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# LEVEL I NUTRIENT/PATHOGEN EVALUATION FOR J & G PEACOCK RANCH SUBDIVISION

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March 6, 2023

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Appendix A – Aerial Photography of Project Vicinity 1994 through 2021

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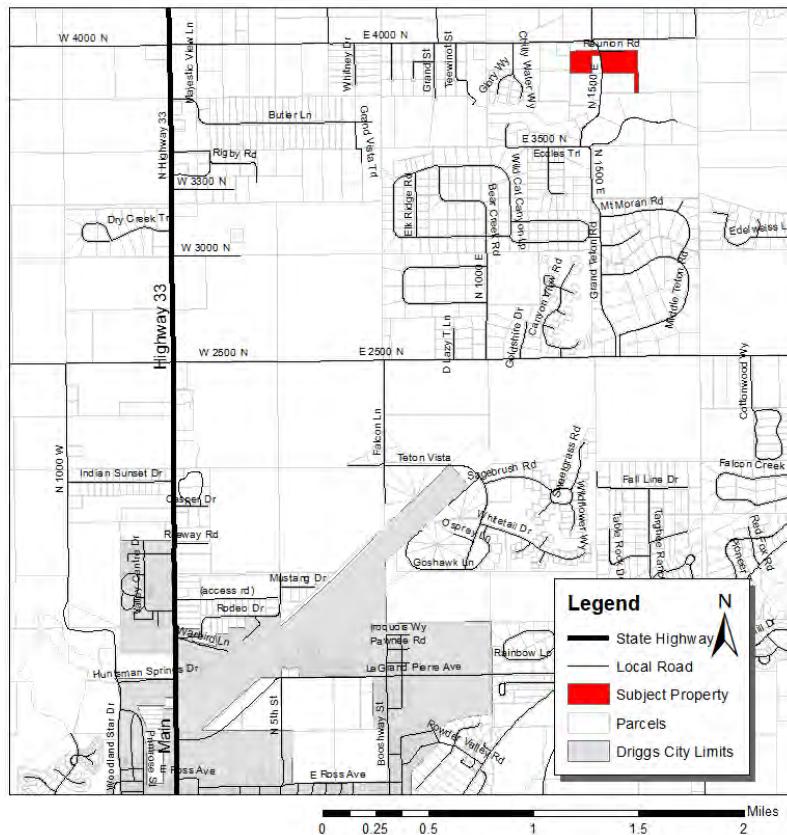
Appendix E – NP Mass Balance Spreadsheets

# I. INTRODUCTION

## I.1 PROJECT DESCRIPTION

The proposed J&G Peacock Ranch Subdivision is located off County Road West 4000 North, 1.5 miles northwest of Driggs, in Teton County, Idaho (Figure 1). More specifically it is a part of the NE ¼, Section 7, Township 5 North, Range 46 East, Boise Meridian, Teton County, Idaho. The adjacent properties are sparsely developed. Average density of single family houses (some with guest houses) is 13.7 acres per main residence, with a range of 1.79 acres up to 51 acres for the nine properties adjoining this subdivision.

The proposed project site includes 20.69 acres of land that will be subdivided into five (5) lots varying in size from 3.3-acres to 6.58-acres (Figure 2). Although not within the property boundaries, proximity to Dry Creek causes a portion of proposed Lot 5 to be within Teton County’s Wetlands and Waterways Overlay, as well as within both the current and proposed Zone A flood hazard area. In accordance with Teton County Land Development Code, Section 6-6, a nutrient/pathogen (NP) study is required to evaluate the impact to groundwater and surface water quality due to on-site sewage disposal from the proposed development.



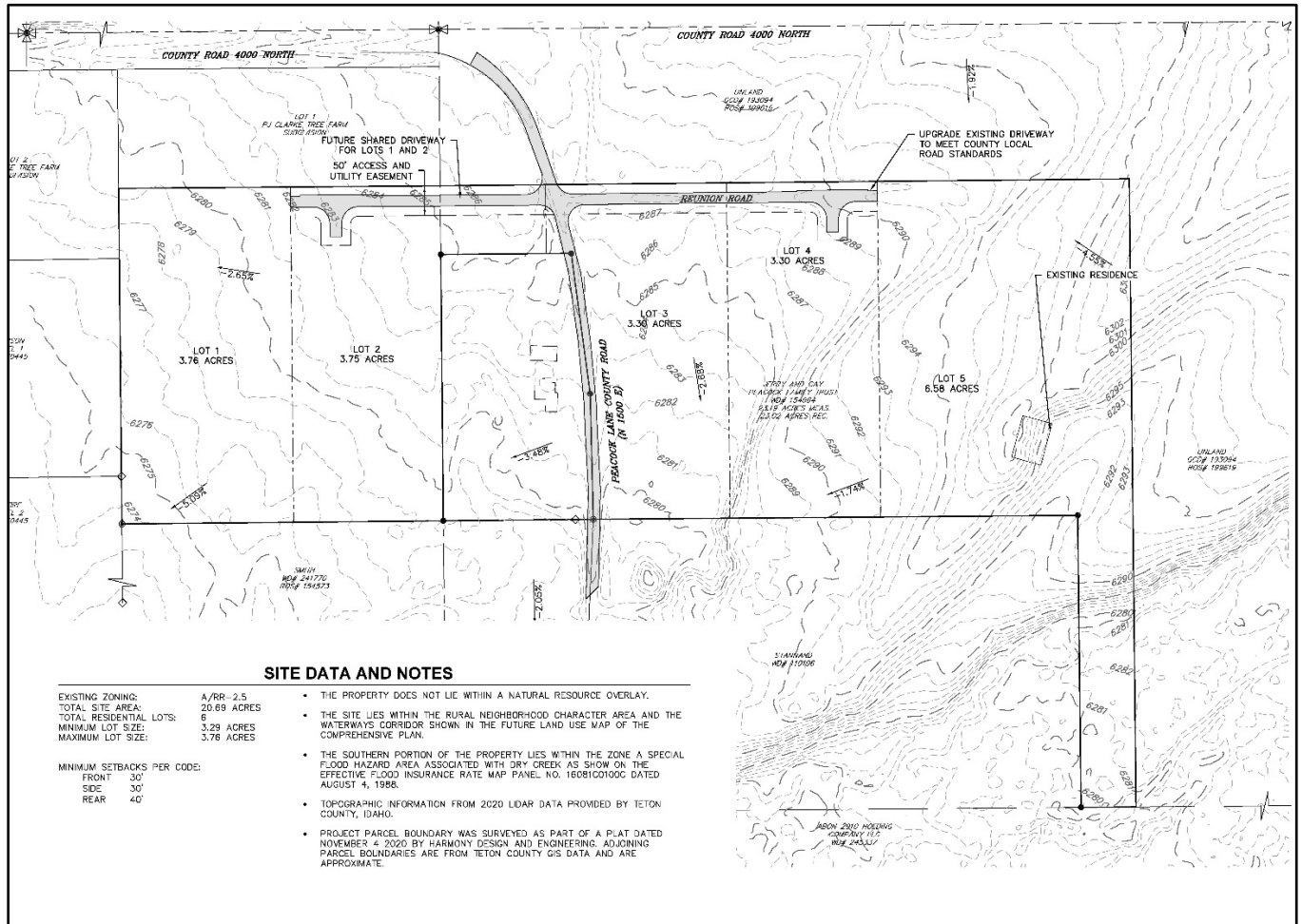


Figure 2. Concept Site Plan

## 1.2 STUDY OBJECTIVES

The objective of this Level I Nutrient-Pathogen (NP) Evaluation is to evaluate the impact of proposed on-site septic systems to groundwater and surface water quality and determine if a more detailed Level II study is warranted. The site does not lie within a Nitrate Priority Area identified by Idaho Department of Environmental Quality (DEQ, 2019). A Level I NP Evaluation takes into consideration the hydrogeologic conditions of a site, and the results help determine the appropriate number, type, and location of on-site wastewater treatment systems for a proposed development (DEQ, 2002). The NP Evaluation is a tool to help guide development to minimize adverse impacts to groundwater and surface water quality. This report presents the methods and findings of the Level I NP evaluation for the proposed J&G Peacock Ranch Subdivision.

## **2. GEOLOGIC AND HYDROLOGIC SETTING**

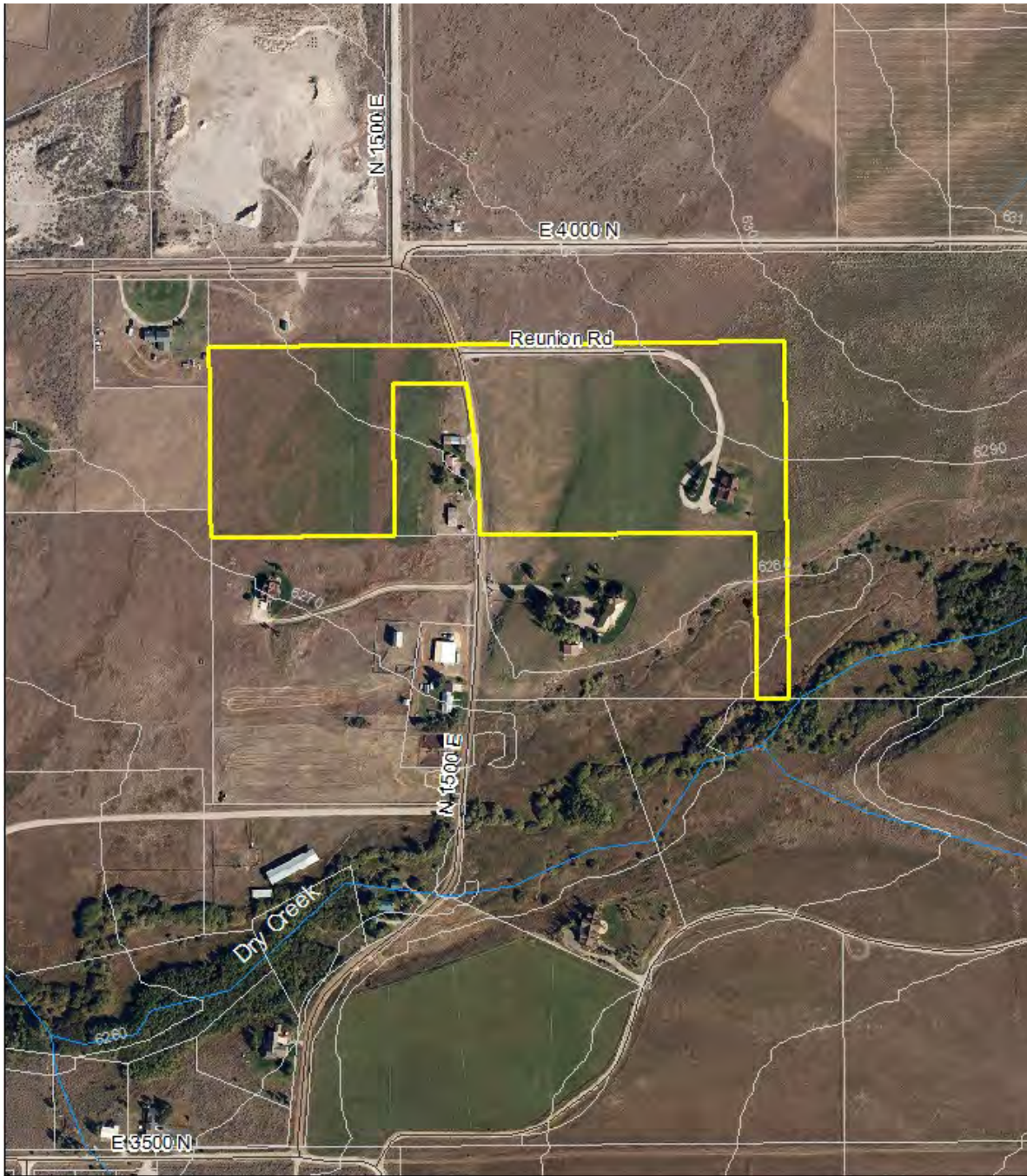
### **2.1 SURFACE HYDROLOGY**

Excess storm water and snowmelt runoff from the site will generally drain from the northeast to the southwest according to the prevailing mild grades. No irrigation ditches or discernable natural drainages are present. The ground slope on the property is generally mild and ranges from 1 to 4%, with one steeper north-to-south trending grade break that drops approximately 5 feet, producing slopes of about 15%. There is an existing road, County Road North 1500 East, which bisects the proposed subdivision, creating a drainage divide.

There are no surface water bodies within the property, however, Dry Creek is approximately 30 feet from the southeast corner of the property, and a portion of its floodplain and riparian zone is contained onsite. The site lies at an elevation around 15 to 20 feet above the banks of Dry Creek, when compared along a line directly south.

The average annual precipitation at the site is estimated to be 21 inches, inferred from Figure 4 of the Nicklin study (Nicklin, 2002). The property has been routinely irrigated and farmed for at least several decades, as evidence in aerial photography (presented in Appendix A).

Groundwater flowing beneath the proposed subdivision is not likely to discharge into the creek, as supported by evidence of water levels in nearby wells. This conclusion is further discussed in Section 2.4.



*Figure 3. Aerial Photo with Topographic Contour Overlay (not to scale)*

## 2.2 VEGETATION AND SOILS

The existing vegetation on the property consists of irrigated agricultural pastureland and some lawn and landscape shrubs close to the existing house on proposed Lot 5. Anticipated vegetation will consist of additional lawn, landscape trees, and shrubs typical of residential landscaping as well as a smaller area of cultivated agricultural fields. Management of agriculture on each lot will depend on each property owner's inclinations, and potentially also by covenants placed on the property and their enforcement.

Soil information was obtained from a customized soil survey report from the Natural Resources Conservation Service (NRCS). The NRCS custom soils report was generated using an automated tool available on their website. The NRCS is responsible for investigating, documenting, and classifying soils, as well as publishing and promoting the use of this information nationwide. The NRCS soil survey reports that slightly more than half (55%) of the soil onsite is Alpine-St Anthony complex, with 39.9% comprised of Altaby-Alpine complex, and the remaining 4.2% Badgerton-Arimo complex. (Figure 4). The Alpine-St. Anthony complex belong to hydrologic group B as defined by the NRCS, and it is well drained with moderate to high rates of water transmission. It is characterized by a fairly uniform profile of gravelly loam to extremely gravelly loamy sand or sandy loam.

The Atalby-Alpine complex belongs to hydrologic group C and is classified as well drained with a moderately high to high capacity of the most limiting layer to transmit water. It is characterized by silt loam transitioning to extremely gravelly silt loam to 60 inches deep. The Badgerton-Arimo complex belongs to hydrologic soil group B and is well drained. It also has moderately high to high capacity of the most limiting layer to transmit water. The Badgerton-Arimo is characterized by 0-9 inches of loam above very gravelly and extremely gravelly loam and sand to approximately 30 inches. Extremely gravelly loamy coarse sand exists along with extremely gravelly sandy loam and extremely gravelly sand to 60 inches, with the Alpine member containing gravel from 51 to 60 inches.

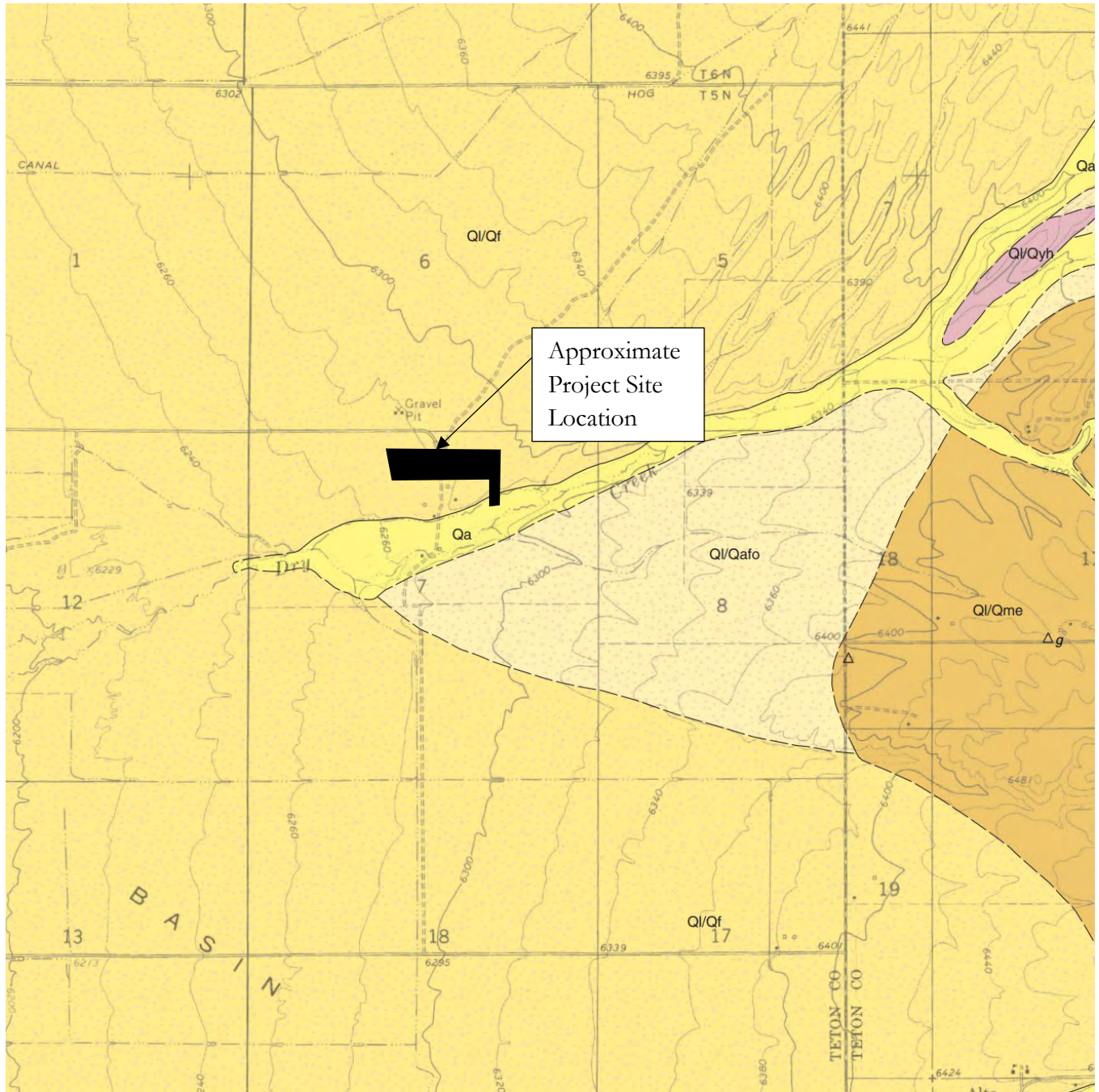
The soils mapped on the site are predicted to exhibit "very limited" rating for septic leach fields due mainly to bottom layer seepage and filtering capacity. Detailed soil information from the Web Soil Survey by the NRCS (US Department of Agriculture, 2019) is included in Appendix B. The NRCS descriptions were aligned reasonably with the surficial geology mapping (see Section 2.3) and generally were confirmed by the test pits (see Section 3.1).



*Figure 4. NRCS Soil Map  
(See also Appendix A)*

### 2.3 GEOLOGY

The geology of the site consists of alluvial fan sedimentary deposits of the Holocene to Late Pleistocene period as shown on the Geologic Map of the Clawson Quadrangle, Teton County, Idaho (Figure 5). The site lies entirely in the Q1Qf<sub>1</sub>, where the alluvial fan is overlain by loess, and it is adjacent to Holocene alluvium from the Dry Creek drainage to the south (Embree, 2014). The driller's logs discussed in the next section, and provided in Appendix C, give direct indications relevant to subsurface geology.



*Figure 5. Excerpt from Geologic Map of the Clawson Quadrangle  
Teton County, Idaho and Teton County, Wyoming*

## 2.4 AQUIFER

Within the two quarter-quarter sections of the proposed subdivision and the 10 adjacent quarter-quarter sections, 26 wells are indicated on the Idaho Department of Water Resources well location

mapping tool. Until recently, drillers were only required to report a well's drilled location to the nearest quarter-quarter, so often these are displayed by the mapping tool in the geometric center of their applicable quarter-quarter, sometimes with several overlapping in one location. It was also suspected that several wells had incorrect locations reported. Using aerial photography obtained from Google Earth Pro, with usable imagery dating back to 1994, as well as parcel information obtained from the Teton County GIS site and links, 15 wells within the 12 relevant quarter-quarter sections could be associated to an approximate location with high confidence. These wells are shown in Figure 6 with their corresponding well ID number displayed. The corresponding well logs filed by the driller, as well as relevant property ownership records obtained, are included in Appendix C.

Well driller filings show that the static groundwater level ranges from 43-feet to 120-feet below the ground surface for wells selected for consideration in this study. Within these logs two primary formation units are indicated: an unconsolidated upper zone of mixed cobbles, gravel, sand and clay, overlying a fractured bedrock lower zone. The contact depth between these two zones is revealed in the wells drilled at locations where the upper zone presumably did not yield sufficient water to supply a single domestic residence. For these wells, drilling proceeded down into the lower, consolidated zone, until adequate fractures were encountered to serve as an adequate water supply source. In these wells, casing was advanced into the bedrock, preventing connection with the upper, unconsolidated zone. Most completions were open-hole type, with no screens or casing perforations installed.

Wells completed in fractured bedrock reported appreciable strata of clays alternating with coarser deposits. Saturated strata were reported above the bedrock contact, and wells completed in the lower fractured bedrock often showed static water levels reaching depths that corresponded to the reports of first water encountered in the unconsolidated zone. Wells were drilled to depths of 80-ft to 220-ft. Well driller reports are included in Appendix B.

Wells completed in the bedrock formation appear to align with an east/west trend, while shallower, unconsolidated formation wells generally are found to the north and south of this trend.

The understanding that may be inferred from this evidence is that in locations closer to the subject site and to the east and west of it, the aquifer starts in the fractured bedrock, with higher saturated layers unable to supply sufficient water to be usable. In locations further northwest and southwest, wells generally are completed within the unconsolidated zone, indicated that ample interconnected coarse deposits exist to qualify as the uppermost aquifer. While a general geographic trend can be observed, there was insufficient information to better define a horizontal boundary between these two aquifer types.

### **Hydraulic Gradient**

The hydraulic gradient is the difference between two or more hydraulic head measurements over the length of the flow path. Hydraulic head includes a velocity component and a potentiometric (water level) component. Assuming the velocity is similar throughout the aquifer or has a negligible effect on the total hydraulic head, the hydraulic gradient can be determined from maps of equal potentiometric head.

While Nicklin prepared such a map for the published modeling effort, Cosgrove and Taylor evaluated that map, and concluded that the Kilburn map prepared in 1964 remained a more plausible representation of the gradient of the uppermost aquifer layer in the valley. This report relies on the Kilburn map as recommended by Cosgrove and Taylor when conducting Nutrient-Pathogen evaluations. Aquifer gradient magnitude and direction were determined by overlaying Kilburn's lines of equipotential shown at 50' intervals on top of the project boundary map. The gradient produced in this manner is 0.025, in a direction that is 34 degrees south of west. The width of aquifer below the project site perpendicular to this gradient is 1,367 feet, which omits the 93-foot wide strip of area running south along the eastern property boundary. That strip is not considered developable due to setback constraints, and its inclusion was considered to unreasonably skew the level 1 analysis.

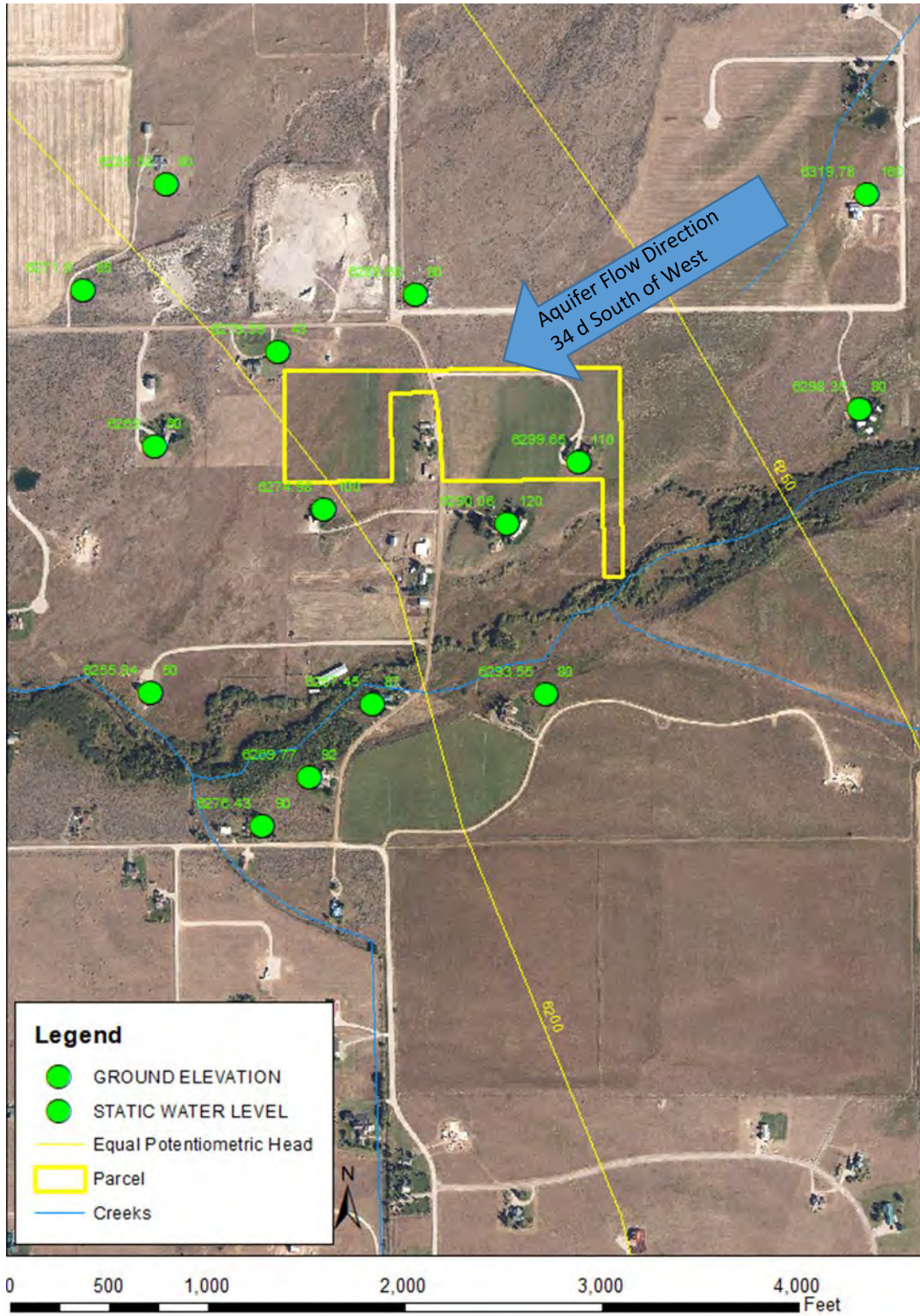


Figure 6. Existing Wells and Potentiometric Map

### **Hydraulic Conductivity**

Saturated hydraulic conductivity ( $K_{sat}$ ) is a measure of the ease with which water flows through the materials that make up the aquifer. Hydraulic conductivity is highly variable, and values can be estimated in the field using well pump tests or in the lab using empirical formulas related to grain size distribution. However, no record has been found of any conductivity investigations or grain size distribution analysis on wells in the study area.

Hydraulic conductivity for fractured rock, clay and gravels aquifers can range from  $10^{-4}$  to 1000 ft/day (Heath, 2004), (Domenico & Schwartz, 1990). Groundwater studies in the area include those by Nicklen (Nicklin Earth & Water, Inc., 2003), Kilburn (Kilburn, 1964), and Cosgrove & Taylor (Cosgrove & Taylor, 2007).

Cosgrove & Taylor evaluated the conductivity distribution published in the Nicklin model and prepared their own map of value ranges assigned to geographic areas in the valley. Description of their methods is presented on page 11 of their report, and the corresponding figure is reproduced below with this subject site indicated. The proposed J&G Peacock Ranch subdivision falls within an area of conductivity ranging from 21.5 to 31.5 feet per day.

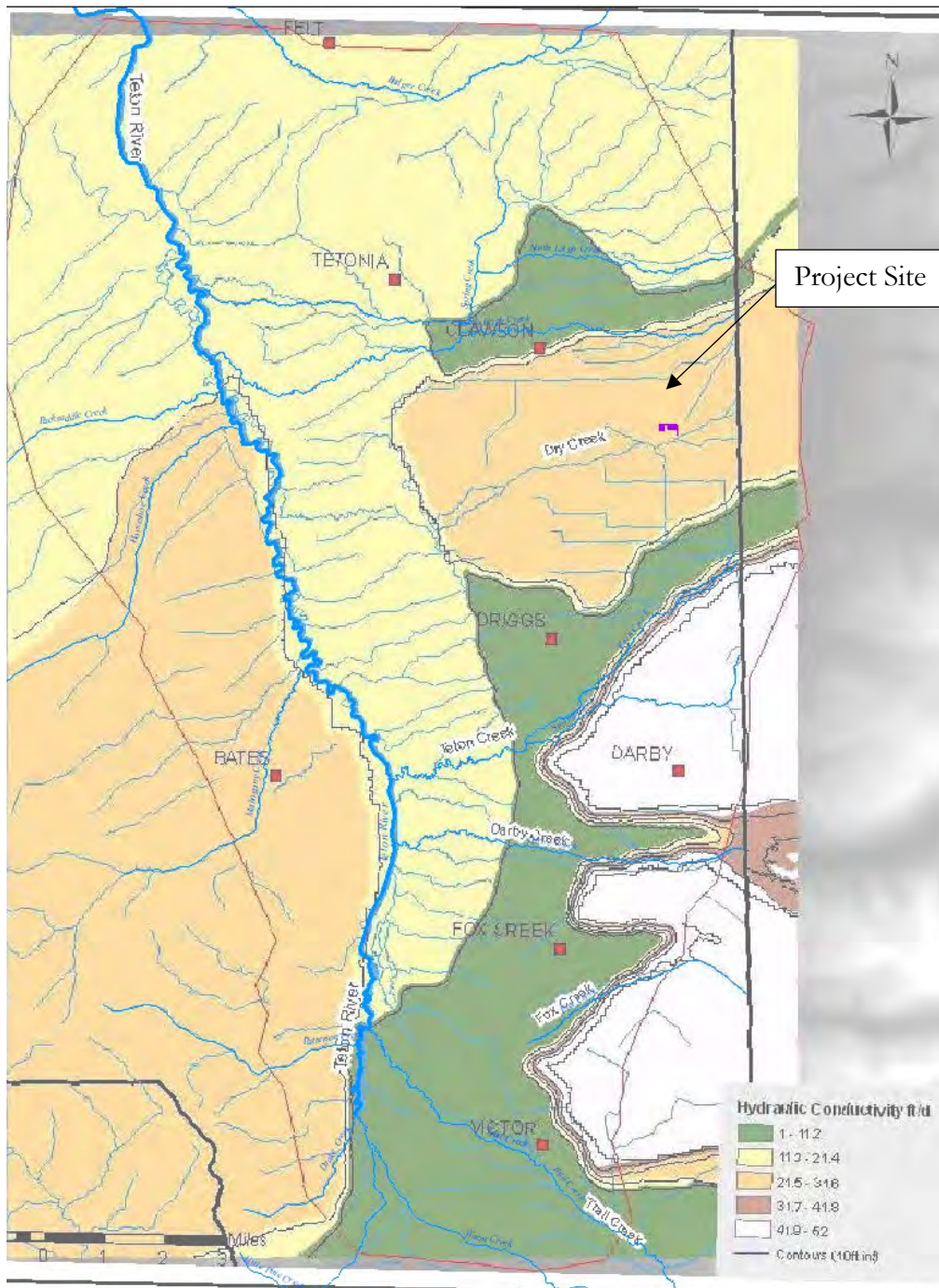


Figure 7. Hydraulic Conductivity Map from Cosgrove & Taylor (2007)

### **3. FIELD INVESTIGATION**

#### **3.1 TEST PITS**

An on-site evaluation of the soils was conducted by Eastern Idaho Public Health (EIPH) in July 2022. A total of four test pits were excavated. Soils observed on the site are consistent with the NRCS Soil Survey data and were consistent across the site. Soils included silt loam top soil with gravely sand and 65 to 70% rock content including gravel and cobbles. There was no evidence of groundwater or bedrock to a depth of 10-ft bgs. The soils present were classified as Design Group B-2 (sandy loam) and A2A (loamy sand) for septic leachfield design by EIPH.



*Figure 8. Test Pit Excavation*

### 3.2 PATHOGEN TRANSPORT

Pathogens are biological disease-causing agents such as bacteria, viruses, and fungi. Two factors that determine whether groundwater will be contaminated by pathogens are the ability of the organisms to survive and the availability of adequate transport mechanisms. Survival times and transport distances are affected by many conditions, such as soil properties, saturation levels, and pathogen characteristics. Environmental conditions such as high organic matter content, lower temperatures, and high moisture content favor longer survival times for pathogens (Teutsch, 1991). The presence of an adequate vadose zone is very important for bacteria and virus removal. Therefore, minimum separation distances from the bottom of the drainfield to normal high groundwater is specified in the *Technical Guidance Manual* (DEQ, 2020) and ranges, depending on soil type, from 3- to 6-feet for a standard drainfield.

Bacteria is primarily removed from effluent through filtration processes in the biomat (infiltration) zone that forms at the interface of the infiltration trench and the natural soil. With a mature biomat in place, most bacteria are removed within the first 1-foot vertically or horizontally from the trench-soil interface (University of Wisconsin, 1978), and studies of the movement of fecal coliform from a septic tank system through undisturbed soil have shown that there is limited mobility and survival of fecal coliform 1- to 2-years after system start up (Brown, 1988). The vadose (unsaturated) zone located below the infiltration zone is also very important for slowing bacteria travel time, providing aeration, and facilitating bacteria die-off. Within 2- to 5-feet of unsaturated, aerobic soil, most if not all fecal indicators are retained or killed-off, and biochemical oxygen demand is removed (U.S. Environmental Protection Agency, 2002). Since viruses are smaller than bacteria, their primary removal mechanism is through adsorption to soil particles, which also occurs primarily in the vadose zone.

Transport modeling of pathogens has been attempted using mathematical advection and dispersion models. However, organisms do not behave like dissolved contaminants and these models do not take into consideration changes in porosity and permeability due to the presence of bacteria and viruses. Therefore, as stated in the NP Evaluation guidelines (DEQ, 2002), pathogen transport modeling is difficult to achieve with enough certainty to be useful and a pathogen transport model has not been developed as part of this study. Instead, recommendations for drainfield design are included in Section 6 of this report to help ensure that pathogen removal is sufficient to prevent groundwater contamination.

The driller's logs for this vicinity do indicate appreciable depths of unsaturated soil column (ranging from 43 feet to 125 feet deep) that can act as a functional removal mechanism for pathogens. Many logs report layers of clays intermixed with coarser deposits, and these are especially effective for this process.

### 3.3 PHOSPHOROUS TRANSPORT

Phosphorous is a contributor to eutrophication and consequent depletion of dissolved oxygen in surface water and thus, is a chemical of concern if there is a possible connection between subsurface water and surface water. Phosphorous in septic effluent originates from detergents and human excreta (Brown, 1988). Phosphorous can easily be retained in the underlying soils through chemical precipitation, ion exchange, plant uptake, and adsorption and thus, is not usually transported through soil to groundwater. The depth of unsaturated soils in vicinity of the property range from 43 to 125 feet. The drilling logs show a mixture of coarse materials as well as frequent clay-rich strata. Clays in particular are effective at sequestering dissolved phosphorus species, so it is reasonable to conclude that phosphorus concentrations in the groundwater will not be increased.

The depth of the saturated zone as exhibited in the drillers logs indicates that groundwater does not discharge into Dry Creek along the reach in proximity to the study site. This is best exemplified by the wells in located in the SENW, SWNE, NENW and NWNE quarter-quarters of Section 7. For these wells most closely adjacent to Dry Creek, static water levels reported by the driller range from 50 to 120 feet below ground surface (at their respective locations), with the average depth of 91 feet. Additionally, the onsite test pits did not show seasonal high groundwater on the site. This combined with the well data indicates that Dry Creek in the vicinity of this project is a losing reach and that water flows from the stream to groundwater and there is no flow from subsurface water to surface water. Without the potential to discharge into this surface water body, there is no mechanism for transport or contamination by phosphorus.

### 3.4 NITROGEN TRANSPORT

In contrast to phosphorous, which interacts strongly with soils, the nitrate anion ( $\text{NO}_3^-$ ) is mobile and chemically conservative in groundwater transport. Conventional septic tank/ leach field systems typically achieve 10 to 20% removal rates (U.S. Environmental Protection Agency, 2002). Human health effects are primarily observed when young infants consume baby formula prepared using water containing elevated nitrate concentrations resulting in a serious conditions termed methomoglobinemia. For this reason, the EPA's primary maximum contaminant level for nitrate in drinking water is set at 10mg/L (measured as N-nitrogen).

Dissolved nitrate, along with phosphorus already discussed, can behave as a nutrient for plants and algae. If the affected environment was otherwise limited in nitrogen sources, then excessive plant growth can result from higher nitrate concentrations. Thus, nitrate (measured as nitrogen) is a substance of concern in wastewater system effluent because of its mobility and its potential negative impact on public health.

As presented in guidance from DEQ an increase of 1.0 mg/L nitrate, or less, predicted to occur in the aquifer downstream of the project boundary is considered to be a negligible impact (DEQ, 2002). Nitrate transport was evaluated to the drinking water aquifer using a DEQ developed Level 1

mass balance spreadsheet. The nitrate mass balance spreadsheet is included in Appendix D and the results are summarized in the next section.

## **4. ANALYSIS AND RESULTS**

### **4.1 PATHOGEN TRANSPORT ANALYSIS**

As discussed in the previous section, pathogen transport modeling is too uncertain to be useful and was not conducted as part of this study. However, properly designed and maintained septic and drain field systems are very effective in removing pathogens, and design recommendations in Section 6 will help prevent pathogen contamination.

### **4.2 PHOSPHOROUS TRANSPORT ANALYSIS**

All indications from the drilling logs and site topography indicate that Dry Creek in this vicinity is a losing reach. The elevation of the water table is too low to provide the necessary flow component for any contaminant transport, phosphorus or otherwise, from on-site septic systems to seep into the bed or banks of the sole water body in this vicinity. Thus, phosphorous transport was not conducted as part of this study.

### **4.3 NITROGEN TRANSPORT ANALYSIS**

In accordance with the DEQ NP Evaluation program guidance (DEQ, 2002), compliance boundaries that should be considered include:

- 1) Individual lot boundaries (when non-central water supply wells are used)
- 2) Downgradient boundary of the overall subdivision or development (when a centralized or community water system is used)
- 3) Surface water bodies (when subsurface conditions result in a hydraulic connection between impacted groundwater and a surface water body within the boundary of the development)

The upper water bearing aquifer generally flows in a westerly/southwesterly direction, and locations of down-gradient drinking water wells are located west and south of the site. Thus, the groundwater compliance boundaries that meet 1, 3, and 4 above are the western and southern property boundaries.

### ***Groundwater Compliance Boundary Evaluation***

Potential nitrate contamination to the water bearing aquifer was evaluated using the Level I nitrogen mass balance spreadsheet provided by Idaho DEQ as part of their NP Evaluation guidelines. The following paragraphs describe the origin or development of each parameter that was input into the nitrogen mass-balance spreadsheet for this project.

### *Hydraulic Conductivity*

As discussed in Section 2.4, a hydraulic conductivity of 21 ft/day was used in the NP mass balance model for the project site.

### *Hydraulic Gradient*

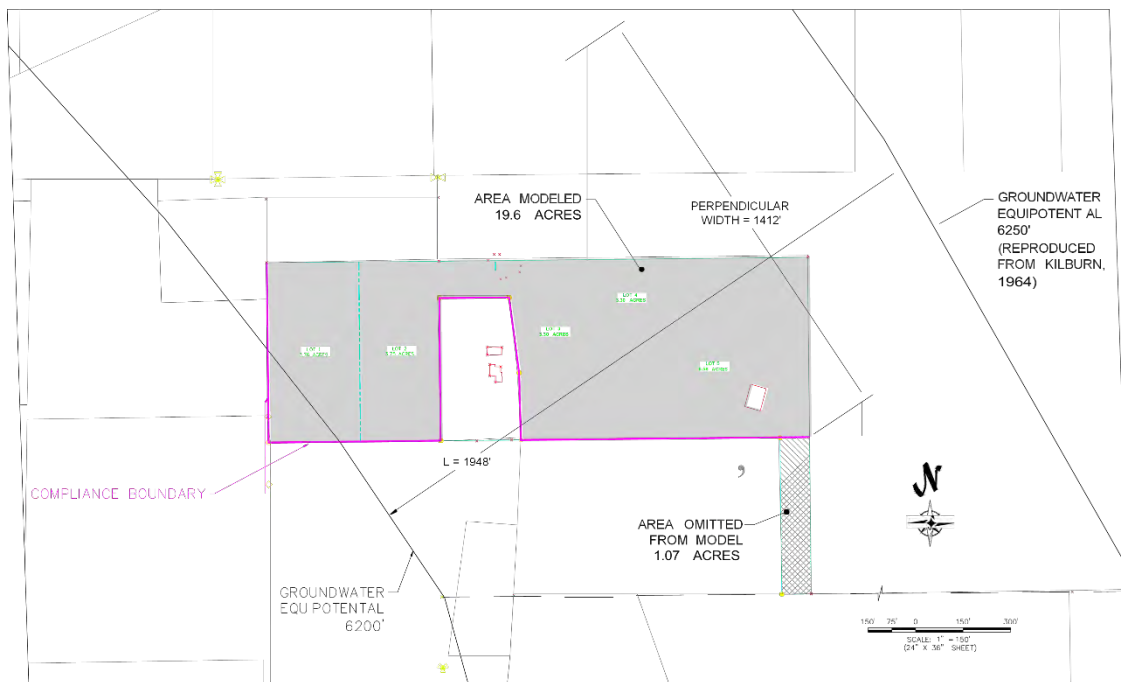
Based on recommendations from Cosgrove and Taylor (2007), which deferred back to the earlier report from Kilburn, mapping of estimated equipotential lines were employed to determine gradient at the site. By reproducing the gradient mapping into the project computer aided drawing file, the length between the two closest equipotential lines was measured at 1,946 feet. The equipotential lines differ by an elevation of 50 feet, which results in a modeled gradient of 0.025. The axis of the gradient through the site is directed 34 degrees south of west. This is portrayed in Figure 6 and Figure 9.

### *Aquifer Width*

The aquifer width perpendicular to flow represents the dimension across which septic leachate will be dispersed from the future drain fields for the development. The gradient in the vicinity of the project site trends 34 degrees south of west. Locations of future drain fields are not easily predicted at the time of subdivision, and they depend principally on where the corresponding residential structures are placed within each lot. It is reasonable to assume for the Level 1 analysis that the five potential homes and 5 potential accessory units may be distributed anywhere between the north and south property lines. The southern-most strip of proposed lot 5 is omitted from this computation because it is not possible to locate a drain field within it. Thus, the width of the property perpendicular to the modeled gradient of the aquifer is 1,412 feet. A plot of the drawing used in determining aquifer width, as well as gradient and parcel area, is presented in Figure 9.

### *Parcel Area*

The total area of the proposed subdivision is calculated to be 20.69 acres. The area used for the Level 1 spreadsheet was reduced by omitting the southern strip of area that was also not counted in the Aquifer Width, described above. The recharge from this strip would not contribute to the portion of aquifer that flows beneath the location of any septic systems in this subdivision. Including the area would tend to bias the model results to report lower nitrate concentrations. The strip area is 1.07 acres, leaving the remaining 19.6 acres as the relevant input value.



*Figure 9. Aquifer Width Exhibit*

### **Percent Impervious**

The percent impervious of the proposed development was estimated based on the number of homes that could be constructed in the development. Per Teton County code, each lot is allowed one main house and one guest house no greater than 50% the size of the main house. Each lot was estimated to have 15,000-sf of impervious surface including roads, driveways, and buildings, which results in an estimated 75,000-sf of impervious surface. The counted site area is approximately 19.6-ac resulting in an estimated percent imperviousness of 8.7%.

As discussed in Cosgrove and Taler (2007) the Level 1 spreadsheet removes this contribution to the water budget from further calculations. This would be the case if all precipitation or snowmelt from the impervious surface were conveyed as runoff away from the property. While this modeling approach may be justified in more urban stormwater settings or on sites that have direct conveyance to existing surface waters, this is likely a poor characterization of recharge mechanisms on low-density parcels with very pervious soils and low ground slopes. Runoff from pervious surfaces is likely directed to vegetated lawns and open pasture lands, where it may be more likely to satisfy any water deficit in site soils and vegetation and be all the more likely to migrate vertically toward the aquifer.

Despite this justification for omitting the impervious area, the estimated impervious area of 8.3% was used and can be considered a factor of conservatism in the model output.

### ***Natural Recharge Rate***

The natural recharge rate (NRR) can be estimated using a formula shown on the Level 1 spreadsheet as:

$$\text{NRR} = (\text{TAP})^2 \times 0.0046$$

where NRR = natural recharge rate, in/yr

TAP = total annual precipitation, in/yr

Using the total annual precipitation of 21 inches per year results in a NRR of 2.03 in/yr. It is noted that Cosgrove and Taylor state that the Nicklin Modeling effort and other credible estimates simply assign a value of 3 in/ year as an appropriate for use in the Level 1 spreadsheet. A value of 2.03 in/yr was used since it results in a more conservative estimate.

In addition to the recharge from direct precipitation, there is likely to remain a significant annual volume of irrigation water applied to the agricultural fields of the subdivision, outside of the residentially developed areas. While irrigation is intended to only provide sufficient moisture to make up for the evapotranspiration of crops, this is likely to reduce the moisture deficit in the soil so that when substantial natural storms occur, their contributions are more likely to migrate down into the deeper subsurface, instead of being held close to the surface where consequent evaporation would follow.

This NP evaluation did not attempt to quantify the additional recharge resulting from irrigation and use it in the Level 1 spreadsheet. It could also be considered, however, as a factor of conservatism in the model results.

### ***Background Nitrate Concentration***

The IDWR provides water quality data for a small selection of sampling locations in Teton County. One such location is remarkably close to the proposed subdivision, identified as station 05N 46E 07BDA1(U.S. Geological Survey Identification number 434635111041201). The concentrations of nitrate (as N) determined from this station show a small but discernable declining trend since the monitoring started in 1994, with the most recent sample taken in 2022. .

Timestamp	Nitrate as N (mg/l)	Sample Number
8/17/2017 13:50	0.73	GWQM-2017-111
8/27/2012 13:43	0.8	GWQM-2012-169
9/14/2006 11:40	0.82	GWQM-2006-350
7/24/2001 14:30	0.845	GWQM-2001-226
8/6/1997 10:00	0.8	GWQM-1997-256
9/16/1993 11:10	0.88	GWQM-1993-373

*Table 2. Nitrate Concentrations for Station 05N 46E 7BDA1*



*Figure 10. Background Nitrate Concentrations Monitoring Well (IDWR, 2022)*

**Effluent Flow Rate**

The septic tank effluent average flow rate in gallons per day (gpd) is established in IDAPA 58.08.03.08 as 250 gpd for a three bedroom residence, with 50 gpd added or subtracted for each bedroom greater or less than three. It is difficult to predict the development decisions that will be made by future lot owners, particularly with parcels that are larger than 1 acre. The Level I spreadsheet was used with all other parameters fixed and only effluent rate adjusted in increments of 50gpd to understand what scale of development could be accommodated. The consequence of this adjustment is that 400 gpd is the final value used in the model, which equates to six bedrooms equivalent of flow. As with other parameters in this Level 1 evaluation, this is considered a reasonable approximation for use in a screening tool. Note that the mass loading of nitrate from on-site wastewater to the aquifer is primarily a combination of effluent flow and effluent nitrate concentration. Treatment designs for on-site wastewater and subsurface disposal are available to reduce the concentration of nitrate discharged (discussed below) and the use of such “advanced” treatment systems would allow an increase in bedroom count per parcel in direct proportion to the improvement in nitrate concentration.

### ***Effluent Nitrate Concentration***

The nitrate concentration in the effluent depends on the type of septic system proposed for the development. Conventional septic tank/ drain field system effluent concentration equal to the default value of 45 mg/L is used in the Level 1 spreadsheet. While more advanced treatment systems are commonly available, their higher cost of installation and more demanding operations and maintenance requirements place financial burdens on property owners. They may be selected by individual property owners at the time of development for improved effluent quality. They could also be selected if concern over nitrate impacts were restricting the development bedroom count on a parcel (see discussion above for Effluent Flow Rate). The default value for using advanced treatment is 27 mg/L instead of the 45 mg/L of conventional septic design. Results are also reported below for this scenario.

### ***Denitrification rate***

The coarse nature of the subsoils depths typical at which drain fields are installed likely do not favor the residence times and biochemical conditions necessary for significant denitrification. Therefore, this parameter was left at the default of 0 in the Level 1 spreadsheet.

### ***Mixing Zone Thickness***

DEQ guidance (DEQ, 2002) proposes a mixing zone thickness of 15 feet, though little justification is presented for that value. Cosgrove and Taylor (2007) go further to imply that the use of 15 feet for this parameter is based on regulation, without citing any reference to which regulations apply. While this value may be justified in instances of shallow, coarse aquifers penetrated by shallow supply wells, that is not an apt description of this study site. Wells in close proximity to the proposed subdivision display water levels that are much higher than their corresponding depth of casing. Many of these wells are completed in a distinctly different formation than the upper-most saturated zone. It would likely require a more sophisticated model to better approximate the vertical mixing of downward migrating effluent with the bulk of water flux moving laterally through the aquifer that is tapped by typical domestic supply wells. This is considered a limitation in the accuracy of the model predictions, though the default value of 15 feet was used in the Level 1 spreadsheet for this study.

*Table 1. Nitrogen Mass Balance Input Values*

<b>Parameter</b>	<b>Input Value</b>
Hydraulic Conductivity	21 ft/day
Hydraulic Gradient	0.025
Mixing Zone Thickness	15 ft (default)
Aquifer Width Perpendicular to flow	1412 ft
Parcel Area	19.6 acres
Percent of Parcel that is Impervious	8.7 %
Number of Homes in Parcel (Subdivision)	5
Septic Tank Effluent	400 gpd (6 bedrooms), also 600 gpd (10 bedrooms)
Natural Recharge Rate	2.03 in/yr
Up-gradient Groundwater Concentration	0.80
Septic Tank Effluent Concentration	45 mg/L (default), also 27 mg/L (default-advanced treatment)
Denitrification Rate	0 (default)
Nitrate in Natural Recharge	0.3 mg/L (default)

**Results**

As shown in the nitrogen mass-balance spreadsheet included in Appendix E, the proposed subdivision fully developed with residential dwellings served by standard septic systems using the input parameters explained previously results in a 1.0 mg/L increase from 0.8 mg/L to 1.8 mg/L groundwater nitrate (as N) concentration, which is considered negligible per DEQ guidelines. Additionally, since the homes in the area are served by individual wells and septic systems, each lot was evaluated individually with the results showing a 0.4 to 0.5 mg/L increase in nitrate, which is also considered a negligible impact. Comparing the somewhat higher modeled increase for the entire subdivision versus the lower modeled impact for the individual lots reflects the cumulative effect of the additions from each lot sequentially along the groundwater gradient. In the model the main parameters that change are the lot area and lot perpendicular width, instead of the subdivision total area and subdivision perpendicular width.

## **5. CONCLUSIONS**

The proposed J&G Peacock Ranch Subdivision to be served by individual, on-site subsurface sewer treatment facilities has undergone Nutrient-Pathogen evaluation, in compliance with Teton County, Idaho Land Development Code Section 6-6. Guidance and modeling recommendations developed by DEQ staff were followed closely in this evaluation. The evaluation was conducted by Ted Van Holland, who possesses a Professional Engineering License (Environmental discipline) from the State of Idaho, and has experience in groundwater modeling, conforming to the definition of a Qualified Professional. The results of predictive modeling indicate that at full build-out the ground and surface water quality is protected at the property boundary from contamination from on-site sewage systems.

The input parameters assigned in the model are considered the most accurate estimations of specific site conditions, but it is important to emphasize that uncertainty exists in these estimations, as well as in the simplifications of the predictive model, known as a Level I Spreadsheet in representing the physical setting and mechanisms simulated. Methods used in quantifying the input parameters are discussed in the text. It is the conclusion of the Qualified Professional that the proposed development meets the requirements of the Groundwater Quality Rule.

Note that the Level I NP Evaluation assumes that no attenuation or transformation of nitrates occurs through the vadose zone, and it utilizes values for hydraulic gradient and hydraulic conductivity based on published reports and evaluation of well driller records. Results are highly dependent on these two variables. A Level II NP Evaluation would include nutrient attenuation in the vadose zone, as well as site-specific water quality data, groundwater flow direction, and hydraulic conductivity information collected by installing at least three monitoring wells on the site. Currently, we do not believe that further on-site investigation or reporting is necessary, unless the owner chooses to conduct a Level II NP Evaluation to verify the results of this Level I Evaluation.

All data included in this report adequately supports the recommendations included herein. Interpretations are based on the data are accurate and represent sound, unbiased professional judgment.

## **6. RECOMMENDATIONS**

The project was evaluated for typical residential development on each of the proposed 5 lots. Development is further restricted by applicable zone designation and Teton County Land Development Code. Permitting of subsurface sewage systems is under the jurisdiction of the DEQ, with implementation handled by Eastern Idaho Public Health Department. These multiple levels of

governmental safeguards provide significant assurance that the development on each lot created by this proposed subdivision will remain protective of the public health and the environment. In addition to these safeguards, it is recommended that all development involving water supply, sewer treatment and disposal, and stormwater management is completed in consultation with a professional engineer competent in these areas of practice.

The design of on-site wastewater treatment systems must meet all criteria included in the DEQ Technical Guidance Manual (2020), and test pits at the location of each proposed leach field will need to be inspected by Eastern Idaho Public Health. Final locations of the septic tanks and leach fields should be indicated on site plans for each lot to insure that required separation distances from culinary wells, property boundaries, and other features of interest are maintained.

It is important that the septic systems are designed, installed, and maintained properly. Having an adequate unsaturated zone below the septic drain field is critical to ensure that good aeration and slow travel of effluent is achieved through the soil. This is important to achieve adequate pathogen decomposition and die-off, promote soil-based removal of bacteria, and adequate adsorption of phosphorous. All wastewater treatment and disposal components must meet all DEQ requirements for vertical and horizontal separation between surface water, groundwater, and drinking water resources. Wells shall be constructed with adequate casing and sealing to prevent cross contamination between higher groundwater layers and the lower water bearing formation.

# **APPENDIX C**



## **IDAHO DEPARTMENT OF WATER RESOURCES- WELL DRILLER REPORTS**

Section	Qtr-Qtr	Well ID	Year	SWL Depth	Casing	TD
7	SWNE	447934	2017	80	202	220
7	SENW	398825	1983	92	119	140
7	SENW	384777	1983	90	130	140
7	SENW	398313	1983	87	133	135
7	SENW	327152	1996	50	140	140
7	NENE	326043	1999	80	160	220
7	NWNE	421065	2008	110	140	220
7	NWNE	328104	1988	120	159	180
7	NENW	376732	2003	100	183	400
7	NENW	427119	2009	60	180	220
7	NENW	326856	1995	43	80	80
6	SESW	464638	2021	85	180	200
6	SESW	326462	1997	80	120	120
6	SWSE	387320	2004	90	159	180
6	SESE	455748	2019	160	158	380

# IDAHO DEPARTMENT OF WATER RESOURCES WELL DRILLER'S REPORT

1. WELL TAG NO. D 0073792

Drilling Permit No. \_\_\_\_\_

Water right or injection well # \_\_\_\_\_

2. OWNER: \_\_\_\_\_

Name Anthony Bonacuse

Address 5050 Common Wealth Drive

City Sarasota State FL Zip 34242

3. WELL LOCATION:

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

Sec. 7 1/4 SW 1/4 NE 1/4  
10 acres      40 acres      160 acres

Gov't Lot \_\_\_\_\_ County Teton

Lat. 43 46.552 (Deg. and Decimal minutes)

Long. 111 4.067 (Deg. and Decimal minutes)

Address of Well Site 3685 North 1500 East

City Driggs

(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 ft <sup>3</sup> )	Placement method/procedure
Bentonite	0'	-38'	1150 lbs	Poured

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/Schedule	Material	Casing Liner			
					Threaded	Welded		
6"	+1'	-202'	.250	Steel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Was drive shoe used?  Y  N Shoe Depth(s) -202'

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 ft <sup>3</sup> )	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) 80 Static water level (ft) 80

Water temp. (°F) \_\_\_\_\_ Bottom hole temp. (°F) \_\_\_\_\_

Describe access port Well Cap

Well test:	Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)	Test method:			
				Pump	Bailer	Air	Flowing artesian
	20	60		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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	N
12	0	22			
10	22	38			
6	38	220			
	0	7	Clay and some gravel		X
	7	52	Clay gravel and cobble		X
	52	60	Clay and some gravel		X
	60	152	Clay, gravel and cobble	X	
	152	154	Boulder	X	
	154	190	Clay, cobble, gravel	X	
	190	220	Gray broken rock	X	

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JUN 09 2017  
Department of Water Resources  
Eastern Region

Completed Depth (Measurable) 220'

Date Started: May 30, 2017 Date Completed: Jun 1, 2017

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 Independent Drilling/RJH Co. No. 343

\*Principal Driller *Ernie J. ...* Date Jun 2, 2017

\*Driller \_\_\_\_\_ Date \_\_\_\_\_

\*Operator II \_\_\_\_\_ Date \_\_\_\_\_

Operator I \_\_\_\_\_ Date \_\_\_\_\_

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











DMD

# IDAHO DEPARTMENT OF WATER RESOURCES WELL DRILLER'S REPORT

22

1. WELL TAG NO. D 0048855

Drilling Permit No. \_\_\_\_\_  
Water right or injection well # \_\_\_\_\_

2. OWNER: Gay Peacock %  
Name White Home Builders  
Address 4134 W 33rd N  
City Idaho Falls State ID Zip 83402

3. WELL LOCATION:  
Twp. 5 North  or South  Rge. 46 East  or West

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

Gov't Lot \_\_\_\_\_ County Teton  
Lat. 43 ° 46.745 (Deg. and Decimal minutes)  
Long. 111 ° 04.026 (Deg. and Decimal minutes)  
Address of Well Site 400 So. 167 Reunion Drive City Driggs  
(Give at least name of road + Distance to Road or Landmark)

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 ft <sup>3</sup> )	Placement method/procedure
<u>bentonite</u>	<u>0</u>	<u>20</u>	<u>350 lbs.</u>	<u>overbox</u>

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/Schedule	Material	Casing	Liner	Threaded	Welded
<u>6"</u>	<u>0</u>	<u>140</u>	<u>.250</u>	<u>Steel</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Was drive shoe used?  Y  N Shoe Depth (in) 140

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 ft <sup>3</sup> )	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) 115 Static water level (ft) 110  
Water temp. (°F) \_\_\_\_\_ Bottom hole temp. (°F) \_\_\_\_\_  
Describe access port \_\_\_\_\_

Well test: \_\_\_\_\_ Test method:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)	Pump	Bailer	Air	Flowing artesian
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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	N
<u>8"</u>	<u>0</u>	<u>20</u>	<u>clay-gravels</u>		
<u>6"</u>	<u>20</u>	<u>40</u>	<u>clay-gravels</u>		
<u>6"</u>	<u>40</u>	<u>60</u>	<u>clay-gravels</u>		
<u>6"</u>	<u>60</u>	<u>80</u>	<u>clay-gravels</u>		
<u>6"</u>	<u>80</u>	<u>100</u>	<u>clay-gravels</u>		
<u>6"</u>	<u>100</u>	<u>120</u>	<u>clay-gravels</u>	<u>X</u>	
<u>6"</u>	<u>120</u>	<u>135</u>	<u>clay-gravels</u>	<u>X</u>	
<u>6"</u>	<u>135</u>	<u>140</u>	<u>soft rock</u>	<u>X</u>	
<u>6"</u>	<u>140</u>	<u>190</u>	<u>rock-fractured at 170</u>	<u>X</u>	
<u>6"</u>	<u>190</u>	<u>220</u>	<u>fractured rock</u>	<u>X</u>	

Completed Depth (Measurable): 220  
Date Started: 4-29-08 Date Completed: 4-29-08

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. 528  
\*Principal Driller Daniel Denning Date 5-9-08  
\*Driller John Denning Date 5-9-08  
\*Operator II Shirley Denning Date 5-9-08  
Operator I \_\_\_\_\_ Date \_\_\_\_\_

\* Signature of Principal Driller and rig operator are required.  
RECEIVED  
MAY 27 2008

# 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.

*9812*

**1. WELL OWNER**

Name Frank Ryan

Address Rt. 1 Box 3915 Driggs Idaho 83422

Owner's Permit No. 22-88-E-016

**7. WATER LEVEL**

Static water level 120 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.*

**2. NATURE OF WORK**

New well  Deepened  Replacement

Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

**8. WELL TEST DATA**

Pump  Bailer  Air  Other \_\_\_\_\_

Discharge G.P.M.	Pumping Level	Hours Pumped

**3. PROPOSED USE**

Domestic  Irrigation  Test  Municipal

Industrial  Stock  Waste Disposal or Injection

Other \_\_\_\_\_ (specify type)

**9. LITHOLOGIC LOG**

Bore Diam.	Depth		Material	Water	
	From	To		Yes	No
6"	0	155	Clay & Gravel		
	155	180	Conglomerate		

**RECEIVED**  
APR 21 1988  
Department of Water Resources

**RECEIVED**  
APR 15 1988  
Department of Water Resources  
Eastern District Office

**4. METHOD DRILLED**

Rotary  Air  Hydraulic  Reverse rotary

Cable  Dug  Other \_\_\_\_\_

**5. WELL CONSTRUCTION**

Casing schedule:  Steel  Concrete  Other \_\_\_\_\_

Thickness	Diameter	From	To
<u>250</u> inches	<u>6</u> inches	<u>1</u> feet	<u>159</u> 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  Pudding 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

NW 1/4 NE 1/4 Sec. 7, T. 5 N, R. 46 W.

**MICROFILMED**  
DEC 14 1988

**10.** Work started Jan 12, 88 finished Jan 15, 88

**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 Jan 18, 88

Signed by (Firm Official) Shane Jennings

and  
(Operator) Jan Jennings

Form 238-AD 6/02 IDAHO DEPARTMENT OF WATER RESOURCES  
**WELL DRILLER'S REPORT**

Office Use Only			
Well ID No.	_____		
Inspected by	_____		
Twp	Rge	Sec	
_____	_____	_____	
Lat: _____	_____	Long: _____	_____

1. WELL TAG NO. D 0027547  
 DRILLING PERMIT NO. \_\_\_\_\_  
 Water Right or Injection Well No. \_\_\_\_\_

2. OWNER:  
 Name Robert Christie & Ray Stachbart  
 Address P.O. Box 6851  
 City Jackson State Wyo Zip 83002

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. 46E East  or West   
 Sec. 7 1/4 SE 1/4 NW 1/4  
 Gov't Lot \_\_\_\_\_ County teton  
 Lat: \_\_\_\_\_ Long: \_\_\_\_\_  
 Address of Well Site 375n 125E  
 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
<u>Bentonite</u>	<u>0'</u>	<u>25'</u>	<u>500#</u>	<u>overbore</u>

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
<u>6"</u>	<u>+1</u>	<u>183'</u>	<u>250</u>	<u>steel</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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
						<input type="checkbox"/>	<input type="checkbox"/>

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

\_\_\_\_\_ ft. below ground Artesian pressure \_\_\_\_\_ lb.  
 Depth flow encountered \_\_\_\_\_ ft. Describe access port or control devices: \_\_\_\_\_

12. WELL TESTS:

Pump  Bailor  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	Y	N
8"	0'	2'	Dirt, cobbles, sand		X
	3'	100'	clay, cobbles, sand		X
	100'	170'	clay gravel few large rocks	X	
6"	120'	150'	clay gravel		X
	130'	170'	clay few gravel seams very small		X
	170'	183'	clay gravel	X	
	183'	220'	light grey rock (fractured)	X	
	220'	260'	dark rock solid		X
	260'	360'	red rock solid		X
	360'	400'	fractured dark rock	X	

RECEIVED  
 AUG 20 2003

Department of Water Resources  
 Eastern Region

Completed Depth 400' (Measurable)  
 Date: Started 8-12-03 Completed 8-13-03

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 Samuel Denning Date 8-13-03  
 and Driller or Operator II [Signature] Date 8-13-03  
 Operator I \_\_\_\_\_ Date \_\_\_\_\_

Principal Driller and Rig Operator Required.  
 Operator I must have signature of Driller/Operator II.

# IDAHO DEPARTMENT OF WATER RESOURCES WELL DRILLER'S REPORT

1. WELL TAG NO. D 0055140

Drilling Permit No. 518

Water right or injection well # \_\_\_\_\_

2. OWNER: Ren Bishop

Name \_\_\_\_\_

Address PO Box 50474

City Idaho Falls State ID Zip 83405

3. WELL LOCATION:

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

Sec. 7 1/4 NE 1/4 NW 1/4

Gov't Lot \_\_\_\_\_ County Teton

Lat. 43 ° 46.763 (Deg. and Decimal minutes)

Long. 111 ° 04.514 (Deg. and Decimal minutes)

Address of Well Site 1281 East 9000 North

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

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
<u>benonite</u>	<u>0'</u>	<u>40'</u>	<u>1350 lbs</u>	<u>10" conductor pipe</u>

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/Schedule	Material	Casing	Liner	Threaded	Welded
<u>6" + 1"</u>	<u>180'</u>	<u>250'</u>	<u>250</u>	<u>steel</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Was drive shoe used?  Y  N Shoe Depth(s) 180'

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) 60' Static water level (ft) 60'

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	N
<u>10"</u>	<u>0'</u>	<u>20'</u>	<u>clay-gravels</u>		
<u>10"</u>	<u>20'</u>	<u>40'</u>	<u>clay-gravels</u>		
<u>6"</u>	<u>40'</u>	<u>60'</u>	<u>light brown clay-gravels</u>		
<u>6"</u>	<u>60'</u>	<u>95'</u>	<u>clay-gravels</u>		
<u>6"</u>	<u>95'</u>	<u>110'</u>	<u>dark brown clay-gravels</u>		
<u>6"</u>	<u>110'</u>	<u>150'</u>	<u>clay-gravels</u>		
<u>6"</u>	<u>150'</u>	<u>153'</u>	<u>boulder</u>		
<u>6"</u>	<u>153'</u>	<u>175'</u>	<u>clay-gravels</u>		
<u>6"</u>	<u>175'</u>	<u>180'</u>	<u>phs lite rock</u>		
<u>6"</u>	<u>180'</u>	<u>200'</u>	<u>broken rock</u>		
<u>6"</u>	<u>200'</u>	<u>220'</u>	<u>Fractured rock</u>		

RECEIVED

SEP 30 2009

Department of Water Resources  
Eastern Region

Completed Depth (Measurable): 220'

Date Started: 9-9-09 Date Completed: 9-11-09

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 Dennis Drilling Co. No. 518

\*Principal Driller William Dunning Date 9-15-09

\*Driller JD Dunning Date 9-15-09

\*Operator II \_\_\_\_\_ Date \_\_\_\_\_

Operator I \_\_\_\_\_ Date \_\_\_\_\_

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

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT 093650

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. 22-95-E-092-000  
 Other IDWR No. \_\_\_\_\_

2. OWNER:  
 Name RON RAMIREZ  
 Address P.O. Box 137  
 City DRIGGS State Id Zip 83422

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.

N		Twp. <u>5</u> North <input checked="" type="checkbox"/> or South <input type="checkbox"/>	
E		Rge. <u>46</u> East <input checked="" type="checkbox"/> or West <input type="checkbox"/>	
S		Sec. <u>7</u> NE 1/4 NW 1/4 _____ 1/4	
W		Gov't Lot _____ County <u>TETON</u>	
		Lat: : : Long: : :	

Address of Well Site \_\_\_\_\_ City \_\_\_\_\_

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

Lt. 2 Bk. \_\_\_\_\_ Sub. Name CLARK TREE FARMS

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			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	
<u>Bentonite</u>	<u>0</u>	<u>30</u>	<u>6</u>	<u>Overbar</u>

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
<u>8</u>	<u>+2</u>	<u>80</u>	<u>250</u>	<u>Steel</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Length of Headpipe \_\_\_\_\_ Length of Tailpipe \_\_\_\_\_

9. PERFORATIONS/SCREENS None

- Perforations Method \_\_\_\_\_  
 Screens Screen Type \_\_\_\_\_

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						<input type="checkbox"/>	<input type="checkbox"/>

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

43 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
<u>30</u>	<u>80</u>	<u>80</u>	<u>2 Hrs</u>

Water Temp. \_\_\_\_\_ Bottom hole temp. \_\_\_\_\_

Water Quality test or comments: Excellent  
65 Depth first Water Encountered \_\_\_\_\_

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
<u>8</u>	<u>0</u>	<u>33</u>	<u>Clay + top soil</u>		<input checked="" type="checkbox"/>
	<u>33</u>	<u>37</u>	<u>sandstone layer Rock</u>		<input checked="" type="checkbox"/>
	<u>37</u>	<u>60</u>	<u>sand + gravel clay shales</u>		<input checked="" type="checkbox"/>
<u>8</u>	<u>60</u>	<u>80</u>	<u>sand + pea gravel</u>	<input checked="" type="checkbox"/>	

RECEIVED

MAR 08 1996

Department of Water Resources

RECEIVED

MAR 06 1996

Department of Water Resources  
 Eastern District Office

AUG 27 1995

Completed Depth: 80 (Measurable)  
 Date: Started 8-30-95 Completed 9-15-95

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 [Signature] Date 9/20/95

and Supervisor or Operator [Signature] Date 9-20-95

(Sign once if Firm Official & Operator)

Form 238-7  
6/02  
DMD

# 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 0032777  
DRILLING PERMIT NO. \_\_\_\_\_  
Water Right or Injection Well No. \_\_\_\_\_

22

### 12. WELL TESTS:

Pump  Bailor  Air  Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. \_\_\_\_\_ Bottom hole temp. \_\_\_\_\_  
Water Quality test or comments: \_\_\_\_\_

2. OWNER: Cindy & John Bach  
Name \_\_\_\_\_  
Address PO Box 101  
City Driggs ID State ID Zip 83422

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. 46 East  or West   
Sec. 6 1/4 SW 1/4 SE 1/4  
Gov't Lot \_\_\_\_\_  
County Teton  
Lat: \_\_\_\_\_ Long: \_\_\_\_\_  
Address of Well Site 400 W 152nd Summit View Drive  
City Driggs  
Lt. \_\_\_\_\_ Blk. \_\_\_\_\_ Sub. Name Summit View

### 13. LITHOLOGIC LOG: (Describe repairs or abandonment) Water

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
8"	0'	20'	clay, gravel, sand		X
6"	20'	80'	clay gravel, sand		X
	80'	90'	clay		X
	90'	105'	grey rock, broken	X	
	105'	150'	clay some soft rock		X
	150'	180'	broken lava rock	X	

RECEIVED

JUL 15 2004

Department of Water Resources  
Eastern Region

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
<u>benonite</u>	<u>0'</u>	<u>20'</u>	<u>550 #</u>	<u>over bore</u>

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
<u>6"</u>	<u>11'</u>	<u>159'</u>	<u>250</u>	<u>Steel</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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
						<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

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

Completed Depth 180' (Measurable)  
Date: Started 6-11-04 Completed 6-17-04

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 Wendell Denning Date 6-18-04  
and  
Driller or Operator II [Signature] Date 6-17-04  
Operator I \_\_\_\_\_ Date \_\_\_\_\_

Principal Driller and Rig Operator Required.  
Operator I must have signature of Driller/Operator II.

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

Use Typewriter or Ballpoint Pen

63103

Office Use Only  
 Inspected by \_\_\_\_\_  
 Twp. \_\_\_\_\_ Rge. \_\_\_\_\_ Sec. \_\_\_\_\_  
 \_\_\_\_\_ 1/4 \_\_\_\_\_ 1/4 \_\_\_\_\_ 1/4  
 Lat: : : Long: : :

1. DRILLING PERMIT NO. 22-95-E-0194-000

Other IDWR No. \_\_\_\_\_

2. OWNER:

Name John Hansford  
 Address 104 Black Bear Drive  
 City DRiggs State Id Zip 83422

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.

N		Twp. <u>5</u> North <input checked="" type="checkbox"/> or South <input type="checkbox"/>	
E		Rge. <u>46</u> East <input checked="" type="checkbox"/> or West <input type="checkbox"/>	
S		Sec. <u>7</u> 1/4 <u>SE</u> 1/4 <u>NE</u> 1/4	
W		Gov't Lot _____ County <u>Blaine</u> 10 acres 40 acres 160 acres	
		Lat: : : Long: : :	
		Address of Well Site <u>104 Black Bear Dr.</u>	
		City _____	

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

Lt. \_\_\_\_\_ Blk. \_\_\_\_\_ Sub. Name Bear Creek Estates

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			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	
<u>Bentonite</u>	<u>0</u>	<u>20'</u>	<u>600LBS</u>	<u>OVER Bore.</u>

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
<u>6"</u>	<u>+1</u>	<u>115'</u>	<u>.250"</u>	<u>Steel</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Length of Headpipe \_\_\_\_\_ Length of Tailpipe \_\_\_\_\_

9. PERFORATIONS/SCREENS

- Perforations Method \_\_\_\_\_  
 Screens Screen Type \_\_\_\_\_

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						<input type="checkbox"/>	<input type="checkbox"/>

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

142 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) Water

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
<u>8"</u>	<u>0</u>	<u>55'</u>	<u>Clay &amp; Gravel Cobble Rocks</u>		<input checked="" type="checkbox"/>
<u>8"</u>	<u>55'</u>	<u>60'</u>	<u>Clay</u>		<input checked="" type="checkbox"/>
<u>8"</u>	<u>60'</u>	<u>10'</u>	<u>Clay Gravel Cobble Rocks</u>		<input checked="" type="checkbox"/>
<u>8"</u>	<u>10'</u>	<u>140'</u>	<u>Clay Gravel Cobble Rocks</u>		<input checked="" type="checkbox"/>
<u>8"</u>	<u>140'</u>	<u>150'</u>	<u>Clay Gravel</u>	<input checked="" type="checkbox"/>	
<u>8"</u>	<u>150'</u>	<u>170'</u>	<u>Clay Sand</u>		<input checked="" type="checkbox"/>
<u>8"</u>	<u>170'</u>	<u>176'</u>	<u>Rock</u>		<input checked="" type="checkbox"/>
<u>6"</u>	<u>176'</u>	<u>195'</u>	<u>Rock</u>		<input checked="" type="checkbox"/>
<u>6"</u>	<u>195'</u>	<u>196'</u>	<u>Fracture</u>	<input checked="" type="checkbox"/>	
<u>6"</u>	<u>196'</u>	<u>235'</u>	<u>Rock</u>		<input checked="" type="checkbox"/>
<u>6"</u>	<u>235'</u>	<u>238'</u>	<u>Fractured Rock</u>	<input checked="" type="checkbox"/>	
<u>6"</u>	<u>238'</u>	<u>255'</u>	<u>Rock</u>		<input checked="" type="checkbox"/>
<u>6"</u>	<u>255'</u>	<u>256'</u>	<u>Fractured Rock</u>	<input checked="" type="checkbox"/>	
<u>6"</u>	<u>256'</u>	<u>260'</u>	<u>Rock</u>		<input checked="" type="checkbox"/>
			<u>about 15gpm</u>		

RECEIVED RECEIVED  
 JAN 19 1996

NOV 13 1995  
 Department of Water Resources  
 Eastern District Office

Completed Depth 260' (Measurable)  
 Date: Started 10-30-95 Completed 11-2-95

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 Denning Drilling Firm No. 518  
 Firm Official Denning Drilling Date 11-2-95  
 and  
 Supervisor or Operator \_\_\_\_\_ Date \_\_\_\_\_

(Sign once if Firm Official & Operator)

# IDAHO DEPARTMENT OF WATER RESOURCES WELL DRILLER'S REPORT

1. WELL TAG NO. D 0089325

Drilling Permit No. \_\_\_\_\_  
Water right or injection well # \_\_\_\_\_

2. OWNER:

Name New West Const c/o Michael Teuszink  
Address PO Box 541  
City Driggs State ID Zip 83422

3. WELL LOCATION:

Twp. 05 North  or South  Rge. 46 East  or West   
Sec. 6 1/4 SW 1/4 SW 1/4

Gov't Lot \_\_\_\_\_ County Teton  
Lat. 43 ° 46.809 (Deg and Decimal minutes)  
Long. 111 ° 04.552 (Deg and Decimal minutes)  
Address of Well Site 1205 E 4000N

City Driggs  
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 ft <sup>3</sup> )	Placement method/procedure
<u>Bentonite</u>	<u>0</u>	<u>40'</u>	<u>1100 lbs</u>	<u>Temp Casing Overburden</u>

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/Schedule	Material	Casing	Liner	Threaded	Welded
<u>6"</u>	<u>42'</u>	<u>180'</u>	<u>.250</u>	<u>steel</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Was drive shoe used?  Y  N Shoe Depth(s) 180'

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 ft <sup>3</sup> )	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) 90' Static water level (ft) 85'  
Water temp. (°F) \_\_\_\_\_ Bottom hole temp. (°F) \_\_\_\_\_

Describe access port \_\_\_\_\_

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)	Pump	Bailer	Air	Flowing artesian
<u>180'</u>	<u>715 gpm</u>	<u>30 min</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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	N
<u>10"</u>	<u>0</u>	<u>20'</u>	<u>topsoil, boulders</u>		<u>N</u>
	<u>20'</u>	<u>40'</u>	<u>boulders, clay</u>		<u>N</u>
<u>6"</u>	<u>40'</u>	<u>60'</u>	<u>clay, gravel</u>		<u>N</u>
	<u>60'</u>	<u>80'</u>	<u>clay, gravel</u>		<u>N</u>
	<u>80'</u>	<u>100'</u>	<u>clay, gravel</u>	<u>Y</u>	
	<u>100'</u>	<u>120'</u>	<u>clay, gravel</u>	<u>Y</u>	
	<u>120'</u>	<u>140'</u>	<u>clay, gravel</u>	<u>Y</u>	
	<u>140'</u>	<u>160'</u>	<u>soft sylvite</u>	<u>Y</u>	
	<u>160'</u>	<u>180'</u>	<u>soft sylvite</u>	<u>Y</u>	
	<u>180'</u>	<u>200'</u>	<u>Black lava fractures</u>	<u>Y</u>	

RECEIVED

JUN 21 2021

Department of Water Resources  
Eastern Region

Completed Depth (Measurable): 200'  
Date Started: 6/8/21 Date Completed: 6/10/21

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 [Signature] Date 6-10-21

\*Driller [Signature] Date 6/10/21

\*Operator II \_\_\_\_\_ Date \_\_\_\_\_

Operator I [Signature] Date 6/10/21

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



# **APPENDIX D**



**EASTERN IDAHO PUBLIC HEALTH  
DEPARTMENT- TEST PIT REPORT**

08/17/2022

Teton County Planning and Zoning  
89 North Main Suite 6  
Driggs, Idaho 83422

Jerry Peacock Fr. Trst.  
26 N 5W #25  
Rexburg, Idaho 83440

RE: Peacock Ranch Subdivision

I have reviewed the application to have RP05N46E070755 subdivided into six (6) lots to be known as the Peacock Ranch Subdivision and determined that the property is suitable for sub-surface waste disposal systems to serve residences. Four (4) test holes were excavated on July 28, 2022, to allow observation of the soil horizon to ten feet below natural grade. Following is my evaluation of the soils on the property. All test pits presented basically the same soil layering with minor differences in thickness of the layers. (See included Test Hole Information page for greater detail.)

Soil information observed:

12-24 inches of topsoil showed in all test holes except TH4 which had only 4 inches of silt loam topsoil below natural grade. B2 soil type.

12-120 inches fine to coarse sand with 70% rock content consisting of clasts 1-8 inches in diameter. Rock content and size increase with depth. Minor fines. A2A soil type.

A thin calcareous layer was encountered in TH4 approximately 36 inches below grade. This layer is not continuous and can be dug through. It is also permeable and should not create a deterrent for installing a septic system drainfield. No bedrock was encountered in any test hole. No groundwater was encountered in any test hole.

Most of the parcel has minor slope (4%) from east to west. Steeper slopes are found on Lot 6 which has an existing dwelling with a permitted septic system. Lot 4 has an area to the south that has slope up to 10% but ample area with less slope to accommodate a drainfield and replacement area.

Eastern Idaho Public Health gives preliminary approval of the application to divide this parcel creating the Peacock Ranch Subdivision based on suitability 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 at time of installation.

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.

A handwritten signature in black ink that reads "Kathleen Price". The signature is written in a cursive style with a large, looped initial "K".

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



Peacock Ranch.

~. Test Hole Locations

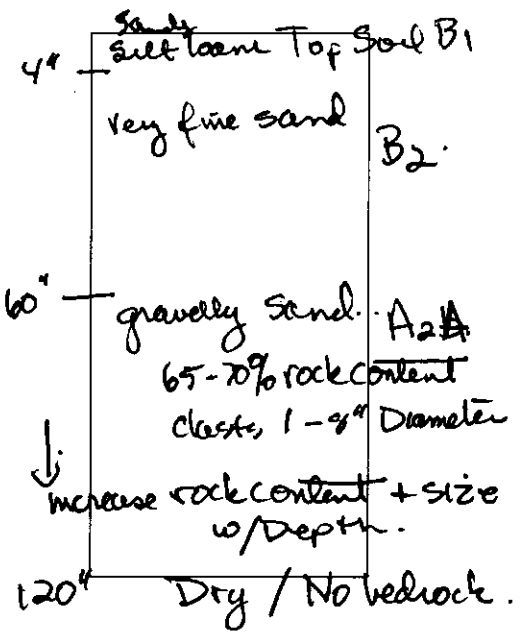
# TEST HOLE INFORMATION

SUBDIVISION Peacock Ranch DATE 7-28-2022

Test Hole # 1

Location: Lot 5 NE corner  
center of lot

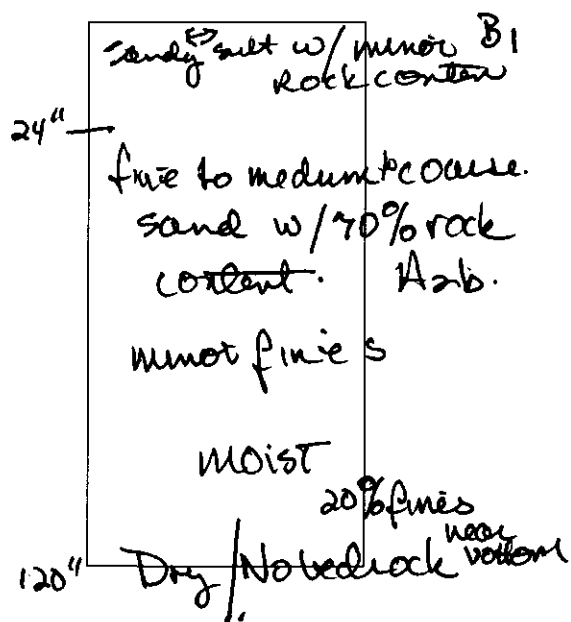
Depth: 120"



Test Hole # 2.

Location: lot 3. North

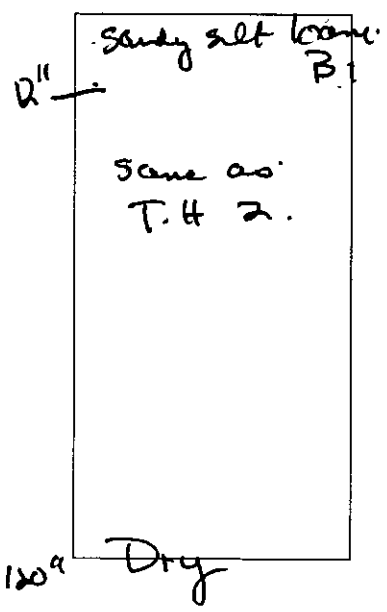
Depth: \_\_\_\_\_



Test Hole # 3

Location: lot 2

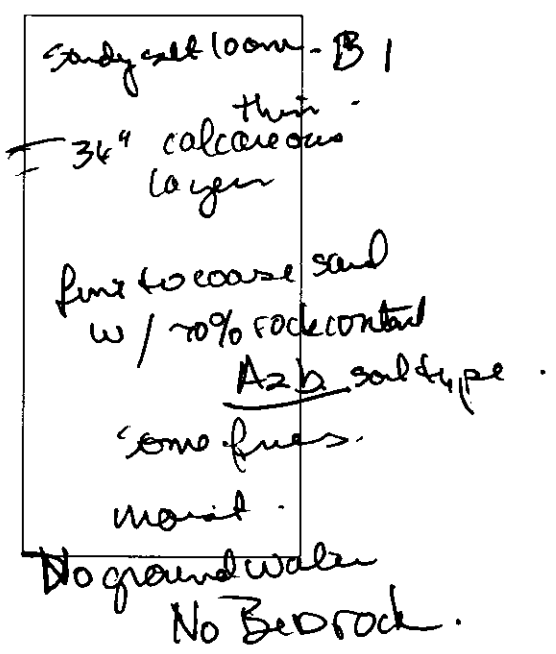
Depth: 120"



Test Hole # 4

Location: lot 1

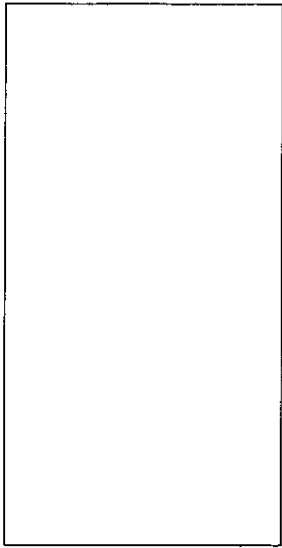
Depth: 120"



Test Hole # \_\_\_\_\_

Location: \_\_\_\_\_

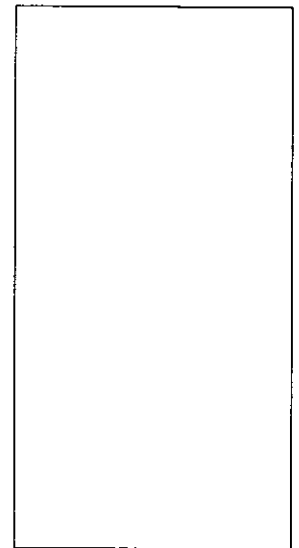
Depth: \_\_\_\_\_



Test Hole # \_\_\_\_\_

Location: \_\_\_\_\_

Depth: \_\_\_\_\_



COUNTY ROAD 4000 NORTH

COUNTY ROAD 4000 NORTH

LOT 2  
CLARKE TREE FARM  
SUBDIVISION

LOT 1  
PJ CLARKE TREE FARM  
SUBDIVISION

50.00' ACCESS  
EASEMENT

REUNION ROAD

UNLAND  
ACQ# 193094  
ROS# 199619

UPGRADE EXISTING DRIVEWAY  
TO MEET COUNTY LOCAL  
ROAD STANDARDS

MONTIPIRE  
PARCEL 2  
ROS# 30445

ANDERSON  
PARCEL 1  
ROS# 10445

Property : 1  
Area : 3.78 ACRES

PARCEL 1  
20.69 ACRES

Property : 2  
Area : 3.78 ACRES

PARCEL 2  
2.50 ACRES

PEACOCK LANE COUNTY ROAD  
(N 1500 E)

Property : 3  
Area : 3.30 ACRES

PARCEL 1  
20.69 ACRES

Property : 4  
Area : 3.30 ACRES

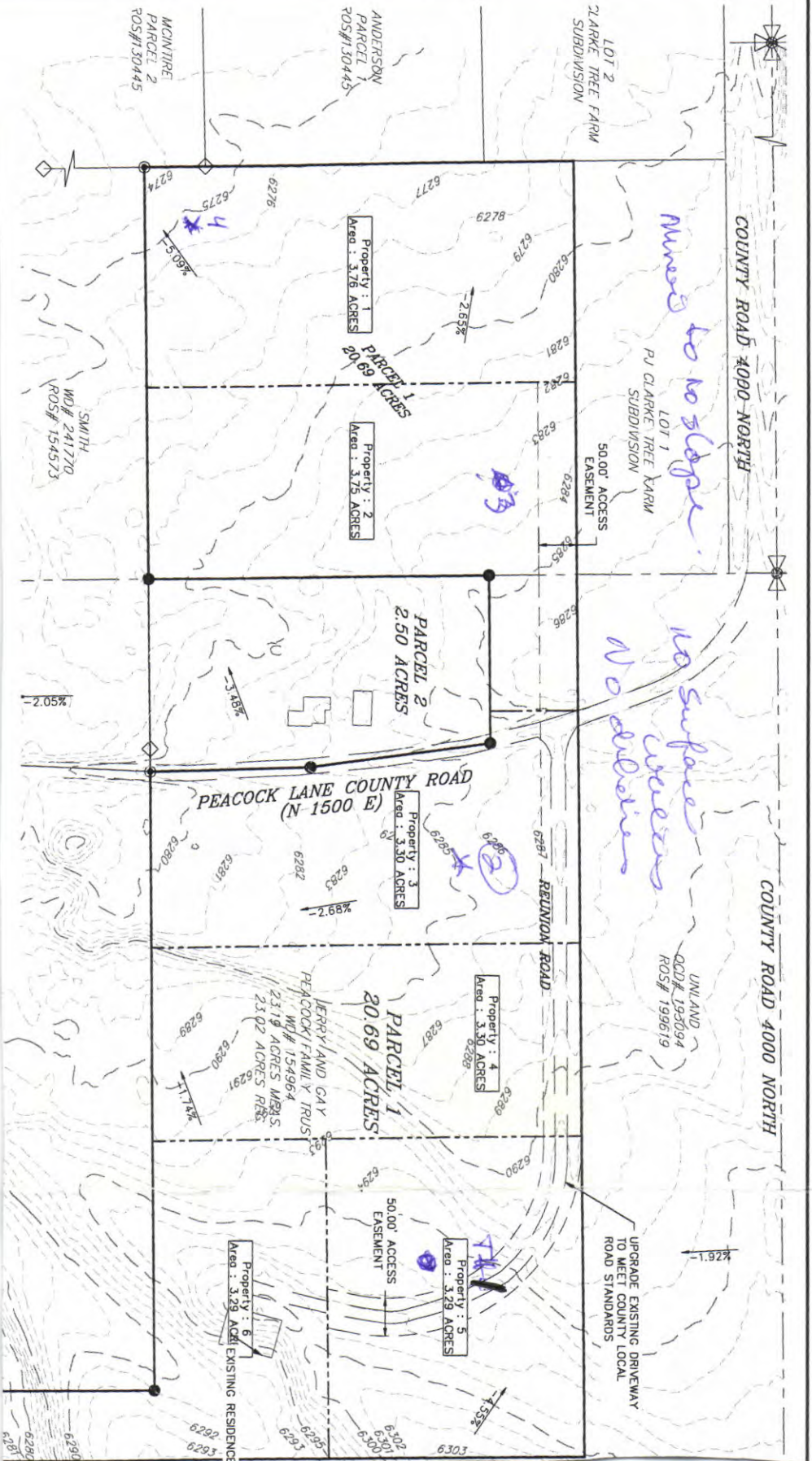
HERRYLAND GAY  
PEACOCK FAMILY TRUS  
W# 154964  
23.19 ACRES MERS.  
23.02 ACRES R&B.

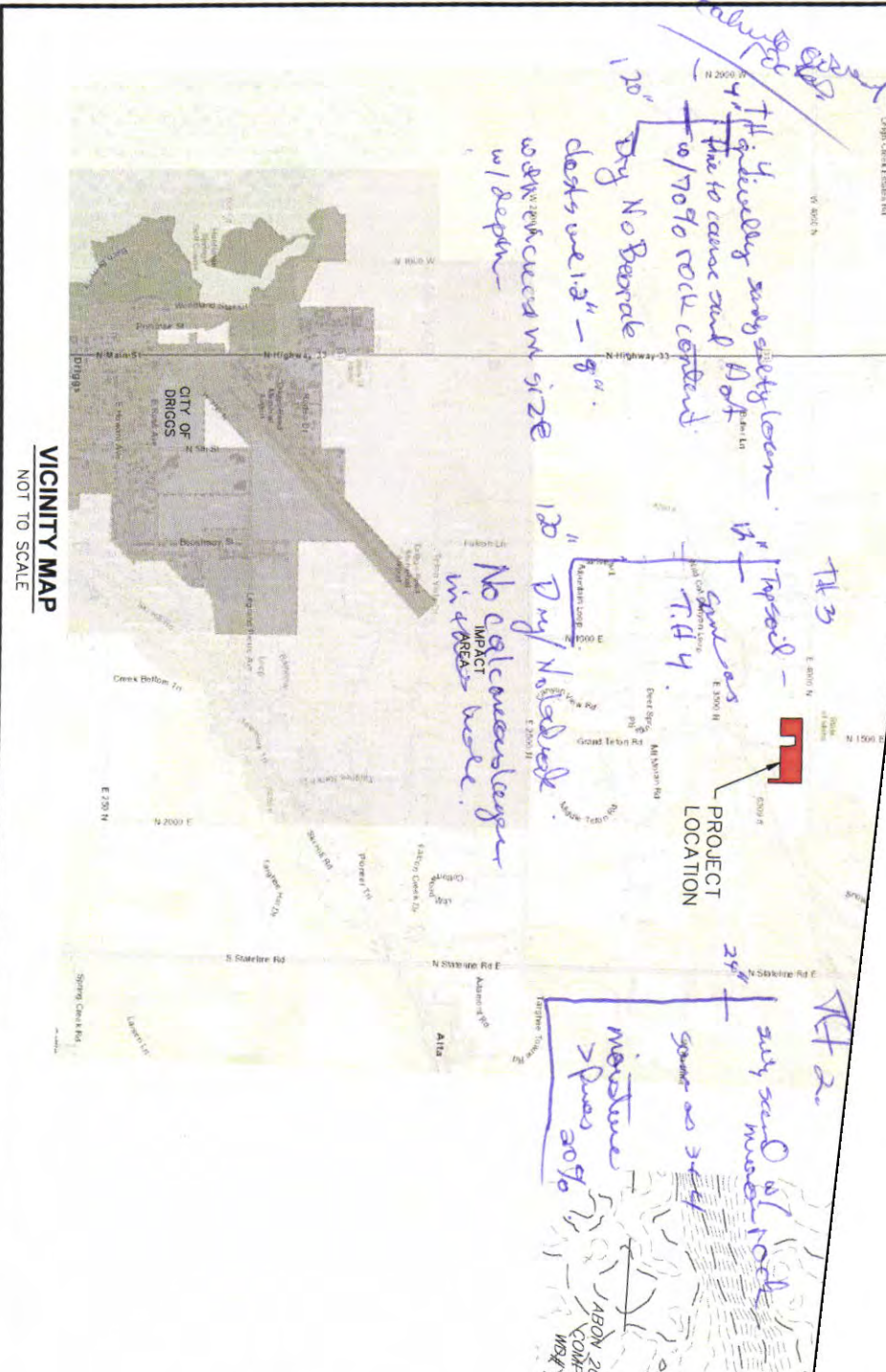
50.00' ACCESS  
EASEMENT

Property : 5  
Area : 3.29 ACRES

Property : 6  
Area : 3.29 ACRES EXISTING RESIDENCE

SMITH  
W# 241770  
ROS# 154573





VICINITY MAP  
NOT TO SCALE

EXISTING ZONING:	
TOTAL SITE AREA:	A/RR - 2.5
TOTAL RESIDENTIAL LOTS:	20.69 ACRES
MINIMUM LOT SIZE:	3.29 ACRES
MAXIMUM LOT SIZE:	3.78 ACRES
MINIMUM SETBACKS PER CODE:	
FRONT	30'
SIDE	30'
REAR	40'

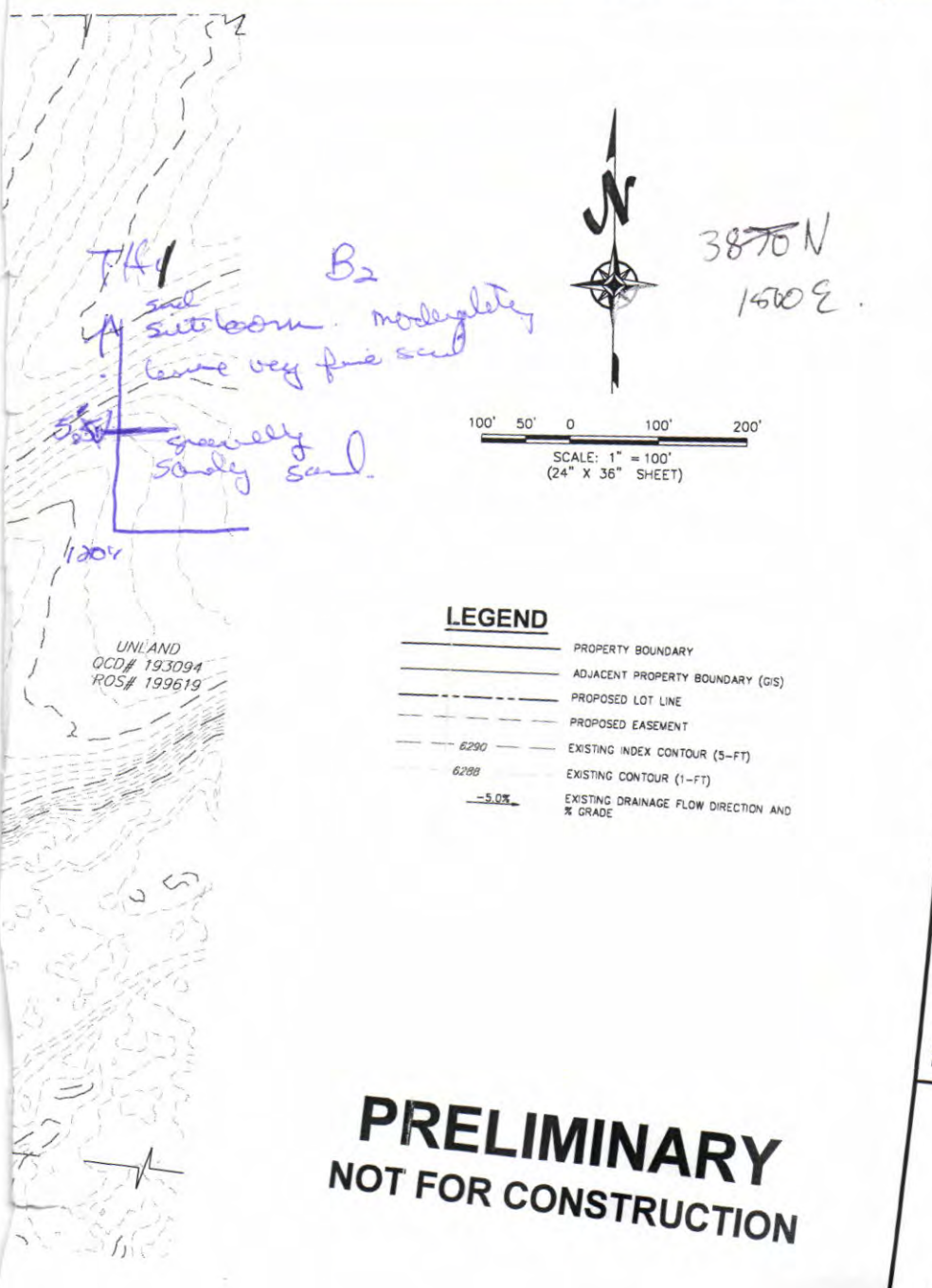
**SITE DATA**



10:00 AM Thursday 7-28-2022

**HARMONY**  
DESIGN & ENGINEERING

18 N MAIN STE 305 • DRIGGS ID 83422  
208.354.1331 • www.harmonydesigninc.com



**LEGEND**

- PROPERTY BOUNDARY
- - - ADJACENT PROPERTY BOUNDARY (GS)
- PROPOSED LOT LINE
- - - PROPOSED EASEMENT
- 6290 --- EXISTING INDEX CONTOUR (5-FT)
- 6288 --- EXISTING CONTOUR (1-FT)
- 5.0% --- EXISTING DRAINAGE FLOW DIRECTION AND % GRADE

UNLAND  
QCD# 193094  
ROS# 199619

**PRELIMINARY**  
**NOT FOR CONSTRUCTION**

**TA AND NOTES**

THE PROPERTY DOES NOT LIE WITHIN A NATURAL RESOURCE OVERLAY.

THE SITE LIES WITHIN THE RURAL NEIGHBORHOOD CHARACTER AREA AND THE WATERWAYS CORRIDOR SHOWN IN THE FUTURE LAND USE MAP OF THE COMPREHENSIVE PLAN.

THE SOUTHERN PORTION OF THE PROPERTY LIES WITHIN THE ZONE A SPECIAL FLOOD HAZARD AREA ASSOCIATED WITH DRY CREEK AS SHOWN ON THE EFFECTIVE FLOOD INSURANCE RATE MAP PANEL NO. 16081C0100C DATED AUGUST 4, 1988.

TOPOGRAPHIC INFORMATION FROM 2020 LIDAR DATA PROVIDED BY TETON COUNTY, IDAHO.

PROJECT PARCEL BOUNDARY WAS SURVEYED AS PART OF A PLAT DATED NOVEMBER 4 2020 BY HARMONY DESIGN AND ENGINEERING. ADJOINING PARCEL BOUNDARIES ARE FROM TETON COUNTY GIS DATA AND ARE APPROXIMATE.

DRAWING IS TO SCALE IF  
BAR MEASURES:  
1" = FULL SCALE  
1/2" = HALF SCALE

FILE : 21240\_SITE.DWG  
PROJ.# : 21240

DATE: 2/23/2022

REVISIONS:

NO.	DESCRIPTION

**PROJECT NAME**  
**PEACOCK SUBDIVISION**  
**1665 REUNION ROAD**  
**CONCEPT PLAN**

**SHEET #**  
**1 OF 1**

# **APPENDIX E**



## **NP 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.

<b>INPUT</b>				<b>OUTPUT</b>		
<b>Water Budget</b>	<b>Input Value</b>	<b>Default Value</b>		<b>Yearly Water Budget</b>	<b>Volume (m<sup>3</sup>)</b>	<b>% of Total</b>
Hydraulic Conductivity (ft/day)	21.000	Site-specific		Ground Water	1.15E+05	94.7
Hydraulic Gradient	0.025	Site-specific		Effluent	2.76E+03	2.3
Mixing Zone Thickness (ft)	15	15	<b>Default</b>	Recharge	3.73E+03	3.1
Aquifer Width Perpendicular to Flow (ft)	1412	Site-specific		<b>Total Water Volume</b>	<b>1.22E+05</b>	
Parcel Area (acres)	19.6	Site-specific		<b>Point of Compliance Nitrate Concentration Goal (mg/l)</b>	<b>1.8</b>	
Percent of Parcel That Is Impervious (Percent)	8.7	Site-specific		<b>Avg. Downgradient Nitrate Concentration in GW (mg/l)</b>	<b>1.8</b>	
Current/Acceptable Number of Homes in Parcel	5.0	Site-specific		<b>Current/Acceptable Lot Size (Acres)</b>	<b>3.9</b>	
Septic Tank Effluent (gallons/d/home)	400	300	<b>Provide Justification</b>			
Natural Recharge rate (inches/yr)	2.0286	Site-specific				
<b>Nitrogen Budget</b> (all concentrations represent nitrate nitrogen)				<b>Yearly Nitrogen Budget</b>		
Upgradient Ground Water Concentration (mg/l)	0.8	Site-specific			<b>Mass (mg)</b>	<b>% of Total</b>
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	<b>Default</b>	Background GW Nitrate Mass	9.20E+07	42.3
Denitrification Rate (decimal fraction)	0	0	<b>Default</b>	Septic Tank Effluent Nitrate Mass	1.24E+08	57.2
Nitrate in Natural Recharge (mg/l)	0.3	0.3	<b>Default</b>	Recharge Nitrate Mass	1.12E+06	0.5
				<b>Total Nitrate Mass</b>	<b>2.17E+08</b>	

**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
<b>Typical Range of Hydraulic Gradient</b>	0.0001 to 0.1

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

<b>SITE INFORMATION</b>	
<b>J&amp;G Peacock Ranch Subdivision</b>	<b>Site Name</b>
<b>Entire Subdivision; conventional treatment</b>	<b>Parcel Identification</b>
<b>2/4/2023</b>	<b>Date</b>
<b>Ted Van Holland, P.E.</b>	<b>Prepared By</b>
Disclaimer: Considerable care was exercised in developing this software. However, the Idaho Department of Environmental Quality makes no warranty regarding its accuracy and shall not be held liable for any damages resulting from its use.	



**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.

<b>INPUT</b>				<b>OUTPUT</b>		
<b>Water Budget</b>	<b>Input Value</b>	<b>Default Value</b>		<b>Yearly Water Budget</b>	<b>Volume (m<sup>3</sup>)</b>	<b>% of Total</b>
Hydraulic Conductivity (ft/day)	21.000	Site-specific		Ground Water	1.15E+05	93.6
Hydraulic Gradient	0.025	Site-specific		Effluent	4.14E+03	3.4
Mixing Zone Thickness (ft)	15	15	<b>Default</b>	Recharge	3.73E+03	3.0
Aquifer Width Perpendicular to Flow (ft)	1412	Site-specific		<b>Total Water Volume</b>	<b>1.23E+05</b>	
Parcel Area (acres)	19.6	Site-specific		<b>Point of Compliance Nitrate Concentration Goal (mg/l)</b>	<b>1.8</b>	
Percent of Parcel That Is Impervious (Percent)	8.7	Site-specific		<b>Avg. Downgradient Nitrate Concentration in GW (mg/l)</b>	<b>1.7</b>	
Current/Acceptable Number of Homes in Parcel	5.0	Site-specific		<b>Current/Acceptable Lot Size (Acres)</b>	<b>3.9</b>	
Septic Tank Effluent (gallons/d/home)	600	300	<b>Provide Justification</b>			
Natural Recharge rate (inches/yr)	2.0286	Site-specific				
<b>Nitrogen Budget</b> (all concentrations represent nitrate nitrogen)				<b>Yearly Nitrogen Budget</b>		
Upgradient Ground Water Concentration (mg/l)	0.8	Site-specific			<b>Mass (mg)</b>	<b>% of Total</b>
Septic Tank Effluent Concentration (mg/l)	27.0	45.0	<b>Provide Justification</b>	Background GW Nitrate Mass	9.20E+07	44.9
Denitrification Rate (decimal fraction)	0	0	<b>Default</b>	Septic Tank Effluent Nitrate Mass	1.12E+08	54.6
Nitrate in Natural Recharge (mg/l)	0.3	0.3	<b>Default</b>	Recharge Nitrate Mass	1.12E+06	0.5
				<b>Total Nitrate Mass</b>	<b>2.05E+08</b>	

**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
<b>Typical Range of Hydraulic Gradient</b>	0.0001 to 0.1

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

<b>SITE INFORMATION</b>	
<b>J&amp;G Peacock Ranch Subdivision</b>	<b>Site Name</b>
<b>Entire Subdivision: Advanced Treatment</b>	<b>Parcel Identification</b>
<b>2/4/2023</b>	<b>Date</b>
<b>Ted Van Holland, P.E.</b>	<b>Prepared By</b>
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**IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET**

V. 1.3 5/2/2002

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<b>INPUT</b>				<b>OUTPUT</b>		
<b>Water Budget</b>	<b>Input Value</b>	<b>Default Value</b>		<b>Yearly Water Budget</b>	<b>Volume (m<sup>3</sup>)</b>	<b>% of Total</b>
Hydraulic Conductivity (ft/day)	21.000	Site-specific		Ground Water	5.06E+04	97.5
Hydraulic Gradient	0.025	Site-specific		Effluent	5.53E+02	1.1
Mixing Zone Thickness (ft)	15	15	<b>Default</b>	Recharge	7.19E+02	1.4
Aquifer Width Perpendicular to Flow (ft)	621	Site-specific		<b>Total Water Volume</b>	<b>5.19E+04</b>	
Parcel Area (acres)	3.76	Site-specific				
Percent of Parcel That Is Impervious (Percent)	8.3	Site-specific		<b>Point of Compliance Nitrate Concentration Goal (mg/l)</b>	<b>1.8</b>	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific				
Septic Tank Effluent (gallons/d/home)	400	300	<b>Provide Justification</b>	<b>Avg. Downgradient Nitrate Concentration in GW (mg/l)</b>	<b>1.3</b>	
Natural Recharge rate (inches/yr)	2.0286	Site-specific		<b>Current/Acceptable Lot Size (Acres)</b>	<b>3.8</b>	
<b>Nitrogen Budget</b> (all concentrations represent nitrate nitrogen)				<b>Yearly Nitrogen Budget</b>		
					<b>Mass (mg)</b>	<b>% of Total</b>
Upgradient Ground Water Concentration (mg/l)	0.8	Site-specific		Background GW Nitrate Mass	4.05E+07	61.7
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	<b>Default</b>	Septic Tank Effluent Nitrate Mass	2.49E+07	37.9
Denitrification Rate (decimal fraction)	0	0	<b>Default</b>	Recharge Nitrate Mass	2.16E+05	0.3
Nitrate in Natural Recharge (mg/l)	0.3	0.3	<b>Default</b>	<b>Total Nitrate Mass</b>	<b>6.56E+07</b>	

**Instructions for Use**

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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.

<b>Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)</b>	
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
<b>Typical Range of Hydraulic Gradient</b>	0.0001 to 0.1

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

<b>SITE INFORMATION</b>	
<b>Peacock Subdivision</b>	<b>Site Name</b>
<b>Lot 1, Conventional Treatment</b>	<b>Parcel Identification</b>
<b>2/4/2023</b>	<b>Date</b>
<b>Ted Van Holland, P.E.</b>	<b>Prepared By</b>
Disclaimer: Considerable care was exercised in developing this software. However, the Idaho Department of Environmental Quality makes no warranty regarding its accuracy and shall not be held liable for any damages resulting from its use.	



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

V. 1.3 5/2/2002

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<b>INPUT</b>				<b>OUTPUT</b>		
<b>Water Budget</b>	<b>Input Value</b>	<b>Default Value</b>		<b>Yearly Water Budget</b>	<b>Volume (m<sup>3</sup>)</b>	<b>% of Total</b>
Hydraulic Conductivity (ft/day)	21.000	Site-specific		Ground Water	4.94E+04	97.5
Hydraulic Gradient	0.025	Site-specific		Effluent	5.53E+02	1.1
Mixing Zone Thickness (ft)	15	15	<b>Default</b>	Recharge	7.17E+02	1.4
Aquifer Width Perpendicular to Flow (ft)	606	Site-specific		<b>Total Water Volume</b>	<b>5.06E+04</b>	
Parcel Area (acres)	3.75	Site-specific		<b>Point of Compliance Nitrate Concentration Goal (mg/l)</b>	<b>1.8</b>	
Percent of Parcel That Is Impervious (Percent)	8.3	Site-specific		<b>Avg. Downgradient Nitrate Concentration in GW (mg/l)</b>	<b>1.3</b>	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific		<b>Current/Acceptable Lot Size (Acres)</b>	<b>3.8</b>	
Septic Tank Effluent (gallons/d/home)	400	300	<b>Provide Justification</b>			
Natural Recharge rate (inches/yr)	2.0286	Site-specific				
<b>Nitrogen Budget</b> (all concentrations represent nitrate nitrogen)				<b>Yearly Nitrogen Budget</b>		
Upgradient Ground Water Concentration (mg/l)	0.8	Site-specific			<b>Mass (mg)</b>	<b>% of Total</b>
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	<b>Default</b>	Background GW Nitrate Mass	3.95E+07	61.2
Denitrification Rate (decimal fraction)	0	0	<b>Default</b>	Septic Tank Effluent Nitrate Mass	2.49E+07	38.5
Nitrate in Natural Recharge (mg/l)	0.3	0.3	<b>Default</b>	Recharge Nitrate Mass	2.15E+05	0.3
				<b>Total Nitrate Mass</b>	<b>6.46E+07</b>	

**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.

<b>Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)</b>	
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
<b>Typical Range of Hydraulic Gradient</b>	0.0001 to 0.1

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

<b>SITE INFORMATION</b>	
<b>Peacock Subdivision</b>	<b>Site Name</b>
<b>Lot 2: Conventional Treatment</b>	<b>Parcel Identification</b>
<b>2/4/2023</b>	<b>Date</b>
<b>Ted Van Holland, P.E.</b>	<b>Prepared By</b>
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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.

<b>INPUT</b>				<b>OUTPUT</b>		
<b>Water Budget</b>	<b>Input Value</b>	<b>Default Value</b>		<b>Yearly Water Budget</b>	<b>Volume (m<sup>3</sup>)</b>	<b>% of Total</b>
Hydraulic Conductivity (ft/day)	21.000	Site-specific		Ground Water	5.18E+04	97.8
Hydraulic Gradient	0.025	Site-specific		Effluent	5.53E+02	1.0
Mixing Zone Thickness (ft)	15	15	<b>Default</b>	Recharge	6.31E+02	1.2
Aquifer Width Perpendicular to Flow (ft)	636	Site-specific		<b>Total Water Volume</b>	<b>5.30E+04</b>	
Parcel Area (acres)	3.3	Site-specific		<b>Point of Compliance Nitrate Concentration Goal (mg/l)</b>	<b>1.8</b>	
Percent of Parcel That Is Impervious (Percent)	8.3	Site-specific		<b>Avg. Downgradient Nitrate Concentration in GW (mg/l)</b>	<b>1.3</b>	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific		<b>Current/Acceptable Lot Size (Acres)</b>	<b>3.3</b>	
Septic Tank Effluent (gallons/d/home)	400	300	<b>Provide Justification</b>			
Natural Recharge rate (inches/yr)	2.0286	Site-specific				
<b>Nitrogen Budget</b> (all concentrations represent nitrate nitrogen)				<b>Yearly Nitrogen Budget</b>		
Upgradient Ground Water Concentration (mg/l)	0.8	Site-specific			<b>Mass (mg)</b>	<b>% of Total</b>
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	<b>Default</b>	Background GW Nitrate Mass	4.14E+07	62.3
Denitrification Rate (decimal fraction)	0	0	<b>Default</b>	Septic Tank Effluent Nitrate Mass	2.49E+07	37.4
Nitrate in Natural Recharge (mg/l)	0.3	0.3	<b>Default</b>	Recharge Nitrate Mass	1.89E+05	0.3
				<b>Total Nitrate Mass</b>	<b>6.65E+07</b>	

**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.

<b>Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)</b>	
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
<b>Typical Range of Hydraulic Gradient</b>	0.0001 to 0.1

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

<b>SITE INFORMATION</b>	
<b>Peacock Subdivision</b>	<b>Site Name</b>
<b>Lot 3; Conventional Treatment</b>	<b>Parcel Identification</b>
<b>2/4/2023</b>	<b>Date</b>
<b>Ted Van Holland, P.E.</b>	<b>Prepared By</b>
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**IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET**

V. 1.3 5/2/2002

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<b>INPUT</b>				<b>OUTPUT</b>		
<b>Water Budget</b>	<b>Input Value</b>	<b>Default Value</b>		<b>Yearly Water Budget</b>	<b>Volume (m<sup>3</sup>)</b>	<b>% of Total</b>
Hydraulic Conductivity (ft/day)	21.000	Site-specific		Ground Water	4.94E+04	97.7
Hydraulic Gradient	0.025	Site-specific		Effluent	5.53E+02	1.1
Mixing Zone Thickness (ft)	15	15	<b>Default</b>	Recharge	6.31E+02	1.2
Aquifer Width Perpendicular to Flow (ft)	606	Site-specific		<b>Total Water Volume</b>	<b>5.05E+04</b>	
Parcel Area (acres)	3.3	Site-specific				
Percent of Parcel That Is Impervious (Percent)	8.3	Site-specific		<b>Point of Compliance Nitrate Concentration Goal (mg/l)</b>	<b>1.8</b>	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific				
Septic Tank Effluent (gallons/d/home)	400	300	<b>Provide Justification</b>	<b>Avg. Downgradient Nitrate Concentration in GW (mg/l)</b>	<b>1.3</b>	
Natural Recharge rate (inches/yr)	2.0286	Site-specific		<b>Current/Acceptable Lot Size (Acres)</b>	<b>3.3</b>	
<b>Nitrogen Budget</b> (all concentrations represent nitrate nitrogen)				<b>Yearly Nitrogen Budget</b>		
					<b>Mass (mg)</b>	<b>% of Total</b>
Upgradient Ground Water Concentration (mg/l)	0.8	Site-specific		Background GW Nitrate Mass	3.95E+07	61.2
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	<b>Default</b>	Septic Tank Effluent Nitrate Mass	2.49E+07	38.5
Denitrification Rate (decimal fraction)	0	0	<b>Default</b>	Recharge Nitrate Mass	1.89E+05	0.3
Nitrate in Natural Recharge (mg/l)	0.3	0.3	<b>Default</b>	<b>Total Nitrate Mass</b>	<b>6.45E+07</b>	

**Instructions for Use**

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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.

<b>Ranges of Hydraulic Conductivity (K) for Unconsolidated Sediments (feet/day)</b>	
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
<b>Typical Range of Hydraulic Gradient</b>	0.0001 to 0.1

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

<b>SITE INFORMATION</b>	
<b>Peacock Subdivision</b>	<b>Site Name</b>
<b>Lot 4; Conventional Treatment</b>	<b>Parcel Identification</b>
<b>2/4/2023</b>	<b>Date</b>
<b>Ted Van Holland, P.E.</b>	<b>Prepared By</b>
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**IDEQ LEVEL 1 NUTRIENT-PATHOGEN EVALUATION NITROGEN MASS-BALANCE SPREADSHEET**

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<b>INPUT</b>				<b>OUTPUT</b>		
<b>Water Budget</b>	<b>Input Value</b>	<b>Default Value</b>		<b>Yearly Water Budget</b>	<b>Volume (m<sup>3</sup>)</b>	<b>% of Total</b>
Hydraulic Conductivity (ft/day)	21.000	Site-specific		Ground Water	5.47E+04	97.0
Hydraulic Gradient	0.025	Site-specific		Effluent	5.53E+02	1.0
Mixing Zone Thickness (ft)	15	15	<b>Default</b>	Recharge	1.15E+03	2.0
Aquifer Width Perpendicular to Flow (ft)	671	Site-specific		<b>Total Water Volume</b>	<b>5.64E+04</b>	
Parcel Area (acres)	6	Site-specific		<b>Point of Compliance Nitrate Concentration Goal (mg/l)</b>	<b>1.8</b>	
Percent of Parcel That Is Impervious (Percent)	8.3	Site-specific		<b>Avg. Downgradient Nitrate Concentration in GW (mg/l)</b>	<b>1.2</b>	
Current/Acceptable Number of Homes in Parcel	1.0	Site-specific		<b>Current/Acceptable Lot Size (Acres)</b>	<b>6.0</b>	
Septic Tank Effluent (gallons/d/home)	400	300	<b>Provide Justification</b>			
Natural Recharge rate (inches/yr)	2.0286	Site-specific				
<b>Nitrogen Budget</b> (all concentrations represent nitrate nitrogen)				<b>Yearly Nitrogen Budget</b>		
Upgradient Ground Water Concentration (mg/l)	0.8	Site-specific			<b>Mass (mg)</b>	<b>% of Total</b>
Septic Tank Effluent Concentration (mg/l)	45.0	45.0	<b>Default</b>	Background GW Nitrate Mass	4.37E+07	63.4
Denitrification Rate (decimal fraction)	0	0	<b>Default</b>	Septic Tank Effluent Nitrate Mass	2.49E+07	36.1
Nitrate in Natural Recharge (mg/l)	0.3	0.3	<b>Default</b>	Recharge Nitrate Mass	3.44E+05	0.5
				<b>Total Nitrate Mass</b>	<b>6.89E+07</b>	

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 (inches/yr) = (TAP)<sup>2</sup> \* 0.0046  
 TAP is input in inches/yr.

<b>SITE INFORMATION</b>	
<b>Peacock Subdivision</b>	<b>Site Name</b>
<b>Lot 5; Conventional Treatment</b>	<b>Parcel Identification</b>
<b>2/4/2023</b>	<b>Date</b>
<b>Ted Van Holland, P.E.</b>	<b>Prepared By</b>
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