College of Agriculture, Biotechnology and Natural Resources
University of Nevada, Reno
Department of Natural Resources & Environmental Science

California Department of Parks and Recreation
Sierra District
Cyndie Walck, CEQA Coordinator
PO Box 266
Tahoma, CA 96142

Subject: Upper Truckee River Restoration and Golf Course
Public Comment

July 25, 2018

I have reviewed the document "Preferred Alternative 2B and Additional Environmental Analysis" from the "Upper Truckee River Restoration and Golf Course Reconfiguration Project SCH No. 2006082150. I had also commented on the 2010 version of the EIR/EIS and had reviewed the previous preferred alternative. These documents are hereby incorporated by reference into these comments on the EIR and are attached.

General comments

My comments had centered on the hydrologic integrity of the fen on the west side of the Upper Truckee River and also on the potential for nutrient leaching. I note that alternative 2B has increased the distance between the fen and the proposed golf course to "approximately 250 feet and down-gradient from the fen at its closest point" (EIR Volume 6 page 3-14). I remain concerned that the newly developing fen on the quarry floor (referred to as a vernal pool in the EIR), which is of great scientific interest, is closer to the proposed golf course than the distance listed above.

One of my concerns had been that excavation below the fen would intercept the groundwater surface and increase the drainage of the fen. I see that now in alternative 2B the berm below the seepage face would be maintained and the "vernal pool" at the bottom of the seepage face would be maintained. I also noted that groundwater wells had been installed and monitored as we had recommended in previous comments. Fortunately, this slope is excluded from the boundaries of the golf course, but it is important that it remain intact and protected from accidental excavation.

The vertical cross section shown in Exhibit 3.1-2 (EIR Volume 6, page 3-7) is informative but it does confirm my concerns about the depth of the groundwater surface along the transect through the sand pit down to the river. These appear to vary from about 6 to 4 feet below the surface in Spring, to

7.5 to 12 feet in late Summer based on my manual measurements from the Figure. One deficiency in the current EIR is that the locations of the wells should have been given (e.g. on a map) and the longer term data on trends in the groundwater depth be included. We cannot determine, for example if the data were taken in a dry or wet year. Also, what are the groundwater levels in other areas of the course away from this particular transect?

The California Native Plant Society's report which I referenced in my 2012 comments characterizes the Washoe Meadows main fen with a high ranking for Conservation Significance first because of its rare species and that fact that is relatively undisturbed and also because it is in Washoe Meadows State Park and is thus considered well protected. It is important that this protection continues.

Disturbance from haul roads

The map showing the haul roads raises concerns about the emission effects of the vehicles that will be traveling so close to the largest fens. One proposed haul road goes on the "jeep trail" that follows the natural berm directly below the margin of the large fen. On this road, any excavation, or deposition of fill on either side of the road in the fen or the groundwater drainage on the downhill side could interfere with the hydrologic integrity of the fen. The stream drainage channel for the large fen gradually becomes deeper at the point it drains the northeast edge of the large fen and that point is probably the greatest increase in drainage volume. The stream was diverted under the berm trail along the fens at another point where there was an old rusting metal culvert pipe under the trail. Since this point controls the drainage elevation of the fen, it is important that this culvert is not lowered, destroyed by truck traffic or impeded. It would likely have to be strengthened to tolerate truck traffic but is important to maintain the same elevation of the drain and there are the issues with effects of vehicle traffic mentioned above. Therefore it would be preferable if another alternative such as Alternative 3 were selected in order to avoid all these potential impacts.

Any traffic along this haul road could result in deposition of dust that contains phosphorus in the fens. In addition, dust from the roads and other construction activity falling on the fens (which are within 25 meters in some locations, would add phosphorus to the fen surface. The fen community is adapted and dependent on a deficiency of phosphorus (P) and nitrogen (N), in way that is analogous to the sensitivity of Lake Tahoe to nutrient enrichment. Dust from dirt roads has also been implicated as a source of phosphorus enrichment to the surface of Lake Tahoe. It is critical to keep traffic off of the dirt road bordering the southeastern side of the fen. There is not estimate of vehicle travel on the haul roads near the fens and analysis of potential negative impacts and mitigation measures.

Disturbance from channel relocation

I also have concerns about the need for backfilling of 3400 feet of the existing channel. The existing channel has had several decades to adapt and develop habitat for aquatic biota. The 3300 feet of historic channel remnants that would be reconnected are not well documented. Are they really the result of channelization or just historic remnants of natural meandering? The 2100 feet of new channel to be excavated is not well rationalized beyond the desire to develop more channel length within the reach of the Upper Truckee. I would suggest the need for the channel modifications be presented in the EIR document. I would also suggest that any data on sediment loads resulting from other restoration projects on the Upper Truckee above and below the Washoe Meadows State Park reach be placed in the

document in order to compare the impact of sediment production due to channel excavation with current sediment production.

Potential for transport of fertilizer nutrients from the golf course to the Upper Truckee River.

I have read Dr. Goldman's letter commenting on this project and I agree with everything that he has pointed out. He has pointed out the there will always be risks associated with the application of fertilizer in areas with a high water table and that there is a risk of flushing of nutrients during floods. He also points out the impact of disturbance and loss of the nutrient uptake capacity of the trees that are to be removed. I will follow up those comments with a detailed analysis of the potential for leaching of N and P based on data from the Soil Survey after a few preliminary comments on the most recent EIR.

The soils in the area of the proposed fairways on the west side of the Upper Truckee R. are mapped as a Celio gravelly loamy coarse sand (University of California Davis Soil Resource Lab, and USDA, NRCS 2007; accessed via the SoilWeb online survey tool). The area in the pit is mapped as "Pit" but seems likely to have been a Celio soil since the Celio soil surrounds the pit area on 3 sides. The original soil pedon (a soil profile excavated for characterization) dug to classify the Celio soil type is only about 700 meters from the proposed course on the western side of the river, and so is likely very representative of soil in the proposed golf holes on the western side. Also, the Celio soil pedon had an accompanying set of chemical and physical analyses for each horizon. The following description will show that the soil represents a "worst case" environment for rapid percolation for irrigation water containing fertilizer, very rapid movement of groundwater toward the river, and minimal removal of P and N through adsorption and denitrification.

Celio gravelly loamy coarse sand, contains 80 to 100% sand in the top 3 meters in the fine soil fraction (less than 2 mm). The Celio soil is classified in Hydrologic Soil Groups A/D, which are defined as having a seasonal water table <60 cm, and a saturated hydraulic conductivity of more than 1.42 inches per hour (which is the maximum classification). In the C horizon (140 to 205 cm and below) where most groundwater would be moving, the fine soil contains 98.5% sand, mostly as coarse or very coarse sand. Furthermore, the soil contains 27 to 62% gravel by weight. The saturated hydraulic conductivity is listed as 30.0 to 40.0 cm per hour in the A and upper B horizons, which is a very high rate of conductivity for water moving down in the soil, although in unsaturated soil, the rate would be lower. The high sand and gravel content is the reason that water moves so rapidly through the soil. In the Celio soil there is a "hardpan" layer (duripan) of cemented silica at 120 to 140 cm deep, which may restrict the movement downwards, but may encourage movement toward the river (downward in elevation).

In the sand/gravel pit area, it is likely that the surface horizons of the Celio soil have been removed, but it likely resembles the subsoil (C horizon) of the Celio soil. This would also mean that the "hardpan" layer is absent and that the soil consists of more than 90% sand in the fine soil, with "increasing amount of gravel with depth". Consequently, the hydraulic conductivity is expected to be very high, with groundwater moving rapidly down the elevation gradient toward the river.

In addition to the high hydraulic conductivity, the high sand content also makes the ability of the soil to adsorb phosphorus from fertilizer minimal. The adsorption capacity of soil is largely due to iron and aluminum oxyhydroxides and some clays (Weil and Brady, 2017). The laboratory analyses of the Celio soil included measurements of iron and aluminum oxyhydroxides, represented by citrate dithionite and acid oxalate extractions of iron and aluminum. The contents of iron oxyhydroxides were 2.7 to 2.8

mg/kg in the A horizon, but only 0.3 to 0.4 mg/kg in the C horizon. Concentrations of aluminum oxyhydroxides (as Al) were only 0.66 in the A horizon, declining to 0.20 mg/kg in the lower b horizon. Both of these forms of Fe and Al would indicate extremely low P adsorption capacity in the Celio soil (Weil and Brady, 2017).

Nitrogen fertilization will be accomplished with slow release fertilizers according the EIR. This likely would be a urea based fertilizer. Urea is hydrolyzed first to ammonium ion and then, under favorable conditions, converted to nitrate ion which is very mobile in soil and groundwater (Weil and Brady, 2017). The soil survey of the Celio soil indicates a pH of 6.0 in the A horizon rising to 6.5 below about 60 cm depth. Since acidic conditions favor the conversion of urea to ammonia, and slightly acid to alkaline conditions favor the conversion of ammonium to nitrate, a pH of 6 to 6.5 is nearly optimal for the combined rate of conversion of urea to nitrate (Xi, et al. 2017). Thus, we can expect that a substantial portion of the urea not taken up by grass can be subject to leaching into the groundwater and transported toward the river. Ammonium ion may also be subject to leaching because the cation exchange capacity is exceptionally low, only 15 cmol (positive charge)/kg soil in the upper A horizon down to 1 in the lower horizons (Soil Survey data).

Since the groundwater level is not far below the surface in the proposed golf holes on the west side of the river, nitrate leached downward will enter groundwater a few feet below the surface (see Exhibit 3.1-2 in the EIS). If the groundwater is anaerobic and there is a sufficient carbon source, nitrate may subject to denitrification (conversion to nitrogen gas) thus preventing being a pollutant as it reaches the river. However, the soil survey description noted that the groundwater in the Celio soil does not rise above 55 degrees F even in the summer, which would essentially prevent the process of denitrification which requires relatively warm temperatures (Weil and Brady, 2017). Consequently, nitrogen applied as fertilizer has a substantial potential to leach into the Upper Truckee River because of: (1) the high water table, (2) high hydraulic conductivity, (3) a suitable pH for nitrification, (4) low cation exchange capacity, and (5) low temperatures in groundwater.

Summary

In conclusion, I have concerns about the adequacy of the EIR because of lack of some important information related to the justification for allowing golf course at the proposed distance from the fens. Without this information the basis for the conclusions of the EIR cannot be reviewed or confirmed.

There are also concerns about the potential impacts on the fens from the use of an adjacent haul road.

The risk of sediment production and its impact on water quality from the channel relocation is of concern.

There is a well-founded potential for transport of fertilizer nutrients from the proposed golf course footprint proposed in Washoe Meadows State Park to the Upper Truckee River.

For all of the above reasons, it would seem prudent for State Parks to re-evaluate their selection of Alternative 2B. Alternative 3 or another project with less potential negative impacts would be preferable.

References:

University of California-Davis Soil Resource Lab and USDA NRCS. Soil Web. Accessible at https://casoilresource.lawr.ucdavis.edu/gmap/

United States Department of Agriculture, Natural Resources Conservation Service. 2007. Soil survey of the Tahoe Basin Area, California and Nevada. Accessible online at: http://soils.usda.gov/survey/printed_surveys/.

Ray R. Weil, R.R., and N. C. Brady. Nature and Properties of Soils. 15th Ed, 2017. Pearson, N.Y.

Xi, R., Long, X., Huang, S., & Yao, H. (2017). pH rather than nitrification and urease inhibitors determines the community of ammonia oxidizers in a vegetable soil. *AMB Express*.

From: Robert G. Qualls
Professor Emeritus, Department of Natural Resources and Environmental Science,
And Global Water Center,
University of Nevada, Reno, NV, 89519

1-27-12 Qualls statement

Comments regarding California Native Plant Society report: Verification and Description of Fens in Washoe Meadows State Park, El Dorado County, California, November 2011.

The report confirms that there are 5 separate fens, (including the north and south meadows of the main fen as one). The spring has at least one point that will almost certainly qualify as a fen since it is very unlikely to have enough clay to be below the threshold for organic carbon content. Even the newly developing wetland on the quarry floor is of great scientific interest since it was excavated in the 60's and has already accumulated 25 cm of peat which represents 8-10 mm per year of accumulation of peat. It represents a great opportunity to observe primary succession of a fen developing on a new substrate.

The CNPS report also shows 5 plants that merit special status; two vacular plants and 3 mosses (Table 2, page 5). Two are rare in California but more common elsewhere. Two are "Taxa to watch" since they have such limited distribution. Three of the species have a "moderate degree of threat" in California. The report also lists the status of the plant communities ("Alliances and Associations") in Table 4. One is "Imperiled" and four are "Vulnerable" in California.

The report does an excellent job of analysis of the fens and their vegetation. Their species list matches the one I compiled from our short trip to the main fen but theirs is much more extensive. It confirms the great diversity of species and the variety of communities in the main fen that we observed.

Jerry Qualls

Associate Professor

Department of Natural Resources and Environmental Science University of Nevada, Reno, NV 89557

College of Agriculture,
Biotechnology, and Natural Resources
University of Nevada, Reno

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I have read Dr. Goldman's letter commenting on this project and I agree with everything that he has pointed out. He had wisely thought to cover the impact on the scale of global, watershed –wide, and local ecosystems. He has pointed out the there will always be risks associated with the application of fertilizer in areas with a high water table and that there is a risk of flushing of nutrients during floods. He also points out the impact of disturbance and loss of the nutrient uptake capacity of the 1600 trees that are to be removed.

It might be argued that disturbance of moderately large areas might *individually*, not have a large impact on the whole watershed or on global issues but I would like to point out that Section 404 of the Clean Water Act which regulates the discharge of dredged material , placement of fill material, and excavation within waters of the United States recognizes that "although a individual discharge, may in itself, constitute a minor change, the *cumulative effect* of numerous piecemeal changes can result in a major impairment of water resources and interfere with the productivity and water quality of aquatic ecosystems". The assessment of cumulative impacts is mandated in 40 CFR Part 230.11 of the Clean Water Act and requires the Corps of Engineers to collect information regarding cumulative impacts and consider these in permit applications (Stein and Ambrose, 1998)

I have also commented previously on my concerns about disturbance of the groundwater surface below the fens themselves. If, the hydraulic conductivity of the subsurface is high below the fens, them there may be no increase in the groundwater flux from the fens, and their drainage rate. But, an increase in the slope of the groundwater surface, even below the fens in a matrix of high hydraulic conductivity may tend to increase the drainage rate of the fens. I do not think we know enough about the hydraulic conductivity of the subsurface areas below the fens.

Natural Resources and
Environmental Science
1664 No. Virginia Street
University of Nevada, Reno/370
Reno, Nevada 89557
(775) 784-1896 office
(775) 784-4789 fax

I have also read the most recent report on the vegetation of the fens in Washoe Meadows State Park. It is a very good and thorough report. It documents the presence of several threatened species that occur in the very specialized environment of these fens.

Reference:

Stein, E.D., and R.F. Ambrose. 1998. Cumulative impacts of section 404 Clean Water Act Permitting on the riparian habitat of the Santa Margarita, California Watershed. Wetlands. 18: 393-408.

Robert G. Qualls