APPENDIX E

2019 Mission Ridge Hydrology Memo

"Solutions to water quality, quantity, permitting & planning issues"

December 31, 2019

Clay White
Director of Planning, LDC, Inc.
20210 142nd Ave NE
Woodinville, WA 98072

Re: Mission Ridge Hydrogeology for Plan Revision

Dear Mr. White:

Per your request, the Water & Natural Resource Group, Inc. (WNR Group) reviewed the proposed application revisions for Planned Residential and Commercial construction at the Mission Ridge Expansion development. On March 26th, 2018, the WNR Group prepared a Hydrogeology Review Memorandum for the proposed project. This Hydro Memorandum presented the following conclusions and recommendations:

"The preliminary hydrogeologic investigation at the site has determined that the availability of future water needs may be present in deep bedrock fractures in the vicinity of the proposed Mission Ridge Expansion project as defined by EMS and VLF geophysical surveys. These fractures appear to be in some degree of hydraulic continuity with surface water in the Squilchuck Creek drainage. Several water rights are currently used at the Mission Ridge ski area for indoor use and snow making activities. Although these approved diversions are located within the lower drainage area, it appears that the deep bedrock aquifers may be the source for the intermittent creeks, and as such can be inferred to be within the same hydrologic water budget.

Proposed water use at the expansion project will primarily occur during winter and spring months when water is most available. Proposed snow making, a non consumptive use, will also be a benefit to creek flows in spring and summer months, by allowing additional snow pack melt to the creeks.

In summary, it is our opinion, that the potential availability of groundwater for domestic and snow making uses may be available from deep bedrock factures at the site. These deep bedrock fractures appear to be in hydraulic continuity with the surface waters near the ski area where current water right diversions are being utilized."

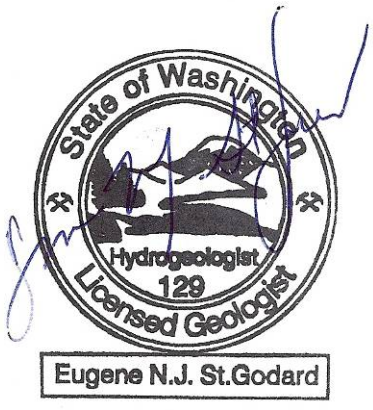
WNR Group has reviewed the changes to the phased planning related to the Mission Ridge Project. The changes proposed appear to represent a de minimus change of potential water requirements from the original application. As such, the WNR Group does not recommend any additional changes to the Hydrogeologic Memo dated March 26th, 2019.

On March 19th, 2018, the WNR Group prepared Memorandum that outlined a Scope of Work for further defining the potential for water resource availability at the site. The change under the revised application does not warrant a proposed change to the future recommendations for hydrogeologic work required for future water supply. Therefore, the WNR Group still recommends that the next phase of hydrogeologic work be conducted as outlined in our March 19th, 2018 Memorandum – "The Mission Ridge Expansion – Estimate of Future Work". The completion of the recommended Scope of Work will assist with fully defining the water availability for the site.

We appreciate the opportunity to be of service to Tamarack, LLC in providing our interpretation of groundwater conditions at the Site. Should you have any questions regarding this Memorandum, please do not hesitate to call us at your earliest convenience.

Very truly yours,
Water & Natural Resource Group, Inc.

Eugene N.J. St.Godard, R.G., L.Hg.
Principal Hydrogeologist/Owner
WNR Group, Inc.



Signed: December 31st, 2019

Water & Natural Resource Group, Inc.
Gene St.Godard, R.G., L.Hg., CWRE
PO Box 28755
Spokane, Washington 99228
Cell: 509-953-9395

MEMORANDUM

To: **Mr. Larry Scrivanich**
PO Box 2174
Woodenville, WA 98072

From: **Gene St.Godard, P.G., L.Hg., CWRE**
Water & Natural Resource Group, INC.
Spokane, WA

Date: **March 26th, 2018**

Re: **Mission Ridge Expansion Preliminary Hydro Review**

Project No: 077-001 – Mission Ridge

SITE BACKGROUND

The Mission Ridge Expansion proposed development is located within private property near the Mission Ridge Ski Area located approximately eight miles southwest of Wenatchee within Chelan County (Figure 1). The property consists of 650 acres and is located within Section 19 and the NE¼ Section 30, Township 21 North, Range 20 E.W.M. (Figure 2). The subject area is currently zoned RR20 and the general plan designation is Land Use Code 88, Designated Forest Land. The property is identified in the Chelan County records as Property Identification No. (PIN) 19014, Parcel No. 212019000000 (Sec. 19) and PIN 19051. Parcel No. 212030100050 (Sec. 30), owned by Tamarack Saddle LLC. The proposed development will require water for up to a 400-unit multifamily community comprised of an estimated 120 single family homes and 280 condominium units, constructed in four phases over many years (Figure 3).

This Memorandum outlines the preliminary study used to identify potential water sources to supply potable drinking water to the proposed community.

PHYSIOGRAPHIC SETTING

The Mission Ridge Expansion development is located within a part of the Squilchuck Basin watershed which contributes water within the basin to Squilchuck Creek; Squilchuck Cheek then flows in a generally northeasterly direction where it discharges directly to the Columbia River. The site is located in the National Watershed Boundary Dataset as Squilchuck Creek Subbasin. These subbasins are developed as follows:

> The Watershed Boundary Dataset (WBD) is a comprehensive aggregated collection of hydrologic unit data consistent with the national criteria for delineation and resolution. It

> defines the areal extent of surface water drainage to a point except in coastal or lake front areas where there could be multiple outlets as stated by the "Federal Standards and Procedures for the National Watershed Boundary Dataset (WBD)" "Standard". Watershed boundaries are determined solely upon science-based hydrologic principles, not favoring any administrative boundaries or special projects, nor particular program or agency. This dataset represents the hydrologic unit boundaries to the 12-digit (6th level) for the entire United States. Some areas may also include additional subdivisions representing the 14- and 16-digit hydrologic unit (HU). At a minimum, the HUs are delineated at 1:24,000-scale in the conterminous United States, 1:25,000-scale in Hawaii, Pacific basin and the Caribbean, and 1:63,360-scale in Alaska, meeting the National Map Accuracy Standards (NMAS). Higher resolution boundaries are being developed where partners and data exist and will be incorporated back into the WBD. WBD data are delivered as a dataset of polygons and corresponding lines that define the boundary of the polygon. WBD polygon attributes include hydrologic unit codes (HUC), size (in the form of acres and square kilometers), name, downstream hydrologic unit code, type of watershed, non-contributing areas, and flow modifications. The HUC describes where the unit is in the country and the level of the unit. WBD line attributes contain the highest level of hydrologic unit for each boundary, line source information and flow modifications.

Within the Washington State database, the site is identified as being within the northern portions of the Alkali-Squilchuck Water Resource Inventory Area (WRIA 40). Figure 4 presents a map showing the identification of the Washington State WRIA boundary and the National WBD subbasin boundaries. Note on map that boundaries within the different data bases do not exactly match.

This area is mountainous terrain with a variety of ecosystems and is being developed using an environmentally sensitive design that takes advantage of the land's natural contours. The Mission Ridge Expansion development plan has been formulated recognizing that significant potential and demand exists for overnight lodging and housing at the Mission Ridge Ski Area.

The United States Geological Survey (USGS) topographic quadrangle maps for the Site and vicinity were reviewed to determine the physical setting of the Site. The Site is located within the eastern area of the Mission Ridge, Washington 7-1/2 minute quadrangle map dated 1987 and the western edge of the Wenatchee Heights, WA 7-1/2 minute quadrangle map dated 1987. As shown on Figures 4 and 5, the Site is located along the southeast valley wall of Squilchuck Creek drainage, of which the north half and southwest quarter of Section 19 drains to Squilchuck Creek. The southeast quarter of the section drains towards the Stemilt Creek subbasin. For the hydrogeologic assessment, the portion of the property which lies within the Squilchuck Creek drainage will be the focus for identifying additional potential water sources. The general slope of this portion of the property is to the northwest in the western part of the property and to the north in the northern portions of the property. Slopes generally fall to the incised drainages of Squilchuck Creek.

Elevation relief across the property is approximately 1440 feet, with the highest elevation of approximately 4840 feet above msl in the central part of the property, which is the center of Section 19 and a low elevation of approximately 3400 feet above msl in the Squilchuck Creek drainage in the northeastern area of the property. Shallow unconfined groundwater in the gravels

perched on bedrock beneath the Site is inferred to flow to the drainages, as interpreted from the topographic slope in the area of the property. This inference is examined relative to physical data in this document.

SURFACE WATER IN SITE AREA

The Mission Ridge Expansion lies within a mountainous terrain which contains numerous springs and steep incised creeks. In the immediate area of the Site, several small unnamed intermittent creeks, which are inferred to be recharged from shallow springs located near the headwaters, flow in a northwesterly direction across the property. These intermittent deeply incised creek flows appear to be highly variable for short and for long-term durations, and is representative of the precipitation, snowpack, and temperatures within the Squilchuck Creek subwatershed. Flows are inferred to correlate with available groundwater from the thin shallow perched unconsolidated aquifer, and are dependent upon snowmelt and rain-on-snow events. Various unnamed intermittent tributaries flow directly into Squilchuck Creek which is tributary to the Columbia River near Wenatchee, WA.

Flow of creeks and streams in mountainous terrain varies highly, and depends directly on precipitation and snowpack. In this type of terrain, which has been visually observed at the Site, low flows occur during late fall and throughout the winter months. This flow is produced by low precipitation and high evapotranspiration (ET) from July through September, and October through March precipitation falling as snowpack. Flows increase in the late winter months and spring as rain-on-snow events occur and melting snow provides recharge to the creeks.

GEOLOGIC SETTING

The area between Wenatchee and Osoyoos, WA is within the eastern margin of the North Cascade subcontinent (Alt & Hyndman, 2002). West of Wenatchee is the area geologically identified as the Chiwaukum Graben, in which the Chumstick Formation is located. This geologic area butts up to the south against the Miocene Columbia River basalt plateau. North of the site near the town of Chelan was the southern extent of the of the glacial advance, with all of the country north of Chelan buried under the Okanogan lobe of the big ice sheet during the last ice age (Alt & Hydnman, 2002). The area south of Chelan, in the area of the Columbia River Valley, was scoured out by the regional Spokane glacial floods.

The Washington State DNR geologic map (WDNR, 1991) for the area of the Site was reviewed to interpret geologic conditions. As shown on Figure 6, the Site is located in the Wenatchee Mountains, which are located west of the Columbia River Valley in this area. The Site is located within the southern portion of an area defined as the Chiwaukum Graben (Willis, 1953). The area of the site is underlain by geologic units of early to middle Tertiary age and are covered by Columbia River Basalt Group rocks of Miocene age in areas to the south (Gressens, 1983). As shown on Figures 6 and 7, the site is underlain primarily by Tertiary Age sedimentary rocks of the Chumstick Formation. The Chumstick Formation in the area of the site is comprised mostly of sedimentary rocks.

The geology of the immediate area of the site is best described by Gressens et. al. (1981) as:

“The Chiwaukum graben in central Washington contains two unconformity-bounded fluvial and lacustrine units, here named the "Chumstick" and "Wenatchee" Formations. The Chumstick is dated at 45 m.y. (middle Eocene), and the Wenatchee is dated at 34 m.y. (early Oligocene) by the fission-track method on zircons from tuffs. Previously, both formations were thought to be part of the Swauk Formation, which is older. The Chumstick Formation rests on weathered crystalline basement and is several thousands of meters thick. Fanglomerate occurs at the base and along the margins. Most of the formation consists of feldspathic sandstone and pebbly sandstone of fluvial origin; but within the upper part, there is a lacustrine unit, herein designated the Nahahum Canyon Member. Tuff is common in the lower part of the formation. Both of the bounding faults, the Leavenworth and the Entiat, were active during deposition of the Chumstick Formation, but relief was greatest on the northeast (Entiat) side. The Wenatchee Formation occurs in the vicinity of Wenatchee, Washington, and is ≤300 m thick. It unconformably overlies the Chumstick Formation within the graben but overlaps the northeast side of the graben, where it lies directly on weathered metamorphic basement. The Wenatchee Formation, like the Chumstick, was deposited primarily in fluvial and lacustrine environments; unlike the Chumstick, much of the sediment is mature quartz sandstone. Relief in the source area probably was very subdued during its deposition.”

The geologic maps in the area show the bedrock near the Site contains numerous large fault zones (Figure 6), which often display water-bearing splay faults. Fault lines will typically form the Site’s linear valleys. The area is heavily faulted with the NW-SE trending faults thrusting rock layers to the northeast, as depicted in Figure 8 (Gressens, 1983).

EMS SURVEYWORK

An EMS satellite survey was flown for the subject property, allowing the identification of deep water-bearing fractures. Geophysical surveying methods have been used since the 1940’s for the interpretation of various geological conditions. The technology used in this survey is used to find useful quantities of underground water that may be present in fractures and voids. Using the magnetic component of the electromagnetic field generated by VLF (very low frequency) transmitters, it is possible to locate anomalies, such as saturated fractures within the bedrock. Identification of water-bearing fractures is difficult and the geology and hydrogeology professions typically use geophysical methods to assist with the location and depth of fracture aquifers. Geophysical surveys should not be used to confirm water source information, but they do provide projections of potential water sources. Location, depth, and yield of bedrock aquifers from the interpretation of the geophysical data is a professional best-judgment, and no exact warranty of the potential aquifer characteristics exists without the completion of subsurface exploration (e.g. drilling).

Figure 9 (western area near ski area) and Figure 10 (eastern area near expansion) presents the results of the EMS geophysical survey conducted at the project site. As shown in the figures, there are numerous fractures with potential water located across the Site. The highest probability of locating groundwater is typically where two or more fractures intersect within the fractures containing the strongest geophysical signature. Numerous fractures across the Site show high signatures (5 to 6), and therefore probably contain groundwater. A more detailed site investigation using field VLF technologies was conducted at the Site on June 22, 2017 in order

to identify three to four locations which may contain the highest probability of groundwater for project use.

The VLF ground verification supported the EMS Survey in determining that points #4, #5, and #6 are the preferred drilling locations of the anomalies identified in the satellite survey. In addition, a VLF survey was conducted in the western area of the site in case an additional water supply well was needed near the ski lodge. The EMS and VLF surveys recommended site anomaly #10 in this area. These four sites are identified as proposed wells PW-4, PW-5, PW-6 and PW-10 on Figures 4, 7, and 11.

Ecology Water Well Logs - An Internet search of the Washington State Department of Ecology's water well database was conducted. Search criteria of Township 21 North, Range 20 East, Section 19, and Township 21 North, Range 19 East, Sections 24, 25 and 26 was entered. Only one well log was identified within the four sections searched. This well log is for the domestic well at the Ski Area lodge facility within the SE ¼ SW ¼ Section 24, T21N., R19E.W.M. The well log is shown in Figure 12.

The well log is only completed to a depth of 100 feet below grade and intercepted gravels and clay to a depth of 48 ft, then intercepted basalt with gravel interbeds to the full depth explored of 100 feet. Yield in the well was estimated at 100 gpm at the time of drilling.

Hydrogeologists Site Visit

Gene St.Godard, a licensed Professional Hydrogeologist in Washington (L.Hg. #129), conducted a site visit on June 22nd, 2017. The geologic conditions of the site were inspected during this site visit. The field visit also consisted of looking for bedrock outcroppings, talus and colluvium on and in the vicinity of the property to document the geologic setting of the area. Numerous outcroppings of sedimentary rocks were observed on or near the site. A generalized search of the existing ski lodge property in Section 24 and the proposed development property in Section 19 and 30 was conducted in order to document the location of the existing and proposed water source locations. Four existing water diversions are located on the ski lodge property in addition to a constructed reservoir. Locations of these sites are shown on Table 1 and Figure 11. These diversions divert water under existing water rights.

Four proposed well locations were also identified in the field and GPS locations collected. These included one location near the existing lodge (PW-10) and three within Section 19 (PW-4, PW-5, and PW-6). The GPS locations are shown in Table 2 and on Figure 11.

Table 1: Site Water Diversion GPS Coordinates

Existing Diversions	Latitude	Longitude
AEH922 (8-inch existing Dom Well)	N47.29138	W-120.39857
Lake Creek Diversion	N47.29322	W-120.40172
Developed Spring Location (36"-corrugated pipe)	N47.29316	W-120.40247
Squilchuck Diversion (within buried vault)	N47.29094	W-120.70008
Reservoir (at top of hill)	N47.28117	W-120.42853

Table 2: Proposed Well GPS Coordinates

Proposed Wells	Latitude	Longitude
PW-4	N47.29572	W-120.37807
PW-5	N47.29506	W-120.37875
PW-6	N47.29523	W-120.38130
PW-10	N47.29362	W-120.39642

HYDROGEOLOGIC CONCEPTUAL MODEL

A generalized conceptual hydrogeologic model was developed to illustrate the hydraulic continuity of the aquifers underlying the Mission Ridge Development Site and the Squilchuck Creek Valley. This generalized description of the hydrogeologic system at the Site was developed from existing published documents and data, and site-specific data collected from test pits, well points, and water well drilling. The on-site data developed during this project is discussed later in the report.

The Site's hydrogeologic regimes consist of two distinct aquifer systems. The first is the shallow, seasonal perched aquifer that is located in the shallow unconsolidated sediments above the bedrock. This seasonal aquifer system is in direct hydraulic continuity with the surface water streams on the property. After snowpack has melted, this aquifer is depleted as it recharges the creeks. The second hydrogeologic system consists of a deep bedrock fracture aquifer system. This system is not in direct hydraulic continuity with the surface waters except in areas where the deep incised drainages may cross the fracture flow system. Both hydrogeologic regimes are recharged primarily from rain and snow in the spring and winter seasons.

The shallow aquifer near the Site is a thin unconfined colluvium aquifer that is inferred to be seasonal and appears to consist of only a few feet of saturated sediments. Typically within alpine systems such as at the site, saturated conditions are present only in the winter and spring months. Groundwater in this shallow unconsolidated aquifer flows from the elevated ridges towards Squilchuck Creek drainage. Some direct flow within the creeks may be a result of recharge of bedrock fracture aquifers that may be in hydraulic continuity with the intermittent streams and creeks when hydraulic heads in the fracture aquifer are elevated above the creek elevations. The ski area currently has three areas in which they are developing water from these creeks and springs. These developed areas are inferred to have a recharge component from the deep bedrock fractured aquifers.

Most water users in the mountainous terrain get drinking water from deep bedrock fracture aquifers. In the vicinity of the Site, these are located at depths of several hundred feet within the Tertiary (Eocene Age) sedimentary rocks which are in contact with the Miocene basalts south of Squilchuck Creek. These aquifers appear not to be in direct hydraulic continuity with the shallow perched aquifer. However, some hydraulic connection to surface water in the drainages may occur where the incised drainages intersect the bedrock fracture.

Groundwater and surface-water flows in the Squilchuck Creek drainage are directly influenced by the geologic controls within the valley, and may be locally variable depending on depth to bedrock and valley width for the unconsolidated aquifer and depth, lateral extent, and thickness of the fractures. Recharge to the shallow valley aquifer primarily comprises precipitation infiltration, snowpack depth, and interaction with surface water bodies. Confined aquifers in the deeper bedrock may be recharged from some infiltration along the valley walls and/or from recharge areas further up the headwaters of the drainage where the fracture systems are incised by stream erosion. Water collected in the headwaters of Squilchuck Creek and its tributaries flows through the valley in the form of shallow groundwater and surface water, and discharges to Columbia River Valley aquifer and river near the city of Wenatchee, Washington. Therefore, in our opinion, surface and groundwater within the boundaries of the Squilchuck sub-basin as outlined in Figure 4. It would be our recommendation that an exploration hole be completed either at PW-6 or PW-5.

The water budget at the existing site is what is observed in typical mountainous terrains. Availability of water is typically found during winter and spring seasons. If the proposed development occurs, the majority of use will occur during these seasons when water is available. Potable groundwater for in house use at the site will be in highest demand during the winter months, not during the low flow time period of the hydrologic cycle. In addition, water will also be required during the winter months for snow making activities. The development of a snow pack on the ski slopes near the development is a non-consumptive use, and will also effectively help stream flows during the spring and summer months by allowing more recharge to the surface waters during the spring melt. Water during summer and fall months will be de minimus at the proposed development. Therefore, it is inferred that the proposed development, which will have highest demands during spring and winter months, will not have a major affect on the water budget within the basin.

CONCLUSIONS

The preliminary hydrogeologic investigation at the site has determined that the availability of future water needs may be present in deep bedrock fractures in the vicinity of the proposed Mission Ridge Expansion project as defined by EMS and VLF geophysical surveys. These fractures appear to be in some degree of hydraulic continuity with surface water in the Squilchuck Creek drainage. Several water rights are currently used at the Mission Ridge ski area for indoor use and snow making activities. Although these approved diversions are located within the lower drainage area, it appears that the deep bedrock aquifers may be the source for the intermittent creeks, and as such can be inferred to be within the same hydrologic water budget.

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We appreciate the opportunity to be of service to Tamarack, LLC in providing our interpretation of groundwater conditions at the Site. Should you have any questions regarding this Memorandum, please do not hesitate to call us at your earliest convenience.

Very truly yours,
Water & Natural Resource Group, Inc.

Eugene N.J. St.Godard, R.G., L.Hg.
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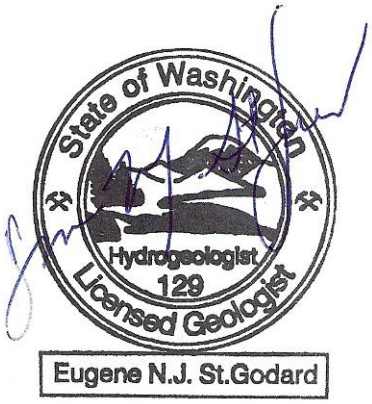

Signed: March 26th, 2018

BIBLIOGRAPHY

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United States Geological Survey, 1987: Wenatchee Heights, Washington 7-1/2 minute Topographical Map.

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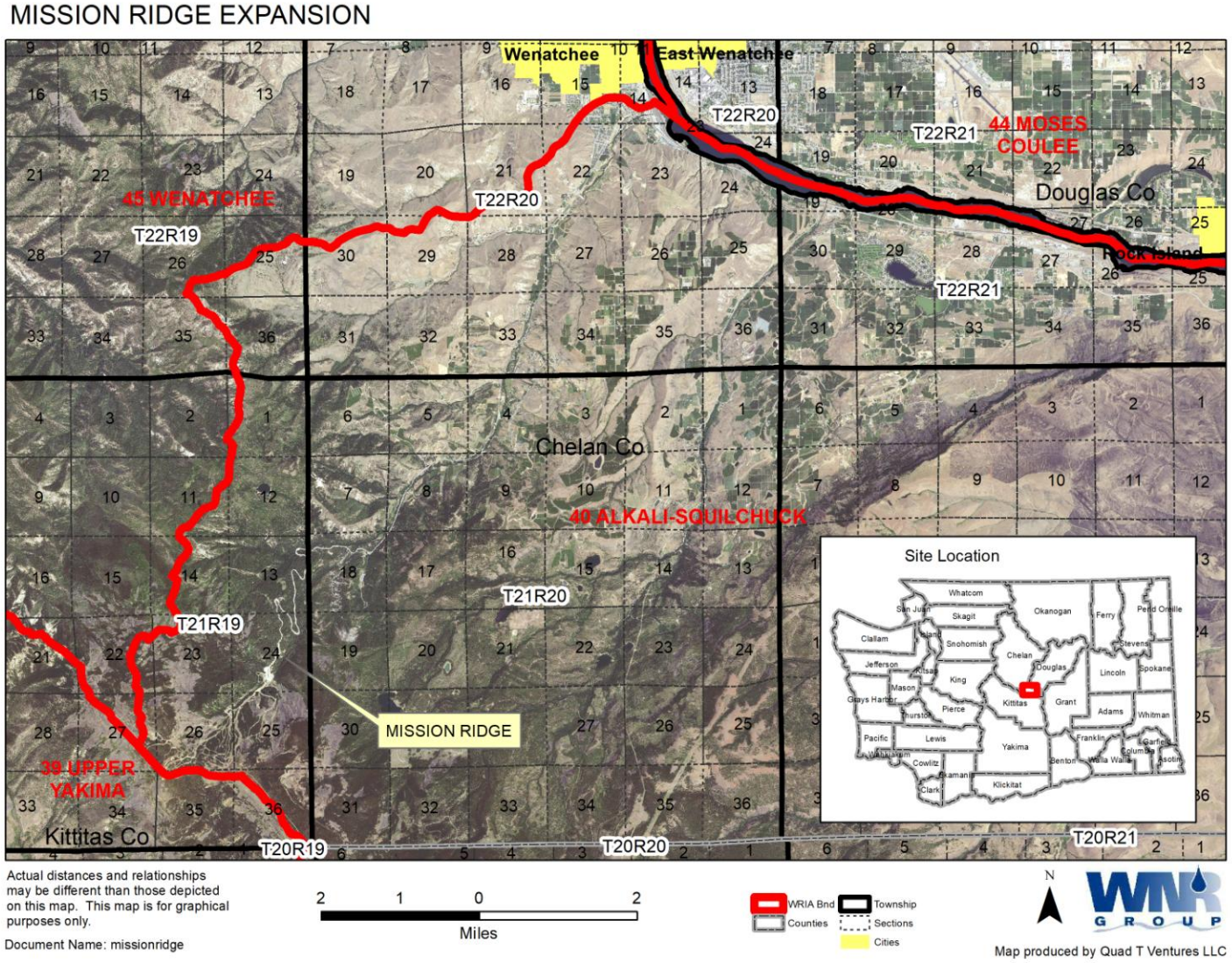


FIGURE 1: MAP SHOWING LOCATION OF MISSION RIDGE SKI AREA AND PROPOSED MISSION RIDGE EXPANSION SW OF WENATCHEE, WA.

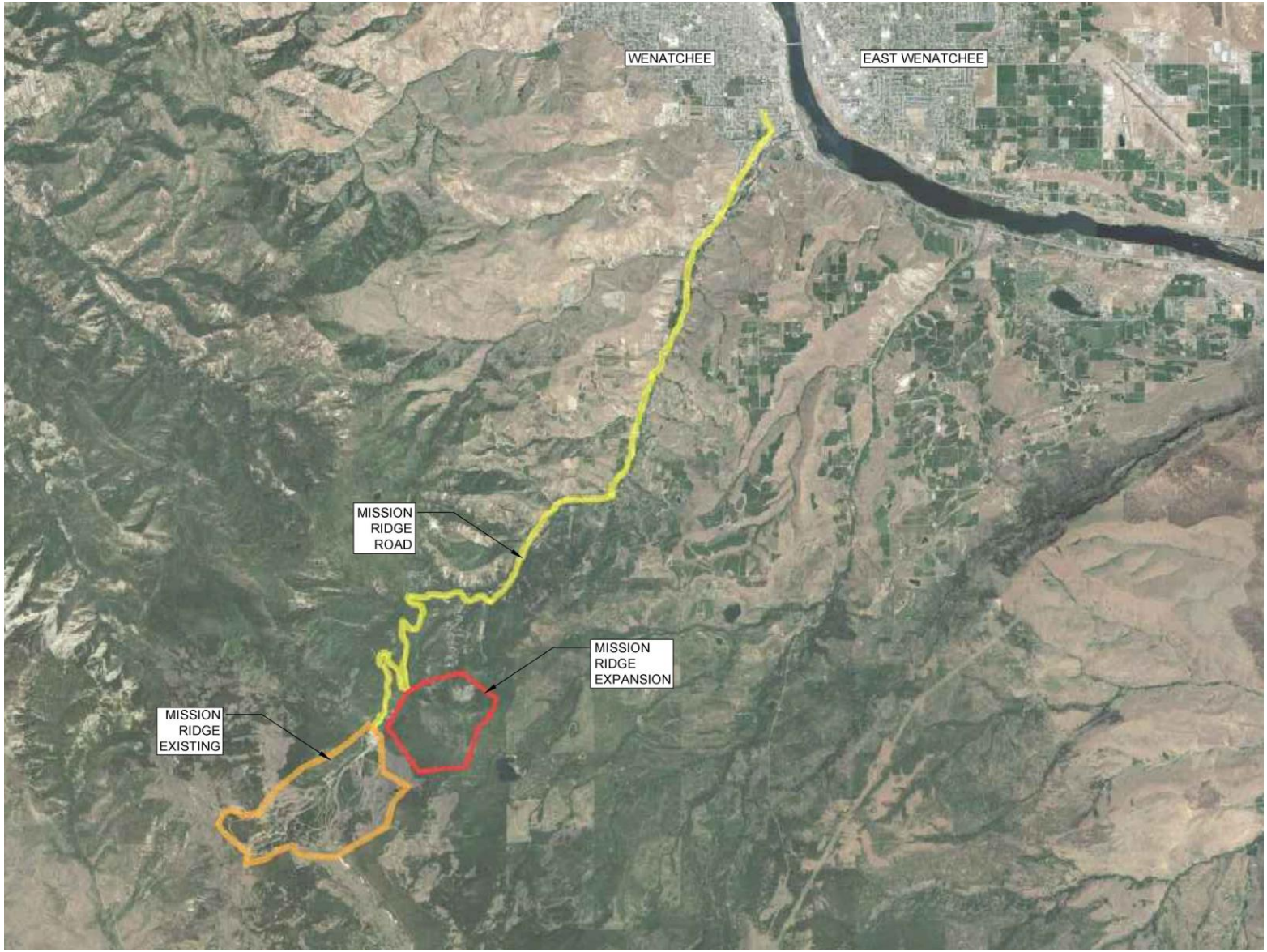


FIGURE 2: MAP SHOWING LOCATION OF PROPOSED PROJECT IN SECTION 19 (T21N, R20E.W.M.) NEXT TO MISSION RIDGE SKI AREA.

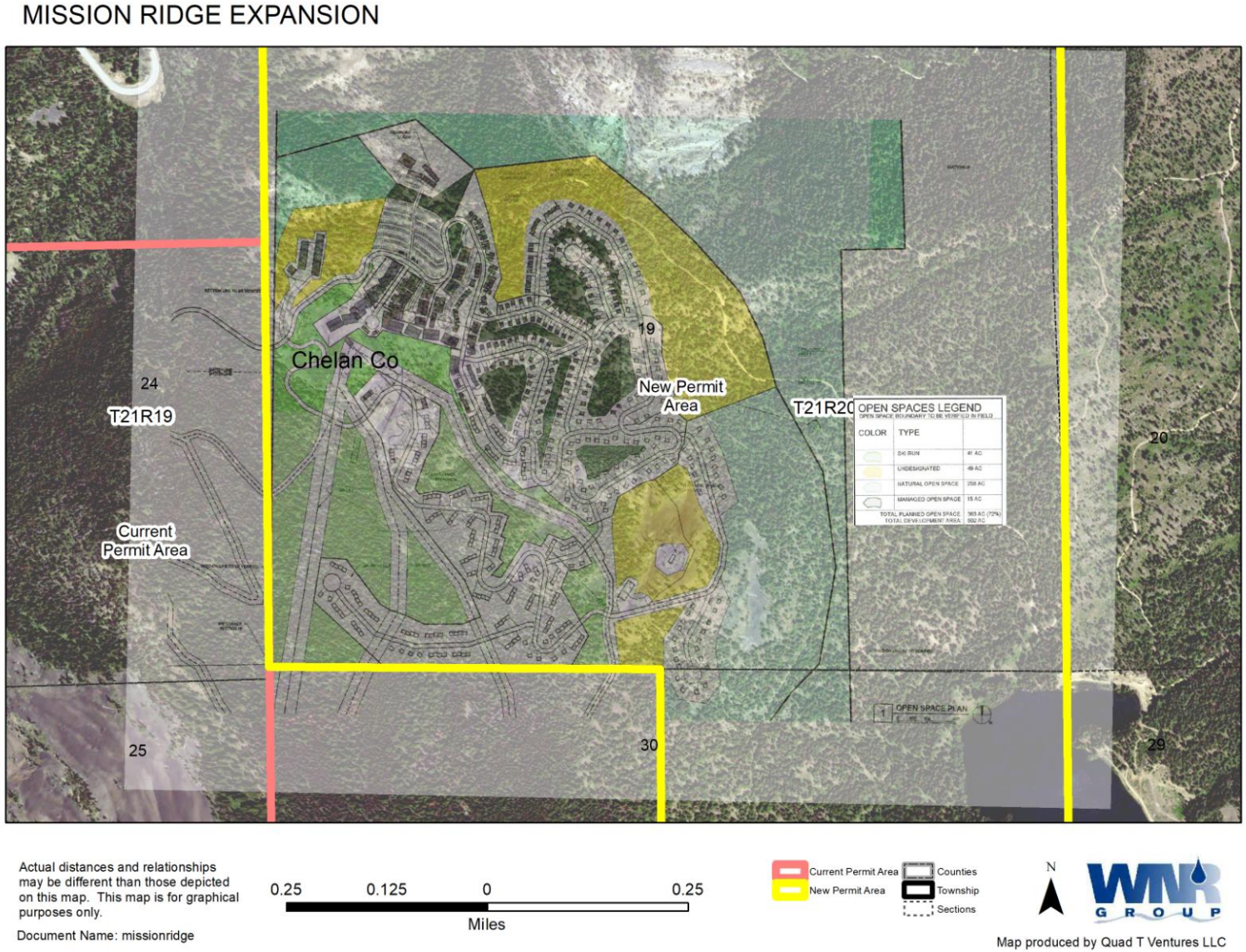


FIGURE 3: PROPOSED VILLAGE AT MISSION RIDGE EXPANSION WHICH WILL REQUIRE WATER.

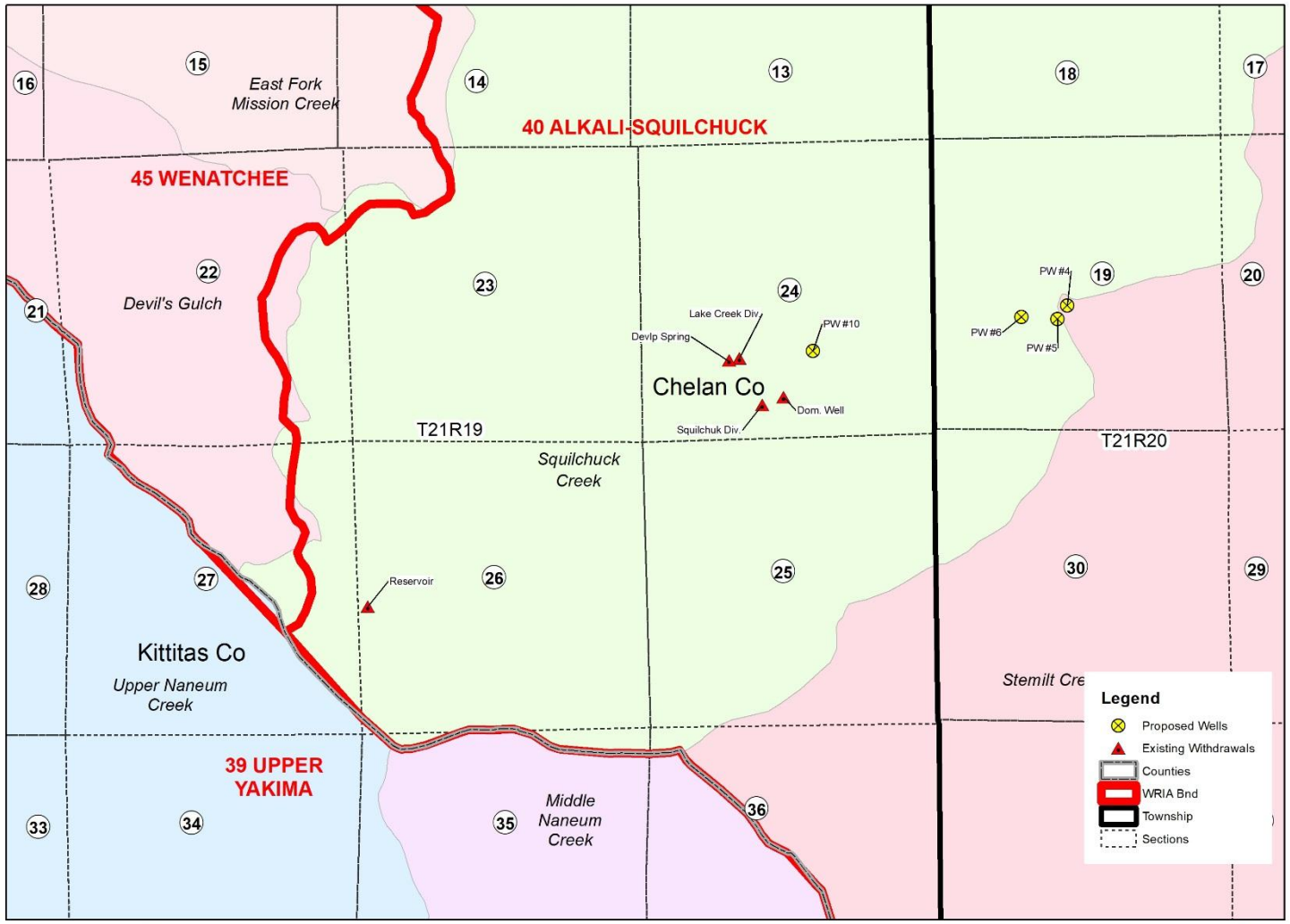


FIGURE 4: MAP SHOWING WASHINGTON STATE WRIA BOUNDARY AND NATIONAL WBD BOUNDARIES. LOCATION OF EXISITNG WATER RIGHT DIVERSION POINTS AND GEOPHYSICAL IDENTIFIED PROPOSED WELL SITES ALSO SHOWN.

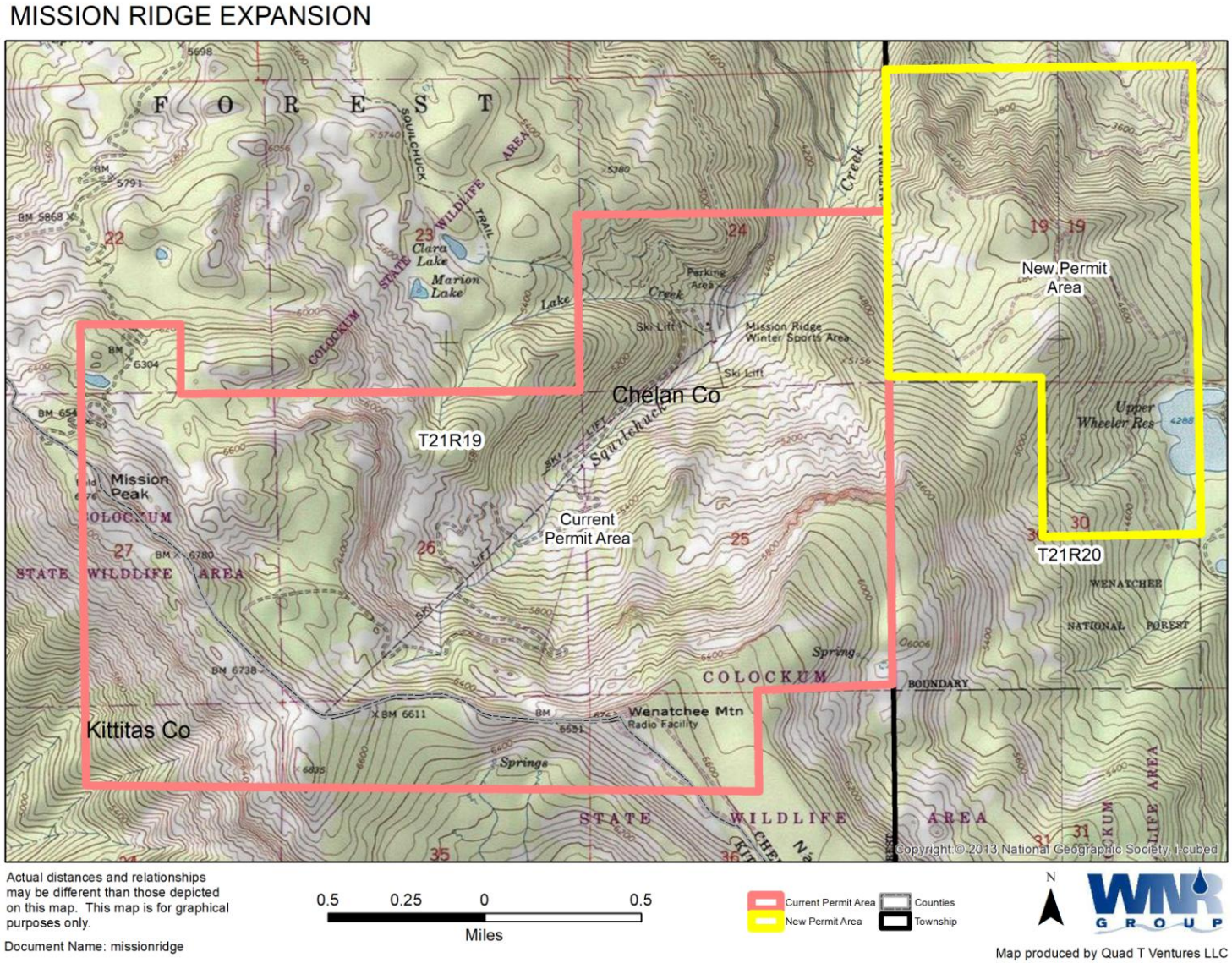


FIGURE 5: TOPOGRAPHIC MAP SHOWING LOCATION OF PROPOSED SITE IN SECTION 19 & 30, T21N, R20E.W.M.

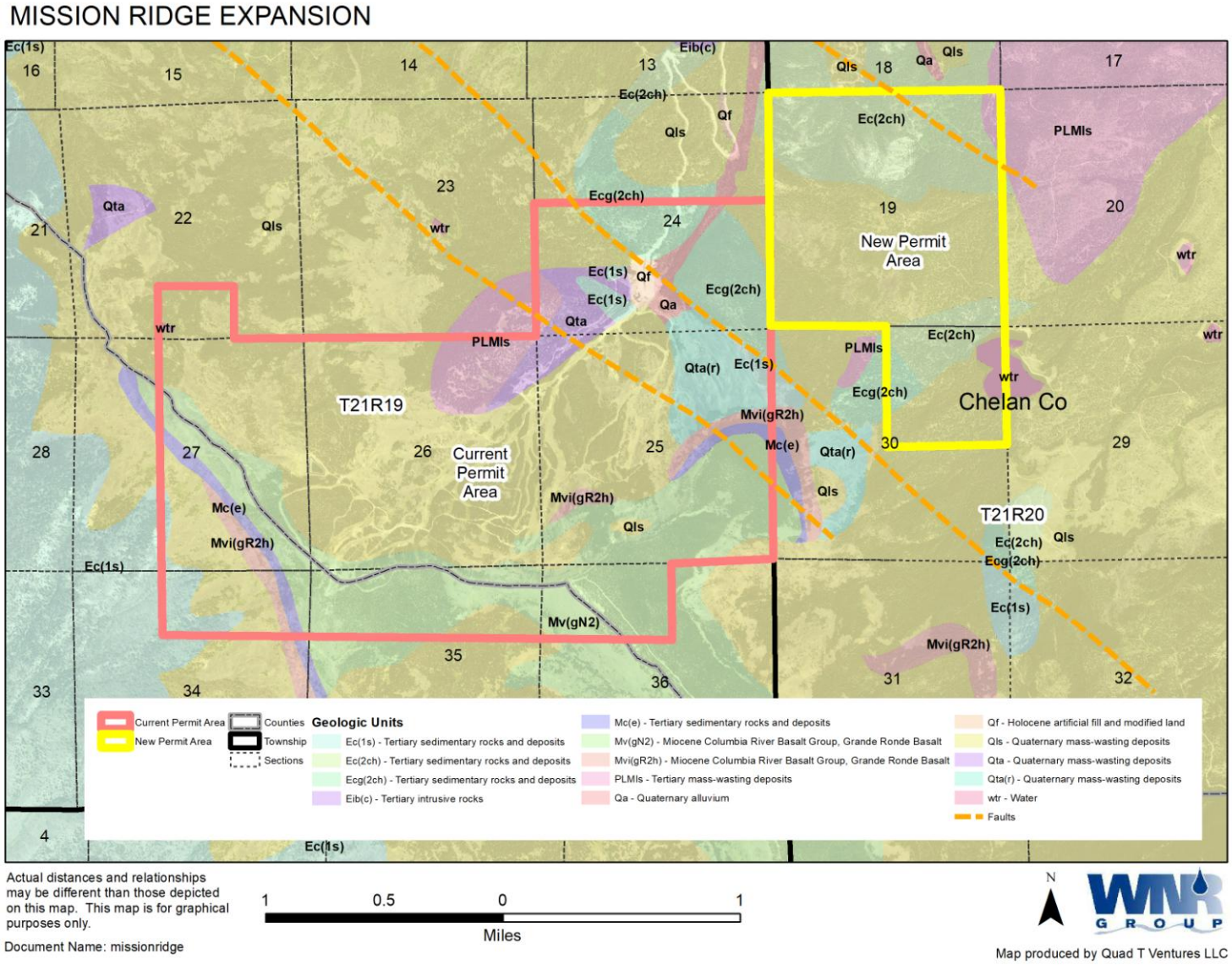


FIGURE 6: REGIONAL GEOLOGIC MAP OF THE MISSION RIDGE SKI AREA & MISSION RIDGE EXPANSION SITE.

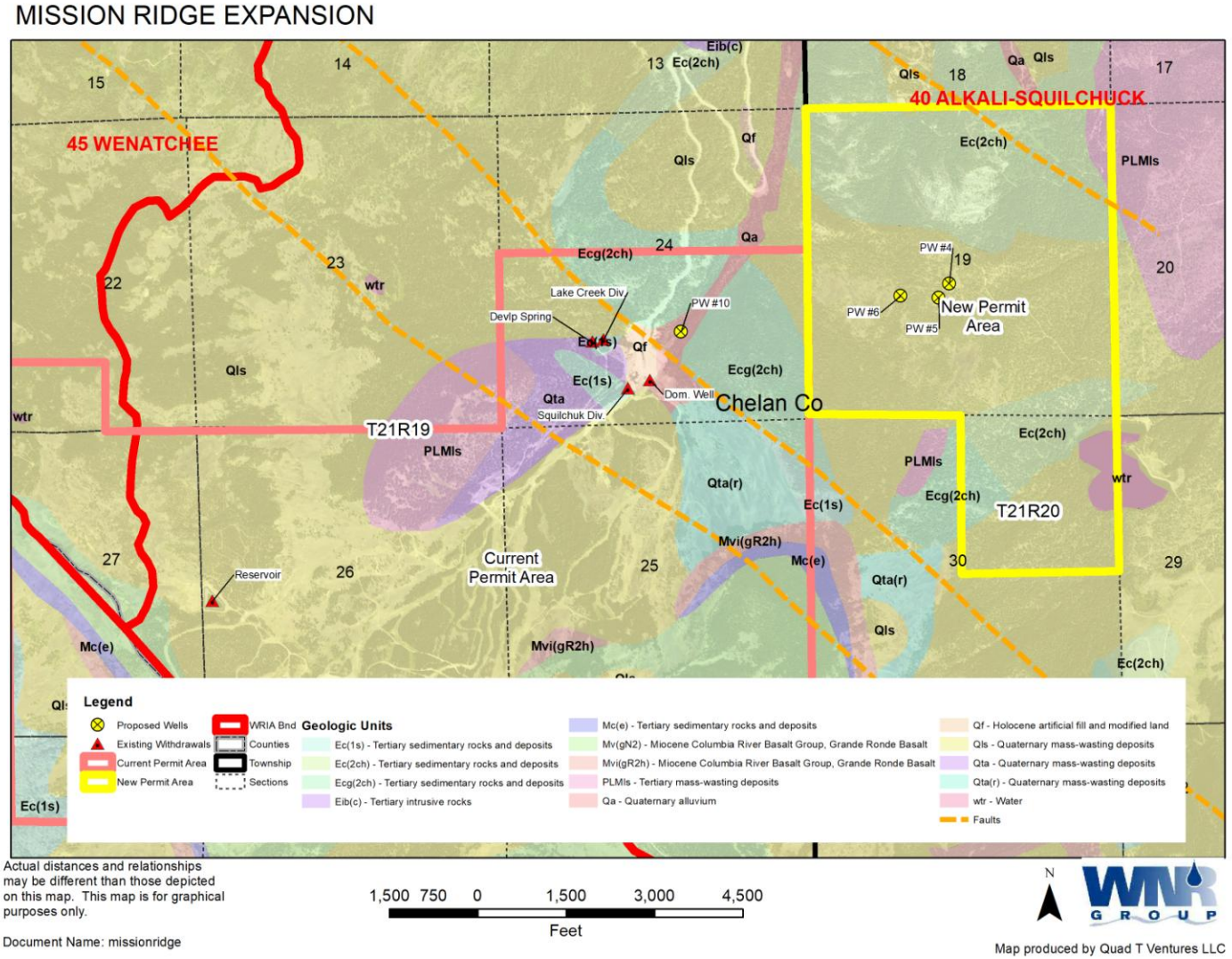


FIGURE 7: GEOLOGIC MAP OF THE IMMEDIATE AREA OF THE MISSION RIDGE EXPANSION IN SECTION 19 & 30 AND THE GENERAL AREA AROUND THE MISSION RIDGE SKI AREA WEST OF THE SITE. THE AREA IS UNDERLAIN BY TERTIARY AGE SEDIMAENTARY ROCKS COVERED WITH QUARTERNARY AGE MASS WASTING DEPOSITS. SEVERAL NW-SE TRENDING FAULTS ARE IDENTIFIED IN THE AREA (WDNR, 1991).

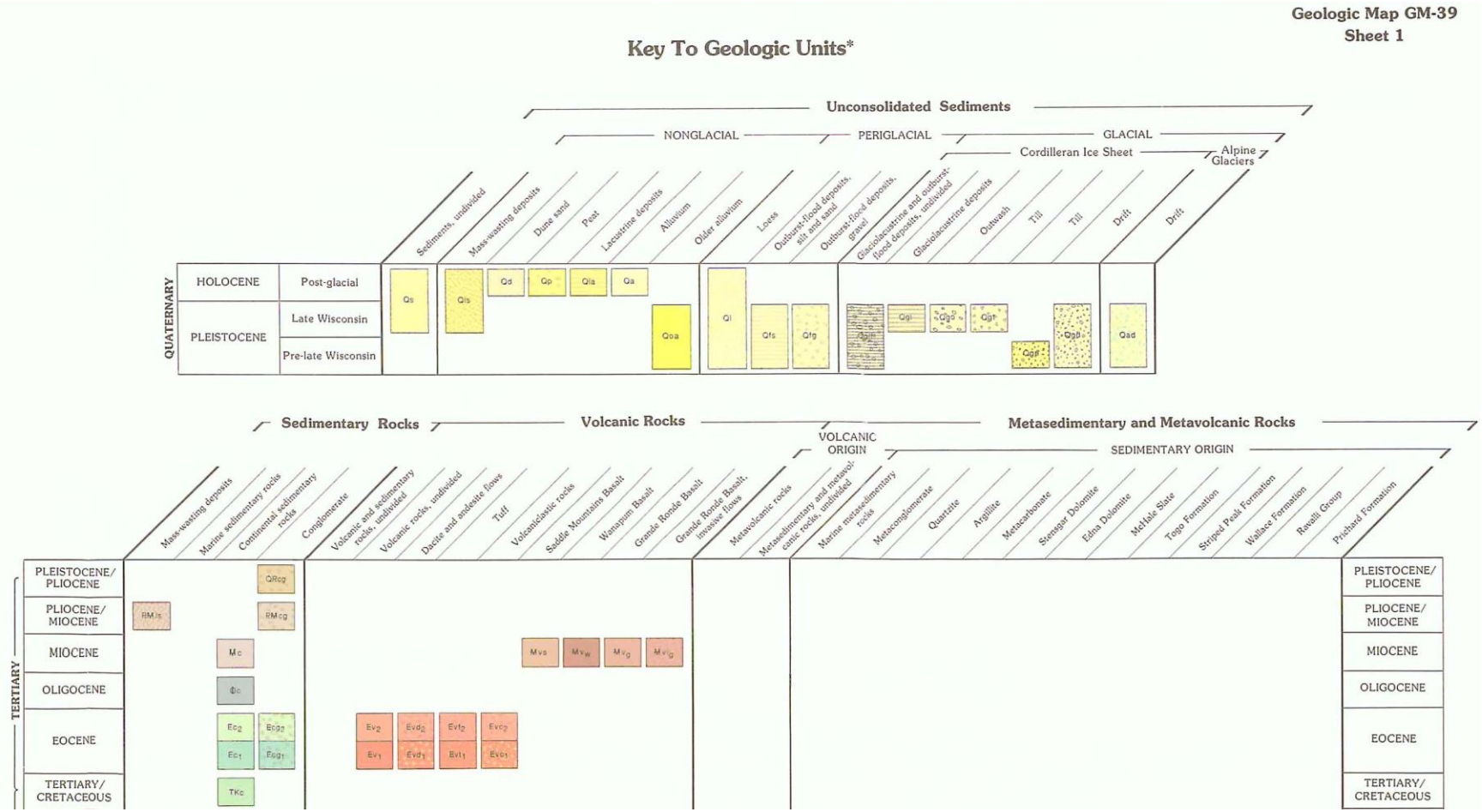


FIGURE 7-A: KEY TO GEOLOGIC MAP SYMBOLS.

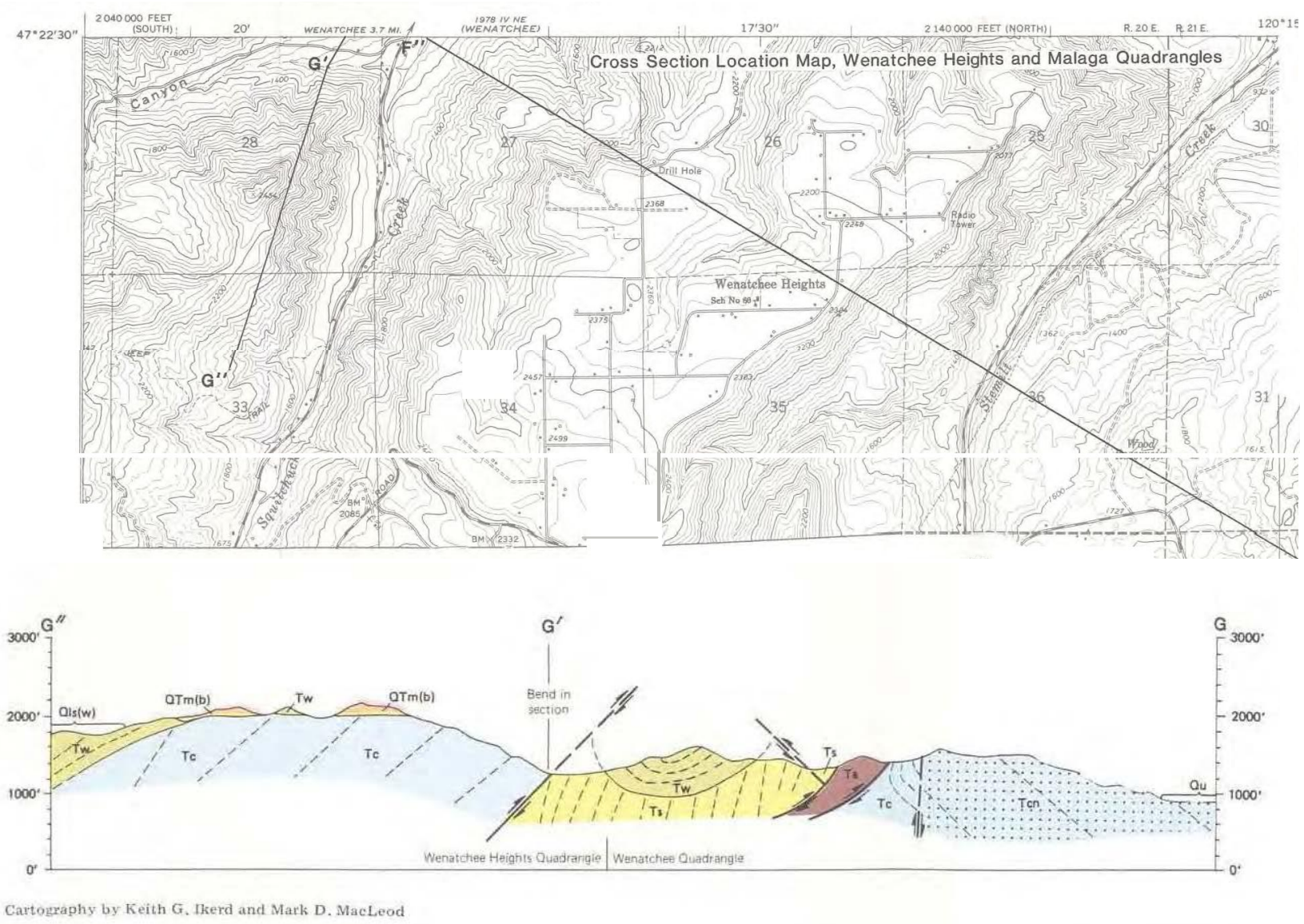


FIGURE 8: GEOLOGIC CROSS SECTION IN THE LOWER SQUICHUCK VALLEY SHOWING TERTIARY ROCK LAYERS AND FAULTING (GRESENS, 1983).

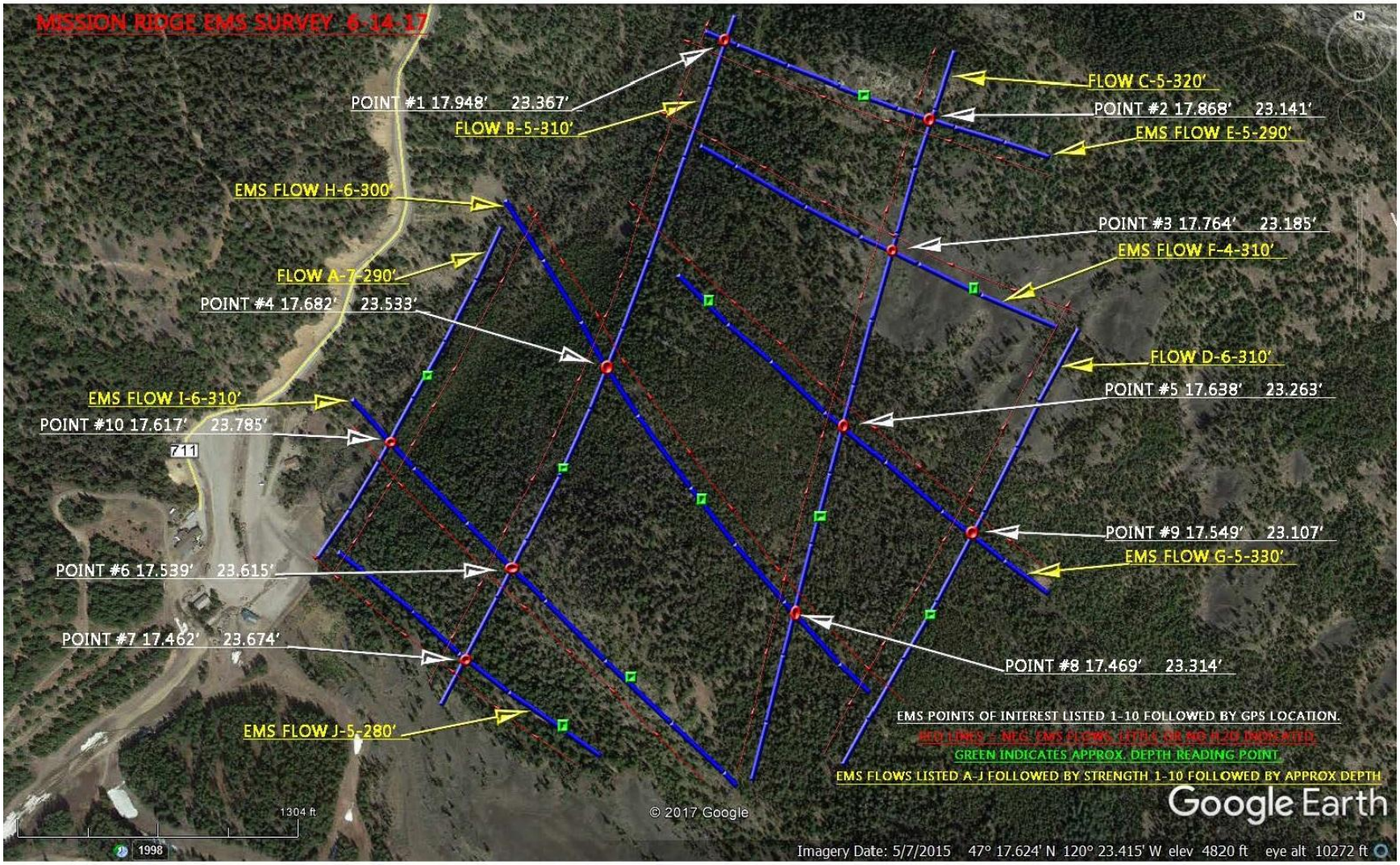


FIGURE 9: EMS SURVEY MAP OF WESTERN AREA SHOWING POTENTIAL RANKING OF DRILLING LOCATIONS.

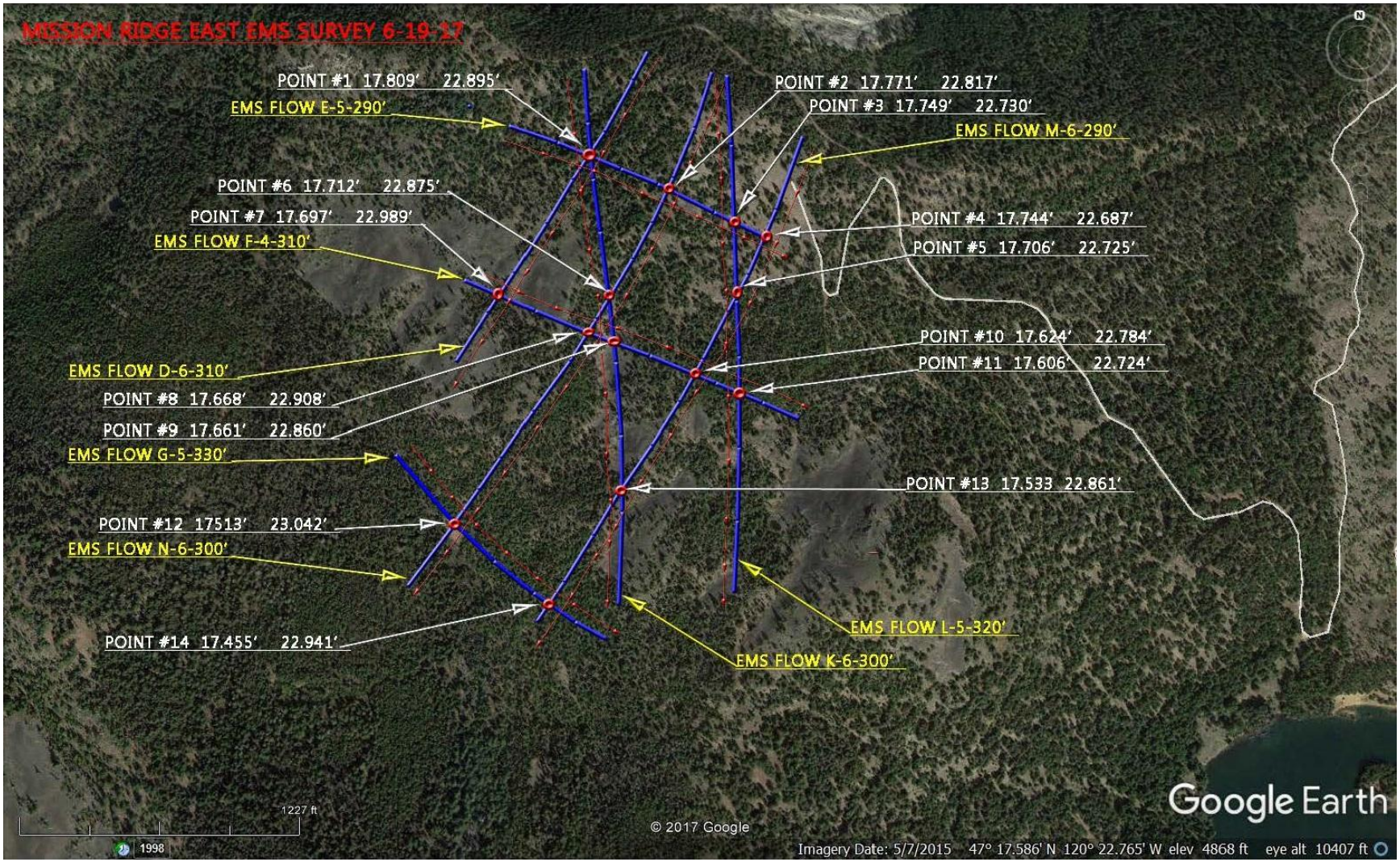


FIGURE 10: EMS SURVEY MAP OF EASTERN AREA SHOWING POTENTIAL RANKING OF DRILLING LOCATIONS.

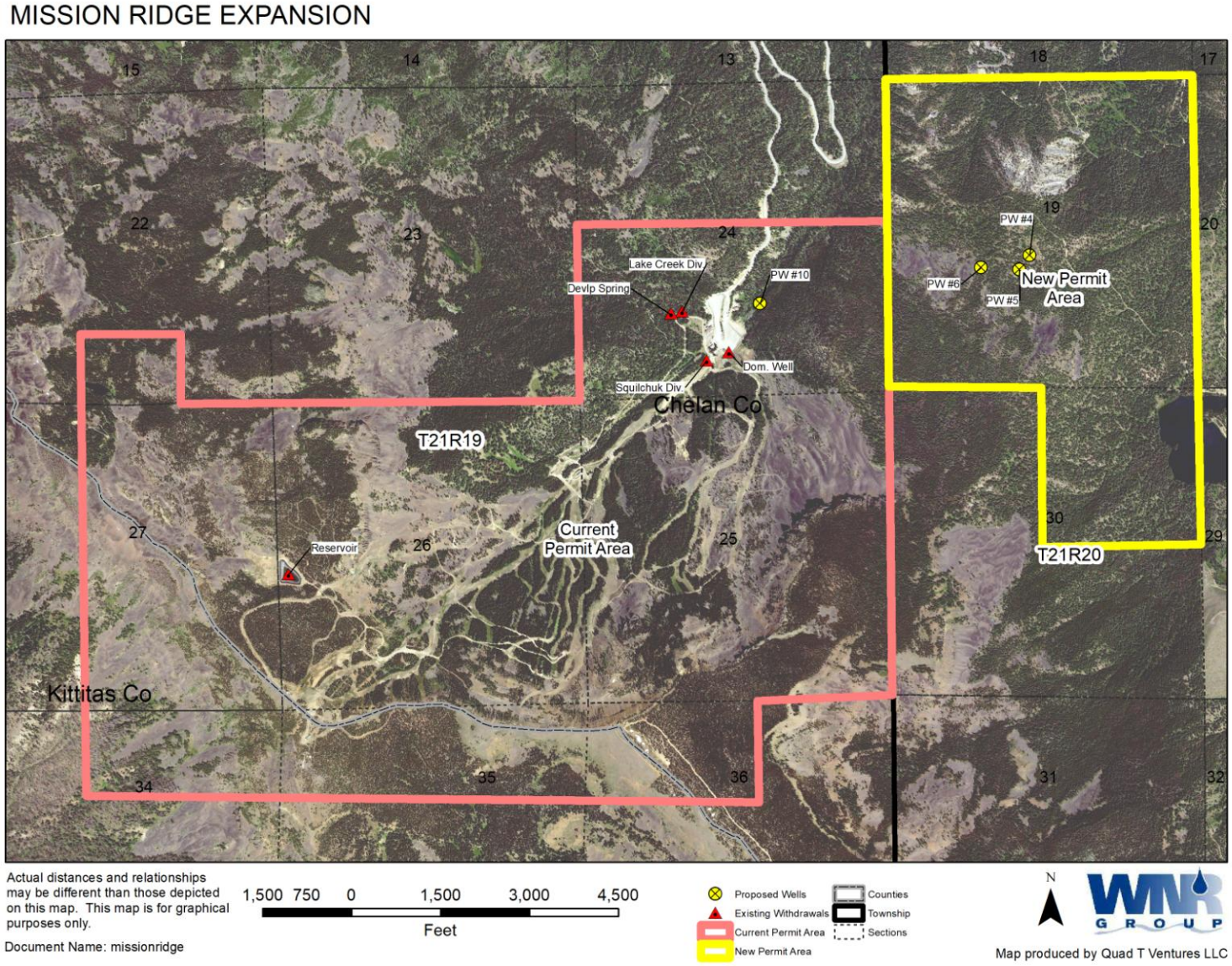


FIGURE 11: LOCATION OF EXISITNG DIVERSIONS AND PROPOSED WELL LOCATIONS ACROSS THE SITE.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. WO 94314
UNIQUE WELL I.D. # AEH 922
Water Right Permit No.

(1) OWNER: Name Harbor Properties Address P.O Box 1668 Wenatchee 98807-1668

(2) LOCATION OF WELL: County Chelan SE ¼ SW ¼ Sec 24 T 21 N., R 19 E.W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) 7500 mission Ridge Road Wenachee 98807

(3) PROPOSED USE: ☒ Domestic ☐ Irrigation ☐ DeWater ☐ Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 100 feet. Depth of completed well 82 ft.

(6) CONSTRUCTION DETAILS:
Casing Installed: 8 " Diam. from 0 ft. to 82 ft.
Welded ☐ Liner installed ☐ Threaded ☐ _____ " Diam. from _____ ft. to _____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type _____ Model No.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 ft.
Material used in seal Bentinite Chips.
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? _____ Depth of strata _____
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: _____ H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level
Static level 40 ft. below top of well Date 8-20-98
Artesian pressure _____ lbs. per square inch Date
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest 100 gal./min. with stem set at 60 ft. for 1 hrs.
Artesian flow _____ g.p.m. Date
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Boulders - Silts.	0	32
Brown gravels - Clay.	32	35
Gravels, Sands, [redacted]	35	45
Grey Clays	45	48
Basalts Fracture. with Gravel. Water.	48	95
Grey gravels, Clay.	95	100

DEPT. OF ECOLOGY CENTRAL REGION OFFICE Received FEB 22 1999

Work started 8-18-98, 19. Completed 8-20-98, 19.

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Holt Drilling INC (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 10621 Todd Rd E Puy 98372
(Signed) _____ (WELL DRILLER) License No. 2359
Contractor's Registration No. HOLTDI*B606 Date 9-5-98, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329-

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

FIGURE 12: WELL LOG FOR MISSION RIDGE SKI AREA LODGE WELL.

Attachment A

IDEA4WATER

EMS Survey Report

IDEA4WATER Inc.

Site Survey Report

IDEA4WATER Inc.
121 Iowa Ave. Suite 1K
Whitefish, MT 59937
(208) 290-8811
info@idea4water.com

Results

Introduction
IDEA4WATER Inc. was contracted by Mission Ridge Ski Resort via Gene St. Godard to perform a site survey at 7500 Mission Ridge Rd., Wenatchee, WA. (Township 21N, Range 19/20E, Section 24/19)

Purpose
The objective of the investigation was to identify subsurface fractures that could contain underground water. The investigation consisted of an EMS and/or VLF survey. The investigation was successful in identifying a number of geophysical anomalies thought to be useful in finding water. The survey was conducted on June 24, 2017.

Water Survey
It is a well known fact that fresh water often sits in fracture zones in rock structures. Finding these fractures are the key to obtaining positive results when drilling for water. Finding the best place to drill can radically reduce the costs of drilling.

Geophysical surveying methods were developed in the 1940s, 1950s and 1960s. The methods used since this time have become more sophisticated and with the evolution of digital technologies, geophysicists have had a chance to obtain and analyze information obtained and develop more accurate and meaningful results.

The technologies used in this survey are known for finding useful quantities of underground water that may be trapped in rock fractures and cavities. This enables us to be able to determine the best site for drilling a well. By utilizing the magnetic components of the electromagnetic field generated by VLF (very low frequency) transmitters, it is possible to locate anomalies which provide a view of what structures exist underground. This is done by comparing electrical resistances of structures which are created by using the low frequency waves that are sent out by military radio transmitters around the world.

Survey Design
The EMS survey was conducted first and numerous potential water flows were discovered. The VLF survey area was then conducted. We conducted numerous runs along the flows to be certain that both technologies gave us information showing that we had water flows at those locations.

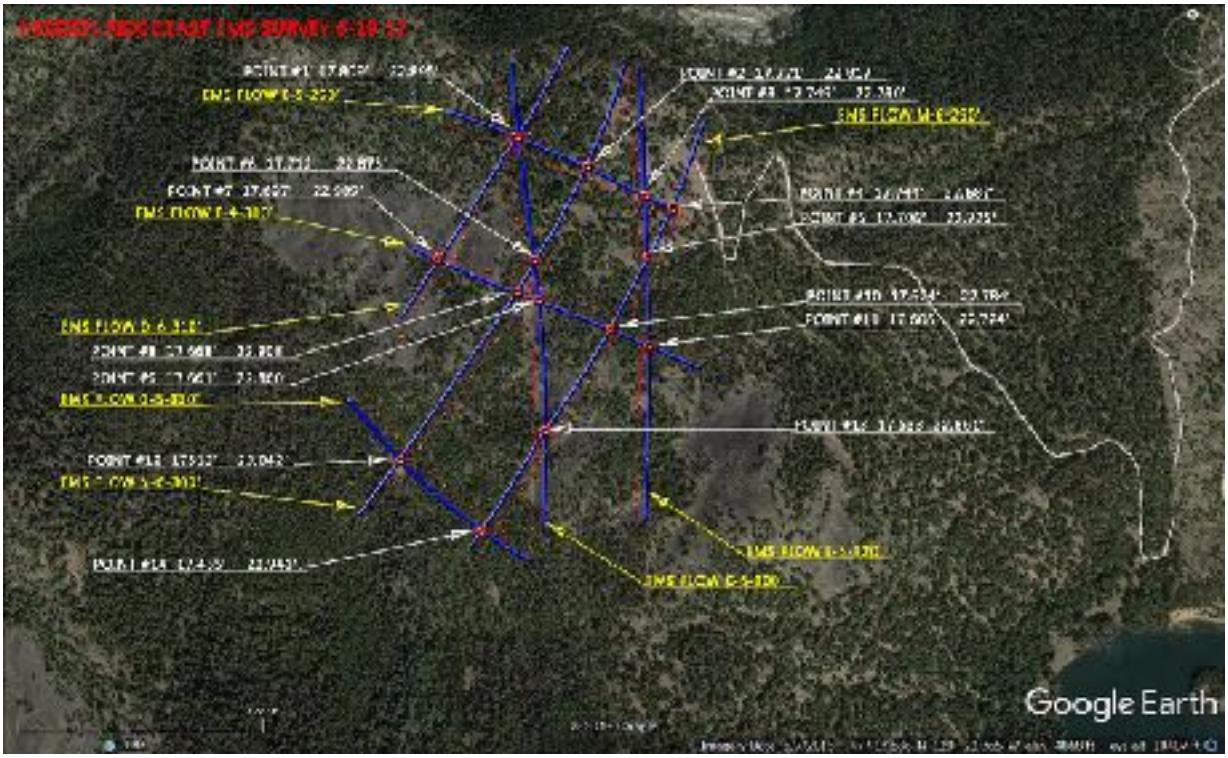
Results
The EMS results are listed below. The blue flow lines indicate good signals which could hold the potential for water. The red flows indicate very little likelihood of containing significant water. The blue crossing points of the lines were of extreme interest as they are most likely to contain the largest volumes of water.

The VLF survey was conducted to pinpoint the location of the crossing points and to verify that water is being indicated by this technology also. The frequency used was 24.7 kHz. The profiles were run at 90/270 degrees.

The EMS and VLF were in total agreement and the points determined to be the most likely to produce the best water were at points #4, #5, #6 from the East Area. We anticipate a maximum drilling depth at this point of about 450 feet*.

West Area

East Area



Interpretations
The EMS and VLF survey was successful in mapping several anomalies. While surveys can give information that can be somewhat ambiguous, there are a number of anomalies thought to be associated with underground water. The confidence in the results of the water prospecting survey are average.

Drilling Recommendations
We recommend drilling at points #4, #5, #6 in the East Area to a depth of 450 feet*. The drilling order should be point #4 (Due to the strong flow of M-6 and the additional fracturing in that area), #6 (Due to Very Good signals in that area), then #5 (Due to the Very Good signals) in the East Area.

The EMS Flows listed below are rated based on the quality of the signals received.

- M-6 Excellent/Outstanding
- E-5 OK
- L-5 Very Good
- N-6 Good
- K-6 Very Good
- F-4 OK

If adequate water is not obtained, we recommend Hydro fracturing the well. We believe that this will give the best volume of water for the money spent.

These results are respectfully submitted this 28th day of June, 2017.

Norman Larson, President

* In the event that there is in excess of 50 feet of clay, this depth will increase by 150 feet.