Y2 CONSULTANTS

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ENGINEERING, SURVEYING & PLANNING
LANDSCAPE ARCHITECTURE, GIS
NATURAL RESOURCE SERVICES

LEVEL I NUTRIENT PATHOGEN EVALUATION

IRISH ACRES SUBDIVISION

Prepared by:
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Prepared for:
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December 29, 2023

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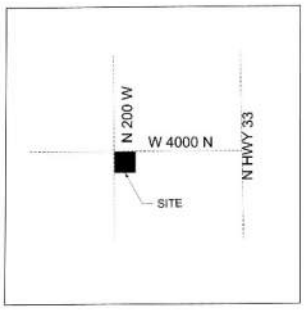
INTRODUCTION

The purpose of this document is to fulfill the requirements of a Level I Nutrient Pathogen Study to investigate the potential impacts on groundwater and surface water from on-site wastewater treatment systems. The project site is called Irish Acres Subdivision, owned by Cloud Veil LLC. It is located in the northwest quarter of the northwest quarter of section 10 of T. 5 N. and R. 45 E., B.M. in Teton County Idaho and the parcel ID is RP05N45E103300.

The proposed project is for the subdivision of a 40.14 acre parcel of land. The parcel is currently zoned "Agriculture/Rural Residential-2.5-Acre Min. Lot Size". This project is proposing to subdivide the parcel into 10 lots. There are four 2.5 acre lots in the northwest corner of the property. The remaining six lots area all 5 acres. Please see Figure 1 for the project vicinity and proposed layout.



VICINITY MAP
(N.T.S.)

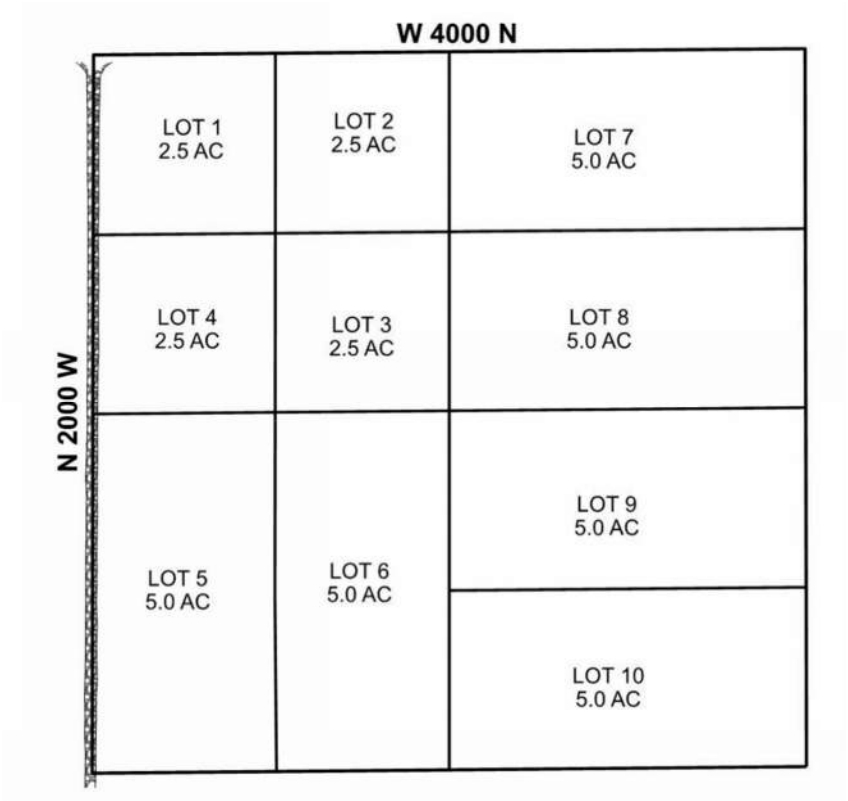


Figure 1: Project Vicinity and Layout

To start the process, Y2 on behalf of Cloud Veil LLC, submitted the application for Subdivision/Land Development Review to East Idaho Public Health (EIPH). EIPH provided preliminary approval in a letter dated June 29, 2022. Four test pits were excavated on site. There was no bedrock or groundwater encountered in any of the test holes. Test hole 1 exhibited very fine sand with some silt, becoming more gravelly with depth. Test holes 2 through 4 had loamy, coarse sand down the 120" excavation depth. The test hole locations are shown in Figure 2. The report from EIPH is included in Appendix A in its entirety of this report.

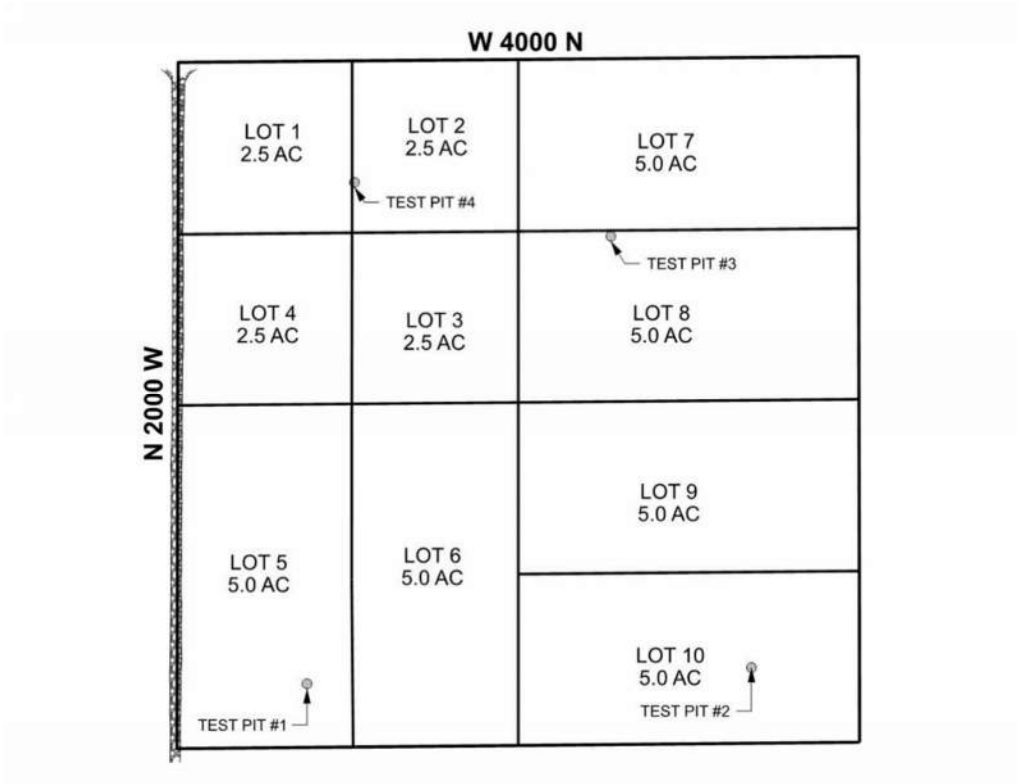


Figure 2: Approximate Test Pit Locations

The proposed site lies partially within the Wetland Overlay area and therefore a Level I Nutrient Pathogen (NP) Evaluation is required Per Subdivision Regulations of Teton County, Idaho, Title 9, Section 9-3-2-C-3-b-i-a. However, the wetlands are irrigation induced and not truly wetland areas. The following sections provide information to meet the minimum required elements for an NP evaluation.

WELL DRILLER REPORTS

Per Appendix A of Title 09, Nutrient-Pathogen Evaluation Technical Guide for On-Site Wastewater Treatment Systems in Teton County, Idaho (referred to as Guide from now on in this submittal), the first of the minimum requirements is to provide well driller reports within ½ mile of the project site. See Figure 3 for the area for which well driller reports were researched and cataloged.

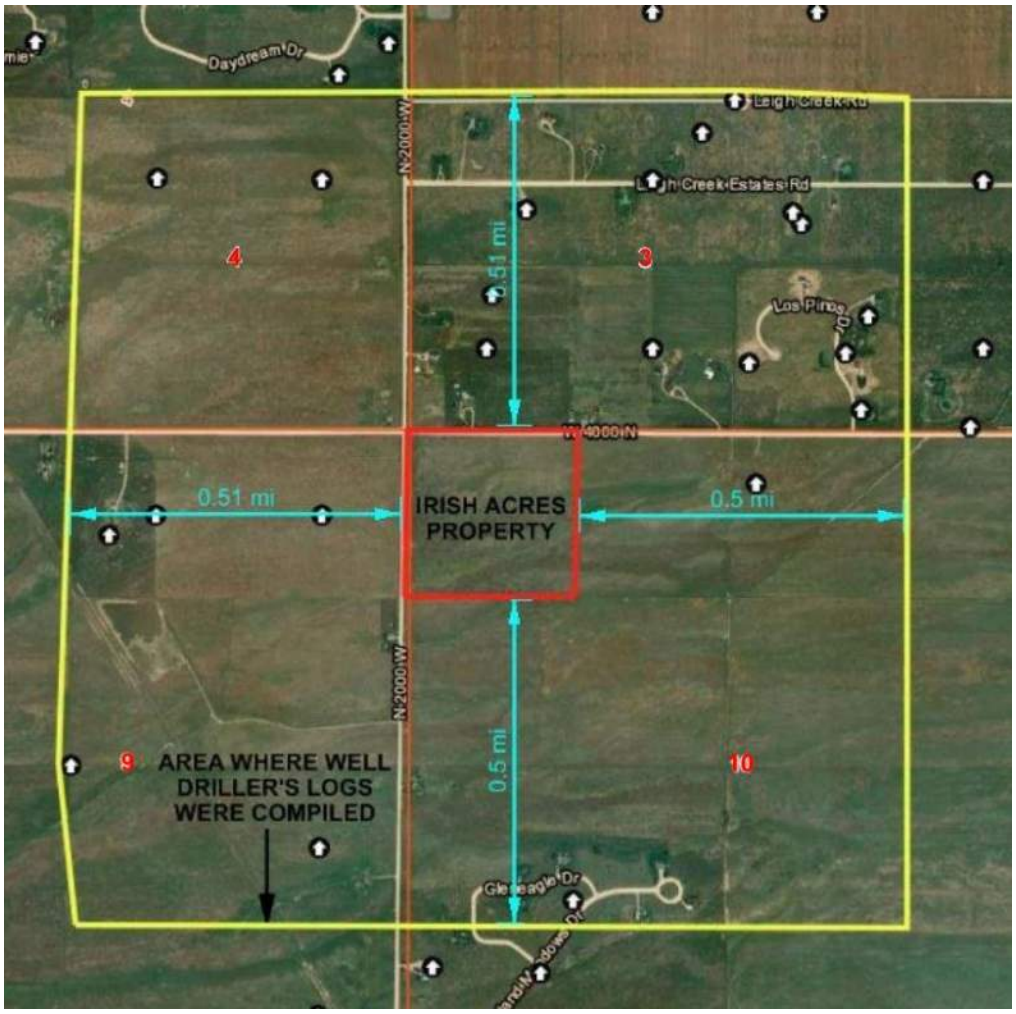


Figure 3: Area of Well Driller Report and Compilation

The search area was all within T. 05 N. and R. 45 E. B.M. in Teton County. In section 10, the Northwest quarter, the north half of the Southwest quarter, the west half of the Northeast quarter, and the Northwest of the Southeast quarter were queried. All of section 10 was included except for the southern row and eastern column of quarter-quarters. The Southwest quarter of section 3 was included along with the western half of the Southeast quarter of section 3 were included in the search area. The area in section 3 was extended a little farther north to encompass an additional well. The remaining well driller report search area included the southeast quarter of section 4, the Northeast quarter of section 9, and the north half of the southeast quarter of section 9. Section 9 was also extended a little west to include an addition well that was close to the line of the area of review.

A total of 25 wells were found within the area of review. Where well use was listed, it was for domestic, most of which were listed as a single residence. There is a well in section 3 that was drilled in 1962 for irrigation supply.

Table 1: Result Summary from IDWR Find a Well Map in the Area of Review

Permit ID	Metal Tag #	Construction Date	Section	Quarter - Quarter	Production Rate (gpm)	Static Water Level (ft bgs)	Casing Diameter (in)	Casing Depth (ft)	Total Depth (ft)
Section 3 Wells									
780854	D0024649	7/16/2002	3	NESW	20	73	6	120	120
703039		7/6/1997	3	NESW	30	60	6	100	
895620	D0083626	8/30/2020	3	NESW	35	10	6	100	100
800174		5/31/1962	3	NESW		11	16	139	142
897398	D0084046	1/28/2021	3	NWSE	20	38	6	118	120
894735	D0081943	7/6/2020	3	NWSE	15	28	6	120	120
887264	D0075647	8/23/2018	3	NWSW		10	6	98	98
701985		8/21/1991	3	SESW	50	15	6		85
702847		5/13/1996	3	SESW	30	64	6	100	
702556		9/17/1994	3	SESW	35	15	6	60	
702232		4/28/1993	3	SWSW	50	105	6	152	
897773	D0084048	3/9/2021	3	SWSE	15	40	6	98	100
886148	D0075610	5/30/2018	3	SWSE		30	6	98	100
838116	D0037981	1/23/2006	3	SWSE	20	46	6	99	100
822910		3/14/1977	3	SWSW		23	6	60	60
702846		5/12/1996	3	SWSW	40	32	6	100	

Permit ID	Metal Tag #	Construction Date	Section	Quarter - Quarter	Production Rate (gpm)	Static Water Level (ft bgs)	Casing Diameter (in)	Casing Depth (ft)	Total Depth (ft)
Section 4 Wells									
770109	D0021196	7/19/2001	4	NESE		35	6	144	145
702566		10/5/1994	4	NESE	0	56	6	99	100
Section 9 Wells									
703513		10/5/1989	9	NENW	0	10	6	59	60
702246		4/7/1993	9	NESE	0	26	6	61	
894881	D0081998	7/16/2020	9	NWNE	47	2	6	78	80
808484	D0027575	10/29/2003	9	NWNE		20	6	100	100
833535		11/18/1962	9	SWNE		12	6	50	50
Section 10 Wells									
849279	D0048827	10/1/2007	10	NWNE		20	6	100	100
826174	D0035757	4/27/2005	10	SWSW		40	16	116	140

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Section 3 Well Summary

The wells in section 3 make up the majority of the wells within the area of review. There were 16 wells located in this section. All the lithologic logs have similar findings with most of them referring to clay, gravel, and sand throughout the depths. The shallowest static water level was 10 feet and the deepest was 105 feet.

Section 4 Well Summary

There are two wells located in section 4 and both have drilling logs associated with them. One log shows clayey gravel from the entire depth to 145 feet with water first encountered at 35 feet bags. The second log shows clay and rocks down to 56 feet, which is also where water was encountered. Then there is a transition to a mixture of clay, gravel, and sand down to a depth of 100 feet.

Section 9 Well Summary

Section 9 has five wells. All these wells have drilling logs, but one well that was constructed in 1962 has an illegible lithologic log. The shallowest level where water was first encountered was at 2 and the deepest was at 35 feet bags. All the drilling logs for these wells found a mix of clay and gravel throughout the log. Two of the logs also found some sand mixed in with the clay and gravel. Total well depths varied from 60 to 100 feet bags.

Section 10 Well Summary

Section 10 has two wells located in the area of review, one was drilled in 2005 and the other in 2007. One of the logs encountered mainly clay and gravel with some sand mixed in throughout the middle of the log. The other log encountered gravel and sand in the shallower depths and then started to encounter some larger gravels from 100 to 140 feet bags. One well had a static water level of 20 feet and the other was 40 feet.

Overall Well Log and Topography Observations

Figure 4: Topographic Map of Area Review

The general topography in the project site area is sloping down from east to west. The project site slopes at approximately 1%. The eastern side of the project property has an elevation of a little less than 6100 feet and the western end has an elevation ranging from about 6090 down to 6080 feet. Down gradient wells are located west of the project site, in the northeast portion of section 9.

The two legible well logs in NWNE show a mixture of clay, gravel, and sand. Depth to groundwater is relatively shallow, which one well having first encountered water at 2 and the other at 20 feet bags.

Soil and Surface Geologic Conditions

The United States Department of Agriculture (USDA) Natural Resources Conservation District (NRCS) soil survey for the project area was utilized to supplement the information on soils in the area. A summary of site soils is presented below. The entire soil survey is included in Appendix C

Figure 5: Project Site Soil Survey Excerpt

Table 2: Soil Characteristic Summary

Soil Map Unit Number	Soil Group Name	Soil Description
13101	Redfish-Foxcreek complex, 0 to 2 percent slopes	Mucky peat on the surface underlain by loam progressing to extremely gravelly coarse sand. Soil Group C/D.
13113	Foxcreek mucky peat, 0 to 2 percent slopes	Mucky peat on the surface underlain by loam progressing to extremely gravelly coarse sand. Soil Group C/D.
13430	Alpine – St. Anthony complex, 0 to 2 percent slopes	Gravelly loams progressing to gravel. Well Drained. Soil Group B.
13431	Feltonia-Arimo complex 0 to 2 percent slopes	Loam, progressing to a very gravelly loamy sand. Well Drained. Soil Group B/C.

According to the area geologic map, the project is located in the East Teton Basin, which is influenced by Leigh Creek and Tributaries. The specific surface geology is a combinate of Qafe1 and Qafe2. Qafe 1 which is the Alluvial fan 1 of East Teton Basin (late Pliestocene). This is a gravel and silt mixture said to be formed by a large flood of Leigh Creek. Qafe2 was formed in the same manner and time as Qafe1. However, Qafe2 is stratified sand and gravel deposited above adjacent Qafe1 surfaces. Please see the excerpt below. The entire geologic map is included in Appendix C.

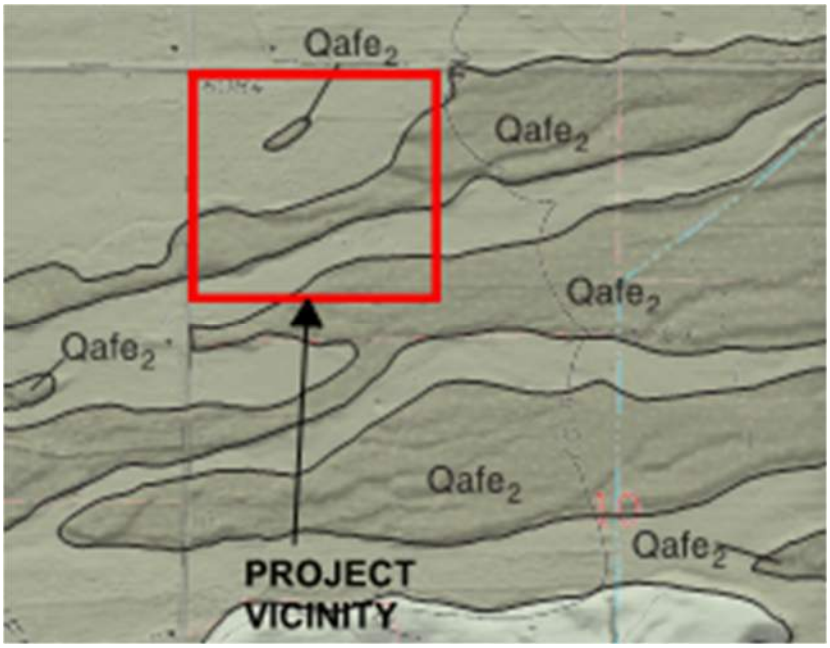


Figure 6: Surface Geology

Background Nitrate Concentration

The Idaho Department of Environmental Quality (IDEQ) 2020 Nitrate Priority Area GIS server was used to determine nearby background nitrate concentrations. The figure below illustrates the nearby sample points. To the north, there are two sample points which are 0.27 and 0.73 mg/L. There are many sample points to the east of the project site, and they have a wide range of values, ranging from 0.18 to 3.44 mg/L Nitrate. The samples located south of the project site range from 1.44 to 3.12 mg/L of Nitrate. There is one sample point that is located southwest of the project site and it has the highest value of 7.87 mg/L.

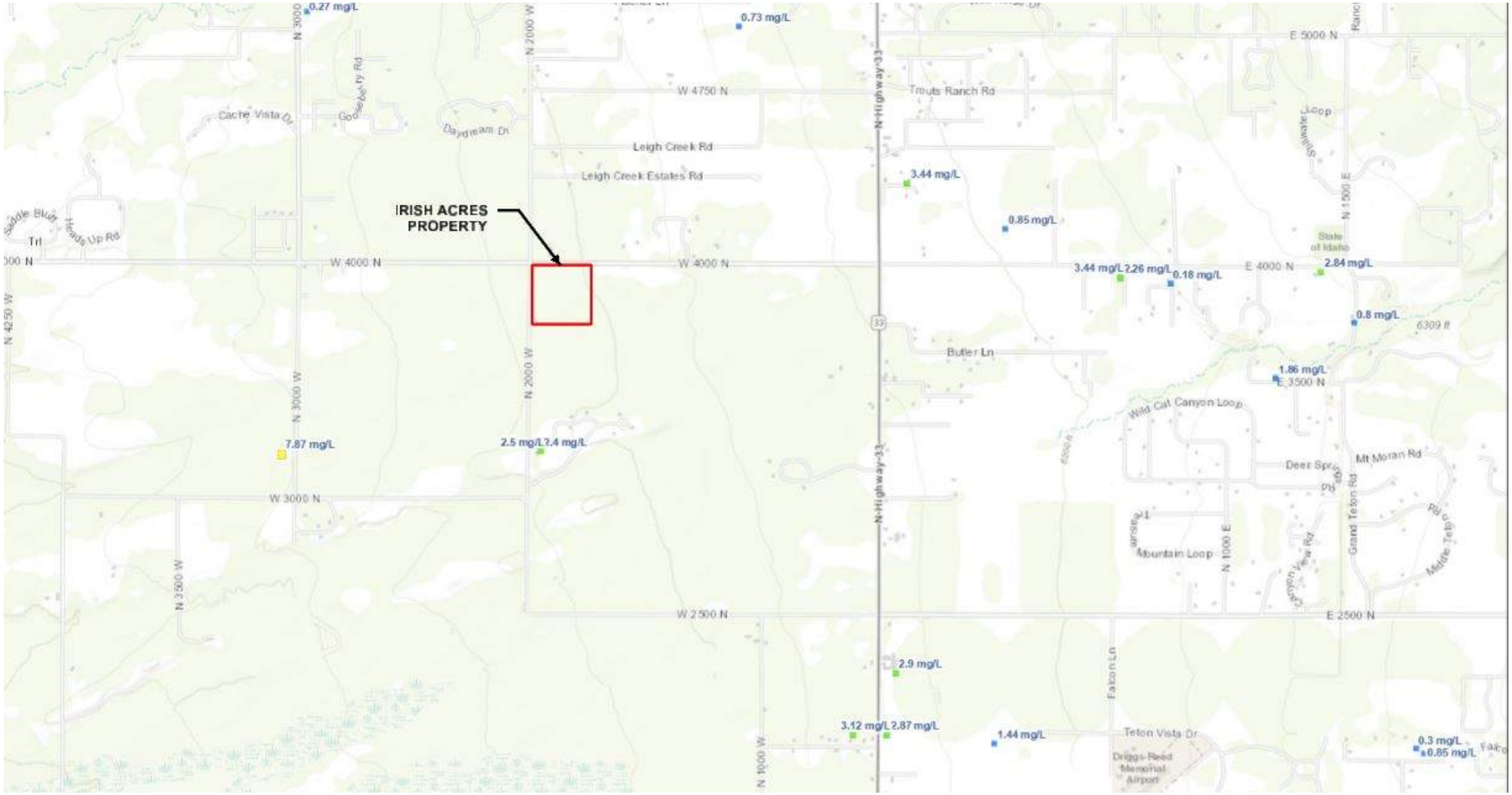


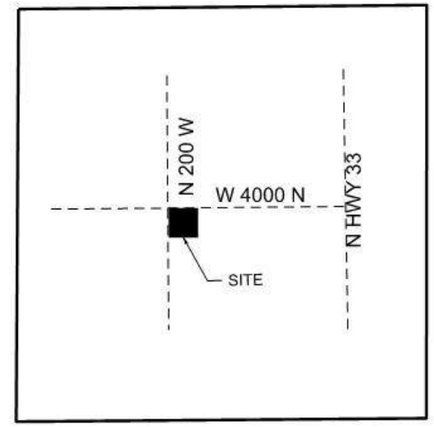
Figure 7: Nitrate Samples Near Project Vicinity

LEGEND

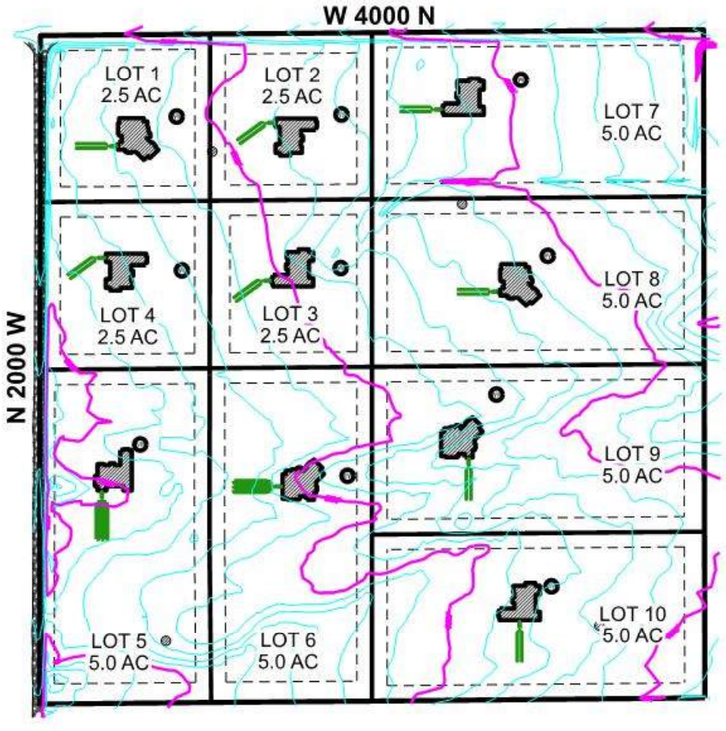
- PROPERTY LINES
- SETBACK LINE
- SEPTIC SYSTEM COMPONENTS
- SEPTIC TANK
- BUILDING OUTLINE
- WATER WELL
- GRAVEL ROAD
- MAJOR CONTOUR / MINOR CONTOUR

PERMIT ID 702846 & 822910

PERMIT ID 702556, 701985 & 702847

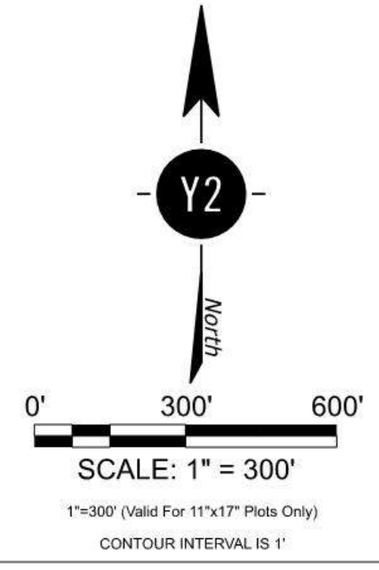


VICINITY MAP
(N.T.S.)



D0048827

PERMIT ID 703513
THIS IS ACTUALLY MISLOCATED
AND IS TWO QUARTER QUARTERS
(2600 FEET) FURTHER WEST



SCALE: 1" = 300'

1"=300' (Valid For 11"x17" Plots Only)

CONTOUR INTERVAL IS 1'

DATE 6/28/2022
DRAWING SET TITLE
DRAWN BY: MXW
CHECKED BY: JOB #: AL

Y2 CONSULTANTS
ENGINEERING, SURVEYING & PLANNING
LANDSCAPE ARCHITECTURE, GIS
NATURAL RESOURCE SERVICES
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SITE PLAN

IRISH ACRES SUBDIVISION
SECTION 10, T5N, R45E BM
TETON COUNTY WYOMING

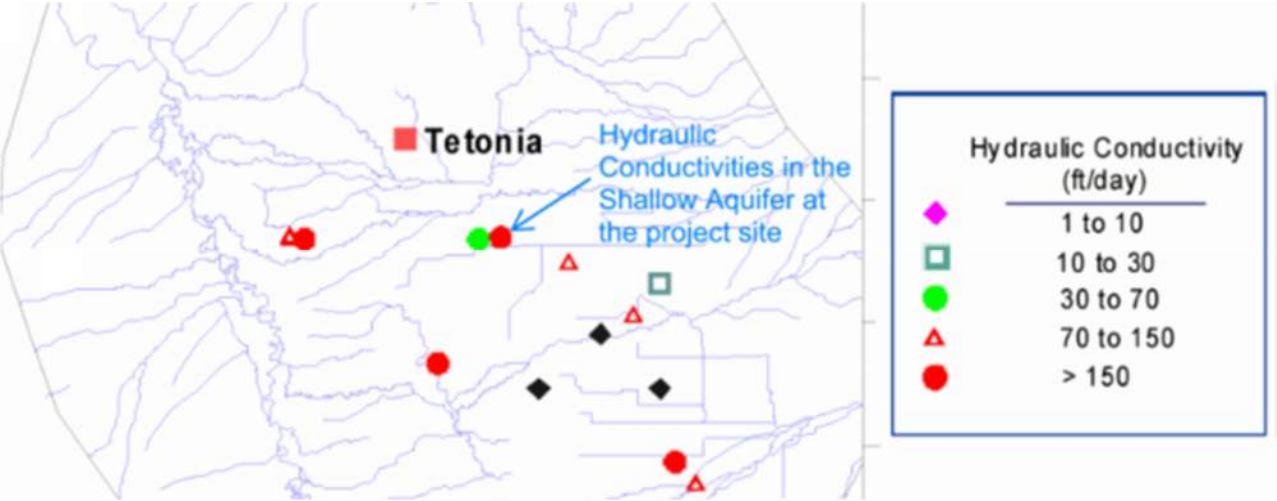
NUTRIENT PATHOGEN STUDY SITE LAYOUT

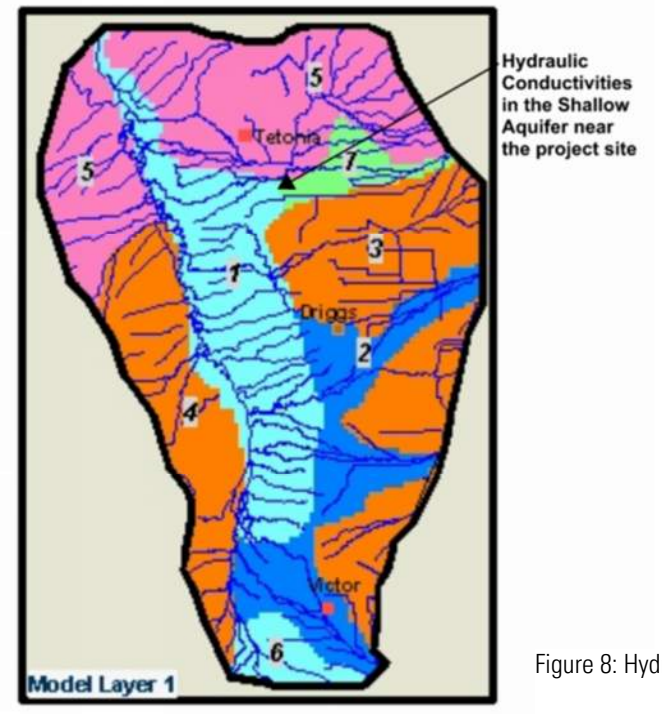
NITROGEN MASS BALANCE SPREADSHEET

The entire development as well as individual lot boundaries were assessed in the nitrogen mass balance spreadsheet to determine if the proposed systems would increase background concentrations of Nitrate by 1.0 mg/L or more. A summary of the input values is provided below. The individual mass balance sheets are included in Appendix D.

HYDRAULIC CONDUCTIVITY

The on site test pits excavated exhibit a soil classification of pooly sorted sand (SP). Some gravel and very few fines were observed in the proposed leachfield areas. This on site excavation indicates a relatively permeable soil. Drilling logs, soil survey, and geology for the project site all demonstrate sand and gravel with some silts and clays. Per the Nicklin (2003) report assigned shallow hydraulic conductivity, we have use 80 feet per day in this analysis. In the same report in the project area, there was also an assignment of 150 feet per day, but the lower, more conservative value was used for this analysis.





Final Hydrauclic Conductivity Zonation

Zone	Hydraulic Conductivity (ft/day)
1	80
2	330
3	25
4	25
5	14
6	130
7	150

Figure 8: Hydraulic Conductivity Information from Nicklin (2003)

HYDRAULIC GRADIENT

The hydraulic gradient was assumed to follow the natural topography of the site. Slope across the site goes from the east towards the west at about 1%.

Additionally, nearby wells logs were reviewed for water level surfaces. A topographic survey has been completed on the proposed subdivision site, as well as an additional proposed subdivision to the east. Using this data as well as the USGS topography patterns from Figure 4, the surface elevation was estimated for the well locations. The static surface water elevation was estimated using this and the depth to static water level on the nearby logs as shown in Figure 9. This exercise resulted in a potentiometric surface slope of 1.5% from the northeast to the southwest.

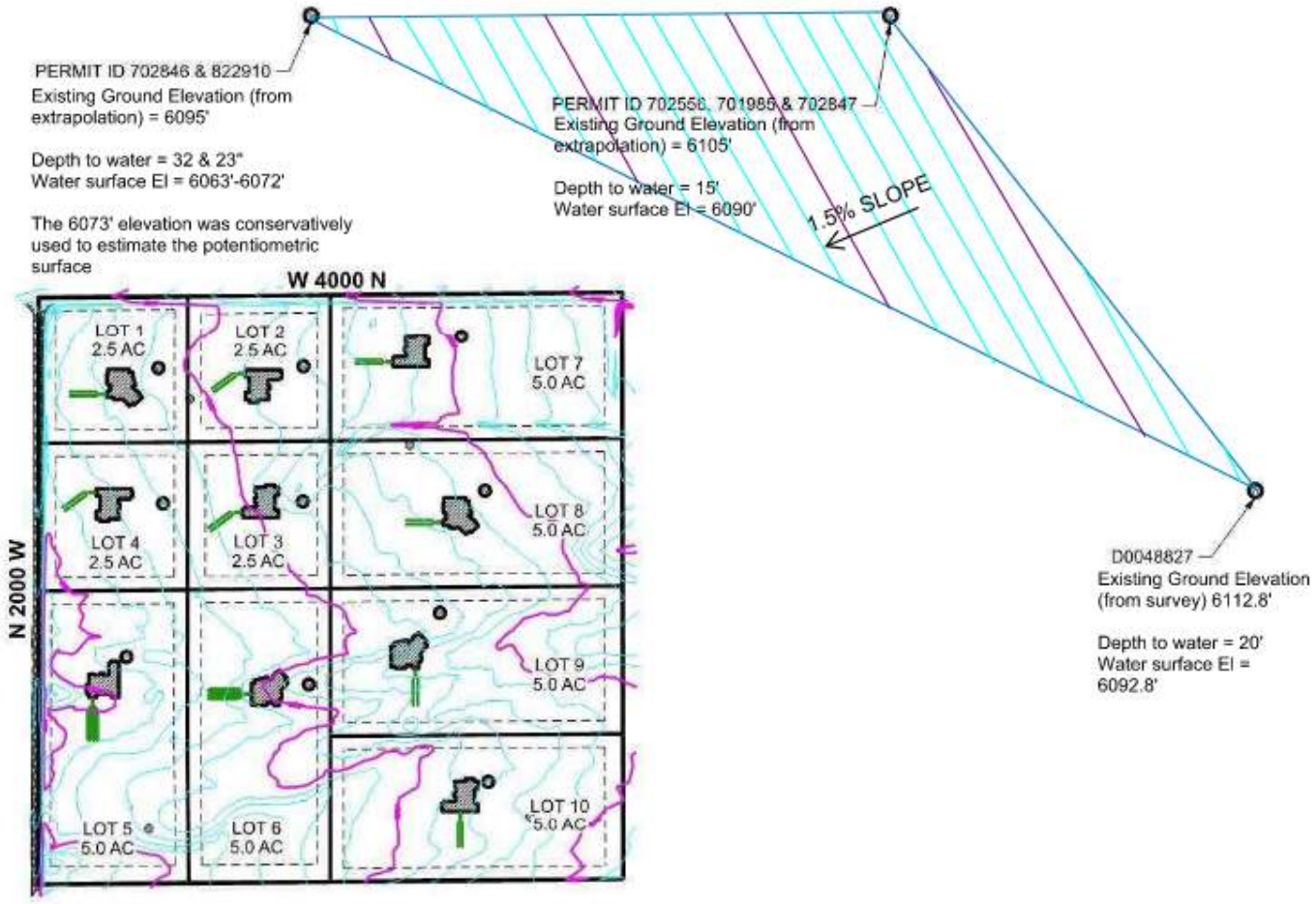


Figure 9: Hydraulic Gradient Estimate from nearby Well Logs

Design Flow

The 300 gallon per day per household default parameter value was used for the design flow. Each lot will be allowed to have a home and an accessory dwelling unit. Based on the zoning regulations, 4 bedrooms was used anticipating a 3-bedroom home and the possibility of an accessory dwelling unit.

Mixing Zone Thickness

The default mixing zone thickness was used for all the lots.

Lot Layout Parameters

The site flows from northeast to southwest. The aquifer width perpendicular to flow was the measured distance between lot lines parallel to the estimated potentiometric surface. Those distances for each scenario run as part of this evaluation are shown in the Nutrient Mass Balance Spreadsheets in Appendix D.

Parcel Imperviousness

The average lot size is 4 acres. A relatively large house, outbuildings, and an access drive are assumed to use a maximum of 6,000 square feet for each lot. This results in an average imperviousness of 4%.

Natural Recharge Rate

The natural recharge rate was calculated as 1.65 inches per year from the natural recharge rate calculation in the spreadsheet. The average annual precipitation amount according to the Tetonia Experiment Station is 18.96 inches per year.

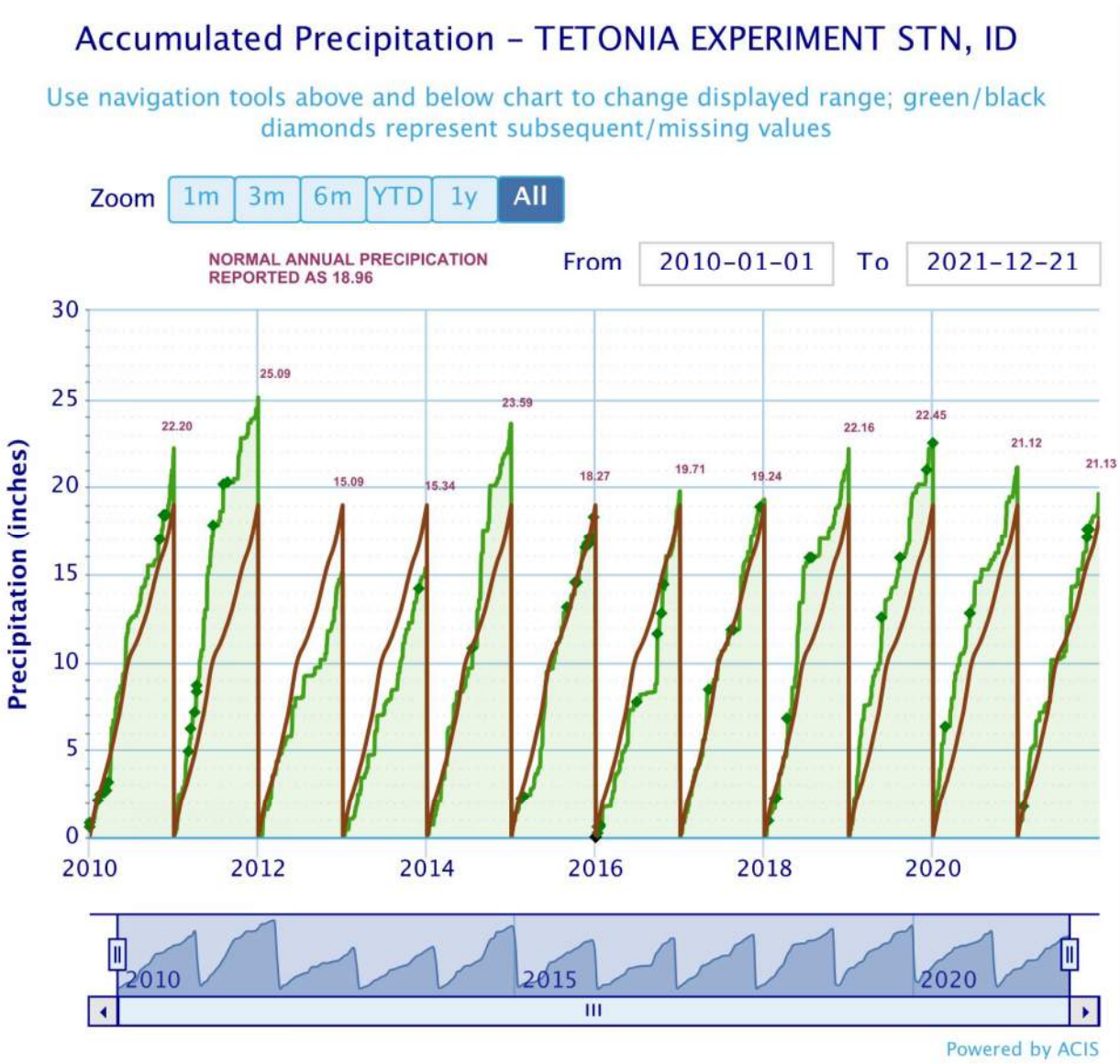


Figure 10: Annual Precipitation Information

Background Nitrate Concentration

The background nitrate concentration of 3.4 mg/L was used from the data point south of the site from the IDEQ 2020 Nitrate Priority Area GIS server. This was the highest value from the upgradient sample points.

Mass Balance Spreadsheet Results

The summary of the downgradient nitrate concentration of each lot is shown in the table below.

Table 3: Nitrate Concentration Results

Lot #	Downgradient Nitrate Concentration (mg/L)	Less than 1 mg/L Nitrate Increase?
Entire Subdivision	3.9	Yes
1, 2, 7	4.0	Yes
4, 2, 8	4.0	Yes
5, 6, 9, 10	3.8	Yes
1	3.6	Yes
2	3.6	Yes
3	3.6	Yes
4	3.6	Yes
5	3.5	Yes
6	3.5	Yes
7	3.6	Yes
8	3.6	Yes
9	3.6	Yes
10	3.6	Yes

Pathogen Transport Analysis

According to Appendix A, Nutrient-Pathogen Evaluation Technical Guide for On-Site Wastewater Treatment Systems in Teotn County, Idaho "pathogen transport modeling cannot be done with enough certainty to be useful". However, septic systems, by design are very effective at removing pathogens from the wastewater stream prior to water migrating into the aquifer. A properly maintained system will develop a biomat in the leachfield which prevents migration of pathogens off site.

Phosphorous Transport Analysis

Phosphorus is the chemical of concern when assessing impacts to surface water bodies. Additional phosphorus can lead to excessive vegetation and algae growth that lowers the oxygen in the surface water body. This leads to fish dye off and an overall decrease in water quality. There are no adjacent surface water bodies that would be directly affected by this subdivision development. The Nitrogen analysis demonstrates that nitrate increases from the development will be held to less than 1 mg/L increase. Phosphorus, even assuming no treatment from the septic system, will be similarly diluted and not decrease groundwater or surface water quality.

Conclusion

The proposed layout of the Irish Acres Subdivision will not degrade groundwater. Our findings are that the soil is suitable for traditional septic systems as laid out in the letter from EIPH. In addition,the lots are large enough to

provide adequate distance between wastewater and water systems to protect the health and safety of the future users of the subdivision and adjacent landowners.

REFERENCES

Idaho Department of Environmental Quality. July 14, 2021. 2020 Nitrate Priority Areas. https://mapcase.deq.idaho.gov/npa/.

Idaho Department of Water Resources. Find a Well Map. June 28, 2022. https://idwr.idaho.gov/wells/find-a-well-map/

National Oceanic and Atmospheric Administration. July 14, 2022. https://www.ncdc.noaa.gov/cdo-web/datasets/GHCND/stations/GHCND:USC00109065/detail

Nickling Earth & Water, Inc. Ground-Water Model for the Upper Teton Valley Watershed. 2003.

Philips, William M., Glenn F. Embree, and Dean L. Garwood. Geologic Map of the Tetonia Quadrangle, Teton County, Idaho. 2013.

Teton County Code. Title 09 Subdivision Regulations. 2013.

Teton County Online Geographic Information System. July 15, 2022. https://tetonidaho.maps.arcgis.com/apps/webappviewer/index.html?id=7cad88173b644a6a8e8c1147e94aa524.

United States Department of Agriculture, Natural Resources Conservation District. Custom Soil Resource Report for Teton Area, Idaho and Cloud Veil, LLC 21094, Tetonia, ID. Downloaded June 23, 2021.

Appendix A: EIPH Letter Report

Eastern Idaho Public Health
Prevent. Promote. Protect.

TETON COUNTY
820 Valley Centre Drive
Driggs, ID 83422
OFFICE (208) 354-2220
FAX (208) 354-2224

06/29/2022
Teton County Planning and Zoning
89 North Main Suite 6
Driggs, Idaho 83422

Cloud Veil LLC
PO Box 1116
Wilson, WY 83014

Re: Irish Acres Subdivision

I have reviewed the application to have RP05N45E103300 subdivided into ten (10) lots to be known as Irish Acres Subdivision and determined the parcel and proposed lots are suitable for sub-surface waste disposal systems to serve residences.

Soil information observed has some minor variations across the parcel. Please see the detailed Test Hole Information page for more thorough soil description of each test hole. The following is a generalization of the soils observed in the 4 test holes.
Test hole one had slightly different make up of soils than did the other three. It consisted of very fine sand with minor silt content becoming more gravelly with depth with 25% rock content. This test pit was dug to 96 inches because this soil type allows drain field bottoms to be as close as four (4) feet to any impermeable or groundwater level. B1 to A2b soil type.
Test holes 2 through 4 consist mainly of very gravelly fine to medium to coarse sand with up to 50% rock content. All test holes were excavated to 120 inches. Rock content increases with depth but remains below 60% of content. A2A soil type.
No groundwater evidence was seen any test hole. No bedrock was encountered in any test hole.

Topography on the parcel varies in elevation. The southern portion of the property is lower by 3 to 5 feet than the north. There is surface undulation across entire parcel. This is not a concern for septic systems, but elevation should be kept in mind when septic systems are permitted as no portion of the drainfield can be deeper than four (4) feet from the natural grade.

The parcel has a very minor slope from the Northeast to the southwest. Areas to the south have been designated as agricultural wetlands due to flood irrigation practices. Once this irrigation is stopped there is no actual wetland. There are no hydric soils or wetland plants in evidence. There is a small area that appears to be a watering hole for livestock in the southwest corner of the parcel. Small irrigation ditches are apparent across the property.

Eastern Idaho Public Health gives preliminary approval of the application to divide RP05N45E103300 creating the Irish Acres Subdivision. The site is suitable for residential sub-surface waste disposal.

Individual subsurface sewage disposal systems may be allowed in accordance with IDAPA 58.01.03 and the Technical Guidance Manual for Individual Subsurface Waste Disposal. All current Idaho Rules must be met. Suitability criteria and required separation distances are to be maintained.

A copy of the final plat is to be provided to the Health District at the time the Health Certificate is signed. The application fee balance if any will also be collected prior to signing the Health Certificate. If this application /plan changes for any reason, please coordinate those changes in advance, with this office.

Kathleen Price
REHS/MSG
Eastern Idaho Public Health District
kprice@eiph.idaho.gov
208-354-2220

TEST HOLE INFORMATION

SUBDIVISION Ingalls Acres DATE June 2022

Test Hole # 1
Location: SW corner / Lot 6
Depth: 96"

Brown very fine sand — B1
little fines content
No rock content

30" — gravelly fine sand — B1 to A2b
25% rock content
1-(3-4") Diameter Rounded.

96" — ~~Dry / No Bedrock~~
No GW evidence

Test Hole # 2
Location: Lot 10
Depth: 120"

6" — ~~Black/Dark~~ gravelly silt loam

Very gravelly medium to coarse sand
35-40% Rock content
A2A

Rock content > @ Depth.

120" — No Groundwater or Bedrock.

Test Hole # 3
Location: Lot 7 / 8 Border
Depth: 120"

10" — ~~Dark sandy silt~~ minor gravel

Very gravelly fine to medium sand
40-50% Rock content
1-5" rounded clasts.
A2A-

Rock content > @ Depth — coarse sand

120" — No Groundwater or Bedrock.

Test Hole # 4
Location: Lot 1/2 Boundary
Depth: 120"

Same as T.H. 3.

A2A-

120" — Dry / No bedrock.

Test Hole #
Location:
Depth:

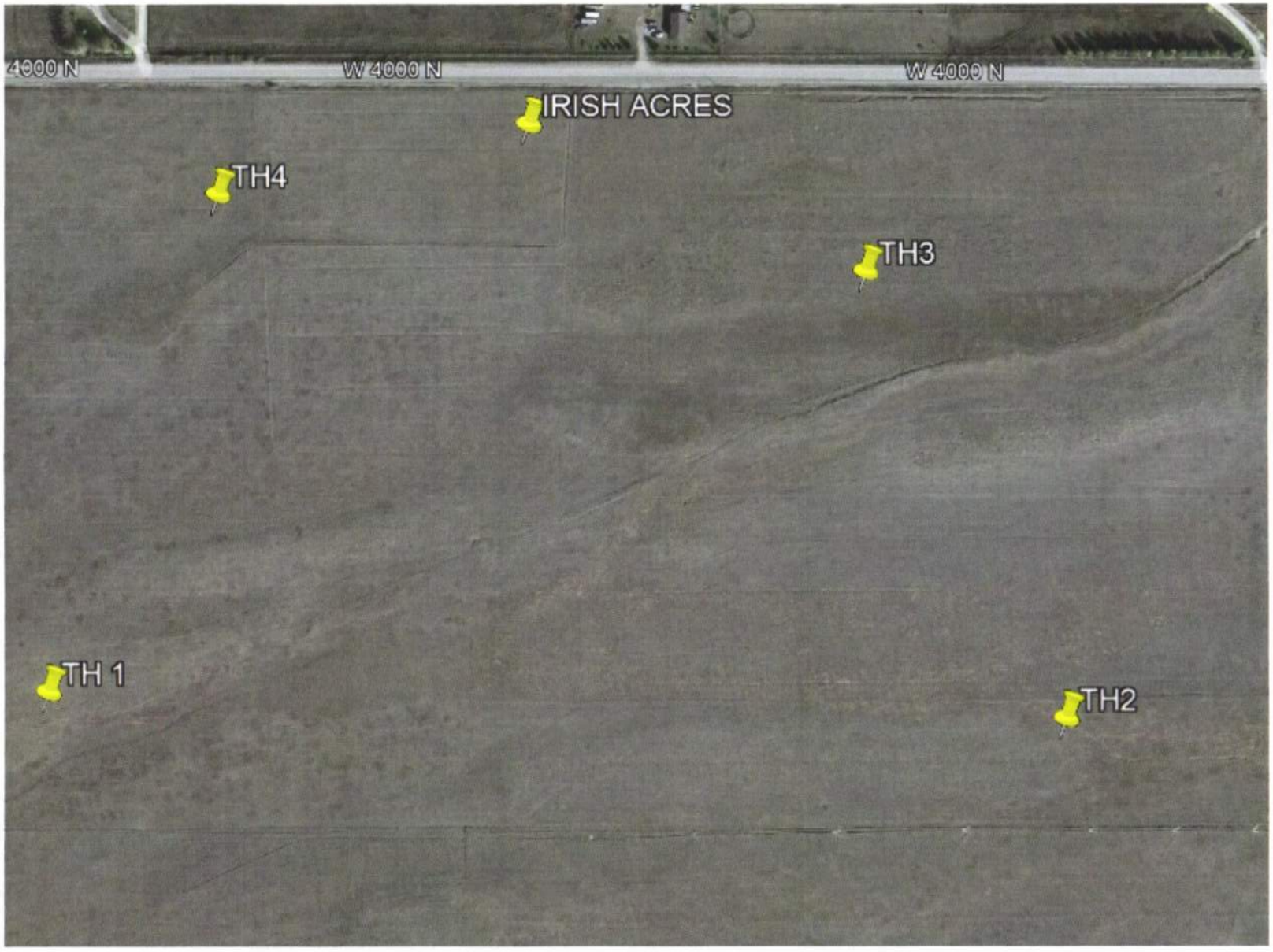
Test Hole #
Location:
Depth:

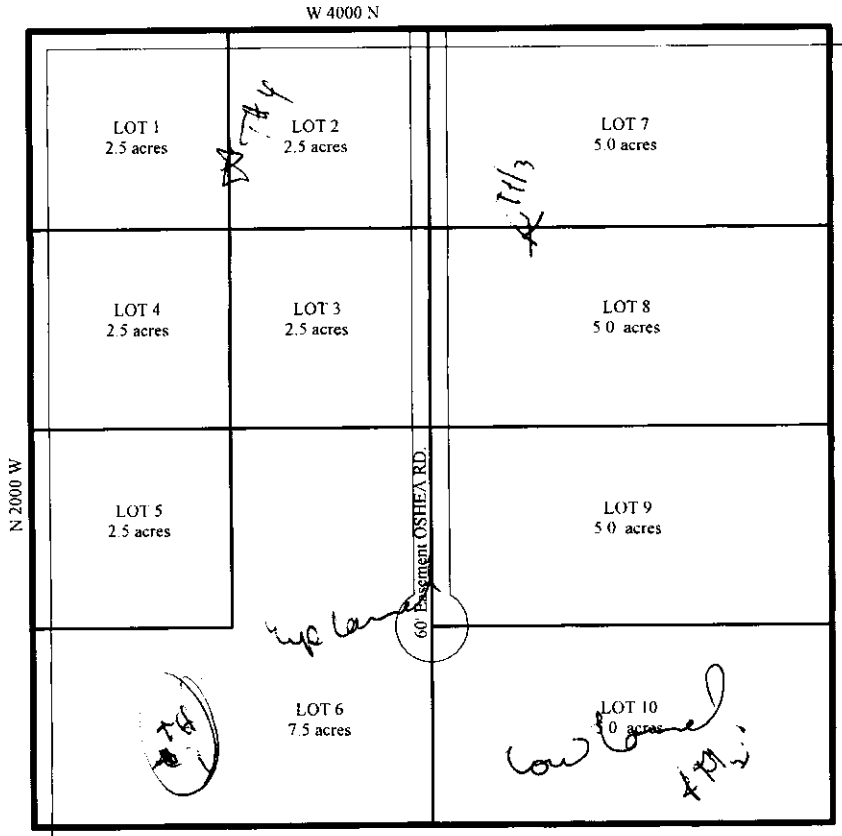
Size systems @ A2b if bottom of trench @ 48".

Lot 6 size @ B1 if trench is shallow (≥ 24 to 30")

Minor to no slope -

Small wet area near SW corner for watering livestock.


4000 N
W 4000 N
W 4000 N
IRISH ACRES
TH4
TH3
TH 1
TH2



CONCEPT MASTER PLAN

Parent Parcel:
40.118 acres

Located in
Section 10, T5N, R45E, BM
Teton County, Idaho

Scale: 1"=200'

North

CONSULTANTS

SUBDIVISION APPLICATION

IRISH ACRES SUBDIVISION APPLICATION
40 acres within Sec. 10, Township 5 North, Range 45 East, B.M.
Teton County IDAHO

JOB NO: 21094

SET TITLE
CONCEPT PLAN APPLICATION

PLOT DATE: 2021-06-28

TITLE	DATE

CONCEPT MASTER PLAN

SHEET:
MAP 1

Vicinity Map

Map not to scale

06/29/21

Irish Acres - Concept Plan

Appendix B: Well Driller Reports

Form 238-7
11/97

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only
Inspected by
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0024049
DRILLING PERMIT NO. 780854
Other IDWR No.

2. OWNER: River Bend Construction
Name
Address P.O. Box 588
City Victor State ID Zip 83455

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 5 North ☒ or South ☐
Rge. 45 East ☒ or West ☐
Sec. 3 NE 1/4 SW 1/4 ____ 1/4 ____ 1/4
(10 acres / 40 acres / 160 acres)
Gov't Lot 2 County Teton
Lat: : : Long: : :
Address of Well Site 475 N. 125 W.
City Tetonia
(Give at least name of road + Distance to Road or Landmark)

Lt. ____ Blk. ____ Sub. Name ____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other ____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other ____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other ____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	20	300	overbore

Was drive shoe used? ☐Y ☒ N Shoe Depth(s) ____
Was drive shoe seal tested? ☐ Y ☐ N How? ____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+2	120	.250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____

9. PERFORATIONS/SCREENS
Perforations Method ____
Screens Screen Type ____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
73 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices: ____

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
20+			1 hr.

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments: ____
Depth first Water Encounter 77

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8"	0	1	dirt		✓
6"	1	76	gravel & sand		✓
6"	76	111	sand & gravel	✓	
6"	111	120	gravel	✓	

RECEIVED
NOV 12 2002
Department of Water Resources
Eastern Region

Completed Depth 120'
Date: Started 7-17-02 Completed 7/17/02 (Measurable)

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Teton Water Works Firm No. 5040
Firm Official [signature] Date 7-17-02
and
Driller or Operator [signature] Date 7/17/02
(Signatures if Firm Official & Operator)

Form 238-7
3/95

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT
Use Typewriter or Ballpoint Pen

68043

Office Use Only
Inspected by _____
Twp____ Rge____ Sec____
____1/4 ____1/4 ____1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 22-97-E-0055-000
Other IDWR No. _____

Permit ID 703039

2. OWNER:
Name Dave VanEssen
Address HC 83
City Cascade State ID Zip 83611

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 5 North ☑ or South ☐
Rge. 45 East ☑ or West ☐
Sec. 3, NE 1/4 (10 acres) SW 1/4 (40 acres) ____ 1/4 (160 acres)
Gov't Lot ____ County Teton
Lat: : : Long: : :
Address of Well Site _____
_____ City Driggs
(Give at least name of road + Distance to Road or Landmark)

Lt. _____ Blk. _____ Sub. Name _____

4. USE:
☑ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☑ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☑ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	20	100	Overbore

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+01	100	280	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS
☐ Perforations Method _____
☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
60 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: _____

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
30+			1 hr

Water Temp. _____ Bottom hole temp. _____
Water Quality test or comments: _____
_____ Depth first Water Encountered _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
6	0	6	Top Soil		X
	6	40	Sand & Gravel some Clay	X	
	40	87	Clay & Gravel	X	X
	87	90	Clay	X	X
	90	100	Gravel	X	

RECEIVED
JUL 30 1997
Department of Water Resources
Eastern Region

RECEIVED
AUG 08 1997
Department of Water Resources

MICROFILMED
OCT 15 1997

Completed Depth 100 (Measurable)
Date: Started 7/7/97 Completed 7/7/97

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Teton Water Works LLC Firm No. 506
Firm Official [signature] Date 7-8-97
and
Supervisor or Operator [signature] Date 7/7/97
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D0083626

Drilling Permit No. _____

Water right or injection well # _____

2. OWNER: Scott Barlow

Name _____

Address 27614 Robillard Springs In.

City Katy State TX Zip 77494

3. WELL LOCATION:

Twp. 5 North ☒ or South ☐ Rge. 45 East ☒ or West ☐

Sec. 3 ____ 1/4 (10 acres) NE 1/4 (40 acres) SW 1/4 (160 acres)

Gov't Lot _____ County Teton

Lat. 43 ° 47.263 (Deg. and Decimal minutes)

Long. 111 ° 07.910 (Deg. and Decimal minutes)

Address of Well Site 1530 Leigh Creek Estates Rd

(Give at least name of road + Distance to Road or Landmark) City Tetonia

Lot. _____ Blk. _____ Sub. Name _____

4. USE:

☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other _____

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0	35	1100 LBS	10" temp casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6	+1	100	250	Steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 100

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method _____

Manufactured screen ☐ Y ☒ N Type _____

Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule

Length of Headpipe _____ Length of Tailpipe _____

Packer ☐ Y ☒ N Type _____

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) _____

Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 10 Static water level (ft) 10

Water temp. (°F) _____ Bottom hole temp. (°F) _____

Describe access port _____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
	35	20

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☒	☐
☐	☐	☐	☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
10	0	10	clay & gravel		X
10	10	38	clay & gravel	X	
6	38	100	clay & gravel	X	

RECEIVED
SEP 28 2020
Department of Water Resources
Eastern Region

Completed Depth (Measurable): 100'

Date Started: 8/31/20 Date Completed: 8/31/20

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Daniel Denning Drilling Co. No. 518

*Principal Driller _____ Date _____

*Driller Beau Bay Date 9/1/20

*Operator II _____ Date _____

Operator I Brand Piquet Date 9/1/20

* Signature of Principal Driller and rig operator are required.

Permit ID 800174

025222

WELL LOG AND REPORT OF THE STATE RECLAMATION ENGINEER OF IDAHO

Department of Reclamation

Permit No. _____ Well No. 1 County Teton

Owner ~~Earl~~ Spencer

Address Idaho Falls, Idaho

Driller R. P. Cope

Address 927 Poulsen Idaho Falls, Idaho

Well location S½ ¼ N½ ¼ Sec. 3, T. 5 N/~~S~~, R. 45 E/~~W~~

Size of drilled hole 16 inch

Total depth of well 142 ft.

Locate well in section

NW¼	NE¼
SW¼	SE¼

Give depth to standing water from the ground 11 ft. Water temp. _____ °Fahr.

On "Pumping Test" delivery was _____ g.p.m. or _____ c.f.s. Drawdown was _____ feet.

Size of pump and motor used to make test _____

Length of time of test _____ hours _____ minutes.

If flowing well, give flow _____ c.f.s. or _____ g.p.m. and of shut off pressure _____

If flowing well, described control works _____
(TYPE AND SIZE OF VALVE, ETC.)

Water will be used for Irrigation Weight of casing per lineal foot _____

Thickness of casing ¼ in. Casing material Steel
(STEEL, CONCRETE, WOOD, ETC.)

Diameter, length and location of casing 139 ft. of 16" O.D.
(CASING 12" IN DIAMETER OR LESS, GIVE INSIDE DIAMETER; CASING OVER 12" IN DIAMETER, GIVE OUTSIDE DIAMETER)

CASING RECORD

Diam. Casing	From Feet	To Feet	Length	Remarks—seals, grouting, etc.

Welds

Number and size of perforations _____ located _____ feet to _____ feet from ground

Perforated 133 ft.

Date of commencement of well May 1962 Date of completion of well May 1962

4585

SN – 45E — 3 s½ n½

22

025223

WELL LOG

From Feet	To Feet	Type of Material	Water-bearing Formation Ans. Yes or No	Casing Perforated Ans. Yes or No
0	15	Coarse gravel and clay		
15	25	Coarse gravel and clay		
25	31	Coarse gravel and clay		
31	45	Sand and gravel- some water		
45	62	Sand and gravel		
62	90	Sand and gravel		
90	116	Clay and gravel		
116	120	Sand and gravel		
120	126	Sand and gravel-more water		
126	142	Clay and gravel		
		If more space is required use Sheet No. 2		

WELL DRILLER'S STATEMENT

This well was drilled under my supervision and the above information is true and correct to the best of my knowledge and belief.

Signed R. P. Cope

By Rhea Cope

License No. 28

Dated April 15, 1963.

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0084046
Drilling Permit No. _____
Water right or injection well # _____

2. OWNER:
Name Randy Dawson
Address P.O. Box 1535
City Driggs State ID Zip 83422

3.WELL LOCATION:
Twp. 5 North ☒ or South ☐ Rge. 45 East ☒ or West ☐
Sec. 3 ____ 1/4 NW 1/4 SE 1/4
(10 acres / 40 acres / 160 acres)
Gov't Lot _____ County teton
Lat. 43 ° 47.160 (Deg. and Decimal minutes)
Long. 111 ° 07.747 (Deg. and Decimal minutes)
Address of Well Site 4283 Log Pines DR City Tetonia
(Give at least name of road + Distance to Road or Landmark)
Lot. _____ Blk. _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other _____

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
bentonite	0'	40'	1150 lbs	overbore

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6"	+1	118'	.250	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 118'

9. PERFORATIONS/SCREENS:
Perforations ☐ Y ☒ N Method _____
Manufactured screen ☐ Y ☒ N Type _____
Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule

Length of Headpipe _____ Length of Tailpipe _____
Packer ☐ Y ☒ N Type _____

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) _____
Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 38' Static water level (ft) 38'
Water temp. (°F) 58* Bottom hole temp. (°F) 58*
Describe access port _____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
110'	20	45

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☒	☐
☐	☐	☐	☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
10"	0'	44'	clay gravel	X	
6"	44'	120'	clay gravel	X	

Completed Depth (Measurable): 120'
Date Started: Jan 25, 2021 Date Completed: Jan 29, 2021

RECEIVED
MAR 01 2021
Department of Water Resources
Eastern Region

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Denning Well Drilling Co. No. 702
*Principal Driller Steven Justin Farmer Date Feb 1, 2021
*Driller Steven Justin Farmer Date Feb 1, 2021
*Operator II _____ Date _____
Operator I _____ Date _____

*** Signature of Principal Driller and rig operator are required.**

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0081943
Drilling Permit No. _____
Water right or injection well # _____

2. OWNER:
Name Riverbend Builders
Address 2810 Wood Bridge
City Idaho Falls State ID Zip 83402

3.WELL LOCATION:
Twp. 5 North ☒ or South ☐ Rge. 45 East ☒ or West ☐
Sec. 3 ____ (10 acres) 1/4 NW (40 acres) 1/4 SE (160 acres) 1/4
Gov't Lot _____ County Teton
Lat. 43 ° 47.144 (Deg. and Decimal minutes)
Long. 111 ° 07.731 (Deg. and Decimal minutes)
Address of Well Site 1401 Leigh Creek Estate
City Tetonia
(Give at least name of road + Distance to Road or Landmark)
Lot. _____ Blk. _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other _____

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0	40'	1100lbs	Temp Casing Overburden

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6"	+2'	120'	.250	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 120'

9. PERFORATIONS/SCREENS:
Perforations ☐ Y ☒ N Method _____
Manufactured screen ☐ Y ☒ N Type _____
Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule

Length of Headpipe _____ Length of Tailpipe _____
Packer ☐ Y ☒ N Type _____

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) _____
Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 38' Static water level (ft) 28'
Water temp. (°F) _____ Bottom hole temp. (°F) _____
Describe access port _____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)	Test method: Pump	Bailer	Air	Flowing artesian
100'	15+gpm	60 min	☐	☐	☒	☐
			☐	☐	☐	☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
10"	0	20'	topsoil, gravel		N
	20'	40'	gravel, sand	Y	
6"	40'	60'	gravel, clay	Y	
	60'	80'	gravel, clay	Y	
	80'	100'	clay, gravel	Y	
	100'	120'	gravel	Y	

RECEIVED
AUG 03 2020
Department of Water Resources
Eastern Region

Completed Depth (Measurable): 120'
Date Started: 7/6/20 Date Completed: 7/7/20

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Denning Drilling Co. No. 518
*Principal Driller Dennis Denning Date 7-21-20
*Driller Ryan Cook Date 7/8/20
*Operator II _____ Date _____
Operator I Riley Hill Date 7/8/20

* **Signature of Principal Driller and rig operator are required.**

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0075647

Drilling Permit No. _____

Water right or injection well # _____

2. OWNER: Benjamin & Heather Bollinger

Name _____

Address P.O. Box 241

City Tetonia State ID Zip 83452

3.WELL LOCATION:

Twp. 5 North ☒ or South ☐ Rge. 45 East ☒ or West ☐

Sec. 3 ____ 1/4 (10 acres) NW 1/4 (40 acres) SW 1/4 (160 acres)

Gov't Lot _____ County Teton

Lat. 43 ° 47.166 (Deg. and Decimal minutes)

Long. 111 ° 8.232 (Deg. and Decimal minutes)

Address of Well Site 1827 Leigh Creek Estates Rd.

City Tetonia

(Give at least name of road + Distance to Road or Landmark)

Lot. _____ Blk. _____ Sub. Name _____

4. USE:

☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other _____

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0'	38'	1050 lbs.	10" temp. casing

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6"	+2'	98'	.250	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 98'

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method _____

Manufactured screen ☐ Y ☒ N Type _____

Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule

Length of Headpipe _____ Length of Tailpipe _____

Packer ☐ Y ☐ N Type _____

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) _____

Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 10' Static water level (ft) 10'

Water temp. (°F) _____ Bottom hole temp. (°F) _____

Describe access port _____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
80'	25 +	30 min.

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☒	☐
☐	☐	☐	☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
10"	0'	38'	clay & gravel	X	
6"	38'	78'	sand & gravel	X	
	78'	98'	sand & gravel	X	

RECEIVED
AUG 31 2018
Department of Water Resources
Eastern Region

Completed Depth (Measurable): 98'

Date Started: 8-24-18 Date Completed: 8-24-18

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Daniel Denning Drilling inc. Co. No. 518

*Principal Driller _____ Date 8-24-18

*Driller _____ Date 8-24-18

*Operator II _____ Date _____

Operator I _____ Date 8-24-18

*** Signature of Principal Driller and rig operator are required.**

Form 238-7
6/89

Permit ID 701985

DMC

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Don Dabell

Address Star Route Box 343 Wilson, Wyoming

Owner's Permit No. 22-91-E-087

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6" inches	+ _____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

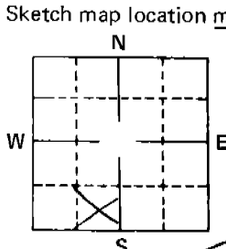
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 18' Material used in seal: ☐ Cement grout ☐ Bentonite ☒ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.



RECEIVED
MAY 05 1992

Subdivision Name _____

Lot No. _____ Block No. _____

County Teton

SE ¼ SW ¼ Sec. 3, T. 5 N ☒ S ☐ R. 45 E ☒ W ☐

7. WATER LEVEL

Static water level 15' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ °F. Quality _____
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
50		

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
6"	0	56	Sand + Gravel		☒
	56	59	Gravel + Brown Clay		☒
	59	85	Sand + Gravel	☒	

10.

Work started 8/21/91 finished 8/21/91

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Independent Drilling Firm No. 343
Address 664 W. 200 N. Bluff Date 8/26/91
Signed by (Firm Official) Brent Henderson
and
(Operator) Kip L Rahmig

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
8/95

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT 093649

Permit ID 702847

Use Typewriter or Ballpoint Pen

Office Use Only
Inspected by _____
Twp____ Rge____ Sec____
____1/4 ____1/4 ____1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 22 - 96 - E - 0037 - 000
Other IDWR No. _____

2. OWNER:
Name Todd or Cindy Friend
Address P.O. Box 590
City Driggs State ID Zip 83422

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 5 North ☒ or South ☐
Rge. 45 East ☒ or West ☐
Sec. 3, SE 1/4 (10 acres) SW 1/4 (40 acres) ____ 1/4 (160 acres)
Gov't Lot ____ County Teton
Lat: : : Long: : :
Address of Well Site _____
_____ City _____
(Give at least name of road + Distance to Road or Landmark)
Lt. _____ Blk. _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	20	200	over Bore

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6	+2	100	250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS
☐ Perforations Method None
☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
64 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: _____

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
30	100	100	2 Hrs

Water Temp. _____ Bottom hole temp. _____
Water Quality test or comments: Excellent
Depth first Water Encountered 80'

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
6	0	14	Top Soil		X
	14	21	clay & gravel		X
	21	27	Large Black Rock & clay		X
	27	40	Large gravel & clay		X
	40	55	Small gravel & Clay		X
	55	80	Clay	X	
6	80	100	Clay & small gravel	X	

RECEIVED
MAY 17 1996
Department of Water Resources
Eastern District Office

AUG 21 1996

Completed Depth 100' (Measurable)
Date Started 5-14-96 Completed 5-14-96

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Teton Water Works LLC Firm No. 506
Firm Official [signature] Date 5-15-96
and
Supervisor or Operator [signature] Date 5-15-96
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Permit ID 702556

Form 238-7
1/94

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter
or
Ball Point Pen

55899

1. DRILLING PERMIT NO. 22-94-E-167
Other IDWR No.

2. OWNER:
Name Kent Hale
Address P.O. Box 117
City Tetonia State Id Zip 83452

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 5 North ☒ or South ☐
Rge. 45 East ☒ or West ☐
Sec. 3, SE 1/4 (10 acres) SW 1/4 (40 acres) 1/4 (160 acres) 1/4
Gov't Lot ____ County TETON

Address of Well Site 178 W. 400 N
Pucksaddle Rd. City Tetonia
(Give at least name of road + Distance to Road or Landmark)

Lt. ____ Blk. ____ Sub. Name ____

4. PROPOSED USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other ____

5. TYPE OF WORK
☒ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☒ Air Rotary ☐ Cable ☐ Other ____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	20	3	Outdoor

Was drive shoe used? Y ☐ N ☒
Was drive shoe seal tested? Y ☐ N ☐ How? ____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6	0	60	250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____

9. PERFORATIONS/SCREENS NONE
☐ Perforations Method ____
☐ Screens Screen Type ____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
15 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices: ____

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
35	55	55	1 Hr

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments: Clear + good

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
6	0	20	sand & gravel (12' H2O)	X	
	20	30	sand		X
	30	40	washed gravel	X	
6	40	60	sand & gravel		

RECEIVED
DEC 23 1994
Department of Water Resources

RECEIVED
DEC 14 1994
Department of Water Resources
Eastern District Office

OCT 14 1994
Department of Water Resources
Eastern District Office

MAY 08 1995

Completed Depth 60' (Measurable)
Date: Started 9-18-94 Completed 9-18-94

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Teton Water Works Firm No. 506
Firm Official ____ Date 10-12-94
and
Supervisor or Operator ____ Date ____
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Permit ID 702232

Form 238-7
4/92

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

Location Corrected by IDWR To:
T05N R45E Sec. 3 NESWSW
By: mciscell 2012-12-13

1. WELL OWNER

Name Monte Whittier
Address P.O. Box 4833 Pocatello, Id
Drilling Permit No. 22-93E-023-000
Water Right Permit No. A22-02161F A22-02151F

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☐ Rotary ☐ Air ☐ Auger ☐ Reverse rotary
☒ Cable ☐ Mud ☐ Other _____ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6 inches	+ 0 feet	162 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer _____ Type _____
Top Packer or Headpipe _____
Bottom of Tailpipe _____

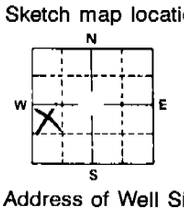
Diameter _____ Slot size _____ Set from _____ feet to _____ feet
Diameter _____ Slot size _____ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☐ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet

Surface seal depth 20 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit
☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☐ Welded
☐ Solvent Weld ☐ Cemented between strata

Describe access port _____

6. LOCATION OF WELL

Sketch map location **must** agree with written location.



Subdivision Name _____
Lot No. _____ Block No. _____
County _____
Address of Well Site Packsaddle road
(give at least name of road)
SW ¼ NW ¼ Sec. 3, T. 5S N ☒ or S ☐, R. 45 E ☒ or W ☐

7. WATER LEVEL

Static water level 105 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ °F. Quality _____
Describe artesian or temperature zones below.

8. WELL TEST DATA

☒ Pump ☐ Bailer ☐ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
50		3

9. LITHOLOGIC LOG

107138

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
	0	30	dirty clay mixed w/ gravel		X
	30	46	real fine sand mixed w/ clay		X
	46	56	dirty water, gravel, sand, (small gravel)	X	
	56	108	clay w/ 1½" to 2" gravel mixed w/ gravel		X
	108	150	water w/ gravel & fine sand Kept going dry	X	
	150	152	gravel - good flow	X	

RECEIVED
MAY 2 1993
Department of Water Resources
Eastern District Office

RECEIVED
DEC 09 1994

10.

Work started 3-30-93 finished 4-28-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Teton Water Firm No. 506
Address Idaho Falls Id Date 5-18-93
Signed by Drilling Supervisor Richard Teton
and
(Operator) _____
(If different than the Drilling Supervisor)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0084048
Drilling Permit No. _____
Water right or injection well # _____

2. OWNER:
Name Bob Fylling
Address 1020 Cresent Lane
City Bismark State ND Zip 58501

3.WELL LOCATION:
Twp. 5 North ☒ or South ☐ Rge. 45 East ☒ or West ☐
Sec. 3 ____ (10 acres) 1/4 SW (40 acres) 1/4 SE (160 acres) 1/4

Gov't Lot _____ County Teton
Lat. 43 ° 46.962 (Deg. and Decimal minutes)
Long. -111 °07.827 (Deg. and Decimal minutes)
Address of Well Site 4433 Los Pinos
(Give at least name of road + Distance to Road or Landmark) City Tetonia
Lot. _____ Blk. _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other _____

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
bentonite	0'	40'	1050 lbs	overbore

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6"	+2	98'	.250	steel	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 98'

9. PERFORATIONS/SCREENS:
Perforations ☐ Y ☒ N Method _____
Manufactured screen ☐ Y ☒ N Type _____
Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule

Length of Headpipe _____ Length of Tailpipe _____
Packer ☐ Y ☒ N Type _____

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) _____
Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 40' Static water level (ft) 40'
Water temp. (°F) 58* Bottom hole temp. (°F) 58*
Describe access port _____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
90'	15	45

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☒	☐
☐	☐	☐	☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
10"	0'	40'	clay gravel	X	
6"	40'	75'	clay gravel	X	
	75'	90'	mostly clay few gravel	X	
	90'	100'	clay gravel	X	

RECEIVED
MAR 26 2021
Department of Water Resources
Eastern Region

Completed Depth (Measurable): 98'
Date Started: Mar 5, 2021 Date Completed: Mar 10, 2021

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Denning Well Drilling Co. No. 702
*Principal Driller Steven Justin Farmer Date Mar 12, 2021
*Driller Steven Justin Farmer Date Mar 12, 2021
*Operator II _____ Date _____
Operator I _____ Date _____

* Signature of Principal Driller and rig operator are required.

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0075610

Drilling Permit No. _____

Water right or injection well # _____

2. OWNER: Darren Enrico

Name _____

Address 548 Cobblecrest Rd.

City Driggs State ID Zip 83422

3.WELL LOCATION:

Twp. 5 North ☒ or South ☐ Rge. 46 East ☒ or West ☐

Sec. 3 10 acres 1/4 40 acres SW 1/4 160 acres SE 1/4

Gov't Lot _____ County Teton

Lat. 43 ° 47.023 (Deg. and Decimal minutes)

Long. 111 ° 7.610 (Deg. and Decimal minutes)

Address of Well Site 4183 Los Pinos Dr.

(Give at least name of road + Distance to Road or Landmark) City Tetonia

Lot. _____ Blk. _____ Sub. Name _____

4. USE:

☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection

☐ Other _____

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well

☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☐ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Bentonite	0	40'	20 Bags	overbore

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6"	+2	98'	.230"	Steel	☒	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) _____

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method _____

Manufactured screen ☐ Y ☐ N Type _____

Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule

Length of Headpipe _____ Length of Tailpipe _____

Packer ☐ Y ☒ N Type _____

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) _____

Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 30' Static water level (ft) 30'

Water temp. (°F) _____ Bottom hole temp. (°F) _____

Describe access port _____

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☐	☐
☐	☐	☐	☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
10"	0	40'	Clay Gravel		X
6"	40	65'	Clay Gravel	X	
6"	65'	68'	Clay		X
6"	68'	100'	Clay & Gravel	X	

RECEIVED
AUG 13 2018
Department of Water Resources
Eastern Region

Completed Depth (Measurable): 98'

Date Started: 5-30-18 Date Completed: 5-31-18

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Denning Drilling Co. No. 518

*Principal Driller Daniel Denning Date 6-12-18

*Driller Daniel Denning Date 6-12-18

*Operator II _____ Date _____

Operator I Ray Cook Date 6/12/18

* **Signature of Principal Driller and rig operator are required.**

Form 238-7
6/02

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

22

Office Use Only
Well ID No.
Inspected by
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0037951
DRILLING PERMIT NO.
Water Right or Injection Well No.

2. OWNER:
Name Brad R. Nelson
Address P.O Box 157
City Letonia State Id Zip 83452

3. LOCATION OF WELL by legal description:
You must provide address or Lot, Blk, Sub. or Directions to well.
Twp. 5 North ☒ or South ☐
Rge. 45 East ☒ or West ☐
Sec. 3, SW 1/4 SE 1/4
(10 acres / 40 acres / 160 acres)
Gov't Lot ____ County Latah
Lat: : : Long: : :
Address of Well Site Lot 1 Los Pinos Sub P.U.D.
City
(Give at least name of road + Distance to Road or Landmark)
Lt. 1 Blk. ____ Sub. Name Los Pinos

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other

6. DRILL METHOD:
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume	Seal Placement Method
Bentonite	0	20	450	Overbore

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 99'
Was drive shoe seal tested? ☐ Y ☐ N How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6	+1	99	250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____
Packer ☐ Y ☐ N Type

9. PERFORATIONS/SCREENS PACKER TYPE
Perforation Method
Screen Type & Method of Installation

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
46 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices:

12. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
20T	450 @ 250		1hr

Water Temp. Cool Bottom hole temp Cool
Water Quality test or comments:
Depth first Water Encounter 60'

13. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8	0	20	Sand & gravel		☒
6	20	70	Clay & gravel	☒	
1	70	80	Brn clay	☒	
1	80	100	Clay & gravel	☒	

RECEIVED
JAN 26 2006
Department of Water Resources
Eastern Region

Completed Depth 100' (Measurable)
Date: Started 1-19-06 Completed 1-24-06

14. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Mark Mitchell Well Dr. Firm No. 612
Principal Driller [signature] Date 1-24-06
and
Driller or Operator II ____ Date ____
Operator I ____ Date ____
Principal Driller and Rig Operator *Required.*
Operator I must have signature of Driller/Operator II.

FORWARD WHITE COPY TO WATER RESOURCES

Permit ID 822910

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Resources

WELL DRILLER'S REPORT

RECEIVED
JUN 30 1977
Department of Water Resources
Eastern District Office

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Floyd Baler

Address Rt. #1 Tetonia, Idaho 83452

Owner's Permit No. _____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

_____

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type)

☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or Injection

4. METHOD DRILLED

☐ Cable ☒ Rotary ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 6 inches Total depth 60 feet

Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.250 inches	6 inches	+ 1 feet	60 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was casing drive shoe used? ☒ Yes ☐ No

Was a packer or seal used? ☐ Yes ☒ No

Perforated? ☐ Yes ☒ No

How perforated? ☐ Factory ☐ Knife ☐ Torch

Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No

Manufacturer's name _____

Type _____ Model No. _____

Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Gravel packed? ☐ Yes ☒ No Size of gravel _____

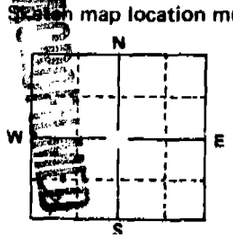
Placed from _____ feet to _____ feet

Surface seal depth 21' Material used in seal ☐ Cement grout ☐ Puddling clay ☐ Well cuttings

Sealing procedure used ☐ Slurry pit ☒ Temporary surface casing ☒ Overbore to seal depth

6. LOCATION OF WELL

Section map location must agree with written location.



Subdivision Name _____

Lot No. _____ Block No. _____

County Teton

SW ¼ SW ¼ Sec. 3, T. 5 N/S, R. 45 E/W

7. WATER LEVEL

Static water level 23 feet below land surface

Flowing? ☐ Yes ☒ No G.P.M. flow _____

Temperature _____° F. Quality _____

Artesian closed-in pressure _____ p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped

9. LITHOLOGIC LOG

46363

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
6"	0'	6'	Clay and cobble rocks		X
	6'	23'	Clay and gravel		X
	23'	60'	Clay, gravel and intermitted cobble rock.		X

10.

Work started March 15, 1977 finished March 15, 1977

11. DRILLERS CERTIFICATION

Firm Name D. Denning Well Drilling Firm No. 10

Address Box 64 Ucon, Idaho 83454 Date March 18'77

Signed by (Firm Official) Dennis Denning

and

(Operator) Daniel Denning

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
3/96

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter or Ballpoint Pen

Permit ID 702846

093648

Office Use Only
Inspected by _____
Twp____ Rge____ Sec____
____1/4 ____1/4 ____1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 22 - 96 - E-0036 - 000
Other IDWR No. _____

2. OWNER:
Name Don Delaunay
Address 174 Yellow Creek Road, Apt P
City Evanston State Wy Zip 83930

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 15 North ☒ or South ☐
Rge. 45 East ☒ or West ☐
Sec. 3, ~~SW~~ 1/4 (10 acres) SW 1/4 (40 acres) SW 1/4 (160 acres)
Gov't Lot ____ County _____
Lat: : : Long: : :
Address of Well Site _____
City _____
(Give at least name of road + Distance to Road or Landmark)

Lt. _____ Blk. _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	20	300	Overtone

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6	+2	100	250	Stw	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS None
☐ Perforations Method _____
☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
32 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: _____

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
40	100	100	2 Hrs

Water Temp. _____ Bottom hole temp. _____
Water Quality test or comments: excellent
Depth first Water Encountered _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
6	0	40	Top soil		X
	4	25	Clay & gravel		X
	25	40	gravel		X
	40	69	clay	X	
	69	80	Clay & gravel	X	
6	80	100	Clay & gravel	X	

RECEIVED
MAY 17 1996
Department of Water Resources
Eastern District Office

AUG 21 1996

Completed Depth 100' (Measurable)
Date Started 5-13-96 Completed 5-13-96

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Teton Water Works LLC Firm No. 506
Firm Official _____ Date 5-15-96
and
Supervisor or Operator _____ Date 5-15-96
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
11/97

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only
Inspected by _____
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0021196
DRILLING PERMIT NO. ___-7-70109
Other IDWR No. _____

2. OWNER:
Name Harold Robinson
Address 140 2 5th East
City Driggs State Id Zip 83422

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 5 North ☒ or South ☐
Rge. 45 East ☒ or West ☐
Sec. 4, ____ 1/4 NE 1/4 SE 1/4
(10 acres / 40 acres / 160 acres)
Gov't Lot ____ County Teton
Lat: : : Long: : :
Address of Well Site Hwy 33
City of Driggs
(Give at least name of road + Distance to Road or Landmark)

Lt. _____ Blk. _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	20'	250 LBS	OVER BORE

Was drive shoe used? ☐Y ☒ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y ☒ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+1	144'	250#	Steel	☒	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS
Perforations Method _____
Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
35 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: _____

11. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. _____ Bottom hole temp. _____
Water Quality test or comments: _____
Depth first Water Encounter _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8"	0'	20'	Clay Gravel		☒
6"	20'	35'	Clay Gravel		☒
6"	35'	145'	Clay Gravel	☒	

RECEIVED
JUL 27 2001
Department of Water Resources
Eastern Region

RECEIVED
AUG -9 2001
Department of Water Resources

Completed Depth 145' (Measurable)
Date: Started 7-20-01 Completed 7-20-01

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Denning Drilling Firm No. 518
Firm Official Daniel Denning Date 7-20-01
and
Driller or Operator _____ Date _____
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
1/94

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter or Ball Point Pen

55902

Permit ID 702846

1. DRILLING PERMIT NO. 22-94E-177-000
Other IDWR No.

2. OWNER:
Name Blaine McInelly
Address Box 714
City Driggs State ID Zip 83422

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 5 North ☒ or South ☐
Rge. 45 East ☒ or West ☐
Sec. 4, 10 acres 1/4 40 acres NE 1/4 160 acres SE 1/4
Gov't Lot ____ County Driggs

Address of Well Site 3 1/2 mi N of Driggs City
(Give at least name of road + Distance to Road or Landmark)

Lt. ____ Blk. ____ Sub. Name

4. PROPOSED USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☒ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☒ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT (Sacks or Pounds)	METHOD
Bentonite	0	18	2	Overbore

Was drive shoe used? Y ☒ N ☐
Was drive shoe seal tested? Y ☐ N ☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+1	99	250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____

9. PERFORATIONS/SCREENS
☐ Perforations Method
☐ Screens Screen Type

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
56 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
	0	56	Clay & Rocks		
	56	100	Clay Gravel Sand	X	

RECEIVED
NOV 4 1994
Department of Water Resources

RECEIVED
OCT 31 1994
Department of Water Resources
Eastern District Office

MAY 08 1995

Completed Depth [redacted] 100' (Measurable)
Date: Started 10-4-94 Completed 10-6-94

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Deming Wells Drilling Inc Firm No. 0
Firm Official ____ Date 10-6-94
and
Supervisor or Operator ____ Date
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
9/82

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

Permit ID 703513

1. WELL OWNER

Name Steve Tomlin

Address 255 W 400 N Tetonia, Idaho 83452

Owner's Permit No. 23-90-E-0003-200

2. NATURE OF WORK

☒ New well ☐ Deepened ☒ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	59 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 18 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.

N / W / E / S

Subdivision Name _____
Lot No. _____ Block No. _____

County Teton

NE ¼ NW ¼ Sec. 9, T. 5 ☒ N ☐ S, R. 45 ☒ E ☐ W.

MICROFILMED
AUG 29 1991

7. WATER LEVEL

Static water level 10 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ °F. Quality _____
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
6	0	60	Gravel & Clay	✓	

RECEIVED
FEB 23 1990
Department of Water Resources
Eastern District Office

10.

Work started 10/5/89 finished 10/6/89

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Jennings Drilling Firm No. 10
Address Box 460 Ucon Date 10/6/89
Signed by (Firm Official) Clinton Jennings
and
(Operator) Cody Jennings

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
4/92

Permit ID 702246

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Steve L Johnson

Address 225 N 100 S Driggs

Drilling Permit No. 22-93-E-038-000

Water Right Permit No. _____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☐ Reverse rotary
☐ Cable ☐ Mud ☐ Other _____ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6 inches	+ 1 feet	61 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer _____ Type _____
Top Packer or Headpipe _____
Bottom of Tailpipe _____

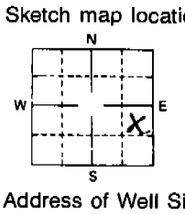
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet

Surface seal depth 20' Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit
☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☒ Threaded ☒ Welded
☐ Solvent Weld ☐ Cemented between strata

Describe access port _____

6. LOCATION OF WELL

Sketch map location **must** agree with written location.



Subdivision Name _____
Lot No. _____ Block No. _____
County Teton
Address of Well Site _____ (give at least name of road)
NE ¼ SE ¼ Sec. 9, T. 5 N ☒ or S ☐, R. 45 E ☒ or W ☐

7. WATER LEVEL

Static water level 26' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ °F. Quality _____
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☒ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG

107139

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
6"	0	7'	Clay		☒
6"	7'	35'	Clay and Gravel		☒
6"	35'	41	Clay	☒	
6"	41	61'	Clay & Gravel	☒	

RECEIVED
APR 19 1993
Department of Water Resources
Eastern District Office

FEB 09 1994

10.

Work started 4-8-93 finished 4-8-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Daniel Drilling Co. Firm No. 518
Address PO Box 460 Ucon Date 4-8-93
Signed by Drilling Supervisor Daniel Deming
and
(Operator) _____ *(If different than the Drilling Supervisor)*

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0081998

Drilling Permit No. _____

Water right or injection well # _____

2. OWNER:

Name Charlie Norville

Address P.O. Box 972

City Victor State ID Zip 83455

3.WELL LOCATION:

Twp. 05N ☑ North or ☐ South Rge. 45 ☑ East or ☐ West

Sec. 9 ____ 1/4 (10 acres) NW 1/4 (40 acres) NE 1/4 (160 acres)

Gov't Lot _____ County Teton

Lat. 43 ° 46.7410 N (Deg. and Decimal minutes)

Long. -111 ° 8.8390 W (Deg. and Decimal minutes)

Address of Well Site Not assigned

(Give at least name of road + Distance to Road or Landmark) City Tetonia

Lot. _____ Blk. _____ Sub. Name parcel # RP05N45E090900A

4. USE:

☑ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK:

☑ New well ☐ Replacement well ☐ Modify existing well ☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☑ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Geo Grout	0	43		Grout Pump
Portland Cement	0	43		tremmie pipe

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6"	+2	78	.250	steel	☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s) _____

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☑ N Method _____

Manufactured screen ☐ Y ☑ N Type _____

Method of installation _____

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule

Length of Headpipe _____ Length of Tailpipe _____

Packer ☐ Y ☐ N Type _____

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☑ N Artesian Pressure (PSIG) _____

Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 2 ft Static water level (ft) _____

Water temp. (°F) _____ Bottom hole temp. (°F) _____

Describe access port well cap

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
65	47	5 hrs

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☑	☐
☐	☐	☐	☐

Water quality test or comments: 12 ppm

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
10	0	10	Clay Gravel / Sand	✓	
	10	30	Sand, gravel, & clay	✓	
	30	42	sand, gravel, clay		✓
6"	42	60	Clay fan silt		
	60	80	Gravel, sand	✓	

Completed Depth (Measurable): 78

Date Started: 7/14/20 Date Completed: 7/17/20

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Well 2 Well Co. No. 785

*Principal Driller Travis Tew Date 7/17/20

*Driller _____ Date _____

*Operator II _____ Date _____

Operator I _____ Date _____

*** Signature of Principal Driller and rig operator are required.**

Form 238-7
6/02

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only
Well ID No.
Inspected by
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0027575
DRILLING PERMIT NO.
Water Right or Injection Well No. 22

2. OWNER:
Name Jarold Gee
Address 2272 E Hwy 33
City Sugar City State ID Zip 83448

3. LOCATION OF WELL by legal description:
You must provide address or Lot, Blk, Sub. or Directions to well.
Twp. 5 North ☒ or South ☐
Rge. 45 East ☒ or West ☐
Sec. 9, ____ 1/4 (10 acres) NW 1/4 (40 acres) NE 1/4 (160 acres)
Gov't Lot ____ County Teton
Lat: : : Long: : :
Address of Well Site 375 N 300 W
City Driggs
(Give at least name of road + Distance to Road or Landmark)
Lt. ____ Blk. ____ Sub. Name ____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other ____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other ____

6. DRILL METHOD:
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other ____

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume	Seal Placement Method
Bentonite	0'	20'	400 #	overbore

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) ____
Was drive shoe seal tested? ☐ Y ☒ N How? ____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+1	100'	.250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____
Packer ☐ Y ☐ N Type ____

9. PERFORATIONS/SCREENS PACKER TYPE
Perforation Method ____
Screen Type & Method of Installation ____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
20' ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices: ____

12. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments: ____
Depth first Water Encounter ____

13. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8"	0'	20'	Dirt, clay, gravel		X
6"	20'	68'	clay gravel	X	
	68'	90'	clay sand gravel	X	
	90'	100'	clay gravel	X	

RECEIVED
DEC 08 2003
Department of Water Resources
Eastern Region

Completed Depth 100' (Measurable)
Date: Started 10/28/03 Completed 10/30/03

14. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Denning Well Drilling Firm No. 518
Principal Driller ____ Date 11-3-03
and
Driller or Operator II ____ Date 10/30/03
Operator I ____ Date ____
Principal Driller and Rig Operator *Required*.
Operator I must have signature of Driller/Operator II.

FORWARD WHITE COPY TO WATER RESOURCES

Permit ID 833535

RECEIVED DEC 1962

WELL LOG AND REPORT OF THE STATE RECLAMATION ENGINEER OF IDAHO

026859

Permit No.______ Well No.______ County Teton

Owner Roy Hansen

Address Tetonia

Driller Warren Morris

Address Rigby Idaho

Well location 5 1/2 mile ¼ NE ¼ Sec. 9, T. 5 N/S R. 45 E/W

Size of drilled hole 6"

Total depth of well 50'

Give depth to standing water from the ground 12' Water temp.______°Fahr.

On "Pumping Test" delivery was______g.p.m. or______c.f.s. Drawdown was______feet.

Size of pump and motor used to make test______

Length of time of test______hours______minutes.

If flowing well, give flow______c.f.s. or______g.p.m. and of shut off pressure______

If flowing well, described control works______
(TYPE AND SIZE OF VALVE, ETC.)

Water will be used for Domestic Weight of casing per lineal foot______

Thickness of casing______ Casing material Steel
(STEEL, CONCRETE, WOOD, ETC.)

Diameter, length and location of casing 6" 50' 50'
(CASING 12" IN DIAMETER OR LESS, GIVE INSIDE DIAMETER; CASING OVER 12" IN DIAMETER, GIVE OUTSIDE DIAMETER)

CASING RECORD

Diam. Casing	From Feet	To Feet	Length	Remarks—seals, grouting, etc.
6"	1	50	50'	

Number and size of perforations______located______feet to______feet from ground

Date of commencement of well Nov 17-62 Date of completion of well Nov 19-62

4587

5N- 45 E —— 9 5 1/2 NE used

22

026860

WELL LOG

From Feet	To Feet	Type of Material	Water-bearing Formation Ans. Yes or No	Casing Perforated Ans. Yes or No
1	18	[illegible]	Yes	Yes
18	22	[illegible]	"	"
22	24	"	"	"
24	50	"	"	"
		If more space is required use Sheet No. 2		

WELL DRILLER'S STATEMENT

This well was drilled under my supervision and the above information is true and correct to the best of my knowledge and belief.

Signed [illegible]

By [illegible]

License No. [illegible]

Dated Dec 19, 1962.

Form 238-7
6/02

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only
Well ID No.
Inspected by
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0048827
DRILLING PERMIT NO.
Water Right or Injection Well No.

2. OWNER:
Name Shaun Perkins
Address 307 North Hwy 33
City Driggs State ID Zip 83455

3. LOCATION OF WELL by legal description:
You must provide address or Lot, Blk, Sub. or Directions to well.
Twp. 5 North ☒ or South ☐
Rge. 45 East ☒ or West ☐
Sec. 10, ____ 1/4 (10 acres) NW 1/4 (40 acres) NE 1/4 (160 acres)
Gov't Lot ____ County Teton
Lat: 43 : 46 : 869 Long: 111 : 07 : 859
Address of Well Site 400 N. 95 West
(Give at least name of road + Distance to Road or Landmark) City Driggs
Lt. ____ Blk. ____ Sub. Name

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other

6. DRILL METHOD:
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume	Seal Placement Method
bentonite	0'	18'	450 lbs	overbore

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 100'
Was drive shoe seal tested? ☐ Y ☒ N How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	0'	100'	.250	steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____
Packer ☐ Y ☐ N Type

9. PERFORATIONS/SCREENS PACKER TYPE
Perforation Method
Screen Type & Method of Installation

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
20 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices:

12. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments:
____ Depth first Water Encounter ____

13. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8"	0'	18'	clay-gravels		X
6"	18'	40'	clay-gravels	X	
6"	40'	60'	clay-sand-gravels	X	
6"	60'	80'	clay-sand-gravels	X	
6"	80'	100'	clay-gravels	X	

RECEIVED
OCT 11 2007
Department of Water Resources
Eastern Region

Completed Depth 100' (Measurable)
Date: Started 10-2-07 Completed 10-2-07

14. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Deming Drilling Firm No. 518
Principal Driller Daniel Deming Date 10-3-07
and
Driller or Operator II Daniel Deming Date 10-3-07
Operator I Seth Deming Date 10-5-07
Principal Driller and Rig Operator *Required.*
Operator I must have signature of Driller/Operator II.

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Form 238-7
6/02

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

22

Office Use Only
Well ID No.
Inspected by
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0035757
DRILLING PERMIT NO.
Water Right or Injection Well No.

2. OWNER:
Name Highland Meadows LLC
Address PO Box 408
City Driggs State Id Zip 83422

3. LOCATION OF WELL by legal description:
You must provide address or Lot, Blk, Sub. or Directions to well.
Twp. 5N North ☐ or South ☐
Rge. 45E East ☐ or West ☐
Sec. 10, ____ 1/4 (10 acres) SW 1/4 (40 acres) SW 1/4 (160 acres)
Gov't Lot ____ County Teton
Lat: : : **Long:** : :
Address of Well Site
(Give at least name of road + Distance to Road or Landmark) City
Lt. ____ Blk. ____ Sub. Name Highland Meadows Subdivision

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☒ Other Subdivision - Domestic

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other

6. DRILL METHOD:
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume	Seal Placement Method
NEAT Cement	0'	60'	3½ yds	over Bore

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) 140'
Was drive shoe seal tested? ☐ Y ☐ N How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
16"	+1	60'	.50	Steel	☒	☐	☐	☐
12"	+1	116'	.322	Steel	☒	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____
Packer ☐ Y ☐ N Type

9. PERFORATIONS/SCREENS PACKER TYPE
Perforation Method Johnson Wirewrap (Stainless)
Screen Type & Method of Installation Lowered W K Packer

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
116'	140'	.080"	Tele	12"	Stainless	☐	☐
						☐	☐
						☐	☐

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
35' ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices:

12. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments:
Depth first Water Encounter 40'

13. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
16"	0'	20'	Gravels, Sand		x
16"	20'	40'	Gravels, Sand	x	
16"	40'	50'	Boulders, Gravel	x	
16"	50'	60'	Gravel (Small)	x	
12"	60'	80'	Gravels (Small)	x	
12"	80'	100'	Gravels (Small)	x	
12"	100'	120'	Gravel (Large)	x	
12"	120	140	Gravel (Mixed)	x	

RECEIVED
MAY 06 2005
Department of Water Resources
Eastern Region

Completed Depth 140' (Measurable)
Date: Started 11-26-04 Completed 4-28-05

14. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Denning Well Drilling Firm No. 518
Principal Driller Clement Denning Date 4-28-05
and
Driller or Operator II ____ Date ____
Operator I ____ Date 2/17/05
Principal Driller and Rig Operator *Required.*
Operator I must have signature of Driller/Operator II.

FORWARD WHITE COPY TO WATER RESOURCES

APPENDIX C: SOIL RESOURCES

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 Teton Area, Idaho and Wyoming

21094 CLOUD VEIL LLC, Tetonia ID

June 23, 2021

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

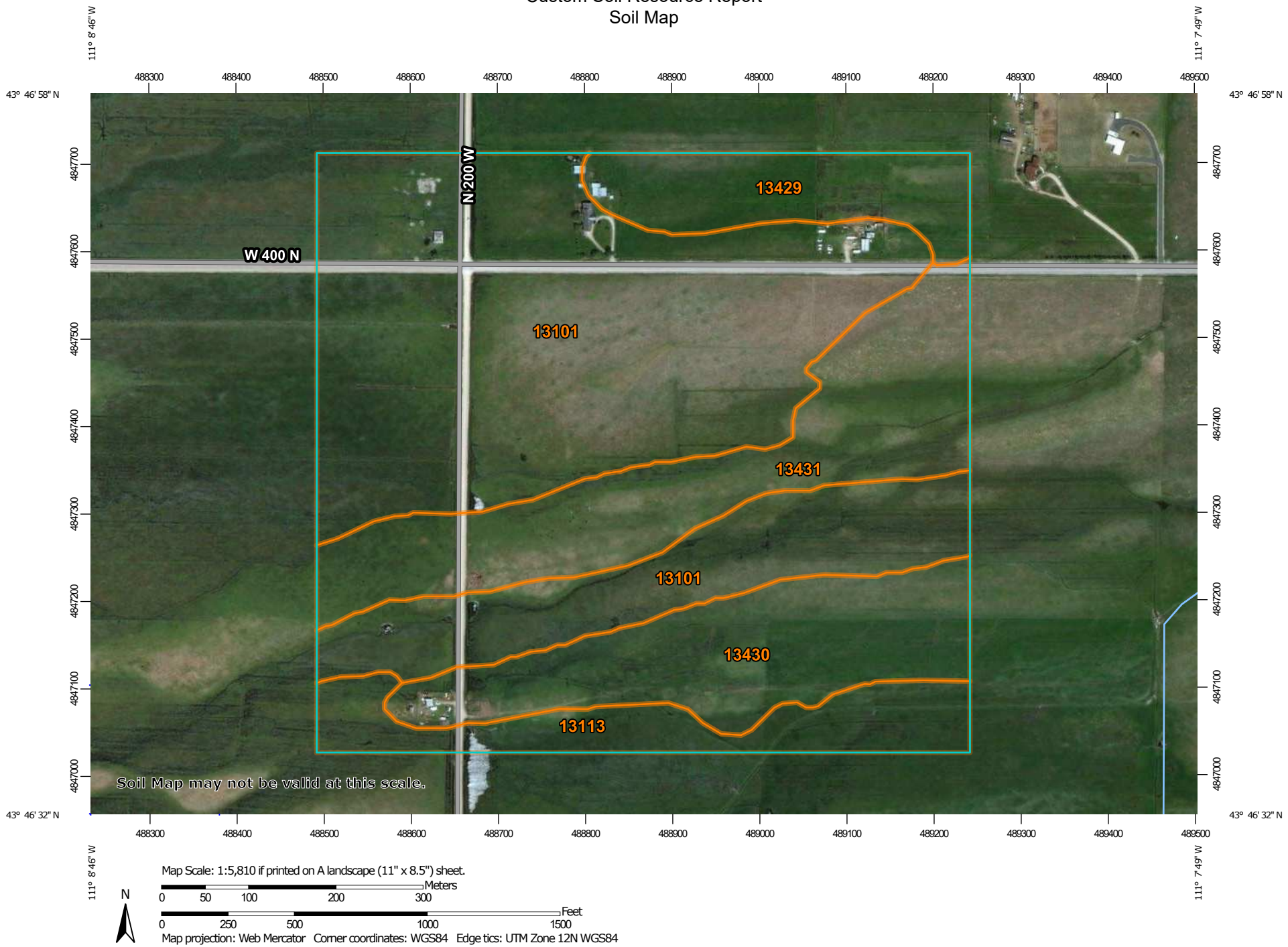
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:5,810 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N 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: Teton Area, Idaho and Wyoming
Survey Area Data: Version 9, Jun 4, 2020

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

Date(s) aerial images were photographed: Sep 24, 2011—Oct 25, 2016

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13101	Redfish-Foxcreek complex, 0 to 2 percent slopes	68.2	53.4%
13113	Foxcreek mucky peat, 0 to 2 percent slopes	10.3	8.1%
13429	Alpine gravelly loam, 0 to 2 percent slopes	9.4	7.4%
13430	Alpine-St. Anthony complex, 0 to 2 percent slopes	17.5	13.7%
13431	Feltonia-Arimo complex, 0 to 2 percent slopes	22.1	17.3%
Totals for Area of Interest		**127.6**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Teton Area, Idaho and Wyoming

13101—Redfish-Foxcreek complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1qmkh
Elevation: 5,920 to 6,230 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 38 to 44 degrees F
Frost-free period: 20 to 50 days
Farmland classification: Not prime farmland

Map Unit Composition

Redfish and similar soils: 70 percent
Foxcreek and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Redfish

Setting

Landform: Fan remnants, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

Oe - 0 to 2 inches: mucky peat
A - 2 to 10 inches: loam
AB - 10 to 13 inches: gravelly loam
2BC - 13 to 16 inches: very gravelly loamy sand
2C - 16 to 43 inches: extremely gravelly sand
2Cg - 43 to 60 inches: extremely gravelly coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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 10 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 4 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): 6c
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C/D
Ecological site: R013XY050ID - RIPARIAN WET MEADOW SALIX/CAREX
Hydric soil rating: Yes

Description of Foxcreek

Setting

Landform: Flood plains, drainageways
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Mixed alluvium

Typical profile

Oe - 0 to 2 inches: mucky peat
Ag - 2 to 8 inches: loam
ABg - 8 to 15 inches: loam
Bg1 - 15 to 21 inches: loam
2Bg2 - 21 to 26 inches: very gravelly coarse sandy loam
2Bkg - 26 to 42 inches: very gravelly loamy sand
2Cg - 42 to 60 inches: extremely gravelly coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 0.57 in/hr)
Depth to water table: About 0 to 10 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): 6c
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C/D
Ecological site: R013XY050ID - RIPARIAN WET MEADOW SALIX/CAREX
Hydric soil rating: Yes

13113—Foxcreek mucky peat, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1qmks
Elevation: 5,920 to 6,520 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 38 to 44 degrees F
Frost-free period: 20 to 50 days
Farmland classification: Not prime farmland

Map Unit Composition

Foxcreek and similar soils: 90 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Foxcreek

Setting

Landform: Flood plains, drainageways
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Mixed alluvium

Typical profile

Oe - 0 to 2 inches: mucky peat
Ag - 2 to 8 inches: loam
ABg - 8 to 15 inches: loam
Bg1 - 15 to 21 inches: loam
2Bg2 - 21 to 26 inches: very gravelly coarse sandy loam
2Bkg - 26 to 42 inches: very gravelly loamy sand
2Cg - 42 to 60 inches: extremely gravelly coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 0.57 in/hr)
Depth to water table: About 0 to 10 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): 6c
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: C/D
Ecological site: R013XY050ID - RIPARIAN WET MEADOW SALIX/CAREX
Hydric soil rating: Yes

Minor Components

Zufelt, occasionally flooded

Percent of map unit: 10 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear, convex
Ecological site: R013XY039ID - DRY MEADOW PONE-PHAL2
Hydric soil rating: Yes

13429—Alpine gravelly loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1v280
Elevation: 5,970 to 6,500 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 38 to 44 degrees F
Frost-free period: 50 to 90 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Alpine and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alpine

Setting

Landform: Fan remnants
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Mixed alluvium

Typical profile

A1 - 0 to 2 inches: gravelly loam
A2 - 2 to 11 inches: very gravelly loam
ABk - 11 to 17 inches: extremely gravelly loam
Bk - 17 to 25 inches: extremely gravelly sandy loam
Bkq - 25 to 31 inches: extremely gravelly loamy sand
Bk' - 31 to 35 inches: extremely gravelly sandy loam
Bkq' - 35 to 44 inches: extremely gravelly loamy sand
Bk1'' - 44 to 51 inches: extremely gravelly sandy loam
Bk2'' - 51 to 60 inches: gravel

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 75 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): 4c
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: B
Ecological site: R013XY004ID - SHALLOW GRAVELLY 12-16 ARTRV/PSSPS
Hydric soil rating: No

13430—Alpine-St. Anthony complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1vghp
Elevation: 5,910 to 6,480 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 38 to 44 degrees F
Frost-free period: 50 to 90 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Alpine and similar soils: 50 percent
St. anthony and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alpine

Setting

Landform: Stream terraces, fan remnants
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Mixed alluvium

Typical profile

A1 - 0 to 2 inches: gravelly loam
A2 - 2 to 11 inches: very gravelly loam
ABk - 11 to 17 inches: extremely gravelly loam
Bk - 17 to 25 inches: extremely gravelly sandy loam
Bkq - 25 to 31 inches: extremely gravelly loamy sand
Bk' - 31 to 35 inches: extremely gravelly sandy loam
Bkq' - 35 to 44 inches: extremely gravelly loamy sand
Bk1'' - 44 to 51 inches: extremely gravelly sandy loam
Bk2'' - 51 to 60 inches: gravel

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 75 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): 4c
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: R013XY004ID - SHALLOW GRAVELLY 12-16 ARTRV/PSSPS
Hydric soil rating: No

Description of St. Anthony

Setting

Landform: Swales on fan remnants
Down-slope shape: Convex, concave, linear
Across-slope shape: Linear, concave
Parent material: Gravelly mixed alluvium

Typical profile

A1 - 0 to 7 inches: gravelly loam
A2 - 7 to 12 inches: gravelly loam
Bw - 12 to 23 inches: very gravelly sandy loam
BC - 23 to 47 inches: extremely gravelly coarse sandy loam
2C - 47 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 4c
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Ecological site: R013XY004ID - SHALLOW GRAVELLY 12-16 ARTRV/PSSPS
Hydric soil rating: No

13431—Feltonia-Arimo complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1vlkd
Elevation: 5,950 to 6,240 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 38 to 44 degrees F
Frost-free period: 50 to 90 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Feltonia and similar soils: 75 percent
Arimo and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Feltonia

Setting

Landform: Fan remnants, stream terraces
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Mixed alluvium with loess influence

Typical profile

Ap - 0 to 6 inches: loam
A - 6 to 12 inches: loam
Bw1 - 12 to 20 inches: loam
Bw2 - 20 to 27 inches: loam
Bk1 - 27 to 36 inches: loam
Bk2 - 36 to 49 inches: very gravelly loam
2Bk3 - 49 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): 4c
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Ecological site: R013XY001ID - LOAMY 12-16 - Provisional
Hydric soil rating: No

Description of Arimo

Setting

Landform: Fan remnants, stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium with loess influence

Typical profile

Ap1 - 0 to 2 inches: loam
Ap2 - 2 to 13 inches: loam
Bw - 13 to 15 inches: loam

Bk1 - 15 to 25 inches: loam
Bk2 - 25 to 29 inches: very gravelly sandy loam
2Bkq - 29 to 35 inches: extremely gravelly loamy sand
2C - 35 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 36 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 4c
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R013XY001ID - LOAMY 12-16 - Provisional
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

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

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

Vegetative Productivity

This folder contains a collection of tabular reports that present vegetative productivity data. The reports (tables) include all selected map units and components for each map unit. Vegetative productivity includes estimates of potential vegetative production for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture and rangeland. In the underlying database, some states maintain crop yield data by individual map unit component. Other states maintain the data at the map unit level. Attributes are included for both, although only one or the other is likely to contain data for any given geographic area. For other land uses, productivity data is shown only at the map unit component level. Examples include potential crop yields under irrigated and nonirrigated conditions, forest productivity, forest site index, and total rangeland production under of normal, favorable and unfavorable conditions.

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition (21094 CLOUD VEIL LLC)

In areas that have similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

This table shows, for each soil that supports vegetation, the ecological site, plant association, or habitat type; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average

percentage of each species. An explanation of the column headings in the table follows.

An *ecological site, plant association, or habitat type* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site, plant association, or habitat type is typified by an association of species that differs from that of other ecological sites, plant associations, or habitat types in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service (NRCS). Descriptions of plant associations or habitat types are available from local U.S. Forest Service offices.

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Characteristic vegetation (the grasses, forbs, shrubs, and understory trees that make up most of the potential natural plant community on each soil) is listed by common name. Under *rangeland composition and forest understory*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The percentages are by dry weight for rangeland. Percentages for forest understory are by either dry weight or canopy cover. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in the "National Range and Pasture Handbook," which is available in local offices of NRCS or on the Internet.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity

index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service, National range and pasture handbook.

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Teton Area, Idaho and Wyoming								
Map unit symbol and soil name	Ecological Site, Plant Association, or Habitat Type	Total dry-weight production			Characteristic rangeland or forest understory vegetation	Composition		
		Favorable year	Normal year	Unfavorable year			Rangeland	Forest understory
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	
13101—Redfish-Foxcreek complex, 0 to 2 percent slopes								
Redfish	RIPARIAN WET MEADOW SALIX/CAREX (R013XY050ID)	3,500	2,500	2,000	beaked sedge	25		
					water sedge	25		
					willow	25		
					Baltic rush	10		
					Shrubby cinquefoil	5		
Foxcreek	RIPARIAN WET MEADOW SALIX/CAREX (R013XY050ID)	3,500	2,500	2,000	beaked sedge	25		
					water sedge	25		
					willow	25		
					Baltic rush	10		
					Shrubby cinquefoil	5		
13113—Foxcreek mucky peat, 0 to 2 percent slopes								
Foxcreek	RIPARIAN WET MEADOW SALIX/CAREX (R013XY050ID)	3,500	2,500	2,000	beaked sedge	25		
					water sedge	25		
					willow	25		
					Baltic rush	10		
					Shrubby cinquefoil	5		

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Teton Area, Idaho and Wyoming								
Map unit symbol and soil name	**Ecological Site, Plant Association, or Habitat Type**	**Total dry-weight production**			**Characteristic rangeland or forest understory vegetation**	**Composition**		
		Favorable year	**Normal year**	**Unfavorable year**			**Rangeland**	**Forest understory**
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	
13429—Alpine gravelly loam, 0 to 2 percent slopes								
Alpine	SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID)	1,000	750	400	bluebunch wheatgrass	40		
					mountain big sagebrush	20		
					Idaho fescue	10		
					tapertip hawksbeard	8		
					antelope bitterbrush	5		
13430—Alpine-St. Anthony complex, 0 to 2 percent slopes								
Alpine	SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID)	1,000	750	400	bluebunch wheatgrass	40		
					mountain big sagebrush	20		
					Idaho fescue	10		
					tapertip hawksbeard	8		
					antelope bitterbrush	5		
St. anthony	SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID)	1,000	750	400	bluebunch wheatgrass	40		
					mountain big sagebrush	20		
					Idaho fescue	10		
					tapertip hawksbeard	8		
					antelope bitterbrush	5		

Rangeland and Forest Vegetation Classification, Productivity, and Plant Composition–Teton Area, Idaho and Wyoming								
Map unit symbol and soil name	**Ecological Site, Plant Association, or Habitat Type**	**Total dry-weight production**			**Characteristic rangeland or forest understory vegetation**	**Composition**		
		Favorable year	**Normal year**	**Unfavorable year**			**Rangeland**	**Forest understory**
		Lb/ac	*Lb/ac*	*Lb/ac*		*Pct dry wt*	*Pct dry wt*	
13431—Feltonia-Arimo complex, 0 to 2 percent slopes								
Feltonia	LOAMY 12-16 - Provisional (R013XY001ID)	1,800	1,200	800	bluebunch wheatgrass	40		
					mountain big sagebrush	15		
					arrowleaf balsamroot	10		
					Idaho fescue	10		
					Letterman's needlegrass	10		
					antelope bitterbrush	5		
					common snowberry	5		
Arimo	LOAMY 12-16 - Provisional (R013XY001ID)	1,800	1,200	800	bluebunch wheatgrass	40		
					mountain big sagebrush	15		
					arrowleaf balsamroot	10		
					Idaho fescue	10		
					Letterman's needlegrass	10		
					antelope bitterbrush	5		
					common snowberry	5		

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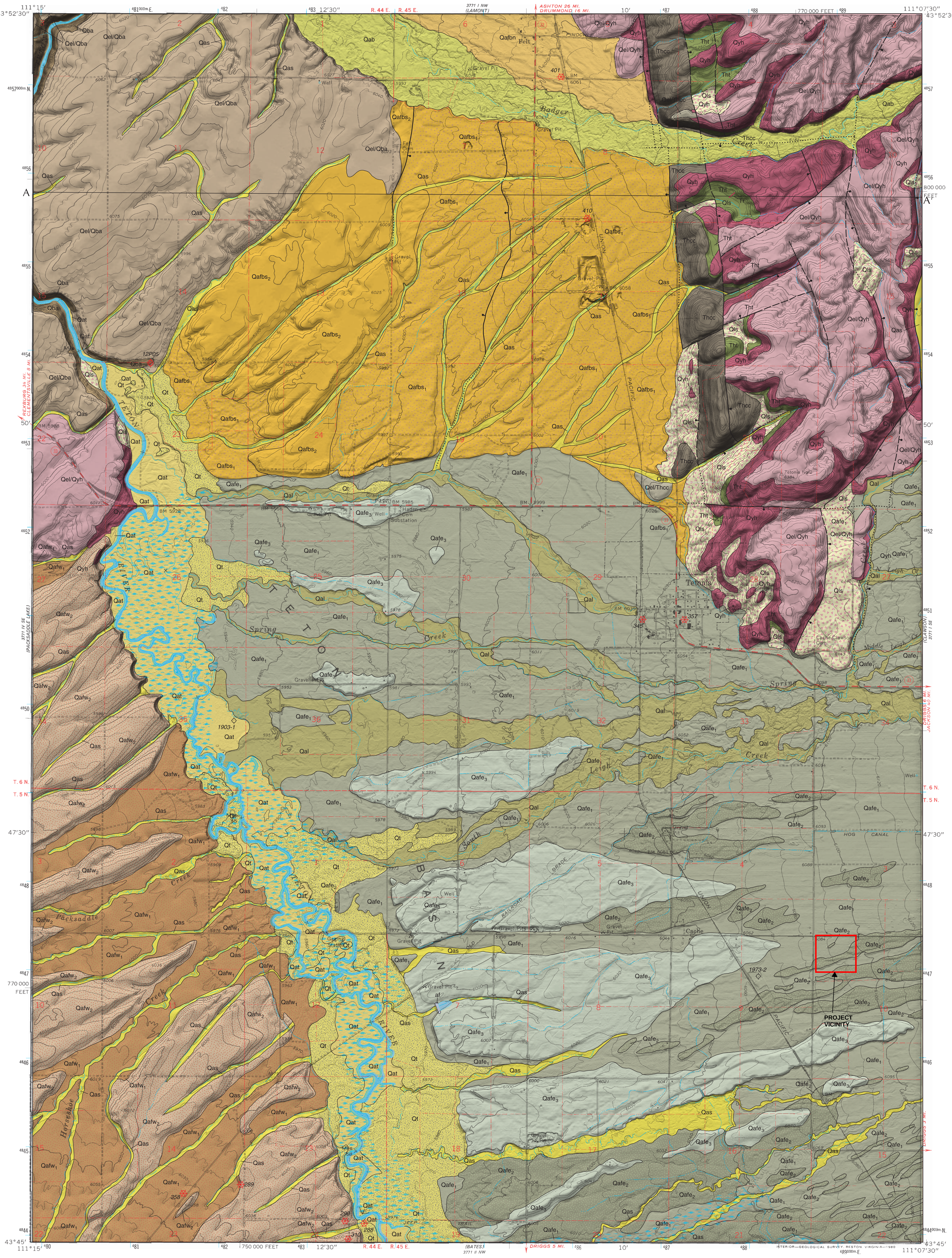
GEOLOGIC MAP OF THE TETONIA QUADRANGLE, TETON COUNTY, IDAHO

William M. Phillips, Glenn F. Embree, and Dean L. Garwood

2013



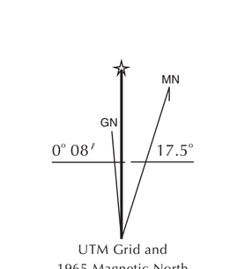
Base Map Credit
Base digitally scanned from 24,000-scale USGS film separates, 1965.

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1965.

Projection: Idaho coordinate system, east zone (Transverse Mercator). 1927 North American Datum.

10,000-foot grid ticks based on Idaho coordinate system, east zone.

1000-meter Universal Transverse Mercator grid ticks, zone 12.



UTM Grid and 1965 Magnetic North Declination at Center of Map

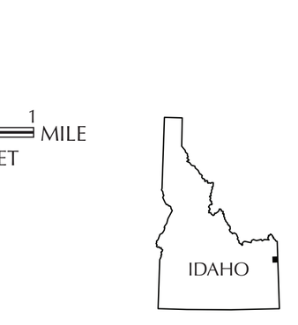
SCALE 1:24,000

1 0.5 0 1 MILE

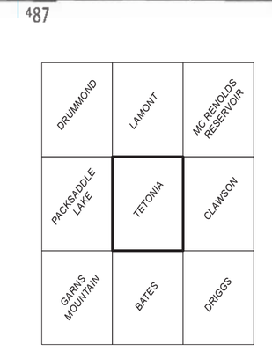
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0.5 0 1 KILOMETER

Contour interval 10 feet



QUADRANGLE LOCATION



ADJOINING QUADRANGLES

Field work conducted 2012.

This geologic map was funded in part by the U.S. Geological Survey National Cooperative Geologic Mapping Program, USGS award number G12AC20113.

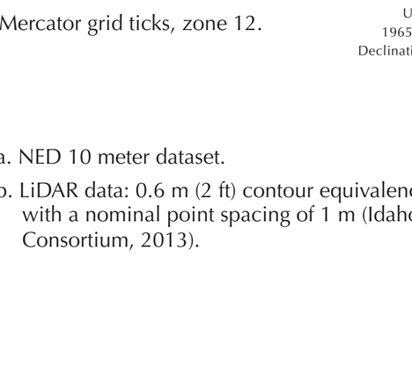
Digital cartography by Jane S.Freed at the Idaho Geological Survey's Digital Mapping Lab.

Technical review status: Authors only.

Editorial review by Alyson R. Kral.

Map version 11-1-2013.

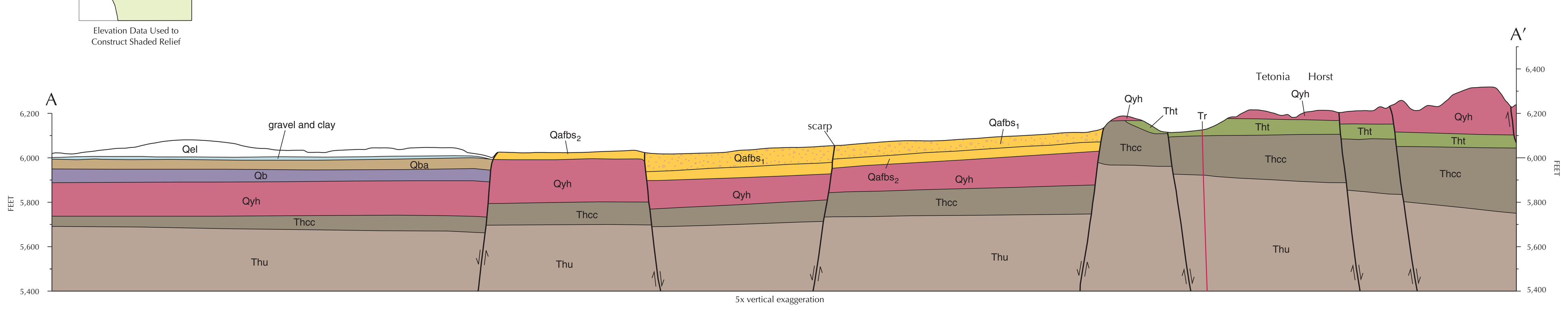
PDF (Acrobat Reader) map may be viewed online at www.idahogeology.org.



a. NED 10 meter dataset.

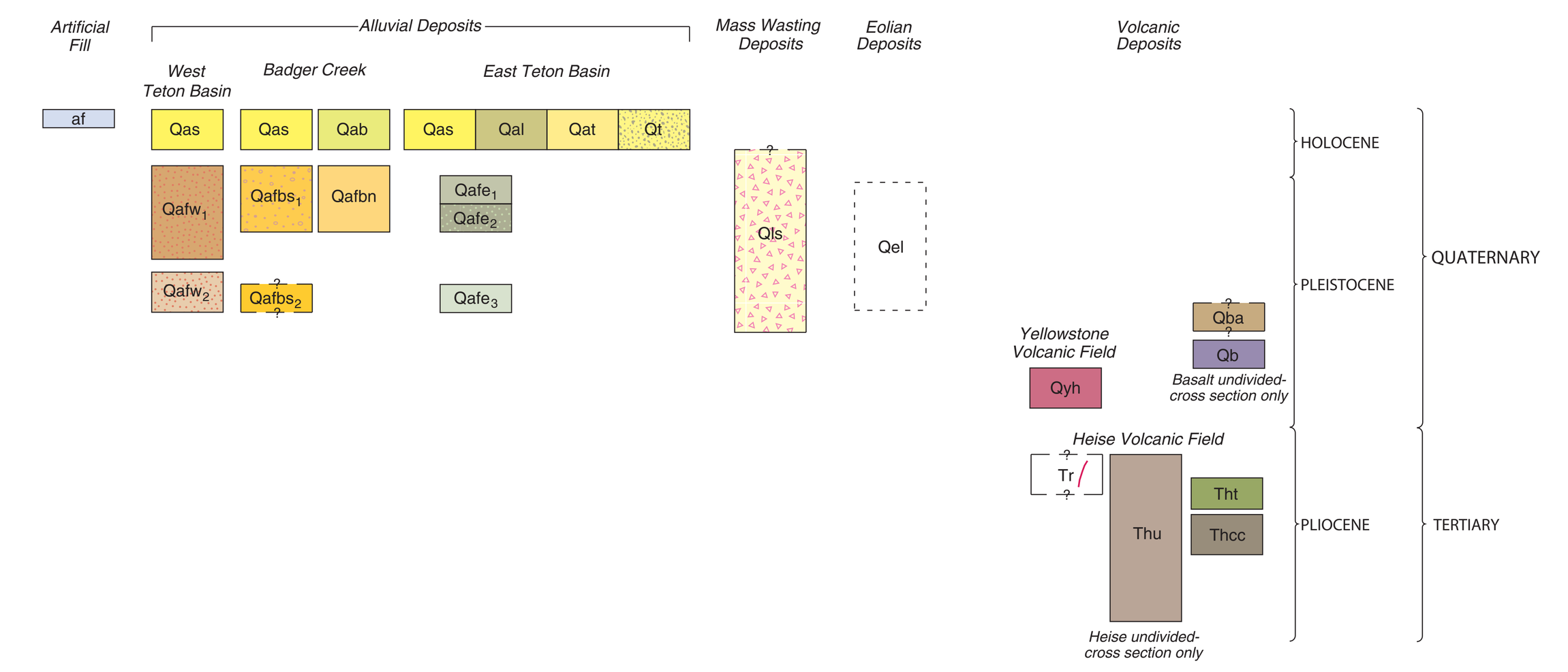
b. LiDAR data: 0.6 m (2 ft) contour equivalency accuracy with a nominal point spacing of 1 m (Idaho LiDAR Consortium, 2013).

Elevation Data Used to Construct Shaded Relief



5x vertical exaggeration

CORRELATION OF MAP UNITS



SYMBOLS

Contact: dashed where approximately located.

Normal fault: ball and bar on downthrown side; dashed where approximately located; dotted where concealed.

12P05 Geochemical sample.

12P05 Paleomagnetism sample.

1973-2 Oil and Gas Exploration Well and IGS number.

290 Vs30, shallow shear wave velocity within 30 m (98 ft) of surface (m/s).

METHODS AND PREVIOUS WORK

Field work was conducted in 2012. Outcrops of surficial and bedrock units were visited and described. Photogeologic methods were used where outcrops could not be visited. Geomorphic features in most of the map were identified using LiDAR data acquired June 10 – July 25, 2011 by AeroMetric Inc. for the Federal Emergency Management Agency (FEMA) RiskMAP program (Idaho LiDAR Consortium, 2013). FEMA requires that the LiDAR data have 0.6 m (2 ft) contour equivalency accuracy with a nominal point spacing of 1 m. The LiDAR dataset does not include uplands north of the city of Tetonia or west of the Teton River. Digital 1-m orthophoto imagery flown in 2011 by the National Agricultural Imagery Program was also used (Inside Idaho, 2013) along with older sources of air photos. Basalt of Ard Farms was correlated with outcrops outside of the map using major and trace element chemistry, and paleomagnetic characteristics. Glenn Embree mapped the Tetonia horst. William Phillips and Dean Garwood mapped the remainder of the quadrangle.

Previous maps by Prostka and Hackman (1974), Mitchell and Bennett (1979), and Scott (1982) were compiled and consulted. Shallow shear-wave velocity profiles (Vs30) for Teton County (Phillips, 2011), water well logs (Idaho Department of Water Resources, 2011), oil and gas exploration well logs (Idaho Geological Survey, 2013), and soil maps (Soil Survey Staff, 2011) were also consulted.

STRATIGRAPHY

QUATERNARY ALLUVIAL UNITS

Alluvial fan units are separated on the basis of relative age assignments and clast composition. Ages are based on cross-cutting relationships, height of geomorphic surface above floodplain, degree of soil formation (especially development of Bt (clay) and Bk (carbonate-silica) horizons), and thickness of loess caps. The headwaters of Badger and Leigh creeks were glaciated and outwash deposits from these drainages are correlated with dated regional glaciations (Pinedale, ~13.5-19 ka; and Bull Lake, ~151-157 ka) of the Teton Range and Yellowstone Plateau (Licciardi and Pierce, 2008).

In the West Teton Basin, alluvial fans are sourced from the western boundary of the Teton Basin, and to a limited degree, from the northern flanks of the Big Hole Mountains. Here, lithologies are dominated by the Huckleberry Ridge Tuff (unit *Qyh*) with lesser amounts of Neogene rhyolitic rocks of the Heise and Carlton Creek volcanic fields, and upper Cretaceous Frontier Formation (Price and Rodgers, 2010). These lithologies produced much finer-grained alluvial fans than elsewhere in the Teton Basin as shown by outcrops, water well logs, and Vs30 data.

In the East Teton Basin, east-sourced alluvium from Badger Creek and Leigh Creek consists of gravels and sands containing granite, biotite gneiss, limestone, dolomite, and sandstone derived from Precambrian and Paleozoic units in the Teton Mountains (Love and others, 1992), as well as rhyolite and obsidian from the Huckleberry Ridge (*Qyh*) and Conant Creek (*Thcc*) tuffs. Alluvial fans from these sources are much more gravel-rich than west-sourced units.

Deposits of the Teton River are contained in meandering channels with muddy gravel and sand beaches (unit *Qat*), and muddy terraces (unit *Qt*). These units contain a mix of eastern and western sources including a variety of Mesozoic sedimentary rocks from the Big Hole Mountains (Staatz and Albee, 1967; Pampeyan and others, 1967).

LAKE DEPOSITS

Water wells in the Badger Creek area consistently penetrate 15 to 30 m (50 to 100 ft) of clay beneath alluvial fan deposits. The clays may represent lake deposits created by the damming of Badger Creek, perhaps by basalt of Ard Farms (unit *Qba*). Water wells also penetrate clay and gravel between *Qba* and overlying loess (*Qel*), consistent with overtopping of a lava dam prior to its removal by stream incision.

QUATERNARY AND NEOGENE RHYOLITIC ROCKS

Rhyolitic ignimbrites of the Yellowstone Plateau volcanic field (Christiansen, 2001) and the Heise volcanic field (Morgan and McIntosh, 2005) are present in the map. These rocks were previously grouped together as Huckleberry Ridge Tuff (unit *Qyh*; Protska and Hackman, 1974; Mitchell and Bennett, 1979). This map is the first to recognize the Heise units of Conant Creek Tuff (*Thcc*) and an unnamed tephra (*Tht*) in the Tetonia quadrangle. An unusual rhyolite dike (*Tr*) dated at 4.66 Ma that cuts Tht is also identified for the first time.

QUATERNARY BASALTS

The basalt flows exposed in the northwest corner of the map are correlated by paleomagnetism and geochemistry with basalt of Ard Farms, a post-Huckleberry Ridge Tuff unit with a concealed vent ~4 km (2.5 mi) west of the map. This unit is also present along the Teton River canyon west of the map (Embree and Phillips, 2011).

STRUCTURE

The map lies in the Teton Basin, an intermountain basin separating the Teton Range and Big Hole Mountains. The western margin of the Teton Basin is a northwest-trending normal fault about 3 km (1.9 mi) west of the map that offsets the Huckleberry Ridge Tuff at least 79 m (260 ft). The fault parallels Cretaceous thrust faults in the Big Hole Mountains (Staatz and Albee, 1967; Pampeyan and others, 1967). A group of north-south trending faults and lineaments continues east across the Teton Basin. A fault-bounded bedrock block in the northeast portion of the map is here termed the Tetonia horst. The horst is broken into several blocks by two sets of normal faults: one trending approximately north-south, roughly paralleling the bounding faults; and a second set striking east-west or N60-70°E. The second set are generally down-to-the-south normal faults geomorphically expressed as prominent canyons (such as Badger Creek) that transect the horst.

South of Badger Creek, in secs. 7, 18, and 19, T. 6 N., R. 45 E., a north-south trending 2.5 m (8.2 ft) high scarp about 2.5 km (1.5 mi) long is revealed by LiDAR data (Figure 1). The scarp cuts across the slope of a late Pleistocene alluvial fan (unit $Qafbs_1$) but does not cut late Pleistocene-Holocene stream channels (unit *Qas*). Because the scarp cannot easily be attributed to stream erosion, and because it is parallel to other nearby normal faults, it is tentatively classified as a fault scarp. A similar, east-facing scarp is present in sec. 7.

RESOURCES

Sand and gravel have been mined from numerous small pits in alluvial fan deposits of Badger Creek and Leigh Creek (units $Qafbs_1$, *Qafbn*, $Qafe_1$, $Qafe_2$, and $Qafe_3$). These deposits contain resistant lithologies suitable for aggregate, road-building, and landscaping use.

Exposed units are underlain by sedimentary strata of Mesozoic to Paleozoic age, and Precambrian metamorphic and igneous rocks. Two dry oil and gas exploration wells have been drilled into these rocks in the map (Idaho Geological Survey, 2013): Breckenridge Ranch No. 1 (IGS no. 1903-01, lat 43.80234°N., long 111.22156°W., sec. 35, T. 6 N., R. 44 E., drilled 1903; total depth 200 m, 660 ft); and Hansen No. 1 (IGS no. 1973-02, lat 43.77648°N., long 111.14755°W., sec. 9, T. 5 N., R. 45 E. drilled 1973; total depth 2560 m, 8402 ft). No logs are available for the Breckenridge Ranch well. The Hansen No. 1 was reported to encounter Cretaceous, Cambrian, and Precambrian rocks. These units are not exposed on the map or shown in the cross section.

DESCRIPTION OF MAP UNITS

Note: water well logs are referred to by Well ID numbers in some unit descriptions. The logs may be viewed at http://www.idwr.idaho.gov/apps/appswell/RelatedDocs.asp?WellID="xxxxxx"where "xxxxxx" is the six-digit Well ID number.

ARTIFICIAL FILL

af **Artificial fill (Holocene)**—Compacted gravel, sand, and silt at earth fill dam in sec. 7, T. 5 N., R. 45 E. Thickness estimated to be about 3 m (10 ft).

ALLUVIAL SEDIMENTS

Qat **Alluvium of Teton River floodplain (Holocene)**—Dark brown to light gray sand, silt, mud, decomposed plant matter, and gravel; thinly bedded to massive, planar- to cross-bedded; cobbles and granules are rhyolite and obsidian with lesser granite, biotite gneiss, limestone, dolomite, and sandstone derived from the Teton Range and Big Hole Mountains. Deposits are contained in shallow meandering channels with muddy gravel and sand bars and beaches.

Qt **Terraces of Teton River (Holocene)**—Dark brown to gray overbank deposits of sand, silt, mud, and decomposed plant matter; thinly bedded. The terraces are about 1 m (39 in) above the floodplain and are visible on LiDAR images. Most of these surfaces are subject to seasonal flooding.

Qas **Alluvium of tributary streams (Holocene)**—Thin < 3 m (10 ft) of gravel and sand contained in narrow channels incised into alluvial fans of Badger Creek, West Teton Basin, East Teton Basin, and deposits of the mainstream Teton River. Decomposed plant matter present where soils are subject to seasonal saturation. Clast compositions are mostly rhyolite and obsidian derived from unit *Qyh* in the West Teton Basin; in the East Teton Basin, deposits also contain granite, biotite gneiss, limestone, dolomite, and sandstone derived from Precambrian and Paleozoic units in the Teton Mountains. Streams are mostly ephemeral and aggraded on west; on east, deposits are contained in numerous, incised, highly sinuous channels.

Badger Creek

Qab **Alluvium of Badger Creek floodplain (Holocene)**—Light gray, well-rounded, cobble-sized gravel and sand. Planar to cross-bedded; clasts are composed of rhyolite, obsidian, granite, biotite gneiss, limestone, dolomite, and sandstone. Active braided channels cut low terraces capped with as much as 64 cm (25 in) of silty loam. Remnants of older fans with Bt and Bk soil horizons are locally present. Water wells (411564, 327827, 336233) penetrate 12 to 35 m (40 to 120 ft) of interbedded gravels, sand and clay before reaching bedrock. The lowermost clays may represent lake deposits. Badgerton, Wiggleton, and Driggs gravelly loam and silt loam soils are developed on this unit. Subject to seasonal flooding.

Qafbn **Alluvial fan of north Badger Creek (Holocene-late Pleistocene)**—Light gray, well-rounded cobble-sized gravel, planar bedded with local sandy cross-beds. Clast composition similar to *Qab*. Generally capped by as much as 64 cm (25 in) of silty loam soil. Water wells (411250, 423003, 426526) penetrate as much as 67 m (220 ft) of interbedded gravel, sand, and clay over rhyolite and basalt bedrock. The lowermost clays may represent lake deposits. This unit consists of glacial outwash formed during the last glaciation (Pinedale) of the Teton Range plus some post-glacial flood deposits. The Driggs silt loam soil is developed on this deposit. It contains a 43 cm (17 in) Bt horizon but no Bk horizon.

$Qafbs_1$ **Alluvial fan 1 of south Badger Creek (Holocene-late Pleistocene)**—Light gray, well-rounded, crudely imbricated, cobble-sized gravel with poorly sorted coarse sand and silt matrix; planar bedded with rare sandy cross-beds. Clast composition similar to *Qab*. Best exposed in gravel pits in sec. 17, T. 6 N., R. 45 E. (Figure 1) where gravels are overlain by 45 to 60 cm (18 to 24 in) of dark reddish-brown clay-rich soil (Bt horizon). Water wells (357340, 357331, 326572, 338209) show that the fan thickens southwest from about 24 m (78 ft) to as much as 60 m (200 ft) of gravel, sand, and clay over rhyolite bedrock. Fan was largely deposited during last glaciation (Pinedale) of the Teton Range when Badger Creek discharged southwest to Leigh Creek and Teton River but may also have received some flows during large Holocene floods. Driggs silt loam soil is developed on this deposit. It contains a 43 cm (17 in) Bt horizon but no Bk horizon (Soil Survey Staff, 2011). Hummocky deposits in sec. 23, T. 6 N., R. 44 E. are interpreted to have been deposited via channels eroded into $Qafbs_2$.

$Qafbs_2$ **Alluvial fan 2 of south Badger Creek (middle? Pleistocene)**—Well-rounded cobbles, granules, and yellowish sand of granite, biotite gneiss, and rhyolite; typical exposures consist of cobbles in fields disturbed by plowing. Water well (388660) and topography suggest a minimum thickness of 15 to 24 m (50 to 85 ft). Partially eroded Felt loam, Feltonia loam, and Driggs silt loam soils are developed on the unit. Bk horizons of 78 to 122 cm (31 to 48 in) are present (Soil Survey Staff, 2011), consistent with deposition during an older glaciation (Bull Lake?) of the Teton Range when Badger Creek discharged to the southwest (Figure 1).

West Teton Basin

$Qafw_1$ **Alluvial fan 1 of West Teton Basin (Holocene-late Pleistocene)**—Low relief surfaces lying in broad valleys and fans that cut older alluvial fans ($Qafw_2$); deposits rarely exposed; consists of thickly bedded gravel and sand overlain by about 100 cm (40 in) of loess-derived soils with Bt and Bk horizons. Gravel is cobble to granule in size and composed dominantly of well-rounded rhyolite derived from *Qyh* with lesser sandstone. Driggs silt loam and Packsaddle loam soils are developed on the unit. The Packsaddle soil has a 28 cm (11 in) Bt horizon and a 53 cm (21 in) Bk horizon. The Driggs soil lacks a Bt horizon (Soil Survey Staff, 2011).

$Qafw_2$ **Alluvial fan 2 of West Teton Basin (late to middle Pleistocene)**—Loess-covered, incised alluvial fans and fan remnants; deposits rarely exposed. At bluffs on west side of Teton River in sec. 27, T. 6 N., R. 44 E., consists of medium to light gray sand and gravel beds, planar to cross-bedded, interbedded with several light brown, massive silt beds (Figure 2). The silt beds are 75 to 150 cm thick (29 to 60 in) and capped with variably developed dark paleosols. Gravels are composed of well-rounded rhyolite and lesser sandstone. The surface loess layer consists of light gray massive silt with a patchy white carbonate-silica Bk horizon that is 100 to 150 cm (39 to 59 in) thick. Total thickness of the exposed section is about 15 m (50 ft). The deposits are interpreted to be alluvial fan deposits interbedded with loess sheets. Source of the alluvial fans at this site is the fault scarp of *Qyh* comprising the western boundary of the Teton Basin, and small portions of the northern Big Hole Mountains. Regional loess chronologies (Pierce and others, 2011; Phillips and others, 2009), suggest that the surface loess is Pinedale age while the older sheets may be between about 30 ka to approximately 154 ka (Bull Lake age). Similar deposits are exposed in SE¼ sec. 13, T. 5 N., R. 44 E. The Tetonia and Ririe silt loam soils are developed on the unit with 91 to 129 cm (36 to 51 in) Bk horizons (Soil Survey Staff, 2011).

East Teton Basin – Leigh Creek and Tributaries

Qal **Alluvium of floodplain of Leigh Creek and tributaries (Holocene)**—Light gray, well-rounded cobble gravel and coarse sand, thick planar-bedded with minor cross-bedded sand; clasts are composed of rhyolite derived from unit *Qyh*, and granite, biotite gneiss, limestone, dolomite, and sandstone from Precambrian and Paleozoic units in headwaters. Braided channels cross the floodplain separated by low terraces as much as 1 m (39 in) in height. Decomposed plant matter present where soils are subject to seasonal saturation. The Bagerton gravelly loam is developed on this unit with as much as 76 cm (30 in) of loam over terrace surfaces. There are no Bt or Bk horizons (Soil Survey Staff, 2011). Locally subject to seasonal flooding.

$Qafe_1$ **Alluvial fan 1 of East Teton Basin (late Pleistocene)**—Broad low relief fan with apex along South Leigh Creek in sec. 31, T. 6 N., R. 45 E. about 5 km (3 mi) east of the map. Formed by a large flood which incised units $Qafe_2$ and $Qafe_3$, creating numerous sinuous channels, broad valleys, and lenticular fan remnants (Figure 3). Described in soil maps as 20 cm (8 in) of gravel burying about 40 cm (17 in) of preexisting silt. Topographic profiles show that about 1.5 to 2 m (5 to 6.6 ft) of unit $Qafe_2$ was removed by this flood adjacent to South Leigh Creek. Decomposed plant matter present where soils are subject to seasonal saturation. The Driggs gravelly loam and Driggs cobbly loam is developed on most of the deposit (Soil Survey Staff, 2011). Not dated but lack of significant loess cap and cross-cutting relationships suggest formation late in the glaciation of the Teton Range.

$Qafe_2$ **Alluvial fan 2 of East Teton Basin (late Pleistocene)**—Stratified gravel and sand in eroded remnants of east-sourced fans; surfaces are 0.75 to 1.50 m (2.5 to 5.0 ft) above adjacent $Qafe_1$ surfaces. Overlain by 64 cm (25 in) of silt (probably a loess cap) with Bt soil development. Clast lithologies are similar to other east-sourced fans; poorly exposed except in gravel pits. The Driggs silty loam soil is developed on most of the deposits (Soil Survey Staff, 2011). Undated; presence of loess cap with Bt soil suggests this is Pinedale-age glacial outwash (14-25 ka).

$Qafe_3$ **Alluvial fan 3 of East Teton Basin (late to middle Pleistocene?)**—Gravel and sand in remnants of east-sourced fans with surfaces 4 to 6 m (13 to 20 ft) above active floodplains. The fans are characterized by loess caps with thicknesses of 86 to 150 cm (34 to 60 in). Formerly formed a continuous deposit along east side of Teton River. Valleys were incised through and across the unit during deposition of $Qafe_1$; and the Teton River eroded linear bluffs and several generations of strath terraces at its western edge. Deposits are similar to other east-sourced fans; poorly exposed except in gravel pits. The Feltonia loam, Felt gravelly loam, and Tetonia silt loam soils are developed on this unit; all have Bt horizons from 38 to 56 cm (15 to 22 in) in thickness, and Bk horizons from 79 to 122 cm (31 to 48 in) in thickness (Soil Survey Staff, 2011). Age uncertain but may correlate with Bull Lake (about 154 ka) moraine and outwash deposits about 6 km (3.7 mi) east of map (Scott, 1982).

MASS WASTING DEPOSITS

Qls **Landslides, talus, and colluvium (Holocene-Pleistocene)**—Blocks of massive rhyolite as much as 1.5 to 2 m (5 to 6.5 ft) in length contained in earthflow, fall, and slip deposits. Matrix poorly exposed. Derived from outcrops of Huckleberry Ridge Tuff (Qyh); mostly present where underlain by incompetent tephra unit Tht. Along north side of Badger Creek (sec. 9, T. 6 N., R. 45 E.), includes talus, colluvium and small slides derived from Conant Creek Tuff (Thcc). Along the western scarp of the southern portion of the Tetonia horst and its transecting canyons (secs. 16, 21, and 28, T. 6 N., R. 45 E.), slabs of *Qyh* as large as 200 m (700 ft) are contained in slumps. Age uncertain; landslides may have been most active during wetter and colder climates of the Pleistocene.

EOLIAN SEDIMENTS

Qel **Loess (late Pleistocene-middle Pleistocene)**—Massive, light gray to light brownish gray silt, clay, and very fine sand; locally crudely bedded where reworked on hill slopes. Thickness in well logs (e.g. 327616, 327455, 357336) ranges from <1.5 to 13 m (<5 to 44 ft). Typically forms linear geomorphic patterns that trend northeast, parallel to prevailing winds. Derived from deflation of outwash deposits during glaciations of the Yellowstone Plateau and Teton Range (Scott, 1982; Pierce and others, 2011). Several depositional units separated by buried soils are present in correlative deposits in the upper eastern Snake River Plain (Pierce and others, 1982; Scott, 1982). Not dated in the map; regional ages range between 15-25 ka, 35-51 ka, 69-76 ka, and 141-154 ka (Phillips and others, 2009; Pierce and others, 2011).

VOLCANIC ROCKS

Qel/Qba, Qba **Basalt of Ard Farms (middle to early Pleistocene)**—Light to medium gray fine-grained basalt with rare plagioclase phenocrysts <2 mm and patchy areas of diktytaxitic texture; about 15 to 17 m (50 to 55 ft) in thickness. Normal magnetic polarity (Table 1). Shown as *Qel/Qba* where covered by loess. Believed to have erupted from north-trending, loess-covered ridge in the adjacent Drummond quadrangle with a 6,220 ft high-point centered at lat 43.890°N., long 111.230°W. From the vent, lava flowed eastward into the map and over a scarp probably created by a north-south trending normal fault. Correlated on the basis of geochemistry (Table 2) and paleomagnetism with flows as far west as Canyon Creek, about 20 km (12 mi) from the map (Embree and Phillips, 2011); undated. Subdued vent morphology, degree of incision by streams, and thick loess cover away from canyon edges suggests eruption during the Olduvai normal subchron at 1.79-1.95 Ma, rather than during the Brunhes chron after 0.78 ka.

Qb **Basalt (early Pleistocene?)**—Not exposed on surface. Depicted on cross section on the basis of water wells and correlated with surface outcrop of basalt outside of map. Unit has reverse magnetic polarity.

Yellowstone Plateau Volcanic Field

Qel/Qyh, Qyh **Member B of Huckleberry Ridge Tuff (early Pleistocene)**—Compound cooling unit of crystal rich welded rhyolitic ignimbrite. Shown as *Qel/Qyh* where covered by loess. Major phenocrysts are sanidine and quartz; plagioclase and pyroxene are much sparser. Phenocrysts are abundant (20-30%) in lower parts of the unit, which consists of black basal vitrophyre overlain by grayish-brown to grayish-pink densely welded devitrified tuff with well-developed eutaxitic texture; locally grades upward into a lithophysal zone composed of closely spaced, 1 cm spherical lithophysae. The lower part of the section is as much as ~10 m (33 ft) thick and is exposed as massive blocks up to several meters in diameter. The upper part of the unit is light brownish-gray to pale pink, slabby weathering, relatively crystal poor (< 5%), moderately to poorly welded, devitrified tuff. Maximum exposed thickness of the entire unit in the map is approximately 60 m (196 ft). The Huckleberry Ridge Tuff was erupted from the Big Bend Ridge Caldera in the Yellowstone volcanic field and is divided into members A, B, and C (Christiansen, 2001). Only member B has been identified in the map. Paleomagnetic inclination and declination are anomalous (Reynolds, 1977) and correlated with the Reunion Normal-Polarity Subchron between 2.128-2.148 Ma. The mean $^{40}Ar/^{39}Ar$ age for 22 individual sanidine crystals is 2.131 ± 0.008 Ma (Ellis and others, 2012).

Tr **Rhyolite dike (Pliocene)**—Light brown rhyolite dike, consisting of clay matrix with sparse glass shards and numerous shard impressions, 3 to 5 mm; abundant pumice lapilli and lithic fragments, 2 to 7 mm; and quartz, sanidine, plagioclase and pyroxene or amphibole phenocrysts, <1 to 3 mm and totaling ~5-10%. Classified as a rhyolite based upon phenocryst mineralogy. Dike is 35 to 45 cm (14 to 18 in) thick and thins upward. It has an orientation of N50E° 88°E. There is crude vertical jointing (Figure 4). Semi-consolidated; pieces are easily broken by hand. The dike cuts tuff of unit *Tht* and is exposed at pumice quarry in SE¼ SW¼ sec. 9, T. 6 N., R. 45 E. (lat 43.8564°N., long -111.1520°W.). Many glass and pumice fragments comprising the matrix were apparently altered to clay shortly after emplacement while the adjacent ash and lapilli tuff (*Tht*), which it intruded, are not altered. The dike must have been very near the surface where the rhyolite had transitioned to an emulsion of glass shards, phenocrysts, small pumice lapilli, and lithics. Presence of relatively abundant phenocrysts contrasts sharply with phenocryst poor character of Heise *Tht* and *Thcc* units. Dated at 4.66 ± 0.01 Ma by $^{40}Ar/^{36}Ar$ (weighted average of 8 analyses; Mark Anders, written commun., 2013).

Heise Volcanic Field

Tht **Tephra (late Miocene?)**—White, gray, and reddish-brown, unwelded, generally well-sorted, ash and lapilli tuff with thin to thick parallel beds. Contains white pumice up to 30 mm, black aphyric obsidian up to 5 mm, and glass shards; crystals and lithics are absent or very sparse. Maximum thickness ~ 15 m (49 ft). Includes both air fall deposits and pyroclastic flows. Unconformably overlays Conant Creek Tuff (*Thcc*). Abrupt eastward thickening suggests deposition against topography such as eroded fault scarps. Good exposures of this unit are confined to pumice quarries east of Tetonia (NW¼ SE¼ sec. 28, T. 6 N., R. 45 E.), and south of Badger Creek (Table 3). Areas containing thick beds of *Qyh* that are underlain by this unit are landslide prone (see description of *Qls*).

Qel/Thcc, Thcc **Conant Creek Tuff (late Miocene)**—Rhyolitic densely welded ignimbrite. Light gray to pale purplish gray, devitrified, eutaxitic, locally lithophysal with spherical to irregular vapor phase lined cavities up to 5 cm in diameter. Contains very sparse, small (< 1mm) phenocrysts of quartz, sanidine and plagioclase. Generally poorly exposed, with flaggy to slabby talus covering most slopes. Relationships between *Qyh*, *Tht* and *Thcc* are shown in Figure 5. Corresponds to unit 3 from the type and reference sections of Christiansen and Love (1978). Exposures of this unit are confined to the western scarp of the Tetonia Horst, and the basal vitrophyre and underlying units recognized elsewhere are not exposed in this quadrangle. Maximum exposed thickness is about 75 m (246 ft). Reverse magnetic polarity (Morgan and McIntosh, 2005). Age reported as 5.51 ± 0.13 Ma by Morgan and McIntosh (2005), 5.97 ± 0.07 Ma by Anders and others (2009, Appendices DR2009021), and 5.70 ± 0.19 Ma by Bindeman and others (2007).

Thu **Heise Volcanic Field, undivided (Pliocene-late Miocene)**—Used only on the cross section where stratigraphic identification of units in subsurface are uncertain. On the Tetonia horst, only Conant Creek Tuff and *Tht* are present. On the northwest slopes of the Big Hole Mountains west of the map, Kilgore Tuff, a tephra similar to *Tht*, and Blacktail Creek Tuff are present and Conant Creek Tuff is absent. Faulting or non-deposition of units could be responsible for this.

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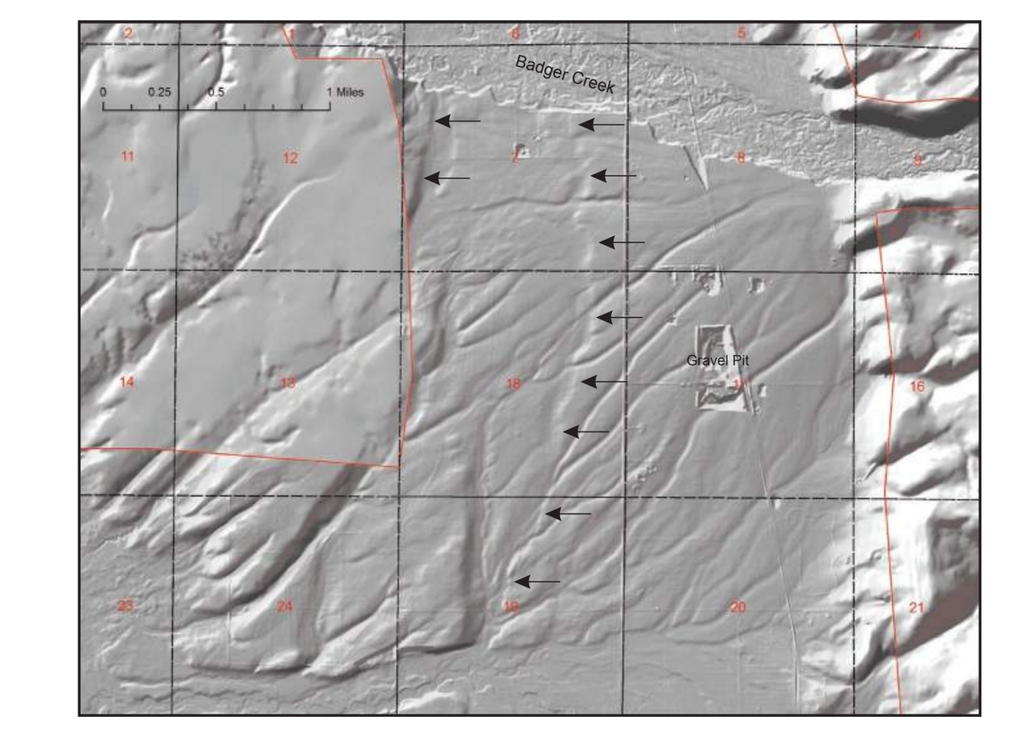

Figure 1. Hillshade image of northern portion of map produced from LiDAR and 10-m DEM. Black arrows point to 2.5 m (8.2 ft) scarps crossing the $Qafbs_1$ alluvial fan surface in secs. 7, 18, and 19, T. 6 N., R. 45 E. Red line is boundary between LiDAR and 10-m DEM. Red numbers and black dashed lines are sections.

Figure 2. View west of bluffs above Teton River (sec. 27, T. 6 N., R. 44 E., lat 43.81744°N., long 111.24072°W.) exposing section of unit $Qafw_2$. Layer S0 is surface soil with white Bk horizon. Layers S1-S3 are massive silts (loess sheets). Layers labeled GS are gravels and sands (alluvial fan deposits).

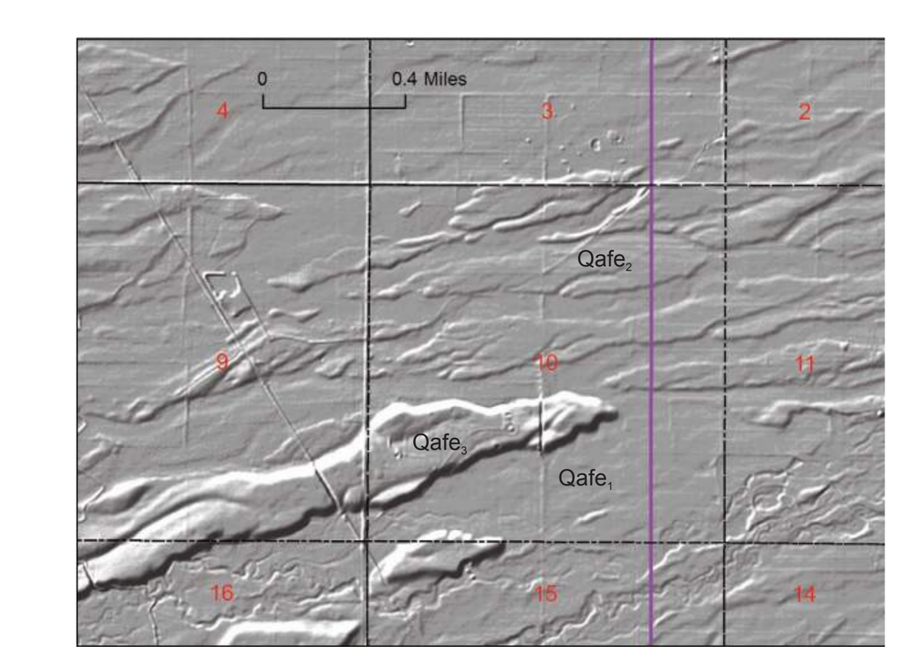

Figure 3. Hillshade image from LiDAR showing streamlined and incised alluvial fan remnants in secs. 9-11, T. 5 N., R. 45 E. Representative examples of units $Qafe_3$, $Qafe_2$, and $Qafe_1$ are labeled. Purple line is eastern boundary of the Tetonia quadrangle. Red numbers and black dashed lines are sections.

ACKNOWLEDGMENTS

Thanks to the King family and other landowners for permitting access to their property, and to Mark Anders for providing the new age estimate for the rhylolite dike.

Figure 4. View north of rhyolite dike cutting unwelded tephra (*Tht*) at King Ranch pumice pit (SE¼ SW¼ sec. 9, T. 6 N., R. 45 E. (lat 43.8564°N., long 111.1520°W.). Scale bar is 40 cm. Dike orientation is N50°E 88°E.

Figure 5. View to the north of section on north side of Badger Creek (N½ sec. 9, T. 6 N., R. 45 E.) showing relationships between *Qyh*, *Tht*, and *Thcc*.

Table 1. Paleomagnetic data for basalt samples collected in the Tetonia quadrangle (SW1/4 sec 14, T. 6 N., R. 44 E.)

Sample number	Unit name	Latitude	Longitude	n	D	I	α_{95}	R	κ	Polarity	Treatment
12P05	Qba	43.83946	-111.2335	8/8	339	55	3.5	7.972	248	N	PCA

n = number of cores used / number of cores measured.
D = site mean declination of characteristic remanent magnetization (ChRm).
I = site mean inclination of ChRM.
α_{95} = confidence limit for the mean direction at the 95% level.
κ = precision parameter.
Polarity: N = normal; R = reverse.
Treatment: method used to isolate ChRM; PCA = principal component analysis.
All analyses performed in IGS paleomagnetism laboratory.

Table 2. Major oxide and trace element chemistry of basalt samples collected in the Tetonia quadrangle (SW1/4 sec 14, T. 6 N., R. 44 E.)

Sample number	Latitude	Longitude	Unit name	Map unit	Major elements in weight percent: SiO_2	TiO_2	Al_2O_3	FeO*	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI	Sum
12P05	43.83946	-111.23351	basalt of Ard Farms	Qba	46.78	2.34	15.75	13.93	0.21	7.14	9.82	3.05	0.44	0.45	-0.23	99.69

Sample number	Trace elements in parts per million: Ni	Cr	Sc	V	Ba	Rb	Sr	Zr	Y	Nb	Ga	Cu	Zn	Pb	La	Ce	Sm	Nd	U
12P05	95	62	30	301	400	4	279	200	34	18.0	20	36	135	2	20	45	2	25	1

Major and elements are not normalized.
*Total Fe expressed as FeO.
All analyses performed at Washington State University GeoAnalytical Laboratory, Pullman, Washington.

Table 3. Measured section of unwelded tuff (unit *Tht*) in King Ranch pumice pit (SE¼ SW¼ sec. 9, T. 6 N., R. 45 E. (lat 43.8564°N., long -111.1520°W.).

Unit	Interpretation	Thickness cm (in)	Description
5	Surface soil	120 (47)	Sandy colluvial soil (very stony loam); medium brown AB horizon gradational to light gray-brown B horizon with abundant pumice and rhyolite chips 2 to 10 cm (0.8 to 4 in).
4	Pyroclastic flow	122 (48)	Reddish-brown lapilli tuff and ash with inclined thin bedding coarsening upward to lapilli pumice tuff; contains white pumice up to 20 mm, and black obsidian, 3 to 5 mm; crystals and lithics absent or very sparse; crudely bedded on scale of 10 to 20 cm (4 to 8 in). Gradational contact with unit 5.
3	Air fall	15 (6)	White ash; thin parallel bedding on scale of <1cm; sharp contact with unit 4.
2	Air fall	35 (14)	Reddish-brown to light gray-brown ash; thin parallel bedding on scale of 3 to 15 cm. Contact with unit 3 marked by thin ledge-forming gray ash bed.
1	Air fall	200 (79)	Alternating parallel beds 5 to 30 cm (2 to 12 in) of gray and brown ash and white pumice lapilli tuff; pumice up to 30 mm; obsidian, 3 to 5 mm; crystals and lithics absent or very sparse; base not exposed.

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APPENDIX D: NUTRIENT MASS BALANCE SPREADSHEETS

IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

V. 1.3 5/2/2002

This spreadsheet is based on the mass balance approach documented in: 1985.Bauman, B.J. and W.M. Schaefer.Estimating Ground-Water Quality Impacts From On-Site Sewage Treatment Systems. In Proceedings of 5th Northwest On-Site Wastewater Treatment Shortcourse, September 10-11, 1985. University of Washington, Seattle, WA. Pages 23-41. See **Instructions for Use** below.

INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	2.5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	6.98E+04	98.8
Effluent	4.14E+02	0.6
Recharge	4.07E+02	0.6
Total Water Volume	**7.06E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.6**
Current/Acceptable Lot Size (Acres)	**2.5**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	2.37E+08	92.7
Septic Tank Effluent Nitrate Mass	1.87E+07	7.3
Recharge Nitrate Mass	1.22E+05	0.0
Total Nitrate Mass	**2.56E+08**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

As values are input into the blue shaded cells the totals and percent of total for various components of the water and nitrogen budgets are calculated and shown on the *OUTPUT* side of the spreadsheet. The **Avg. Downgradient Nitrate Concentration in GW** is also calculated. The Density button allows the calculation of both the Acceptable Number of Homes in the Parcel (shown in the *INPUT* area) as well as the acceptable lot size. Clicking the Density button opens an input box that allows the input of the **Point of Compliance Nitrate Concentration Goal**. The number of homes in the parcel is then adjusted to meet the specified goal.This calculation can be redone iteratively along with changing other site input parameters to examine the resultant impact on nitrate concentrations.

Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lot 1	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

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IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

V. 1.3 5/2/2002

This spreadsheet is based on the mass balance approach documented in: 1985.Bauman, B.J. and W.M. Schaefer.Estimating Ground-Water Quality Impacts From On-Site Sewage Treatment Systems. In Proceedings of 5th Northwest On-Site Wastewater Treatment Shortcourse, September 10-11, 1985. University of Washington, Seattle, WA. Pages 23-41. See **Instructions for Use** below.

INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	2.5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	6.98E+04	98.8
Effluent	4.14E+02	0.6
Recharge	4.07E+02	0.6
Total Water Volume	**7.06E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.6**
Current/Acceptable Lot Size (Acres)	**2.5**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	2.37E+08	92.7
Septic Tank Effluent Nitrate Mass	1.87E+07	7.3
Recharge Nitrate Mass	1.22E+05	0.0
Total Nitrate Mass	**2.56E+08**	

Instructions for Use

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Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	**Site Name**
Lot 2	**Parcel Identification**
12/29/2023	**Date**
Adrienne Lemmers, PE Y2 Consultants, LLC	**Prepared By**

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IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

V. 1.3 5/2/2002

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INPUT

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Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	2.5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

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Ground Water	6.98E+04	98.8
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Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$ TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lot 3	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

V. 1.3 5/2/2002

This spreadsheet is based on the mass balance approach documented in: 1985.Bauman, B.J. and W.M. Schaefer.Estimating Ground-Water Quality Impacts From On-Site Sewage Treatment Systems. In Proceedings of 5th Northwest On-Site Wastewater Treatment Shortcourse, September 10-11, 1985. University of Washington, Seattle, WA. Pages 23-41. See **Instructions for Use** below.

INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	2.5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	6.98E+04	98.8
Effluent	4.14E+02	0.6
Recharge	4.07E+02	0.6
Total Water Volume	**7.06E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.6**
Current/Acceptable Lot Size (Acres)	**2.5**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	2.37E+08	92.7
Septic Tank Effluent Nitrate Mass	1.87E+07	7.3
Recharge Nitrate Mass	1.22E+05	0.0
Total Nitrate Mass	**2.56E+08**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

As values are input into the blue shaded cells the totals and percent of total for various components of the water and nitrogen budgets are calculated and shown on the *OUTPUT* side of the spreadsheet. The **Avg. Downgradient Nitrate Concentration in GW** is also calculated. The Density button allows the calculation of both the Acceptable Number of Homes in the Parcel (shown in the *INPUT* area) as well as the acceptable lot size. Clicking the Density button opens an input box that allows the input of the **Point of Compliance Nitrate Concentration Goal**. The number of homes in the parcel is then adjusted to meet the specified goal.This calculation can be redone iteratively along with changing other site input parameters to examine the resultant impact on nitrate concentrations.

Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	**Site Name**
Lot 4	**Parcel Identification**
12/29/2023	**Date**
Adrienne Lemmers, PE Y2 Consultants, LLC	**Prepared By**

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IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

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INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	635	Site-specific	
Parcel Area (acres)	5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	1.18E+05	99.0
Effluent	4.14E+02	0.3
Recharge	8.14E+02	0.7
Total Water Volume	**1.19E+05**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.5**
Current/Acceptable Lot Size (Acres)	**5.0**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	4.02E+08	95.5
Septic Tank Effluent Nitrate Mass	1.87E+07	4.4
Recharge Nitrate Mass	2.44E+05	0.1
Total Nitrate Mass	**4.21E+08**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

As values are input into the blue shaded cells the totals and percent of total for various components of the water and nitrogen budgets are calculated and shown on the *OUTPUT* side of the spreadsheet. The **Avg. Downgradient Nitrate Concentration in GW** is also calculated. The Density button allows the calculation of both the Acceptable Number of Homes in the Parcel (shown in the *INPUT* area) as well as the acceptable lot size. Clicking the Density button opens an input box that allows the input of the **Point of Compliance Nitrate Concentration Goal**. The number of homes in the parcel is then adjusted to meet the specified goal.This calculation can be redone iteratively along with changing other site input parameters to examine the resultant impact on nitrate concentrations.

Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lot 5	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

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INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	635	Site-specific	
Parcel Area (acres)	5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	1.18E+05	99.0
Effluent	4.14E+02	0.3
Recharge	8.14E+02	0.7
Total Water Volume	**1.19E+05**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.5**
Current/Acceptable Lot Size (Acres)	**5.0**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	4.02E+08	95.5
Septic Tank Effluent Nitrate Mass	1.87E+07	4.4
Recharge Nitrate Mass	2.44E+05	0.1
Total Nitrate Mass	**4.21E+08**	

Instructions for Use

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Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lot 6	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

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IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

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INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	6.98E+04	98.3
Effluent	4.14E+02	0.6
Recharge	8.14E+02	1.1
Total Water Volume	**7.10E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.6**
Current/Acceptable Lot Size (Acres)	**5.0**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	2.37E+08	92.6
Septic Tank Effluent Nitrate Mass	1.87E+07	7.3
Recharge Nitrate Mass	2.44E+05	0.1
Total Nitrate Mass	**2.56E+08**	

Instructions for Use

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Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lot 7	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

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INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	6.98E+04	98.3
Effluent	4.14E+02	0.6
Recharge	8.14E+02	1.1
Total Water Volume	**7.10E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.6**
Current/Acceptable Lot Size (Acres)	**5.0**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	2.37E+08	92.6
Septic Tank Effluent Nitrate Mass	1.87E+07	7.3
Recharge Nitrate Mass	2.44E+05	0.1
Total Nitrate Mass	**2.56E+08**	

Instructions for Use

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Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lot 8	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

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INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	3.5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	

Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	6.98E+04	98.6
Effluent	4.14E+02	0.6
Recharge	5.70E+02	0.8
Total Water Volume	**7.08E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.6**
Current/Acceptable Lot Size (Acres)	**3.5**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	2.37E+08	92.7
Septic Tank Effluent Nitrate Mass	1.87E+07	7.3
Recharge Nitrate Mass	1.71E+05	0.1
Total Nitrate Mass	**2.56E+08**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

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Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	**Site Name**
Lot 9	**Parcel Identification**
12/29/2023	**Date**
Adrienne Lemmers, PE Y2 Consultants, LLC	**Prepared By**

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INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	5	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	6.98E+04	98.3
Effluent	4.14E+02	0.6
Recharge	8.14E+02	1.1
Total Water Volume	**7.10E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.6**
Current/Acceptable Lot Size (Acres)	**5.0**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	2.37E+08	92.6
Septic Tank Effluent Nitrate Mass	1.87E+07	7.3
Recharge Nitrate Mass	2.44E+05	0.1
Total Nitrate Mass	**2.56E+08**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

As values are input into the blue shaded cells the totals and percent of total for various components of the water and nitrogen budgets are calculated and shown on the *OUTPUT* side of the spreadsheet. The **Avg. Downgradient Nitrate Concentration in GW** is also calculated. The Density button allows the calculation of both the Acceptable Number of Homes in the Parcel (shown in the *INPUT* area) as well as the acceptable lot size. Clicking the Density button opens an input box that allows the input of the **Point of Compliance Nitrate Concentration Goal**. The number of homes in the parcel is then adjusted to meet the specified goal.This calculation can be redone iteratively along with changing other site input parameters to examine the resultant impact on nitrate concentrations.

Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lot 10	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

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IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

V. 1.3 5/2/2002

This spreadsheet is based on the mass balance approach documented in: 1985.Bauman, B.J. and W.M. Schaefer.Estimating Ground-Water Quality Impacts From On-Site Sewage Treatment Systems. In Proceedings of 5th Northwest On-Site Wastewater Treatment Shortcourse, September 10-11, 1985. University of Washington, Seattle, WA. Pages 23-41. See **Instructions for Use** below.

INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	10	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	900	300	Provide Justification
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	6.98E+04	96.0
Effluent	1.24E+03	1.7
Recharge	1.63E+03	2.2
Total Water Volume	**7.27E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	4.4
Avg. Downgradient Nitrate Concentration in GW (mg/l)	4.0
Current/Acceptable Lot Size (Acres)	10.0

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	2.37E+08	80.8
Septic Tank Effluent Nitrate Mass	5.60E+07	19.0
Recharge Nitrate Mass	4.88E+05	0.2
Total Nitrate Mass	**2.94E+08**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

As values are input into the blue shaded cells the totals and percent of total for various components of the water and nitrogen budgets are calculated and shown on the *OUTPUT* side of the spreadsheet. The **Avg. Downgradient Nitrate Concentration in GW** is also calculated. The Density button allows the calculation of both the Acceptable Number of Homes in the Parcel (shown in the *INPUT* area) as well as the acceptable lot size. Clicking the Density button opens an input box that allows the input of the **Point of Compliance Nitrate Concentration Goal**. The number of homes in the parcel is then adjusted to meet the specified goal.This calculation can be redone iteratively along with changing other site input parameters to examine the resultant impact on nitrate concentrations.

Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lots 1, 2 and 7 combined	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

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IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

V. 1.3 5/2/2002

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INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	660	Site-specific	
Parcel Area (acres)	20	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	4.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	1.23E+05	96.2
Effluent	1.66E+03	1.3
Recharge	3.26E+03	2.5
Total Water Volume	**1.28E+05**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.9**
Current/Acceptable Lot Size (Acres)	**5.0**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	4.18E+08	84.7
Septic Tank Effluent Nitrate Mass	7.46E+07	15.1
Recharge Nitrate Mass	9.77E+05	0.2
Total Nitrate Mass	**4.93E+08**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

As values are input into the blue shaded cells the totals and percent of total for various components of the water and nitrogen budgets are calculated and shown on the *OUTPUT* side of the spreadsheet. The **Avg. Downgradient Nitrate Concentration in GW** is also calculated. The Density button allows the calculation of both the Acceptable Number of Homes in the Parcel (shown in the *INPUT* area) as well as the acceptable lot size. Clicking the Density button opens an input box that allows the input of the **Point of Compliance Nitrate Concentration Goal**. The number of homes in the parcel is then adjusted to meet the specified goal.This calculation can be redone iteratively along with changing other site input parameters to examine the resultant impact on nitrate concentrations.

Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$
TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lots 5, 6, 9 & 10	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

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IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

V. 1.3 5/2/2002

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INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	375	Site-specific	
Parcel Area (acres)	10	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	3.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	

Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	6.98E+04	96.0
Effluent	1.24E+03	1.7
Recharge	1.63E+03	2.2
Total Water Volume	**7.27E+04**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**4.0**
Current/Acceptable Lot Size (Acres)	**3.3**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	2.37E+08	80.8
Septic Tank Effluent Nitrate Mass	5.60E+07	19.0
Recharge Nitrate Mass	4.88E+05	0.2
Total Nitrate Mass	**2.94E+08**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

As values are input into the blue shaded cells the totals and percent of total for various components of the water and nitrogen budgets are calculated and shown on the *OUTPUT* side of the spreadsheet. The **Avg. Downgradient Nitrate Concentration in GW** is also calculated. The Density button allows the calculation of both the Acceptable Number of Homes in the Parcel (shown in the *INPUT* area) as well as the acceptable lot size. Clicking the Density button opens an input box that allows the input of the **Point of Compliance Nitrate Concentration Goal**. The number of homes in the parcel is then adjusted to meet the specified goal.This calculation can be redone iteratively along with changing other site input parameters to examine the resultant impact on nitrate concentrations.

Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$ TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Lots 3, 4 & 8	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

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IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET

V. 1.3 5/2/2002

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INPUT

Water Budget	Input Value	Default Value	
Hydraulic Conductivity (ft/day)	80.000	Site-specific	
Hydraulic Gradient	0.015	Site-specific	
Mixing Zone Thickness (ft)	15	15	Default
Aquifer Width Perpendicular to Flow (ft)	1520	Site-specific	
Parcel Area (acres)	40	Site-specific	
Percent of Parcel That Is Impervious (Percent)	4	Site-specific	
Current/Acceptable Number of Homes in Parcel	10.0	Site-specific	
Septic Tank Effluent (gallons/d/home)	300	300	Default
Natural Recharge rate (inches/yr)	1.65	Site-specific	
Nitrogen Budget (all concentrations represent nitrate nitrogen)			
Upgradient Ground Water Concentration (mg/l)	3.4	Site-specific	
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	Default
Denitrification Rate (decimal fraction)		0	Default
Nitrate in Natural Recharge (mg/l)	0.3	0.3	Default

OUTPUT

Yearly Water Budget	Volume (m^3)	% of Total
Ground Water	2.83E+05	96.4
Effluent	4.14E+03	1.4
Recharge	6.51E+03	2.2
Total Water Volume	**2.94E+05**	

Point of Compliance Nitrate Concentration Goal (mg/l)	**4.4**
Avg. Downgradient Nitrate Concentration in GW (mg/l)	**3.9**
Current/Acceptable Lot Size (Acres)	**4.0**

Yearly Nitrogen Budget	Mass (mg)	% of Total
Background GW Nitrate Mass	9.62E+08	83.6
Septic Tank Effluent Nitrate Mass	1.87E+08	16.2
Recharge Nitrate Mass	1.95E+06	0.2
Total Nitrate Mass	**1.15E+09**	

Instructions for Use

Input parameter values appropriate to conditions at the site under consideration are entered in the blue shaded cells on the *INPUT* side of the spreadsheet. These input values form the basis for calculating yearly water and nitrogen budgets. Default values for selected parameters are provided, as described in the accompanying N-P guidance. Selecting values other than these defaults will require providing adequate justification. Sources of water and nitrogen include ground water inflow from upgradient, natural recharge on pervious portions of the site, and from septic tank effluent. The total yearly nitrogen mass input is then divided by the total yearly volume of water available to recharge groundwater to arrive at an estimated **Average Downgradient Nitrate Concentration in GW** (shown in the *OUTPUT* side of the spreadsheet).

As values are input into the blue shaded cells the totals and percent of total for various components of the water and nitrogen budgets are calculated and shown on the *OUTPUT* side of the spreadsheet. The **Avg. Downgradient Nitrate Concentration in GW** is also calculated. The Density button allows the calculation of both the Acceptable Number of Homes in the Parcel (shown in the *INPUT* area) as well as the acceptable lot size. Clicking the Density button opens an input box that allows the input of the **Point of Compliance Nitrate Concentration Goal**. The number of homes in the parcel is then adjusted to meet the specified goal.This calculation can be redone iteratively along with changing other site input parameters to examine the resultant impact on nitrate concentrations.

Aquifer Width Perpendicular to Flow: For land development projects not completely oriented perpendicular to ground water flow, the site specific aquifer width value is determined using the average property width that is perpendicular to flow.

Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)	
Silt and sandy silt	0.003 to 0.3
Silty sands and fine sands	0.03 to 3
Well-sorted sands and glacial outwash	3 to 300
Well-sorted gravel	30 to 3000
Typical Range of Hydraulic Gradient	0.0001 to 0.1

Natural Recharge Rate (NRR) can be estimated from total annual precipitation (TAP) using the equation: NRR (inches/yr) = $(TAP)^2 * 0.0046$ TAP is input in inches/yr.

SITE INFORMATION

Irish Acres Subdivision	Site Name
Entire Property	Parcel Identification
12/29/2023	Date
Adrienne Lemmers, PE Y2 Consultants, LLC	Prepared By

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