



COUNCIL AGENDA: 2/7/2023

ITEM: 7.1

FILE NO: 23-164

# Memorandum

**TO:** HONORABLE MAYOR AND  
CITY COUNCIL

**FROM:** Toni J. Taber, CMC  
City Clerk

**SUBJECT: SEE BELOW**

**DATE:** February 7, 2023

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**SUBJECT: Lake Cunningham Shoreline and Water Quality Report**

## Recommendation

As recommended by the Neighborhood Services and Education Committee on December 8, 2022, accept the report on the Lake Cunningham Shoreline and Water Quality Study.

CEQA: Not a Project, File No. PP17-009, Staff Reports, Assessments, Annual Reports, and Informational Memos that involve no approvals of any City action. (Parks, Recreation and Neighborhood Services/Public Works)

[Neighborhood Services and Education Committee referral 12/8/2022 - Item (d)6]



# Memorandum

**TO:** NEIGHBORHOOD SERVICES  
AND EDUCATION COMMITTEE

**FROM:** Jon Cicirelli

**SUBJECT:** LAKE CUNNINGHAM SHORELINE  
AND WATER QUALITY REPORT

**DATE:** November 21, 2022

Approved

Date

12/1/22

**COUNCIL DISTRICT: 8**

## **RECOMMENDATION**

1. Accept report on the Lake Cunningham Shoreline and Water Quality Study; and
2. Accept report on staff work plan and next steps for making recommendations to Council on project scope, phasing and financial resources.

## **OUTCOME**

This report informs the community and Neighborhood Services and Education Committee regarding an on-going study of water quality and recreational access at Lake Cunningham Park and presents staff's current efforts to fully understand lake quality issues, define optimum project phasing, and identify potential resources to advance the project.

Development of a project per the Study would improve lake quality through natural, mechanical, and chemical additive processes. It would improve some recreational opportunities (improved shoreline pathway) and reduce existing recreational resources (reconfiguration of the park's turf areas). The project may not achieve or be able to sustain a sufficiently high level of water quality to permit recreational swimming and/or boating.

## **BACKGROUND**

The Lake Cunningham Master Plan was approved by the City Council in 1978, with subsequent versions amended in 1983, 1990, and 2006. The master plan guided development of a flood detention basin and recreational facility, including shoreline paths, playgrounds, picnic areas, a water theme park, and an action sports park. While Lake Cunningham Regional Park contains the largest artificial lake in San José, swimming was not part of the original design intent. The original master plan called for the creation of a dedicated swimming lagoon, separated from the main lake. Later renditions of the master plan acknowledged the challenges around constructing

a swimming lagoon, and in the 2006 master plan update, City Council approved developing the identified space into what is now the action sports park.

Lake Cunningham regional park is 203 acres, with a 50-acre lake within the park. The site is bound by East Capital Expressway, Tully Road, South White Road, and Cunningham Avenue. The lake is a shallow, artificial body of water, constructed between 1979 and 1983. It serves primarily as a flood detention basin at the confluence of three creeks and to reduce the peak of a 100-year flood event. Operation of the lake for flood purposes is conducted in conjunction with Valley Water. Valley Water has participated in the Study and would be engaged for technical reviews and permitting for any future work at the site.

The park is classified by Parks, Recreation and Neighborhood Services Department (The Department) as a “regional park” for its scale and unique features. The park offers several miles of trails, an action sports park, water theme park (via private contract with Raging Waters), and open space fields and picnic areas for recreation. Swimming, boating, and fishing were once available at the lake prior to the deterioration of water quality in the late 1990s.

## **ANALYSIS**

In fall 2022, staff completed a Water Quality Study in collaboration with the Department of Public Works (DPW) and the consultant Environmental Science Associates (“Consultant”). The Study’s primary objectives were to:

- Document water quality and concerns;
- Document some sources for water quality issues;
- Recommend remedies to address water quality issues;
- Develop rough order of magnitude construction costs for potential projects; and
- Address erosion and restore/relocate a perimeter walking path.

The lake lacks the natural features that would sustain water quality. Lake Cunningham does not have a reliable or constant source of freshwater inflows. The lake also lacks the benefit of functional outlets that would support water circulation and potential transport of contaminants. In its present state, the lake’s water quality has declined as concentration of contaminants increase without the normal flushing processes common to a natural lake.

The Study has focused primarily on water quality improvement and shoreline alterations. Specifically, the Study is to record baseline conditions and recommend treatment measures. The level of water quality to be achieved is a level which is sufficient to reduce odor, prevent algae blooms, and increase ecological function, such as supporting habitat for aquatic wildlife. The Study does not define the systems and conditions needed to meet a water quality level necessary for swimming. This is not seen as an achievable level of water quality because the lake is a closed system (lacking constant inlet or outlet flows).

Staff is seeking further work by DPW and the Consultant on the following:

- Test water at source points from Raging Waters for fecal matter and related bacteria. If determined to be a source of concern, additional recommendations may be made to divert, capture, or manage that contaminant; and
- Revisit cost estimates, adjust for DPW project management costs, consultant fees, and establish a recommended phasing approach; with public health/safety being the highest priority for project prioritization.

The water quality issues in the lake are primarily from:

- Physicochemical Parameters: Increased lake water temperatures and thermal stratification (Physiochemical parameters measure the general physical and chemical properties of a water body related to water column mixing and density stratification, for example, temperature, dissolved oxygen (DO) and, in marine or estuarine environments, salinity);
- Geochemical Parameters: Elevated pH levels (Geochemical parameters measure geological inputs into a water body that affect water clarity and sedimentation, and may include, pH, turbidity, specific conductance, and total dissolved and total suspended solids);
- Trophic Parameters: Increased levels of nitrogen and phosphorus which contribute to increased algae growth (the base of the food chain in water is largely comprised of phytoplankton, the primary producers that support higher trophic levels such as zooplankton and fish. The biomass of phytoplankton is typically measured by the level of the photosynthetic pigment Chlorophyll-a (Chl a). The principal parameters that influence accumulation of phytoplankton biomass are light availability and nutrients including phosphorus and nitrogen. In turn, phytoplankton, through photosynthesis, modulate levels of pH and dissolved oxygen (DO) in the water); and
- Pathogens: Increased fecal bacteria (Pathogens are bacterial constituents that are used as indicators of more noxious human pathogens associated with animal waste products (e.g., viruses, disease causing bacteria), including fecal coliform, Escherichia coli (E. coli), and Enterococci).

The Study provides an evaluation of alternatives to describe each set of recommendations.

### **Alternative 1: Internal Treatments and Focused Park Improvements**

Base Improvements for all Alternatives:

- Algaecide treatments (used to reduce algae populations to restore ecological health, and reduce fish kills);
- Treatment of lakebed sediments (treatment to bind and settle phosphorus from water column in effort to reduce algal blooms);
- Turf replacement (converting turf to native vegetation will limit external nutrient loading and pathogens from entering lake by removing geese from water's edge);

- Fertilizer reduction (limit introduced fertilizers which contain high levels of nitrogen and phosphorus); and
- Bioswale implementation (filters rainwater runoff before entering lake).

This alternative assumes that the failing shoreline path would be reinforced and rebuilt along the shoreline edge as part of a separate project, and the existing rock slope protection along the failing shoreline edge is preserved in place. Alternative 1 is unlikely to address ongoing issues with shoreline path failure without significant geotechnical work and reengineering of the lake's northern and eastern shoreline.

This alternative relies on both internal lake improvements and external nutrient loading reduction. Bioswales (designed depressions which intercept rainwater runoff to slow, filter, and infiltrate water through vegetation, subsurface mediums and organic materials) and plantings would be applied strategically to limit the runoff of nutrients, sediment, and pathogens into the lake, initially focusing on high traffic areas near the shoreline's edge where geese are most commonly present and expanding these areas in the future. This alternative could be deployed relatively quickly (one to three years), and the effectiveness of the combined treatments would be continuously monitored.

#### Alternative 1: Construction Rough Order of Magnitude

- \$1.2 million to \$1.8 million, *excluding* cost of repair and reconstruction of path in its existing configuration; and
- Excludes City project management costs, consultant fees, and hard cost contingency.

#### **Alternative 2: Internal Treatments, Focused Park Improvements, Path Stabilization, and Shoreline Wetlands**

Alternative 2 builds upon Alternative 1 with shoreline improvements that would address shoreline path failure, improve lake water quality, and provide valuable wildlife habitat. Hills on the northeastern shore of the lake would be regraded to feature a gentler slope, the shoreline path would be relocated to a more stable location slightly uphill, and an emergent wetland bench (a transitional area between permanently wet and dry environments) would be created along the lake shoreline. The graded hillslope and new wetland bench would limit future erosion of phosphorus-laden sediments into the lake. Upland and riparian tree plantings would provide shade for shoreline trail users and the wetland bench would provide wildlife habitat while passively cleaning the lake water. Alternative 2 could be built all at once or phased as needed to accommodate funding availability.

#### Alternative 2: Construction Rough Order of Magnitude

- \$1.2 million to \$1.8 million, *excluding* cost of repair and reconstruction of path in its existing configuration
- \$5 million to \$9 million for 10 acres of shoreline wetland;

- \$12 million to \$20 million for 17.5 acres of shoreline wetland; and
- Excludes City project management costs, consultant fees and hard cost contingency.

### **Alternative 3: Internal Treatments, Focused Park Improvements, Path Stabilization, Shoreline Wetlands, and Big Meadow Wetland Enhancement**

Alternative 3 builds upon Alternative 2 with a flow-through wetland in the Big Meadow. This would involve pumping water from the lake to the upper end of the wetland, from which water would flow slowly through a gently-graded wetland channel back towards the lake via a new surface water connection between the lake and the Big Meadow. Such a flow-through wetland would be very effective at removing nutrients from the lake water. This measure would also allow for discontinuing use of the existing sump pump and the irrigation and fertilization of the Big Meadow, further reducing external nutrient loading of the lake.

#### **Alternative 3: Construction Rough Order of Magnitude**

- \$1.2 million to \$1.8 million, *excluding* cost of repair and reconstruction of path in its existing configuration;
- \$5 million to \$9 million for 10 acres of shoreline wetland;
- \$12 million to \$20 million for 17.5 acres of shoreline wetland;
- \$3 million to \$5 million for concurrent 19-acre Big Meadow wetland; and
- Excludes City project management costs, consultant fees and hard cost contingency.

### **Water Contact Recreation**

A water contact scope was developed to attempt to develop a conceptual cost estimate to bring water contact recreation (i.e. boating, kayaking, etc.) back to Lake Cunningham. This approach is similar to Alternative 3 above, with the main variable being the limit in scope. This option provides the “lowest cost project” that could achieve a water quality that allows for recreation activities to occur at the lake. This includes a minimum scope in each of the following areas:

- Algaecide treatment;
- Lakebed sediment treatment with alum;
- Turf replacement;
- Bioswale installation;
- Pavement and shoreline wetland improvements;
- Tree plantings; and
- Flow through wetland at the Big Meadow.

#### **Water Contact Recreation: Construction Rough Order of Magnitude**

The estimated costs of these limited improvements, including project management and contingencies, is \$27 million. It should be noted that this is an extremely conceptual cost

estimate and it is not guaranteed that the expenditure of this \$27 million would provide the necessary water quality changes to achieve recreational uses. Further work will be completed to refine estimates.

## **CONCLUSION**

The Lake Cunningham Shoreline and Water Quality Study has provided in-depth exploration of existing conditions and has provided a series of implementation strategies. Staff will continue to work with the Consultant and DPW to conduct further water quality tests, refine cost estimates, and establish a recommended phasing approach.

## **EVALUATION AND FOLLOW-UP**

The Department will work with DPW to complete the Study, produce a phasing plan with associated cost estimates, and continue investigating funding sources for future presentation to the Neighborhood Services and Education Committee in spring of 2024.

## **CLIMATE SMART SAN JOSÉ**

The recommendation in this memo has no effect on Climate Smart San José energy, water, or mobility goals.

## **PUBLIC OUTREACH**

This memorandum will be posted on the City's Council Agenda website for the December 8, 2022, Neighborhood Services and Education Committee Meeting.

## **COORDINATION**

This memorandum has been coordinated with the Department of Public Works, the City Manager's Budget Office, and the City Attorney's Office.

## **COMMISSION RECOMMENDATION/INPUT**

No commission recommendation or input is associated with this action.

**CEQA**

Not a Project, File No. PP17-001, Staff Reports, Assessments, Annual Reports, and Informational Memos that involve no approvals of any City action.

/s/

Jon Cicirelli

Director of Parks, Recreation and  
Neighborhood Services

For questions, please contact Sara Sellers, interim Deputy Director, at (408) 793-5514.