RESOLUTION OF THE
BOARD OF HEALTH OF THE
TRI-COUNTY HEALTH DEPARTMENT
BALD MOUNTAIN ESTATES CONDITIONAL VARIANCE

WHEREAS, the Tri-County Health Department ("TCHD") is the District Public Health Agency for Adams County, Arapahoe County and Douglas County, Colorado; and

WHEREAS, pursuant to C.R.S. 25-10-101, et seq., and the Colorado Department of Public Health and Environment Water Quality Control Commission On-Site Wastewater Treatment System Regulation #43, 5 CCR-1002-43; and

WHEREAS, pursuant to a Resolution of the Board of Health ("Board") of TCHD, effective as of October 1, 2017, the Board promulgated TCHD OWTS Regulation No. 0-17 ("Regulation 0-17"), regulating On-Site Wastewater Treatment Systems (OWTS) in the counties of Adams, Arapahoe and Douglas, Colorado; and

WHEREAS, the Douglas County Board of County Commissioners granted a waiver from Douglas County Zoning Regulations allowing for the construction of residential water wells at Bald Mountain Estates, a residential subdivision in Douglas County, Colorado; and

WHEREAS, TCHD has been informed that individual residential property owners desire to drill and construct residential water wells at Bald Mountain Estates to replace the existing community water system; and

WHEREAS, Regulation 0-17 requires a water well to have a minimum horizontal setback of 50 feet from a septic tank, and a minimum horizontal setback of 100 feet from the soil treatment area ('STA"); and

WHEREAS, it is anticipated that one or more individual residential property owners may request a variance to allow a water well, or water wells, to be drilled and constructed at a closer proximity to the OWTS or STA than presently allowed by Regulation 0-17 without compromising the integrity of the water quality of the constructed well(s); and

WHEREAS, the Board has been presented with a written professional opinion, dated June 7, 2018, from Joe V. Meigs, a registered Professional Geologist, and Bruce A. Lytle, a registered Professional Engineer, from the consulting firm of Lytle Water Solutions, LLC, stating:

> "Therefore, it is our professional opinion that, as long as the minimum well design standards shown in **Figure 3** and described in this report are adhered to for all new wells being installed within the subdivision that can't meet the minimum spacing requirements, if a variance is approved for the Bald Mountain Estate residential wells, it will result in no greater risk than that associated with compliance with the requirements of Regulation 0-17 related to horizontal spacing."; and

WHEREAS, the Board desires to grant a Conditional Variance, which is general and applicable to any proposed variance request submitted to TCHD by any individual residential property owner in the Bald Mountain Estates subdivision, but is conditioned upon compliance with minimum well design standards relating to each individual variance request, and as approved by TCHD.

NOW, THEREFORE, BE IT RESOLVED that pursuant to Regulation 0-17, Section 3.10. et seq., a Conditional Variance is hereby granted to the residential real property lots located in, and known as, Bald

Mountain Estates subdivision, and which Conditional Variance is conditioned upon full compliance with well design standards relating to each individual variance request.

BE IT FURTHER RESOLVED that each applicant requesting a variance shall comply with the procedures established by TCHD, and upon completion of the well, and upon receipt of the well construction certification, and verification by TCHD staff, TCHD shall issue a Variance to the applicant, which Variance shall be recorded, by TCHD with the Douglas County Clerk and Recorder.

Adopted and made effective this 12th day of June, 2018.

Kaia Gallagher

6/12/18

Kaia Gallagher, PhD., President
Tri-County Health Department Board of Health

Date

Paulette Joswick

6-12-18

Paulette Joswick, Secretary
Tri-County Health Department Board of Health

Date

LYTLE WATER SOLUTIONS, LLC

June 7, 2018

Tri-County Health Department
6162 South Willow Drive, Suite 100
Greenwood Village, Colorado 80111

Attn: Mr. Warren S. Brown, P.E.
Senior Environmental Health Consultant

Subject: Request for a Variance from Tri-County Health Department On-site Wastewater Disposal Systems Regulation No. O-17 Related to Well/Septic Spacing at Bald Mountain Estates, Douglas County, Colorado.

Project No. 1437-18

Dear Mr. Brown:

Lytle Water Solutions, LLC (LWS) has been retained by the Colorado Baptist General Convention to address issues raised by Tri-County Health Department (TCHD) in its October 23, 2017 letter to Douglas County Community Development Department. TCHD has raised an issue related to the proposal to install individual residential wells at Bald Mountain Estates, given the relative density of the lots and the potential inability to maintain minimum spacings between the residential wells and the on-site wastewater treatment systems (OWTSs). In the October 23 letter, it was stated that if any of the residential wells cannot be constructed within the setback requirements from an OWTS, a variance is required from TCHD OWTS Regulation No. O-17. The minimum horizontal setbacks required by the regulation are 50 feet from a septic tank and 100 feet from the soil treatment area (STA).

Based on the configuration of the residential lots within the subdivision, it is possible that some lots may not be able to maintain these minimum spacings. As such, this letter report has been prepared to provide the technical basis to allow TCHD to consider and approve a variance that will protect the residential wells at Bald Mountain Estates from potential contamination from the OWTSs even if the minimum horizontal setbacks cannot be maintained. This work has been conducted by LWS' Senior Project Manager, Mr. Joe V. Meigs, a registered Professional Geologist with over 40 years of experience, and by Mr. Bruce A. Lytle, a registered Professional Engineer in Colorado, also with over 40 years of experience working with ground water issues related to the Denver Basin.

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The individual wells at Bald Mountain Estates will be completed in the uppermost formation in the Denver Basin, i.e., the Dawson Formation, which extends from ground surface to a depth of approximately 1,000 feet beneath this subdivision. This variance request is premised on the layered stratigraphy of the Denver Basins which, even though the spacing between the well/septic/STA may not meet the horizontal spacing requirements, will provide significant protection against the vertical movement of flows from the STAs so as to protect the integrity of the water quality being produced from the Dawson Formation to the individual residential wells. It is our opinion that measures can be taken so there will be no greater risk related to the proximity of the well to the OWTS than that associated with compliance with the requirements of Regulation O-17.

LWS has used local geologic and hydrogeologic data to demonstrate the protection the natural geology can provide against vertical migration of effluent from the STAs, as long as minimum well construction standards are adhered to, as described herein. These technical issues are described in the following sections.

STRATIGRAPHIC EVALUATION OF THE DAWSON FORMATION

Because the individual residential wells will be drilled into the Dawson Formation, part of the Denver Basin bedrock aquifers, the Colorado Division of Water Resources (DWR) well geophysical log database was queried to locate Denver Basin wells with geophysical logs near the Bald Mountain Estates property. Five wells were found located north, east and southwest of the property to have geophysical logs of the boreholes. The subject property and the location of the wells with geophysical logs are shown on **Figure 1**.

Each of the geophysical logs was reviewed and interpreted to determine the lithology of the approximate upper 300 feet of the borehole. This zone is typically in the unsaturated zone above the Dawson aquifer and is composed of layers of both sand and clay, as well as layers containing varying percentages of interbedded clay and sand. As such, these near-surface strata of the Dawson Formation can provide an effective barrier to vertical movement of water from the residential STAs to the local ground water table.

The geophysical log that is the closest to the property is the log from Well Permit No. 18191-F. This is the Dawson aquifer well owned by the Colorado Baptist General Convention and is located north of the subject property (**Figure 1**). The log was interpreted to identify low-permeability clay zones as well as higher-permeability sandstone units. After interpreting the log at Well Permit No. 18191-F, we reviewed the geophysical logs from the other wells shown in **Figure 1**. Our interpretation of these geophysical logs indicates that there is a similar pattern or response in the geophysical logs, where there were individual layers of both sand and clay, as well as interbedded clay and sand.

Figure 2 shows the interpreted lithology from the geophysical log. The lithologic log shows two upper clay zones (100-130 feet and 160-180 feet) and a lowermost clay zone from approximately 250 to 300 feet. The one predominate clay feature shown in **Figure 2** from approximately 250 to 300 feet was also observed in the geophysical logs of the other boreholes, while the shallower clay zones were not as distinct.

In addition to the stratigraphic layering shown in **Figure 2**, log and well construction data indicate that historic water levels in the Dawson aquifer have ranged from 155 to 270 feet. The most recent water level data available from the vicinity (Permit No. 298513) was 220 feet in 2014. While water levels will vary from lot to lot based on topography, it is expected that water levels will be a minimum of 200 feet below ground surface. As such, not only is there horizontal bedding of low-permeability material that will retard vertical flow from the STAs to the local aquifer water table, but the interval from ground surface to over 200 feet is also unsaturated. As such, it is highly unlikely that a saturated front could be developed from residential STAs to the water table even if the effective impediment to vertical flow wasn't present. Given these two factors, it is our opinion that there is not a contamination threat to new residential wells completed in the Dawson aquifer as long as minimum design standards for these wells are adhered to for new well construction.

Based on the geophysical data, it is LWS' opinion that the extensive low-permeability zone from 250 feet to 300 feet will be present in the residential wells drilled (although the depths and thickness could vary from well to well). The shallower clay zones observed in one well could also be present and, if so, could also provide a low-permeability barrier to vertical flow. Identification of low-permeability zones below 100 feet is important so this information can be incorporated as part of the well construction guidelines to further separate the upper unsaturated and stratified zone from the underlying Dawson aquifer. If the shallower clay zones exist in the boreholes for residential wells, but are greater than 100 feet in depth, the well grout seal can be set in this shallower zone if it is a minimum thickness of 10 feet. Since the strata above this zone is likely unsaturated anyway, this will not affect the yield of the residential wells at Bald Mountain Estates. The proposed minimum well design standards that we recommend be followed for all new residential wells in Bald Mountain Estates are described in the following section.

PROPOSED MINIMUM DESIGN STANDARDS FOR INDIVIDUAL RESIDENTIAL WELLS

Given the stratigraphic layering in the Dawson Formation, particularly as it relates to the interval from ground surface to a depth of 250 feet, it is our professional opinion that protection from effluent from a STA can be provided through the proper design and completion of the individual residential wells if minimum design standards are followed. Given the stratigraphy, LWS recommends that <u>all</u> wells drilled at Bald Mountain Estates be completed with the following procedure regardless of whether there is currently a setback issue requiring a variance as a protection for individual well water quality, as conditions could change in the future and an OWTS might need to be moved.

However, only the wells that can't meet the setback requirements have to follow the minimum design standards presented herein.

The well design, with the following key criteria, is acceptable to meet the terms of the variance request.

(1) **Drill, set, and grout 7-inch steel surface casing through the surficial low-permeability zone and a low-permeability zone below 100 feet from ground surface.** According to local geologic and geophysical logs, there are either low-permeability clay lenses or sand/clay layers within the top 20 to 40 feet below ground surface. Furthermore, there are potentially multiple thick, low-permeability zones in the range of 100 to 250 feet. The driller needs to create a detailed geologic log during drilling, as the available geophysical log data in the area indicates variable stratigraphy. The minimum 7-inch inside diameter steel casing needs to be seated in a minimum 10-foot thick low-permeability zone that is greater than 100 feet below ground surface. The grout seal on the steel surface casing then needs to be set by pressure grouting from inside the casing from the base of the casing continuously up the annular space to ground surface. The cement to be installed needs to be fully-hydrated prior to introduction to the borehole. This grout seal should be allowed to set for a minimum of 24 hours prior to proceeding with drilling the borehole for the residential well. This design of the surface casing and grout seal will isolate potential contamination due to near-surface lateral movement as well as deeper vertical migration.

(2) **Drill the borehole to the proposed maximum depth and gravel pack the well.** The borehole needs to be drilled to the desired total depth (maximum depth of the Dawson Formation at this location is approximately 1,000 feet but will vary in depth from lot to lot). The well casing and screen string can be installed in the open borehole. The screened section of the well should be gravel packed up to a level inside the steel surface casing to allow for settlement and still protect the well from fines movement from the aquifer face.

With the setting of the continuous well grout seal in the annular space adjacent to the steel surface casing, there will be an adequate grout seal to the base of the surface casing to a minimum depth of 100 feet with the base of the casing set in a minimum 10-foot low-permeability zone. A schematic showing the well construction with these minimum design standards is presented in **Figure 3**.

Given these minimum design standards, even if the minimum horizontal setback distances are not maintained on some lots within Bald Mountain Estates, it is our professional opinion that a minimum 100-foot grout seal provides adequate protection for the water quality of the residential wells from the individual OWTSs. This is based on two conditions present at Bald Mountain Estates in the

Dawson Formation. First, there is significant layering of low-permeability clays in the interval from ground surface to approximately 250 feet that creates an effective barrier to vertical flow. However, the depths and thickness of this layering will likely vary from borehole to borehole. Hence, the multiple requirement of a minimum 100-foot grout seal set into a minimum 10-foot thick low-permeability seam. Second, this interval is unsaturated so, even if there is a minor vertical flow component, the Bald Mountain Estates STAs won't provide a sufficient supply of water to create a saturated front to the Dawson aquifer water table.

As such, it is our professional opinion that a variance should be granted for the Bald Mountain Estates wells given (a) the local stratigraphic conditions within the Dawson Formation, i.e., stratified, relatively horizontally-bedded low-permeability units minimize the potential for vertical hydraulic communication from the near-surface soils to the water-producing zones of the residential wells, (b) there is an approximate 200-foot vertical unsaturated zone between the STAs and the Dawson aquifer water table, and (c) the minimum well design standards which seal the well from surface, and near-surface, inputs provides significant protection against the well being a conduit for vertical flow movement.

ALTERNATIVE WATER SUPPLY OPTIONS THAT WOULD NOT REQUIRE A VARIANCE

A number of alternatives were evaluated for maintaining the potable water supply to the residents of Bald Mountain Estates.

The following describes in detail the alternatives evaluated.

(1) **Maintain the existing system:** The existing potable water distribution system that serves the Bald Mountain Estates development was originally intended to serve cabins for Ponderosa Retreat and Conference (PRCC) members during large events. Over the years, as the cabins and properties were sold to build single-family units the distribution system was extended to serve these homes in addition to the PRCC. The current system is served by two Denver Basin aquifer wells completed in the Dawson aquifer. One of the wells ("South Well") has been relegated to Emergency Service as it was found to contain elevated levels of combined radium 226 and 228. The system also features one 25,000 gallon equalizing storage tank, 6" transmission line from the wells to the Bald Mountain Estates development, a master meter which monitors water delivery to the Bald Mountain Estates development, an old 2" trunk line providing main water through the center of the development, and 1.5" services off of the trunk line to provide lateral service to the individual home services. Since its inception, the existing distribution system has never been upgraded and currently experiences a myriad of problems that are both cumbersome and expensive to address. Because of the age and repairs necessary to maintain the current system operation, maintenance, and repair costs were approaching roughly $43,000 per

residential unit, with $20,000 per year (on average) going to water line repairs. Other challenges associated with the aging distribution system infrastructure have proven to be the following:

- Old materials comprising the existing distribution system (i.e. galvanized pipe, galvanized saddles, old HDPE pipe) would commonly break and require approximately $20,000 per year in unreimbursed repair costs with PRCC;
- Low water pressure in many locations throughout the development due to unfavorable topography;
- Inability to isolate sections of distribution lines;
- Inability to adequately monitor individual water use (no residential water meters);
- Limited water sources (one main well, one emergency well) with no redundancy;
- Questionable water quality due to elevated presence of combined radium in the South Well;
- Currently-worded covenant does not allow for PRCC to make up operation and maintenance costs through user fees; and
- Single entry point into distribution system can pose a problem if a main break occurs in the main trunk line.

Maintaining the existing system as it currently exists would not improve these listed conditions and more than likely result in elevated operation and maintenance costs for PRCC, elevated user rates for the Bald Mountain Estates residents, and unreliable service to all involved entities.

(2) **Replace existing distribution system with a looped system :** To upgrade the existing distribution system to meet current fire code, water quality, and storage requirements Bald Mountain Estates and PRCC considered the following upgrades to the existing transmission and distribution system:

- 3,000 LF of new 6" and 8" transmission line from PRCC wells to Bald Mountain Estates development;
- New Denver Basin well;
- New 110,000 gallon concrete water tank with associated 12" PVC transmission line;
- Over 8,000 linear feet of 6-inch and 8-inch PVC distribution line within the Bald Mountain Estates development;
- Over 25 new gate valves to improve isolation capabilities;
- 15 new fire hydrants;
- 42 new meter pits;
- 42 new 1-inch polyethylene services; and
- Re-paving of all new main lines in paved road areas.

The above-listed improvements would provide the following benefits to the Bald Mountain Estates residents:

- Provides 1,500 gallon per minute (gpm) of fire flow at the highest point in the system, with a residual pressure of 25 pounds per square inch (psi). This flow can be sustained for 73 minutes with the proposed 110,000-gallon storage tank;
- Provides redundant two entry points into the distribution system in case one of the entry points go down;
- Deeper burial depth helps prevent freezing of lines;
- Replaces old, undersized, and outdated system;
- Provides usable fire hydrants;
- Loops and valves help keep majority of constituents in service during repairs;
- Loop along Furrow Road allows water service from front of properties which front Furrow Road. This allows reduced impact of isolation should repairs be required at other locations within distribution system;
- New services and meters allow monitoring of water usage and more representative billing;
- Higher service pressures;
- Not responsible for system maintenance outside of paying bills;
- Better movement of water throughout system with improved water quality (disinfection); and
- Addresses CORAD issue at South Well.

However, the proposed distribution system improvements would also pose the following challenges.

- Most expensive option (approximately $2.33 million in anticipated construction costs;
- Not the best alignment as loops have been eliminated along western side of neighborhood. Multiple "dead ends" along west end;
- Construction of new lines and services would not be easy;
- Still would need to pay PRCC for monthly service fees and charges;
- PRCC fees could escalate due to increased operational responsibilities (i.e. new well to operate, new blending system to operate, new tank to maintain, etc.);
- Still tied to PRCC for water service; and
- Still would need to pay PRCC for monthly service fees and charges.

(3) **Replace existing distribution system / upgrade existing alignments:** Another alternative which would allow Bald Mountain Estates residents to stay connected to the existing PRCC-operated water distribution system would be to simply replace or upgrade the existing distribution system alignments. This particular alternative would include the following improvements:

- Approximately 1,650 linear feet of 8-inch PVC from existing wells to Bald Mountain Estates master meter;
- New Denver Basin well;
- New cast-in-place concrete 110,000-gallon storage facility with new transmission line;
- Provide approximately 9,000 linear feet of 4-inch and 6-inch water line to replace the existing 1.5-inch and 2-inch water mains in their current alignments;
- Approximately 17 new gate valves to provide additional isolation capabilities;
- 12 new fire hydrant assemblies;
- 42 new meters pits and 1-inch PE services lines; and
- Re-paving of road cuts within Douglas County right-of-way.

The above-listed improvements would provide the following benefits to the Bald Mountain Estates residents:

- Not as expensive as proposed looped distribution system (estimated at $1.98 million);
- Includes fire hydrants and new valves to help with fire suppression and partial isolation in event of repairs;
- Replaces old, undersized, and outdated system;
- New services and meters allow monitoring of water usage and more representative billing;
- Moderate increase in service pressures;
- Increase in fire flows and suppression due to provision of water tank;
- Not responsible for system maintenance outside of paying bills;
- Deeper burial depth helps prevent freezing of lines; and
- Addresses CORAD issue at South Well (if well replacement / blending is financed).

However, the proposed distribution system replacement / upgrade in place would also pose the following challenges:

- Difficult to isolate homes along Furrow Road should repairs be required on homes along Ray Drive;
- Only moderate improvement on fire flows due to lack of looping;

- Construction of new lines and services would not be easy;
- Still would need to pay PRCC for monthly service fees and charges
- Minimal improvement of water quality and water movement due to lack of looping;
- Still tied to PRCC for water service;
- Still would need to pay PRCC for monthly service fees and charges; and
- PRCC fees could escalate due to increased operational responsibilities (i.e. new well to operate, new blending system to operate, new tank to maintain, etc.)

(4) **Install cluster wells to serve the subdivision:** A fourth alternative which did not involve upgrading or replacing the existing distribution system involved drilling approximately 9 to 11 wells to serve groups or "clusters" of homes within the Bald Mountain Estates development in an effort to save costs, while providing individualized well service. Facilities proposed with each cluster service included the following:

- New residential well drilled into the Denver Basin (preferably the Dawson Aquifer);
- 4-inch water mains from well to service locations;
- Pressure tanks at each home to control the respective well;
- 1-inch PE service lines from each 4-inch main to individual homes; and
- 42 individual service valves.

The above-listed components of the proposed cluster wells would provide the following benefits to the Bald Mountain Estates residents.

- Possible reduction in overall project expense;
- Probably no PWSID number required, as long as number of entities served remains less than 6-7 homeowners;
- One time capital expenditure as residents would no longer need to pay PRCC for user fees or monthly increases;
- Each cluster of homeowners can obtain bids from a variety of homeowners to obtain the best price (possibly even lower than the one listed below); and
- No longer have radium issues from PRCC wells (though water quality would be dependent upon the water quality in each "cluster" well).

However, the proposed "cluster" well alternative would also pose the following challenges.

- More expensive and larger well needed for larger production;
- Running pipe from well to each home may be difficult with the area topography and subdivision;
- Who maintains the well serving each cluster, as operation of each "cluster" well between 6-7 homeowners might be difficult;
- Drilling to deeper aquifer may be required;
- What if only one home has a line problem, are all five responsible for assisting the one (service isolation);
- Potential larger storage needed to maintain service pressures to the cluster; and
- Pumps to maintain head may be required (or additional service pressure may be required at the well head).

Arapahoe County, with the assistance of Douglas County, PRCC, and Bald Mountain Estates, conducted a vote where the residents of Bald Mountain Estates were to select their preferred alternative out of the five proposed options. The vote was administered by mailed ballot with the ballots being opened and counted on August 15, 2017. The five choices with associated results by percentage were as follows:

1.	Individual Wells	82%
2.	PRCC (maintain existing system)	12%
3.	Replace existing system with looped system	2%
4.	Replace existing system with "in-kind" system	4%
5.	Cluster (Shared) wells	0%

Thus, the Bald Mountain Estates residents themselves selected the currently-preferred alternative of drilling individual wells for each Bald Mountain Estates resident versus the other alternatives described above.

NECESSITY OF VARIANCE

If individual residents who wish to drill a residential well that encroaches upon the TCHD setbacks are not granted a variance the entire water service renovation effort would be jeopardized. Even though there is an existing distribution system in place that serves all residents within Bald Mountain Estates, the PRCC will not be able to maintain a full distribution system to serve only 6-8 residents who may not be able to construct a new well that meets all of the required setbacks. If all 42 residents and 53 individual lots are not able to be served by individual wells the entire development would be forced to return to the PRCC-operated distribution system and consider one of the other rejected alternatives listed above. The resulting impacts would be felt beyond just the residents who

could not meet the variance, but to the entire Bald Mountain Estates development and Ponderosa Retreat and Conference Center, as all entities would need to consider the challenges described with each eliminated option.

SUMMARY

LWS has reviewed the available local geophysical and geologic logs to assess the stratigraphic sequencing within the upper portion of the Dawson Formation to evaluate the potential for vertical migration of effluent from the individual STAs. After review of 5 geophysical logs in the vicinity of Bald Mountain Estates, it is our professional opinion that there is significant stratigraphic layering that includes not only low-permeability claystone layers that minimize the potential for vertical migration of effluent from the STAs to the individual residential wells, but also that these strata are unsaturated, which would be a further impediment to developing a vertical flow component. Therefore, it is our professional opinion that, as long as the minimum well design standards shown in **Figure 3** and described in this report are adhered to for all new wells being installed within the subdivision that can't meet the minimum spacing requirements, if a variance is approved for the Bald Mountain Estate residential wells it will result in no greater risk than that associated with compliance with the requirements of Regulation O-17 related to horizontal spacing.

If anyone has questions regarding the information provided herein related to this variance request, please do not hesitate to give us a call. In addition, we will be available to attend, and answer questions, at a public hearing with the Board of Public Health, should that be necessary.

Bruce A. Lytle, P.E.
President

COLORADO LICENSED
BRUCE A. LYTLE
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6/7/18
PROFESSIONAL ENGINEER

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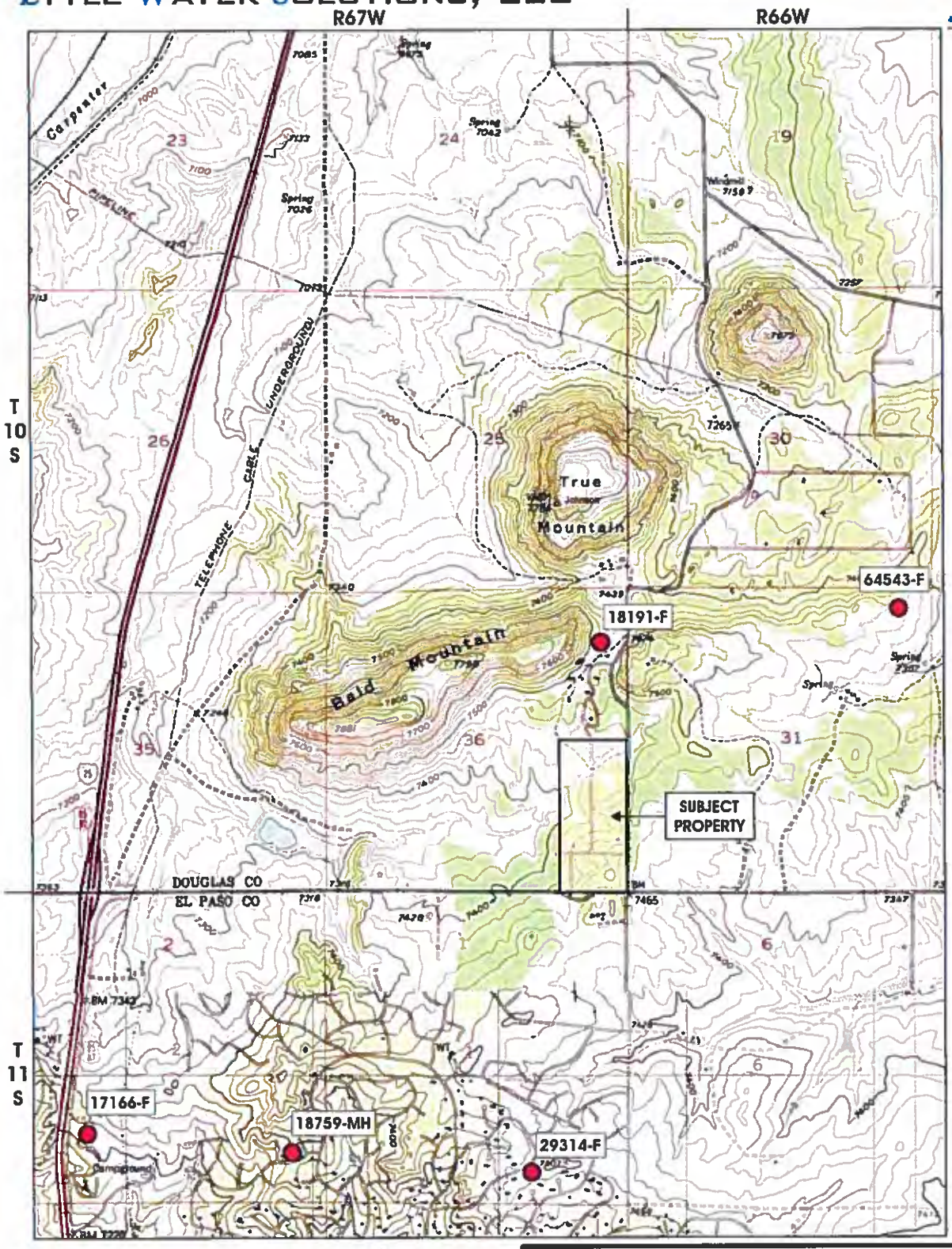


LEGEND

- LOCATION AND PERMIT NUMBER OF WELL WITH GEOPHYSICAL LOG

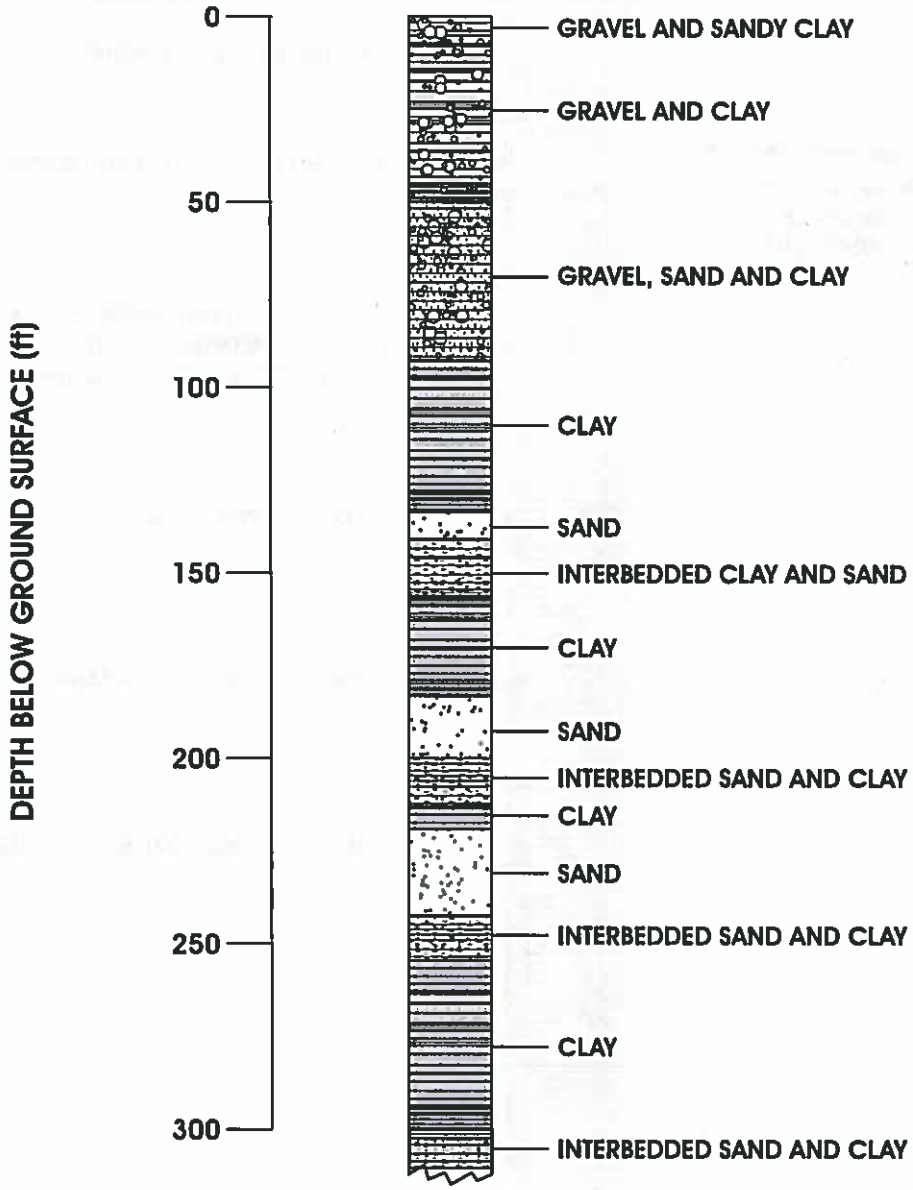
N

0 0.5 mi

COLORADO BAPTIST GENERAL CONVENTION

LOCATION MAP

File Name: CO_BaptistConv-LocMap.cdr		Date: 04/06/2018
Project No.: 1437-18	Drawn By: VAL	Fig. No.: 1



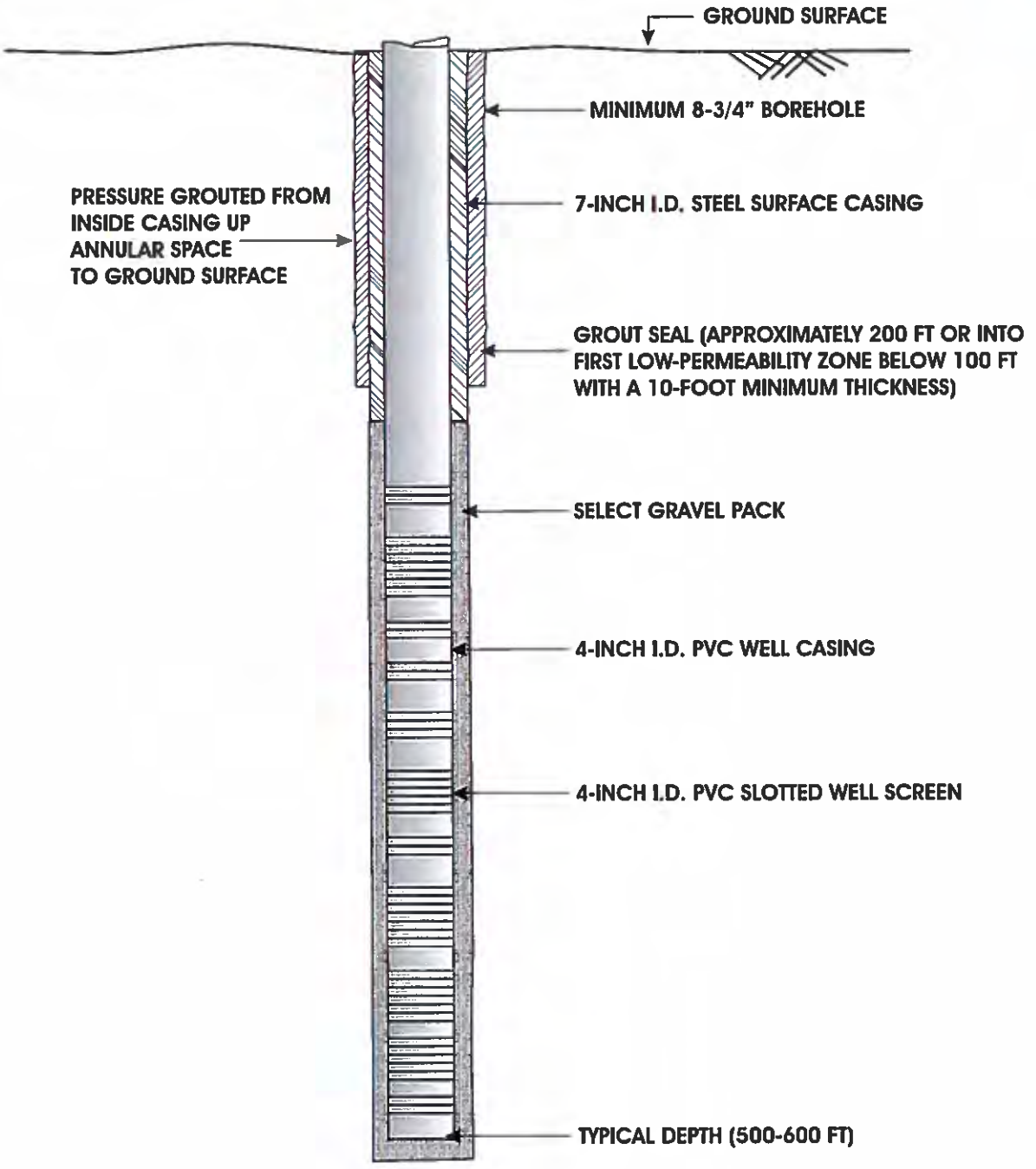
NO HORIZONTAL SCALE

Note:
Lithology based on interpretation of geophysical log from well permit No. 18191-F and correlation with other geophysical logs (Figure 1).

COLORADO BAPTIST GENERAL CONVENTION

STRATIGRAPHIC LOG OF UPPER PORTION OF DAWSON FORMATION

File Name: StratigraphicLog.cdr		Date: 04/06/2018
Project No.: 1437-18	Drawn By: VAL	Fig. No.: 2



NO SCALE

Note:
Continuous grout seal required to minimum depths shown.

COLORADO BAPTIST GENERAL CONVENTION

WELL COMPLETION WITH MINIMUM DESIGN STANDARDS

File Name: AltWellComp.cdr		Date: 05/26/2018
Project No.: 1437-18	Drawn By: VAL	Fig. No.: 3