) Do not write above this line) STATE ENGINEER SALEM, OREGON

DESC 6096

20/10/25 20/10-26

State Well No.

State Permit No.

(1) OWNER:

Name Oregon Water Wonderland Address 538 W. Highland Redmond, Ore.

(2) TYPE OF WORK (check):

New Well [] Deepening [x] 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 [] Industrial [] Municipal [] Irrigation [] Test Well [x] Other []

CASING INSTALLED:

Threaded [] Welded []

Diam. from None ft. to ft. Gage

PERFORATIONS:

Perforated? [] Yes [x] No.

Type of perforator used

Size of perforations in. by in. 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.

(8) WATER LEVEL: Completed well.

Static level 3 ft. below land surface Date 11/3/69 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? Bailer test 20 gal./min. with 120 ft. drawdown after 1 hrs. Artesian flow g.p.m. Date Temperature of water 51 degrees Was a chemical analysis made? [] Yes [x] No

(10) CONSTRUCTION:

Well seal—Material used See # 12 Depth of seal ft. Diameter of well bore to bottom of seal 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? [x] Yes [] No Size of gravel: 3/4 Gravel placed from 370 ft. to 686 ft.

(11) LOCATION OF WELL:

County Deschutes Driller's well number Section 26 T. 20-S. R. 10-E W.M. Bearing and distance from section or subdivision corner

(12) WELL LOG:

Diameter of well below casing 6

Depth drilled 271 ft. Depth of completed well 686 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.

Table with columns: MATERIAL, From, To, SWL. Rows include: Gravel (small) Black sand (fine), Brown clay, Black sand (fine), Brown clay, Black sand (med), Green clay, Brown clay, Bkk. Hard Rock, Brn. clay strips of sand.

This well was already cased to 374 - Seal undisturbed.

Work started 10/14 1969 Completed 11/3 1969 Date well drilling machine moved off of well 11/3 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] W. M. Cunningham Date 11/3, 1969 (Drilling Machine Operator)

Drilling Machine Operator's License No. 370-522

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 Cunningham Well Drilling (Person, firm or corporation) (Type or print) Address P.O. Box 104 Bend, Ore. [Signed] W. M. Cunningham (Water Well Contractor) Contractor's License No. 474 Date 11/3, 1969

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

AUG 17 1992

DBSC
 1441

20s/10e/25b

WATER RESOURCES DEPARTMENT
 SALEM, OREGON 97331

(START CARD) # 33160

(1) **OWNER:** Well Number 577-20-92
 Name Oregon Water Wonderland Water Imp. Dist.
 Address P.O. Box 3584
 City Sun River State Oregon 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 753 ft.
 Explosives used Yes No Type _____ Amount _____

Diameter	HOLE		Material	SEAL		Amount sacks or pounds
	From	To		From	To	
8"	410	745	undisturbed			
6"	745	753				

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:				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liner:	6"	+2	-745	.188	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Final location of shoe(s) _____

(7) **PERFORATIONS/SCREENS:**
 Perforations Method Machine
 Screens Type _____ Material _____

From	To	Slot size	Number	Diameter	Tel./pipe size	Casing	Liner
-720	-740	1/8x3	239	6		<input type="checkbox"/>	<input checked="" type="checkbox"/>

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

Pump Bailer Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
200	60	630	1 hr.
100	30	745	1hr
30	0	615 & 738	1 hr. each

Temperature of Water 46° 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: 575 to 600

(9) **LOCATION OF WELL by legal description:**
 County Deschutes Latitude _____ Longitude _____
 Township 20 ~~XXX~~ S. Range 10 E ~~XXX~~ W. M.
 Section 25 NW 1/4 NW 1/4
 Tax Lot 4100 Lot 27 Block 3 Subdivision OWW#1
 Street Address of Well (or nearest address) Big River Drive
 Unit 1 Well #2

(10) **STATIC WATER LEVEL:**
11 ft. below land surface. Date 7-16-92
 Artesian pressure _____ lb. per square inch. Date _____

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

From	To	Estimated Flow Rate	SWL
685	753	200+	11

(12) **WELL LOG:** Ground elevation _____

Material	From	To	SWL
Cement	410	685	
Red Cinder, Boulders & Sand	685	753	11
IK&H formation packers	640		
"	645		
"	590		
"	595		

Date started 7-16-92 Completed 8-12-92

(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.

Signed David J. Kulan WWC Number 1568
 Date 8-12-92

(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.

Signed [Signature] WWC Number 685
 Date 8-12-92

Pump

Appendix F.

**RidNO_x[™] and
Lysimeter Installation,
and Sampling Instructions**



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 $\frac{1}{2}$ to $\frac{3}{4}$ -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.



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.



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 ($\text{NO}_3\text{-N}$).
- 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**



475 NE Bellevue Dr, Bend, OR 97701 to 55706 Big River Dr, Bend, OR 97707

You can enter notes here.

475 NE Bellevue Dr

Bend, OR 97701

Take NE Dalton St to US-20

- ↑ 1. Head north toward NE Dalton St 35 sec (463 ft)
- ↷ 2. Turn right toward NE Dalton St 79 ft
- ↷ 3. Turn right onto NE Dalton St 148 ft
- ↷ 236 ft

Take SE 27th St, Knott Rd, US-97 S and S Century Dr to Big River Dr

- ↷ 4. Turn right onto US-20 32 min (23.7 mi)
- ↶ 5. Turn left onto SE 27th St 0.2 mi
- ↶ 6. Slight left to stay on SE 27th St 1.4 mi
- ↑ 7. Continue onto Knott Rd 1.9 mi
- ↷ 8. At the traffic circle, take the 2nd exit and stay on Knott Rd 1.2 mi
- ↷ 9. Slight right 3.0 mi
- ↷ 10. Merge onto US-97 S 0.3 mi
- ↷ 11. Slight right onto Vandevent Rd 12.0 mi
- ↶ 12. Turn left onto S Century Dr 1.0 mi
- ↷ 13. Turn right to stay on S Century Dr 1.1 mi
- ↷ 1.5 mi
- ↷ 14. Turn right onto Big River Dr 2 min (0.6 mi)
i Destination will be on the left

55706 Big River Dr

Bend, OR 97707

Adjacent Parcels Property Owners

55706 Big River Drive, Bend, Oregon
(T20S, R10E, Section 25BB, Tax Lot 3600, 0.53 acres)

* Tax Lot	3600	Nuevo Dia Adventures LLC 17074 Cooper Drive Bend, OR 97707
A. Tax Lot	2000	Hensley Fam Rev Trust 1465 NW 123 rd Avenue Portland, OR 97229
B. Tax Lot	1900	Wendell, Sharon M 3620 Spring Blvd Eugene, OR 97405
C. Tax Lot	3500	Kramer, Haley Heather & David Stewart 55710 Big River Drive Bend, OR 97707
D. Tax Lot	4100	Staduhar, Darren Joseph et al 16826 Brenda Drive Bend, OR 97707
E. Tax Lot	4000	McManus, John F 1 Nantucket Place Manhattan Beach, CA 90266
F. Tax Lot	3900	McManus, John F 1 Nantucket Place Manhattan Beach, CA 90266
G. Tax Lot	3700	Gibson, John R & Gail 1210 W Wilshire Blvd Nichols Hills, OK 73116

