PROJECT DESCRIPTION
San Diego currently imports about 90% of its total water consumption. To improve water reliability in an environment influenced by climate change the region is embarking on a program to diversify its water portfolio. This strategy includes the proposed $26 indirect potable reuse (IPR) project called Pure Water.

The Anteater Hydro-Tech Project is for the $150m Water Conveyance System for Pure Water. The conveyance system is being optimized considering Triple Bottom Line principles: Economic, Environmental, Social.

DESIGN APPROACH
- Triple Bottom Line Optimization: Economic, Environmental, Social
- Conveyance system route elevation change minimized
- Design guiding criteria: M11 Steel Pipe Design & Installation
- Pump station integration in order to eliminate tunneling needs and to fulfill flow demands.
- Minimized altering existing terrain wherever possible
- Cost analysis (Present Worth) conducted on pipeline, pump station, and energy costs in a low discount rate and variable energy escalation environment

ASSUMPTIONS AND DESIGN CRITERIA
FLOW
- Uniform Flow
- Tri Annual Flow Magnitude Changes: 10, 15, 20 MGD every 4 months
- Additional 53 MGD flow introduced 10 years after project completion 6 miles to outlet
- 30 year planning period

PIPELINE
- Uniform Diameter
- Tri Annual Diameter of 66" for common pipe
- 50" surge pressure
- Free water surface at each pump station
- Hazen-Williams C factor: 120
- 250 Working Pressure-City’s Preference
- Minimum wall thickness for low pressures adopted for pipeline handling stability

SENSITIVITY ANALYSIS OF PRESENT WORTH

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Capital Cost in $ Million</th>
<th>Annual Power Mitional</th>
<th>Present Worth in $ Million</th>
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<tbody>
<tr>
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STEEL & PUMP STATION COST

<table>
<thead>
<tr>
<th>Pipe Cost Per Foot</th>
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</thead>
<tbody>
<tr>
<td>300.00</td>
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<td>200.00</td>
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<tr>
<td>150.00</td>
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<tr>
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</table>

HYDRAULIC GRADE LINE PROFILE

- Alternatives are at hypothetical loss of 6/1000`
- Alternative 1: One Pump Station alternative eliminated because of excessive head
- Alternative 2: Three Pump Station alternative eliminated because of free water surface with associated energy loss at Fortuna Mountain
- Two Pump Station alternative adopted

OPTIMIZING TRIPLE BOTTOM LINE
ECONOMIC
- Using multiple energy escalation and discount rate combinations for sensitivity analysis
- Using the sensitivity analysis we can determine the optimal present worth value

ENVIRONMENTAL
- Flat areas chosen to build pump stations in order to minimize altering mountainside
- Route alignment parallel to existing roads in order to minimize altering undeveloped areas
- Construction methods that minimize dust emission implemented
- Energy usage optimized

SOCIAL
- Provide safe, reliable water
- Minimizing community Impact
  - Alignment designed to stay out of site whenever possible
  - Construction time only during normal working hours
  - Safe construction methods implemented to minimize risk to public

POWERING WATER INFRASTRUCTURE IN CALIFORNIA AMOUNTS TO A CONCERNING 20% OF ALL ELECTRICITY PRODUCED IN THE STATE.