Las Vegas Valley
Wastewater Treatment Overview

LVWWAC
January 14, 2014

City of North Las Vegas
City of Las Vegas
Clark County Water Reclamation District
City of Henderson
History Pre-SNWA (1991)

1931  First treatment plant for Las Vegas was an Imhoff Tank – capacity 1 MGD
1956  CLV (4.5 MGD)/CCWRD (1.2 MGD) begin discharging directly to the Las Vegas Wash
1957  LV Wash flows begin entering LV Bay
1971  EPA initiates enforcement action because of algae in LV Bay
1971  Lake Mead used as surface potable water supply
1973  Sewage and Wastewater Advisory Committee (SWAC) is organized
1973  Clark County adopted the construction of the AWT plant for P removal
1978  Consent decree involved dischargers & EPA
1979  Algae bloom continues, Chlorophyll-a concentrations in the LV Bay > 400 µg/L
1981  City of Las Vegas and Clark County’s P removal treatment plants on-line: Total P <1 mg/L
1985  Clark County Regional Flood Control District (CCRFCD) created
1986  Chlorophyll-a concentrations continue to be high >380 µg/L with an algae bloom
1989  NDEP establishes Total P TMDL to meet chlorophyll standards for LV Bay
1991  SNWA formed
1991 – Members of SNWA

- Mission: Water Reclamation / Water Reuse
- Community significance shifts to Return Flow Credits
- Wastewater reclamation is a water resource
History Post-SNWA

1992  NPDES permit issued requiring receiving water monitoring
1995  CoH begins discharging to LV Wash (November to March = 5.4 MGD)
1998  Las Vegas Wash Coordination Committee established
2000-2010 drought lowers Lake Mead 112 feet, the lowering re-forms the delta
2001  Phosphorus “trading” allowed in WW discharger’s permit
2001  Major *Pyramidichlamys dissecta* algae bloom in LV Bay and Lake LV, Chl-a >320 µg/L
2002  In response to algae bloom, dischargers begin voluntary year round P removal
2002  SCOP pipeline project initiated to transport P to the bottom of the Boulder Basin of Lake Mead
2004  Wash, Wastewater, & Water Reuse (W³) to plan the water quality for watershed
2005  Dischargers optimize P removal, P lowered to ~170 lb/day, highest Chl-a in LV Bay is 6 µg/L
2007  Nine local agencies approve formation of Las Vegas Valley Watershed Advisory Committee
2011  SCOP pipeline project terminated
2011  CNLV begins discharging to Sloan Channel
Influent Flows

<table>
<thead>
<tr>
<th>Month-Year</th>
<th>CCWRD</th>
<th>CLV only</th>
<th>CoH</th>
<th>CNLV only</th>
</tr>
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<tbody>
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<td>Jan-00</td>
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million gallons per day (MGD)
Influent Flows (all dischargers, monthly average)
## Capacities and (Current Average Influent Flows)

<table>
<thead>
<tr>
<th>Entity</th>
<th>Facility</th>
<th>Capacity in avg. MGD</th>
<th>Current Flow in avg. MGD</th>
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<tbody>
<tr>
<td>CNLV</td>
<td>Water Reclamation Facility</td>
<td>25</td>
<td>17</td>
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<tr>
<td>CLV</td>
<td>Water Pollution Control Facility</td>
<td>91</td>
<td>39</td>
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<tr>
<td>CLV</td>
<td>Durango Hills Water Resource Center</td>
<td>10</td>
<td>4.5*</td>
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<tr>
<td>CLV</td>
<td>Bonanza Mojave Water Resource Center</td>
<td>1</td>
<td>1*</td>
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<tr>
<td>CCWRD</td>
<td>Flamingo Water Resource Center</td>
<td>150</td>
<td>96</td>
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<tr>
<td>CCWRD</td>
<td>Desert Breeze Water Resource Center</td>
<td>5</td>
<td>5*</td>
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<tr>
<td>CoH</td>
<td>Kurt R. Segler Water Reclamation Facility</td>
<td>32</td>
<td>20</td>
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<tr>
<td>CoH</td>
<td>Southwest Water Reclamation Facility</td>
<td>8</td>
<td>4*</td>
</tr>
</tbody>
</table>

* Summer high-demand averages
What do the plants treat?

Wastewater discharged to the sanitary sewer from:

• residences (toilets, sinks, showers/bath tubs, dishwashers, washing machines, etc.)
• hotels/restaurants
• businesses/industries

Our plants do not treat stormwater. Sanitary sewers and storm sewers are separate. Stormwater and urban run off travel to the Las Vegas Wash and Lake Mead untreated.
Is the wastewater “reclaimed”?

All wastewater discharged to the sanitary sewers in the Las Vegas Valley is **reclaimed**.

- most is returned to Lake Mead and the Colorado River System and we gain return flow credits
- some is directly reused by local golf courses, parks, and industries

Therefore, for us, reuse makes sense in many situations, but it is **not** water conservation.
City of North Las Vegas

- New Water Reclamation Facility opened in June 2011
- On leased Nellis AFB land near Carey and Nellis
- Capacity is 25 MGD, currently treating 17 MGD
- State-of-the-art membrane bioreactor (MBR)/Enhanced Biological Nutrient Removal for nitrogen and phosphorus using the A²/O² process
- 2nd largest wastewater MBR plant in the United States; 3rd largest in the world.
- Effluent is discharged to the LV Wash via the Sloan Channel
- Solids are dewatered and sent to the Apex Landfill for disposal
CNLV Water Reclamation Facility (WRF) History

- January 2004 US BoR Title XVI Funding Approval for WRF
- October 2005 CNLV 208 Plan Amendment Presentation/ Adoption (Clark County Commission Meeting)
- November 2005 – October 2009 Public Outreach Events and Mailed Materials
- June 2006 Approval Clean Water Coalition (CWC) Membership
- August 2008 NDEP Conditional Approval
- September 2008 Enhanced Use Lease Approved with U.S. Air Force
- November 2008 Construction Manager at Risk (CMAR) Contract
- March 2009 Clark County 208 Plan approved by Clark County Commission
- April 2010 NPDES Permit Issued
- 2011 – CWC SCOP Project Terminated
- June 2011 Commenced Treatment
- October 2013 – Converted to Colorado River Commission (CRC) for Power Supply
CNLV Water Reclamation Facility
CNLV Water Reclamation Facility

- Influent Pump Station and Headworks
- Solids Handling Facility
- Operations Building
- Disinfection Facility
- Membrane (MBR) Facilities
- Bioreactor Facilities
- Plant Outfall
CNLV GE ZeeWeed 500D Membrane Cassette
CNLV plant and effluent
CNLV Collection System

- 774 miles of Sewer Main (Clay, PVC, Reinforced Concrete)
- No Public Lift Stations
- Sewer Maintenance Goals are Jet Rodding – 68,000 feet/month (5 Year Cycle) and Video Inspections CCTV – 25,000 feet/month
- 62,300 Sanitary Sewer Service Connections
CNLV Capital Improvement Program

Next Five Years and Beyond

- Sewer Main Rehabilitation
- Sewer Manhole Rehabilitation
- Sewer line Oversizing
- WRF LEAP MBR Upgrade – Upgrade to existing membrane air scour system
- WRF Capital Repairs
- NAFB Reclaimed Waterline
- WRF Blowers – Downsize blowers at the WRF to increase efficiency
- WRF Enclose Blowers
City of Las Vegas

Water Pollution Control Facility (WPCF)

- located at East Valley View and the Las Vegas Wash
- 91 MGD capacity, currently treating about 40 MGD
- Physical/Chemical, Nitrification/BNR, Tertiary Filtration, Sodium Hypochlorite Disinfection
- most effluent flows go to the Las Vegas Wash
- some effluent is directly reused by area golf courses and industries
CLV Water Pollution Control Facility
City of Las Vegas

**Durango Hills Water Resource Center**
- located on Durango, just north of Cheyenne
- 10 MGD capacity, currently treating about 5 MGD
- Preliminary, Activated Sludge, Tertiary Filtration, Sodium Hypochlorite Disinfection
- effluent flows go to northwest area golf courses
- joint venture with Las Vegas Valley Water District
- solids are returned to the sanitary sewer for removal at the WPCF

**Bonanza Mojave Water Resource Center**
- located on Mojave, just north of Bonanza
- 1 MGD capacity, currently treating 1 MGD
- Activated Sludge Oxidation Ditch, Tertiary Filtration, UV Disinfection
- effluent flows go solely to Desert Pines Golf Course
- solids are returned to the sanitary sewer for removal at the WPCF
CLV Collection System

- 1,724 miles of Sanitary Sewers
- 1 lift station on Lone Mountain Road
- 207,172 Service Connections (July 2012 data)
CLV Capital Improvement Program

Treatment Plant Improvements:
• SCADA/PLC Replacements
• Plant 7&8 with new BNR, Electrical & Headworks Upgrades
• Solar/Renewable Expansion
• FOG/Food Waste Co-Digestion
• BMWRC Pipeline
• General rehab of: Plants 3&4, 5&6 Primaries, Digesters, Solids Handling (Dewatering and TWAS) and BNR

• 10 Yr CIP Budget ~$250M
Flamingo Water Resource Center

- east end of Flamingo on LV Wash
- 150 MGD capacity, currently treating 96 MGD on average
- preliminary/primary, advanced BNR activated sludge, tertiary filtration, UV disinfection to Wash, sodium hypochlorite to reuse
- 30 MGD of membranes and ozone under construction
- most effluent to Las Vegas Wash
- 3 MGD to Nature Preserve (CC Wetlands Park)
- 2 MGD goes to Desert Rose Golf Course, Silver Bowl Park, NV Energy Clark Station
Desert Breeze Water Resource Center

- Flamingo, just east of Durango
- 5 MGD capacity “reuse” plant, at full (5 MGD) capacity in the summer
- Screening/Flow EQ/Activated Sludge/Traveling Bridge Dual Media Filtration/UV Disinfection
- all effluent flows go to southwest area golf courses
- joint venture with Las Vegas Valley Water District
- solids are returned to sanitary sewer, sent to Central Plant

Also Treatment Facilities outside Las Vegas Valley - Laughlin, Searchlight, Blue Diamond, Moapa Valley, Indian Springs
CCWRD Collection System

- 2070 miles of sanitary sewers
- 2030 miles of gravity, 40 miles of pressure
- 26 lift stations
- 13 SSOs in 2012, 8 in 2013
- 60 Private Sewer Systems scattered
- Some bottlenecks identified
  - Spring Mountain and LV Blvd
  - Sunset Interceptor south
  - Sunset Interceptor west
## CCWRD Capital Improvement Program

<table>
<thead>
<tr>
<th>Facility</th>
<th>5-year CIP FY 13/14 – 17/18</th>
<th>Following 10 years FY 18/19 – 27/28</th>
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<tbody>
<tr>
<td></td>
<td>$M</td>
<td>$M</td>
</tr>
<tr>
<td>Flamingo</td>
<td>$220M</td>
<td>$710M</td>
</tr>
<tr>
<td></td>
<td>media filters, flood control, pipes, blowers, odor control</td>
<td>plant capacity expansion and rehabs</td>
</tr>
<tr>
<td>Desert Breeze</td>
<td>$4M</td>
<td>$16M</td>
</tr>
<tr>
<td></td>
<td>aeration basins and clarifiers rehabs</td>
<td>filter and other plant rehabs</td>
</tr>
<tr>
<td>Collection System</td>
<td>$436M</td>
<td>$72M</td>
</tr>
<tr>
<td></td>
<td>Paradise-Whitney Interceptor numerous rehabs</td>
<td>various rehabs and capacity constraint relief</td>
</tr>
</tbody>
</table>

Note: does not include Laughlin, Searchlight, Moapa Valley, Indian Springs, or Blue Diamond
City of Henderson

Kurt R. Segler Water Reclamation Facility

- Primary wastewater treatment plant, constructed in 1994
- Expanded in 2008 at a cost of $77.8 Million
- Facility is located at east end of Galleria Drive and Pabco Road
- Current capacity is 32 MGD, current flows are 22 MGD
- Headworks, BNR, Supplemental Phosphorus Removal, Tertiary Filtration, UV Disinfection
- Over half of the effluent is directly reused on golf courses during summer months
- Most effluent is discharged to the Las Vegas Wash during winter months
City of Henderson

Southwest Water Reclamation Facility

- Satellite scalping facility
- Construction cost of $96.7 million
- Located on St. Rose Parkway, east of Eastern Ave.
- Capacity is 8 MGD, currently treating 4 MGD
- Headworks, Membrane Bioreactor (MBR), Ultraviolet as backup disinfection
- Solids are returned to sewer for removal at Kurt R. Segler plant
- Effluent directly reclaimed on golf courses
CoH Southwest Water Reclamation Facility
City of Henderson

Collection System

- 965 miles of sanitary sewers
- 16 sanitary sewer lift stations
- More than 22,000 sanitary sewer manholes
- Sanitary sewer maintenance
  - Jet 200,000 ft/mo (2-year cycle)
  - Inspect 40,000 ft/mo
City of Henderson

Capital Improvement Program

- Sewer Main Rehabilitation (5 year)
  - Rehab/Replace 30,000 lineal feet of 12 to 21-inch sewer
  - Sewer Main Relocation / Replacement - Relocation of 25,000 lineal feet of 8 to 12-inch sewer mains
- WRF Improvements (5 year)
  - Odor Control Assessment & Improvements
- Approximately $54 million of improvements identified over the next 10 years
NPDES Discharge Permits Limits

- Monthly average BOD 30 mg/L, TSS 30 mg/L (min 85% removal)
- Class D disinfection = monthly geo mean 200 MPN/100 mL
- Discharges cannot cause an exceedance of any water quality standard in LV Wash/LV Bay/Lake Mead/Colorado River
- Individual Waste Load Allocations (IWLA Load Limits)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>CNLV IWLA lb/day</th>
<th>CLV IWLA lb/day</th>
<th>CCWRD IWLA lb/day</th>
<th>CoH IWLA lb/day</th>
<th>Total WLA lb/day</th>
<th>Applicable Period</th>
<th>Approximate Compliance Concentration mg/L</th>
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<tbody>
<tr>
<td>Total Phosphorus</td>
<td>31</td>
<td>80</td>
<td>182</td>
<td>41</td>
<td>334</td>
<td>March 1 – October 31</td>
<td>0.21</td>
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<tr>
<td>Total Ammonia as N</td>
<td>91</td>
<td>231</td>
<td>529</td>
<td>119</td>
<td>970</td>
<td>April 1 – Sept. 30</td>
<td>0.62</td>
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Water Resource Centers – Reuse

• Agencies engage in reuse

• CNLV planning to provide reuse water to Nellis AFB

• Extensive systems are in place
  – CoH Reclaimed System
    • Treat and deliver 2.6 billion gallons of reclaimed water annually
    • Operate and maintain more than 40 miles of distribution pipeline, 5 pumping stations, 10 reservoirs

• Plants require capital improvements
  – CLV DHWRC recent improvements to screenings, filtration and disinfection. Future project to improve facility influent/effluent flow.
  – CLV BMWRC to be replaced with reuse pipeline from WPCF.
  – CCWRD Desert Breeze
    • 5-year CIP - Rehab of aeration basins and clarifiers - $4.3M
    • 15-year CIP – Rehab of filter system and possible plant expansion - $16.3M
**Financial Models / Funding Sources**

- **Connection Charges**
- **Sewer Service Charge**
- **Proceeds from Quarter-cent Sales Tax Distribution**

<table>
<thead>
<tr>
<th>Entity</th>
<th>Connection Charges</th>
<th>Annual Sewer Service Charge</th>
<th>Quarter-cent Sales Tax Distribution</th>
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<tbody>
<tr>
<td>CNLV</td>
<td>$1730/ERU</td>
<td>$205/ERU (min(^1)) $483/ERU (max(^1))</td>
<td>~$3M annual</td>
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<tr>
<td>CLV</td>
<td>$2087/ERU</td>
<td>$237/ERU(^2)</td>
<td>Applied to Debt Service ($34M remaining end of FY14)</td>
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<tr>
<td>CCWRD</td>
<td>$2195/ERU</td>
<td>$237/ERU(^2)</td>
<td>$14.9M collected for FY 12/13</td>
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<tr>
<td>CoH</td>
<td>$1800/ERU</td>
<td>$204 (min(^3)) $292/ERU (max(^3))</td>
<td>~4M collected in FY2013</td>
</tr>
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1. CNLV minimum is for ≤ 3000 gal/month, maximum is for ≥ 8000 gal/month
2. Does not include surcharges for properties with pools
3. Charges vary by property type; no additional charges for properties with pools
Las Vegas Wash

– Dry Weather Flows
  • 90% highly treated wastewater effluent (≈ 170 MGD)
    – “dilutes” other sources
  • 10% urban runoff, rising groundwater
    – microbes, TDS, pH, selenium, perchlorate, other “legacy” pollutants

– Wet Weather Flows
  • 4 inches average annual rainfall on 1,000,000 acre watershed
  • Average annual runoff at Northshore Road Bridge is 6000 acre-ft (or 2 billion gallons ≈ 5 MGD)
  • So, over the course of an average year about 2.5% of LV Wash flow into LV Bay is stormwater

– Lake Mead Inflow
  • 97% Colorado River
  • 1.5% Virgin and Muddy Rivers
  • 1.5% Las Vegas Wash
Future Challenges

- Regulation Changes
- Deteriorating Infrastructure
- Water Quality
- Las Vegas Wash
- Lake Mead, including drought impacts
- Downstream users
- System Rehabilitation Costs
- Rates and Charges keeping up with system requirements
- Environmental / Sustainability measures
- Collection System bottlenecks
- Sewer is currently a land Annexation tool, not a community partnering opportunity
- Labor issues relating to retirement/knowledge retention, demographics shift, recruitment of specialty technical based talent
• The end

• Questions?