
San Francisco Bay Regional Water Quality Control Board

TO: File
Upper Berryessa Creek Flood Risk Management Project
CIWQS Place ID 818597
Regulatory Measure 403119

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DATE: August 27, 2018 (revised from August 6, 2018)

SUBJECT: Rationale for Accepting the Santa Clara Valley Water District's Proposal for Complying with the Board's Order for the Upper Berryessa Creek Flood Risk Management Project (CIWQS ID 818597)

The San Francisco Bay Regional Water Board (Water Board) adopted waste discharge requirements and water quality certification for the Upper Berryessa Creek Flood Risk Management Project (Upper Berryessa Project) in April 2017 as Order No. R2-2017-0014 (Order). The Order requires mitigation for impacts to about 10 acres and 10,000 linear feet of Upper Berryessa Creek in the cities of Milpitas and San Jose. Specifically, Provision B.19 of the Order requires submittal of a mitigation and monitoring plan (MMP) by October 2, 2017, that includes a mitigation proposal acceptable to the Executive Officer. At the request of the Santa Clara Valley Water District (District) and in light of ongoing discussions between Water Board and District staff on the mitigation proposal, the Water Board's Assistant Executive Officer provided a letter on September 20, 2017, indicating that the Water Board's prosecution staff would not pursue enforcement for failure to meet the October 2 deadline as long as the District continued to work diligently to complete and submit an acceptable plan. Accordingly, the District has worked diligently with Water Board staff and has proposed to implement the Almaden Lake Park Improvements Project (Almaden Lake Project, or Lake Project) to comply with Provision B.19 of the Order for the Upper Berryessa Project. This memo documents the Water Board's rationale for tentatively accepting the District's proposal.

The goal of mitigation is to achieve "long-term net gain in the quantity, quality, and permanence of wetlands acreage and values", consistent with the Governor's Executive Order W-59-93 (also referred to as the California Wetland Conservation Policy or No Net Loss Policy) and the *Water Quality Control Plan for the San Francisco Bay Region* (Basin Plan), section 4.23.4. In determining whether a proposed project is acceptable as mitigation, the Water Board considers several factors such as (but not limited to) the type of mitigation (creation, restoration, enhancement, or preservation), whether the proposed

project is onsite and in-kind, and the amount of time that would pass before the proposed project's functions and values would be established relative to the occurrence of impacts. With those factors, we made assumptions in Finding 21 of the Order, because we did not have a proposed project to evaluate. Based on these assumptions, the Order's resulting compensatory mitigation requirement was 15,000 linear feet or 15 acres of riverine wetlands. Finding 21 further stipulates a range of examples that could otherwise compensate for the Upper Berryessa Project's impacts based on those factors, provided the mitigation project is commensurate with the impacts:

Examples of potentially acceptable mitigation projects include dam removal, increasing salmonid habitat complexity in another creek, replacing a concrete channel with restored riverine wetland habitat, and preparing a watershed management plan and implementing projects specified in that plan sufficient to meet the Order's mitigation requirements.

The District's Almaden Lake Project will restore Alamos Creek by constructing a levee to separate the creek channel from Almaden Lake (Lake) (SCVWD 2017a; 2017b; 2017c; and 2017d). As presented in the following sections in more detail, the Lake Project will have the following effects:

- Constructing a levee to separate the creek channel from Almaden Lake (Lake), which will result in 16 acres of permanent impacts and 16 acres of temporary impacts to the Lake;
- Restoring 11 acres (1,700 linear feet) of Alamos Creek, which will reestablish the creek channel, floodplain, and riparian vegetation and improve fish passage for migrating salmonids; and
- Enhancing the Lake habitat by improving dissolved oxygen levels, reducing methyl mercury production, and decreasing algae blooms that result in park closures.

The temporary and permanent impacts in the Lake Project will be offset by a net gain in functions and values of the impacted waters. In addition, the benefits of creek restoration and Lake enhancements will extend beyond the project footprint. This is because opening fish passage by restoring Alamos Creek will benefit steelhead trout (*Oncorhynchus mykiss*) ("steelhead"), a federally-listed endangered species, and Chinook salmon (*Oncorhynchus tshawytscha*), which both require unimpaired and unconstrained passage from freshwater to the ocean to complete their life history and to sustain local populations (NMFS, 2016). The Lake Project will also improve water quality in discharges into the Guadalupe River system because methylmercury production in the Lake will be minimized. With these improvements in aquatic functions and values, the Lake Project meets the No Net Loss Policy and Basin Plan requirements for mitigation of the impacts from both the Lake and Upper Berryessa projects.

A. Almaden Lake Project Site Overview

The Lake is an impoundment of Alamos Creek in the City of San Jose, Santa Clara County, and is part of a 65-acre recreation facility, bordered by Almaden Expressway

on the west, Coleman Road on the north, and Winfield Road on the east and south (see map attached). The Lake was created when a levee along Alamos Creek was breached to allow the creek to flood and fill in former gravel quarry pits and a meadow next to the channel, circa 1950-1960 (Water Board, 2008a). The existing lake footprint of 32 acres covers the former quarry pits and about 1,700 linear feet of the Alamos Creek channel and its riparian corridor (the tops of remnants of the creek levee system are 1 to 2 meters deep). Alamos Creek flows into the Lake at its southern end, and the Lake discharges back into Alamos Creek at Coleman Road at its northern end. About 350 feet downstream of Coleman Road, Alamos Creek joins Guadalupe Creek, which subsequently discharges into the Guadalupe River. The Lake is used for pedal boating and fishing, and the park has many other amenities, such as trails, a playground, ball courts, and an amphitheater.

Alamos Creek supports federally-threatened Central California Coast steelhead (*Oncorhynchus mykiss*) and other native fish species and wildlife (Water Board, 2008a¹; Water Board, 2008b). The Basin Plan (Table 2.1) lists the following existing beneficial uses for Alamos Creek: Cold Freshwater Habitat (COLD); Preservation of Rare and Endangered Species (RARE); Fish Spawning (SPWN); Fish Migration (MIGR); Freshwater Replenishment (FRSH); Groundwater Recharge (GWR); Municipal and Domestic Supply (MUN); Warm Freshwater Habitat (WARM); Wildlife Habitat (WILD); Water Contact Recreation (REC1); and Non-Contact Water Recreation (REC2) (Water Board, 2018). Although Almaden Lake is generally referred to as a separate water body from Alamos Creek, the Lake is not listed in the Basin Plan, Table 2.1. The beneficial uses of Alamos Creek apply to the Lake because the Lake is part of the creek.

B. Almaden Lake Project Purpose

The Almaden Lake Project is a “creek/lake separation project” under the District’s *Safe, Clean Water and Natural Flood Protection Program, Priority D4-Fish Habitat and Passage Improvement*, which the District’s rate payers authorized through passage of a *Measure B* parcel tax in 2012 to fund the program (SCVWD, 2018). The District’s website states: “This project helps restore and maintain healthy steelhead trout populations by improving fish passage and habitat ... where manmade creek alterations disrupt fish migration” (SCVWD, 2018). Thus, the project purpose is to

¹ Biological resources in the Lake Project’s area are as follows, as reported in the Guadalupe River TMDL Staff Report (Water Board, 2008) based on information from the District’s Watershed Stewardship Management Plan of 2005:

State or federally listed threatened or endangered wildlife species that may be resident in the watershed include red-legged frog, yellow-legged frog, western pond turtle, southwestern pond turtle, Central California coast steelhead, native rainbow trout, Chinook salmon, California least tern, tri-colored blackbird, yellow warbler, double-crested cormorant, and bald eagle, as well as the Bay checkerspot butterfly (Santa Clara Valley Water District 2005). The red-legged frog, steelhead, and tern are all federally listed and therefore protected by the Endangered Species Act (ESA). The bald eagle has been delisted; however it is still protected by the federal Migratory Bird Treaty Act and the federal Bald and Golden Eagle Protection Act. Although the fall run Chinook salmon is not listed, it is regulated by NOAA Fisheries under the Magnuson-Stevens Fishery Conservation and Management Act.

restore steelhead habitat and fish passage for steelhead to complete their life cycle. The Lake Project will also significantly enhance the Lake's water quality and reduce methylmercury concentrations discharged from the Lake into the Guadalupe River system (SCVWD, 2017a and 2017b). This will improve habitat for steelhead, other aquatic species, and wildlife including piscivorous birds (see footnote 1) (Water Board, 2008a and 2008b). The following project elements would be constructed to achieve the project purposes (SCVWD 2017a, 2017b, 2017c; and 2017d):

- Construct a levee of 1,700 linear feet (5 acres) along Alamitos Creek to separate the creek from Almaden Lake;
- Restore 11 acres (1,700 linear feet by up to 300 feet wide) of Alamitos Creek, with a low flow channel and vegetated floodplain;
- Re-contour Almaden Lake substrate and shoreline as a homogenous bowl shape, and reduce the depth to a maximum of 26 feet to improve water quality;
- Add two new solar-powered water circulation instruments (Solar Bees) to the existing four Solar Bees in the Lake to further improve water circulation and help prevent low dissolved oxygen throughout the system, and help minimize conditions leading to mercury methylation;
- Cap the Lake substrate with an impermeable layer to reduce methylmercury production in the sediment, and prevent mercury (and methylmercury) from migrating out of the existing lake bed sediment;
- Reconfigure the water source for the Lake to disconnect Alamitos Creek as the water source, and connect an imported water source; and
- Construct a new island and enlarge the existing island for habitat diversity in the Lake.

C. Existing Conditions

The Lake lacks the physical properties necessary for salmonid life history strategies: cool, well-oxygenated water with habitat complexity for rearing and refugia from predators and from high-velocity flows; and relatively shallow, swift-moving water with clean gravel of a certain range of sizes for spawning (NMFS, 2016; Moyle, 2002a and 2002b). The Lake has low-velocity flow and poor water circulation around its irregular shoreline and lakebed, which include the old quarry pits up to 43 feet deep. This results in development of anoxic water pockets throughout the Lake. With poor circulation and deep pools, thermal stratification occurs during the dry season (Corps, 2004), which contributes to anoxia in the hypolimnium, while the epilimnium acts as a thermal barrier to migrating fish. Further, non-native species are more tolerant of warmer and less-oxygenated water and prey on native fish (such as salmonids) in the Lake (SCVWD, 2017a). As a result, this impoundment detrimentally affects the COLD, RARE, MIGR, and WILD beneficial uses in Alamitos Creek. Further, as one of several impoundments in the Guadalupe River system, the Lake is a sediment trap and contributes to the sediment-starved condition of Guadalupe River (Corps, 2013) that detrimentally affects the COLD, RARE, and SPWN beneficial uses.

In addition, the nutrient loadings from bird feces and other sources in the surrounding park, coupled with poor water circulation, promote blue-green algae blooms (including harmful algae blooms that produce toxins²), that increase oxygen demand and exacerbate anoxia in the Lake as the algae decay (SCVWD, 2017b). This results in lake closures, contributing to impacts to the REC-1, RARE, WILD, and REC-2 beneficial uses.

The Lake water quality is also degraded by elevated mercury levels, resulting in noncompliance with the Basin Plan's water quality objectives for bioaccumulation³ and mercury concentrations in fish from the Guadalupe River Watershed.⁴ The primary source of mercury is from the New Almaden Mining District, the historic mercury mining district in the upper Guadalupe River watershed. During the wet season, Alamitos Creek transports mercury-laden sediment to Almaden Lake. During the dry season, the Lake warms and anoxic zones develop due to poor water circulation and thermal stratification. Anoxic conditions promote the transformation of elemental mercury into methylmercury by anaerobic, sulfate-reducing bacteria (Water Board, 2008a). Methylmercury is a potent neurotoxin that bioaccumulates in the food chain, and public health advisories to limit the consumption of fish from several water bodies in the Guadalupe River watershed, including Almaden Lake and Alamitos Creek, have been in effect since 1987 (Basin Plan section 7.7.1.1). Methylmercury is also toxic to wildlife that primarily or exclusively eat fish (such as piscivorous birds, the most sensitive wildlife species in the watershed (Water Board, 2008b)).

Pursuant to the Clean Water Act (CWA), section 303(d), the Water Board developed an action plan to minimize mercury bioaccumulation in the water bodies in the Guadalupe River watershed, including Almaden Lake and Alamitos Creek, as the *Guadalupe River Watershed Total Maximum Daily Load (TMDL)* plan. The TMDL plan was adopted in 2008, and implementation actions for the first 20-year management phase are in progress. Monitoring data collected for the TMDL plan indicate that methylmercury concentrations in the outlet flows are greater than in the inlet flows,

² Reports of harmful algae blooms (HABs) at Almaden Lake are available online at http://www.mywaterquality.ca.gov/habs/where/freshwater_events.html (accessed May 1, 2018).

³ Basin Plan section 3.3.2 has the following narrative water quality objective for bioaccumulation:

Many pollutants can accumulate on particles, in sediment, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.

⁴ Basin Plan Table 3-4A contains the freshwater water quality objectives for the protection of aquatic organisms and wildlife, which are also protective of humans who consume fish from the Guadalupe River watersheds. The objectives are 0.05 milligrams methylmercury per kilogram of fish for fish lengths of 5 to 15 cm, and 0.1 milligrams methylmercury per kilogram of fish for fish lengths of 15 to 35 cm.

despite having similar concentrations of elemental mercury (Austin, 2018).⁵ Thus, the REC-1, RARE, and WILD beneficial uses in the Lake are impaired by the presence of mercury and the water quality conditions that promote mercury methylation and bioaccumulation of methylmercury in fish in the Lake (Basin Plan, section 7.7.1.1). As a source of methylmercury, discharges from the Lake are detrimental to waters downstream in the Guadalupe River and contribute to impairment of the Guadalupe River.

The Lake (from Winfield to Coleman Road) is part of another impoundment extending from Coleman Road downstream for about 1,700 linear feet to the Alamos Flashboard Dam in the Guadalupe River, making the combined impoundment length about 3,400 feet (0.64 mile)). The dam is a permanent barrier because it blocks free passage of native fish species and sediment transport in the system and forms a thermal barrier to migrating fish. This results in adverse effects to the MIGR, COLD, and SPWN beneficial uses in Alamos and Guadalupe creeks. Despite the dam fish ladder, and temporary seasonal removal of the flashboards during the peak adult steelhead migration season, successful passage for out-migrating juvenile steelhead, which occurs December through June (SCVWD, 2017a), as well as for the adult Chinook salmon peak migration season during the fall, is blocked or encumbered by impoundment at the flashboard dam because the flashboards are only out of operation from January through March each year (Corps, 2004; SCVWD, 2017a).

The purpose of the impoundment at the flashboard dam is to supply water to the Alamos percolation pond located west of the Guadalupe River (see attached map). The pond, in turn, is the source of water for the series of ponds further downstream that make up the Guadalupe River percolation pond system (Blank, 2018a and 2018b). While the impoundment supports the FRSH, GWR, and MUN beneficial uses, these benefits are at the expense of the other riverine functions and habitat values at this site. Thus, although the Lake Project provides incremental benefits on a larger scale for fish passage, it will not resolve all the constraints on beneficial uses in this reach of the creek because of the flashboard dam.

D. Potential Impacts and Benefits of Almaden Lake Project

The Lake Project will permanently impact 16 acres of open water habitat in Almaden Lake by placing fill in 5 acres of the Lake to construct a levee, and converting 11 acres of open water in the Lake back to creek and riparian habitat. The Lake Project will also

⁵ The draft 2017 biennial report (unpublished at the time of writing this memorandum) for a comprehensive monitoring program to inform the Guadalupe River Total Maximum Daily Load (TMDL) implementation plan indicates that the Lake is a source of methylmercury to the Guadalupe River system. The previous biennial reports (2011, 2013, and 2015) indicated that the Lake was a sink for methylmercury, but this was based on a sample design error in which the inlet data were collected from within the Lake so did not represent inlet conditions. The monitoring flaw was rectified after the 2015 report. The monitoring reports are available online (under "Coordinated Monitoring" subheading):
https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/guadalupeivermercurytml.shtml

temporarily impact the other 16 acres of open water in the Lake by recontouring and capping the Lake bed and shoreline. However, the project will also provide substantial benefits to Alamitos Creek, the Lake, and the Guadalupe River watershed, as explained below in more detail:

1. *Benefits from Restoring a Reach of Alamitos Creek*. The Lake Project will restore 11 acres and 1,700 linear feet of Alamitos Creek between Winfield Road and Coleman Road by separating Almaden Lake from Alamitos Creek and reestablishing a low-flow channel with adjacent riparian habitat. This will improve fluvial processes, such as transport of sediment and organic material, including large and small woody debris, and fish passage for salmonids in the reach (FISRWG, 1998; SCVWD, 2017a). Natural sediment dynamics will facilitate the development of habitat features that support native fish, including well-oxygenated water, diverse structure with pools and riffles for rearing, and potential spawning beds depending on gravel sizes. Because the Lake will no longer intercept flow, attraction flows for up-migrating salmonid and pulse flows to facilitate juvenile out-migration will be improved from January through March each year, when the flashboards at the Alamitos Flashboard Dam are not impounding the creek. Moreover, migration through the restored reach will also have significantly less predation pressure from non-native fish (SCVWD, 2017a). These habitat improvements will improve the COLD, RARE, MIGR, SPWN, and WILD beneficial uses, which translates to significant lifts in function and value of Alamitos Creek.

The habitat improvements will extend far beyond the Lake Project site by restoring connectivity for salmonids for roughly 28.7 miles during January through March each year. This distance is the sum of the distance from San Francisco Bay to the Lake Project site (about 21 miles) and that from the Lake Project site to Almaden Dam (about 7.7 miles), which is the next permanent barrier upstream of the Lake Project site. As a result, salmonids (and other biota) migrating upstream through the flashboard dam and the restored creek channel, will have access to about 7.7 miles of less-densely developed habitats in the upper Alamitos Creek watershed, up to Almaden Dam, and 3 miles in Calero Creek, a tributary to Alamitos Creek, up to Calero Dam.

The restored creek channel reach is also expected to reduce a portion of the temperature barrier created by the current Lake and Alamitos flashboard dam system. Specifically, it may result in seasonally lower temperatures between Winfield Road and Coleman Road. Warming will still occur during the seven to eight months of the year when the Alamitos Flashboard Dam is in place (April through December), but, based on temperature modeling conducted in 2004, it will be less than what is currently experienced (Corps, 2004). The model also indicated that the anticipated reductions in temperature are likely to be local. It did not show a significant change in temperature three miles downstream of the flashboard dam. It did predict slightly lower temperatures (i.e., about one-half of a degree F°) between Coleman Road and the flashboard dam (i.e., Reach 18), suggesting a positive,

albeit uncertain, temperature effect from the Lake Project beyond its limits (SCVWD, 2017a).

2. *Benefits from Improving Water Quality in Almaden Lake.* Water circulation in the Lake will be significantly improved by constructing a bowl-shaped basin with a homogenous bed. Adding two new water circulation units to the four existing units will also improve water circulation. With the improvement to water circulation, thermal stratification and anoxic zones will be far less likely to develop, which in turn, will reduce the frequency and duration of algae blooms and associated lake closures. This would improve the Lake's functions and values and the REC-1, REC-2, WARM, and WILD beneficial uses.

The Lake Project will also directly benefit water quality in the Lake by capping the Lake substrate with a two-foot⁶ thick impermeable layer and replumbing the water supply to come from imported sources rather than Alamos Creek. The Guadalupe River TMDL Staff Report (Water Board, 2008a) acknowledges that other water sources for the Lake may also contain mercury but at significantly lower concentrations relative to the levels in Alamos Creek. This, along with the reduction in anoxic zones, will result in less methylmercury production within the Lake and a corresponding improvement to water quality discharges to the Guadalupe River system downstream of the Lake. Further, reducing methylmercury concentrations within and downstream of Almaden Lake is consistent with the Guadalupe River TMDL, objective 2.2, which states:

Restore and protect beneficial uses in waters of the Guadalupe River watershed by attaining TMDL numeric targets and water quality standards while maintaining—enhancing where possible—habitat for wildlife.

The reductions in methylmercury production and concentrations will improve the REC-1, WARM, and WILD beneficial uses both in the Lake and downstream of the Lake in Guadalupe Creek and the Guadalupe River. The benefits of the Lake Project would also reduce the District's future expenses for methylmercury controls in the Lake and disposal of mercury-laden sediment removed for flood control and other stream maintenance program purposes (see TMDL, section 9.5 (Water Board, 2008a)). Thus, the water quality benefits from enhancing the Lake will extend well beyond the Lake's footprint with water quality as well as the District's ongoing maintenance activities and funding for maintenance.

The Lake Project will also increase riparian trees and wetland and riparian vegetation along the new lake and stream margins. This will improve habitat functions and value by providing shade and enhancing nutrient cycling and pollutant filtration functions. This is expected to reduce algal blooms and improve water quality, enhancing recreational opportunities for anglers and boaters, and creating

⁶ The thickness is subject to change pending further analyses by the District (Blank, R., 2018c).

an overall more inviting waterscape for visitors, thereby improving both REC-1 and REC-2 beneficial uses. Although project plans do not include repopulating the Lake with fish, the District would not oppose a fish stocking program by third parties and anticipates fish will be introduced back into the Lake by individual community members, fish carried in with the imported water supply, and fish that inadvertently swim through the outlet where flow from the Lake will discharge into the creek (Blank, 2018b). While it is possible that fish harmful to salmonids, such as bass, could be reintroduced into this public lake, the Lake's outlet to the creek would have a fish screen, reducing the potential adverse effects of such introduction. The REC-2 beneficial uses will be further enhanced by the levee with trails that will create a continuous loop around the Lake (complete access around the Lake is not possible with the current configuration).

E. Mitigation Analysis to Compensate for Impacts of Both Almaden Lake and Upper Berryessa Creek Projects

The Basin Plan's (section 4.23) framework for evaluating whether a project meets the No Net Loss Policy is a preference for the project to be onsite, in-kind, and completed prior to or at the same time as the permitted project's impacts. To evaluate whether the Lake Project would satisfy the mitigation requirement for the Upper Berryessa Project, we first quantified the impacts and benefits of the Lake Project, as detailed above in Section D. We then combined that analysis with the impacts and other information for the Upper Berryessa Project to determine whether no net loss in jurisdictional waters will result from construction of both the Upper Berryessa Project and the Lake Project.

The Lake Project will permanently impact 16 acres of Lake Almaden and temporarily impact another 16 acres of the Lake. The permanent impacts are from filling 5 acres of open water to construct a levee and converting 11 acres of open water in the Lake to creek and riparian habitat. The temporary impacts are from recontouring and capping the Lake bed and shoreline. To minimize these impacts, the levee will be planted with native woody riparian vegetation. In addition, a path will be placed on top of the levee to provide public access.

The Upper Berryessa Project, which was completed in January 2018, degraded about 10 acres and 10,000 linear feet of creek and riparian area. As a result, Finding 21 of the Order requires compensatory mitigation that enhances about 15,000 linear feet or 15 acres of waters of the State or a combination of length and area commensurate with the Project's impacts.

Together, the Lake Project and the Upper Berryessa Project result in a net gain of two acres of waters of the State. Further, as described in Section D above, the Lake Project will restore 11 acres and 1,700 linear feet of creek and riparian area. This will, in turn, have far-reaching benefits to riverine functions in the Guadalupe River watershed (about 28 miles). In addition, the Lake Project will enhance 16 acres of the Lake.

The temporal losses in functions resulting from the Lake Project will be negligible because the water quality improvements will begin as soon as construction is complete and will increase during the estimated five-year period for the establishment of shoreline vegetation. The four years of lost functions occurring between construction of the Lake Project (2021) and the impacts from the Upper Berryessa Project (2017) are greater than the one-year loss in functions estimated in the Order.

The creek restoration component of the Lake Project has a moderate to high level of certainty of success because the District has constructed similar creek restoration projects successfully in the past. The Lake enhancement component of the Lake Project has a high certainty of success because similar projects have been successful in the past (e.g., see Wang et al., 2004), and the District has studied the Lake enhancement component intensively to develop a design that would help bring the Lake into compliance with the Basin Plan's mercury objectives (see footnotes 3 and 4). We anticipate that the Lake Project will expedite delisting of the Lake as impaired for mercury under the CWA section 303(d) which would partially meet the goals of the Guadalupe River Watershed TMDL plan.

The Lake Project also supports the Coastal Multispecies Recovery Plan (NMFS, 2016) and is consistent with Finding 21 of the Order, which states a fish passage improvement project would be an acceptable means to compensate for the impacts of the Upper Berryessa Project. In addition, the Lake Project supports the Habitat Goals Reports (Goals Project, 2016), as well as the Comprehensive Conservation Management Plan (CCMP) (e.g., see Action 7 of the CCMP⁷). Finally, the Lake Project would help fulfill the District's Safe, Clean Water and Natural Flood Protection Program goal to restore steelhead.

Together, the Lake Project and Upper Berryessa Project will result in a net gain in area of waters of the State. In addition, the high-value, far-reaching functional benefits of the Lake Project will compensate for both the temporal and permanent losses in riverine functions caused by the Upper Berryessa Project.

F. Monitoring Plan Requirements

Provision B.19 of the Order requires completion and implementation of a mitigation and monitoring plan (MMP) for projects proposed to address the Upper Berryessa Project's impacts. The MMP will need to address the uncertainties and anticipated benefits specific to the Lake Project. We also recognize that the Water Board will need to issue water quality certification for the Lake Project prior to its implementation and anticipate

⁷ Action 7 of the CCMP, Action 7 is "Conserve and enhance riparian and in-stream habitats throughout the Estuary's watersheds," including the following goal:

Finally, there is also significant value in opportunistic restoration that considers multi-objective and multi-benefit uses and approaches. While this action emphasizes critical in-stream habitat, it also supports efforts to daylight stream reaches, restore urban waterways, and improve riparian habitat conditions for birds and terrestrial wildlife.

that this MMP could be used to address the monitoring plan requirements of that certification.

To be consistent with Provision B.19.e of the Order, the MMP will need to include the following other monitoring elements for the Lake Project:

1. Salmonids. Salmonid monitoring to track the abundance and spatial distributions of steelhead and Chinook salmon in the Alamitos Creek and Guadalupe River systems will be necessary to track the anticipated fisheries benefits of separating the Lake from the creek and the stated goal of restoring steelhead fish passage and habitat. The monitoring plan will need to be consistent with the California Coastal Monitoring Program (CDFW, 2011; CDFW, 2018). Although the District's stated goal addresses steelhead habitat restoration, the District will also be required to monitor for Chinook salmon, to be consistent with the monitoring requirements for other projects in the Guadalupe River watershed including the Downtown, Lower, and Upper Guadalupe River flood control projects (Water Board, 2001, 2002, and 2003, respectively). Further, to maximize the utility of monitoring results, we encourage the District to begin monitoring now to characterize the "before-project" conditions with which to compare post-project conditions.
2. Creek channel geomorphology. Monitoring of Alamitos Creek within and downstream of the restored channel reach is necessary to verify the following geomorphic processes and features:
 - a. Habitat improvements for salmonid rearing habitat;
 - b. Sediment quality to verify whether high-quality gravel is being transferred through the system and spawning sites are formed as a result of the Lake Project; and
 - c. Longitudinal and cross-sectional data to verify the project reach is performing as designed and that the in-channel quarry pit downstream of the project reach is filled in as predicted by the District's sediment transport model (Blank, 2018a).
3. Temperature. Temperature monitoring in Alamitos Creek within, upstream, and downstream of the Lake Project's reach will be necessary to track whether the Lake Project improves temperature in that reach and to calibrate the temperature model (Corps, 2004). In addition, temperature monitoring would inform potential future efforts to further improve the COLD beneficial use in Alamitos Creek, including, but not limited to, the Upper Guadalupe River flood control project (Water Board, 2003) and the gravel augmentation plan for that project, and the Guadalupe Dam seismic upgrade project (State Clearinghouse No. 2018032007).
4. Water Operations Plan. The Alamitos Flashboard Dam will continue to be a fish passage barrier in the Guadalupe River because the impoundment there results in water warmer than without the flashboard dam (Corps 2004). Therefore, the flashboard dam limits the benefits of the Alamitos Creek restoration project element. In addition, the District may alternate filling the impoundment by the Lake

or Alamitos Creek flow, depending on creek flow conditions and other variables for water operations and the District's water rights. This may result in continuation of existing impacts to the River from the Lake, including introduction of non-native fish into the Guadalupe River system (even though any transfers would have fish screens at inlets and outlets), and transferring warm water from the Lake into the impoundment. Therefore, the MMP should include details for how flow in Alamitos Creek is managed and the effects of using the Lake as a redundant water supply for the impoundment. In so doing, it will need to include avoidance and minimization measures that will be implemented to prevent potential adverse effects on Alamitos Creek and the impoundment downstream at the flashboard dam. This is necessary to ensure that the fish passage benefits of the project are fully realized.

We assume that mercury and methylmercury monitoring of Lake sediment, fish tissue, and inlet and outlet concentrations will continue under the existing monitoring program for the Guadalupe River Watershed Mercury TMDL to verify anticipated reductions in mercury and methylmercury in the system. If that's not the case, then they will need to be included in the MMP.

G. Outstanding Issues for a Complete Mitigation and Monitoring Plan

This memo is intended to present an evaluation of whether the Upper Berryessa and Almaden Lake projects together would result in no net loss in function and value to waters of the State. For a complete MMP that complies with the Order, however, the following elements are required:

- A proposal, workplan, monitoring plan, performance standards, and all other information, as appropriate, to ensure the mitigation of permanent and temporal losses in functions and values of waters of the State and to ensure the Lake Project results in no net loss and a long-term net gain in wetland and waters area, function, and value, consistent with Finding 21 of the Order;
- Vegetation performance standards and success criteria, or comparable standards as those in Attachment B of the Order, for vegetation and hydroseeded areas in both the Upper Berryessa Creek site and the Lake Project site;
- Monitoring of vegetation for a minimum of five years for grasses, forbs, and shrubs and ten years for trees;
- Measures to ensure invasive plant species as defined by the California Invasive Plant Council as "highly" invasive do not exceed cover of more than 10 percent;
- Measures for revegetation if the mitigation vegetation planted in the Upper Berryessa Project site and the Lake Project site does not meet the MMP's performance and success criteria;
- Methods for performing an assessment of whether the low-flow channel has recovered within the first five years after construction, using data collected for the Adaptive Management Plan required in Provision 18 of the Order; and

- If the low flow channel does not recover within five years, additional mitigation to compensate for the temporal loss in function and value due to the impacts of creek widening, consistent with Finding 21 of the Order, is required.

In addition, the Water Board will need to post the MMP to provide members of the public the opportunity to review and comment on it for at least 21 days, pursuant to California Water Code, section 3858.

H. Conclusion

In summary, the proposed Almaden Lake Project provides a combination of water quality improvements within the Lake and restoration of riverine habitat that will provide adequate benefits to mitigate for impacts resulting from both the Lake Project, itself, and the Upper Berryessa Project. The Lake Project will improve water quality in Almaden Lake, restore Alamos Creek as a functioning riverine system, and improve fish passage in Alamos Creek. The improvements to water quality and beneficial uses in jurisdictional waters will extend far beyond the Lake Project's footprint. Accordingly, staff recommends that the Water Board tentatively accept the District's proposed plan as complying with the Order pending public review with the caveat that comments from the public or changes in the Lake Project's description and schedule may change the conclusions in this memorandum. In addition, to fully comply with Provision B.19 of the Order, the District needs to incorporate the monitoring elements outlined above in section F (at a minimum) into a MMP to address uncertainties and verify anticipated benefits. Further, the final designs, monitoring elements, and performance criteria for the Lake Project will need to be acceptable to the Water Board's Executive Officer. Finally, a complete MMP must address the other elements of Provision B.19 of the Order, which are addressed above in section G.

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Almaden Lake Project Map

