



TECHNICAL MEMORANDUM

DATE: May 30, 2023
TO: Mr. David Volz
FROM: Jonis C. Smith, PE (JS&TM); Tim Muli, PE (JS&TM)
RE: Carr Park Lake Concept Development
JS&TM PN: 1018

JS&TM has developed a comprehensive lake design approach that creates a lake and lake ecosystem that mimics a natural lake system as much as physically possible. We include an eight (8)-stage biological treatment train in the lake design so that the lake can provide biological nutrient and pollutant control without the use of chemical inputs; similar to how natural lakes provide natural biological treatment. Our lake design includes the following treatment stages:

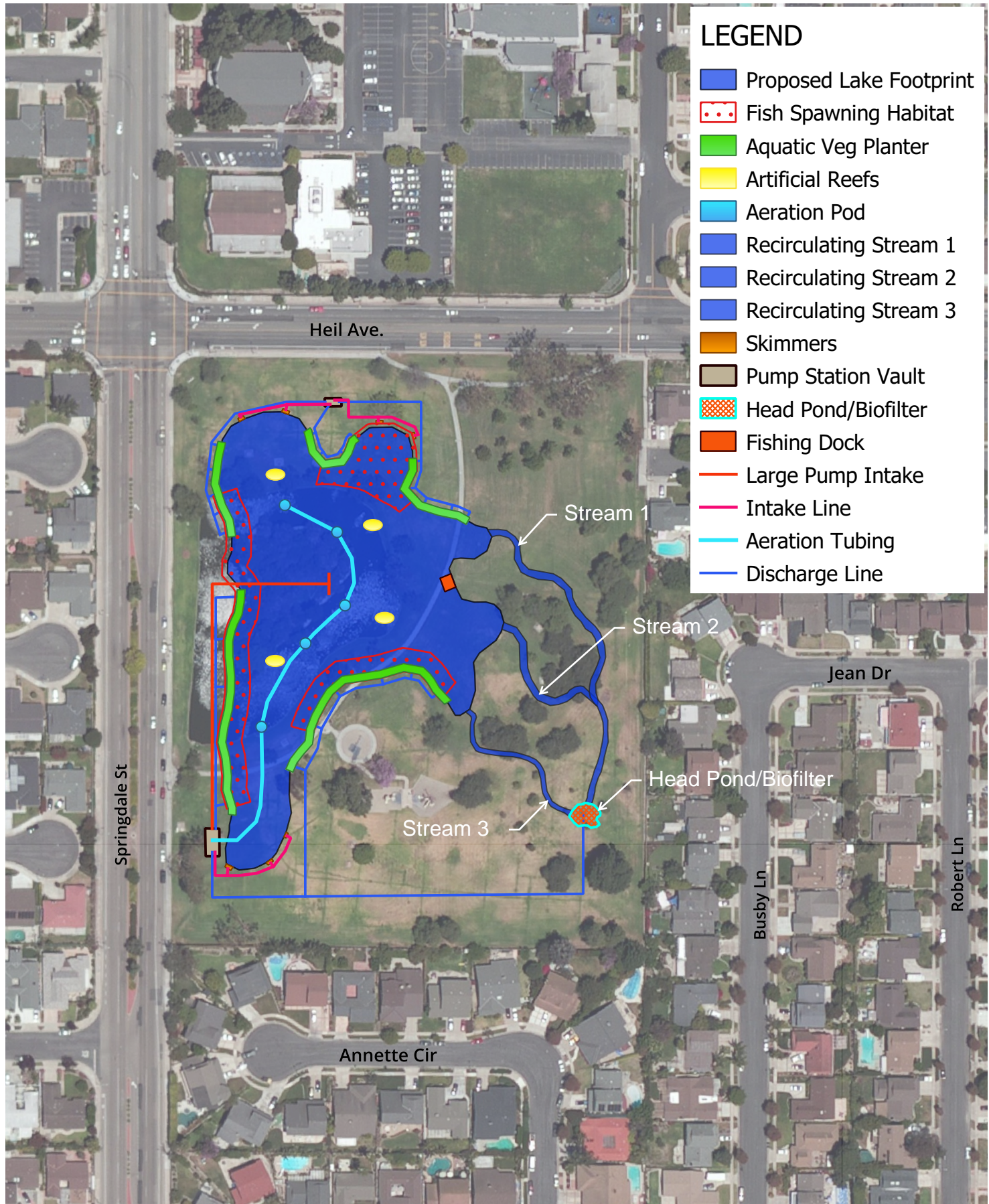
1. Aeration
2. Aerobic biofiltration
3. Anoxic biofiltration
4. Horizontal circulation
 - a. macro trash filtration
5. Vertical circulation
6. Aquatic vegetation/wetland filtration nutrient removal
7. Fishery habitat (support biofilter flora)
 - a. Sporting fish species specific artificial reefs
 - b. Sporting fish species specific spawning beds
 - c. Sporting fish species specific habitat and cover
 - d. Fishery specific sport fish stocking plan
8. Waterfowl and Vector control measures

Conventional/traditional lake design only includes aeration, vertical circulation and in some cases horizontal circulation. Conventional lake design does not result in adequate natural biological treatment and leads to lakes that must be managed using chemicals to manually adjust nutrient control. Thus, conventionally designed lakes typically have excessive algae growth and poor water quality. Our approach results in a lake that has abundant natural biological treatment that controls nutrients, algae, bad bacteria, spores, viruses, etc. Our lake design will not require the lake manager to use chemicals to manage the lake water quality. Instead, the lake management team will control circulation rates and aeration rates to adjust the system gradually, seasonally if needed. The system is self-adjusting and results in a healthy lake and lake ecosystem that is an asset to the community. Our lakes provide great viewing

opportunities, abundant fishing opportunities and are a pleasure to be near without the nuisance of too many waterfowl, insects, and vectors.

A few of the ideas were discussed at the Community Meeting on May 17, 2023. Those ideas and a few other are listed below to consider/investigate to resolve identified deficiencies and issues with Carr Park Lake are listed below. A concept drawing was created to use as a starting point for laying out lake improvement/renovation concepts for the park (see Figure-1).

1. Natural bird feed dispensers
2. Information kiosks /signage
3. Adjust lake boundary to increase distance from road
4. Promote natural predation of waterfowl by supporting owl populations
5. Removal of some island vegetation
6. Provide pedestrian access to island
7. Remove island
8. Make lake larger
9. Provide increased aeration
10. Provide biological treatment
 - a. aerobic and anoxic
11. Increase lake circulation
12. Introduce recirculating streams to the lake/park
13. Provide rooted vascular vegetation
14. Provide natural predation of vector by supporting mosquito eating fish, insects, birds, and bats
15. Improve fishing/angling
 - a. enhance fish habitat
 - b. enhance fish breeding/spawning habitat
 - c. provide artificial reefs
 - d. provide a fishing dock(s)
 - e. create customized fish stocking plan



LEGEND

- Proposed Lake Footprint
- Fish Spawning Habitat
- Aquatic Veg Planter
- Artificial Reefs
- Aeration Pod
- Recirculating Stream 1
- Recirculating Stream 2
- Recirculating Stream 3
- Skimmers
- Pump Station Vault
- Head Pond/Biofilter
- Fishing Dock
- Large Pump Intake
- Intake Line
- Aeration Tubing
- Discharge Line



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0 100 200 ft



Carr Park Lake
 Figure 1.0 - Lake Features Concept Drawing