Applegate Group, Inc.
Water Resource Advisors for the West

Memorandum

Date: 6-25-2020 AG Job No.: 10-118

To: Scott Grosscup From: Craig Ullmann

RE: Kellog Gulch Reservoir

As requested by the Board we have further evaluated the Kellog Gulch reservoir site that was identified during our study in 2016. The original evaluation of this site was for a reservoir that would store 17,687 acre-feet. We have now evaluated this site for a 12,500 acre-foot reservoir which would represent the remaining combined volume of the Lost Park and Ripple Creek conditional water rights.

The attached map depicts the extents of the resulting reservoir and dam embankment. some significant advantages:

- The project would be entirely located on public lands owned predominantly by the BLM with some State lands around the dam and pump station.
- This dam and reservoir would not impact any wilderness areas or wilderness study areas although the reservoir does come close to the Black Mountain WSA on the eastern edge.
- The drainage basin is very small, 2.8 sq miles, which translates into a more economical spillway.
- Dry drainage channel, with no expected wetland impacts at the dam.
- No known existing infrastructure is located in the reservoir area (including gas/oil wells).

The main disadvantage to the site is that all water would need to be pumped out of the White River. In previous work, we evaluated a gravity inlet for Tom Little Gulch reservoir and determined that the river diversion would need to be so far upstream that the cost would be prohibitive to construct the conveyance infrastructure and we do not feel that the situation would be any different for the Kellog Gulch site.

The pumping rate assumed would dramatically affect the capital cost of the pump station. For this analysis we have assumed that the reservoir would be entirely filled in 4 months which requires a flowrate of approximately 52 cfs. It may be possible to work with an existing ditch, the Imes and Reynolds, to allow water to be diverted from the river and carried in the ditch to the base of the proposed dam. It is highly likely that the existing ditch would need to be enlarged to allow for additional capacity but it could simplify the permitting process if the existing river headgate for this ditch could be used. This would also slightly decrease the overall pumping head by about 15 feet. This ditch irrigates lands adjacent to the White River primarily owned by the State of Colorado.

Water diversions at a new location would be limited to those legally and physically available at the original point of diversion. At the original Ripple Creek Reservoir site there is USGS stream

gage data available from 1965 though 1973. During the driest year within that period, 1966, the physical availability was between 50 and 200 cfs. A comparison of 1966 with long term gage records on the White indicate that it was indeed a rather dry year, but it was significantly higher than a few other dry years such as 1977, 2002, 2012, 2018. The location of the original site is relatively high in the drainage basin and there are not a lot of water rights immediately below the site that would be able to significantly affect the water availability at this point. Furthermore, there are many tributaries that feed into the river prior to any significant diversions and therefore it appears that a pump rate of 52 cfs at Kellog Gulch would be reasonable under most, if not all, hydrologic conditions.

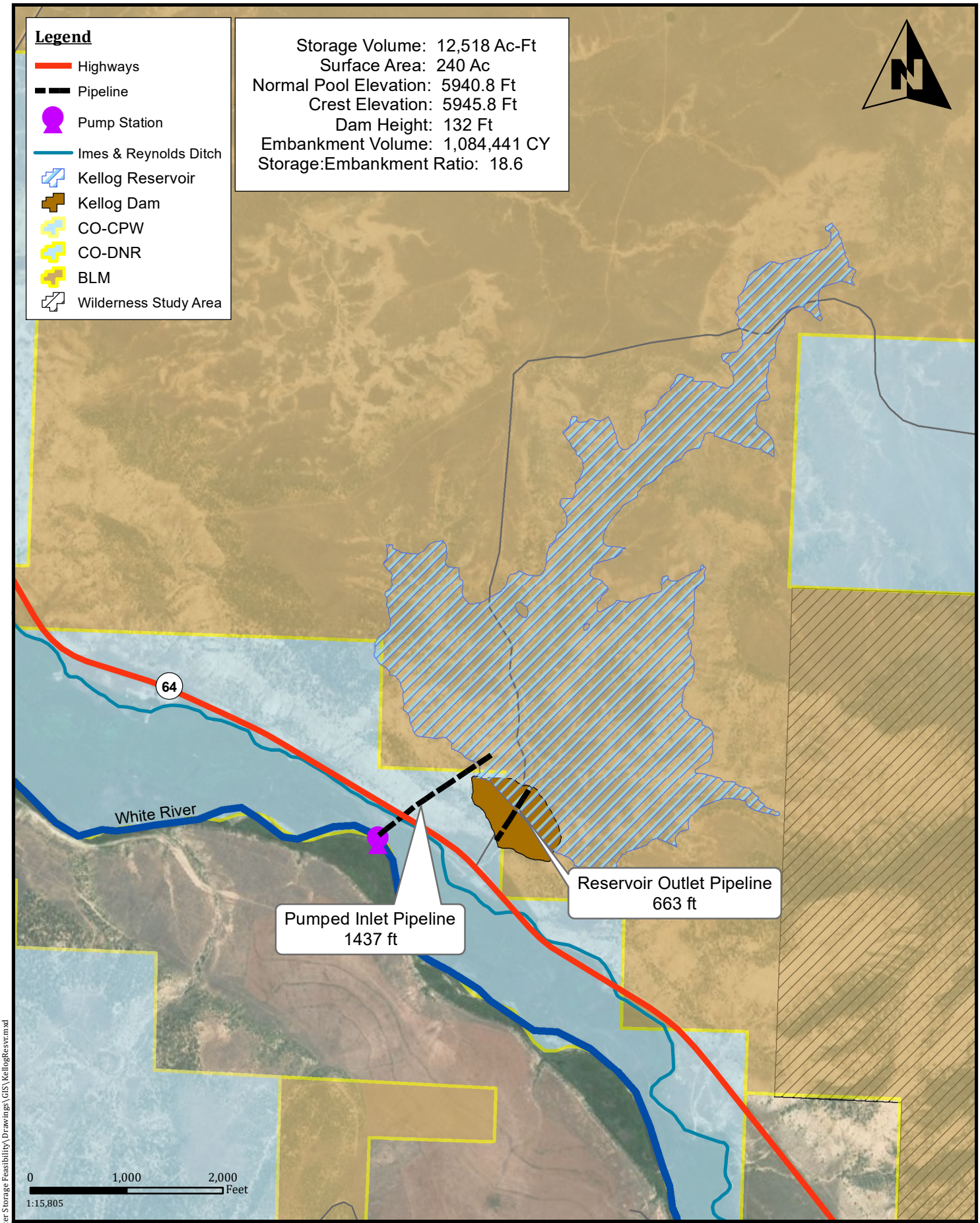
A conceptual cost estimate is shown below for the revised reservoir at this site. At this point we have assumed that a multi-level intake tower would be required for the reservoir outlet. Due to the warm water species located in the lower White River basin it may be necessary to regulate the temperature and quality of the release water.

Kellog Gulch Dam - Opinion of Probable Cost - 12,500 Ac-ft Option

Item	Quantity	Units	Unit Cost	Cost
Mobilization	10	%	Const Cost	$2,191,821
Foundation/Keyway Excavation	216,888	CY	$5.00	$1,084,441
Foundation Grouting	1	LS	$250,000	$250,000
Foundation Fill	216,888	CY	$7.00	$1,518,217
Embankment Fill (average including filters & slope protection)	1,084,441	CY	$11.00	$11,928,851
Outlet Pipe (48 inch encased)	663	LF	$1,500	$994,500
Intake Tower and Bridge	1	LS	$2,000,000	$2,000,000
Outlet Discharge Structure	1	LS	$200,000	$200,000
Emergency Spillway Structure (2.8 sq mile basin)	1	LS	$500,000	$500,000
Intake/Forebay for Pump Station	1	LS	$500,000	$500,000
Pump Station From White River - 52 cfs, 150 feet, 85% eff	1,040	HP	$2,000	$2,080,000
Pipeline From Pump Station to Reservoir	1,437	LF	$600	$862,200
Construction Subtotal				*$24,110,030*
Contingency/Unlisted items	20%	%		$4,822,006
Construction Total				**$28,932,036**
Engineering Design	10	%		$2,893,204
Permitting	2	%		$578,641
Mitigation	2	%		$578,641
Construction Engineering Services	10	%		$2,893,204
			Project Total	**$35,875,725**
			Potential Annual Yield	**12,500**
			Unit Cost	**$2,870**

Based on past analysis of the remaining YJWCD conditional water rights we recommend that 12,500 acre feet of the Ripple Creek Reservoir water right be moved to this location. Stipulations in the last round of diligence stated that only a total 12,500 acre-feet of water could be developed between the 12,500 acre feet Lost Park right and the 12,500 acre-foot Ripple Creek right. Without the Lost Park feeder Canals, abandoned during the last diligence period, the Lost Park right has a severely limited physical water supply

due to the relatively small drainage basin. Ripple Creek, however, has sufficient water available at the original point of diversion and would allow the full 12,500 acre feet to be diverted in all but the driest of years. Furthermore, we also recommend that the remaining 25 cfs North Fork Feeder Conduit right be moved to the location of the pump station shown on the attached map. While this water right is significantly more junior than the Ripple Creek right it could still provide another source for filling the reservoir.



Applegate Group, Inc.
Water Resource Advisors for the West
1490 West 121st Ave., Ste 100
Denver, CO 80234-2728
www.ApplegateGroup.com
Phone: (303) 452-6611
Fax: (303) 452-2759
e-mail: info@applegategroup.com

Kellog Reservoir Site
Yellow Jacket Conservancy District

Date: 22 Jun 2020
Job #: 10-118
Drawn By: BAK

Figure: 1
Of: 1

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