Orange County Groundwater Replenishment System’s Environmental Impact Assessment

What is the Groundwater Replenishment (GWR) System?
GWR is a new project (approved October 2002) of the Orange County Water District (OCWD) and Orange County Sanitation District (OCSD) to purify, for reuse in groundwater recharge, highly treated wastewater that is currently discharged to the ocean via ocean outfalls.

Where is it?
Groundwater Replenishment System Map

Los Angeles

San Diego

Construction Required
- High-tech, water purification system at existing site.
- 13 mile pipeline from Fountain Valley to Anaheim
- New injection wells

Advanced Water Treatment Plant
- High-tech, water purification system producing “ultra-pure,” high quality water
- Technology used in industry for years
  - Microfiltration – food, medicines
  - Reverse Osmosis – bottled water
  - Ultraviolet disinfection – for medical instruments
- Similar projects in VA, TX, AZ, FL, HI, Europe and elsewhere.

First Purification Step
- Microfiltration used since WW II, in blood dialysis
- Used in computer chip, food and pharmaceutical manufacturing
- Used to purify fruit juices & baby food
- Used to sterilize medicines that can't be heated
- First used to treat water by Disneyland in Orlando
- Excellent pre-treatment before reverse osmosis
Second Purification Step

- Technology used by bottled water companies
- Used in homes, boats, & by OCWD at Water Factory 21 since 1975
- Forces water under very high pressure through many plastic sheets of membranes
- Demineralizes and purifies water

Third Purification Step

- Proven technology – used to sterilize medical instruments
- Concentrated light & H₂O₂ creates an advanced oxidation reaction
- Appears to be effective against new, emerging contaminants (e.g., pharmaceuticals)
- Finally, recharge step is an additional natural barrier of filtration through the ground.
  - “Multiple barrier” approach

GWR Project Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>GWR research begins</td>
</tr>
<tr>
<td>1999</td>
<td>Environmental Impact Assessment (EIA) certified</td>
</tr>
<tr>
<td>2001</td>
<td>Design phase completion and approval by OCWD/OCSD</td>
</tr>
<tr>
<td>2002</td>
<td>Phase I construction begins</td>
</tr>
<tr>
<td>2004</td>
<td>Phase I operational. 70,000 af/yr</td>
</tr>
<tr>
<td>2010</td>
<td>Phase II operational. 95,000 af/yr</td>
</tr>
<tr>
<td>2020</td>
<td>Phase III operational. 120,000 af/yr</td>
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Why Groundwater Recharge? What’s the Need and Where does Orange County Water Come From?

Population Growth & Water Shortages

- Orange County’s current population of 2.3 M is predicted to increase to 2.8 M by 2020.
  - Southern California: will add 7 million by 2020
  - California: will add 15 million by 2020
    - CA will add current population of 8 western states!!!
- Unless solutions are found, there will be water shortages by 2020
  - Orange County predicts shortages of 180,000 acre-feet per year
  - CA Department of Water Resources predicts shortages of 2-4 million acre-feet per year

One Acre-Foot (AF) of Water

- Enough water to cover an American football field to a depth of one foot
- 325,900 gallons (1,200 m³)
- Approximately enough water for two families (of 4) for one year
- Orange County total water demand (2002) = 500,000 af/yr
Where Does Orange County Get Water?

- **IMPORTED**
  - “State Water” from Sierra Nevada Mountains = from Owens River and Mono Lake
  - “State Water” from Northern California
  - Colorado River Water
- **LOCAL**
  - Santa Ana River
  - Groundwater

How Much Water Does Orange County Use?

- Current water demand = 500,000 af/yr
- Projected water demand by 2020 = 680,000 af/yr
- 40% = “State Water” + Colorado River Water
- 60% = Groundwater

Colorado River - shared with 7 Western states and Mexico

- Hoover Dam and Lake Mead

Colorado River is Divided Up

- 16.4 M af/yr = original calculation when the Colorado Water Compact was negotiated.
- 14 M af/yr = more accurate measurement
- 12 M af/yr = drought years (e.g. 1930s)
- Total Allocation = 16.5 M acre-feet/year!!!
  - 7.5 M af/yr to upper basin states
  - 5.5 M af/yr to California,
  - 2.0 M af/yr to Nevada, and Arizona.
  - 1.5 M acre-feet to Mexico
- Bottom Line – all parties must use less Colorado River water in the future!

Orange County’s Mix of Groundwater and Imported Water

- North Orange County uses mostly Groundwater provided by Orange County Water District
  - Basin under North-Central OC
  - Groundwater basin is a natural storage, filter and piping system
  - Useable: 1 million acre-feet of water
  - Filled by Santa Ana River & imported water
- South Orange County uses 98% “State Water” (Metropolitan Water District of SoCal (MET) & Municipal Water District OC)
  - Owens River/Mono Lake, Northern California & Colorado River

Imported Water Cutbacks are coming!!!

- State Water Reductions of Northern California Water
  - Expect loss of 25% or more of supply due to $8 Billion restoration SF-San Joaquin Bay Deltas
- Colorado River Reductions
  - CA must cut from 5.5M to 4.4M af/yr by 2016 due to over-allocation demands
  - Colorado River has many threats from growth, environmental, Native American, salinity, international & pollution fronts
- LA/Orange County must leave 10% more water in Mono Lake/Owens River to prevent dust particulate problem
GWR Cost and Who Pays?

- $600 M over 20 years (1999 dollars)
- Grants of $57M are expected of which $37M from State Water Bond approved by California voters in 2000

Benefits of GWR Plan

- More reliable water
  - Supports existing & new business & jobs
  - Provides water for recreation like golfing, horseback riding
  - Allows Orange County to maintain enviable lifestyle
- Higher water quality
  - Softer water
  - Longer appliance life
  - As good as bottled water
- Reuses scarce asset
  - Helps the environment
  - Saves energy
- Protects groundwater from seawater intrusion
- Ensures locally-controlled, low cost water
- Provides water diversity, like financial diversity

Orange County’s Future Water Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Cost ($/af)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation</td>
<td></td>
<td>Trying, but can’t do enough</td>
</tr>
<tr>
<td>Buy “State Water”</td>
<td>$500-$550*</td>
<td>May not be there</td>
</tr>
<tr>
<td>GWR System</td>
<td>$450-$500*</td>
<td>Yes!</td>
</tr>
<tr>
<td>Rehab Existing H2O Treatment Plant</td>
<td>$600</td>
<td></td>
</tr>
<tr>
<td>Desalination</td>
<td>$800 - $2,000</td>
<td>Sister agencies choice</td>
</tr>
<tr>
<td>Satellite Wastewater Reclamation Plants</td>
<td>$3,000</td>
<td>Requires special costly piping</td>
</tr>
</tbody>
</table>

* Cost in 2007

Limitations of Environmental Impact Report

- Does not address the fundamental non-sustainability of current groundwater withdrawal rates.
  - Safe yield (without GWR)* = 274,000 af/yr
  - Groundwater use (2002) = 300,000 af/yr
  - Phase III recharge (2020) = 120,000 af/yr
  - Projected g.water demand (2025) = 450,000 af/yr

- * Note 1: This number is the GWR EIR estimate. Safe yield is defined as “annual amount of water that is naturally and artificially recharged into the groundwater, minus any purchases of imported water for direct replenishment.”
- * Note 2: If 100% of average annual rainfall (13” over 800 sq. km.) wound up in the aquifer, it would come to only 55,000 af/yr.

More Limitations of GWR Environmental Impact Report

- Does not consider low discount rates (valuing the future) or attempt whole life costing/total cost accounting, even though it does provide a range of water pricing options
- “Core” sustainability issues of limiting population, water conservation, fossil aquifer exploitation issues are absent from the discussion.

Media Report of the EIR of GWR System (11/5/98)

- “The GWR System was analyzed for all significant environmental issues, including: land use, geology, water resources, noise, public service impact, air quality, general hazards, biological, cultural and energy resources.”
- “Report found no significant negative impacts beyond temporary construction impacts, which could be mitigated.”
Media Report (11/5/98) indicated that the GWR System:

- Will create more than 100,000 acre-feet per year of new water for Orange County, enough for 200,000 families
- Project water will improve overall water quality of OC groundwater
- Completed project will have no significant adverse impacts on air quality, land or energy use, marine environment, endangered species or native habitat.
- Project water will use 50% less energy to produce compared to importing water from N. Calif or Co. River.
- Project will prevent future saltwater intrusion as more groundwater is pumped to meet Orange County needs.

Based on this example, are you convinced? Does this EIR successfully incorporate environmental values into the GWR project assessments?

Acknowledgements

• Blake Anderson, Exec. Director, Orange County Sanitation District
• Ron Wildermuth, Public Information Officer, Orange County Water District