STATE OF COLORADO

Temp - DNR, DRMS <drms.temp@state.co.us>

Objection letter to Peak Ranch Resource Application M2020041; Request for Party Status

1 message

Harris Sherman <harris.sherman@gmail.com> Thu, Oct 8, 2020 at 12:16 PM
To: drms.temp@state.co.us

October 8, 2020

Ginny Brannon, Director
Division of Reclamation, Mining, and Safety
Colorado Department of Natural Resources
1313 Sherman Street, Room 215
Denver, Co. 80203

Re: Opposition to Peak Ranch Resource Mining Application M2020041
and Request for Party Status

The Lower Blue Residents United, an organization comprised of over 600 landowners, citizens, and supporters both within and outside Summit County, hereby objects to the Peak Ranch mining proposal (hereinafter "Peak") and requests party status in all subsequent proceedings before the Division of Reclamation, Mining & Safety and the Mined Land Reclamation Board..

Please understand that the Lower Blue River Valley is a unique and special place in Colorado known for its beauty, tranquility, abundant wildlife, wetlands and aquatic resources. It is a valley that has one of the highest concentrations of conservation easements in the State, and it has benefited from multiple open space acquisitions by Summit County and the State. It is sandwiched between two federally recognized wilderness areas. It is the part of the Summit County that has long been set aside for agriculture, open space, wildlife, recreation, and low density residential housing. To date, there are no industrial projects in the Lower Blue River Valley. The Peak proposal is the first threat to this special environment. It will create a very harmful precedent.

Our organization, Lower Blue Residents United, and its members have a very direct interest in the outcome of these proceedings. Landowners adjacent to or within the proximity of the proposed mine will see deterioration of their water resources, water quality and aquatic environment. There will be serious impacts to local wildlife. Our air quality and scenic vistas will be negatively impacted. Projected new truck traffic along State Highway 9 will pose a multitude of safety, air quality and noise challenges with a corresponding impact upon wildlife. Noise and dust issues will abound within our numerous residential communities and impact the health and quality of life of its residents.

Non-resident members of our organization frequently visit the Lower Blue River for recreation, fishing, hunting, and solitude and will experience many of these same impacts. Thousands of tourists on a daily basis use the corridor on their way to and from Steamboat Springs and northwest Colorado. The list of threats this project presents goes on and on. Importantly, the proposed mining operation is completely contrary to Summit County's Lower Blue Master Plan. We believe that it is for this reason that Peak has chosen to apply for a State permit before seeking county approval.

We understand that your primary responsibilities relative to this application are to review the mining and reclamation plans, assess water and water quality impacts, wildlife impacts, and other impacts within your jurisdiction. We also understand that you have and will solicit input from a variety of federal, state, and local agencies including Colorado Parks & Wildlife; Colorado State Engineer; Colorado Water Conservation Board; Colorado Divisions of Air and Water Quality; the Department of Natural Resources; the U.S. Army Corps of Engineers; Summit County; and the Colorado Department of Transportation. We hope these agencies will provide input to your review.

Our concerns are set forth in more specificity in the attached reports from our hydrologists, aquatic, and reclamation specialists. They will focus on the following categories of concerns:

I. Inadequacy of the Peak application. Upon our review of the Peak application, we are struck by the multitude of items that are erroneous, incomplete or inadequate, making it impossible for you, other agencies, and the public to understand the project and its true impacts. We urge you to identify these inadequacies, and return the application to Peak for more information and analysis. It is essential that Peak be more forthcoming with its information and seek expert analysis where necessary before returning with a revised application. And we urge DRMS to allow the public to evaluate any revised application with sufficient time to respond.

II. The deficiencies of the Reclamation Plan. Peak is thrusting a large, 10-15 year industrial mining project into the heart of a tranquil community. The reclamation plan uses minimal standards at best to protect the environment and the community. The reclamation plan is designed to keep costs low, and its ultimate land uses are antithetical to the goals and aspirations of the community. The impacts occur immediately adjacent to homes and community buildings with little or no protections and distance separations. The health and safety of nearby residents is ignored. No back up plans exist for impacts to water resources, streams and the Blue River, wells, and wildlife. Noise, lighting, and dust mitigations are laughable. The proposed reclamation plan has been done as minimally as possible. If mistakes are made, the damage will be permanent and irreversible. Peak shamelessly proposes an inadequate $90,000 bond for its operation. The reclamation plan needs to be recreated in its entirety.

III. Connection to existing Maryland Creek Mining Permit. Clearly, the plan that Peak proposes has ramifications for the Maryland Creek mining site also currently operated by Peak. The dependency on Maryland Creek to wash, sort, stack, and process the aggregate from the Peak Ranch/Hillyard site threatens the integrity of the wetlands and the Blue River in the Maryland Creek portion of the Blue River Valley. In addition, Summit County will require a new special use permit to import material to the Maryland Creek site. Peak has ignored the interdependency of these two areas in the Blue River drainage.

IV. The Substantive Impacts. As you will hear, Peak is oblivious to the special qualities of the Lower Blue River Valley, its river, its working ranches, its recreation opportunities, and the people who live there. The Lower Blue River, once a gold medal fishery, is on its way back to gold medal status. Landowners immediately downstream of the proposed project have spent tens of millions of dollars reconnecting the river to its flood plain, and improving their domains to gold medal conditions. Colorado Parks & Wildlife has been a partner in these and other efforts along the Blue River and State Highway 9. These efforts have become a showcase for the rest of Colorado. Ongoing efforts to protect the valley's remaining ranches with conservation easements, and to create more county and state open space, will be undermined.

V. Conclusion. As our expert reports explain, there will be real and permanent damage to the wetlands, river, alluvium, and wells in the area. The landowners adjacent to the proposed mine, in nearby sub-developments, and on large working ranches have built beautiful homes, reinvigorated agricultural activities, and protected their properties with conservation easements. They will see their property values decline, and their quality of life decline for years, and perhaps, decades to come. The tranquility that attracted them to the valley in the first place will be destroyed.

Fisherman, hikers, bikers, boaters, and hunters who visit the area each weekend will experience this same loss. Why would the state want to jeopardize this crown jewel and allow such a project to move forward? This is the wrong place for a new gravel mine. In our view, it cannot be reconfigured to be in harmony with the surrounding environment. It will negate all the past, current, and future efforts of so many people and agencies, local, state, and federal.

Attached please find more detailed, technical analyses of various experts in hydrology (West Sage Water Consultants), fisheries and aquatic environments (Queen of the River Consultants, Inc.), and reclamation (Aridlands LLC) on the proposal in front of you.

As previously mentioned, this application is woefully deficient and inadequate. It is not ripe for review and should be sent back to the applicant for further work. Only after these deficiencies have been addressed should DRMS and MLRB once again review the application. And, of course, we would want to opportunity to weigh in with our comments prior to any public hearing.

We thank you for this opportunity to comment and we look forward to being a party to the proceeding.

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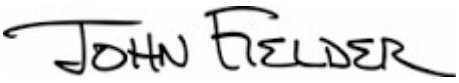
5 attachments



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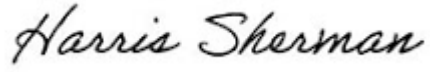

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Alward--LBRU-DRMS-Comments-Aridlands-FINAL-20201008.pdf
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Mitchell final LBRU-QOR comments to MLRS on application.pdf
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Studjuhar Peak Resource Application Comments on Water and Groundwater Final.pdf
5371K

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October 8, 2020

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Colorado Department of Natural Resources
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Denver, Colorado 80203

Sent via email to:
drms.temp@state.co.us

RE: Peak Ranch Resource – 112 Mining Reclamation Permit Application (File No. M2020041)

Dear Director Brannon,

On behalf of the Lower Blue River United citizens, I would like to bring to your attention several deficiencies in the Peak Ranch Resource permit application (File No. M2020041) and to ask that, at a minimum, you rule the application inadequate in its current form.

I am the Senior Ecologist and Owner of Aridlands, LLC, an environmental consulting company operating, since 2004, out of Grand Junction, Colorado. Aridlands, LLC, has contributed to reclamation activities associated with energy development (oil, gas, coal, uranium), construction materials, reservoir expansion, wildlife habitat modifications, and tamarisk control. I earned a Ph.D. in Ecology from Colorado State University in 1999 and served 9 years on the Colorado Oil & Gas Commission as the Commissioner with expertise in reclamation and soil conservation.

The current Peak Ranch Resource permit application has numerous significant deficiencies of which I will discuss five relevant to my professional expertise:

1. The proposed seed mix described in the Reclamation Plan (Exhibit E) fails to meet the requirements of Rule 3.1.10(1).
2. Topsoil quantities are incorrectly characterized in the Reclamation Plan (Exhibit E).
3. The proposed 26-acre groundwater-fed pond includes features that render it unsuitable for the objective of benefiting local wildlife or any other public purpose.
4. The application provides inconsistent descriptions of the extent of existing wetlands on the property.
5. The setbacks and screening berms, as proposed, are grossly inadequate to protect the surrounding residential areas from the impacts of mining operations.

I explain each of these deficiencies more fully below.

1. The proposed Permanent Rangeland Seed Mix is inadequate to meet the requirements of Rule 3.1.10(1) and is inappropriate for the applicant's final use goals.

The proposed "Permanent Rangeland Seed Mix" (Table E-3, p. E-4) lacks both functional and species diversity and is comprised largely of species not native to Summit County, Colorado. Thus, it is unlikely to achieve an effective, long-lasting vegetative cover that will benefit local game and non-game wildlife species.

Rule 3.1.10(1) requires revegetation that will …

> … establish a diverse, effective, and long-lasting vegetative cover that is capable of self-regeneration without continued dependence on irrigation, soil amendments or fertilizer, and is at least equal in extent of cover to the natural vegetation of the surrounding area.

And …

> … the use of species native to the region shall be emphasized.

The applicant includes similar sounding language within Exhibit E – Reclamation Plan, however the differences from the clear language in the rule are significant and, in some cases, factually incorrect. For example, the applicant justifies the proposed seed mix by claiming it will "establish a diverse, effective, and long-lasting vegetative cover that is capable of self-regeneration without continued dependence on irrigation, soil amendments or fertilizer, and it will provide equal or better cover than the existing vegetation." (Exhibit E, p. E-3)

The proposed seed mix will not establish a vegetation cover at least equal in extent of cover to the natural vegetation of the surrounding area. Providing vegetation cover equal or better than the existing vegetation is a very low bar and is not equivalent to the rule's requirement that a comparison to the natural vegetation of the surrounding area is the standard for success. The vegetation cover is admittedly poor throughout much of the property. Indeed, the applicant uses the terms 'overgrazed' or 'degraded' to describe the status of the vegetation cover on site at least 24 times throughout the permit application. However, the language in Rule 3.1.10(1) explicitly sets the criteria for revegetation success and the applicant should be required to develop a reclamation plan that will fulfill the requirements of this rule.

In describing the proposed reclamation seed mix, the applicant claims that the "[p]ermanent vegetation seed mix consists of native species." (Exhibit E, p. E-4, footnote 8) However, a comparison of the species included in Table E-3: Permanent Rangeland Seed Mix (p. E-4) to the USDA-NRCS mapping of the nativity of these species to Summit County reveals that this claim is false. (Table 1, below)

The proposed seed mix does not emphasize the use of native species. Nearly two-thirds of the seed mix (65%, based on number of seeds) is comprised of species not mapped as native to Summit County (NRCS 2020) and 25% of the seed mix is comprised of species not native to Colorado. (Table 1, below)

It is unlikely the proposed seed mix will result in the establishment of diverse, effective vegetative cover that is not dependent on irrigation or soil amendments. The applicant noted that the NRCS

Plant Materials Technical Note No. 59 (Revised) was consulted during the development of the proposed seed mix. Table 6 within this technical note identifies over 200 plant species and varieties and assesses their suitability for conservation plantings for each major land resource area (MLRA) within Colorado, including MLRA E-48A that includes the project area. From this table (summarized in Table 1, below), the applicant selected 9 species (8 grass species, plus alfalfa) of which only 3 are fully suitable for rangeland revegetation on this property. Two species (smooth brome and alfalfa) are not native to Colorado, are not suitable for range plantings, and have high fertility requirements. Additionally, smooth brome has a high rate of spread, which when paired with species with low rates of spread, frequently results in a dense monoculture of smooth brome to the extent that the NRCS warns that this species may become invasive (evidence of this phenomenon can be observed in the roadside verge between this property and Highway 9). Another species, prairie Junegrass, is unsuitable for conservation plantings above a maximum elevation of 8,00 ft.

Table 1. Evaluation of the suitability of the proposed "Permanent Rangeland Seed Mix" for conservation plantings within Summit County, Colorado[1]

Common name[2]	Maximum elevation[3]	Rate of spread[4]	Fertility requirements[5]	Range suitability[6]	Native[7]
smooth brome	10,000	**5**	**H**	**No**	**No**
mountain brome	10,100	2	M	Yes	*No*
➢ **mutton grass**	**13,900**	**2**	**L**	**Yes**	**Yes**
➢ **western wheatgrass**	**10,000**	**4**	**M**	**Yes**	**Yes**
streambank wheatgrass	9,500	4	M	Yes	*No*
prairie Junegrass	**8,000**	2	M	Yes	*No*
bottlebrush squirreltail	11,300	2	L	Yes	*No*
➢ **Indian ricegrass**	**9,500**	**2**	**L**	**Yes**	**Yes**
alfalfa	8,500	2	**H**	**No**	**No**

[1]Source: USDA-NRCS. 2011. Plant suitability for conservation plantings within Colorado. Plant Materials Technical Note No. 59 (Revised) [https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/copmstn10712.pdf]

[2]Common names do not always match exactly to a unique scientific name. Also, these common names do not indicate which specific variety will be planted, some of which may be more suitable to this site than others.

[3]The proposed Peak Ranch quarry site elevation is >8,200 ft and thus exceeds elevation range for prairie Junegrass.

[4]Mixing species with high rates of spread (5) with species with low rates of spread (2) will likely lead to the elimination of the slower spreading species and dominance by the rapidly spreading species.

[5]Species with high fertility requirements will likely not be self-sustaining in these low fertility soils.

[6]Species suitability for meeting the stated objective (p. E-3) "… to revegetate the disturbed areas to be reclaimed as rangeland."

[7]A bold red "**No**" indicates a species that is not native to Colorado. An italic "*No*" indicates a species native to Colorado, but with no mapped occurrences in Summit County. [USDA-NRCS. 2020. The PLANTS Database.]

➢ Only these three species meet all USDA-NRCS suitability criteria, including being species native to the locality.

Recommendations: The applicant has available numerous credible resources to identify a diverse mix of grasses, forbs, and shrubs appropriate for conservation plantings at this site. I would recommend reviewing the suitability of the 24 native species found on the site during vegetation surveys (Exhibit J – Vegetation Information, Appendix J-1, Table 2, p. 15) and the species typical of the two upland vegetation communities identified on the property: Inter-Mountain Basins

Montane Sagebrush Steppe and Rocky Mountain Alpine-Montane Wet Meadow (Exhibit J, Appendix J-1, p.12-13, and NatureServe. 2009.) These identify and describe many forb and shrub species necessary to enhance the game and non-game wildlife habitat on this property. The applicant should contact local seed suppliers about their needs immediately so that the suppliers have the opportunity to collect seeds this fall.

2. The application is inadequate because the quantity of topsoil that is claimed to be available and generated on site is not supported by the evidence provided elsewhere in the permit application.

The project proponent provided an incorrectly calculated volume of topsoil that will be generated, and thus available for berm construction and reclamation (see Exhibit E – Reclamation Plan, 2.3 Topsoil and Overburden Handling, Table E-2a, p. E-2; a corrected Table E-2a is provided in *Attachment 1*).

The volume of topsoil to be generated on site is much less than 43,560 cubic yards (CY); the calculation of this incorrect volume is based on a flawed assumption. The applicant states "… a maximum topsoil depth of six inches was assumed" (p. E-2) when, in practice, they assumed an average topsoil depth of six inches. This mis-assumption was possibly due to an incorrect interpretation of the NRCS Soil Survey Custom Soil Resource Report (Exhibit I, Appendix I-1). The NRCS Report for the 8B–Handran gravelly loam soil map unit indicates that the typical topsoil depth is six inches.

Making this assumption was totally unnecessary since the applicant had recently commissioned measurements of topsoil depths from nine unique samples on the property. Topsoil depths were measured in four exploration drill holes (Exhibit D, Table D-4: Exploration Drill Logs, p. D-7 & 8; see also *Attachment 1*). In each log the topsoil depth was recorded as 2 inches. Topsoil depths were also measured during construction of five groundwater monitoring wells (Exhibit G, Appendix G-2, the five Well Construction and Yield Estimate Reports follow page 7; relevant excerpts from these reports are included in *Attachment 1*). Measured topsoil depths ranged from 0.5 to 4 inches. Thus, the average actual topsoil depth from all nine samples on the property is 1.8 inches and in no measurement did the topsoil depth exceed 4 inches.

If the applicant adopted a more reasonable (but still generous) estimate of 2 inches for the average topsoil depth, then the total volume of topsoil that will be generated on site is 14,520 CY. If the south berm is constructed using 1,540 CY of topsoil for the top treatment (Table E-2a) this leaves just 12,980 CY of topsoil for building the north berm and windrows and for reclamation purposes (see corrected Table E-2a in *Attachment 1*). This represents a shortfall of 8,800 CY of topsoil necessary to complete the reclamation described in the application.

The applicant may intend to address this shortfall by mixing topsoil with other overburden materials; however, this action would be in violation of Rule 3.1.9(1) which requires that

> … topsoil shall be removed and segregated from other spoil.

Furthermore, mixing topsoil with silty clay subsoils (Exhibit D, Table D-4: Exploration Drill Logs, p. D-7) in 1:2 to 1:12 ratios will adversely alter many soil characteristics (e.g., infiltration rates,

drainage, water holding capacity, nutrient levels) and will degrade its ability to support a diverse, effective, and self-regenerating vegetation cover.

Recommendations: The applicant should be required to revise and correct Exhibit E and remove inconsistencies among exhibits. Also, the applicant needs to describe, in detail, how they will ensure segregation of topsoil from other spoil, and fully explain how it will use the limited quantity of topsoil available on site, what materials it will use for constructing berms, and how it will adhere to or modify the reclamation plan if the total quantity of topsoil generated is less than estimated.

3. The description of the groundwater-fed pond proposed for the southern portion of the project area includes features that render it unsuitable to benefit local wildlife populations or serve any useful public purpose such as recreation or a sustainable fishery.

The applicant proposes to minimize its reclamation obligations by "reclaiming" half of the disturbance area to "a groundwater lake for the benefit of local wildlife." (Exhibit E, p. E-1) In reality, the pond, as designed (Exhibit C – Pre-Mining and Mining Plan Maps, Map C-2B), will have little or no public value.

As planned, the shoreline of this pond is starkly uniform. The entire pond will be enclosed by steep 3H:1V mined slopes both above and below the water line. (Exhibit F – Final Reclamation Plan, Map F-1) This design will accommodate only extremely narrow zones suitable for emergent and bank vegetation. Physical diversity, in this case variable and gentler slopes, is necessary to promote desirable vegetation growth and encourage greater connectivity with the existing riparian vegetation along the Blue River and thus provide real benefit to local wildlife. (Figure 1, below)

The permit application includes a further deficiency: in addition to uniform slopes, the pond perimeter is nearly rectangular, broken up by a perfunctory bit of decorative "scalloping" along the northeast corner. Rule 6.3.4(1)(d) plainly requires that where "wildlife habitat is the proposed future land use, shorelines should be irregularly shaped to promote a diverse wildlife habitat."

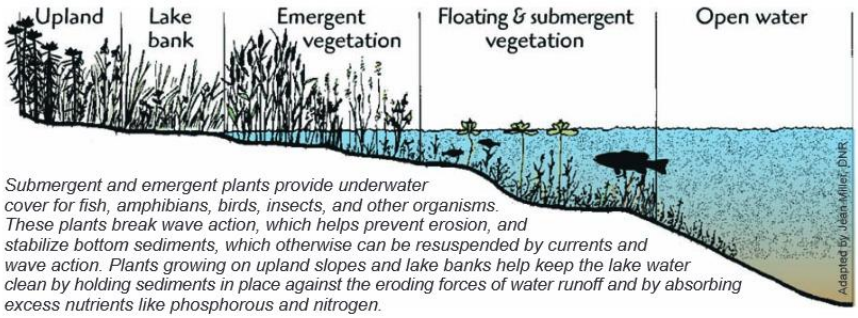

Figure 1. Example of vegetation zones that develop on a reclaimed lake shore with varying gentle to steep slopes. Shorelines with healthy littoral and riparian zones provide many benefits to wildlife and to water quality. (from MDNR 2012)

Recommendations: If a "reclaimed" pond is a component of an approved permit application, it should be redesigned to ensure it provides public benefit: for wildlife and/or recreation. A regrading plan should be developed and implemented that will result in varying shoreline slopes,

both above and below the waterline, and promote shoreline vegetation that will provide habitat for insects, fish, amphibians, and birds. The applicant should be further encouraged to take this opportunity to redesign the perimeter of the pond to be more irregularly shaped from its current poorly disguised rectangle.

4. The permit application provides inconsistent descriptions of the areal extent of wetlands on the property.

The permit application refers to wetlands on the property in two different exhibits. There is insufficient evidence provided to assess which, if either, is accurate and there has been no independent verification by the US Army Corps of Engineers to affirm their accuracy.

In Exhibit J – Vegetation Information, the wetland in the northeast corner of the property is described as palustrine emergent wetland (PEM, *sensu* Cowardin et al. 1979) and is a 6.68-acre portion of the larger Rocky Mountain Alpine-Montane Wet Meadow vegetation community on the property (Figure 2, below). The boundary of this wetland was "determined largely based on the presence of hydric soils." (Exhibit J, Appendix J-1, p. 6) The names and locations of the soil data points are provided in the text and the Aquatic Resource Delineation Map (Exhibit J, Appendix J-1, Appendix A); however, the Wetland Determination Data Forms provided represent only one of these soil data points. Exhibit J, Appendix J-1, Appendix B consists of 19 identical copies of the data form for sampling point DP-A1a. Thus, it is not possible to evaluate the soil and vegetation data collected and used to delineate the wetland.

In contrast, in Exhibit G – Water Information, a larger proportion of the Rocky Mountain Alpine-Montane Wet Meadow vegetation community is characterized as "wetland area" (Figure 2, below). No additional information is provided as to how this approximately 12-acre wet meadow "wetland" was determined.

In aerial imagery, as well as on the ground, the wet meadow vegetation can be observed to extend further south than indicated even in Exhibit G, increasing the potential for wetland resources on site to exceed 16-acres (Figure 2, below). Additional resources indicate that historical wetlands may have covered at least 40-acres of this property. (CNHP 2020; see also Figure 2, below)

Depending on the full extent of jurisdictional wetlands found on this property, the areal extent of wetland resources that will be directly impacted by the proposed mine, haul road, and berms ranges from less than 0.1-acres to over 10-acres.

<u>Recommendations</u>: It is imperative that the actual extent of the wetlands on the property is independently confirmed by the US Army Corps of Engineers before this application can be deemed complete and adequate. The applicant also needs to revise and complete Exhibit J and provide DRMS and other interested parties all of the Wetland Determination Data Forms used in the wetland delineation described therein.

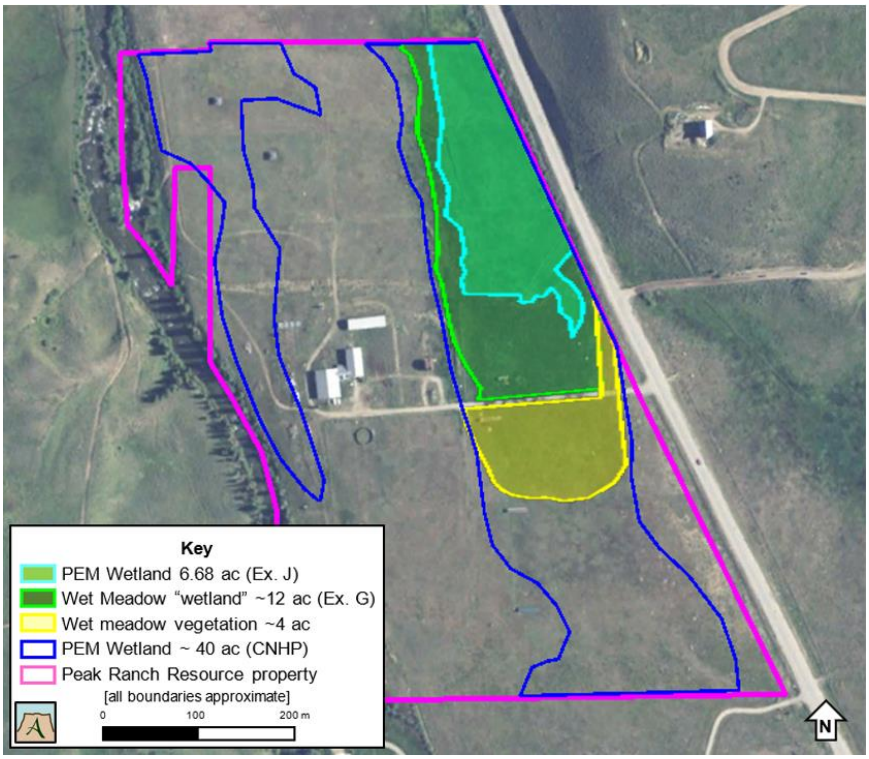

Figure 2. Potential wetland resources located on the PRR property.

5. The screening berms, as proposed, are inadequate to protect the surrounding residential areas from the impacts of mining operations.

The applicant proposes to locate a large open pit gravel mine immediately adjacent to a mixed residential/agricultural community. This intended use is incompatible with the current uses on the neighboring properties and will likely be a source of significant and recurring conflict. Nearby residents should be afforded the opportunity to continue to enjoy their properties, even if this application is approved. A plan that provides for greater distance from mining operations, assurances of aesthetic sight lines, dust-free environments, and effective noise barriers will be critical to generating acceptance among the local residents. Absent these protections, and since the industrial operation may be continual for decades, there likely will be continuous friction and conflict between the mining operations and residential use.

The mining plan indicates the applicant is proposing construction of approximately 4,400 linear feet of screening berms 8-10 ft tall, with some encroaching within 200 feet of neighboring residences. (Exhibit C – Pre-Mining and Mining Plan Maps, Map C-2B) The application further indicates there will be two berms, one on the north end of the property and the other on the south, and both will partially wrap around the mining cells on the east and west sides. (Exhibit F – Reclamation Maps, Map F-1) As noted in Section 2, above, the applicant has incorrectly calculated the volume of topsoil available to construct the northern berm, apply topsoil to a depth of 6 inches on the southern berm, construct the windrows around the base of both berms, and reclaim the mined areas completed during Phase 1.

The screening berms, as currently planned, will be inadequate to protect the residential areas within 400 feet of mining operations to the north and south and even the more distant residential areas to the east (assuming the applicant is able to provide an updated plan indicating how they will obtain the materials required). The residents neighboring the mine will be impacted by noise and dust from mining and trucks on site and on the highway, exhaust fumes, as well as greatly impaired viewsheds, for a minimum of 13 years, and potentially much longer "if the mine life is extended." (Exhibit E – Reclamation Plan, p. E-5)

Recommendations: Setbacks from the mining operation should be increased. Other state agencies have found that setbacks of 500 feet between industrial extraction operations and residential areas are the minimum necessary to reduce impacts. Given that this industrial operation may be ongoing for decades, the applicant should also be required to plant trees and shrubs on the slopes and tops of the berms to enhance their effectiveness at minimizing impacts to the surrounding residential areas. Appropriate species include those currently identified on the property, e.g., Engelmann's spruce (*Picea engelmannii*) as well as native species typical of Inter-Mountain Basins Montane Sagebrush Steppe, e.g., sagebrush (*Artemisia tridentata*), serviceberry (*Amelanchier* spp.), and antelope bitterbrush (*Purshia tridentata*). These shrubs can reach 5-15 feet in height and, together with spruce trees, can contribute to a more effective, and slightly less unsightly, mitigation screen.

In closing, I hope that you will find compelling the concerns of the citizens comprising Lower Blue River United, and conclude that the Peak Ranch Resource permit application is both incomplete and inadequate, if not completely inappropriate for this location. I ask that you consider rejecting this application, or at the very least, you require the applicant to address all the inconsistencies within the application and to amend this application to come into full compliance with Rule 3, to include: (i) proposing an effective, diverse seed mix comprised of native shrubs and forbs, as well as grasses, (ii) correctly calculating the volume of topsoil that can be generated on site and identifying the materials that will be used for berm construction and reclamation, (iii) eliminating the pond, or proposing an appropriate pond design that will benefit local wildlife and/or recreation and promote shoreline vegetation that includes species of willows, alder, rushes, and sedges currently identified on the property, and (iv) increasing setbacks from property lines and redesigning the screening berms so that they are both effective and less unsightly.

Thank you for this opportunity to comment on this permit application and for taking the time to review my comments.

Sincerely,

Richard Alward, Ph.D.
Senior Ecologist
Aridlands, LLC

References

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ATTACHMENT 1

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Exploration Drill Logs from Exhibit D with measured topsoil depths

Table D-4: Exploration Drill Logs

Drill Hole	Drill Hole Log	Note
Drill Hole 1 (NW corner)	0-2" Topsoil 2"-1' Silty Clay 1'-2' Silty sand with gravel 2'-10' Sand and gravel with cobbles 10'-13' Cobble with gravel, sand 13' – 39' Sand and gravel with scattered cobbles 39' – 62' Dense cobbles with sand and gravel 62' – 67' Weathered shale	Completed on April 17, 2018
Drill Hole 2 (NE corner)	0-2" Topsoil 2" – 8" Silty Clay 8"-2' Sandy clay with gravel 2'-3' Sand and gravel 3'-10' Sand gravel with scattered cobbles 10' – 21' Cobbles with sand and gravel 21'-40' Sand and gravel with scattered cobbles 40' – 47' Dense cobbles with sand and gravel 47'-52' Weathered shale	Completed on April 17, 2018
Drill Hole 7 (SW corner)	0-2" Topsoil 2" – 1' Silty Clay 1'-2' Silty gravel 4'-11' Cobbles with sand and gravels 11'-15' Sand and gravel with scattered cobbles 15'-24' Cobbles with sand and gravels 24'-47' Sand and gravel with cobbles 47'-58' Cobbles with sand and gravel 58'- 62' Weathered shale	Completion date note recorded
Drill Hole 9 (SE corner)	0-2" Topsoil 2" – 1' Silty and sandy Clay 1'-3' Silty sand with gravel 3'-10' Dense cobbles with sand and gravels 10'-12' Sand and gravels 12' – 14' Cobbles with sand and gravels 14' – 34' Sand and gravel with cobbles 34'-40' Cobbles with sand and gravels 40' – 41' Dense sand 40'-66' Cobbles with sand and gravels	Completion date note recorded

Well Construction and Yield Estimate Reports from Exhibit G with measured topsoil depth

Form No. GWS-31 02/2017	WELL CONSTRUCTION AND YIELD ESTIMATE REPORT State of Colorado, Office of the State Engineer 1313 Sherman St., Room 821, Denver, CO 80203 303.866.3581 www.water.state.co.us and dwrpermitsonline@state.co.us	For Office Use Only

1. **Well Permit Number:** **Receipt Number:** 59658-MH
2. **Owner's Well Designation:** GW-1
3. **Well Owner Name:** Kilgore Companies (7057 West 2100 South, Salt Lake City, Utah)
4. **Well Location Street Address:** 35405 State HWY 9 Silverthorne, CO 80498
5. GPS **Well Location (required):** ☐ Zone 12 ☒ Zone 13 Easting: 4401254.0 Northing: 4403457.69
6. **Legal Well Location:** ____ 1/4, ____ 1/4, Sec., 20 Twp. 3.0 ☐ N or S ☒, Range 78.0 ☐ E or W ☒, Sixth P.M.
   County: Summit County
   Subdivision: _____, Lot ____, Block _____, Filing (Unit) _____
7. **Ground Surface Elevation:** 8266 feet **Date Completed:** 06/14/2019 **Drilling Method:** ODEX
8. **Completed Aquifer Name :** _____ **Total Depth:** 20 feet **Depth Completed:** 20 feet
9. **Advance Notification:** Was Notification Required Prior to Construction? ☒ Yes ☐ No, Date Notification Given: _____
10. **Aquifer Type:** (Check one) ☐ Type I (One Confining Layer) ☐ Type I (Multiple Confining Layers) ☐ Laramie-Fox Hills ☐ Type II (Not overlain by Type III) ☐ Type II (Overlain by Type III) ☒ Type III (alluvial/colluvial)
11. **Geologic Log:**

Depth	Type	Grain Size	Color	Water Loc.
0-4'	Topsoil	0.002-0.1mm	Brown	No
4-6'	Gravelly Sand	0.05-75mm	Brown	No
6-8'	Sand	0.05-2mm	Tan	No
8-10'	Gravel	2-75mm	Grey	Yes
10-14'	Gravelly Sand	0.05-75mm	Light brown	Yes
14-20'	Pebbles	75-125mm	Grey	Yes

12. **Hole Diameter (in.)**

	From (ft)	To (ft)
5"	0	20

13. **Plain Casing**

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
2	Sch40PVC	.154	0	5.0

Form No. GWS-31 02/2017	WELL CONSTRUCTION AND YIELD ESTIMATE REPORT State of Colorado, Office of the State Engineer 1313 Sherman St., Room 821, Denver, CO 80203 303.866.3581 www.water.state.co.us and dwrpermitsonline@state.co.us	For Office Use Only

1. **Well Permit Number:** **Receipt Number:** 59658-MH
2. **Owner's Well Designation:** GW-2
3. **Well Owner Name:** Kilgore Companies (7057 West 2100 South, Salt Lake City, Utah)
4. **Well Location Street Address:** 35405 State HWY 9 Silverthorne, CO 80498
5. GPS **Well Location (required):** ☐ Zone 12 ☒ Zone 13 Easting: 700869.2 Northing: 4403820.78
6. **Legal Well Location:** ____ 1/4, ____ 1/4, Sec., 20 Twp. 3.0 ☐ N or S ☒, Range 78.0 ☐ E or W ☒, Sixth P.M.
   County: Summit County
   Subdivision: _____, Lot ____, Block _____, Filing (Unit) _____
7. **Ground Surface Elevation:** 8251 feet **Date Completed:** 06/12/2019 **Drilling Method:** ODEX
8. **Completed Aquifer Name :** _____ **Total Depth:** 25 feet **Depth Completed:** 25 feet
9. **Advance Notification:** Was Notification Required Prior to Construction? ☒ Yes ☐ No, Date Notification Given: _____
10. **Aquifer Type:** (Check one) ☐ Type I (One Confining Layer) ☐ Type I (Multiple Confining Layers) ☐ Laramie-Fox Hills ☐ Type II (Not overlain by Type III) ☐ Type II (Overlain by Type III) ☒ Type III (alluvial/colluvial)
11. **Geologic Log:**

Depth	Type	Grain Size	Color	Water Loc.
0-1.3'	Topsoil	0.002-0.1mm	Brown	No
1.3-4.5'	Gravelly Sand	0.05-2mm	Brown	No
4.5-5.5'	Gravel	2-75mm	Tan	No
5.5-10'	Sand Pebbles	0.05-64mm	Brown	No
10-15'	Gravelly Sand	0.05-75mm	Light brown	Yes
15-17'	Pebbles	4-64mm	Grey	Yes
17-25'	Gravelly Sand	0.05-2mm	Tan	Yes

12. **Hole Diameter (in.)**

	From (ft)	To (ft)
5"	0	25

13. **Plain Casing**

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
2	Sch40PVC	.154	0	10

Well Construction and Yield Estimate Reports from Exhibit G with measured topsoil depths (cont.)

Form No. GWS-31 02/2017	WELL CONSTRUCTION AND YIELD ESTIMATE REPORT State of Colorado, Office of the State Engineer 1313 Sherman St., Room 821, Denver, CO 80203 303.866.3581 www.water.state.co.us and dwrpermitsonline@state.co.us	For Office Use Only

1. **Well Permit Number:** **Receipt Number:** 59658-MH
2. **Owner's Well Designation:** GW-3
3. **Well Owner Name:** Kilgore Companies (7057 West 2100 South, Salt Lake City, Utah)
4. **Well Location Street Address:** 35405 State HWY 9 Silverthorne, CO 80498
5. GPS **Well Location (required):** ☐ Zone 12 ☒ Zone 13 Easting: 401009.6 Northing: 4403820.78
6. **Legal Well Location:** ____ 1/4, ____ 1/4, Sec., 20 Twp. 3.0 ☐ N or S ☒, Range 78.0 ☐ E or W ☒, Sixth P.M.
   County: Summit County
   Subdivision: _____, Lot ____, Block _____, Filing (Unit) _____
7. **Ground Surface Elevation:** 8249 feet **Date Completed:** 06/13/2019 **Drilling Method:** ODEX
8. **Completed Aquifer Name :** _____ **Total Depth:** 20 feet **Depth Completed:** 20 feet
9. **Advance Notification:** Was Notification Required Prior to Construction? ☒ Yes ☐ No, Date Notification Given: _____
10. **Aquifer Type:** (Check one) ☐ Type I (One Confining Layer) ☐ Type I (Multiple Confining Layers) ☐ Laramie-Fox Hills ☐ Type II (Not overlain by Type III) ☐ Type II (Overlain by Type III) ☒ Type III (alluvial/colluvial)

11. Geologic Log:

Depth	Type	Grain Size	Color	Water Loc.
0-1.5'	Topsoil	0.002-0.1mm	Brown	No
1.5-5'	Gravelly Sand	0.05-2mm	Brown	No
5-7'	Sandy Silt	0.002-.05mm	Tan	Yes
7-20'	Gravelly Sand	0.05-75mm	Light Brown	Yes

12. Hole Diameter (in.)

	From (ft)	To (ft)
5"	0	20

13. Plain Casing

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
2	Sch40PVC	.154	0	5

Form No. GWS-31 02/2017	WELL CONSTRUCTION AND YIELD ESTIMATE REPORT State of Colorado, Office of the State Engineer 1313 Sherman St., Room 821, Denver, CO 80203 303.866.3581 www.water.state.co.us and dwrpermitsonline@state.co.us	For Office Use Only

1. **Well Permit Number:** **Receipt Number:** 59658-MH
2. **Owner's Well Designation:** GW-4
3. **Well Owner Name:** Kilgore Companies (7057 West 2100 South, Salt Lake City, Utah)
4. **Well Location Street Address:** 35405 State HWY 9 Silverthorne, CO 80498
5. GPS **Well Location (required):** ☐ Zone 12 ☒ Zone 13 Easting: 401015.7 Northing: 4403819.42
6. **Legal Well Location:** ____ 1/4, ____ 1/4, Sec., 20 Twp. 3.0 ☐ N or S ☒, Range 78.0 ☐ E or W ☒, Sixth P.M.
   County: Summit County
   Subdivision: _____, Lot ____, Block _____, Filing (Unit) _____
7. **Ground Surface Elevation:** 8261 feet **Date Completed:** 06/13/2019 **Drilling Method:** ODEX
8. **Completed Aquifer Name :** _____ **Total Depth:** 22 feet **Depth Completed:** 22 feet
9. **Advance Notification:** Was Notification Required Prior to Construction? ☒ Yes ☐ No, Date Notification Given: _____
10. **Aquifer Type:** (Check one) ☐ Type I (One Confining Layer) ☐ Type I (Multiple Confining Layers) ☐ Laramie-Fox Hills ☐ Type II (Not overlain by Type III) ☐ Type II (Overlain by Type III) ☒ Type III (alluvial/colluvial)

11. Geologic Log:

Depth	Type	Grain Size	Color	Water Loc.
0-0.5'	Topsoil	0.002-0.1mm	Brown	No
0.5-2'	Cobbles	20-200mm	Grey	No
2-8'	Gravelly Sand	0.05-75mm	Tan	No
8-12.5'	Cobbles	20-200mm	Grey	No
12.5-17'	Gravelly Sand	0.05-75mm	Light brown	Yes
17-22'	Sandy Silt	0.002-0.1mm	Tan	Yes

12. Hole Diameter (in.)

	From (ft)	To (ft)
5"	0	22

13. Plain Casing

OD (in)	Kind	Wall Size (in)	From (ft)	To (ft)
2	Sch40PVC	.154	0	7

Table E-2a: Topsoil and Overburden Material Balances During Reclamation (corrected)

Table E-2a: Topsoil and Overburden Material Balances During Reclamation per Reclamation Plan F-1 (Phase 1 and Phase 2 mining complete)

Corrected

	Material Generated by Mining (CY)[3]	Material Used in South Berm (CY)[4]	Material Required for Reclamation (CY)[5]	Material Used for Reclamation (CY)[6]
Topsoil	~~43,560~~ 14,520	1,540	21,780	> ~~42,020~~ 12,980
Overburden	87,120	13,159	0	73,961

Queen of the River Aquatic Consultants, Inc.
PO Box 310
Mead, Colorado 80542 (303) 589-2178 mike@qorconsult.com [Type here]
[Type here]

Ms. Ginny Brannon, Director
Division of Reclamation, Mining and Safety
Colorado Department of Natural Resources
1313 Sherman Street, Room 215
Denver Colorado 80203

Re: Comments on Peak Materials112 Mining Reclamation Permit Application (File No. 2020041)

Dear Ms. Brannon;

My name is Michael Mitchell and I am Senior Aquatic Biologist and principal of Queen of the River Aquatic Consultants, Inc. (QOR). QOR has provided scientific aquatic research, consultation, management, design, permitting and construction of aquatic based projects in the Blue River valley since 1983. We have been asked by the Lower Blue River United citizens to review and provide comments to DRMS on the application submitted by Peak Materials in the upper Blue River valley. I would like to bring to your attention a number of deficiencies in the application and offer recommendations that assist in the decision making process of the Board.

I would like to provide a biologist, a business person and interested citizen's perspective on the Blue River for you to consider. The Blue River is a large river by Colorado standards. Its high elevation, large watershed and free stone alluvium define it as excellent for the support of quality cold-water fisheries including trout.

Landowners, river and watershed managers have long recognized the tremendous potential of the Blue River. It is the recognition of the river's "many cuts" that has fueled the successful river restoration efforts of the last 25 years. In addition to the ***hundreds of millions of dollars*** invested in conservation easements and open space in the last 25 years conservators have invested another ***30 million dollars*** in habitat improvements, river channel stabilization, reconnections of the river to its floodplain, development of compatible agriculture and wildlife land use sharing plans, and installation /management of high quality trout fisheries. These areas of fishing now help to make Summit County world renown and attract interested aquatic based recreationists, photographers, and additional conservation land investors interested in our area. The restoration to date has been made primarily with private sector investments and now enjoys partnership with Summit County investments in public open space and assistance from Colorado Parks & Wildlife and the Colorado Department of Transportation.

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The local perspective of Summit County residents recognizes and highly values the Blue River Corridor as its primary agricultural, recreational and natural resource asset for over 100 years. The first conservation easement completed in the State of Colorado was done in the Blue River valley with about 3.5 miles of the river included. In all of Colorado this river corridor contains one of the densest confluences of National Wilderness Areas and public lands with large expanses of established and emerging private conservation easements glazed with increasing purchases of public open space lands. These actions have increased the national recognition of Summit County and defines the value of everyone's experiences. These benevolent and valuable land use practices serve all of Summit County and Colorado and is all done with the *Blue River* as the centerpiece of this effort.

A river's quality is recognized by its aesthetics and potential to produce a healthy environment. The fisheries, which are a large component of this quality, are defined by the function of a physical, chemical and biological continuum starting at the headwaters and continuing to its confluence with larger waters. All knowledgeable water people recognize a river as the beginning of the ocean. This downstream continuum is fed by increased flows, increased numbers of aquatic organisms, increased complexity of food webs and increased amounts of nutrition that supports resident organisms as one ventures downstream. An important component of the headwater Blue River continuum is the riparian or stream side habitat which provides annual nutrition in the form of dissolved leaves, sticks and other carbonaceous compounds. In Colorado the riparian corridor is estimated to be just 3% of our land area yet it is vital to at least 85% of our wildlife species at one time or another in their life histories (birth to death).

A river then is dependent on the physical, chemical and biological connections along the continuum especially through the natural seasons when these connections occur. Along the Blue River as spring matures to summer water flows from snow melt increase then diminish by midsummer. This flow timing or hydrograph distributes the nutrients derived from the prior season's riparian growth to feed the new year's growth in the river (single cell algae to multi-cell organisms; fisheries to wildlife). The nutrients distributed in spring arrive just as the summer growing season starts and the river can utilize them efficiently because high flows wet the most substrate where all this activity occurs. The Blue River then, is essentially dependent on the volume, temperatures, timing, intensity, and duration of flows and the natural annual cycles of the temperate montane climate of Summit County.

Recently the Colorado Wildlife Commission was advised and did remove the "Gold Medal Waters" designation for the Lower Blue because it did not meet the number of fish nor the biomass of fish per acre required for the entire stretch. This action does not justify ignoring the Blue River but instead strongly emphasizes that more attention is needed building on the already remarkable efforts of many landowners.

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The Blue River, with its tremendous potential as a river, has had its cycle of nutrient availability, natural productivity, and its very continuum challenged for 57 years (almost 80 years when considering the river below Green Mountain Reservoir). The placement of large "on-channel" reservoirs, including Dillon and Green Mountain Reservoirs has disrupted the Blue River physical continuum by taking the high spring river flows with their natural nutrition and trapped them in reservoir cycles restricting them from further sharing downstream. When spring flows are impounded in these reservoirs they engage in temperature changes caused by lake processes that create warmer temperatures in surface waters and colder in bottom waters relative to normal stream water conditions at the time they are discharged. These events change the normal annual hydrograph of the Blue River. Low flows are discharged in spring/summer while reservoirs are filled and diverted out of the basin and high flows are discharged in the fall/ winter as stored waters are released for adjudicated downstream demands. In the case of the Blue River at Dillon Reservoir a significant portion of the annual watershed output (about 60,000 acre feet per year or 1/4 of Lake Dillon storage) is completely removed from the watershed when conveyed out of the basin to Denver through Roberts Tunnel. This reversal of flow timing means in spring and summer the flows, widths and depth of the river are diminished just as the summer season when photosynthetic activity and biotic production are at their natural optimum occur. Flows increase in fall/winter wetting greater areas of the stream bed substrate increasing freezing interactions (anchor and frazzle ice) just when photosynthetic activity is diminished by the colder winter seasons.

For these and other factors, the needs of the river and preservation of its value is now heightened more than ever. Many landowners and the Summit County Commissioners have evolved in their role as conservators assisted by the development of the Colorado State Water Plan. This plan helped to form the Blue River Watershed Management Group as an established stakeholder group comprised of federal, state, local and private sector participants committed and engaged in addressing cooperatively the conditions of the Blue River and its part of the continuum. These decision influencers in concert with decision makers can take the substantial investments "in conservation and perpetuity" and focus on essential decisions that support this tremendous public-private wager in conservation. Decision makers must act as wise investment counselors and recognize the wager isn't justified by just preservation but must use time and wise decisions to multiply the investments value exponentially. For Summit County citizens to realize their "payback" it is essential that these natural systems are ***increased and optimized in their function as biotic systems.*** Biotic systems that produce attributable and recognizable values such as appearance, condition, function and use. Their actions managing these waters must improve the long term health of the river keeping it clean, the river must support functions such as larger floodplains that communicate with lower frequency flood events, more wetland for runoff filtration, provide flood flow protections, create safety for structures such as bridges and

roadways and provide sustainable fisheries for recreation and river health. We can't just depend on re-thinking flow regimes but must address increasing what we can have considering multiple uses and optimize the function of the river. Decisions on land use must support connectivity and opportunities to increase river function thus enhancing benefits through adjusted water quality management, water purification, agriculture practices, land and wildlife conservation and recreation. This is the only way time works to ***exponentially enhance the value*** of these expensive and risky investments in conservation. Through increased natural function, increased aesthetics and increased service the river becomes a growing and priceless asset rather than a liability.

To date the wise investments in conservation of the Blue River has increased its function to the public by serving as a major factor in increasing land value. It is also one of the county centerpieces in the realization of Northwestern Colorado's $14.9 billion dollar annual outdoor recreational economy. With respect to the fishery it is paramount to Summit County in realizing its share of Colorado's annual $2.4 billion dollar fishing economy. It cannot be overlooked nor can we settle for more serious impacts to the river.

There is a simple question of wisdom and congruency that asks why anyone would find it valuable to threaten enhancement of a river and the conservation of open space by placing a large open pit mining operation next to the state's oldest and most contiguous open space mosaic containing the only 3.5 mile section of Gold Medal Waters still existing on this reach of the Blue River. Instead we should be building upon these exceptional efforts to restore the river and enhance its gold medal status upstream and downstream of the proposed project.

What follows is a more definitive explanation of the anticipated impacts of the proposed mining plan and reclamation as it impacts the riparian environment and the river itself.

I. Exhibit G-Water Information

Overview:
Each time a gravel mining operation is created within the floodplain of a river, it represents threats to physical and chemical water quality, requires additional floodplain isolation for protection of the operation and then protection of what is left behind from river flood flows. Upon reclamation when pit lakes are left they breach in a flood event that exceeds the protection provided. Table 1 provides a professionally considered overview of the impacts recognized and documented by scientists and managers through review of many studies where gravel pit floodplain lakes adjacent to a river have breached as a result of a flood flow event.

Table 1: Summary of potential impacts caused by floodplain gravel pit capture (taken from Grindeland and Hadley, 2003)

Elements of Avulsion (breach)	Nature of Impact		
	Upstream	**Local**	**Downstream**
Geomorphic Characteristics	• Incision of river channel • Increase in gradient • Coarsening of bed • Undercutting/erosion of stream and mine banks • Increase/decrease of lateral migration rates	• Alluvial fan development • Reshaping of pits • Loss of natural channel geometry • Increased open water areas	• Increased lateral migration • Increased channel width
Sediment Transport	• Increase sediment transport capacity • Reduction in bedload deposition	• Deposition of sediment • Short term increase turbidity • Erosion of gravel pit banks into river	• Reduced sediment supply • Erosion of bed • Coarsening of bed • Increased bank erosion • Short term increase in fine sediment supply
Hydraulics	• Increase slope • Increase velocities • Decreased normal depths • Increased roughness	Decreased slope Increased channel depth Increased channel width Reduced bed roughness	Increased bed roughness
Hydrology		Increased flood storage Increased evaporation Altered ground water flow patterns	• Reduction of flood levels • Attenuation of flood peaks • Changes in summer low flows • Lower riparian groundwater levels due to bed lowering
Water Quality		• Water Temperature increases • Short term turbidity increases • Alteration of hyporheic zone in streambed	• water Temperature increase • Short-term increase in turbidity

Aquatic Habitat	• Habitat loss or disruption due to channel incision • Potential conversion of habitat type/quality • Short and long term habitat instability	• Conversion of stream habitat to still water habitat • Capture of fish/isolation of fish following floods • Release of non-native fish from pits • Alteration of hyporheic zone in streambed	Habitat disruption or loss due to erosion of bed • Habitat loss due to altered sediment supply • Potential conversion habitat type/quality • Short and long term habitat instability

One such event that remains fresh in the mind of Coloradoans is the 2013 flood of the St. Vrain, Coal Creek, Boulder Creek and South Platte River watersheds (Blum and Carroll, 2014). Almost all of these impacts occurred. Many geomorphologists and hydrologists advise that breaching of reclaimed gravel pit ponds along a river **"is not an if …but instead a when disaster"** for policy makers, planners, and communities to assume (Kahnehl and Lyons, 1992). In Norman, *et al,* (1998) they conclude that when the adjacent lakebed is lower than the river bed it's a virtual guarantee of breaching. Considering these aforementioned warnings the approval of this gravel extraction mine on this floodplain site increases challenges realized by the Blue River and downstream landowners by:

1. *Allowing increased, enhanced and continued isolation of the river from its floodplain* and nutrient sources found there.
2. *Condemning nutrient availability to the river from this site to only damaging catastrophic flood events.*
3. *Creating floodplain conditions of higher vertical boundaries requiring higher energy flows and providing more features to erode thereby increasing the damaging energy of floods realized.*
4. *Lakes created as reclamation solutions increase water temperature over concurrent adjacent river temperatures and store them at greater water depths increasing potential for subsurface infiltration.* Warming waters will affect the river especially the hyporheic areas important to aquatic plant growth, macroinvertebrates and fisheries (See Table 1).
5. *Gravels and soils harvested then incorporated into industrial processes (such as onsite excavation, transportation, leaching and water storage) contain adsorbed/absorbed metals and salts which are mobilized more effectively by air, water and wind when chronically disturbed.*
6. ***Creates an imbalanced distribution of risk*** as downstream landowners are the primary recipients of damages during operation, reclamation and the predicted flood failure of site

protections as these flood events affect river function, transportation corridors, communities, agriculturists, water diversions, water storage and especially all who have more natural, desirable, higher functioning floodplains (lower differences between river and flood flow elevations). These areas will flood first and absorb the greatest contribution of damage and debris.

A. Floodplain Protection:

The application is inadequate as it needs to illustrate the topography of the river bed (bank to bank) and the site more clearly connected so one can make perpendicular cross sectionals comparisons of distance, elevations and gradients. The proposal is to put the limit of the mine as close as 50' from the 100 year active floodplain with 10 foot high berms just 25 feet from this boundary. This application places an active mining pit then converts this area to a 26 acre 37 foot deep reclaimed mine pit lake whose bottom is 27 feet below the riverbed. Additionally this proposal does not place berms completely around the perimeter of the pit for flood flow protection but only provides berms that provide "view shed protection".

The application treats the 100 year floodplain as a boundary above which this mines activity represents no further threat to the river. In fact this is not true. The area beyond the 100 year flood plain is adjudicated by the Federal Emergency Management Agency and defined as the Special Floodplain Management Area. It is the approximate 100-500 year floodplain and carries certain protections. The application does not provide discernable details relative to the project and its interactions beyond the vertical boundary of the100 year floodplain and into the SFMA where floods and downstream damages will occur. The application is incomplete in it does not provide DRMS with the information needed to make an informed decision. Proponents must complete analysis of their proposal in the SFMA area with respect to their activities and structures immediately adjacent to the 100 year floodplain and interactions within the SFMA. A set of 10 foot high berms, a 25 year mining operation with structures and processing as well as the proposed reclamation plan that will be within the SFMA in perpetuity.

Recommendations:

1. Clarify Sheets C1-C2c to more clearly show the riverbed elevations and tie them clearly to the site topography so comparisons of cross sectional and longitudinal features can be facilitated. Consider increases in scale, addition of pages and/or provision of more details to assist reviewers.
2. The applicant should better illustrate the vertical and horizontal definition of the project area along the river corridor with respect to the mapped SFMA. The proponent should be required to provide analysis of project interactions and impacts mining, processing and reclamation activities in the SFMA. The SFMA is where these project elements will come in contact with flood flows that will result in damages.

3. The applicant should determine whether in fact there are changes that may trigger a conditional or permanent Letter of FEMA Floodplain Map Revision (CLOMR or LOMR). Upon analysis and need for such floodplain revisions the applicant should be required to do so prior to approval. Minimally this analysis will directly provide predictive capabilities to decision makers relative to likelihood and frequency of the predicted breaching that will occur.

B. Water Quality: General

This proponent identifies in the application mining plan that the mine will penetrate the groundwater table to a depth of 42 feet. Once in the groundwater table the aggregate is dredged and continually disturbed/mixed within the exposed groundwater column upon which mined materials are placed on banks of the pit to further drain back to the pit until suitable for transport. Metals are especially toxic to aquatic organisms having effects at parts per billion rather than parts per million. Exhibit G; Table 2 identifies that groundwater contains concentrations of 12 identified metals and/or identified ionic states of metals listed in the Colorado Department of Health and Environment's (CDPHE) numeric standards for this segment of the Blue River including Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Nickel, Selenium, Silver and Zinc. Kondolf (1998) studied gravel mining pits near rivers in Nigeria and documented levels of five of these metals (Lead, Arsenic, Copper, Cadmium, and Silver) present at higher concentrations in mine site waters than in adjacent river water. This application presently lists them at concentrations below numeric standards but the effects of the chronic disturbance, mixing, dissolution and re-distribution coupled with the operation of the pit in an open flowing groundwater table communicating with the river via the hyporheic area known to flow at slower exchange rates than the water column above over a multi-decade period elicits ecological concerns regarding effects for the river and all wildlife in contact with these waters. The application is incomplete and should:

Recommendations:

1. Provide descriptive water quality analysis for water in the disturbed pit that describes for decision makers the constituents present and concentrations realized during mine operation. (the proponent has maintained such a pit at its Maryland Creek Ranch facility for many decades and can start with data from this mine)
2. Provide adequate locations and numbers of monitoring wells between the pit and the river along the illustrated groundwater flow profile that can characterize WQ of groundwater and develop a groundwater flow rate model. The proponents should provide locations, depths of well, WQ constituents to monitor, sample analyses and sampling protocols for 3 such monitoring wells.
3. Amend the application as recommended and provide results needed so citizens and state agencies such as Colorado Parks and Wildlife and Colorado Department of Public Health

and Environment; Water Quality Control Commission and Summit County staff have the information needed to provide an informed decision.

4. These agencies should be provided adequate time to review the amended application once these important definitions are provided.

Water Quality- Hyporheic Zones.

The conveyance of disturbed and continually mixed groundwater mixed with storm water drainage will occur from the pit to the river through the alluvium. The point of introduction to the river for groundwater is a very sensitive and important stratum of the river alluvium known as the *hyporheic zone.* This area of water saturated substrate in the flowing stream bed and saturated banks is known to be present along all river longitudinal profiles (Wondzell, et al; 2008). It is the point where the groundwater and river water mix and entertains physical, biological and chemical processes that define the health of the river. The rate of water flow in the hyporheic zone is known to be orders of magnitude slower that the flow of the river channel itself (Bencala, 2007; Harvey and Wagner, 2000; Schmadel, et al; 2017). Reasonably this indicates concentrations of introduced water quality constituents from groundwater are more concentrated in the hyporheic zone for longer periods of time than characterized by surface water quality analysis (Schmadel, et al, 2017). This area is deemed by scientists as an ecotone with specialized organisms and processes dependent on conditions that are different than the river above (Woesnner, 2007; Kaplan, et, 2000; Crocker and Meyer, 1987). It is an important area to many of the basic groups of microfuana that start primary productivity (sunlight energy interacting with chemical constituents to form living biomass) as well as many stages of higher macroinvertebrates that represent essential food chain items for a resident fishery (Pipan and Culver; 2019). The application clearly advises that the pit will be maintained as an unsealed alluvial penetration open to groundwater flows and that conveyance will naturally take waters from the pit to the river (Exhibit G, Figure 1). The application is incomplete in its description of water quality in the operating pit, flow rates of the groundwater and the hyporheic zones as well as the resident macroinvertebrate community in the river upstream, downstream and at points downstream where hyporheic zones will be affected from activities occurring on this parcel. When added to the amended application this information would provide for citizens, local, state and federal agency a more complete description of this applications impacts on the Blue River.

Recommendations:

5. The proponents must develop a statistically reliable description of the existing conditions of the hyporheic zone in the river including losing/gaining; substrate composition, flow rate of groundwater, flow rate of hyporheic zone, mixing in hyporheic zone and the macroinvertebrate/plant communities occupying the hyporheic area and the substrate of the river.

6. The proponent should provide a long-term surface water and hyporheic zone water quality monitoring program including minimally metals identified along with pH, TDS, sulfates, phosphorous and nitrogen series that describes water quality. Input from the citizen/landowner stakeholders, Colorado Parks and Wildlife and the Water Quality Control Division staff should be sought
7. This application should define the existing macroinvertebrate communities of the river upstream, at the site and downstream with sampling that adequately takes into effect the mixing of the water discharged via the alluvium in the river.
8. This application should provide a scientifically based program for ongoing monitoring of the hyporheic water quality
9. This application should provide a scientifically based monitoring program for the macroinvertebrate communities in this reach of river.
10. All groups in standing should be provided adequate time to review the amended application once these important definitions are provided.

II. Exhibit J -Vegetation Information-Protection of Wetlands Present:

There is a jurisdictional 6.68 acre wetland on the project property under the jurisdiction of the US Army Corps of Engineers. The delineation provided is incomplete with only 1 delineation site sample report provided when the report identifies 19 sites were completed. To date the proponent has not submitted this delineation to the US Army Corps of Engineers in time to allow them to "ground truth "the delineation. This leaves reviewers of this application with no assurances as to the validity of the delineation and metrics of this habitat present. This makes the application incomplete.

The surface flows that support this wetlands are identified by topography and flow lines on the most recent Summit County GIS system. This wetland appears to be historic and was created as a function of reduced gradient from east to west conveying and filtering watershed precipitation events from the east to the river. The construction of Highway 9 to the east and a drainage ditch at the western wetland boundary indicate this wetland has been altered and confined by anthropomorphic activities. This wetland, based on comparing groundwater well levels and hydrology testing for the delineation, indicates that surface water is essential to this wetland. Groundwater flows through the site is documented in Exhibit G, Figure 1. Figure 1 indicates groundwater comes from the southeast and flows to the northwest connecting with the river. Typical function of a wetland with varying groundwater levels below a surface water source is it likely represents a losing area of watershed providing communication of surface waters to the underlying groundwater. The mining plan shows that the Phase 1 mine pit will excavate in the southeastern corner of the north pit within 25 feet of the western boundary of this wetland *to a depth of 10 feet below the wetland surface* (see Sheet C2b). This action will likely drain the

surface waters from the wetland water table through a cone of depression resulting in the debilitation and perhaps loss and of this wetland.
The mining plan illustrates on Sheets C2a-2c that a road is planned for bifurcation of this wetland. This makes the application incomplete and proponents should provide a biological and physical description of this activity for US Army Corps of Engineers consideration prior to DRMS consideration.

Recommendations

1. Provide a complete wetlands delineation report for all aquatic resources that provides all sample site results in the proponent's delineation.
2. Require that the proponent complete delineation forms and amend their report then secure from the US Army Corps of Engineers a verification of this delineation prior to permit approval. To assist in maintaining credibility for all who review the delineation afterward we suggest a formal "Jurisdictional Delineation" be completed by the US Army Corps of Engineers and provided by the proponent to DRMS.
3. The proponent should illustrate how they plan to protect the Aquatic Resources (wetlands) groundwater levels from cuts that are within 25' that go to depths 10 feet below the surface of this wetland.
4. Protections illustrated must address maintenance of the groundwater levels, surface area, vegetative cover, species composition and vegetative function. A monitoring program should be maintained for the duration of the disturbance.
5. The mining plan should provide for those reviewing this application not just plan view but also longitudinal and cross sectional profiles of the cuts and fill planned in wetlands. This plan should identify the amount of wetlands lost and any mitigation plan required.

III. Exhibit H-Wildlife Information: Fisheries:

The analysis of fisheries in the application identified and discussed many important species of fish that are not present in the river and failed to discuss aquatic species that *are* present such as the population metrics and status of mollusks, amphibians, macroinvertebrates, salmonids, catastomids, cottids, and native cyprinids. The application only discusses one aspect of regional aquatic organism management objectives specifically the presence/absence of state and federal Endangered Species Act "listed species". It provides limited discussion of state "species of special concern" specifically "boreal toads" and other potentially present aquatic species. It is incomplete as it does not discuss specific surveys for the presence of any of these species, should include discussions of migratory species including otters, bald eagles and white pelicans. Analysis needs to determine if they or their habitat are present in this project area or connected adjacent along the river. If present they must be addressed relative to

avoidance and if unavoidable provide mitigation. If absent but resident and can migrate/ use the site (i.e. river otters, mink, bald eagles, white pelicans, moose and others) they should be addressed in the reclamation plan to assure its value to wildlife present.

The project plan provides for leaving a 26 acre mine pit reservoir that will contain heretofore undefined depths of fine inorganic and organic materials which is ideal habitat for tubificid worms that are essential for the continuation of whirling disease in trout. ***Tubifex tubifex*** is a critical host in the completion of the parasite's life cycle which infects trout and renders rainbow and cutthroat trout non reproductive in resources where the worm and parasite exist. Colorado Parks and Wildlife has spent tens of millions of dollars mediating this disease, including in the Blue River. Another water body that can host *Tubifex spp.* is not helpful nor desirable.

The application does not discuss the project relationship to regional aquatic resource goals such as benefits or threats to coordinated watershed and floodplain management, whirling disease management, aquatic nuisance species control and best management practices, or recreational fisheries issues. An important issue is how this project may affect the commitment of Summit County and other stakeholders to regaining "Gold Medal Waters" status (see Water Quality concerns and discussion of hyporheic zones). This mine if installed as designed will be a mere one vertical foot or so above the 100 years floodplain. Professional opinions are that all floodplain placed pits will breach to the channel at some point. This mine is proposed for just upstream of the only Gold Medal Waters in the 30 mile reach above Green Mountain Reservoir. This 3.5 mile restoration area with its dozens of acres of wetlands created and millions of dollars in private conservation easements and restoration investment will be destroyed. It will not be replaced without expenditure of public dollars. The allowance of such a potential threat adjacent to this already completed and functioning conservation resource will certainly squelch any further interest in investments in conservation along the river. The State of Colorado Water Conservation Board has signed an Injury with Mitigation Agreement with downstream conservators recognizing their fisheries enhancements of the river and floodplain agreeing to share river flows during Instream Flow Calls to assure these reclaimed floodplain habitats remain watered and connected to the river. This application fails to evaluate whether this project and its potential depletion of surface and ground waters have identified and evaluated effects to this water right. It is a small water right that allows these now federally jurisdictional water resources to remain wetted during all seasons of the year.

The application is not complete because citizens, government agencies, non-government groups and including the DRMS Board do not have all the information required to provide

direction on issuance of this permit. To complete the application the proponent should be required to:

Recommendations:

1. This application should define the existing macroinvertebrate communities of the river upstream, at the site and downstream with sampling that adequately takes into effect the mixing of the water discharged via the alluvium in the river. This application should provide a scientifically based monitoring program for the macroinvertebrate communities in this reach of river and conduct such monitoring through the lifespan of the project.
2. This application should provide analysis of terrestrial wildlife present within the corridor that will have ability and seasonal timing needs that will result in use of river corridor sites. The application should provide a plan of deterrence and avoidance of impacts. Daily interactions for wildlife –traffic on Highway 9 through this project area and in others have already identified that exclusionary fencing is appropriate. This project reasonably represents such threats and more. Exclusionary fencing and a security system should be provided and included in this project.
3. Provide monitoring and protections for aquatic species that are present in the Blue River including aquatic macroinvertebrates important to resident trout fisheries and minimally salmonid species potentially impacted when the mine and the reclamation plan interacts with the river (groundwater flows, mining water quality to groundwater, sealing of sediments and breaching). It should include native species of cottids, cyprinids and catastomids.
4. Reference Recommendation Ic and provide for this application an ability for decision makers to understand through mapping of the floodplain Special Flood Management Areas on the property when the isolation from the river of the proposed floodplain mining operation and reclamation plan is no longer provided and the site will engage in overland flooding. Provide how the plan can be revised to provide avoidance and protections for downstream landowners and infrastructure regarding engagement of developments and land alterations completed by this proposal in flooding downstream.

IV. **Exhibit E Reclamation Plan: Aquatics**

The reclamation plan proposed does not provide wise nor efficient wildlife enhancement of this property or the Blue River after removal of its aggregate alluvium. Any reclamation plan proposed and accepted must recognize the fact that the river is the predominate wildlife attraction feature and optimize its presence and function with the river so reclamation can be effective and provide enhancement as DRMS regulations require. DRMS regulations in addition "encourage the diversity of both game and non-game species" from such reclamation efforts and

it is intuitive that at a "minimum" habitat and its availability should be created for both classifications of wildlife. This reclamation plan then must continue to marry land and water disturbed with the existing river so wildlife can find value and transitions that encourage use of this parcel. Professional wildlife and fisheries biologists agree the place where this happens is in littoral and riparian aquatic resource areas. This plan does not provide enough of either to be acceptable. The reclamation plan provides a reclaimed site that continues and reinforces the isolation of the Blue River from its needed floodplain. Any reclamation plan based in wildlife enhancements as identified in DRMS regulations must reasonably demonstrate that it represent an improvement to the land areas interaction and function with the floodplain, wildlife and the river. The proposed reservoir is more representative of a water storage and augmentation impoundment than one designed for fisheries, aquatic recreation or aesthetics. The plan utilizes a minimalist approach to reclamation creating land and water features designed on "what is left" and then asking regulators to wait and see what wildlife shows up to define the benefits. This is unacceptable and makes the application inadequate because:

A. The reclamation plan provides a standing water habitat, immediately adjacent to the Blue River, typical of reservoirs scientifically proven to harbor and advance macroscopic tubificid worms which serve as critical links in the continuation and advancement of Salmonid Whirling Disease (WD). This disease has eliminated the reproductive success of rainbow and cutthroat trout in much of western Colorado. Colorado Parks and Wildlife has spent many millions of dollars in mediating Colorado's west slope rivers against WD, including the Blue River. The proposed mining pit reservoir provides additional habitat for these organisms and an open mechanism of exchange with the river through close proximity, avian transfer of tubificids consumed and incidental fish introductions. The mining pit reservoir needlessly confounds the ongoing effort to contain/mediate whirling disease's effect on fisheries in the Blue River.

Recommendation:

1. Eliminate the reservoir as designed from the final reclamation plan and replace it with a plan that clearly provides quantified littoral, riparian and fisheries habitat enhancement and improvements for wildlife habitat.

B. The reclamation plan illustrates a 26 acre reservoir finished at an elevation of 8207'msl with a 3:1 then 2:1 slope to 8160' from uplands to reservoir bottom. This represents a maximum depth of 37 feet. This design provides 82% of the surface area as water approximately 37 feet deep. Much of this reservoir is too deep to allow sunlight penetration to the bottom. Less than 2% of its surface area represents euphotic zone that has contact with the lake bottom classified as littoral area. A reservoir designed for optimized wildlife and fisheries function, health and

productivity should seek additional littoral zone. The reservoir proposed will thermally stratify in winter and summer due to its configuration and will within a few short decades become oxygen depleted or anoxic in the hypolimnion during stratification (twice per year). The biochemical decomposition processes that occur in the depths of such light limited reservoirs create water quality conditions that are highly reductive making metals and other constituents more soluble and available for physical transport. This condition when realized will threaten water quality due to the fine materials dredging operations leave behind. These conditions of anoxia creates undesirable taste and odor problems, creates algae blooms including toxic blue green algae and can kill resident fish.

This reservoir will not support adequate cold-water fish reproduction and will require annual stockings to support recreational fisheries. The competition to satisfy stocking requirements for the Colorado Parks and Wildlife hatchery system has been highly challenged by Whirling Disease and fish available to regional biologists for stocking are limited each year. Stocking of this pit reservoir with fish for public use would compete with fish needed more appropriately for the Blue River. It does not represent the kind of habitat that is valuable or sustains fishes such as native suckers, sculpins and riffle minnow species.

Recommendations:

1. The northern mine cell should be incorporated into functioning for aquatic and terrestrial wildlife with the southern cell where the mine pit reservoir is located. A design approach that utilized the groundwater controlled water levels in the reclaimed reservoir so this northern cell periodically communicates water from the pit reservoir and is saturated adds tremendous wildlife opportunities.
2. Adjustments must be made to the lengths of “fetch” of the reservoir regarding the prevailing winds. They should be reduced to diminish wind induced wave lengths and resulting shoreline erosion.
3. The reservoir as design does not create a safety wading bench for human and wildlife that gets into the lake. The 3:1 slopes are too steep for organism safety.
4. Increases in the shoreline development factor beyond the 1.3 should be provided.
5. The present proposal uses less than 10% of its surface area to create littoral area where primary and secondary production occurs. The reservoir needs far more with riparian habitat creation opportunities incorporated.
6. Shorelines should be graded 20-30:1 more diverse depth distributions, provide transition areas for fish and wildlife, increase shoreline terrestrial wildlife cover and shelter.
7. Increased riparian areas along the shoreline will help filter incoming runoff waters while providing vegetative cycles that create nutrition for wildlife.

8. Grading of the uplands to shoreline areas should provide more opportunities for wetlands with greater opportunities for riparian tree and shrub components.
9. Address access for primary and secondary use contact providing a number of shoreline access points defined by safe wading, demonstrated lower erosion potential and appropriate wading substrates better than mine waste soils.
10. Proponents must revise their vegetative planting plan to include more riparian areas near and communicating with this pit reservoir. They must utilize appropriate densities of wetland, riparian, tree shrub and herbaceous planting that will assist in stabilizing shorelines and assure establishment of non-invasive vegetative species.
11. Provide design assurances that the deep water column will not stratify and become anoxic thereby increasing the solubility of metals from sediments and destruction of aquatic life (including fisheries). Install adequate hypolemnetic aeration at proper size and distribution of circulators to assure once per week vertical circulation of the reservoir volume winter and summer. Install electrical service for this equipment.

C. The creation of a poorly configured 26 acre reservoir representing the cornerstone of a plan that continues to isolate the site from the river when the predominant water feature *is* the river is counter intuitive to improving this site for wildlife. It provides water and grass that wildlife already has in the corridor at the expense of inappropriate habitats and threats to flood intensity and water quality impacts. The application is inadequate because it attempts to create lentic (standing water) habitats where lotic (flowing water riparian) habitats fit the natural resource mosaic. It does not provide for "rehabilitation or improvement of wildlife habitat" [Rule 3; Section 3.1.8(2)] instead the plan offers a barter that is a barrier to it. The proposed reclamation plan provides an unnecessary level of environmental threat over more suitable reclamation approaches such as returning the site to more natural physical and horizontal relationships with the adjacent river. This approach has been used in the reclamation of gravel mining sites in Colorado at the Inn at Wolf Creek Pass, Mineral County; the Bootjack Ranch, Archuleta County; the Alpine Ranch , Archuleta County; the Blue Valley Ranch, Grand County; the Mount Powell Ranch, Summit County; the Table Rock Ranch, Routt County and Creek Ranch, Routt County. The application is inadequate because this kind of reclamation must be incorporated into a revised plan for reclamation on this site so DRMS and others that are party to this decision can completely consider alternatives that address design inadequacies.

Recommendations:

1. Do not build berms from removed top soils but instead reserve topsoil's for use in a lotic habitat reclamation plan; consider the volume of topsoil available and include

affordably made topsoil onsite as a metric for the size of wetlands and riparian areas to be created.

2. Based a on a site size of 45-50 acres provide a reclamation based on creation of a wetlands and abandoned, isolated oxbow channels. Develop a grading plan for the site that when considered in perpendicularity to the river channel down the longitudinal profile of the river grades strategically increase across 2/3 of the width of the site from the river edge at the 10 year flood plain then continue to the eastern edge of disturbance to the existing condition floodplain.
3. Within the 2.5 to 10 year newly designed floodplain provide a series of unconnected abandoned oxbow pools and meandering channels utilizing alluvial water to saturate riparian features whose widths, depths, and channel relationships (water exchange rates, width to depth ratios, substrate sizes/distributions, and bank slopes) providing wetlands, saturated soils, and shallow impoundments in the alluvium .
4. Assure protection of the existing 6.7 acre wetlands (location, size, water source, vegetative composition, soils, relative abundance, vigor and function) through proper grading and reduction of floodplain width to accommodate wetland width and slopes to stabilize. Consider if mitigation replacement/relocation of wetlands might be appropriate.
5. Within the eastern most 1/3 of the site width establish the remaining floodplain elevations from the 50 year to the existing floodplain elevations on the west side of the Highway 9 easement.
6. Develop a landscape plan utilizing native and known successful riparian plant associations for the Blue River corridor such as Cottonwood-Boxelder-Alder or Cottonwood-River Birch-Willow. Consider exclusion fencing, irrigation and maintenance that may be required through establishment of these vegetative communities.
7. If access by the public for angling and non-consumptive uses is anticipated include a trail system throughout the parcels that protects banks and significant landscape features (i.e. wetlands, shallow vegetation filled ponds, grade controls, nesting areas, etc.) while encouraging wildlife interaction with the site.

Thank you for your valuable time in considering our concerns and recommendations for improvement of this application. It is our hope that the information we have provided is helpful and informative. It is our suggestion that this application is incomplete and requires much improvements to better inform this decision. Please do not hesitate to share any questions you may have.

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October 8, 2020

Ginny Brannon, Director
Division of Reclamation, Mining, and Safety
Colorado Department of Natural Resources
1313 Sherman Street, Room 215
Denver, Colorado 80203

Re: Preliminary Analysis of Surface Water and Groundwater considerations Regarding the Peak Ranch Resource – 112 Mining Reclamation Permit Application (File No. M2020041)

Dear Director Brannon,

On behalf of the Lower Blue River United organization, I have done a preliminary evaluation of the application for the Peak Ranch Resource proposed gravel pit north of Silverthorne, Colorado along Highway 9 in Summit County, pending before the Division of Reclamation, Mining & Safety (DRMS).

I am the Principal Water Resources Engineer at West Sage Water Consultants, a water resource consulting firm operating since 2013 in Denver, Colorado. I have extensive engineering and project management experience including surface water and ground water hydrology and modeling, augmentation plan preparations, water rights evaluations, hydrological and watershed analyses, and other water resources analyses. I have served as an expert witness in water court proceedings as well as in hearings before the State Engineer and am a registered Professional Engineer in the State of Colorado. I received a B.S. degree in Engineering and a B.A. degree in Business Administration from Trinity University and an M.S. degree in Water Resources and Environmental Engineering from the University of Colorado.

I have reviewed general surface and groundwater information in the area, impacts from gravel pits, impacts on groundwater levels in the area of the proposed project, wetlands information available, and other hydrological and hydrogeological information. I also reviewed existing water rights in the area. A list of documents and sources reviewed is included in Appendix A. This letter report contains my initial findings to date and will be revised and supplemented as additional information becomes available. In the review of the Peak Ranch Resource permit application (File No. M2020041) several deficiencies were found. Given these deficiencies, the application is inadequate in its current form, as further discussed below.

Overview of Proposed Project Area

The proposed Hillyard Property gravel pit is located in Summit County on an approximately 80 acre parcel abutting the Blue River between Dillon Reservoir and Green Mountain Reservoir. The valley was historically a ranching area, with operational ranches remaining in the vicinity of the parcel. The immediately adjacent properties are small ranchettes, approximately 20 acres in size.

The Hillyard parcel is comprised of four parcels each approximately 20 acres in size. The parcel also shares a boundary with a portion of the White River National Forest. Figure 1 shows the approximate location of the Hillyard parcel including Dillon Reservoir and Green Mountain Reservoir, for reference. Figure 2 shows the general location of the Hillyard Property with nearby streams including Acorn Creek to the south and Slate Creek to the north.

Potential Impacts on Surface Water and Groundwater from Gravel Pits

Gravel pits may have various potential impacts on surface water and groundwater near gravel pits. (See various references in Appendix A.) The potential impacts gravel pits may have on surface water and groundwater include both potential water quality and water quantity impacts. Groundwater gradients and flowpaths can be impacted by gravel pit mining, impacting the quantity of groundwater available in areas near the pit. Gravel pits can impact groundwater quality through introduction of contaminants into the groundwater of a dewatered pit or free water surface of a wet-mined pit, reduction in filtration into the groundwater system by removal of the overlaying soils, and potential alteration to the transport of groundwater constituents and contaminants in the local alluvium. Many streams, rivers, springs, and wetlands are groundwater fed systems. Groundwater flowing into surface water features is important ecologically in sustaining streamflows and spring flows, moderating surface water temperatures, providing ecologically important inflows to streams, and maintaining wetlands. The amount of surface water discharging into streams or wetlands may be altered by a change in the groundwater flow. Ecosystems and aquatic features may be particularly sensitive to changes in groundwater and surface water flows and water chemistry.

Groundwater Levels in the Area

There is high groundwater in the area underlying the Hillyard Property. Groundwater levels in nearby wells were measured at various times in 2019 and 2020. The depths to groundwater are shown in Table 1, attached. The locations of the wells in which water levels were measured are shown in Figure 3.

The average depth to groundwater in the wells on the 2 parcels south of the proposed project average 7 feet below the ground surface. The average depth to groundwater in the wells on the 2 parcels north of the proposed project average approximately 12 feet below the ground surface. The average elevation of the water table in these 4 parcels (2 north and 2 south of the proposed project) is 8,215 feet above mean sea level. The highest average water level for these four parcels is 8,216 feet above mean sea level.

The average elevation of the water table in the well measured on the hillside above the proposed property is 8,255 feet above mean sea level. There is a 40 foot difference in the measured water levels between the average surrounding the Hillyard Property and the well uphill, indicating a significant groundwater gradient from the hillside to the valley floor.

The average elevation of the water table measured by the applicant in wells located on the Hillyard Property from the Peak Ranch Resource Application information is 8,211 feet above mean sea level. The highest average water level for the water measurement data from the application is 8,215 feet above mean sea level. (These water level elevations were determined based upon the water level measurements in Exhibit G and the pre-mining land surface elevations shown in Figure C-1

of Exhibit C.)

The groundwater gradient in the area appears to generally follow the topography with groundwater moving from the hillside to the river valley. The groundwater gradient also generally moves south to north as the river flows, as is demonstrated by the elevation of the water table in the measured wells. Generally, the groundwater moves from the southeast portion of the Hillyard Property towards the northwest portion. There may be some localized gradients introduced by Acorn Creek which may cause groundwater to also move from the Hillyard Property to the south. Additional well water level information, as well as additional water level information from the Hillyard Property, would allow for better assessment of the groundwater gradients throughout the area and better analyses of localized groundwater movement.

Potential Groundwater Level Issues Related to Mining Operations

There is the potential for the mining at the Hillyard Property to create issues for the well owners in the area. The applicants plan to mine using a wet mining operation, where the gravel pit is mined without dewatering the pit. This type of operation can cause impacts to the water levels in nearby wells. These impacts would likely impact wells upgradient of the mine more severely, due to the pit causing more water to flow out of the local aquifer into the pit. In most gravels the pore space is approximately 20% of the gravel. If this is the case in the area, the mining operation could draw 5 times the amount of water out of the local groundwater system, than occurs currently on the parcel.

From our research of geological features in the area, it appears that the uphill aquifer is a fractured rock system, with flow paths that can quickly move water out of the fractured rock system to the gravel alluvial aquifer in the valley below. A general schematic depicting the aquifer characteristics in the area is attached as Figure 4a. Figure 4b demonstrates a potential gravel pit in the area.

Some of the wells that are located uphill from the proposed gravel pit (to the east of the property) could run dry as mining is performed at the site, emptying the fractured rock system into the gravel pit. Another concern with filling groundwater from the alluvium, is depending on the season and groundwater gradient in the area, mining could cause the gradient of groundwater to reverse. The current gradient drains water from the alluvium to the river. Depending on the depth of the pit and available alluvial extent of groundwater in the area, the groundwater gradient could reverse and water could drain out of the river to the pit. Currently the pit appears to be excavated to a maximum depth at an elevation of 8,172 feet above mean sea level in the southern part of the southern pit (Exhibit C, Map C2-B). The approximate elevation of the river near the southern pit is 8,211 feet above mean sea level. The Applicants have done no analyses regarding the extent of the alluvium or fractured rock aquifers in the area, nor the potential impact on wells due to mining operations.

In reviewing the groundwater level measurements provided by the applicants it appears that the measurements in May of 2020 were significantly lower than other measurements. When that date's measurements are removed from the analysis, the average water level is 8,214 feet above mean sea level. The shallowest depths to groundwater are seen in the following wells on the parcel, GW-2, GW-5, P-1, P-4 and P-5, each with shallowest depths to groundwater of less than 7 feet. The

Application states in various different places different elevations of groundwater. In some places the Application materials state the elevation of the groundwater is 8,210 feet in others, they state 8,207 feet. In exhibit H, the text box states 8,207 feet, whereas the mapped elevation shows 8,204 feet above mean sea level. The minimum elevation of groundwater of wells located in and near the proposed open surface water portion of the pit is 8,240 feet, in the southeastern portion of the pit. (This value was determined from the shallowest water level measurement of 5.5 feet for monitoring well GW-3 from the Well Completion Report in Exhibit G and the pre-mining land surface elevation of 8,245 for this well shown in Figure C-1 of Exhibit C.) The Applicants other water level measurements in and near the southern pit show the shallowest water level elevation range of 8,217 to 8,240 feet above mean sea level. Table 1 also summarizes the data from Exhibit G, including the water level measurements provided and the static water levels from the well construction reports in Exhibit G. The Applicant's data shows a range of up to 23 feet, with an average of 9 feet of fluctuation in the water table. Some wells show large year to year differences, as well.

Therefore, it appears the water elevation is erroneous in their mining operation plans and reclamation plan. The Applicant's Phase 1 mining could be limited to significantly shallower depths in order to remain 2 feet above the seasonal high water, as the Applicant claims it will do. In addition, the amount of the property that would be inundated with water would be greater in Phase 2 and in the reclamation plans, due to a higher water table at times. In addition, the volume of water that would fill the pit would be significantly greater, requiring greater augmentation of evaporation and first fill water.

The Applicants do not explain their calculation of water needed for augmentation based upon a first fill of the wet-mined pit based upon 400,000 tons of mined material. They state approximately 95.4 acre-feet of water is needed, whereas when assuming 20% porosity, and 80% other materials is being mined below the water level, 400,000 tons would equate to 141.7 acre-feet of new space for the groundwater to fill in each year. The Applicant needs to replace over 46 acre-feet of depletions for the initial fill each year in Phase 2.

These errors in the application makes the review of the impact on groundwater and its interaction with the surface water in the area impossible until additional accurate and consistent information is provided by the Applicant.

Surface Water Conditions in the Area

The Blue River flows to the west of the proposed gravel pit. Acorn Creek flows from the east to the Blue River south of the Hillyard Property. Slate Creek flows from the west to the Blue River North of the Hillyard Property. These and other drainages that flow in the area and across the Hillyard Property are shown in Figure 2. In addition, there are what appear to be wetlands on the property, as discussed in detail below. The creeks, river and wetlands are also visible in the various years of historical aerial photography included in Appendix B.

There are various springs in the area near the Hillyard Property, some with decreed water rights and some without; some of the nearby springs are indicated in the attached figures. For example,

there is spring located near the river on the Brown Property, an amenity that should be protected from degradation from future mining operations.

Potential Surface Water Issues Related to Mining Operations

If the mining operation were to alter the flow of the drainages on the Property, there could be a negative impact to the surrounding properties, particularly those parcels downgradient (to the north) of the Hillyard Property. Mining operations must not disturb existing drainages or springs, unless flows in those drainages and springs can be properly augmented.

Similar to the discussion in the groundwater section above regarding wet mining, wet mining could impact nearby and uphill drainages and springs, by impacting groundwater that likely feeds these drainages and springs. These drainages and springs rely upon groundwater levels to maintain flows. Mining operations may lower the water table in the area, change groundwater gradients, or degrade water quality, negatively impacting these features.

Wetlands Present in the Area

There are visible wetlands on the property and adjacent properties in the vicinity of Big Gulch, which flows from the hillside east of the property onto the property and exits the property to the Fox Property to the north. The wetlands in the area of the proposed gravel pit based on National Wetland Inventory (NWI) mapping created by the U.S. Fish and Wildlife Service (USFWS) are shown in Figure 2. The NWI classifies the wetlands on the property as freshwater emergent wetlands. The wetlands are also visible in the various years of historical aerial photography included in Appendix B. The wetlands appear to be fed from some surface drainage onto and across the parcel, as well as high groundwater levels in the area. The Applicants have measured water levels to within 4 feet of the ground surface.

The Applicants have shown the wetlands in various places in their Application. In Exhibit J, Vegetation Information, they show an approximate area in blue in Figure 3 which differs from the Aquatic Resource Delineation Map on page 24 of the same Exhibit. In addition, in Figure 1 of Exhibit G (Water Information), the Wetland area is shown as being larger than in Exhibit J. The Applicants appear to use the smallest wetland delineation in their mining operations mapping. The Applicants claim areas are “upland vegetation” nearby areas of wetland vegetation in areas that are lower than the nearby claimed wetland areas. Groundwater and surface water will typically feed the lower elevations vegetation before areas of higher elevation.

However, it is impossible to assess the applicant’s claimed delineation due to missing Wetland Determination Data Forms. The Applicant has provided the same form multiple times and the remaining data points are missing from the Application, as such the Application is incomplete. Data for the remaining 18 points must be provided in order to assess the wetlands area claimed by the Applicant.

Potential Wetlands Issues Related to Mining Operations

The Applicants claim 6.68 acres of wetlands on the property. Based upon the aerial photography, we believe that there are over 14 acres of wetlands present on the property. Due to the missing Wetland Determination Data Forms it is impossible to assess the extent of the wetlands. However, based upon review of aerial photographs and field inspections, it appears the wetlands may be more than twice as large as claimed by the applicant. Appendix C shows aerial photos and field inspection photos indicating the likely areas of wetland vegetation excluded by the Applicant. Part of the wetlands excluded by the Applicant area areas that show high groundwater levels, yet points were not assessed by the Applicants experts.

The Applicant is disturbing a portion of the wetlands they claim, and it is our understanding that this requires the US Army Corps of Engineers to review the wetlands delineation, in order to assess the accuracy of such delineation. It is our understanding the Applicants have not submitted a delineation for review by the Corps.

Similar to the discussion in the groundwater and surface water sections above regarding wet mining, wet mining could impact nearby wetlands by impacting groundwater that likely feeds these wetlands. Wetlands rely in part upon groundwater levels to maintain flows and feed wetland vegetation. Mining operations may lower the water table, change groundwater gradients, or degrade water quality, negatively impacting the wetlands. The wetlands may also be spring fed or rely upon shallow groundwater. Impacts to the groundwater levels in the area may adversely impact the wetlands.

Water Rights Summary

There are various water rights on the Blue River near the Hillyard Property. These include several water rights that have headgates or pump locations on the Blue River near the Hillyard Property. The Plunger Ditch diverts water upstream of the property and is used on parcels near the proposed gravel pit. The Green Mountain Canal diverts from the Blue River adjacent to the Hillyard parcel and delivers water to water users in the valley.

There is a Colorado Water Conservation Board Instream Flow Water Right on the Blue River in the segment that flows past the Hillyard Property. There is also an instream flow water right on the Blue River from Slate Creek to Green Mountain Reservoir. Acorn Creek also has an instream flow appropriation uphill from the proposed site.

A summary of the water rights and instream flow water rights near the Property are shown in Table 2. Figure 5 shows the location of some of these water rights.

Potential Water Rights Issues Related to Mining Operations

The evaporation from the open water surface due to mining operations must be replaced. The first or initial fill of the pond on the property must be replaced. All depletions resulting from the mining operation must be replaced in time, amount and location to prevent injury to downstream water users. An augmentation plan would be required to replace all depletions occurring and ensure all

replacements are made to the stretch of the Blue River adjacent to the property, above the Green Mountain Canal headgate located adjacent to the property, ensuring no detriment to the instream flow water rights in the area.

Due to the conflicting groundwater level data provided by the applicant the amount of augmentation needed cannot be determined at this time. Until additional information is provided, the analyses to determine the amount of water that must be augmented each year cannot be determined.

It appears many of the tributaries in the area may be spring fed. It may not be possible to augment depletions to nearby springs if the groundwater system is altered in such a way that impacts the flow in the springs. There are water rights on springs uphill to the east from the Property.

Water Quality and Environment

The water quality and ecological environment in the Blue River near the proposed project is considered to be outstanding. The Colorado Water Conservation Board's assessment of environmental and recreational attributes includes various outstanding attributes in the Blue River and various nearby tributaries. Those include various wildlife attributes, fishing attributes, outstanding waters, water quality and gold medal fishing waters. The summary of the attributes for the various segments is included in Table 3.

Potential Water Quality and Environment Issues Related to Mining Operations

There are various ways in which the mining operations can negatively impact water quality and the ecological environment near the proposed project. Gravel pit operations can cause degradation of groundwater quality, including introduction of bacteria into the aquifer and changes in hydrogeochemistry and temperature, including increased turbidity in groundwater and nearby surface waters.

Even before the pit is excavated to the level of groundwater, mining operations can introduce contaminants into the nearby groundwater, and the water discharged to the stream system will be higher in temperature and dissolved solids than the nearby River. The loss of filtration due to the removal of the soil overlaying the aquifer can detrimentally impact the groundwater quality.

Exposing the water table through gravel pit mining operations alters groundwater quality in the surface exposure and in the aquifer and stream downgradient of the pit. The chemical impact of exposing an aquifer can be short term, with long-term impacts being minimal where a chemical equilibrium can be reestablished, or can be altered to such a degree that natural chemical equilibrium cannot be reestablished and aquifer water quality will be permanently detrimentally affected. In addition, exposing the aquifer to the surface can introduce bacteria that can move through the aquifer, causing detrimental effects to nearby wells and the River. Disturbing the gravel in the pit area can also alter the hydrogeochemical processes and cause geochemical changes that can be detrimental to nearby groundwater wells and the River.

As the mining operations begin mining below the groundwater level in Phase 2, exposing the

aquifer directly to the air and environment over the entire surface area of the pit increases the potential of bacterial introduction and migration in the groundwater. The pore size in most gravels provides less capacity to filter bacteria and other contaminants than smaller finer soil grains. Therefore, bacteria and other contaminants that may typically be filtered out of the groundwater in the existing groundwater environment may be introduced and the movement of such bacteria and contaminants can become more rapid with surface exposure of groundwater. Various tracer experiments in groundwater have shown rapid movement of bacteria in aquifers, and large aerial extent of such bacterial movement within the groundwater system.

The Applicant's surface water and groundwater monitoring locations are not sufficient. Groundwater monitoring should be done in adequate locations downgradient of the mining operations. The locations must include locations between the mining operations and the river. In addition, surface water quality locations should be added along the property's west side in the River, not solely upstream and downstream of the property.

Water levels fluctuate in the aquifer underlying the gravel pit. The Applicant's well data shows a fluctuation of more than 23 feet in some of the wells measured on the property. This fluctuation can cause additional dissolved solids, bacteria and other contaminants to be introduced into the nearby groundwater. These contaminants and changes in hydrogeochemistry can be detrimental to the water quality in nearby wells, springs and the River.

There are various studies demonstrating these effects, as well as the potential detrimental impacts to nearby wildlife due to gravel pit mining operations. (See references in Appendix A).

Summary

The proposed gravel pit operations at the Hillyard Property can cause detrimental effects to the nearby groundwater, surface water, wetlands, water rights, water quality and natural environment. Mining operations may cause injury to well owners in the area and to surface water rights near the property. Mining operations may impact groundwater gradients in the area detrimentally affecting wetlands and springs on and near the property. Mining operations could cause degradation of water quality in the aquifer and the River. The severity and specific impacts on these items are dependent upon the specific operations of the mining operations.

Recommendations

Additional work is essential to address the items discussed above in more detail, based on specific mining plan operation and reclamations. We urge DRMS to require the applicant to provide the following information, in order that their application be complete, and that we be allowed the opportunity to review and comment on this supplemental information before any DRMS recommendation is made to the Mined Land Reclamation Board.

1. Further injury analyses once the mining plan is revised accounting for the issues raised above to determine more specific impacts to water rights, based upon the mining operations plan.

2. Additional water level measurements in area wells to better understand the groundwater hydrology, gradient, and yearly and seasonal fluctuations, and determine the accurate high groundwater level on the property.

3. Additional analyses based upon additional groundwater information to assess potential impacts of the mining operations to nearby wetlands and springs, based upon the mining operations plan.

4. Provide missing wetland data forms in order to accurately assess the wetlands delineation.

5. Additional analyses to demonstrate potential changes in groundwater gradient that could occur, based on the mining operations plan.

6. Additional analyses to demonstrate the dewatered amount of water or evaporative losses that would need to be augmented, with adequate bases for calculations provided.

7. Additional information regarding water quality and additional measurement locations to enable analyses to demonstrate the potential hydrogeochemical degradation that could occur, based on the mining operations plan.

We will revise or add to the information and analyses contained herein if additional information becomes available.

Sincerely,

Laurel E. Stadjuhar

Laurel E. Stadjuhar, P.E.
Principal

encl

Table 1
Lower Blue River Project
Measured Well Water Levels

	Depth to water from top of casing				Ground level to top of casing	Depth of water level					Minimum Depth to Water Level	Elevation at Well	Elevation of water level				Average Elevation of Water Table	Shallowest Elevation of Water Level	Elevation of River Bank
Homeowner	6/7/2019	9/5/2019	10/22/2019	9/4/2020		6/7/2019	9/5/2019	10/22/2019	9/4/2020	Well Construction			6/7/2019	9/5/2019	10/22/2019	9/4/2020			
Rob Cohen	27.5	34.2	36.6	35.7	1.42	26.08	32.78	35.18	34.28	38	26.08	8279	8253	8246	8244	8245	8248	8253	
Jane Bruce	19.85	22.3	26.5	25.05	0.75	19.10	21.55	25.75	24.30	30	19.10	8255	8236	8233	8229	8231	8233	8236	
Brad Heinrich	7.95	8.85	11.75	11.05	2.25	5.70	6.60	9.50	8.80	8	5.70	8233	8227	8226	8224	8224	8226	8227	8220
Ken Brown	8.50	8.40	9.80	9.50	2.08	6.42	6.32	7.72	7.42	8	6.32	8223	8217	8217	8215	8216	8216	8217	8212
HILLYARD																			
Jonathon Knopf	70	49	53.85	46.7	2.58	67.42	46.42	51.27	44.12	110	44.12	8304	8237	8258	8253	8260	8255	8260	
Chuck Fox	15	16.1	16	16.05	2.17	12.83	13.93	13.83	13.88	15 and 28	12.83	8220	8207	8206	8206	8206	8206	8207	8206
Malik Ravinder	10.5	12.78	11.3	11.2	1.58	8.92	11.20	9.72	9.62	16	8.92	8220	8211	8209	8210	8210	8210	8211	

Pumping WL
Anecdotal WL from homowner (not on specified date)
Possible Pumping, work at house
Order of Parcels Upstream to Downstream with exception of Knopf which is uphill of Hillyard Parcel
Elevations from surveys, where available or topographical mapping.

Applicant's Water Level Measurements

Depth (ft)	Feb-17	6/26/2019	8/15/2019	10/14/2019	5/4/2020	6/12/2020		Min	Max	Ave	Range	Year to Year Difference June	Elevation at well	WL Elev Shallowest	WL Elev Deepest	WL Elev Ave
GW-1	10	13.8	14.5	15.9	*19.2*	14.74		10	19.2	14.7	9.2	0.94	8216	8206	8197	8201
GW-2	15	5.5	5.2	9.7	*16.4*	9.98		5.2	16.4	10.3	11.2	4.48	8230	8225	8214	8220
GW-3	5.5	17.8	17.5	23.8	*28.8*	19.91		5.5	28.8	18.9	23.3	2.11	8245	8240	8216	8226
GW-4	12	11.1	11.3	14.3	*17.6*	12.06		11.1	17.6	13.1	6.5	0.96	8229	8218	8211	8216
GW-5	13	6.56	6.8	9	*13.7*	7.7		6.56	13.7	9.5	7.14	1.14	8215	8208	8201	8206
P-1		-	-	-	*13.8*	6.5		6.5	13.8	10.2	7.3		8217	8211	8203	8207
P-2		-	-	-	*16*	9		9	16	12.5	7		8218	8209	8202	8206
P-3		-	-	-	*19.6*	13.3		13.3	19.6	16.5	6.3		8219	8206	8199	8203
P-4		-	-	-	*13.4*	4.2		4.2	13.4	8.8	9.2		8224	8220	8211	8215
P-5		-	-	-	*14*	5		5	14	9.5	9		8225	8220	8211	8216
P-6		-	-	-	*15.4*	9.4		9.4	15.4	12.4	6		8226	8217	8211	8214
							Average	**7.8**	**17.1**	**12.4**	**9.3**			**8216**	**8207**	**8212**

Static water levels from Well Completion Reports in Appendix G of Application (2/2017)
Other Dates from Exhibit G, page 3 of report

Table 2
Lower Blue River Project
Select Water Rights near Hillyard Parcel

Water District ID	Structure Type	Feature Type	Structure Name	Water Source	Active or Historical Structure
3600503	*Ditch*	*Point of Diversion*	*A B TUBBS DITCH*	*ACORN CREEK [00175965]*	*Historical*
3600504	*Ditch*	*Point of Diversion*	*A B TUBBS NO 2 DITCH*	*ACORN CREEK [00175965]*	*Historical*
3600530	Ditch	Point of Diversion	BLUE RIVER IRRIGATION DITCH	BLUE RIVER [00173194]	Active
3600531	Pump	Point of Diversion	MOSER PUMP NO. 1	BLUE RIVER [00173194]	Active
3600583	*Ditch*	*Point of Diversion*	*DAVIS DITCH*	*ACORN CREEK [00175965]*	*Historical*
3600642	Ditch	Point of Diversion	GREEN MOUNTAIN CANAL	BLUE RIVER [00173194]	Active
3600705	Ditch	Headgate	LINDSTROM NO 1 DITCH	BLUE RIVER [00173194]	Active
3600713	*Ditch*	*Point of Diversion*	*LOT 5 DITCH*	*BLUE RIVER [00173194]*	*Historical*
3600722	Ditch	Point of Diversion	MARSHALL NO 3 DITCH	ACORN CREEK [00175965]	Active
3600771	*Ditch*	*Point of Diversion*	*PEERLESS DITCH*	*ACORN CREEK [00175965]*	*Historical*
3600780	Ditch	Point of Diversion	PLUNGER DITCH	BLUE RIVER [00173194]	Active
3600861	Ditch	Point of Diversion	WAHLSTROM NO 4 DITCH	HARRIGAN CREEK [00175723]	Active
3600862	Ditch	Point of Diversion	WAHLSTROM NO 5 DITCH	HARRIGAN CREEK [00175723]	Active
3600884	*Spring*	*Point of Diversion*	*BEAVER SPRING*	*BLUE RIVER [00173194]*	*Historical*
3600899	*Spring*	*Point of Diversion*	*FALCON SPRING*	*BLUE RIVER [00173194]*	*Historical*
3600902	Spring	Point of Diversion	HAWK SPRING	BLUE RIVER [00173194]	Active
3600904	*Spring*	*Point of Diversion*	*HUMMING SPRING*	*BLUE RIVER [00173194]*	*Historical*
3600917	*Spring*	*Point of Diversion*	*RAINBOW SPRINGS*	*BLUE RIVER [00173194]*	*Historical*
3600922	Spring	Point of Diversion	SELLKE SPRING NO 1	BLUE RIVER [00173194]	Active
3600923	Spring	Point of Diversion	SELLKE SPRING NO 2	BLUE RIVER [00173194]	Active
3600924	Spring	Point of Diversion	SELLKE SPRING NO 3	BLUE RIVER [00173194]	Active
3600991	Ditch	Point of Diversion	INDEPENDENT BLUE (ACORN)	ACORN CREEK [00175965]	Active
3601094	Pump	Point of Diversion	HAWK HILL PUMP AND PIPELINE	BLUE RIVER [00173194]	Active
3601095	Pump	Point of Diversion	FOX PUMP AND PIPELINE	BLUE RIVER [00173194]	Active
3605453	Spring	Point of Diversion	COUNIHAN SPRING	BLUE RIVER [00173194]	Active

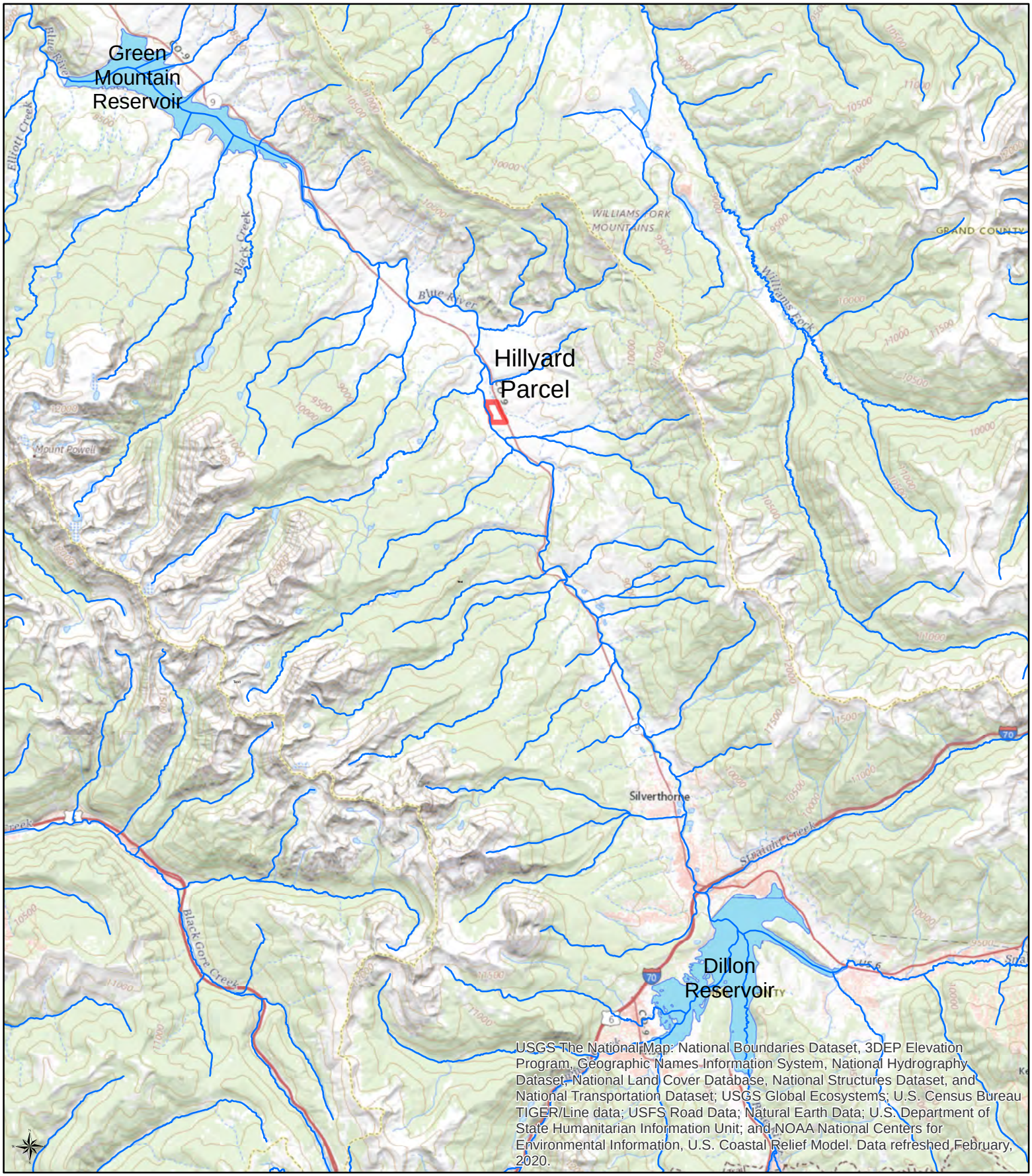
Instream Flow Rights near Hillyard Parcel

WDID	Miles	ISF Type	Name	Case Number	ISF ID	Appropriation Date	Flow Rates *cfs (dates)*
3602011	4.28	Appropriated	Harrigan Creek	5-77W3647	5-77W3647	1/19/1977	1 (1/1 - 12/31)
3602012	10.00	Appropriated	Slate Creek	5-77W3648	5-77W3648	1/19/1977	3 (10/1 - 4/30), 7 (5/1 - 9/30)
3602047	3.13	Acquired	Blue River	5-05CW264B	05/5/ACQ-02	5/23/1904	0.31 (5/1 - 5/31), 3.15 (6/1 - 6/30), 3.51 (7/1 - 7/31), 2.63 (8/1 - 8/31), 0.87 (9/1 - 9/30), 0.31 (10/1 - 10/31)
3602047	4.21	Appropriated	Blue River	5-87CW297	5-87CW297	10/2/1987	70 (11/1 - 2/29), 78 (3/1 - 3/31), 90 (4/1 - 4/30), 125 (5/1 - 8/31), 90 (9/1 - 10/31)
3602048	1.08	Acquired	Blue River	5-05CW264C	05/5/ACQ-03	5/23/1904	0.02 (5/1 - 5/31), 0.45 (6/1 - 6/30), 0.35 (7/1 - 7/31), 0.24 (8/1 - 8/31), 0.14 (9/1 - 9/30)
3602048	6.92	Acquired	Blue River	5-05CW264D	05/5/ACQ-04	5/23/1904	0.02 (5/1 - 5/31), 0.45 (6/1 - 6/30), 0.35 (7/1 - 7/31), 0.24 (8/1 - 8/31), 0.14 (9/1 - 9/30)
3602048	6.92	Appropriated	Blue River	5-87CW298	5-87CW298	10/2/1987	90 (10/1 - 11/30), 85 (12/1 - 2/29), 125 (5/1 - 9/30), 90 (3/1 - 4/30)
3602073	3.26	Appropriated	Acorn Creek	5-85CW644	5-85CW644	11/8/1985	1 (1/1 - 12/31)

Table 3
Lower Blue River Project
Environmental and Recreational Attributes

	Segment Name	Blue River	Acorn Creek	North Acorn Creek	Big Gulch	Slate Creek
Attribute Type	Segment ID	00173194	00175965	00175676	00175678	00175941
	HUC	1401000109; 1401000206; 1401000201; 1401000205; 1401000204	1401000205	1401000205	1401000205	1401000205
	Attribute					
Fish						
Wildlife	Active Bald Eagle Nests	X	X	X	X	X
	Bald Eagle Sites	X	X	X	X	X
	Boreal Toad	X	X	X	X	X
	Northern Leopard Frog	X	X	X	X	X
	Osprey Active Nest Site	X	X	X		
	Osprey Foraging Area	X	X	X	X	X
	Peregrine	X				
	River Otter Habitat	X	X	X	X	X
Recreation & Economy	CPW Fishing Atlas	X	X	X	X	X
	Gold Metal Trout Streams	X				
	Recreational Boating / Kayaking / Rafting	X	X	X	X	X
	RICD	X				
Water Rights	CWCB Instream Flow Water Rights	X	X			X
	CWCB Instream Flow Water Rights					X
Physical Environment	Colorado Outstanding Waters		X	X		X
	Geomorphology	X	X	X	X	X
	National Wetlands Inventory	X	X	X	X	X
	Plant Communities	X			X	X
	Water Quality	X	X	X	X	X

Notes: Data from CWCB Database indicating attributes are found within the Hydrologic Unit Code (HUC).
Most mapped as part of the State's Non-Consumptive Needs Assessment Mapping.
Absence of attributes, such as fish, is usually due to lack of geospatial data sources.



Legend

- Highways
- Rivers and Streams
- Hillyard Property

Reservoirs

- Dillon Reservoir
- Green Mountain Reservoir

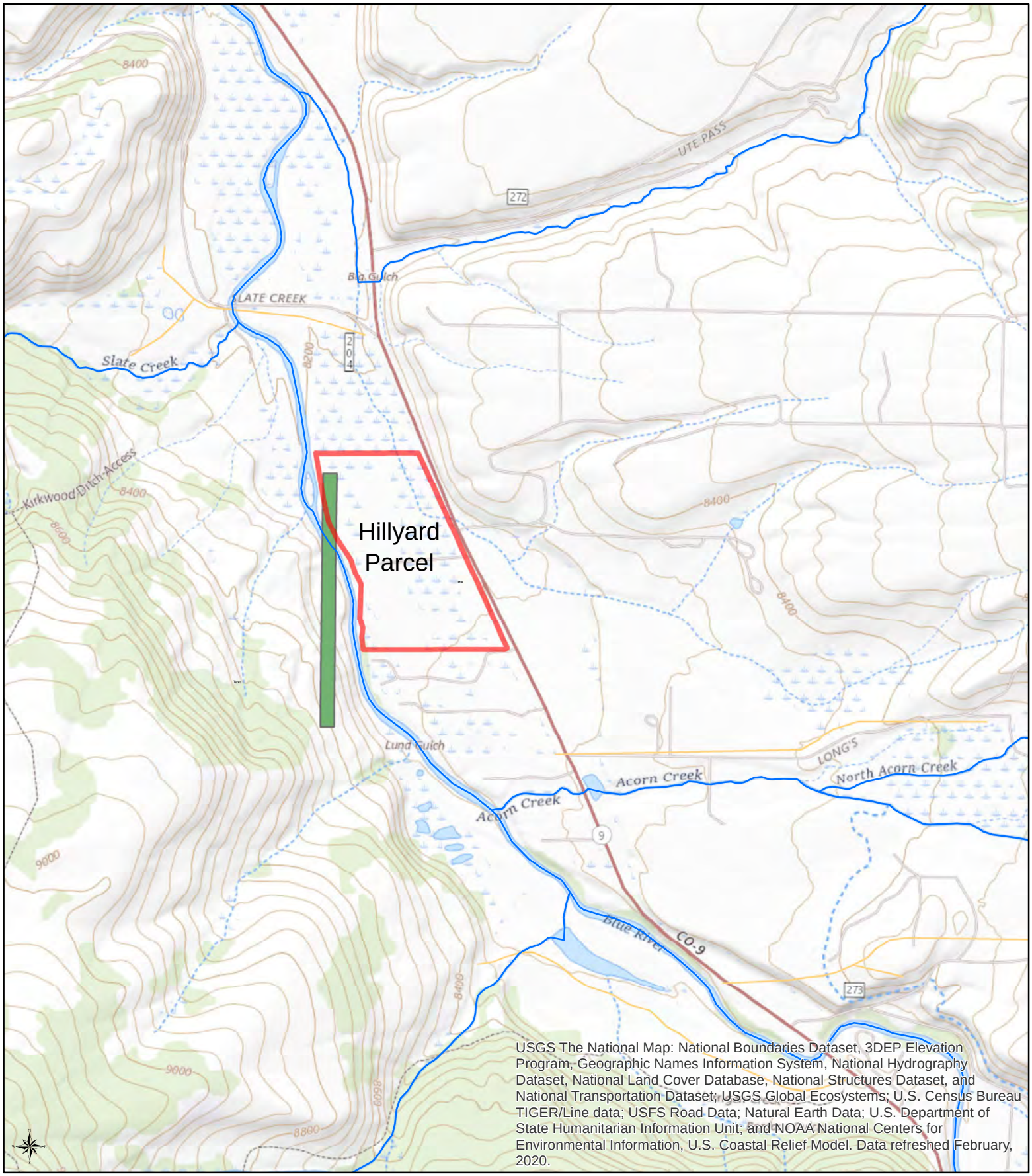
1 inch = 2.7 miles

0 0.5 1 2 3 4 5

Miles

Figure 1
Hillyard Property
Lower Blue River
General Location Map

WEST SAGE
WATER CONSULTANTS



Legend

- Highways
- Rivers and Streams
- Hillyard Property
- Forest Service Parcel
- Roads
- Wetlands (USGS Topo mapping)

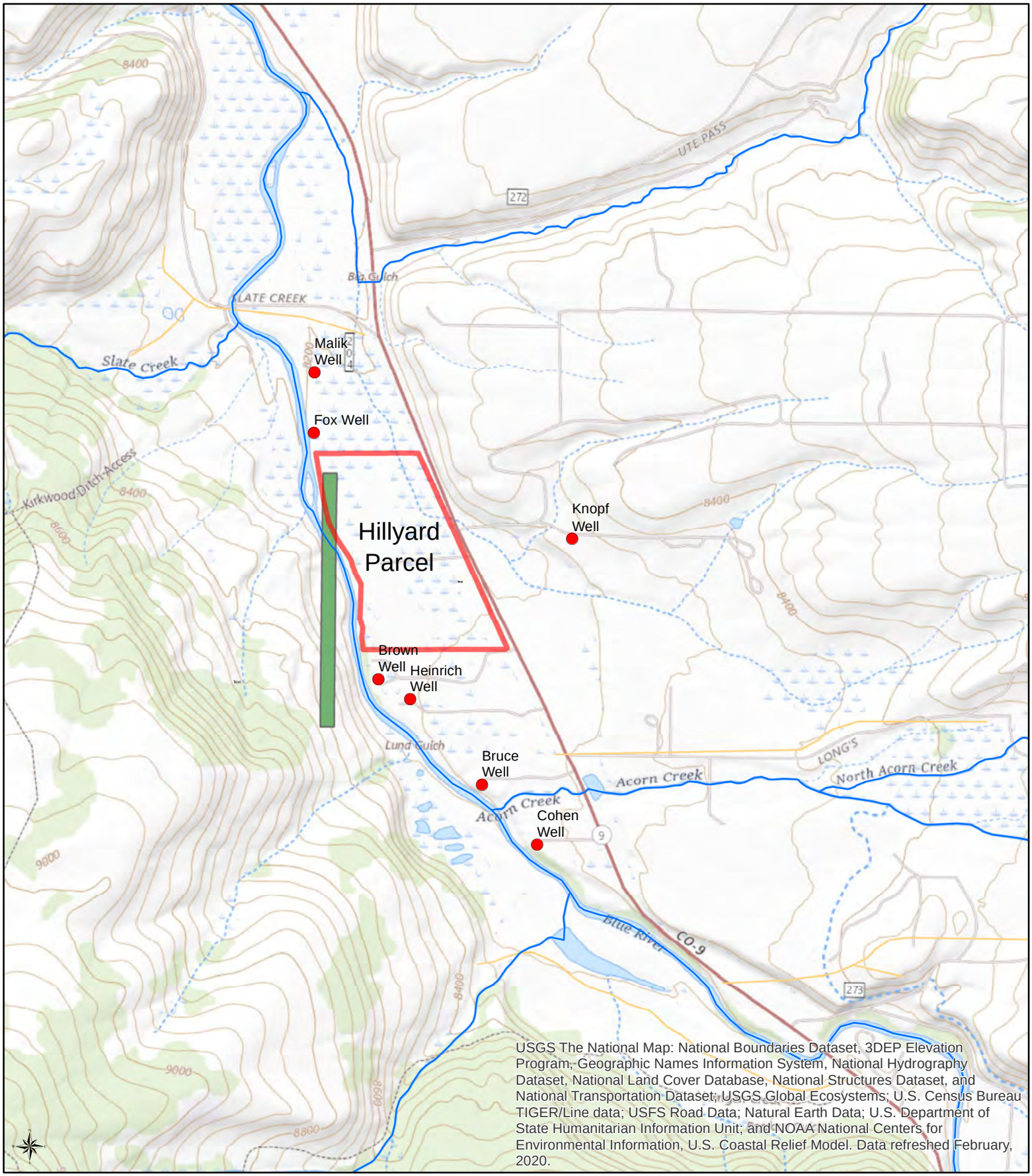
1 inch = 0.3 miles

0 0.05 0.1 0.2 0.3 0.4 0.5

Miles

Figure 2
Hillyard Property
Lower Blue River
General Location Map

WEST SAGE
WATER CONSULTANTS



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed February, 2020.

Legend

- Highways
- Rivers and Streams
- Hillyard Property
- Well Measurements
- Forest Service Parcel
- Roads

1 inch = 0.3 miles

0 0.05 0.1 0.2 0.3 0.4 0.5

Miles

Figure 3
Hillyard Property
Lower Blue River
Measured Wells

WEST SAGE
WATER CONSULTANTS

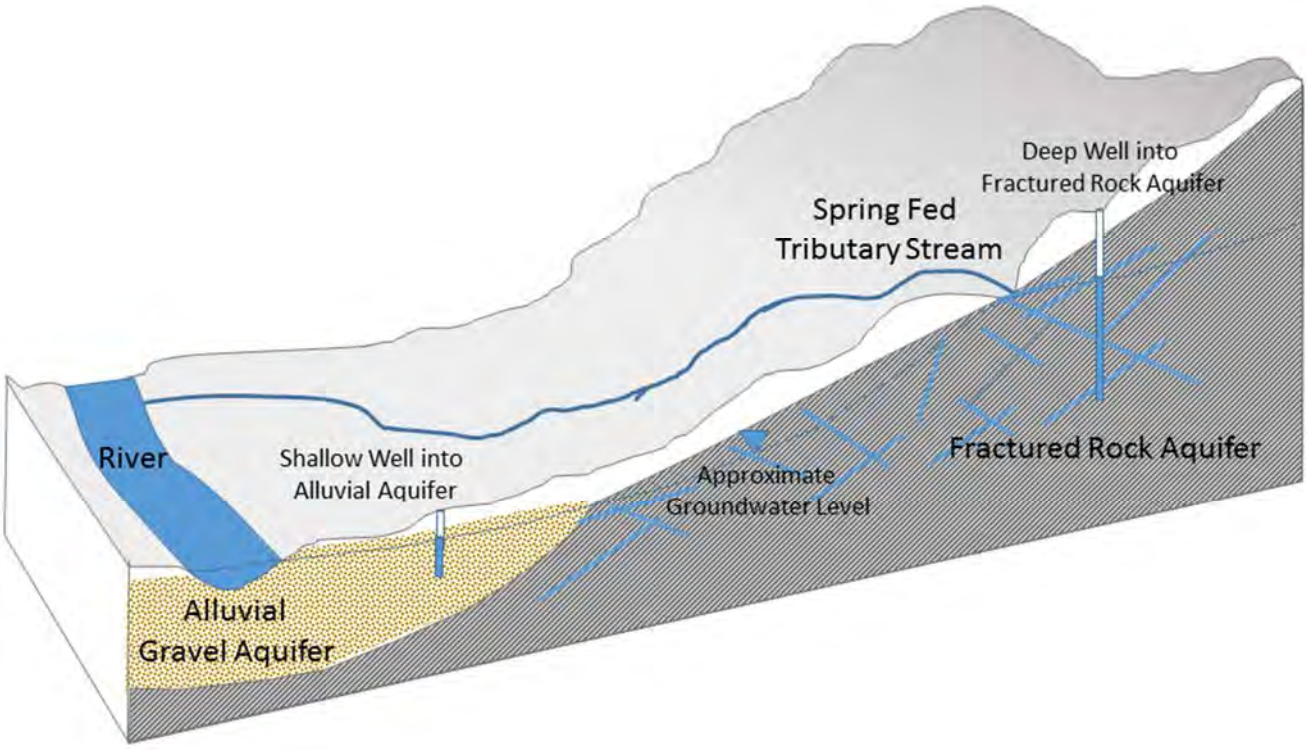


Figure 4a
General Aquifer Characteristics

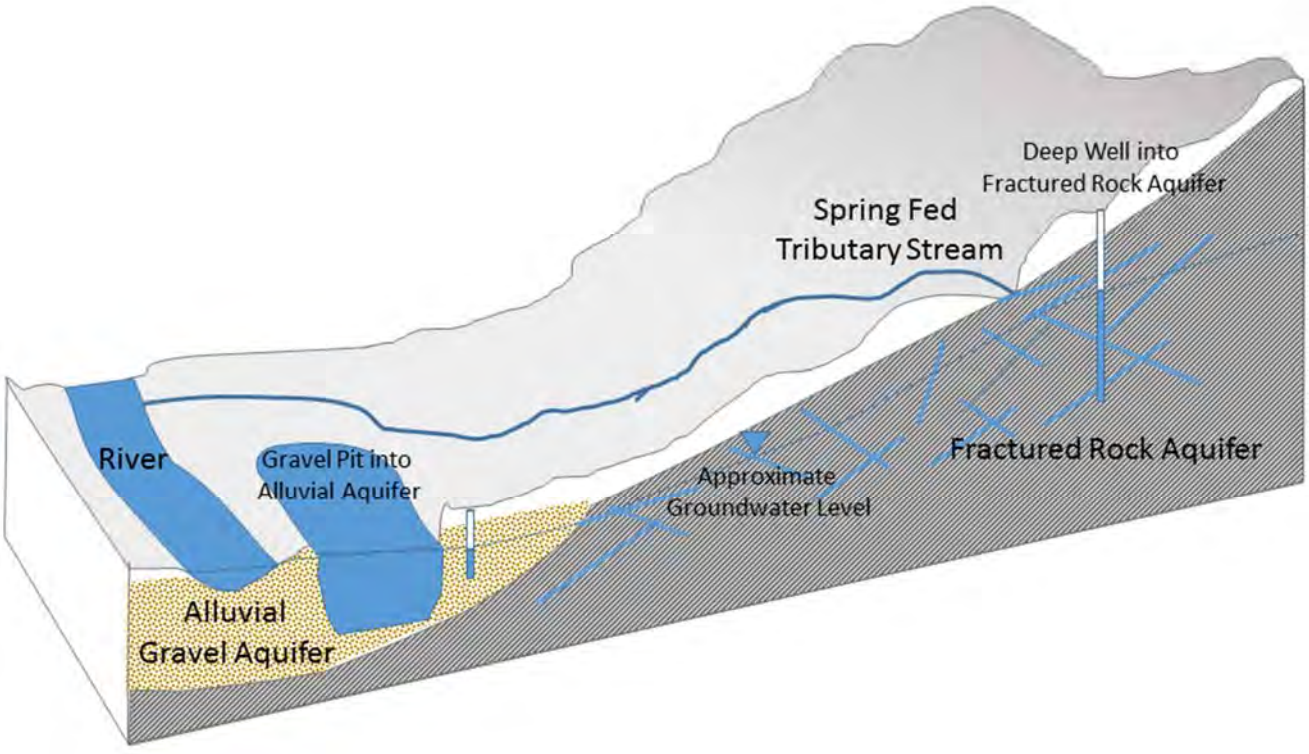
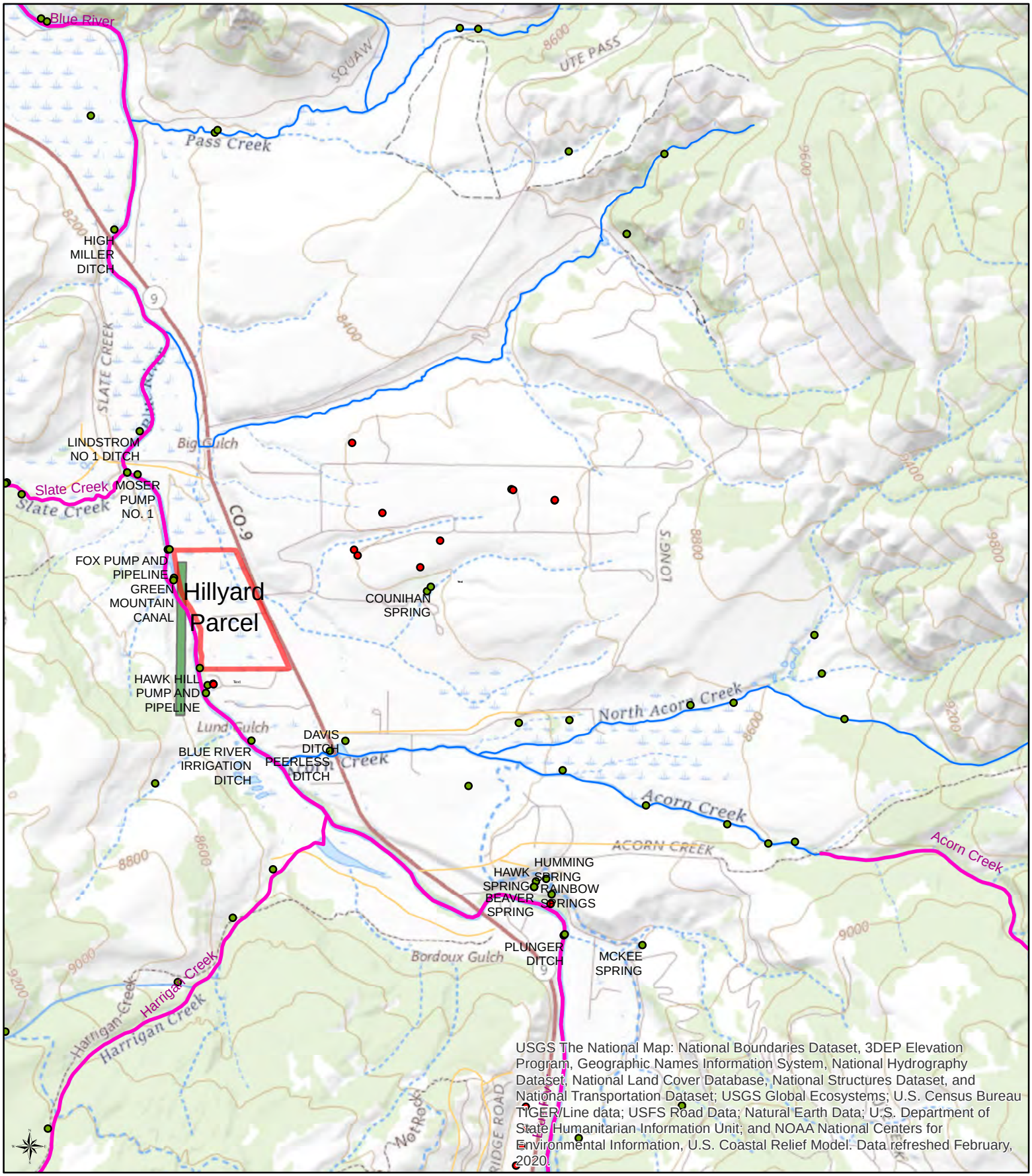


Figure 4b
General Aquifer Characteristics Showing Gravel Pit (Wet Mining)



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed February, 2020.

Legend

- Decreed Ground Water Rights
- Surface Water Rights
- Instream Flow Decreed Reaches
- Rivers and Streams
- Hillyard Property
- Forest Service Parcel
- Roads
- Wetlands (USGS Topo mapping)

1 inch = 0.5 miles

0 0.05 0.1 0.2 0.3 0.4 0.5

Miles

Figure 5
Hillyard Property
Lower Blue River
Water Rights

WEST SAGE
WATER CONSULTANTS

Appendix A

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  - National Water Summary on Wetland Resources, United States Geological Survey Water-Supply Paper 2425; 1996; Colorado Wetland Resources, p. 135.
  - Colorado Wetland Inventory Mapping Tool; CNHP–Colorado Wetland Information Center; 2020; (https://cnhp.colostate.edu/cwic/tools/mapper/).
  - Classification of Wetlands and Deepwater Habitats of the United States; Adapted from Cowardin, Carter, Golet and LaRoe (1979); Wetlands Subcommittee Federal Geographic Data Committee; August 2013
- Various aerial photos and mapping of Summit County, Colorado, including Google Earth Imagery and World Imagery Available from ESRI.

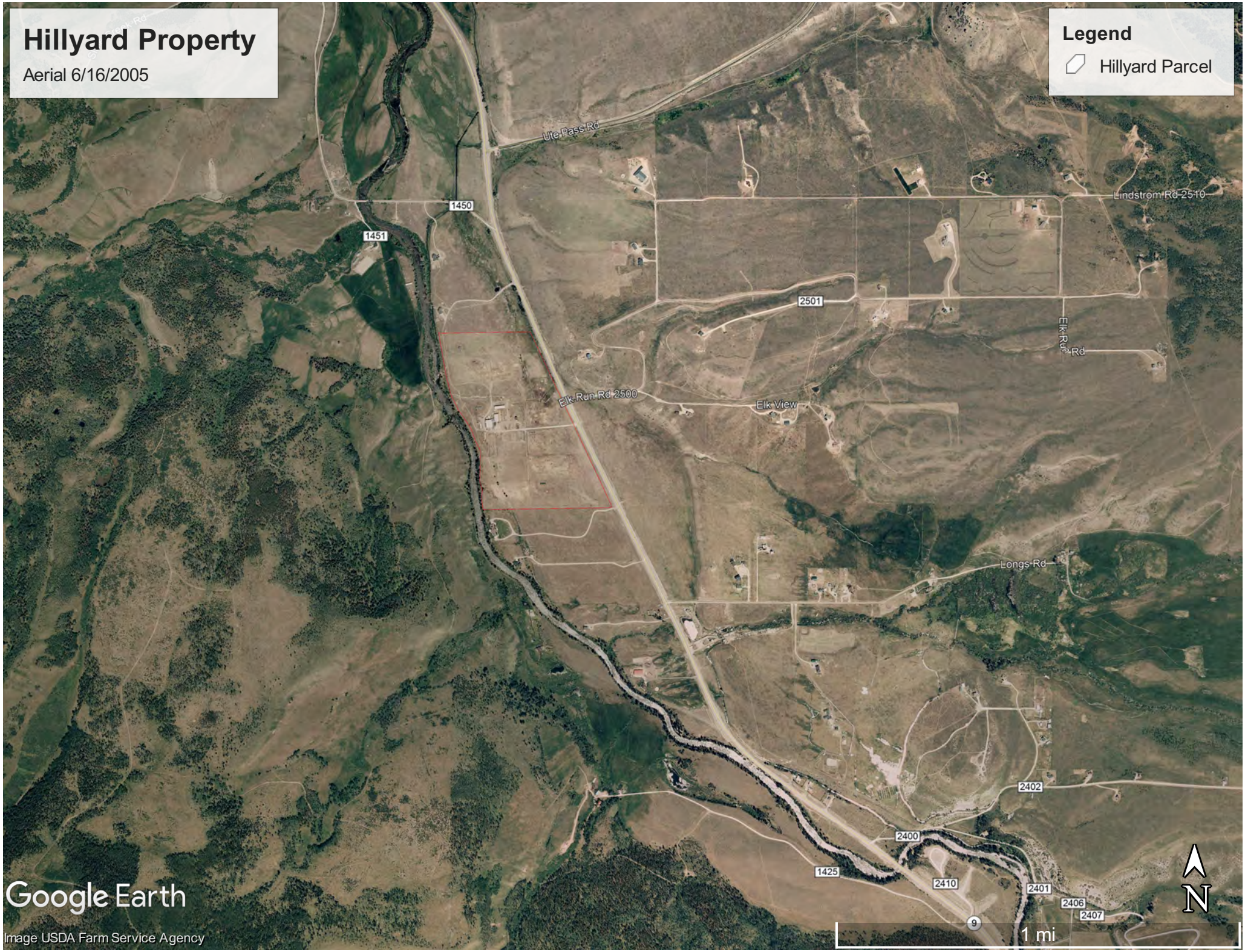
Appendix B

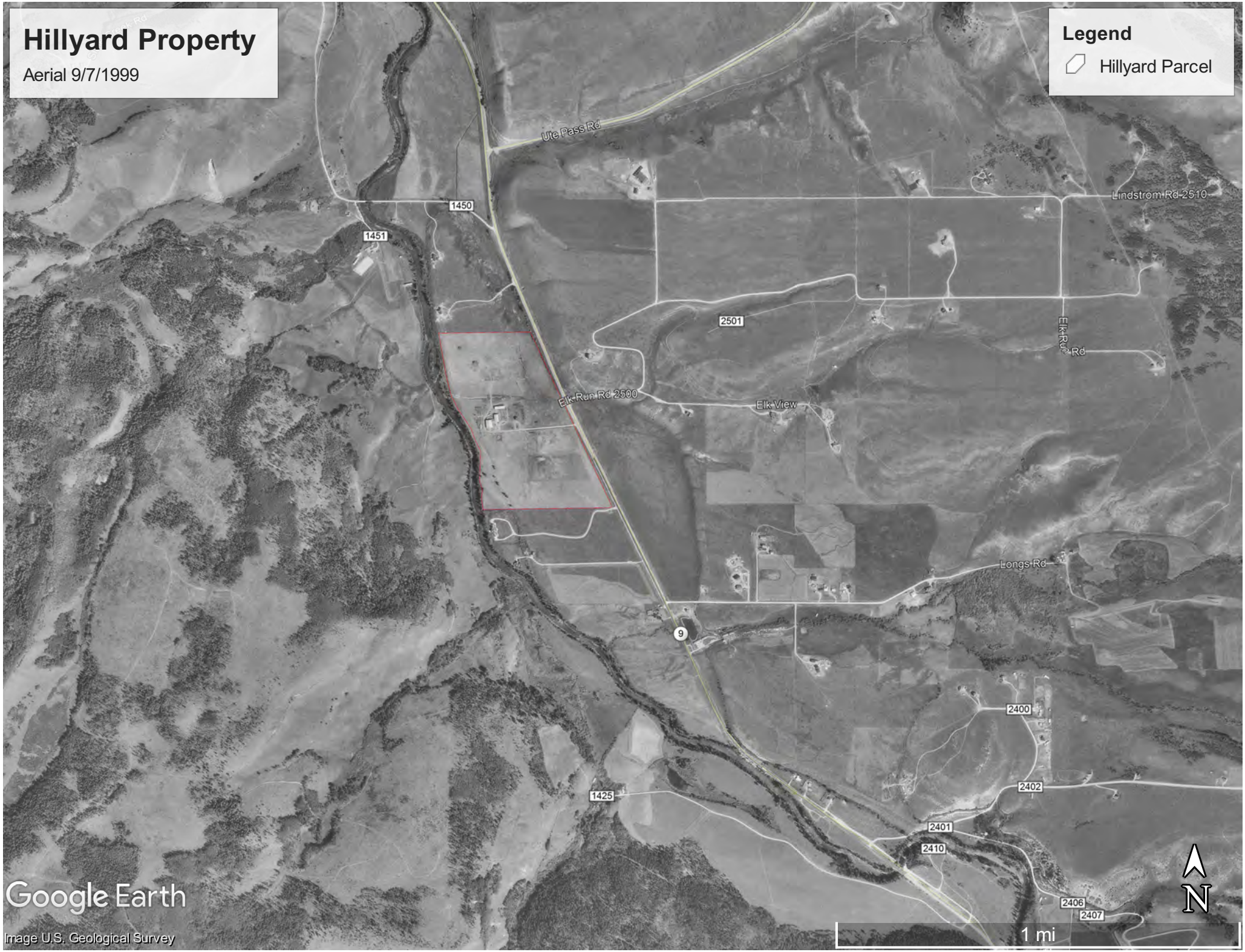
Historical Aerial Photos


Hillyard Property
Aerial 9/3/2019
Legend
Hillyard Parcel
Ute Pass Rd
Lindstrom Rd 2510
1450
1451
2501
Elk View
Longs Rd
2402
2400
2410
1425
2401
2406
2407
9
N
1 mi
Google Earth
© 2020 Google


Hillyard Property
Aerial 10/9/2015
Legend
Hillyard Parcel
Ute Pass Rd
1450
1451
Lindstrom Rd 2510
2501
Elk Run Rd
Elk Run Rd 2500
Elk View
Longs Rd
N
1 mi
Google Earth


Hillyard Property
Aerial 9/23/2011
Legend
Hillyard Parcel
Ute Pass Rd
Lindstrom Rd 2510
1450
1451
2501
Elk Run Rd
Elk Run Rd 2500
Elk View
Longs Rd
2402
2400
1425
2410
2401
2406
2407
9
N
1 mi
Google Earth


Hillyard Property
Aerial 6/16/2005
Legend
Hillyard Parcel
Ute Pass Rd
Lindstrom Rd 2510
1450
1451
2501
Elk Run Rd
Elk Run Rd 2500
Elk View
Longs Rd
2402
2400
1425
2410
2401
2406
2407
9
N
1 mi
Google Earth
Image USDA Farm Service Agency


Hillyard Property
Aerial 9/7/1999
Legend
Hillyard Parcel
Ute Pass Rd
1450
1451
Lindstrom Rd 2510
2501
Elk Run Rd
Elk Run Rd 2500
Elk View
Longs Rd
9
2400
2402
1425
2401
2410
2406
2407
N
1 mi
Google Earth
Image U.S. Geological Survey


Hillyard Property
Aerial 9/7/1999
Legend
Hillyard Parcel
Ute Pass Rd
1450
1451
Lindstrom Rd 2510
2501
Elk Run Rd 2500
9
Elk View
Longs
N
2400
3000 ft
Google Earth
Image U.S. Geological Survey

Appendix C

Wetland Aerial Photographs
and Field Photographs


Wetland Area 2011
Red = NWI Wetlands
Green = Applicants Wetlands
Orance = 2019 Aerial Wetlands
Legend
Wetland Area
Google Earth
N
1000 ft


Wetland Area 2015
Red = NWI Wetlands
Green = Applicants Wetlands
Orance = 2019 Aerial Wetlands
Legend
Wetland Area
Google Earth
N
1000 ft


Wetland Area 2019
Red = NWI Wetlands
Green = Applicants Wetlands
Orance = 2019 Aerial Wetlands
Legend
Wetland Area
Google Earth
N
1000 ft

1 - Area where Applicants Claim Wetlands

2 - Existing Road into property. Wetland Area claimed north (right in photo), not south.

3 – Area south of road where vegetation appears to be wetlands.

Photos taken 9/4/2020