Current Water Quality Issues

- Increased levels of fine sand, manganese, and iron sulfide causing RO membrane fouling => decrease in RO operational time due to high feed pressure shutdown
- High levels of manganese (> 5 times MCL) in newly constructed Maple Wells
- Hydrogen sulfide odor complaints from surrounding neighbors due to air stripper operation
- Arsenic levels dependent on blending, DDW preference for proactive treatment
WTP Testing Process Flow

1. Start Testing (Move from low cost/simple to higher cost/complex solutions)
2. Acidification Jar Testing (Dissolve Raw Water Particles)
3. Particle Removal Successful? (Yes → Full Scale Acidification Testing and RO Piloting, No → Particle Removal Successful?)
4. Sand Separator Pilot Testing for Particle Removal
5. Particle Removal Successful? (Yes → Investigate Means for Foulant Removal, No → Particle and Foulant Removal Successful?)
6. Oxidation/Media Filtration (Particle/Iron/Manganese/Hydrogen Sulfide/Iron Sulfide/Arsenic Removal)
7. Particle and Foulant Removal Successful? (Yes → Additional RO Piloting and Multiple Well Testing, No → Advanced Treatment (Microfiltration))
8. Design Criteria Development and Report Preparation
WTP Testing Summary

• Conducted bench- and pilot-scale testing for treatment of sand, iron sulfide, hydrogen sulfide, iron, manganese, and arsenic
• Hollywood wells (2, 4, 5, and 6) and Maple wells (1 and 2)
• Draft pilot report submitted by Carollo, initial review completed by staff
  ➢ Executive Summary
  ➢ Testing Background, Methodology, and Results
  ➢ Proposed Design
  ➢ Project Delivery Methods
  ➢ Cost and Schedule
  ➢ Recommendations
Sand/Iron Sulfide

• Achieved > 80% suspended particles removal
• Significant reduction of particles in Rossum sand tester (visual indication)
• Optical micrographs and SEM analysis confirmed no iron sulfide and “very, very few particles”
Summary:
- Removed iron, manganese and arsenic to non-detect levels or below their respective MCLs and permit limits
- Couple of anomaly data points due to insufficient chemical dosing and/or power outage
Summary:

- Removed hydrogen sulfide to non-detect levels, verified by HACH test kit and laboratory analyses
RO Operation

- TDS, hardness, silica removed to non-detect in RO permeate
- No accumulation in differential pressure or salt passage, and no decline in normalized permeate flow after 15 days of continuous operation => Minimal RO fouling
Recommendation: Raw Water Blowdown

- Remove particles within the well raw water pipelines upon well start-up
- Flush out constituents with large chlorine demand
Recommendation: Sand Separator

• Capture particles such as iron sulfide and sand, which wells produce during operation
• Reduce particle loading to RO process, prevent membrane fouling and differential pressure shutdown
Recommendation: Oxidation/Media Filtration

- Remove iron sulfide, hydrogen sulfide, iron, manganese, and arsenic
- Stabilize raw water and provide RO with particle-free water
Preliminary Cost Estimate

- Class 3 Estimate (-10% to +30%): $7.1M to $10.3M, most probable cost approx. $8M

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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<tbody>
<tr>
<td><strong>Direct Costs</strong></td>
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<tr>
<td>Raw Water Blowdown</td>
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<td>Sand Separator System</td>
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<td>Media Filter System</td>
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<td>Civil Yard Piping</td>
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<td>RO Process and Electrical</td>
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<td><strong>Total Direct Costs</strong></td>
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<td>Contingency (30%)</td>
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<td>General Contractor Overhead and Profit (10%)</td>
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<td>Sales Tax (50% of Direct Costs)</td>
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<td>Bid Market Allowance (2%)</td>
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<td>Engineering (18%)</td>
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<td>Owner's Agent (6%)</td>
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<td><strong>TOTAL</strong></td>
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Project Delivery

• Carollo and City staff recommends Progressive Design-Build, due to following advantages:
  - Early selection of project team and City input on design elements and costs throughout process
  - “Open Book” estimating by contractor, allows City to be involved in development of a guaranteed maximum price (GMP) for project
  - Availability of “off-ramps”, which allows City to abandon contractor and engineer if an agreed upon GMP cannot be reached
  - Time savings of at least 4 months (no bidding phase, overlapping design and construction activities, and early equipment purchase etc.)
  - May include short-term (6-12 months) operational phase to facilitate start-up and fulfill regulatory compliance requirements
• Based on progressive design-build project delivery:
  
  ➢ **14 to 18 months** including design, construction, coordination with agencies (DDW), and start-up/commissioning
  
  ➢ Schedule subject to change depending on DDW requirements (e.g., prolonged demonstration period)
Actions to Date, Next Steps

- Presented to PWC Ad hoc April 30, 2018
- Presented to PWC May 10, 2018

- City Council Liaison
- City Council Study Session

- Initiated discussion with Planning re: Neg. Dec. La Brea, Cat. Exemption for WTP
- Continued discussion with DDW re: permitting
Staff Recommendations:

- Receive and file Final Piloting Report, Carollo, May 2018

- Support and affirm the recommended enhancements to the Water Treatment Plant identified in the report; and

- Support and affirm that the recommended enhancements be modified to include allowances/provisions/tie-ins to accommodate future expansion to the Water Treatment Plant to receive and treat additional flow from the La Brea sub-basin as it becomes available; and

- Support and affirm future maintenance of the Hollywood Basin wells; and

- Support and affirm a Progressive Design- Build-Commissioning Delivery method