GROUNDWATER, WATER RESILIENCY AND THE CHALLENGES... DO THEY REALLY MIX?

City of Norwalk
Glen W.C. Kau, P.E., QSP/QSD
Public Services Director/City Engineer
• City Water system serves 20,228 population
• Water consumption of 1,900-2,100 acre-feet annually (91.1 gallons/capita/day)
• Approx. 291,800 feet (55.3 miles) distribution mains, 2 to 16 inches; mainly constructed in 1940’s & 1950’s
• 3 operating wells (Well 4 Leffingwell, Well 5 Taddy, & Well 10)
• 2 – 10,000 gallon hydropneumatics tanks for Well 4 & Well 5)
• 4 interconnects – Cities of Santa Fe Springs & Cerritos
• 4 interconnects - City of Cerritos
• 2 interconnects - Golden State Water Company (Artesia & Norwalk)
• 2 interconnects - Liberty Utilities Bellflower/Norwalk
• 1 imported water connection - Metropolitan Water District Turnout No. 16
• 9 emergency interconnections
• 5 pressure regulating stations
• 5,362 service connections

Figure 1: City of Norwalk Water Tower
Figure 2: City of Norwalk USACE WRDA Section 219 Projects
# USACE WRDA SECTION 219 PROPOSED WATER IMPROVEMENTS

<table>
<thead>
<tr>
<th>PHASE 1 PROJECTS - 10 YEAR PROGRAM</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUNDING ADJUSTMENT FROM PRIOR FY23</td>
<td>$ 1,136,368</td>
</tr>
<tr>
<td>CORPS ENVIRONMENTAL INFRASTRUCTURE PROJECT PARTNERSHIP AGREEMENT, NEPA</td>
<td>$ 473,500</td>
</tr>
<tr>
<td>WELL NO. 9 DRILLING - HERMOSILLO PARK, DESIGN, CONSTRUCTION</td>
<td>$ 1,050,000</td>
</tr>
<tr>
<td>WELL NO. 9 EQUIPPING - HERMOSILLO PARK, TRANSMISSION MAINS, DESIGN, CONSTRUCTION</td>
<td>$ 2,500,000</td>
</tr>
<tr>
<td>2023 WATER SYSTEM ANALYSIS</td>
<td>$ 160,000</td>
</tr>
<tr>
<td>NORWALK PARK - RESERVOIR, PUMP STATION, DESIGN, CONSTRUCTION</td>
<td>$ 4,373,862</td>
</tr>
<tr>
<td>NORWALK BLVD. TRANSMISSION MAIN WELL 9 TO NORWALK PARK RESERVOIR</td>
<td>$ 3,064,500</td>
</tr>
<tr>
<td>NORDESTA - IMPERIAL GROUNDWATER RECOVERY PROJECT, PREDESIGN</td>
<td>$ 1,430,000</td>
</tr>
<tr>
<td>NORDESTA - IMPERIAL GROUNDWATER RECOVERY PROJECT, DESIGN, CONSTRUCTION</td>
<td>$ 2,700,000</td>
</tr>
<tr>
<td>DISTRIBUTION MAIN REPLACEMENT PROGRAM</td>
<td>$ 1,272,000</td>
</tr>
<tr>
<td>SCADA SYSTEM INSTALLATION PHASES A, B, C</td>
<td>$ 4,823,862</td>
</tr>
<tr>
<td>166TH STREET TRANSMISSION MAIN PIONEER BLVD. TO EAST CITY LIMITS</td>
<td>$ 880,000</td>
</tr>
<tr>
<td>AUTOMATIC METER READING PROGRAM</td>
<td>$ 500,000</td>
</tr>
<tr>
<td>NORTH SERVICE AREA TRANSMISSION MAIN, DESIGN, CONSTRUCTION</td>
<td>$ 2,586,666</td>
</tr>
</tbody>
</table>

**TOTAL** $26.95M

**FEDERAL** $20.21M

**CITY** $6.74M
NORWALK WATER SOURCES

GROUNDWATER

- Supplied By Central Groundwater Basin

IMPORTED WATER

- Supplied By Metropolitan Water District of Southern CA
  Via Central Basin Municipal Water District

INTERTIES

- Supplied By Neighboring Cities
Figure 3: City of Norwalk – Groundwater Well Map

Well No. 4 Leffingwell Rd.
Well No. 5 Taddy St.
Well No. 10 Sproul St.
## CITY OF NORWALK WELL PRODUCTION

<table>
<thead>
<tr>
<th>Description</th>
<th>Production Capacity (GPM)</th>
<th>2020-2021 Production (AFY)</th>
<th>2021-2022 Production (AFY)</th>
<th>2022-2023 Production (AFY)</th>
<th>3-Yr Average Production (AFY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well No. 4 (Leffingwell Rd.)</td>
<td>680</td>
<td>6</td>
<td>21</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td>Well No. 5 (Taddy St.)</td>
<td>680</td>
<td>341</td>
<td>383</td>
<td>379</td>
<td>367</td>
</tr>
<tr>
<td>Well No. 10 (Sproul St.)</td>
<td>2,000</td>
<td>535</td>
<td>778</td>
<td>209</td>
<td>507</td>
</tr>
<tr>
<td>All City of Norwalk Wells</td>
<td>-</td>
<td>882</td>
<td>1,182</td>
<td>609</td>
<td>891</td>
</tr>
</tbody>
</table>

*Well No. 10 Offline Fiscal Year 2022-2023

*2,273 AFY of Groundwater Adjudicated Rights

*1,900–2,100 AFY Annual Consumption
ANNUAL WATER SUPPLY SOURCES

Fiscal Year 2020-2021
- City of Norwalk: 55%
- City of Cerritos: 23%
- City of Santa Fe Springs: 13%

Fiscal Year 2021-2022
- City of Norwalk: 48%
- City of Cerritos: 16%
- Central Basin Municipal Water District: 27%

Fiscal Year 2022-2023
- City of Norwalk: 43%
- City of Cerritos: 20%
- Central Basin Municipal Water District: 23%

*Well No. 10 Offline Fiscal Year 2022-2023

Figure 4: Annual Water Supply Pie Charts
WRD Replenishment Assessment (RA)  
City of Santa Fe Springs  
City of Cerritos  
Central Basin Municipal Water District

Fiscal Year 2020-2021  
Fiscal Year 2021-2022  
Fiscal Year 2022-2023

Actual Cost Per Acre-Ft 2022-2023  
Annual Water Consumption/$ Paid

$419  
$1,194  
$967  
$1,700

ANNUAL WATER COSTS

Figures 5 & 6: Annual Water & Per Acre-Ft Costs

(*): RA Does Not Include Energy Costs
VOLATILE ORGANIC CARBONS (VOCS) IN NORWALK WATER SOURCES

*Notification Level (NL)
*Response Level (RL)

Well No. 4
PFAS above NLs
Below RLs

Well No. 10
Benzene above RL

Well No. 5
PFAS above NLs
Below RLs
## BENZENE REGULATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Agency</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Maximum Containment Level (MCL)</td>
<td>EPA*</td>
<td>5 µg/L</td>
</tr>
<tr>
<td>State MCL</td>
<td>SWRCB**</td>
<td>1 µg/L</td>
</tr>
<tr>
<td>Detection Limit for Purposes of Reporting (DLR)</td>
<td>SWRCB**</td>
<td>0.5 µg/L</td>
</tr>
<tr>
<td>Public Health Goal (PHG)</td>
<td>OEHHA***</td>
<td>0.15 µg/L</td>
</tr>
<tr>
<td>Cancer Potency Factor (1/10^6 cancer risk)</td>
<td>OEHHA***</td>
<td>0.35 µg/L</td>
</tr>
</tbody>
</table>

**Benzene Contamination Well No. 10: 1.1 – 5.3 µg/L**

*EPA: United States Environmental Protection Agency  
**SWRCB: California State Water Resource Control Board  
***OEHHA: California Environmental Protection Agency’s Office of Environmental Health Hazard Assessment
WATER QUALITY CHALLENGES

• Benzene Sources:
  ○ Found in Motor Fuels, Chemical Solvents, and Refineries
  ○ Enters water sources through industrial discharge, runoff from roads, and leaching from gas storage tanks and landfills

• Environmental Concerns:
  ○ Negatively affects aquatic life, disrupting ecosystems and harming biodiversity

• Health Concerns:
  ○ Anemia
  ○ Decrease in blood platelets
  ○ Increased risk of cancer

Figure 7: Benzene Structure & Molecular Formula
NORWALK WELL NO. 10

How can we remove Benzene?

Figure 8: Norwalk Well No. 10
WATER TREATMENT OPTIONS

REVERSE OSMOSIS

**Pros:**
Effective Benzene Removal
No Chemical Requirement
Removes salts

**Cons:**
Expensive Initial/Maintenance Cost
Requires Electricity
Produces Wastewater

NANOFILTRATION

**Pros:**
Effective Benzene Removal
No Chemical Requirements

**Cons:**
Expensive Initial/Maintenance Cost
Requires Electricity
Produces Wastewater

GAC FILTRATION*

**Pros:**
Effective Benzene Removal
Affordable
Versatile and Simple

**Cons:**
Media Replacement

UV AOP**

**Pros:**
Effective Benzene Removal
Environmentally friendly

**Cons:**
Requires Electricity
Requires Lamp Maintenance

*Granular Activated Carbon
**Advanced Oxidation Process
Granular Activated Carbon (GAC) filtration effectively removes benzene and PFAS contaminants from water sources.

GAC adsorbs benzene molecules onto its porous surface, trapping them within the filter media.

GAC filtration targets Per and Polyfluoroalkyl Substances (PFAS), such as PFOA and PFOS, by capturing them on the carbon surface.

GAC’s versatility and efficiency make it a preferred method for remediation efforts against benzene and PFAS contamination in water treatment systems.

Although GAC is particularly efficient for longer-chain PFAS like PFOA and PFOS, but less so for shorter-chain PFAS like PFBS and PFBA.
WATER TREATMENT CHALLENGES

- Project Layout
- Permitting
- Construction & Maintenance
- Cost
Figure 11: Well No. 10 – Potential Area for GAC Vessels
Figure 12: Well No. 10 SCE and Caltrans Easements
Figure 13: Well No. 10 Rough Preliminary Design
Figure 14: Larger GAC Vessel Comparison

Benzene & PFAS... YAY!!!

But will it fit the budget... mmm
NEXT STEPS...

**DESIGN**
- Site/Conditions Assessment
- PCC Foundation(s)
- Site Work/Pipe Layout
- Electrical & Controls
- GAC Vessel Sizing

**CEQA**
- Initial Study
- Mitigated Negative Declaration

**CONSTRUCTION**
- Early Procurement of GAC Vessels (long lead time)
- Relocation of SCE XFMR & electrical work
- Upgrade chemical facilities & storage
- Yard Piping

**ETC**
- Project Management
- Constructability
- Permitting
**PROJECT SITE CHALLENGES**

**AVAILABLE SPACE**

- Limited space for GAC vessels and backwash tank especially on existing well pump sites
  - Chemical deliveries

**CALTRANS/SCE EASEMENTS**

- Acquiring access rights requires considerable amount of time and coordination
- SCE infrastructure (transformer, electrical pole, and guy wire)

**ETC**

- Yard Piping Configuration
- MWD chloramine vs City sodium hypochlorite
  - No storage facilities
PERMIT AMENDMENT PROCESS

IDENTIFY NEED

Why do we need an amendment?

DESIGN SYSTEM

Submit PDR and Permit Amendment Application Package to Department of Drinking Water (DDW)

CONSTRUCTION

Draft Operation Maintenance Manual and Plan (OMMP)

REVIEW/REVISE

Submit OMMP to DDW for review and revise as needed. Site walk with DDW Engineer

PERMIT ISSUED

Challenges? 24-36 Months
PROJECT COSTS

BREAKDOWN

$150,000 (5%)
Project Management, Constructability Review, Site & Condition Assessment

$300,000 (10%)
Design, Environmental, Permitting

$100,000 (3%)
City Administration

$2,450,000 (82%)
Construction (Equipment & Labor)

Figure 15: Well No. 10 Cost Estimate
PROJECT PARTNERSHIPS AND FUNDING

WRD - $2,000,000 Grant Funding

67%

PROJECT PARTNERSHIPS AND FUNDING

City of Norwalk - $1,000,000 Remainder

33%
• METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

• SWRCB DIVISION OF DRINKING WATER

• SOUTHERN CALIFORNIA EDISON

• CALTRANS

• CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

• CENTRAL BASIN MUNICIPAL WATER DISTRICT

• WATER REPLENISHMENT DISTRICT
CAPITAL IMPROVEMENT PROJECTS – THE 3 YEAR PLAN

FY 2024-2025

Transmission Main – 8”, 12”, & 16” Central and South Loop

Transmission Main – 12” Northwest and Northeast Loop

Pressure Regulating Station

FY 2026-2027

Well No. 9 (at Hermosillo Park)

Reservoir (1 million gallons)

Booster Pump Station
Thank you.

Glen W.C. Kau, P.E., QSP/QSD
Public Services Director
City Engineer

gkau@norwalkca.gov
www.norwalkca.org