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Satellite Savings: GIS and the Army Reserve Rainwater Harvesting Strategy



ARMY RESERVE WATER PROGRAM

Presenters:

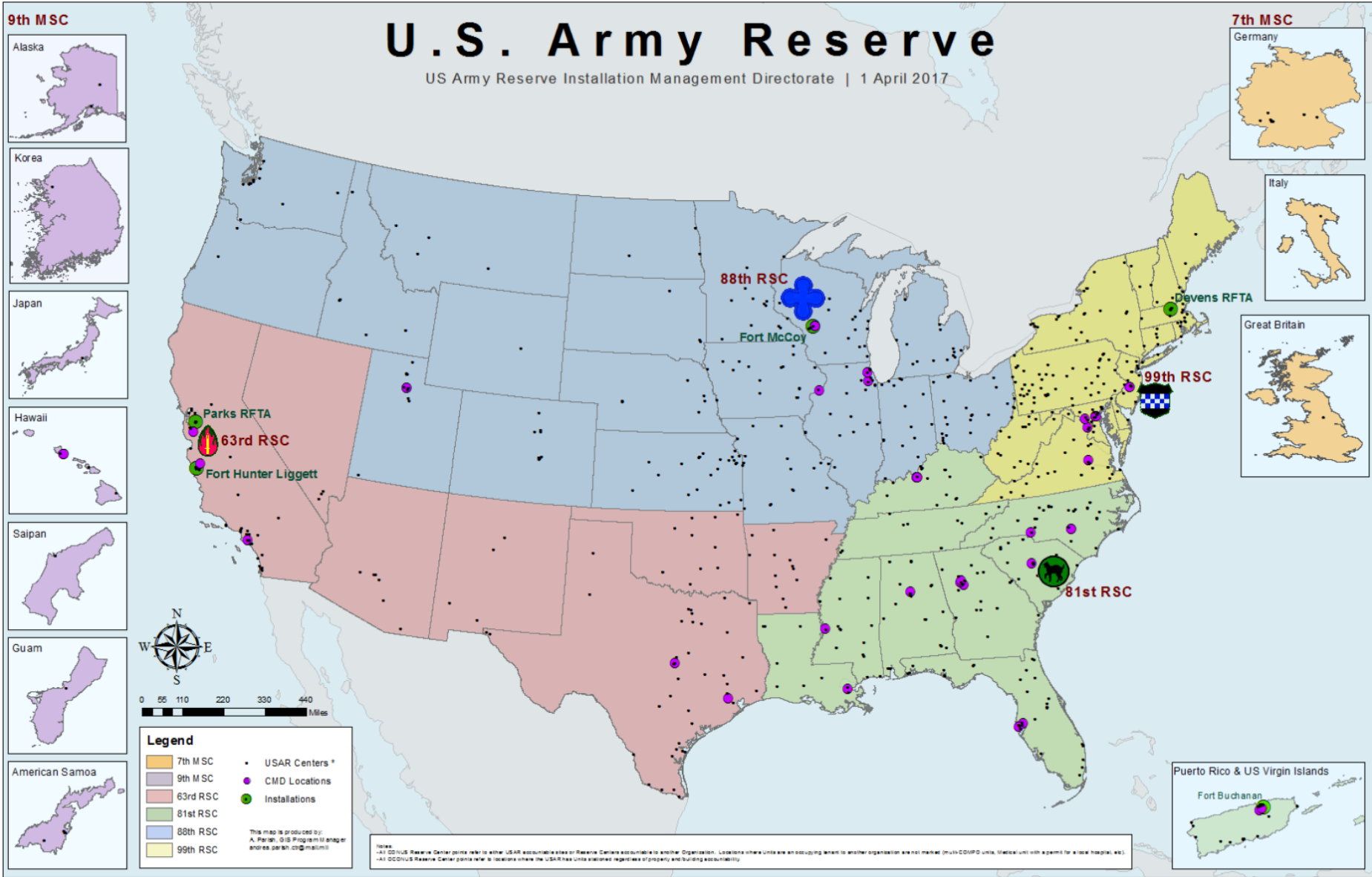
Trey Lewis, Susan Loper and Brian Boyd



ARMY RESERVE SUSTAINABILITY PROGRAMS



Army Reserve Universe FY17





Army Reserve Universe FY17



# Buildings		Bldg (SF)		Land (Acres)	
Owned	Leased	Owned	Leased	Owned	Leased
4,247	258	43.5M	1.8M	332,657	120,014

4,505 buildings

45.3M SF

ARCs (17140)			AFRC (17141)			LTAs ²
Owned	Leased	Enclave ¹	Owned	Leased	Enclave ¹	23
699	29	58	90	0	52	8,793 acres

Total: 951 non-Installation sites

Avg. Bldg Age	Roads		Cemeteries	Airfields & Helipads	
	Paved	Unpaved		Fixed Wing	Rotary Wing
38.95 years	668 mi	518 mi	6 National	1 Paved	1 Runway
			4 Civilian	4 Unpaved	23 Landing Pads

Family Housing Units (FA)			Organizational Maintenance Facilities ³	
Owned	Privately Owned	MHPI	AMSA	ECS
198	12	395	109	31

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

¹ Assets associated with USAR enclaves in HQIS 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.

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)



FY17 OMAR Base Support Resources = \$652.98M



Alternative Water



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

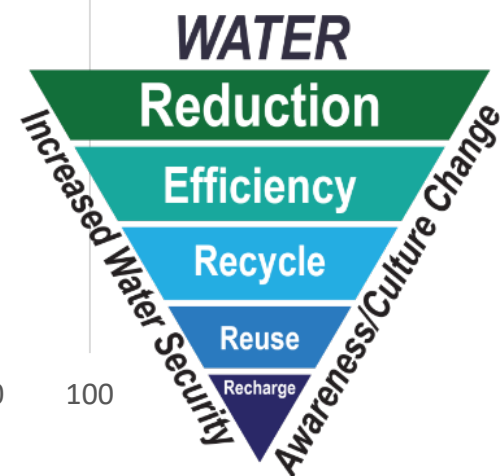
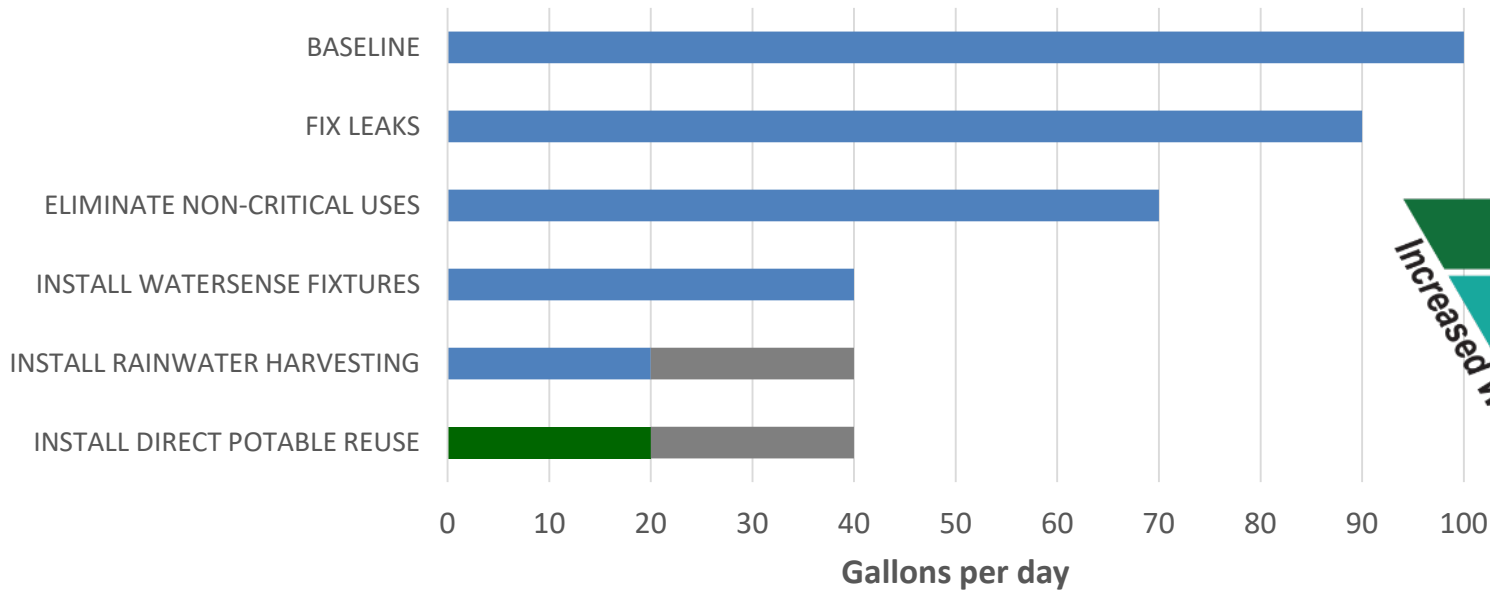


Why is Alternative Water Important?



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

Path to a Water Secure Facility



■ Externally-supplied potable water
■ Internally-supplied potable water
■ Internally-supplied nonpotable water

←
More
Water Secure
Less
→



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

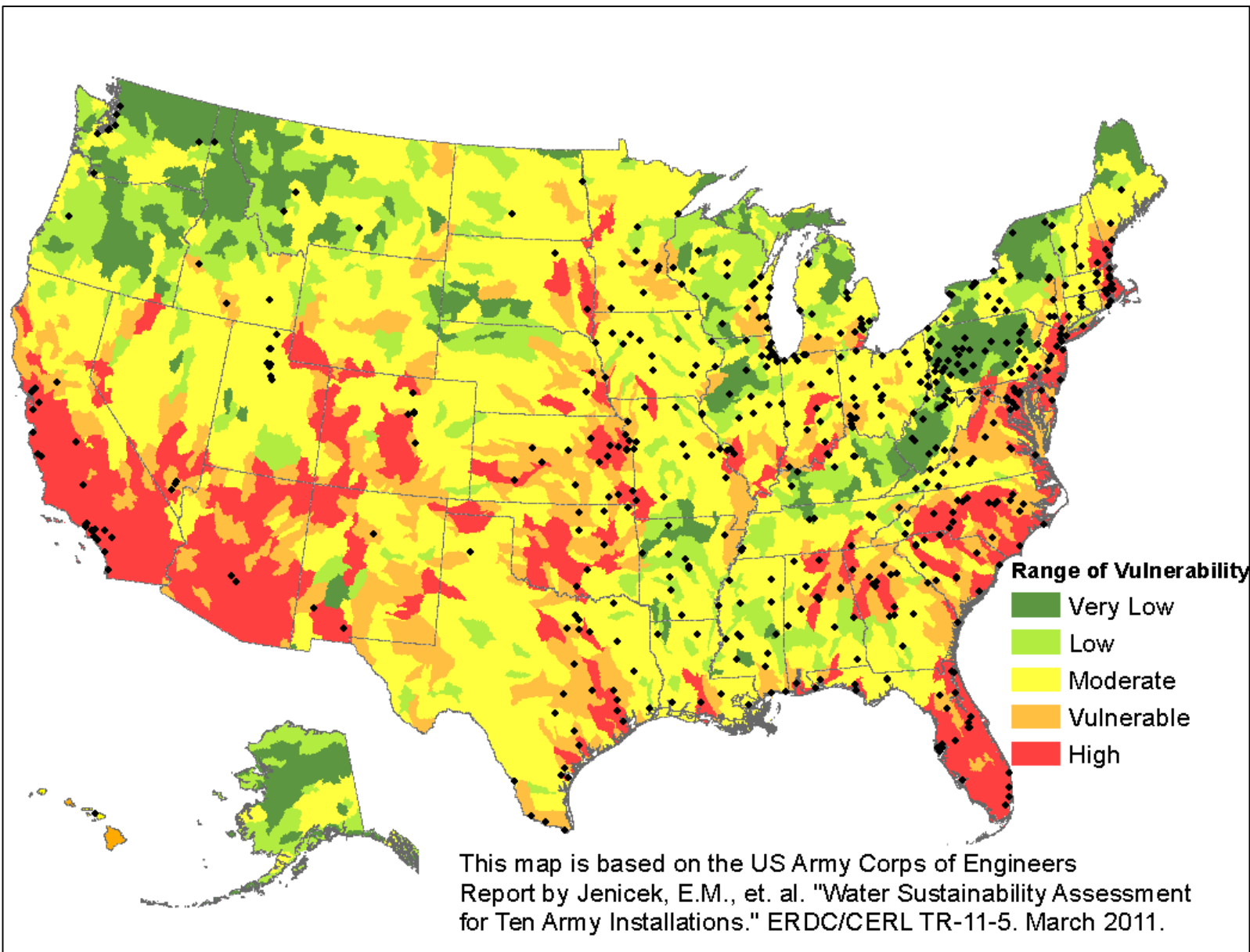
Determine Vehicle Wash Demand

- Low Demand
- High Demand

Select Pilot Sites Selected

- Grand Prairie USARC, TX
- Harry Milton Kandel USAR, Savannah, GA

Army Reserve Watershed Vulnerability

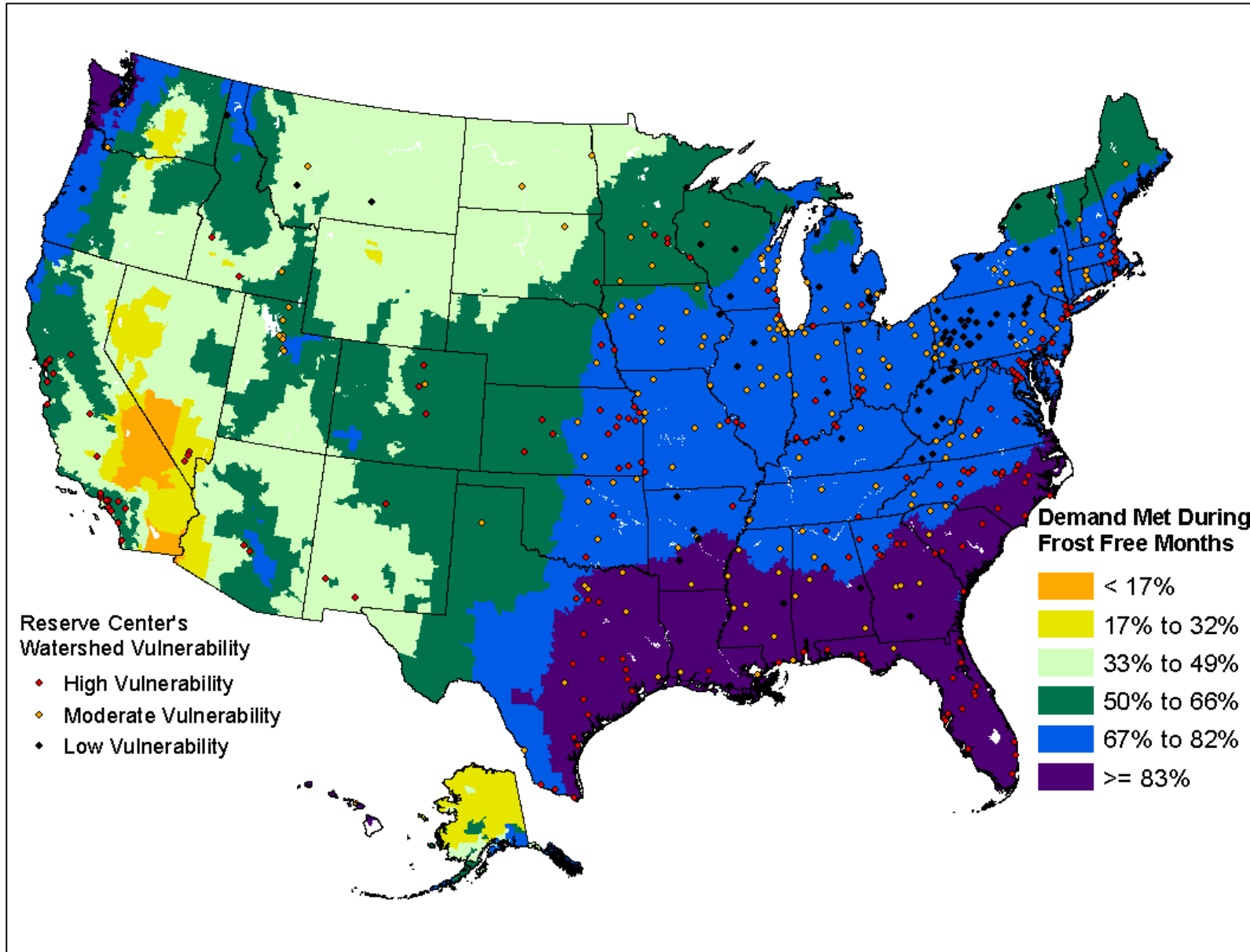




Vehicle Wash - Low Demand



380 Sites
with
300 in
Highly
Vulnerable
Watersheds





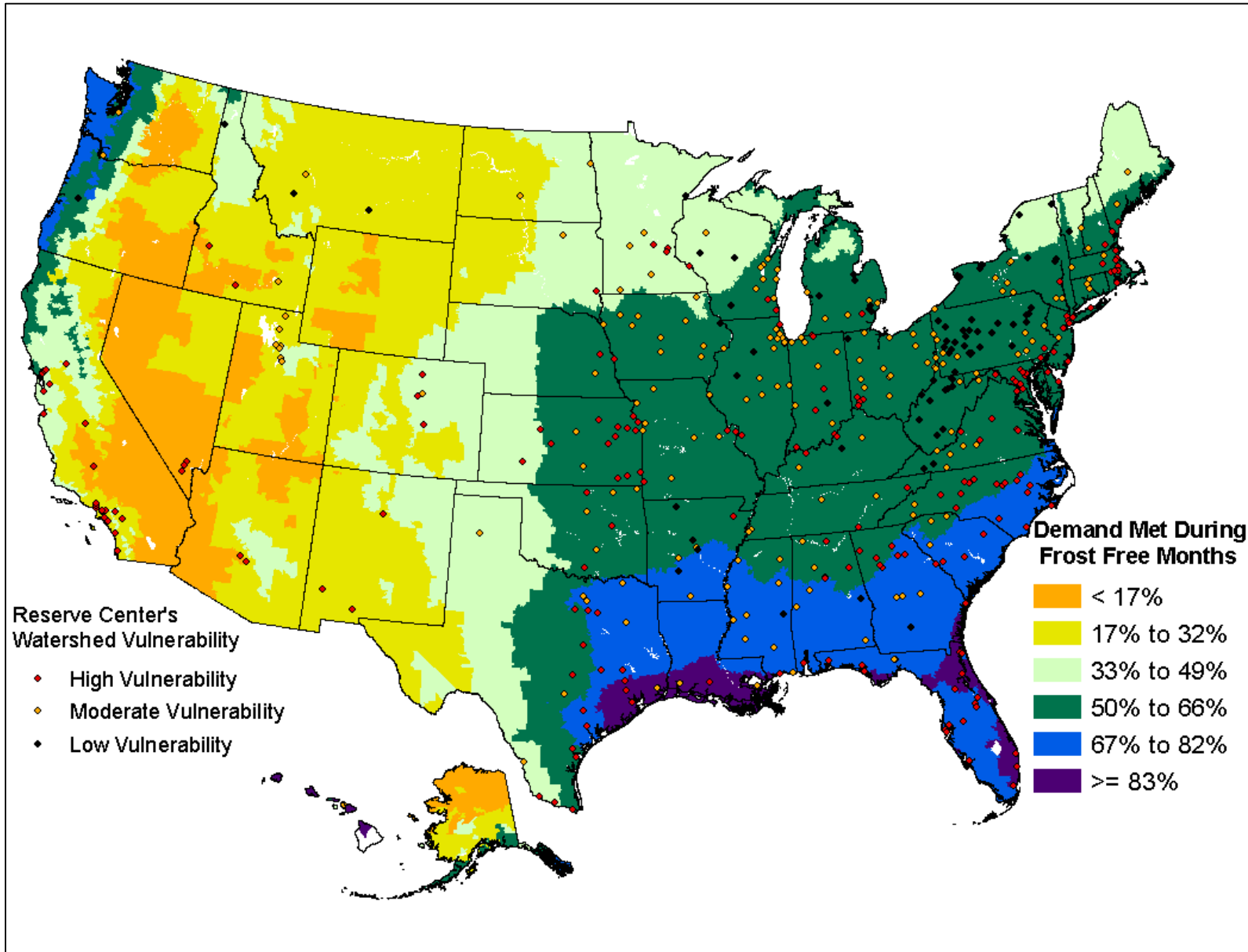
Vehicle Wash - High Demand



90 Sites
with
80 in Highly
Vulnerable
Watersheds

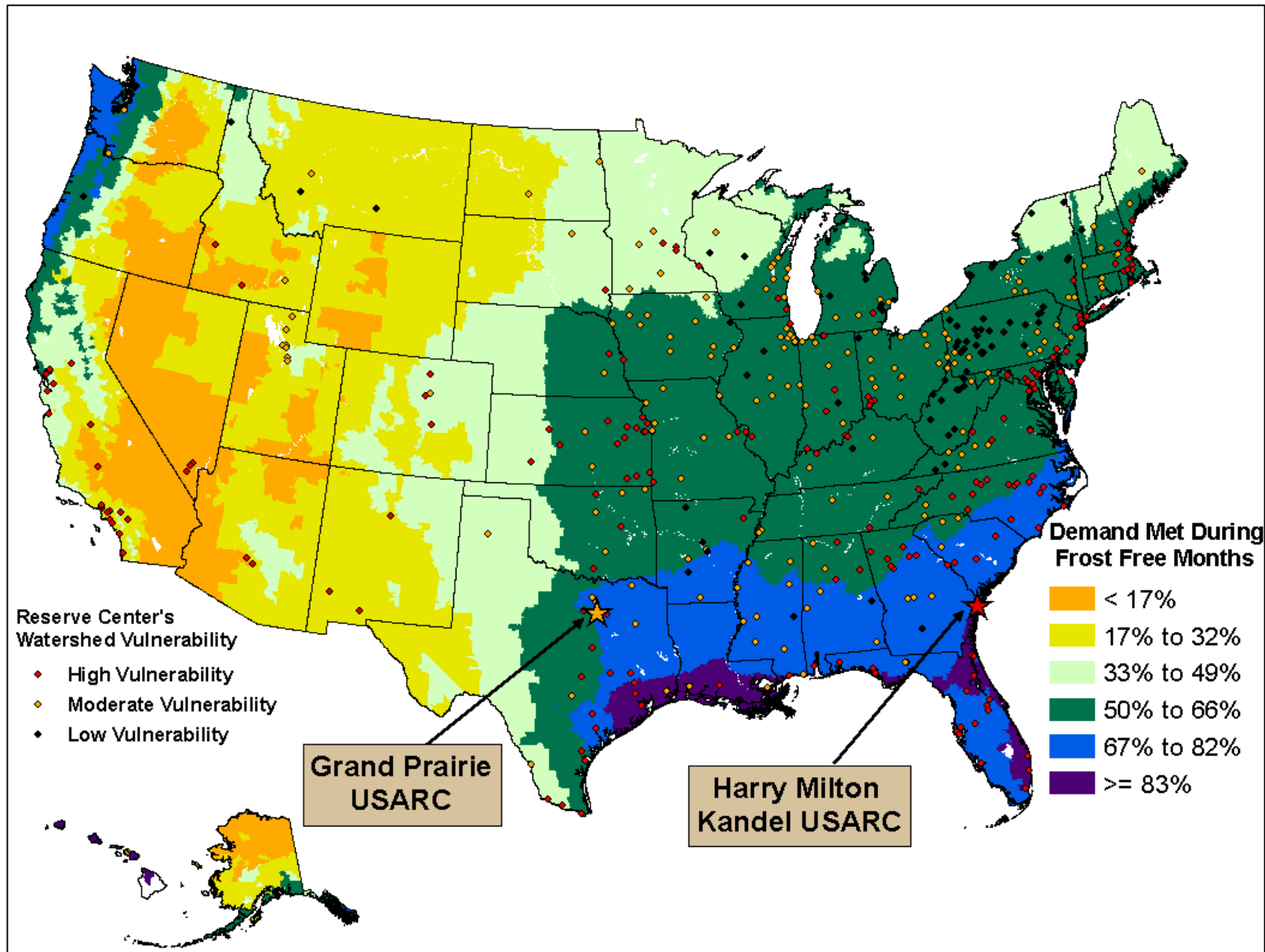
Potable
Water Offset
Potential:
12.7-16.1
Mgal/year

10%
of all Reserve
Center water
use
across Army
Reserve



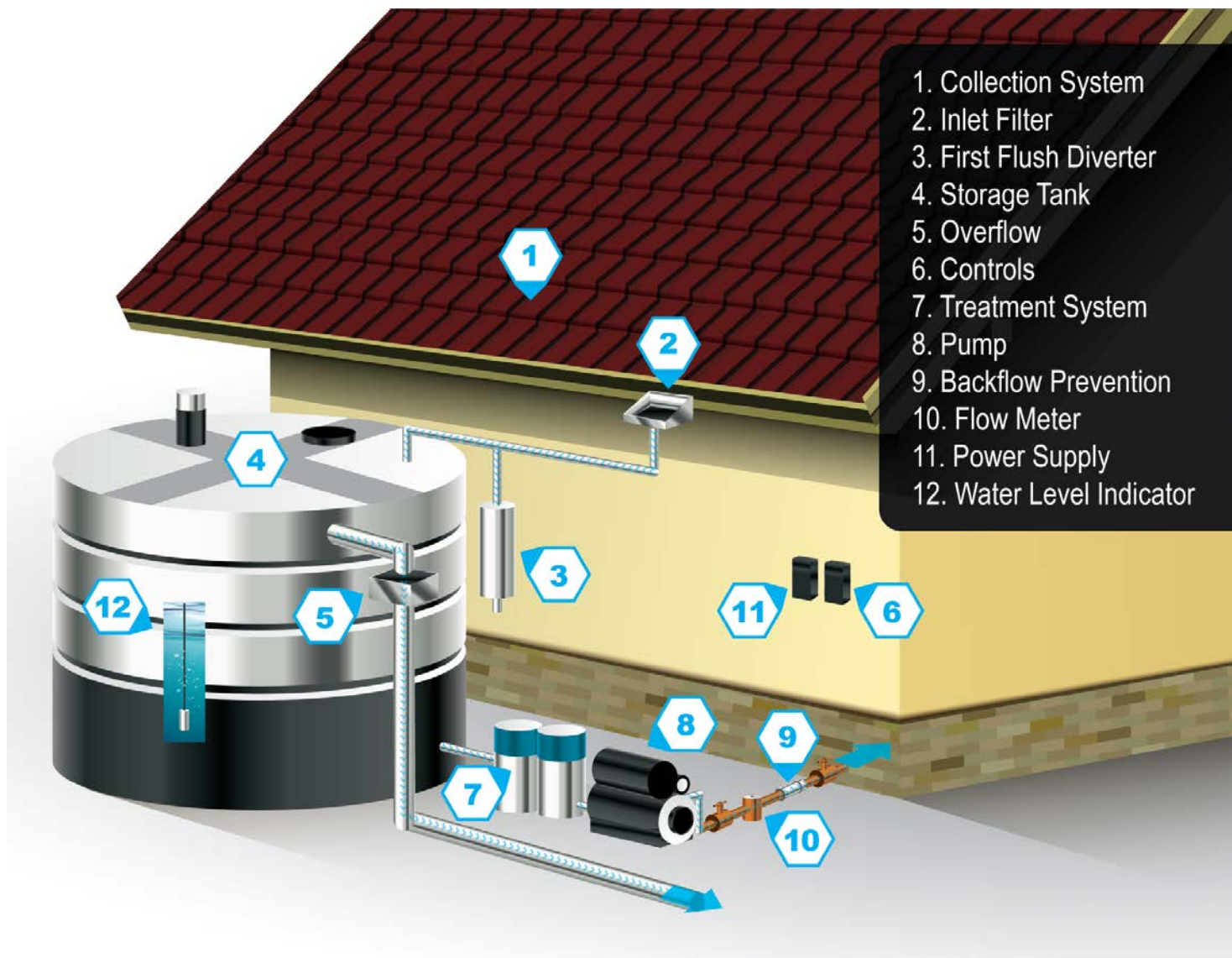


Pilot Sites Selected





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





Harry Milton Kandel Reserve Center





Grand Prairie AFRC





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

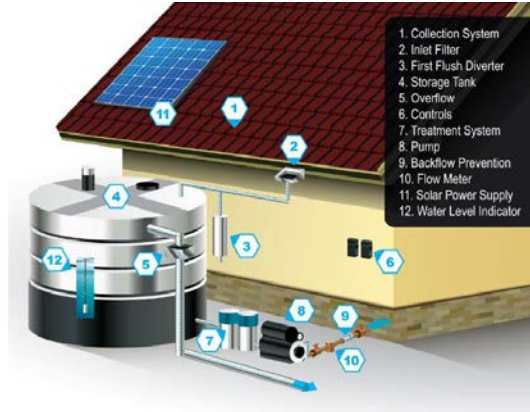


Operations:

- 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

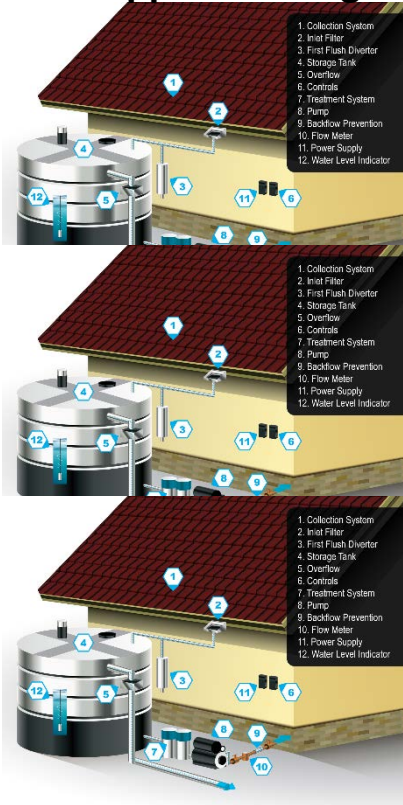
Solar-Powered Rainwater Capture for Potable Use

Fort Buchanan



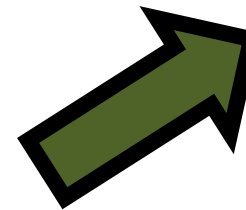
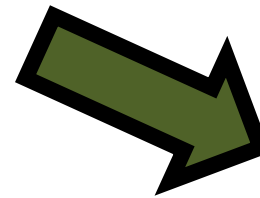
Additional RWH Systems

Applicable Regions



Wastewater Treatment for Non-Potable Reuse

Fort Hunter Liggett



Direct Potable Reuse



Thank you!



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