NORTHERN NEVADA
Public Health

P. 775-328-2400
1001 E Ninth St. Bldg. B
Reno, NV 89512
NNPH.org

Sewage, Wastewater and Sanitation Hearing Advisory Board Meeting Notice and Agenda

Members
Matthew Buehler
Kenneth Lund
John Adams
Chad Carnes, P.E.
Chris Reede
Matt Smith – Alt.
Julianne Zotter, P.E., Alt.

August 1, 2024
5:30 p.m.

Northern Nevada Public Health
Conference Rooms A&B (Building B)
1001 East Ninth Street
Reno, NV

An item listed with asterisk (*) next to it is an item for which no action will be taken.

5:30 p.m.

1. ***Roll Call and Determination of Quorum**
2. ***Pledge of Allegiance**
3. ***Public Comment**

   Action may not be taken on any matter raised during this public comment period until the matter is specifically listed on an agenda as an action item. All public comment is limited to three minutes per person. Members of the public may submit public comment by either attending the meeting in person or submitting comments in writing. Comments submitted in writing must be submitted to smhopkins@nnph.org no later than 4:00 p.m. on the day before the scheduled meeting.
4. **Election of New Chair- (For possible action)**
5. **Approval of Agenda – (For possible action)**
   August 1, 2024
6. **Approval of Draft Minutes – (For possible action)**
   May 2, 2024
7. **Public Hearing** to determine whether to recommend approval to the District Board of Health for a variance for APN 142-241-14 from section 040.100 of the Northern Nevada Public Health Regulations Governing Sewage, Wastewater, and Sanitation. The variance requests permission to cross a drainage channel with a sewer line to connect to a future repair area. – **(For possible action)**
   Staff Representative: Josh Philpott

   Page and Olivia Bailey
   14075 Bihler Road
   Reno, NV 89511

8. ***Public Comment**

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9. **Adjournment – (For possible action)**

Possible Changes to Agenda Order and Timing: Items on the agenda may be taken out of order, combined with other items, withdrawn from the agenda, moved to the agenda of another later meeting, moved to or from the Consent section, or they may be voted on in a block. Items with a specific time designation will not be heard prior to the stated time but may be heard later. Items listed in the Consent section of the agenda are voted on as a block and will not be read or considered separately unless withdrawn from the Consent agenda.

Special Accommodations: The Sewage, Wastewater and Sanitation Board Meetings are accessible to the disabled. Disabled members of the public who require special accommodations or assistance at the meeting are requested to notify Environmental Health Services in writing at the Northern Nevada Public Health, 1001 East Ninth Street, Building B, Reno, NV 89512, by calling 775.328.2434 option 8, or by email to smhopkins@nnph.org, at least 24 hours prior to the meeting.

Public Comment: During the "Public Comment" items, anyone may speak pertaining to any matter either on or off the agenda, to include items to be heard on consent, by filling out a "Request to Speak" form and/or submit comments for the record to the Recording Secretary. For the remainder of the agenda, public comment will only be heard during items that are marked FOR POSSIBLE ACTION. All public comment should be addressed to the Sewage, Wastewater and Sanitation Hearing Advisory Board and not an individual member. The Board asks that your comments are expressed in a courteous manner. Any public comment for hearing items will be heard before action is taken on the item and must be about the specific item being considered by the Board. Public comment and presentations for individual agenda items are limited as follows: fifteen minutes each for staff and applicant presentations, five minutes for a speaker representing a group, and three minutes for individual speakers unless extended by questions from the Board or by action of the Chair. Reasonable efforts will be made to hear all public comment during the meeting.

All public comment is limited to three minutes per person. Unused time may not be reserved by the speaker nor allocated to another speaker.

Response to Public Comment: The Sewage, Wastewater, and Sanitation Hearing Advisory Board can deliberate or take action only if a matter has been listed on an agenda properly posted prior to the meeting. During the public comment period, speakers may address matters listed or not listed on the published agenda. The *Open Meeting Law* does not expressly prohibit responses to public comments by the Sewage, Wastewater, and Sanitation Hearing Advisory Board. However, responses from the Board members to unlisted public comment topics could become deliberation on a matter without notice to the public. On the advice of legal counsel and to ensure the public has notice of all matters the Sewage, Wastewater, and Sanitation Hearing advisory Board will consider, Board members may choose not to respond to public comments, except to correct factual inaccuracies, ask for Health District Staff action or to ask that a matter be listed on a future agenda. The Sewage, Wastewater, and Sanitation Hearing Advisory Board may do this during the public comment item. (No discussion among Board Members will take place on the item)"

Posting of Agenda; Location of Website:

Pursuant to NRS 241.020, Notice of this meeting was posted at the following locations:

Northern Nevada Public Health, 1001 E. 9th St., Reno, NV
Downtown Reno Library, 301 S. Center St., Reno, NV
Reno City Hall, 1 E. 1st St., Reno, NV
Sparks City Hall, 431 Prater Way, Sparks, NV
Washoe County Administration Building, 1001 E. 9th St, Reno, NV
Northern Nevada Public Health Website: www.nnph.org
State of Nevada Website: https://notice.nv.gov

How to Get Copies of Agenda and Support Materials: Supporting materials are available to the public at the Northern Nevada Public Health located at 1001 E. 9th Street, in Reno, Nevada. Ms. Susan Hopkins, Office Specialist for Environmental Health Services is the person designated to respond to requests for supporting materials. Ms. Hopkins is located at the Northern Nevada Public Health and may be reached by telephone at (775) 328-2434 option 8 or by email at smhopkins@nnph.org. Supporting materials are also available at the Northern Nevada Public Health Website www.nnph.org pursuant to the requirements of NRS 241.020.

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SEWAGE, WASTEWATER, AND SANITATION (SWS) HEARING ADVISORY BOARD MEETING MINUTES

Members
Matthew Buehler, Chair
Kenneth Lund, Atty
John Adams
Chad Carnes, P.E.
Matt Smith- Alternate
Ronald J. Anderson, P.E- Alternate

Thursday, May 2, 2024
5:30 p.m.
Washoe County Administration Complex,
Building B
Health District South Conference Room
1001 East Ninth Street
Reno, NV

5:30 p.m.

1. ***Roll Call and Determination of Quorum**

   The meeting of the Sewer, Wastewater, and Sanitation Hearing Board was called to order by Matthew Bueller, Chair, at 05:30 p.m. on Thursday, May 2. The following members and staff were present:

   Members present: Matthew Buehler, Chair
   John Adams
   Chad Carnes, P.E.
   Kenneth Lund

   Staff present: Latricia Lord
   Josh Foster
   Robert Fyda

   Members absent: Frank Kurnick, Jr.
   Matt Smith – Alternate
   Ronald J. Anderson, P.E.– Alternate

   Public present: Lacey Rulli, Petitioner

2. ***Pledge of Allegiance**

   John Adams led those present on the pledge of allegiance.

3. ***Public Comment**

   A period of public comment was opened, and no public comment was presented during the public comment period.

4. **Approval of Agenda –** May 2, 2024
   Mr. Adams moved to approve the agenda of the May 2, 2024, Sewage, Wastewater, and Sanitation (SWS) Board regular meeting. Second by Mr. Lund, motion approved unanimously.

5. **Approval of Draft Minutes** – October 5, 2023

Mr. Lund moved to approve the minutes of the October 5, 2023, Sewage, Wastewater, and Sanitation Board regular meeting. Second by Mr. Adams, motion approved unanimously.

6. **Public Hearing** - Variance request for APN 089-561-12 (460 Nicole Dr) from sections 020.075 and 020.080 of the Northern Nevada Public Health Regulations Governing Sewage, Wastewater, and Sanitation and to determine whether to recommend approval to the District Board of Health.
   Staff Representative: Latricia Lord

Latricia Lord presented a case overview for the subject property. The subject property is requesting a variance to install a new replacement disposal field instead of connection to Washoe County municipal sewer which is available to the applicant. Ms. Lord provided an email that was submitted for board review from Washoe County engineer, Alex Mayorga, stating that the applicant can connect to the municipal sewer system in Athena Way. Mr. Lund asked if the point of connection was Alena Way and not Athena Way. Ms. Lord verified that the connection was in Alena Way and that the email contains a typographical error for the street name.

Ms. Lord stated that sewer was within 400' of the applicant and that current regulations prohibit the issuance of permits necessary for the installation of a replacement field and that the owners, Lacey Rulli and Robert van Looy, ("PETITIONERS") are requesting this variance due to financial hardship as the cost to connect to sewer is cost prohibitive. Ms. Lord referred the board members to the quotes provided by the PETITIONERS in their board packet for sewer connection and replacement field installation. Ms. Lord also referred the board members to a printed excerpt of an email thread between her and Ms. Rulli. In the email thread, Ms. Rulli detailed some of her and her husband's financial obligations and stated that they are not eligible to apply for a loan through Washoe County Community Services Department. Ms. Lord stated that property specific questions can be directed to Ms. Rulli who represents the PETITIONERS and that staff's recommendation is to remain neutral and allow the advisory board to determine appropriateness and that there were no additional conditions recommended should the board recommend approval of the variance request.

Board chair inquired as to the scope of work and if there are existing issues with the leach field. Ms. Lord replied that the PETITIONERS were routinely pumping and that it appears the soil in the current field is oversaturated and needs replacement – a typical fix in this situation. Board chair also asked Ms. Lord if there were any concerns of groundwater contamination or other potential concerns for the nearby Spanish Springs High School. Ms. Lord replied that staff do not anticipate any concerns of that nature for the high school.

Mr. Carnes had questions regarding the current status of the system and future plans of the applicant. Ms. Rulli responded that the system is currently pumped every few months and they have no plans for expansion at this time. The board explored the reasons behind the failure of the existing leach lines and sought clarification on whether any remedial actions had been taken. Mr. Adams raised questions regarding the age of the system, the frequency of maintenance, and any observable impacts on neighboring properties. The PETITIONERS provided insights into their efforts to address the issues, including the use of natural remedies, jetting, and periodic pumping, but ultimately, these measures proved ineffective in resolving the underlying problems.

Board members questioned the PETITIONERS about the financial implications of connecting to the municipal sewer system versus installing a replacement disposal field. The discussion delved

into the substantial cost estimates provided by contractors and what services would be covered, the complexities involved in crossing other utilities, potential traffic mitigation expenses, and the deep excavation required for sewer line connection which could substantially increase the overall expense to the homeowner. Concerns were raised regarding the unique challenges posed by the property's location relative to Alena Way and Spanish Springs High School. The board acknowledged the logistical complexities involved in executing the sewer line connection, emphasizing the need for meticulous planning and coordination to minimize disruptions and ensure public safety.

The board scrutinized the proposed replacement disposal field plan, focusing on its adequacy in addressing the property's sewage disposal needs. Questions were raised regarding the design specifications, including the length and depth of the leach lines, the presence of a distribution box, and the potential for future expansion or modifications. Mr. Carnes made suggestions to consider alternative designs, such as shorter leach lines or additional repair fields, to optimize system performance and longevity through additional percolation testing.

Mr. Lund and board members summarized the main issues that would justify a variance as: the depth for connection, requirement of crossing utilities, and potential requirements for traffic control. The board members felt the quotes were fair and possibly low based on site constraints and potential logistical challenges. The chair asked the board members if there was any additional discussion needed.

Mr. Carnes made a motion to approve the variance request. Mr. Buehler asked if there are any conditions attached to his motion. Mr. Adams stated he would not add conditions and Mr. Carnes had a clarifying question on if the owner chose to pursue additional percolation testing or additional evaluations. Ms. Lord responded saying that additional testing is acceptable and helpful as long as any design modifications meet the required setbacks.

Ms. Lord asked the board to clarify their motion and provide a reference to the proposed motions in the staff report. Mr. Carnes reaffirmed his motion to be: “Move to present to the District Board of Health a recommendation for approval of Variance Case # H24-0001VARI to allow the permitting and construction of a replacement disposal field as proposed, without conditions”.

Conditions of Approval

NNPH staff is not recommending any conditions of approval at this time, as the property is of sufficient size for a replacement disposal field that will meet all applicable setbacks. NNPH will follow its normal permitting and inspection procedures and if groundwater or other limiting layers were encountered would require the appropriate redesign.

Motion

Motion made by Mr. Carnes “move to present to the District Board of Health a recommendation for approval of Variance Case # H24-0001VARI to allow the permitting and construction of a replacement disposal field as proposed, without conditions”. Second by Mr. Adams. Mr. Buehler called for a vote, all members in favor, motion approved unanimously.

Mr. Buehler closed the public hearing.

7. ***Public Comment**

   As there were no public comment requests, closed the public comment period.

8. **Adjournment –**

   At 6:05 p.m., Mr. Buehler moved to adjourn the meeting.

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Staff Report
Board Meeting Date: August 1, 2024

TO: Sewage, Wastewater, and Sanitation Hearing Advisory Board

FROM: Josh Philpott, Registered Environmental Health Specialist
775-433-4007, jphilpott@nnph.org

SUBJECT: Variance Case H24-0002VARI; Requesting variance for APN 142-241-14 from Section 040.100; requesting permission to cross a drainage channel by way of encasing the building sewer line with concrete and extending the casing 25' on both ends to meet the setback for the drainage channel.

SUMMARY

This staff report summarizes the Environmental Health Services Division's (EHS) review of the submitted variance application for your decision to recommend or deny approval to the District Board of Health (DBOH) a variance for APN 142-241-14 which is owned by Page and Olivia Bailey. The variance requests the allowance of a building sewer line to cross a section Whites Creek that has previously been classified as a drainage channel in preparation for a future repair field located on the opposite bank. The building sewer line would be concrete encased from the point of crossing, extending 25' on both sides of the crossing. The building sewer line will run below the drainage channel with a minimum vertical separation of 30" from the surface grade of the drainage channel.

Previous Action

There has been no previous action with this variance request. A Washoe County Building Department permit application for a new Single-Family Dwelling (WBLD24-101365) was received by EHS on April 23, 2024. The parcel in question will be served by a domestic well.

Background

Section 040.100 of the SWS Regulations requires building sewer lines meet a minimum 25' horizontal setback to drainage channels. Section 010.088 of the SWS Regulations defines a drainage channel as a canyon, swale, wash, or depression through which storm waters sometimes flow over and/or through.

Staff have been on site to evaluate the existing property conditions. Based on field observations it is noted the proposed design layout matches the property in question. The width and location of the drainage channel will not allow for the primary and repair fields to be built on the same side of the drainage and still meet all required setbacks to onsite and neighboring wells. The drainage on the property is not a constant source of water due to the amount of development upstream which has cut off the drainage from Whites Creek. The NNPH staff believes that water captured in the channel will be primarily storm water from the subject property, limited to rain and snowfall events, and the proposed mitigation will satisfactorily protect any waters in the channel from being contaminated by effluent. The determination made by the NNPH staff is supported by a hydrological report submitted by the applicant stating that the amount of runoff into the drainage has been significantly reduced due to the development of neighboring parcels.

The property is a vacant 2.5-acre parcel. A wide drainage channel runs west to east across the property. The drainage channel begins approximately a 1/2 mile southwest at Whites Creek but does not connect

to the creek. The channel flows northeast through multiple parcels, each of which have been developed with homes, wells, and onsite sewage systems until it reaches the parcel in question, and then continues northeast under Arrowcreek Parkway until it reaches Steamboat Ditch.

The property owner contracted with Reno Tahoe Geo Associates Inc. to design a sand filter bed to be used as both the primary and repair fields. The proposed design includes constructing a sewer line under the channel to the area designated for future repair. The sewer line will be encased in 4" of concrete and be installed a minimum of 30" below grade. The concrete casing will extend 25' on each side of the crossing to meet the required setback. All other portions of the proposed system are located outside the 25' setback to the drainage as required in Section 040.100. The proposed design requests that the crossing be installed at the time of construction of the repair field.

Staff are supportive of this as a standard mitigation measure. Other variances that have been approved in previous years utilized this same technique of encasing the sewer line in concrete. Staff are currently drafting updates to the existing SWS Regulations to allow for a sewer line to cross a drainage channel by way of encasement as a standard process, as the risk to public health is adequately mitigated, without the need for a variance. No other options exist that do not severely limit the property owners' ability to build on the parcel.

Findings of Fact

The Board must consider the following when making a recommendation on this variance to the DBOH:

1. Will the proposed variance result in contamination of water to the extent it cannot be used for its existing or expected use?
   Reply: If the system functions as intended, then there should not be effluent discharge to surface water or groundwater and should not pose a threat to groundwater contamination. If the building sewer line crossing the drainage channel fails, it could possibly contaminate the water in the drainage channel with raw sewage until such time as the flow is stopped. Additionally, this channel will only intermittently convey water during storm events, meaning that the channel will be empty most of the time.
2. Will the proposed variance pose a threat to public health?
   Reply: There are two primary ways that sewage can pose a threat to public health, direct exposure via surface and groundwater contamination in areas with domestic wells. Direct exposure in this situation would most likely occur if the sleeving were compromised. EHS feels this is unlikely as it will be buried and not easily accessible. As indicated in question #1, the system should also not cause a groundwater contamination issue if the system is maintained and functions properly.
3. Are there other reasonable alternatives?

Reply: In order to maintain all applicable setbacks and not cross the drainage channel the applicant could perform one of the following alternatives:

- **a.** Relocate the proposed house and well to allow for both the primary and repair areas to be on the same side of the drainage channel. This alternative is not consistent with the property owner's wishes for their property and may not be achievable due to the location of neighboring wells.
- **b.** A municipal sewer line is located approximately 700' to the east of the property. Connecting to this line could pose a significant cost to the property owners.

Conditions of Approval

1. Any instances of system non-function must be reported to NNPH for review and must be repaired immediately. In the event of failure to maintain or lack of system function, NNPH may require sampling and/or impose restrictions on the property based on the functionality of the building sewer line, up to and including removal of the storm drain crossing.
2. Require recording of the variance to the parcel to ensure proper public records notification in the event the property is sold to any other person or entity. Recording may not be removed without NNPH approval.

Recommendation

Staff recommends the Sewage, Wastewater and Sanitation (SWS) Hearing Board support the presented Variance Case H24-0002VARI (Page and Olivia Bailey) to allow the approval of the sewer line crossing the drainage channel (WBLD24-101365) with the additional 25' of sleeving to meet the minimum setback to a drainage channel.

Possible Motion

Should the SWS Hearing Board wish to approve the variance application, the four possible motions would be:

1. "Move to present to the District Board of Health a recommendation for approval of Variance Case H24-0002VARI (Page and Olivia Bailey) to allow the approval of a septic system as proposed, including all recommended conditions"; OR
2. "Move to present to the District Board of Health a recommendation for approval of Variance Case H24-0002VARI (Page and Olivia Bailey) to allow the approval of a septic system as proposed, without conditions"; OR
3. "Move to present to the District Board of Health a recommendation for approval of Variance Case H24-0002VARI (Page and Olivia Bailey) to allow the approval of a septic system as proposed, with the following conditions (list conditions)"; OR
4. "Move to present to the District Board of Health a denial of Variance Case H24-0002VARI (Page and Olivia Bailey)".
5. The SWS Board may also formulate their own motion or request additional information from the applicant if desired.

NORTHERN NEVADA Public Health
Environmental Health

NORTHERN NEVADA PUBLIC HEALTH
ENVIRONMENTAL HEALTH SERVICES DIVISION
1001 East Ninth Street • Bldg B • Reno, Nevada 89512
Telephone (775) 328-2434 • Fax (775) 328-6176
www.NNPH.org
HealthEHS@NNPH.org

APPLICATION FOR VARIANCE TO THE REGULATIONS GOVERNING SEWAGE, WASTEWATER, AND SANITATION

Office Use Only
Fee Paid _____
Date Paid _____
Cash/CC/Check _____
Receipt No. _____
Date Appl. Received _____
Considered Comp. _____

DATE 06/04/2024 PROJECT NAME New SFD - Bailey

OWNER

Name Page and Olivia Bailey
Address 1851 Steamboat Parkway Unit 6702
Reno, NV 89521
Phone [redacted]
Email Address [redacted]

ENGINEER

Name Zachary Iler (Reno Tahoe Geo Associates, Inc.)
Address 12000 Old Virginia Rd
Reno, NV 89521
Phone 775-853-9100
Email Address ziler@rtgeo.com

The following items must be submitted with this application:

JOB ADDRESS 14075 Bihler Road, Washoe County, NV 89511 (Formerly: 0 Whites Creek Lane)
SIZE OF PARCEL 2.5 /Acre
COPY OF LEGAL DESCRIPTION AND VERIFICATION OF CURRENT VESTING ON TITLE
EXISTING PARCEL(S) APN(S) 142-241-14 LOT _____ BLOCK _____
REASON FOR VARIANCE REQUEST Whites creek drainage runs through the middle of property.
Build site on N side of drainage for access to Arrowcreek Parkway does not have space for secondary recovery field based on offsets for home, property lines, and adjacent site + proposed site water wells.
SECTION(S) OF REGULATIONS TO BE VARIED Section 040.100 Table 2
Sewage line crossing drainage channel to a secondary leach field if needed

IF A PARCEL MAP: PROJECT NAME _____
APN(S) _____ LOT _____ BLOCK _____

IF TENTATIVE MAP: PROJECT NAME _____
NUMBER OF PROPOSED LOTS _____ LOTS REQUIRING VARIANCES _____
LOT DESCRIPTION(S) _____

Prepare and submit this original application with 9 copies and 10 copies of a construction plot plan with specifications drawn to scale (minimum 1 inch = 30 feet) and include the required following requirements:

- ⌗ Vicinity map.
- ⌗ The direction of North.
- ⌗ A diagram of the location of roadways, easements or areas subject to vehicular traffic, material storage or large animal habitation.

List continued on reverse …

… continued from previous page

- A diagram of the location and distance to any well and on-site sewage disposal system within 150 feet of the subject property (if none, so indicate).
- A diagram of the distances from the proposed on-site disposal system to any proposed or existing on-site well.
- A diagram of the location of any percolation hole or test trench(es) on the property.
- A diagram to scale of the location of all proposed on-site sewage disposal system components, including a delineated area for future replacement of disposal trench(es).
- A diagram of the distance to any available sewer system (if none, so indicate).
- The number of bedrooms in the proposed building.
- The maximum slope across the disposal area.
- A diagram of the lot dimensions and total lot area.
- The location of water supply lines.
- A diagram of all structures on site.
- A diagram of all existing and proposed drainage improvements.
- A diagram of the location of any watercourse and/or natural drainage channel within 150 feet of the property (if none, so indicate).
- Soil logs and percolation test results, including calculations and actual field data (if required).
- Sewage loading calculations and application rates.
- System sizing calculations.
- Pertinent geological and hydrogeological information.
- Construction drawings, cross-sections and specifications of the proposed system.
- Certification by an engineer that the proposed system is properly designed to function for at least ten (10) years (engineer's seal).
- Submit a completed Notice of Special On-Site Requirements. We will give you the form after variance is approved by the District Board of Health.

BE PREPARED TO SUBMIT:

- Other information may be required to enable the Board to adequately consider the application.

THE SUBMITTED DATA, DOCUMENTS AND DESIGNS MUST DEMONSTRATE WHETHER:

1. The proposed system will significantly and/or adversely impact any water so that the water may no longer be used for its existing or expected beneficial use.
2. The proposed system will be detrimental or pose a danger to the public health, safety or create or contribute to a public health hazard.
3. Other reasonable alternatives for compliance with these regulations are available to the applicant. State the alternatives considered, including reasons for rejection.

ALL INFORMATION MUST BE PROVIDED AND THIS APPLICATION MUST BE PROPERLY COMPLETED PRIOR TO SUBMITTAL. FAILURE TO DO SO MAY RESULT IN SIGNIFICANT DELAYS TO THE PROCESSING OF THIS VARIANCE REQUEST.

Nevada Environmental Consulting, LLC
316 California Ave. # 763 Reno, Nevada 89509 | (775) 544-1149 | matt@nvenv.net www.nvenv.net

March 23, 2023

Transmitted via electronic mail:
brandt@k2eng.net

Mr. Brandt Kennedy, P.E.
K2 Engineering, Inc.
860 Maestro Dr. Suite A
Reno, NV 89511

Subject: Surface Water runoff Assessment, Unnamed Ephemeral Drainage at Bihler Road, Washoe County, Nevada

Brandt:

Nevada Environmental Consulting, LLC. (NVENV) has conducted a runoff assessment under various hydrologic scenarios to estimate the anticipated peak discharge conveyed within the unnamed ephemeral channel that crosses Bihler Road approximately 400-feet south of Arrowcreek Parkway and upstream of upgradient of the Steamboat Ditch.

HYDROLOGIC SETTING

Bihler Road is approximate 2,800 feet east (down gradient) from the north branch of Whites Creek, commonly references as the Howards' Branch. The Howards' Branch of Whites Creek is an entrenched, manmade flow path that conveys all flood flows from spilling onto lands east of the alignment. The Howards Branch of Whites Creek was constructed in the 1870's to convey irrigation rights from Whites Creek to irrigated lands north of the pre-development alignment. The Howards Branch isolates all flows from the west from the Bihler Road area, therefore the contribution area evaluated in this analysis starts east for the Howards Branch of Whites Creek.

The contributing catchment areas to the Bihler Creek Road crossing is approximately 42 acres and is constrained on the west (upslope) by the Howards' Branch of Whites Creek containment berm, and on the north by Whites Creek Lane (approximately 350 feet south, and parallel to, Arrowcreek Parkway, and along the south by roadside ditches along Raider Run Road. The contribution area is approximately 2,800 feet in total length and slopes to the east at 5% falling approximately 140 feet to the Bihler Creek Road elevation of ±4,820' amsl.

METHODS

A TR-55 watershed runoff model water prepared using publicly available terrain data and NOAA Atlas 14 hydrologic data were used to define the two through 100-year storm event intensity. Overland sheet flow Time of Concentration (Tc) and channelized characteristics were determined using Manning's Equation using typical channel geometry observed in the field. Applied equations used in the runoff model are:

Channel flow (manning equation)

$V=(1.49*r^{(2/3)}*s^{0.5})/n$

Where V=average velocity (ft/s)
r=hydraulic radius (ft) and is equal to a/pw
a=cross sectional flow area (sq ft)
pw=wetted perimeter (ft)
s=slope of hydraulic grade line (watercourse slope ft/ft
n=Manning roughness coefficient (for open channel flow)

Sheet flow

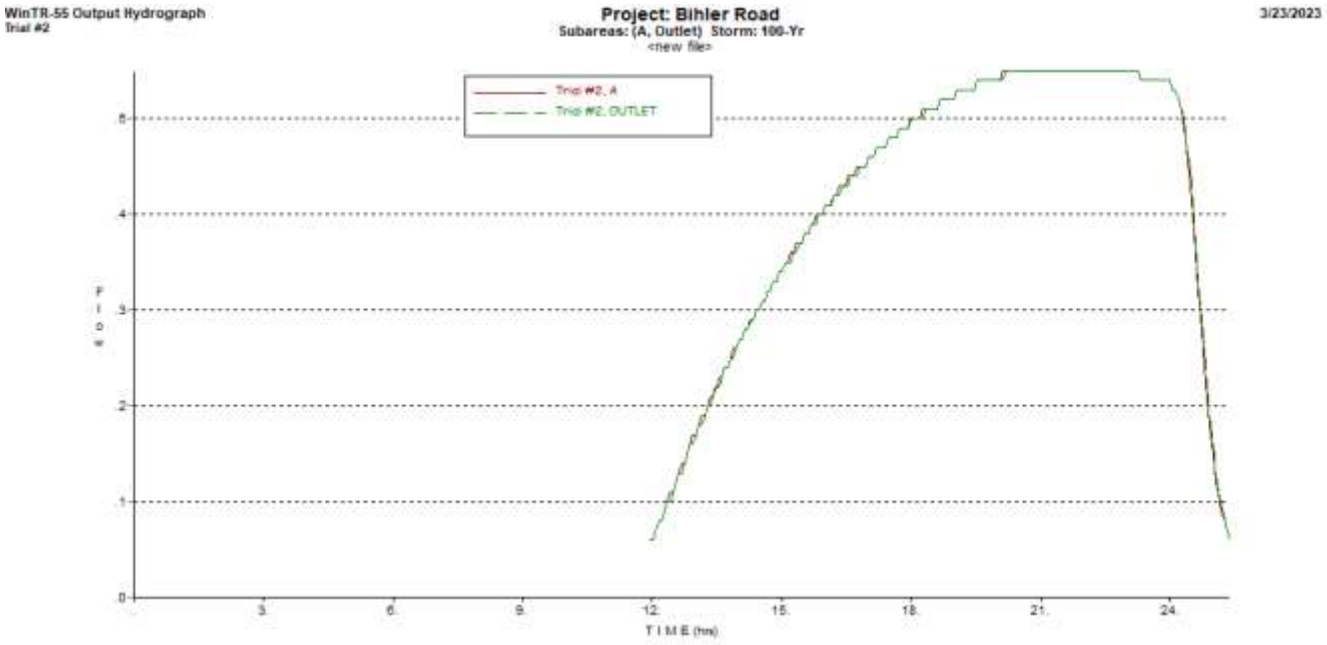
$Tt=(0.007*(nL)^{0.8})/(P2^{0.5}*S^{0.4})$

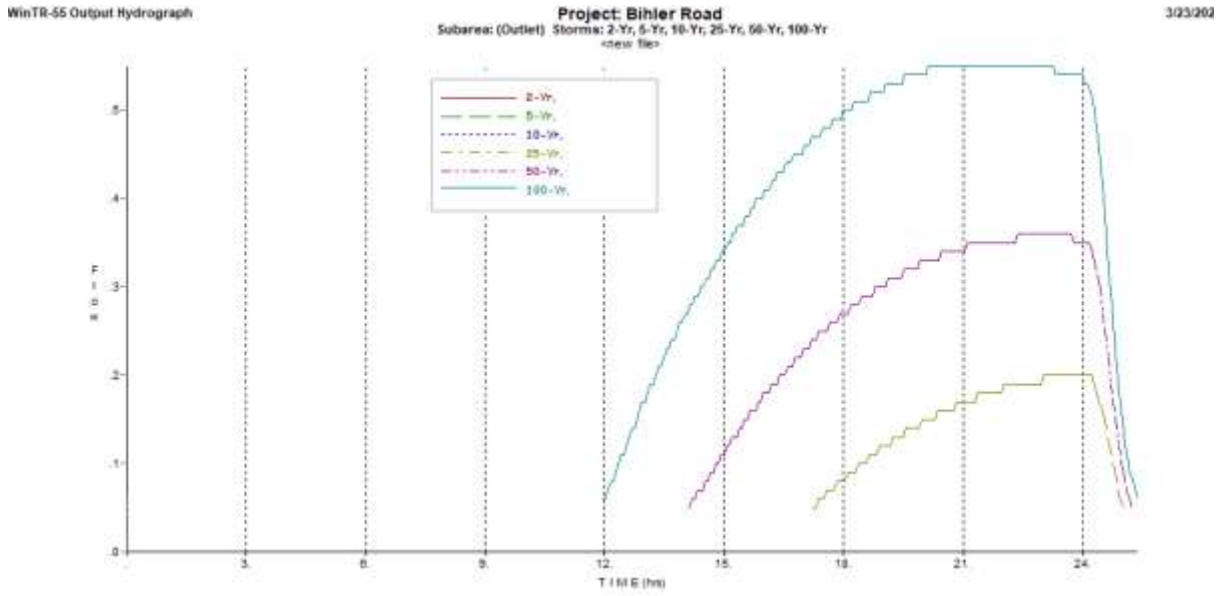
Where Tt=travel time(hr)
N =Manning roughness coefficient (for sheet flow)
L =flow length(ft)
P2=2year, 24-hour rainfall(in)
S =slope of hydraulic grade line(land slope,ft/ft)

The TR-55 Model was run with a 12", 15" and 18" culvert at the discharge of the 42 acre watershed. Model run details are provided in attachment A.

RESULTS

The estimated time to peak discharge during a 100-year, 24-hour storm event (precipitation = 3.12") is 0.55 cubic feet per second (CFS). This peak will occur at 23 hours into the 24-hour storm period.





RECOMENDAITONs

Model runs were conducted with 12", 15", and 18" diameter culvert with a maximum inlet head elevation of two foot over the inlet flow line elevation. The discharge calculation assumes a free (clear) discharge of half of the culvert diameter to eliminate a backwater effect.

The sizing recommendation of 15-inch diameter reflect the need to periodically clean the culvert, therefore while a 12" culvert is adequate to pass the 100-year, 24-hour peak flow of 0.55 cfs, a 15" will allow for maintenance access while maintaining flow velocities adequate to transport sediment. Inlet elevation assumed that the roadbed height is at least 6-inched above eth pipe soffit elevation.

A 15" culvert is adequate to pass the 100-year, 24-hour peak discharge flow rate. Roughness coefficients for smooth wall HDPE corrugated culvert, concrete and CMP were evaluated, and the variation of material is insignificant to the discharge performance of a 15-inch diameter culvert.

Sincerely,

Matthew Setty
Principal Scientist

Attachments (3):

Site Map

TR-55 Model Output File

NOAA Atlas 14 Precipitation Table


Arrowcreek Parkway
Howards' Branch of Whites Creek
Bihler Road Culvert
Browns Creek Branch of Whites Creek
Whites Creek Split (Diversion Structure)
0
500
1,000 ft

Attachment B: TR-55 Watershed Model Output File

NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.4011°, Longitude: -119.7751°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.096 (0.083-0.113)	0.120 (0.102-0.142)	0.161 (0.137-0.191)	0.200 (0.168-0.237)	0.265 (0.217-0.316)	0.324 (0.257-0.392)	0.395 (0.303-0.484)	0.480 (0.353-0.602)	0.619 (0.427-0.797)	0.744 (0.489-0.979)
10-min	0.146 (0.126-0.173)	0.182 (0.156-0.216)	0.245 (0.208-0.291)	0.304 (0.256-0.361)	0.403 (0.330-0.481)	0.494 (0.392-0.597)	0.601 (0.460-0.737)	0.731 (0.538-0.916)	0.941 (0.650-1.21)	1.13 (0.744-1.49)
15-min	0.181 (0.156-0.214)	0.226 (0.194-0.268)	0.303 (0.258-0.360)	0.377 (0.318-0.448)	0.499 (0.409-0.597)	0.612 (0.486-0.740)	0.745 (0.571-0.913)	0.907 (0.667-1.14)	1.17 (0.805-1.50)	1.40 (0.923-1.85)
30-min	0.244 (0.210-0.288)	0.305 (0.261-0.361)	0.409 (0.347-0.485)	0.508 (0.428-0.603)	0.672 (0.552-0.804)	0.824 (0.654-0.996)	1.00 (0.769-1.23)	1.22 (0.897-1.53)	1.57 (1.09-2.03)	1.89 (1.24-2.49)
60-min	0.302 (0.260-0.357)	0.377 (0.323-0.447)	0.506 (0.430-0.601)	0.628 (0.530-0.746)	0.832 (0.683-0.995)	1.02 (0.809-1.23)	1.24 (0.952-1.52)	1.51 (1.11-1.89)	1.95 (1.34-2.51)	2.34 (1.54-3.08)
2-hr	0.404 (0.356-0.465)	0.501 (0.442-0.578)	0.643 (0.562-0.740)	0.764 (0.660-0.881)	0.951 (0.797-1.10)	1.12 (0.913-1.31)	1.31 (1.04-1.56)	1.55 (1.19-1.91)	1.98 (1.45-2.53)	2.37 (1.68-3.11)
3-hr	0.484 (0.430-0.549)	0.603 (0.541-0.687)	0.756 (0.671-0.859)	0.880 (0.774-1.00)	1.05 (0.910-1.20)	1.20 (1.02-1.39)	1.38 (1.15-1.61)	1.62 (1.31-1.92)	2.03 (1.60-2.56)	2.40 (1.85-3.14)
6-hr	0.675 (0.601-0.760)	0.845 (0.753-0.955)	1.05 (0.931-1.19)	1.21 (1.06-1.37)	1.41 (1.23-1.61)	1.57 (1.35-1.80)	1.73 (1.46-2.01)	1.92 (1.59-2.26)	2.22 (1.79-2.66)	2.53 (1.99-3.17)
12-hr	0.881 (0.785-0.990)	1.11 (0.986-1.25)	1.40 (1.24-1.57)	1.62 (1.43-1.83)	1.92 (1.67-2.18)	2.14 (1.84-2.45)	2.37 (2.00-2.75)	2.60 (2.15-3.06)	2.91 (2.34-3.50)	3.17 (2.49-3.87)
24-hr	1.11 (1.00-1.25)	1.39 (1.25-1.56)	1.75 (1.58-1.96)	2.05 (1.84-2.29)	2.46 (2.19-2.75)	2.78 (2.46-3.12)	3.12 (2.73-3.53)	3.47 (3.00-3.96)	3.95 (3.36-4.56)	4.33 (3.62-5.06)
2-day	1.31 (1.17-1.48)	1.64 (1.46-1.86)	2.08 (1.85-2.36)	2.44 (2.16-2.77)	2.94 (2.58-3.35)	3.33 (2.90-3.82)	3.74 (3.22-4.33)	4.18 (3.55-4.87)	4.77 (3.97-5.65)	5.25 (4.28-6.31)
3-day	1.45 (1.30-1.63)	1.82 (1.63-2.06)	2.34 (2.09-2.64)	2.75 (2.45-3.11)	3.34 (2.95-3.79)	3.82 (3.34-4.34)	4.33 (3.74-4.95)	4.86 (4.14-5.61)	5.62 (4.68-6.58)	6.23 (5.10-7.40)
4-day	1.59 (1.43-1.79)	2.01 (1.80-2.26)	2.59 (2.32-2.91)	3.07 (2.74-3.45)	3.75 (3.32-4.23)	4.31 (3.78-4.87)	4.91 (4.25-5.58)	5.55 (4.74-6.36)	6.47 (5.40-7.52)	7.22 (5.92-8.49)
7-day	1.86 (1.65-2.10)	2.36 (2.09-2.67)	3.08 (2.73-3.48)	3.65 (3.23-4.14)	4.47 (3.92-5.07)	5.12 (4.45-5.83)	5.81 (5.00-6.66)	6.54 (5.57-7.55)	7.56 (6.32-8.86)	8.39 (6.90-9.93)
10-day	2.07 (1.84-2.35)	2.64 (2.34-3.00)	3.47 (3.07-3.93)	4.11 (3.63-4.67)	5.01 (4.38-5.70)	5.72 (4.97-6.52)	6.46 (5.57-7.40)	7.23 (6.15-8.34)	8.29 (6.94-9.68)	9.12 (7.54-10.8)
20-day	2.53 (2.26-2.86)	3.23 (2.88-3.65)	4.23 (3.77-4.76)	4.99 (4.43-5.63)	6.03 (5.33-6.81)	6.83 (6.00-7.75)	7.66 (6.66-8.73)	8.49 (7.32-9.75)	9.62 (8.16-11.2)	10.5 (8.79-12.3)
30-day	2.96 (2.64-3.35)	3.78 (3.37-4.28)	4.93 (4.39-5.58)	5.81 (5.15-6.56)	6.99 (6.16-7.91)	7.90 (6.92-8.97)	8.83 (7.67-10.1)	9.77 (8.40-11.2)	11.0 (9.36-12.8)	12.0 (10.1-14.1)
45-day	3.53 (3.15-3.94)	4.51 (4.02-5.02)	5.86 (5.23-6.52)	6.86 (6.12-7.63)	8.17 (7.25-9.10)	9.14 (8.08-10.2)	10.1 (8.86-11.3)	11.0 (9.62-12.4)	12.2 (10.5-13.8)	13.0 (11.2-14.9)
60-day	4.01 (3.57-4.49)	5.14 (4.57-5.76)	6.69 (5.94-7.47)	7.80 (6.92-8.69)	9.20 (8.14-10.3)	10.2 (8.98-11.4)	11.2 (9.79-12.5)	12.1 (10.5-13.6)	13.2 (11.4-14.9)	13.9 (12.0-15.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

Attachment B: TR-55 Watershed Model Output File

```
TR-55 Current Data Description

                         --- Identification Data ---


User:     Setty                                  Date:        3/23/2023
Project:  Bihler Road                            Units:       English
SubTitle: K2 Engineering                         Areal Units: &Acres
State:    Nevada
County:   Washoe
Filename: <new file>

                             --- Sub-Area Data ---


Name           Description              Reach        Area(ac)     RCN     Tc
-------------------------------------------------------------------------------
A             Contribution area        channel         42          51    1.053

Total area: 42 (ac)

                             --- Storm Data  --

                    Rainfall Depth by Rainfall Return Period

   2-Yr        5-Yr        10-Yr       25-Yr       50-Yr       100-Yr      1-Yr

-------------------------------------------------------------------------------
   1.39        1.75        2.05        2.46        2.78        3.12        1.11


Storm Data Source:              User-provided custom storm data
Rainfall Distribution Type:     Type IA
Dimensionless Unit Hydrograph:  <standard>

_
                                  Storm Data

                    Rainfall Depth by Rainfall Return Period

   2-Yr        5-Yr        10-Yr       25-Yr       50-Yr       100-Yr      1-Yr

-------------------------------------------------------------------------------
   1.39        1.75        2.05        2.46        2.78        3.12        1.11


Storm Data Source:              User-provided custom storm data
Rainfall Distribution Type:     Type IA
Dimensionless Unit Hydrograph:  <standard>

_
```

Bihler Road
K2 Engineering
Washoe County, Nevada

Watershed Peak Table (Trial #1)

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	1-Yr
SUBAREAS							
A	.00	.00	.00	0.20	0.36	0.55	.00
REACHES							
channel	.00	.00	.00	0.20	0.36	0.55	.00
Down	.00	.00	.00	0.20	0.36	0.55	.00
OUTLET	.00	.00	.00	0.20	0.36	0.55	.00

Watershed Peak Table (Trial #2)

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	1-Yr
SUBAREAS							
A	.00	.00	.00	0.20	0.36	0.55	.00
REACHES							
channel	.00	.00	.00	0.20	0.36	0.55	.00
Down	.00	.00	.00	0.20	0.36	0.55	.00
OUTLET	.00	.00	.00	0.20	0.36	0.55	.00

Watershed Peak Table (Trial #3)

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	1-Yr
SUBAREAS							
A	.00	.00	.00	0.20	0.36	0.55	.00
REACHES							
channel	.00	.00	.00	0.20	0.36	0.55	.00
Down	.00	.00	.00	0.20	0.36	0.55	.00
OUTLET	.00	.00	.00	0.20	0.36	0.55	.00

Setty

Bihler Road
K2 Engineering
Washoe County, Nevada

Hydrograph Peak/Peak Time Table (Trial #1)

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	1-Yr
	(hr)	(hr)	(hr)	(hr)	(hr)	(hr)	(hr)
SUBAREAS							
A	.00	.00	.00	0.20	0.36	0.55	.00
	n/a	n/a	n/a	24.01	23.03	21.66	n/a
REACHES							
channel	.00	.00	.00	0.20	0.36	0.55	.00
	n/a	n/a	n/a	24.01	23.03	21.66	n/a
Down	.00	.00	.00	0.20	0.36	0.55	.00
	n/a	n/a	n/a	24.01	23.10	21.66	n/a
OUTLET	.00	.00	.00	0.20	0.36	0.55	.00

Hydrograph Peak/Peak Time Table (Trial #2)

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	1-Yr
	(hr)	(hr)	(hr)	(hr)	(hr)	(hr)	(hr)
SUBAREAS							
A	.00	.00	.00	0.20	0.36	0.55	.00
	n/a	n/a	n/a	24.01	23.03	21.66	n/a
REACHES							
channel	.00	.00	.00	0.20	0.36	0.55	.00
	n/a	n/a	n/a	24.01	23.03	21.66	n/a
Down	.00	.00	.00	0.20	0.36	0.55	.00
	n/a	n/a	n/a	24.01	23.03	21.66	n/a
OUTLET	.00	.00	.00	0.20	0.36	0.55	.00

Hydrograph Peak/Peak Time Table (Trial #3)

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	1-Yr
	(hr)	(hr)	(hr)	(hr)	(hr)	(hr)	(hr)
SUBAREAS							
A	.00	.00	.00	0.20	0.36	0.55	.00
	n/a	n/a	n/a	24.01	23.03	21.66	n/a
REACHES							
channel	.00	.00	.00	0.20	0.36	0.55	.00
	n/a	n/a	n/a	24.01	23.03	21.66	n/a
Down	.00	.00	.00	0.20	0.36	0.55	.00
	n/a	n/a	n/a	24.01	23.03	21.66	n/a
OUTLET	.00	.00	.00	0.20	0.36	0.55	.00

Bihler Road
K2 Engineering
Washoe County, Nevada

Structure Output Table

Reach Identifier / Structure Identifier	Peak Flow (PF), Storage Volume (SV), Stage (STG) by Rainfall Return Period 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	1-Yr
Reach: channel							
Pipe : BihlerPIPE							
12							
PF	.00	.00	.00	0.20	0.36	0.55	.00
SV	.00	.00	.00	.00	.00	.00	.00
STG	.00	.00	.00	.03	.05	.08	.00
15							
PF	.00	.00	.00	0.20	0.36	0.55	.00
SV	.00	.00	.00	.00	.00	.00	.00
STG	.00	.00	.00	.02	.04	.06	.00
18							
PF	.00	.00	.00	0.20	0.36	0.55	.00
SV	.00	.00	.00	.00	.00	.00	.00
STG	.00	.00	.00	.02	.03	.04	.00

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
A	42.00	1.053	51	channel	Contribution area

Total Area: 42 (ac)

Reach Summary Table

Reach Identifier	Receiving Reach Identifier	Reach Length	Routing Method
channel	Outlet		STRUCTURE(BihlerPIPE)

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length	Slope	Mannings's n	End Area	Wetted Perimeter	Velocity	Travel Time (hr)
A							
SHEET	100	0.0500	0.130				0.153
SHALLOW	415	0.0500	1.39				0.032
SHALLOW	500	0.0600	1.39				0.035
CHANNEL	1500					0.500	0.833
					Time of Concentration		1.053

Setty

Bihler Road
K2 Engineering
Washoe County, Nevada

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
A	Sagebrush (w/ grass understory)	(fair)	B	32	51
	Desert shrub	(good)	A	10	49
	Total Area / Weighted Curve Number			42	51
				==	==

Reach Channel Rating Details

Reach Identifier	Reach Length	Reach Manning's n	Friction Slope	Bottom Width	Side Slope
channel	(This reach is a structure: BihlerPIPE)				

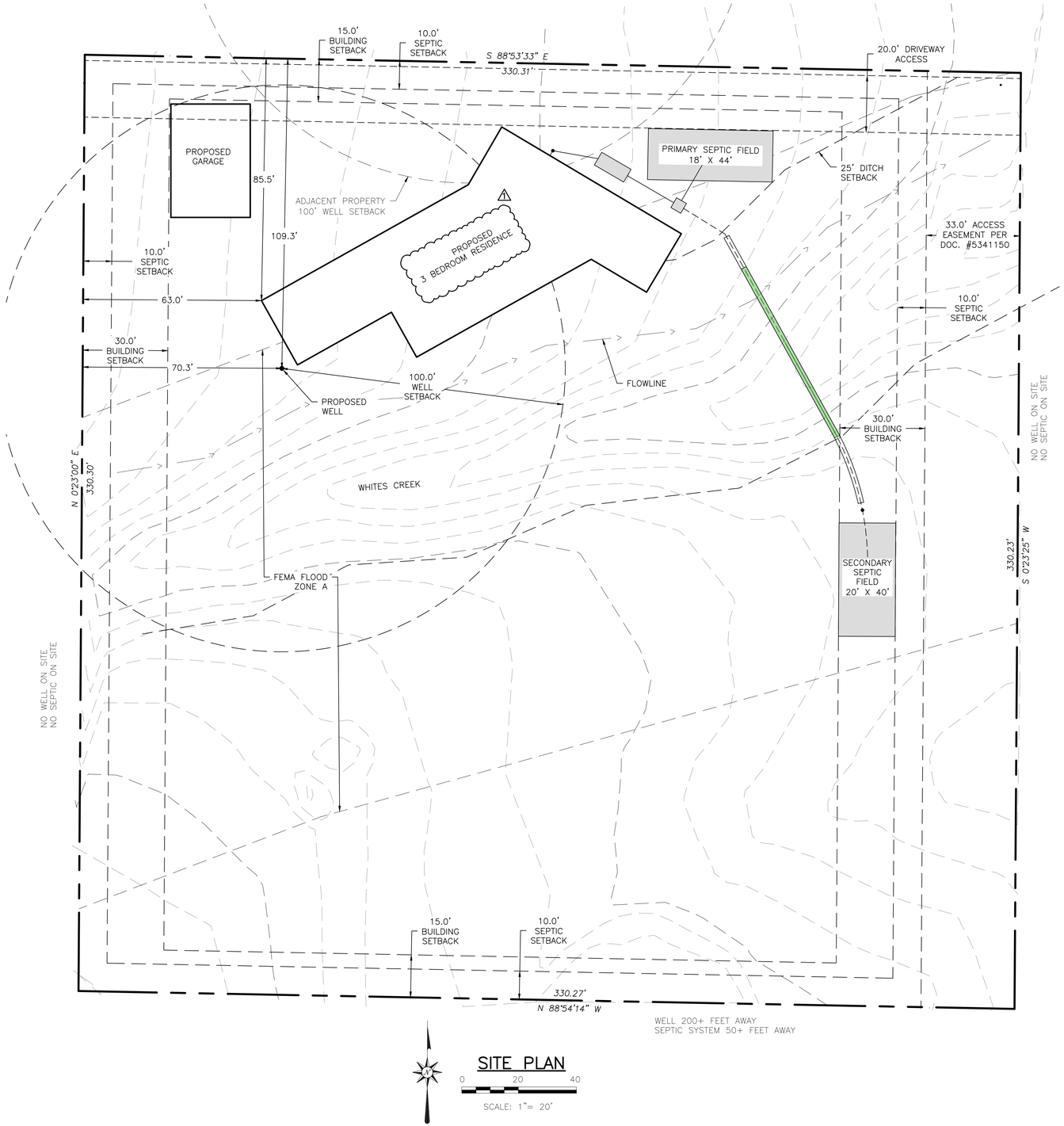
Reach Identifier	Stage	Flow	End Area	Top Width	Friction Slope
channel	(This reach is a structure: BihlerPIPE)				

Structure Description - User Entered

Reach Identifier	Surface Area @ Crest (ac)	Height Above Crest	Surface Area @ Ht Above (ac)	Pipe Diameter	Head on Pipe	Weir Length
channel	.01	2	.05	12 15 18	.8	

Structure Rating Details - Computed

Reach Idendifier	Stage	Pool Storage	Flows @ Pipe Diameter Dia #1 12	Dia #2 15	Dia #3 18
BihlerPIPE	0	0.00	0.000	0.000	0.000
	0.5	0.01	3.372	4.840	6.291
	1	0.02	4.298	6.385	8.692
	2	0.06	5.717	8.687	12.145
	5	0.30	8.679	13.400	19.062
	10	1.10	12.099	18.790	26.890
	20	4.20	16.986	26.458	37.981



SITE PLAN

0 20 40

SCALE: 1"= 20'

VICINITY MAP

NTS

PROPERTY INFORMATION:

PROPERTY INFORMATION:
0 WHITES CREEK LANE
WASHOE VALLEY, NEVADA 89508
APN: 142-241-14
ZONING: 52% GENERAL RURAL (GR), 48% HIGH DENSITY RURAL (HDR)
LOT SIZE: 2.50 ACRES OR 108,900 sq.ft.

OWNER:
PAGE & OLIVIA BAILEY
1828 RESISTOL DRIVE
RENO, NV, 89521
PHONE: (406) 579-1853
EMAIL: PAGE.BAILEY@FREEINTELLECTDESIGN.COM

DESIGN ENGINEER:
CHRISTINA BRENNAN P.E.
RENO TAHOE GEO ASSOCIATES, INC.
P.O. BOX 18449
RENO, NEVADA 89511
(775) 853-9100
E-MAIL: CBRENNAN@RTGEO.COM

IWUIC NOTES:

FIRE HAZARD CLASSIFICATION: HIGH

DEFENSIBLE SPACE: NON-CONFORMING

WATER SUPPLY: NON-CONFORMING

IGNITION RESISTANT CONSTRUCTION CLASSIFICATION: IR1 NC WITH NON-CONFORMING DEFENSIBLE SPACE PER TABLE 503.1 OF THE 2018 WILDLAND URBAN INTERFACE CODE

ACCESS SHALL BE PROVIDED PER SECTION 403 OF THE IWUIC CODE.

IFC NOTES:

FIRE APPARATUS ACCESS ROAD REQUIREMENTS:
ALL EXTERIOR WALLS OF THE FIRST STORY OF THE BUILDING ARE WITHIN 150 FEET OF THE ACCESS ROAD PER SECTION 503.1 OF THE 2018 INTERNATIONAL FIRE CODE

ALL TURNAROUNDS COMPLY WITH FIGURE D103.1 DEAD-END FIRE APPARATUS ACCESS ROAD TURNAROUNDS

SHEET INDEX

Know what's below. Call 811 before you dig.

REV.	DATE	BY	APP'D
1	05/24/24	ZRI	CAB
2	07/23/24	ZRI	CAB

Reno Tahoe Geo Associates, Inc.
CONSULTING CIVIL ENGINEERS
P.O. Box 18449
Reno, Nevada 89511
TEL (775)853-9100
FAX (775)853-9199

OVERALL SITE PLAN

0 WHITES CREEK LANE
APN: 142-241-14

WASHOE COUNTY NEVADA

PROFESSIONAL ENGINEER-STATE OF NEVADA
CHRISTINA A. BRENNAN
Exp. 12/31/24
CIVIL
No. 24135
SIGNED: 7/23/24

DATE: JULY 2024
JOB NUMBER: 22139.002
DESIGNED BY: CAB
DRAWN BY: ZRI
CHECKED BY: CAB

SHEET C1.0

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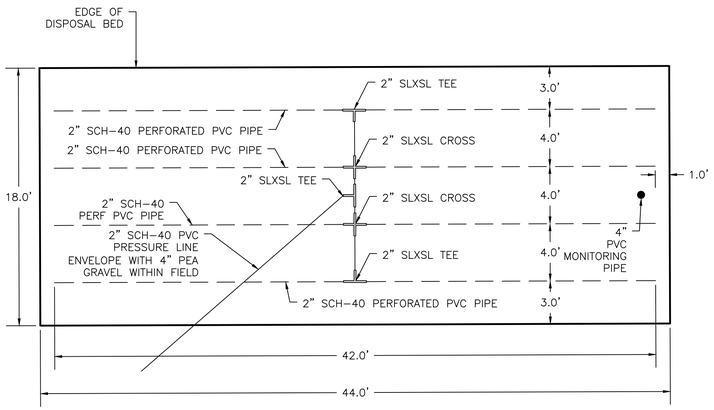
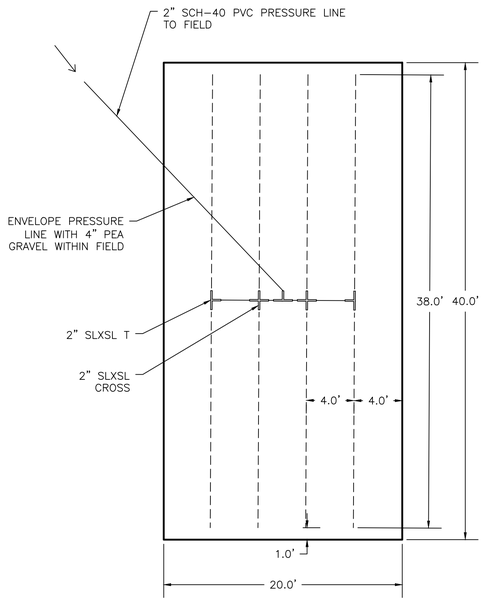


1 C2.0 PRIMARY DISPOSAL BED PLAN

NTS



2 C2.0 SECONDARY DISPOSAL BED PLAN

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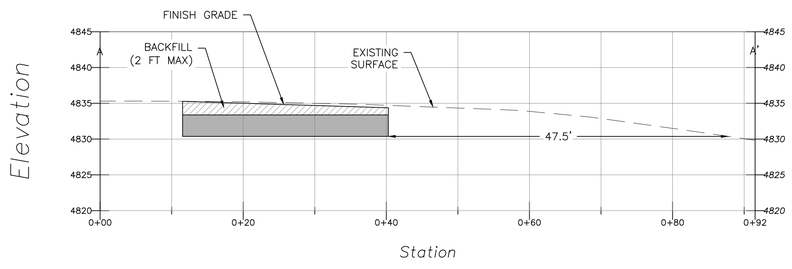
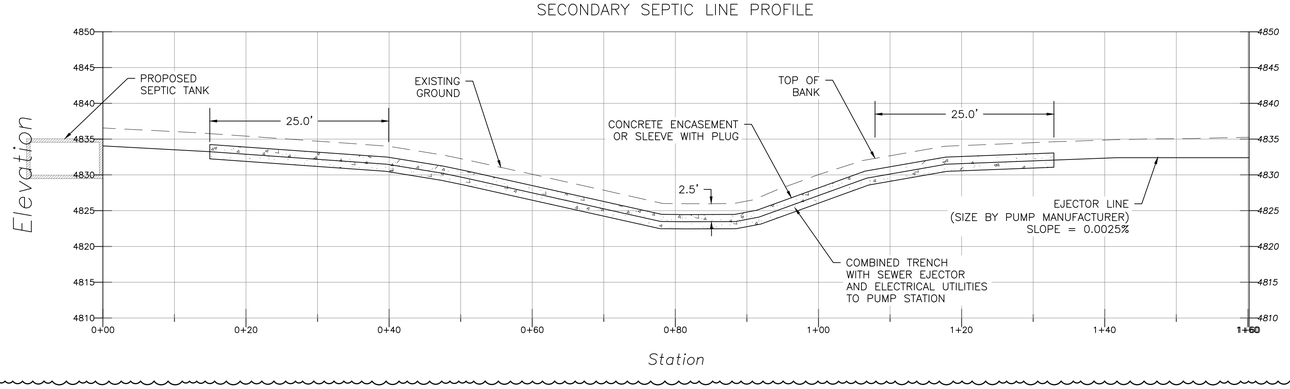


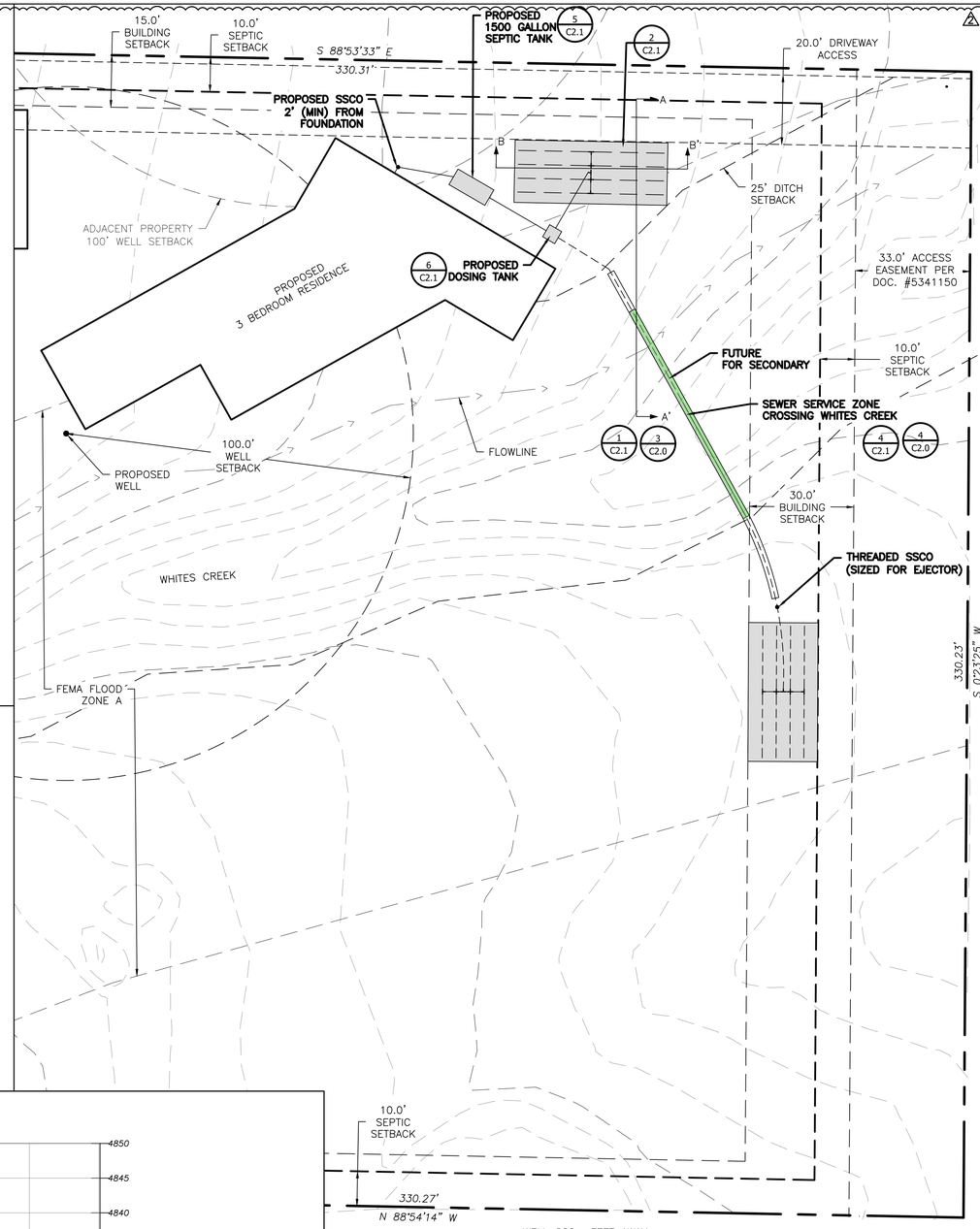
3 C2.0 PRIMARY DISPOSAL BED PROFILE VIEW A-A'

1" = 20'



4 C2.0 SECONDARY SEPTIC DITCH CROSSING PROFILE

1" = 10'



SEPTIC PLAN

0 20 40

SCALE: 1"= 20'

REV.	DATE	BUILDING & NNPH REVISIONS	BY	APP'D
1	05/24/24	NNPH REVISIONS	ZRI	CAB
2	07/23/24		ZRI	CAB

Reno Tahoe Geo Associates, Inc.
CONSULTING CIVIL ENGINEERS
P.O. Box 18449
Reno, Nevada 89511
TEL (775)853-9100
FAX (775)853-9199

ON-SITE DISPOSAL SYSTEM DESIGN

0 WHITES CREEK LANE
APN: 142-241-14

WASHOE COUNTY, NEVADA

PROFESSIONAL ENGINEER STATE OF NEVADA
CHRISTINA A. BRENNAN
Exp. 12/31/24
CIVIL
No. 24135
SIGNED: 7/23/24

DATE: JULY 2024
JOB NUMBER: 22139.002
DESIGNED BY: CAB
DRAWN BY: ZRI
CHECKED BY: CAB

SHEET C2.0

Know what's below. Call 811 before you dig.

J:\2022\22139.002 - 0 Whites Creek - Design\Drawings and Plans\0 White Creeks Civil Set.dwg 7/24/24 3:29 pm

DESIGN AND CONSTRUCTION NOTES:

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CURRENTLY ADOPTED WASHOE COUNTY DISTRICT HEALTH DEPARTMENT SEWAGE, WASTEWATER, AND SANITATION REGULATIONS (S.W.S.), AMENDED JULY 3, 2013 AT TIME OF THIS DESIGN.
2. NO PUBLIC SEWER IS AVAILABLE WITHIN 400 FEET OF THE SUBJECT PARCEL.
3. NO WELLS AND/OR ON-SITE SEWAGE DISPOSAL SYSTEMS ARE LOCATED WITH 200' OF THE SUBJECT PROPERTY OR AS SHOWN.
4. NO DOMESTIC WELLS ARE LOCATED WITHIN 100 FEET OF THE PROPOSED SYSTEM.
5. ALL HORIZONTAL SEPARATIONS SHALL BE IN ACCORDANCE WITH SECTION 040.100, TABLE 2 OF THE S.W.S. REGULATIONS.
6. DISPOSAL BED DIMENSIONING SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 100.090, TABLE 4 OF THE S.W.S. REGULATIONS.
7. DESIGN PERCOLATION RATE IS 60 minutes/inch.
8. FILTER SAND SHALL HAVE AN EFFECTIVE SIZE (D10) BETWEEN 0.3mm (No. 50 SIEVE APPROXIMATELY) AND 0.6mm (No. 30 SIEVE APPROXIMATELY) WITH 95% PASSING (D95), THE No. 4 SIEVE. UNIFORMITY COEFFICIENT (D60/D10) SHALL BE IN ACCORDANCE WITH FIGURE 11 OF THE S.W.S. REGULATIONS, AMENDED JULY 3, 2013.
9. A REPRESENTATIVE SAMPLE OF THE FILTER SAND SHALL BE TESTED BY A RECOGNIZED TESTING FACILITY AND CERTIFIED AS MEETING THE ABOVE REQUIREMENTS. THE SUPPLIER SHALL PROVIDE CERTIFICATION AS TO THE QUALITY OF THE SAND. IT IS RECOMMENDED THAT THE SAND BE TESTED PRIOR TO DELIVERY TO SITE.
10. SETTLE SAND BY FLOODING TRENCH BEFORE PLACEMENT OF GRAVEL AND DRAIN PIPE IN DISPOSAL FIELD.
11. ALL PIPE BENDS TO BE 45° OR LESS.
12. TERMINATE PERFORATED PIPES 1 FOOT FROM END OF FIELD AND CAP ALL ENDS.
13. MINIMUM BURY OVER SEWER SERVICE LINES (GRAVITY OR PRESSURE) IS 30 INCHES.
14. PROPOSED SEWAGE DISPOSAL SYSTEM AS SHOWN IS ORIENTED TO PROVIDE SUITABLE HORIZONTAL DISTANCE TO DAYLIGHT OF SLOPES. ANY MODIFICATIONS/CHANGES TO THE LOCATION OF SYSTEM COMPONENTS AS SHOWN WILL REQUIRE RE-EVALUATION OF SLOPE REQUIREMENTS AND POTENTIAL RE-DESIGN OF THE DISPOSAL SYSTEM.
15. MODIFICATIONS TO THE LOCATION OF THE RESIDENCE AND/OR DRIVEWAY, AND THE ADDITION OF ANY SITE IMPROVEMENT FEATURES NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT WASHOE COUNTY HEALTH DISTRICT (WCHD) SEWAGE, WASTEWATER, AND SANITATION REGULATIONS.
16. DISTRIBUTION MANIFOLD SHALL BE CEMENTED TOGETHER AND BE PLACED IN SUCH A MANNER AS TO PROVIDE UNIFORM DISTRIBUTION TO EACH PERFORATED DISPOSAL LINE. PERFORATED DISPOSAL LINES SHALL BE LAID AT SLOPES WHICH PROVIDE FOR UNIFORM DISTRIBUTION OF EFFLUENT ACROSS THE DISPOSAL BED. THE WCHD ESTABLISHES 85 PERCENT COVERAGE ACROSS THE DISPOSAL BED AS AN ACCEPTABLE MINIMUM.
17. DESIGN IS BASED ON PERCOLATION TEST DATA BY RENO TAHOE GEO ASSOCIATES, DATED AUGUST 6, 2021. DISPOSAL SYSTEM DESIGN UTILIZES A SAND FILTER BED SYSTEM BASED ON A SEASONAL HIGH GROUNDWATER DEPTH OF 5 FEET BELOW GROUND SURFACE. BED EXCAVATION SHALL BE INSPECTED PRIOR TO PLACEMENT OF VISQUEEN OR SAND (SEE INSPECTION NOTES THIS SHEET).
18. DISTRIBUTION PIPING SHALL BE 2"ø SCHEDULE 40 PVC, AND SHALL BE STRAIGHT. 1 ROW OF $\frac{3}{8}$" DIAMETER HOLES SHALL BE DRILLED AT 6" O.C. ALONG THE BOTTOM OF THE PIPING AT 15° FROM VERTICAL DOWN POSITION. PIPES SHALL BE LAID WITH HOLES DOWN AT A UNIFORM GRADIENT THAT WILL PROVIDE UNIFORM FLOW THRU HOLES.
19. THIS SYSTEM IS DESIGNED FOR THE NORMAL USE OF UTILITY FACILITIES ASSOCIATED WITH THE PROPOSED CONSTRUCTION. THE INSTALLATION OF THE UTILITY FACILITIES NOT NORMAL TO THE PROPOSED CONSTRUCTION MAY ADVERSELY EFFECT THE SYSTEM'S FUNCTIONALITY AND SERVICE LIFE.
20. THE PLACEMENT OF ROOT INVASIVE AND HIGH WATER DEMAND PLANTS OVER OR IMMEDIATELY ADJACENT TO THE PROPOSED DISPOSAL FIELD IS STRONGLY DISCOURAGED. PLACEMENT OF THESE TYPES OF PLANTS OVER OR NEAR THE DISPOSAL FIELD WILL REDUCE THE FIELD'S SERVICE LIFE EXPECTANCY.
21. THE FINISH GRADED SURFACE WITHIN THE AREA OF PROPOSED DISPOSAL FIELD SHALL PROVIDE POSITIVE SURFACE DRAINAGE AWAY FROM THE FIELD. IT IS THE OWNER'S RESPONSIBILITY TO MAINTAIN POSITIVE SURFACE DRAINAGE AWAY FROM THE DISPOSAL FIELD INDEFINITELY (INCLUDING LANDSCAPING INSTALLATION).

INSPECTION NOTES:

1. THIS IS AN ENGINEERED SEPTIC DISPOSAL SYSTEM AND INSPECTION IS REQUIRED DURING CONSTRUCTION. CONTRACTOR SHALL NOTIFY RENO TAHOE GEO ASSOCIATES, INC. 48 HOURS (MINIMUM) SUCH THAT THE FOLLOWING INSPECTIONS CAN BE COORDINATED WITH THE WASHOE COUNTY DISTRICT HEALTH DEPARTMENT:

   A. EXCAVATION OF DISPOSAL BED AND SCARIFICATION OF SOIL BOTTOM.
   B. PLACEMENT OF FILTER SAND AND INSPECTION OF MEMBRANE ON SIDEWALLS OF BED.
   C. PLACEMENT OF DRAINROCK AND PIPING ABOVE SAND.
   D. WET TEST OF PIPING PRIOR TO COVERING WITH DRAINROCK. PERFORATED PIPING IS TO BE PLCED IN SUCH A MANNER THAT WATER DISTRIBUTES OVER APPROXIMATELY 85% OF THE DISPOSAL FIELD.
   E. WET TEST OF PUMP ACTIVATION SWITCHING AND ALARM.

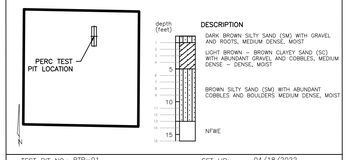
811 Know what's below. Call 811 before you dig.

TEST PIT NO.: PTP-01 — SET UP: 01/30/2023
TEST NO.: A — RUN: 01/30/2023
DIMENSIONS: 18" Wide X 12" Deep — FIELD TECH: Z. ILER
SOIL TESTED: SILTY SAND (SM)

LOG

TIME (hours:minutes)	MEASURED DROP (inches)	REMARKS
0:00	START TEST	Initial Water Added, IAW 090.060
0:10	½"	Proceed, IAW 090.085
0:10	½"	
0:10	½"	
0:10	½"	Terminate, IAW 090.085
0:10	½"	
0:10	½"	

PERCOLATION RATE: 60 Minutes Per Inch
DEPTH TEST PERFORMED: 2 Feet
PIT EVALUATED BY: Z. ILER

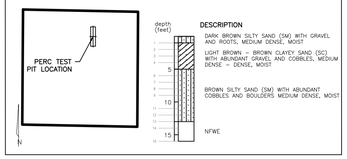


TEST PIT NO.: PTP-01 — SET UP: 04/18/2022
TEST NO.: B — RUN: 04/19/2022
DIMENSIONS: 6" Wide X 12" Deep — FIELD TECH: Z. ILER
SOIL TESTED: POORLY GRADED SAND WITH SILT (SP-SM)

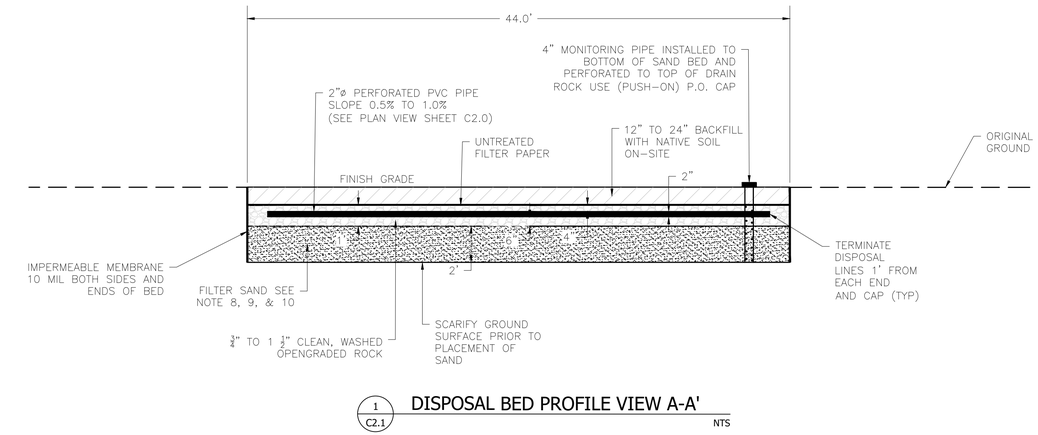
LOG

TIME (hours:minutes)	MEASURED DROP (inches)	REMARKS
0:00	START TEST	Initial Water Added, IAW 090.060
0:30	¼"	Pre-soak, IAW 090.075
0:30	⅛"	Adjust Water level to 6", IAW 090.070
0:30	⅛"	Proceed, IAW 090.085
0:30	⅛"	Terminate, IAW 090.085

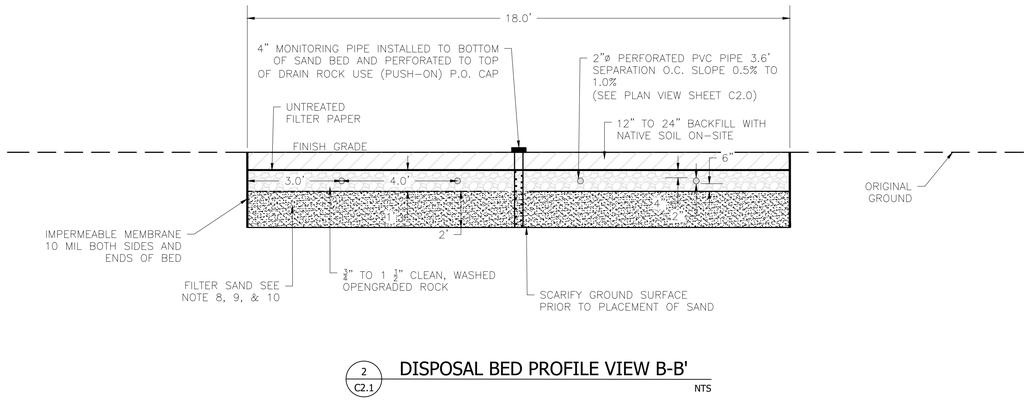
PERCOLATION RATE: 60 Minutes Per Inch
DEPTH TEST PERFORMED: 4 Feet
PIT EVALUATED BY: Z. ILER



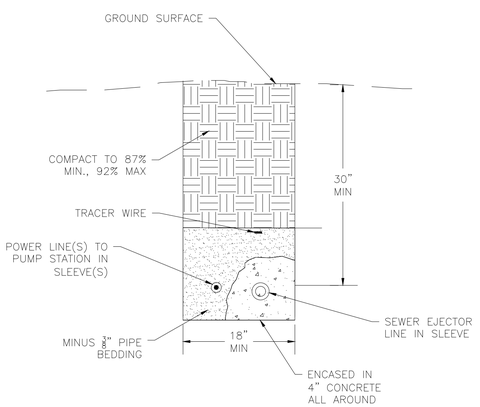
3 C2.1 PERCOLATION REPORTS — NTS



1 C2.1 DISPOSAL BED PROFILE VIEW A-A' — NTS

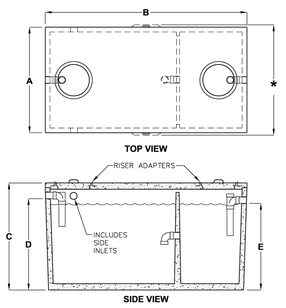


2 C2.1 DISPOSAL BED PROFILE VIEW B-B' — NTS



4 C2.1 SEWER EJECTOR TRENCH DETAIL — NTS

RESIDENTIAL SEPTIC TANKS
LISTED BY UPC®



MODEL NUMBER	LIQUID CAPACITY (GALLONS)	DIM A	DIM B	DIM C	DIM D	DIM E	MINIMUM EXCAVATION WIDTH*	MINIMUM EXCAVATION LENGTH
JS-1000	1000	5'-1"	8'-2"	5'-8"	4'-10"	4'-7"	6'-10"	9'-2"
JS-1200	1200	5'-9"	8'-8"	5'-8"	4'-10"	4'-7"	7'-6"	9'-8"
JS-1500	1500	5'-7"	10'-8"	5'-8"	4'-10"	4'-7"	7'-4"	11'-8"
JS-2000	2000	6'-1"	11'-5"	5'-8"	4'-10"	4'-7"	8'-0"	12'-5"
JS-2500	2500	5'-9"	16'-10"	5'-8"	4'-10"	4'-7"	7'-6"	17'-10"
JS-3000	3000	5'-9"	16'-10"	6'-5"	5'-7"	5'-4"	7'-6"	17'-10"

*OVERALL WIDTH CAN VARY WITH TANK MODEL. USE EXCAVATION WIDTH FOR SITE PLANNING.

DESIGN LOAD: NON-TRAFFIC WITH 3' EARTH COVER MAXIMUM AT 500 PSF.

FOR COMPLETE DESIGN AND PRODUCT INFORMATION CONTACT JENSEN PRECAST.

Jensen Precast reserves the right to make changes to product design and/or dimensions without notice. Please contact Jensen Precast whenever necessary for confirmation or advice on product design.

4/10/2008 JS1000-JS3000_NONH_B.DWG ©2005

JENSEN PRECAST

5 C2.1 JENSEN 1500 GALLON SEPTIC TANK — NTS

DESIGN CALCULATIONS

RESIDENCE: 3 BEDROOM, UPSIZING TO A 1500 GALLON SEPTIC TANK
SOIL TYPE: BROWN SILTY SAND (SM)
GROUND WATER SEASONAL MAX.: NOT APPLICABLE
DEPTH TO IMPERVIOUS SOIL: NOT APPLICABLE
DESIGN PERCOLATION RATE: 60 minutes per inch
LEACH FIELD TYPE: MOUNDED SAND FILTER BED SYSTEM

DESIGN: $Q = \frac{5}{\sqrt{t}}$ WHERE Q=APPLICATION RATE (gpd/sq.ft.) t=DESIGN PERCOLATION RATE (minutes/inch)

(BED SIZING WILL BE CONTROLLED BY PERCOLATION RATE)

$Q = \frac{5}{\sqrt{60}} = 0.6455 gpd/sq.ft.$

FOR MAIN RESIDENCE
BED AREA; $A = \frac{1500 gpd}{Q} = \frac{1500 gpd}{0.6455 gpd/sq.ft.} = 2,324 sq.ft.$

REDUCE THE BED SIZE BY $\frac{2}{3}$ = 775sq.ft.

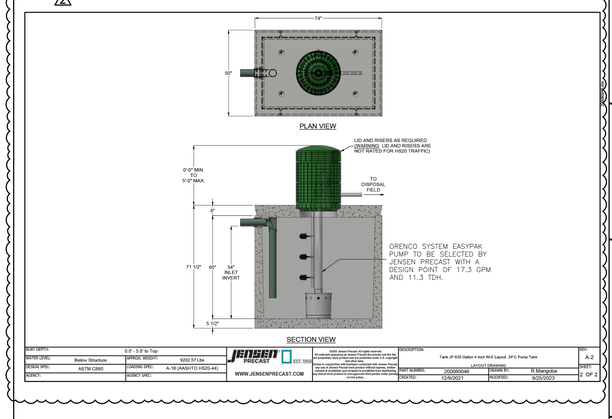
SAND FILTER BED DIMENSIONS:

PRIMARY - 18' X 44' = 792sq.ft. "ok"

SECONDARY - 40'X20' = 800sq.ft. "ok"

DOSING CYCLE:

$\frac{1,500 GPD}{6 DOSES/DAY} = 250 GAL/DOSE$



6 C2.1 JENSEN 620 GALLON DOSING TANK — NTS

REV.	DATE	BY	APP'D
1	05/24/24	BUILDING & NNPH REVISIONS	ZRI	CAB
2	07/23/24	NNPH REVISIONS		

Reno Tahoe Geo Associates, Inc.
CONSULTING CIVIL ENGINEERS
P.O. Box 18449, Reno, Nevada 89511
TEL (775)853-9100 FAX (775)853-9199

SEPTIC DETAILS AND CALCS
0 WHITES CREEK LANE
APN: 142-241-14
WASHOE COUNTY, NEVADA

PROFESSIONAL ENGINEER - STATE OF NEVADA - CHRISTINA A. BRENNAN - Exp. 12/31/24 - CIVIL - No.24133 - SIGNED: 7/23/24

DATE: JULY 2024
JOB NUMBER: 22139.002
DESIGNED BY: CAB
DRAWN BY: ZRI
CHECKED BY: CAB

SHEET C2.1

J:\2022\22139.002 - 0 Whites Creek - Design\Drawings and Plans\0 White Creeks Civil Set.dwg 7/24/24 3:29 pm