TOWN OF
BRECKENRIDGE

FAQs for General Public on Goose Pasture Tarn Dam

DAM SAFETY

What is the condition of Blue Lakes Dam, which holds back the Upper Blue Reservoir upstream of Breckenridge?

Blue Lakes Dam is a high hazard dam. Colorado Dam Safety currently (as of November 2019) considers the dam to be in generally good condition and there are no restrictions on the level of the reservoir impounded by the dam.

When the project is completed and Colorado Dam Safety signs off on the condition of the rehabilitated dam, what is the expected lifespan of the dam?

Following rehabilitation, the dam will be properly monitored for performance. As long as this and other dams are properly monitored, and as long as future dam safety concerns can be identified and addressed, the useful life of the dam can be extended indefinitely. The dam will still be classified as a "High Hazard Dam", which is not an indication of the condition of the dam and instead is based on the consequences if the dam should fail.

How does snowpack and streamflow play into dam operations and dam safety?

High winter snowpack is an indication of higher snowmelt and streamflow, which could result in potential flooding. All high hazard dams including Goose Tarn Dam are required to have an Emergency Action Plan (EAP) in place that considers the potential for flooding as a potential dam safety concern, and includes requirements for notification of emergency managers and others, and increased monitoring if specified flow discharges through the dam have been exceeded.

What type of diversion will be used to maintain river flow over the course of the project?

The currently operating service spillway and outlet works will handle runoff flows during the first construction season, and a reservoir diversion consisting of a 96-inch diameter pipe will be constructed to divert flows around the west side of the dam during construction of the new spillway in 2021. The new spillway and rehabilitated low-level outlet works will handle reservoir flows during the 2022 construction season.

What parameters were used in the hydrologic analysis to generate the inundation map of Breckenridge?

The inundation map shown at the Breckenridge Public Meeting was developed using HEC-RAS hydrologic software. The following flood conditions were displayed: 550 cfs controlled flow through

spillway, 990 cfs controlled flow through spillway (corresponding to a 100 year flood event), 1300 cfs controlled flow through spillway, and a dam breach occurring during the 100-year flood event (990 cfs flow) in which case the reservoir is released in additional to the 990 cfs flow.

How does the Town prepare for flooding?

The Town has prepared an Emergency Action Plan (EAP), which is a detailed plan of actions for response to dam emergencies or unusual events and includes a chain of command for alerting and warning emergency officials in the event of unusual conditions or events that could potentially lead to a dam safety emergency. Representatives of the dam owner and emergency management personnel who would be called upon during a dam emergency have participated in EAP tabletop exercises, in which a dam emergency event was simulated, and participants described actions each would take during the emergency. Breckenridge's Department of Public Works continuously monitors the condition of the dam including instrumentation monitoring, and dam engineers working for the town review the monitoring results and perform on-site inspections.

CONSTRUCTION IMPACTS/SCHEDULE

Will the Gary Roberts Water Treatment Plant be taken off-line during construction?

The Gary Roberts Water Treatment Plant will remain on-line until the new water treatment plant is completed and up and running. The Town anticipates completion of the new plant by July 2020, but it may take several months to iron out bugs with the new plant. For that reason, the Gary Roberts Water Treatment Plant may stay in operation through the 2020 construction season.

What is the anticipated overall length of construction?

Construction is anticipated to extend over three seasons: Season 1 from May to October 2020; Season 2 from May to October 2021; and Season 3 from June to August 2022.

What changes will be made to the dam during the Project?

The planned rehabilitation consists of replacement of the existing service spillway and emergency spillway with a single overtopping concrete spillway, construction of a 2.6-foot raise of the dam crest for flood protection only (the raise will not result in additional reservoir storage capacity), construction of a new drainage system designed to safety control seepage through the dam, and lining of the 54-year old outlet conduit to protect against outlet leaks that could impact dam safety.

RESEVOIR USE/IMPACTS

What is the schedule for lowering the reservoir?

In August of 2020, the reservoir will be completely drained for about one month, then allowed to refill to the normal restricted water level through wintertime. In May 2021, reservoir will be drawn down about 8 feet below the current restricted level and maintained at that level from its current level and keep it there until September, then lower the reservoir entirely to the bottom for one month to complete final work on the low-level outlet. After that, the reservoir will come back up to its original pre-restricted level at end of 2021 and remain through the end of construction in 2022.

When the lake is drawn down, will there be any deepening or digging out of the reservoir?

There will be no dredging or digging out of the reservoir. The construction is only for rehabilitation of the dam.

What are the anticipated residential well impacts?

A preliminary assessment of impacts to residential water wells located around the reservoir resulting from three reservoir drawdowns indicates that residential wells located within about 300 feet of the reservoir could see a temporary drop in water levels greater than 5 feet. The largest impacts are anticipated to occur when the reservoir is completely drained for about one month in the late summer/fall of both 2020 and 2021, and to a much lesser extent when the reservoir is lowered 8 feet for about four months in the early to mid-summer of 2021.

Does the Town have a plan for providing water to residents around Goose Pasture Tarn Reservoir during periods when the reservoir is lowered for construction?

The Town is currently seeking information on the water demand of surrounding residents located in proximity of the reservoir, and assessing measures to provide water to residences wells that are significantly impacted. Possible measures may include offering impacted residents treated Town water stored in temporary water tanks on or near the impacted residences, but a final plan has not yet been developed. The Town is also considering installing temporary wells to help in monitoring water levels, and performing water level monitoring and water quality testing in selected residential wells provided they can obtain permission from those residences to access their wells.

How will you know what's happening in the wells around the reservoir during the project?

The Town has set up the following website to provide an open line of communication with well owners surrounding the reservoir: www.townofbreckenridgegptd.com. The Town is also considering installing temporary wells around the reservoir to monitor changes in water level during the periods when the reservoir is drawn down.

Will it damage wells to run dry?

Running a well pump when the well runs dry can damage the pump, and may cause it to burn our prematurely.

The tarn will be empty at end of the season, when its tributary will be at a very slow flow as you're trying to refill it, how quickly do you realistically expect it to refill?

We estimate that the reservoir could refill in about 3 weeks to one month under average fall flow conditions, but could take longer under low fall flow conditions. The Town has agreements with upstream reservoir operators to obtain up to 400 acre-feet of water, and may request that water to help fill the reservoir if needed.

ENVIRONMENTAL

Will the fish below the reservoir be affected by construction activities?

The fish located in the pool within and immediately downstream of the spillway will be impacted when that pool is drained to construct the bottom of the new spillway. Fish habitat in the natural Blue River channel downstream of the stilling basin pool is not anticipated to be impacted by construction.

What will happen to the fish in the reservoir when the reservoir is completely drained down?

Some rainbow trout fish in the reservoir have gill lice, and Colorado Fish and Wildlife has indicated that they do not want the fish to be released from the reservoir in order to contain that decrease. The Town of Breckenridge will work with the Town of Blue River to see if it is possible to allow for fishing in the reservoir in the summer of 2020, but any remaining fish will likely be removed as practical prior to draining the reservoir in the fall of 2020.

Will other wildlife besides fish be affected by the project, specifically by draining the reservoir?

Based on environmental studies performed to assess potential wildlife impacts of the planned rehabilitation, no other significant impacts to wildlife are anticipated.

GENERAL QUESTIONS

How will the project be funded? How will the Town be financing its portion?

The estimated construction cost, excluding engineering and permitting, is in the range of $15 Million to $20 Million. The Town has been selected by FEMA for funding ($10 million) under the Pre-Disaster Mitigation Grant program for the rehabilitation project, contingent on satisfying FEMA requirements. The Town plans to apply for a loan with the Colorado Water Conservation Board (CWCB) for the remaining construction cost.

Do the Towns of Breckenridge and Blue River share jurisdiction of the Goose Pasture Tarn?

Goose Pasture Tarn is a private lake within the Town of Blue River and is available for use only to property owners of the Town of Blue River. The land around the Tarn is not owned by the Town and is private property. The water and dam are owned by the Town of Breckenridge.

Will recreation rights still belong solely to Blue River even during the period when the reservoir needs to be fished out?

Unless Blue River decides otherwise, yes.

Why won't Blue River share recreation rights on the reservoir with surrounding residents?

They are under no legal obligation to do so.

How are you working with the neighbors immediately adjacent to the dam?

The Town of Breckenridge has been working closely with the neighbors located immediately east of the dam, and has met with them on several occasions to discuss the planned design and construction, and to look for opportunities to reduce impacts to them where practical.

Where do the subdrains in the spillway discharge to?

The three subdrains located beneath the spillway structure discharge into a buried discharge pipe that in turn discharges into the spillway near the downstream toe of the dam.

What changes will be made to the dam during the Project?

The planned rehabilitation consists of replacement of the existing service spillway and emergency spillway with a single overtopping concrete spillway, construction of a 2.6-foot raise of the dam crest for flood protection only (the raise will not result in additional reservoir storage capacity), construction of a new drainage system designed to safety control seepage through the dam, and lining of the 54-year old outlet conduit to protect against outlet leaks that could impact dam safety.

Will the Gary Roberts Water Treatment Plant located beyond the downstream toe of the dam be taken off-line during construction?

The Gary Roberts Water Treatment Plant will remain on-line until the new water treatment plant is completed and up and running. The Town anticipates completion of the new plant by July 2020, but it may take several months to iron out bugs with the new plant. For that reason, the Gary Roberts Water Treatment Plant may stay in operation through the 2020 construction season.

Can the public access and use the reservoir and dam while the Project is underway?

The Town of Blue River has indicated that the reservoir will be off-limits and blocked for recreation use during construction, primarily for safety reasons. Starting in August 2020 the reservoir will be lowered about 8 feet to 29 feet, making it difficult and unsafe to attempt accessing the reservoir pool. There is also a safety concern regarding public interference with construction activities on the dam.

What was the original purpose of the dam?

The dam was built by a private developer for recreational purposes in 1965. It was later acquired by the Town of Breckenridge in the early 1970's.

I attended the GTPD meeting on 11/14/19 and learned that the new spillway is being designed for a discharge of between 18,000 and 20,000 cfs. I believe that value is based on an old Meteorological Report (HMR) that doesn't apply to high elevation areas, and has recently been updated through the Colorado Division of Dam Safety. Discharge values based on the new HMR will result in significantly lower design discharges and consequently, save money on spillway costs. I had discussed this matte with Bill McCornmack, Colorado Chief of Dam Safety and he agreed. It may behoove you to discuss this with him. Note that the old roller compacted emergency spillway was installed due to an HMR that didn't apply to high elevation areas. Frankly, that spillway was a waste of money. There is no paleohydrologic evidence that the Blue River upstream from GPTD has ever had flow out of its banks in the last 10,000 years (approximately); i.e, since the last glacier was in the valley. Any paleohydrologic evidence after that was destroyed by glaciers.

At the time we initiated the hydrology study for design of the new spillway, the new Regional Extreme Precipitation Study (REPS) tool developed by the Dam Safety Branch of the Colorado State Engineer's Office (SEO) was still under development. Therefore, based on direction from the SEO at that time, 70% of the HMR 49 PMP was used in accordance with the Colorado Rules and Regulations for Dam Safety and Dam Construction (DWR, 2007), and resulted in a peak reservoir inflow of 23,700 cubic feet per second (cfs), and a routed peak reservoir discharge of 17,700 cfs. The analyses were subsequently checked using the precipitation derived from the fully developed REPS tool, including the addition of the 7% atmospheric moisture factor, which is now required by the SEO for all dams. The REPS analysis

produced an IDF and routed discharge flow similar to that using HMR 49. We don't disagree with your statement regarding the lack of paleo-hydrologic evidence indicating that PMP-magnitude-flood events have occurred for mid-continent high-elevation basins. However, we are required to perform our analyses in accordance with SEO criteria and the current state of the practice. The REPS analyses, which are considered best available science, were used to assess PMP meteorology in the Goose Pasture Tarn basin. We have discussed your concerns with the SEO Dam Safety Chief, Bill McCormick, and understand that the SEO is continuing to improve the implementation of the REPS tools to include consideration of enveloped historic flood flow information from a statewide database of direct and indirect measurements. The SEO is currently reviewing Wheeler's hydrologic analyses and rehabilitation design, and both W. W. Wheeler & Associates and the SEO will look for opportunities to reduce the IDF during that process.