

Vista Ridge

Stormwater Detention and Water Quality



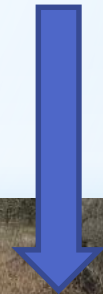
History



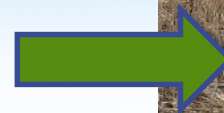
- Service Plan Feb 2000 signaled an “intent” to convey drainage to the Town for maintenance
- VR Development Agreement Nov 30, 2001, unclear
- Town began actively maintaining some drainage ways for safety reasons in 2010
- The Town reviewed various documents in 2018 and determined that maintenance responsibility for the ponds lies with VRMD, the Town is responsible for outlet structures and buried pipes.

Tampering

High Flow

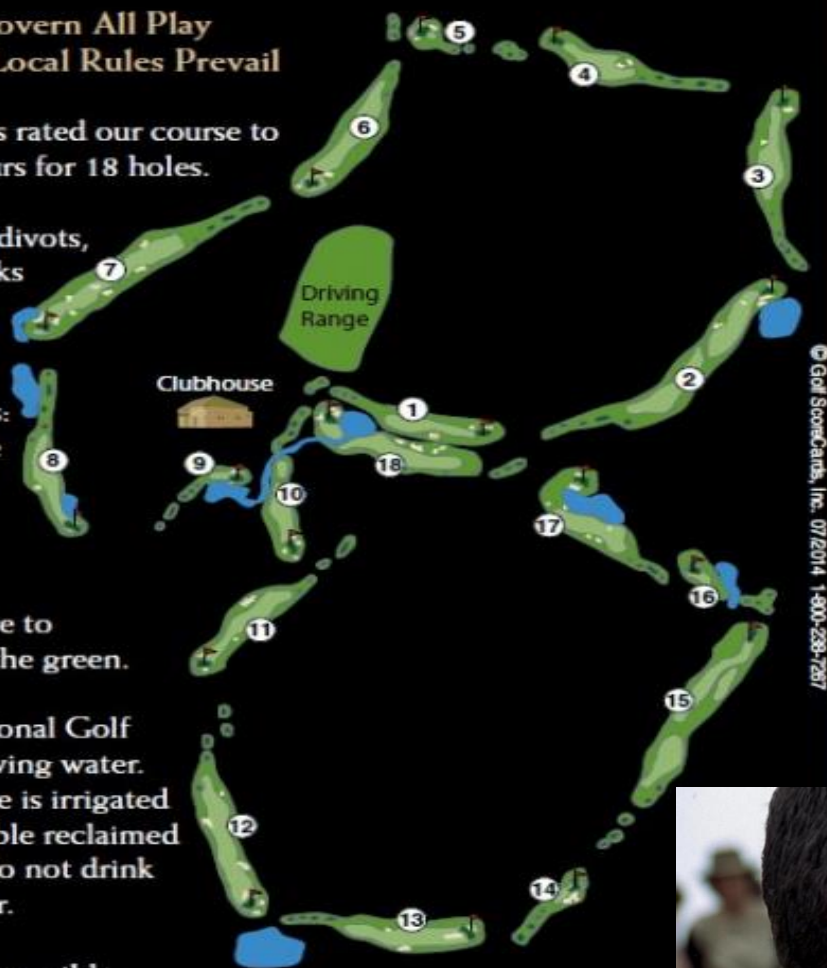


Low Flow



USGA Rules Govern All Play Except Where Local Rules Prevail

- The USGA has rated our course to play in 4½ hours for 18 holes.
- Please replace divots, repair ball marks and rake bunkers.
- Out-of-Bounds: Defined by the inside edge of residents' split rail fences.
- All yardages are to the middle of the green.
- Colorado National Golf Club is conserving water. Our golf course is irrigated with non-potable reclaimed water. Please do not drink irrigation water.
- Golfers are responsible for any damages caused to homes surrounding the golf course.

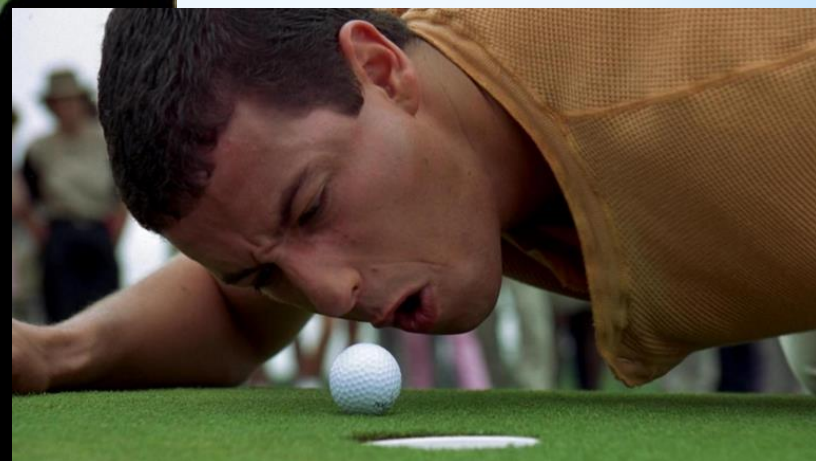


**COLORADO NATIONAL
GOLF CLUB**

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TEE TIMES: 303.926.1723 • WWW.COLORADONATIONALGOLFCLUB.COM



Golf Course Drainage & Water Features



Drainage and Water Quality Management System



↑ To Coal Creek/ Boulder Creek





Colorado National Golf Club

Water Feature

- Aesthetic
- Irrigation
- Hazard
- Filled by VRMD/CNGC from Coal Creek or Ditches
- Relatively low nutrients (phosphorus/nitrogen)
- Frequent turnover of volume

Purpose:

- Storm surge detention 5 – 100 year
- Downstream & Upstream property damage avoidance
- Release water at historical rate (72 – 120 hrs)
- Collect & release groundwater
- Wetlands Water Quality (wetlands/nutrient reduction)

Respec Alternatives Analysis

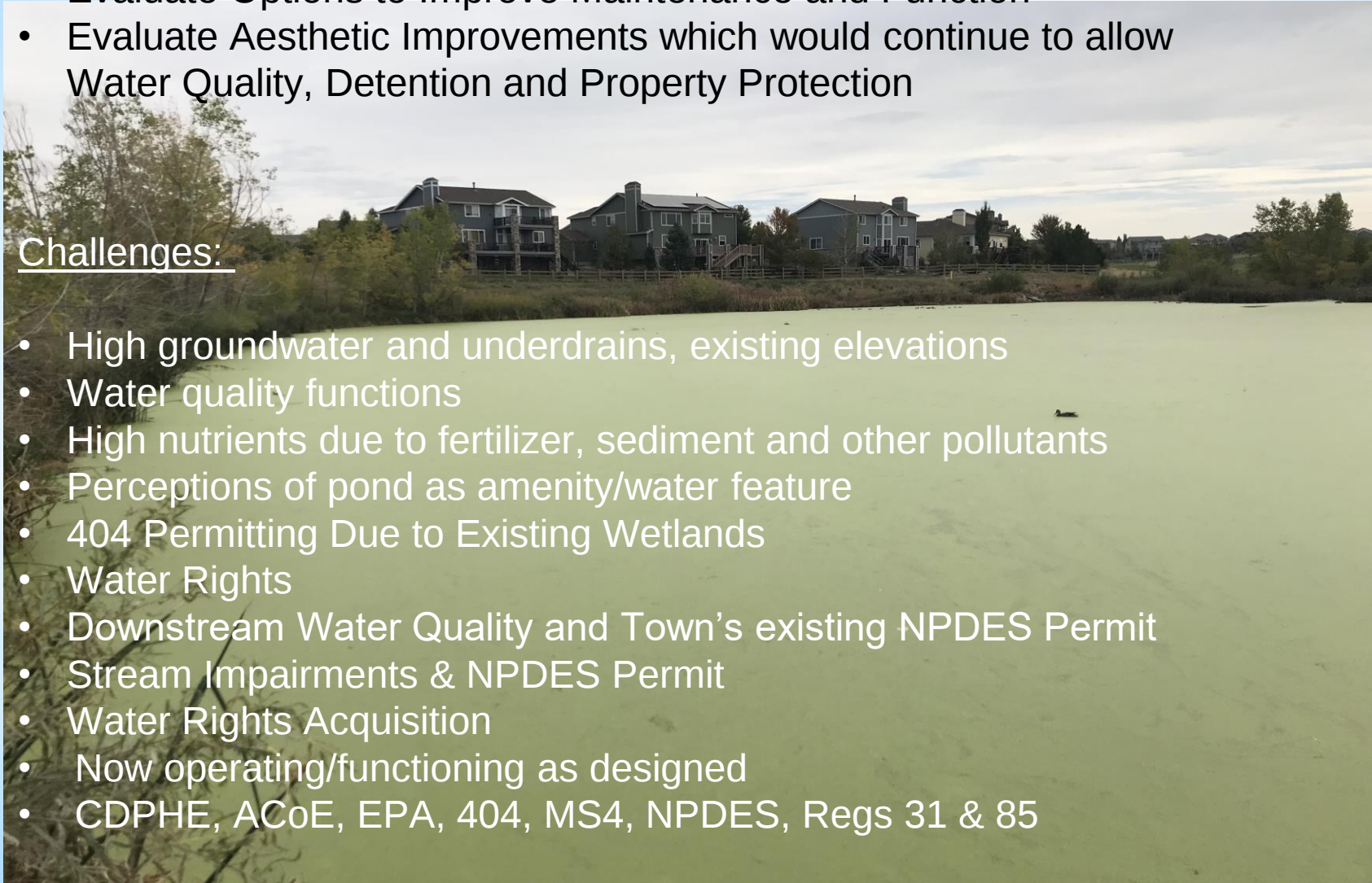


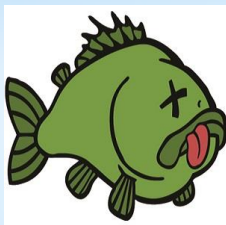
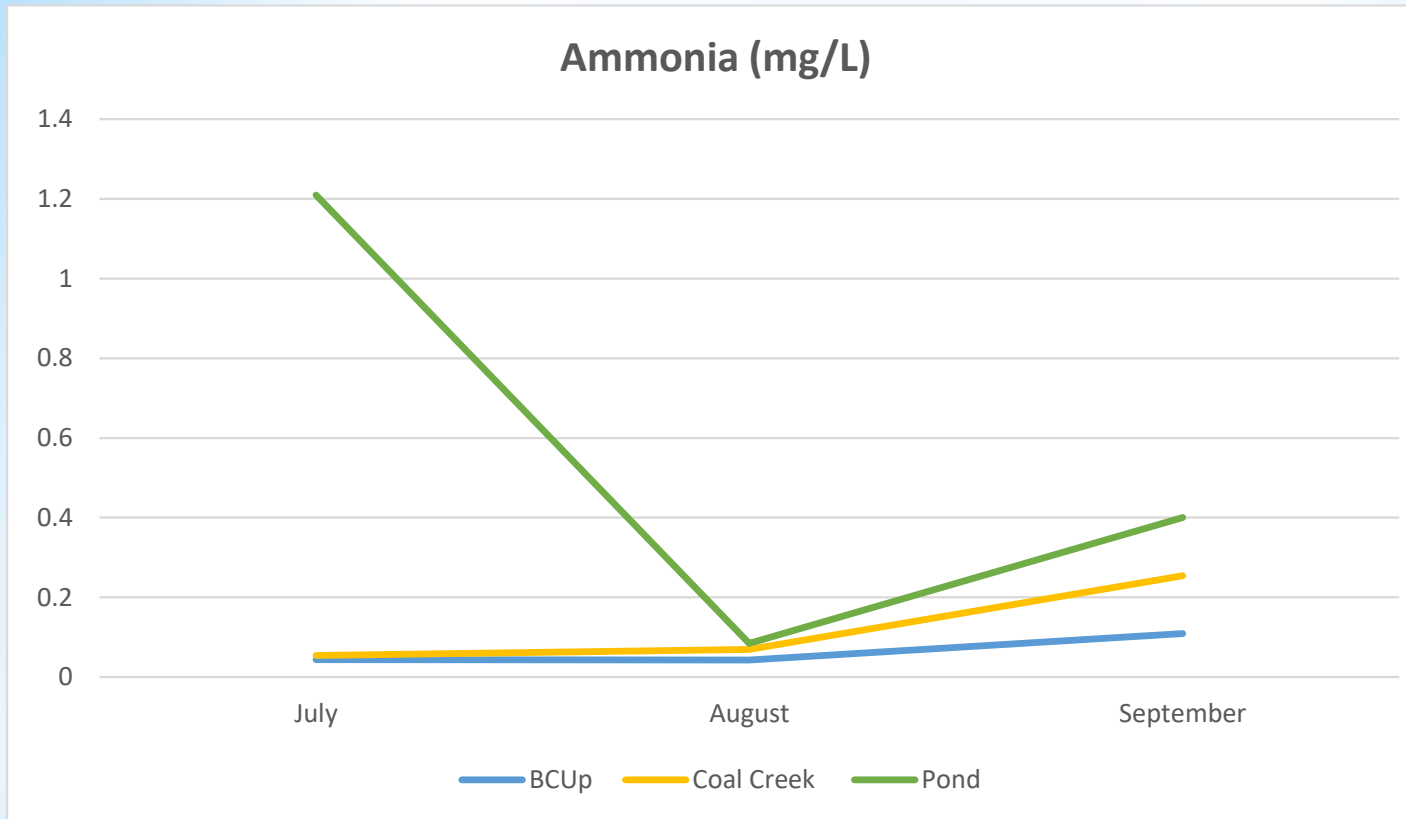
Goals:

- Evaluate Options to Improve Maintenance and Function
- Evaluate Aesthetic Improvements which would continue to allow Water Quality, Detention and Property Protection

Challenges:

- High groundwater and underdrains, existing elevations
- Water quality functions
- High nutrients due to fertilizer, sediment and other pollutants
- Perceptions of pond as amenity/water feature
- 404 Permitting Due to Existing Wetlands
- Water Rights
- Downstream Water Quality and Town's existing NPDES Permit
- Stream Impairments & NPDES Permit
- Water Rights Acquisition
- Now operating/functioning as designed
- CDPHE, ACoE, EPA, 404, MS4, NPDES, Regs 31 & 85





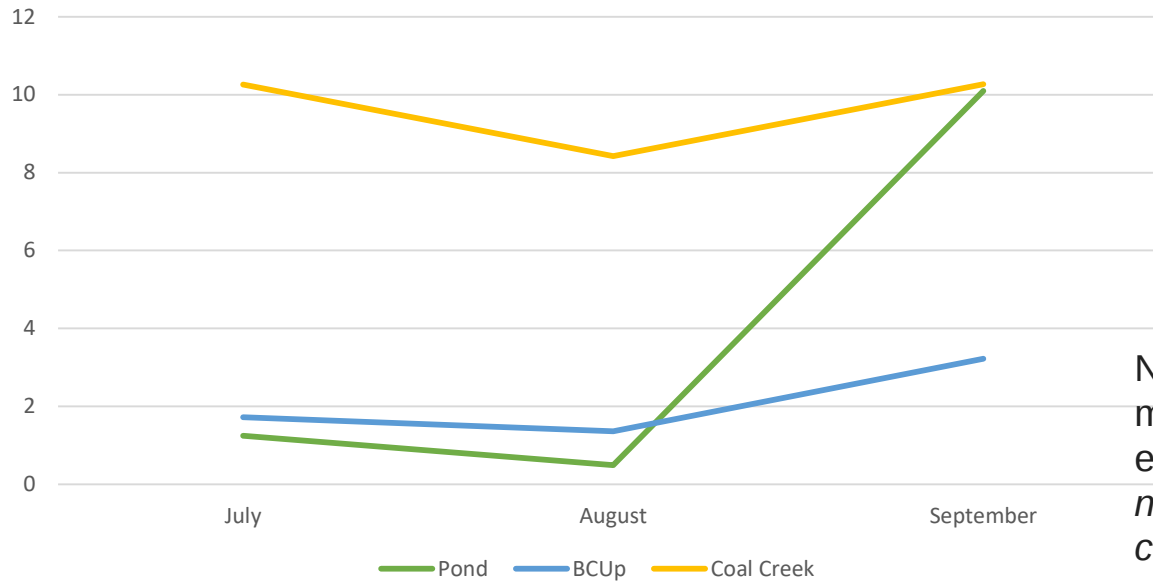
When ammonia is present in water at high enough levels, it is difficult for aquatic organisms to sufficiently excrete the toxicant, leading to toxic **buildup** in internal tissues and blood, and potentially death. Environmental factors, such as pH and **temperature**, can affect ammonia toxicity to aquatic animals. Jul 12, 2017

Aquatic Life Criteria - Ammonia | Water Quality Criteria | US EPA

<https://www.epa.gov/wqc/aquatic-life-criteria-ammonia>

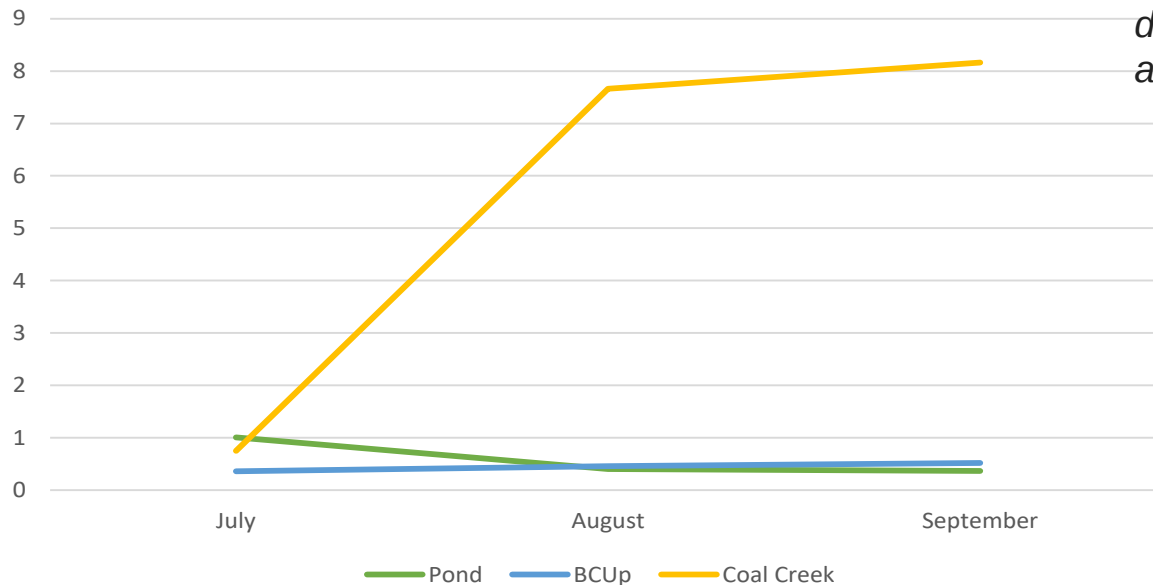


Total Inorganic Nitrogen (TIN) mg/L



Nutrient pollution is one of America's most widespread, costly and challenging environmental problems...*Too much nitrogen and phosphorus in the water causes algae to grow faster than ecosystems can handle. Significant increases in algae harm water quality, food resources and habitats, and decrease the oxygen that fish and other aquatic life need to survive.* - USEPA

Phosphate mg/L

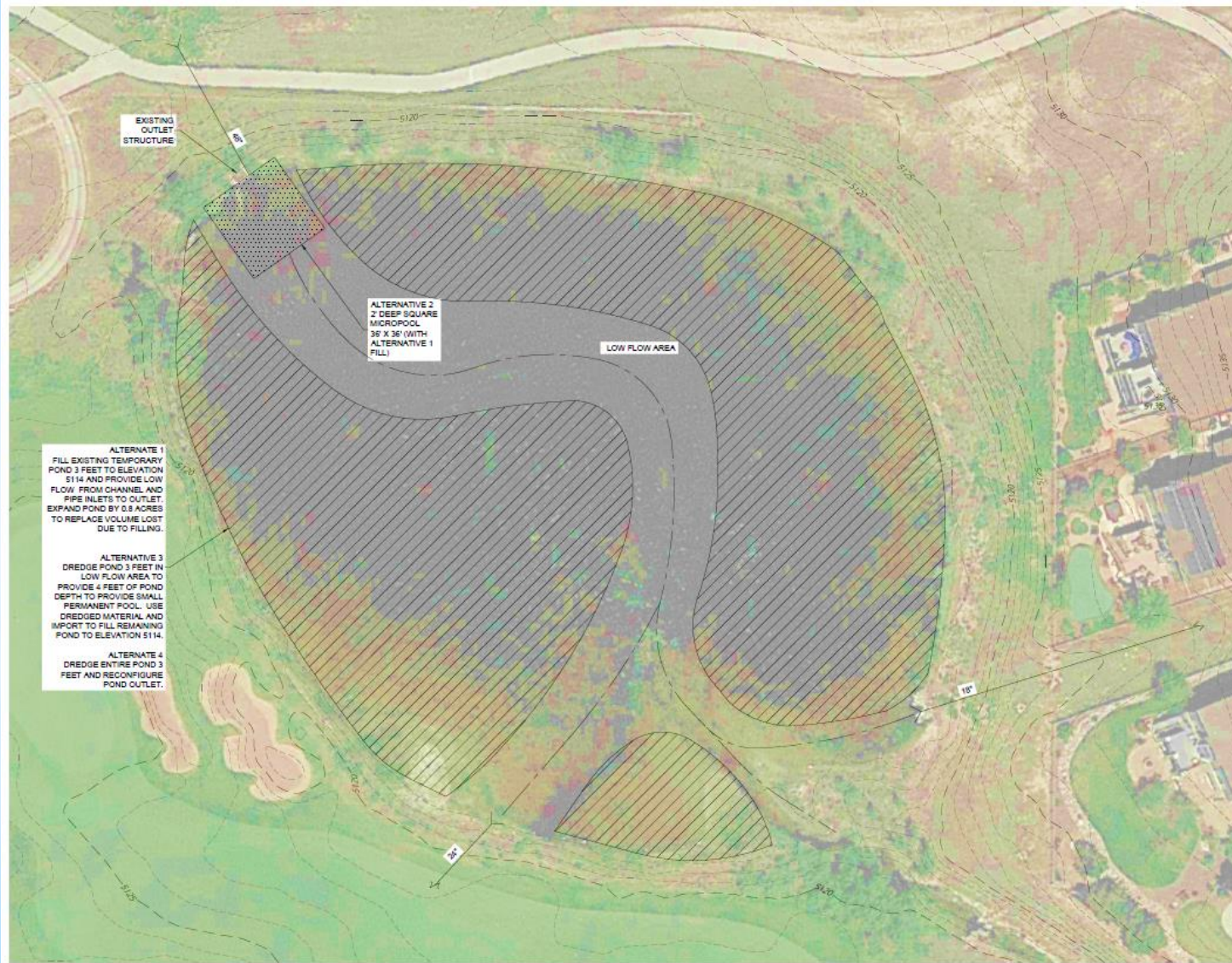


Alternative Option

Design Fall Winter 2018

Complete 2019

Cost Estimate: No Action, \$35K, \$145K, \$420K or \$600K+



Constructed Wetlands

Approximately 1 year to establish





Video from Adjacent
(Downstream)
Wetlands





Ducks Love Duckweed!