This presentation premiered at WaterSmart Innovations

watersmartinnovations.com
Satellite Savings: GIS and the Army Reserve Rainwater Harvesting Strategy

Presenters:
Trey Lewis, Susan Loper and Brian Boyd
Army Reserve Universe FY17

<table>
<thead>
<tr>
<th># Buildings</th>
<th>Bldg (SF)</th>
<th>Land (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned</td>
<td>Leased</td>
<td>Owned</td>
</tr>
<tr>
<td>4,247</td>
<td>258</td>
<td>43.5M</td>
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<tr>
<td></td>
<td></td>
<td>332,657</td>
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</tbody>
</table>

Total: 4,505 buildings, 45.3M SF

Army Reserve Installations
- Fort Buchanan
- Fort McCoy
- Fort Hunter Liggett

Army Reserve Virtual Installations
- 9th Mission Support Command
- 63rd Regional Support Command
- 81st Regional Support Command
- 88th Regional Support Command
- 99th Regional Support Command

Army Reserve Training Areas
- Camp Parks RFTA
- Devens RFTA

Joint Base Army Support Activities
- ASA Dix (JB McGuire-Dix-Lakehurst)

Note: Data for Buildings (overall counts, ARCs/AFRCs, Family Housing), Cemeteries, Airfield/Helipad from HQIIS as of FY17 Q2. Land totals include separate data from REMIS and RFMIS.

1 Assets associated with USAR enclaves in HQIIS for all DoD installations, to include other than Army (OTA) assets.
2 LTA count includes all sites off of installations with assets coded with predominate design FACs 1741, 1742, 1743, & 1744
3 AMSA & ECS counts provided by USARC G4 Logistics Management Division. ECS count does not include MECS.

FY17 OMAR Base Support Resources = $652.98M
Alternative Water: Water that is not from freshwater (surface or groundwater sources)

- Harvested Rainwater
- Air Handling Unit Condensate Capture
- Graywater
- Process Discharge
- Foundation Sump Water
- Reclaimed Wastewater
**Why is Alternative Water Important?**

Alternative **water** is an important component of the Army’s Net Zero Initiative and Water Security Directives.

### Path to a Water Secure Facility

- **Baseline**
- **Fix Leaks**
- **Eliminate Non-Critical Uses**
- **Install Watersense Fixtures**
- **Install Rainwater Harvesting**
- **Install Direct Potable Reuse**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Gallons per day</th>
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</thead>
<tbody>
<tr>
<td>Externally-supplied potable water</td>
<td></td>
</tr>
<tr>
<td>Internally-supplied potable water</td>
<td></td>
</tr>
<tr>
<td>Internally-supplied nonpotable water</td>
<td></td>
</tr>
</tbody>
</table>

**Water Secure**

- **More**
- **Less**

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ARIMD Alternative Water Strategy

Initial Focus Area: Rainwater Harvesting

- Demonstrate the technical feasibility
- Determine system costs
- Estimate potential potable water offsets
- Learn about system operation and maintenance

Future Focus Area: Onsite Reclaimed Wastewater
Army Vehicle Washing

- Most potable water use at Army Reserve facilities is driven by people and normal daily use
  - Flushing toilets, washing hands, drinking water, showers, etc.

- We also discovered that vehicle wash was a large water user at certain locations
  - Vehicles are washed after training or maintenance

- Focusing on vehicle wash allowed us to test non-potable systems prior to considering higher risk, higher cost potable systems

Photo by Rob Schuette- The Real McCoy Online Extra – Fort McCoy, WI
Selecting the Pilot Sites

**Analyze Geospatial Data**
- Army Reserve real property database
- Zip code level precipitation data
- Watershed vulnerability

**Determine Vehicle Wash Demand**
- Low Demand
- High Demand

**Select Pilot Sites Selected**
- Grand Prairie USARC, TX
- Harry Milton Kandel USAR, Savannah, GA
Army Reserve Watershed Vulnerability

Vehicle Wash - Low Demand

380 Sites with 300 in Highly Vulnerable Watersheds

Reserve Center's Watershed Vulnerability
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

Demand Met During Frost Free Months
- Orange < 17%
- Yellow 17% to 32%
- Green 33% to 49%
- Dark Green 50% to 66%
- Blue 67% to 82%
- Dark Blue >= 83%
90 Sites with 80 in Highly Vulnerable Watersheds

Potable Water Offset Potential: 12.7-16.1 Mgal/year

10% of all Reserve Center water use across Army Reserve

Vehicle Wash - High Demand

Reserve Center's Watershed Vulnerability
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

Demand Met During Frost Free Months
- Orange: < 17%
- Yellow: 17% to 32%
- Green: 33% to 49%
- Medium Green: 50% to 66%
- Dark Green: 67% to 82%
- Purple: >= 83%

Rainwater Harvesting System Schematic

1. Collection System
2. Inlet Filter
3. First Flush Diverter
4. Storage Tank
5. Overflow
6. Controls
7. Treatment System
8. Pump
9. Backflow Prevention
10. Flow Meter
11. Power Supply
12. Water Level Indicator

Construction Timeline - 2017

Jan: Preliminary site visits and scoping

Mar: Installation of rainwater harvesting equipment

Apr – Sep: Metering all systems/equipment while in use

May – Sep: Monthly contact with site staff

May – Dec: Validation of project
Harry Milton Kandel Reserve Center
Lessons Learned

Planning/Design:

• Make sure area for **system has needed space** and components (e.g., concrete pad for rainwater tank)

• **Consider underground storage tank** for easier access to maintain tank
  – Does add substantial cost (est. $10k)

• **Consider roof and gutter re-configuration** to maximize rainwater collection
  – Want to be pulling from as much roof space as necessary

• Proposal should include **specific items to prevent mosquitos** around overflow (e.g. permeable pavers or green infrastructure around equipment)

• Specify **high grade gutter guards** to prevent leaves and debris from entering the tank (for potable systems - gutter guards certified through Underwriters Laboratories)

• **Cybersecurity considerations** must be addressed
Lessons Learned

Operations:

• Make sure all equipment is installed as specified

• Train local staff on O&M requirements

• Ensure that gutters and gutter guards are cleaned regularly to maximize rainwater collection and limit debris entering the system
  – Death by cottonwood seeds
  – Can take collection efficiency from >50% to <10%

• Secure system to prevent other organizations from using the system
  – Beware the nozzle thieves and untrained operators

• Battery backup for controls and pumps in outage prone areas
Next Steps

Solar-Powered Rainwater Capture for Potable Use

Fort Buchanan

Additional RWH Systems

Applicable Regions

Wastewater Treatment for Non-Potable Reuse

Fort Hunter Liggett

Direct Potable Reuse
Thank you!

Army Reserve Water Program Coordinator Contact:

Trey Lewis
frank.w.lewis.ctr@mail.mil
*Contract support through Plexus Scientific Corp.*

PNNL Contacts:

Susan Loper
susan.loper@pnnl.gov

Brian Boyd
Brian.boyd@pnnl.gov