



**Water Balance and Roadmap Update**  
**Pacific Northwest National Laboratory**  
**Kate McMordie and Brian Boyd**

**Army Net Zero Installation Workshop**  
**18-20 Jan 2012**



# Agenda

1. Water Balance Overview
2. Progress at Joint Base Lewis McChord (JBLM) and Ft Carson
3. Next Steps





# Net Zero Water Team

- Project management
- Planning
- Domestic

Kate McMordie



- Project management
- Planning
- Central plants/industrial

Brian Boyd



- Project management
- Central plants/industrial

Jim Cabe



- Marcus De La Rosa
- Elisabeth Giever
- Jennifer Williamson
- Benton Russell
- Scott Brown

PNNL auditing team



- Doug Dixon – *planning*
- Ray Reilly – *planning*
- Susan Loper – *GIS*

Roadmap team



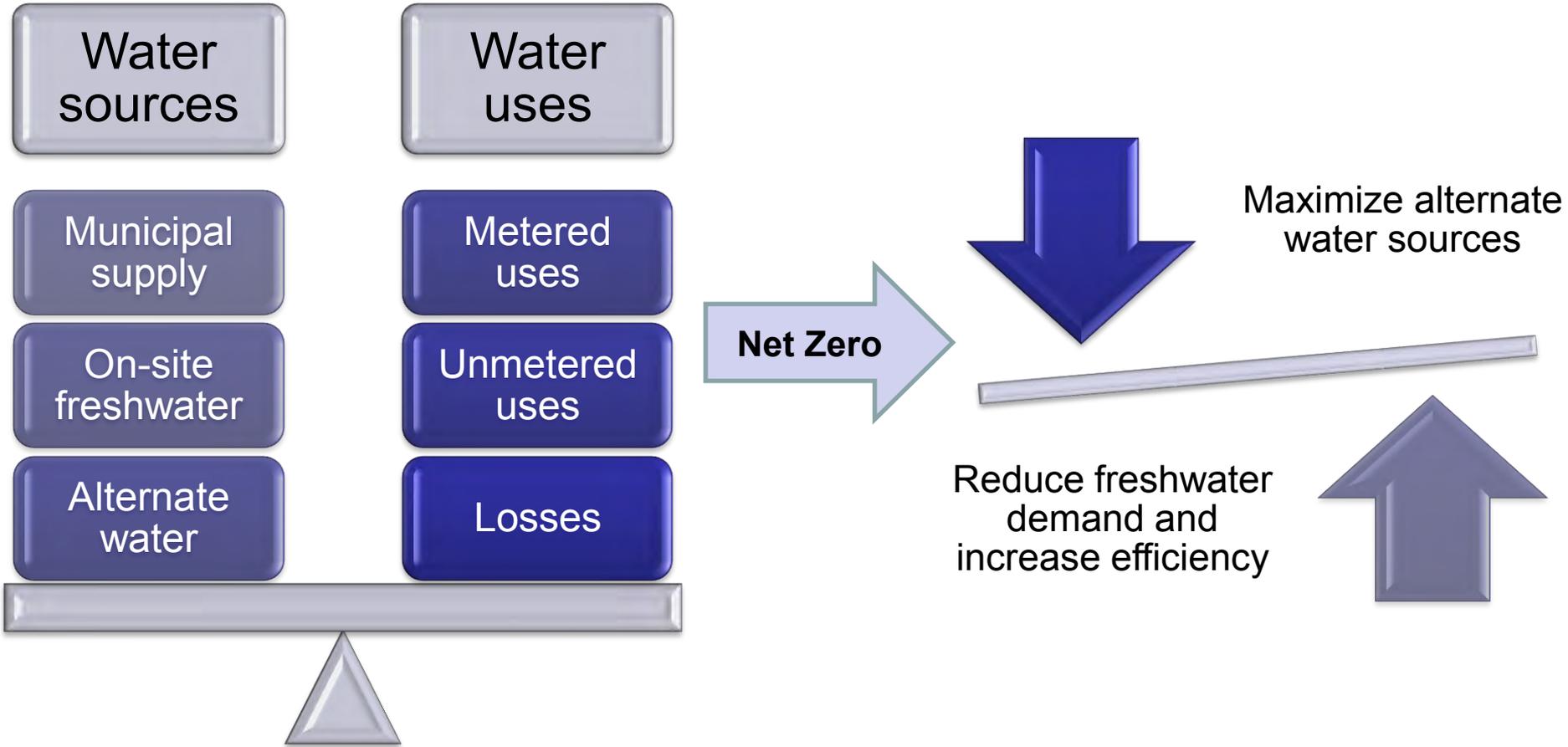
- Subcontract providing specialized expertise for water balances

Water Savers LLC



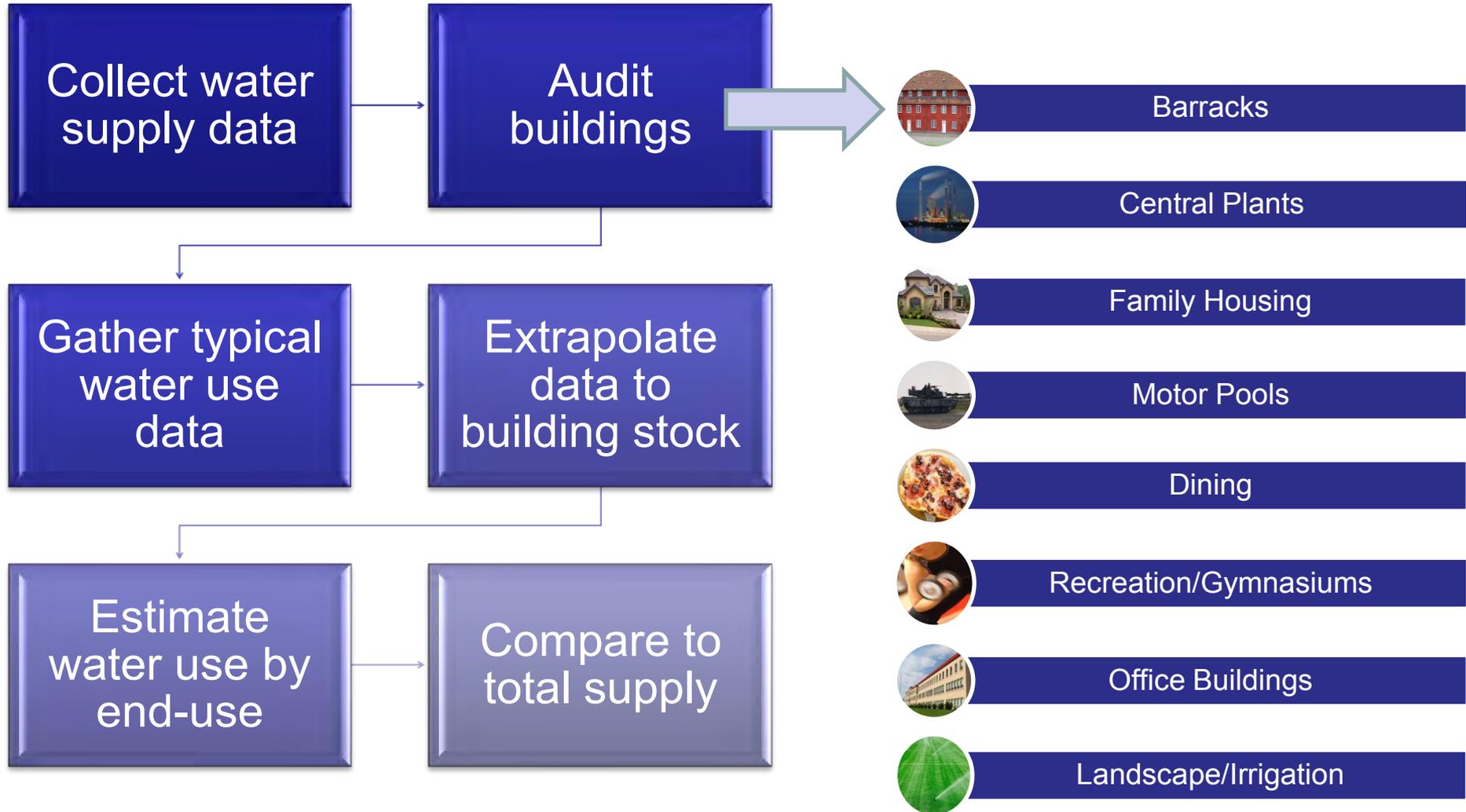


# Water Balance Overview





# Water Balance Approach





# Data Needs for Water Balance

## Data requested during site visit:

- Annual occupancy data for military, family housing, civilian, and contractors
- Barracks – Barracks Utilization Report (AKA “BUR”)
- Morale, Welfare, and Recreation (MWR) – number of visitors, data on pools, other water intensive
- Dining – number of daily meals served, annual operating days
- Hospital – number of beds, occupancy rate, equipment list, central plant logs
- Motor Pools – number of vehicles on post, estimated number of annual washes



# Data Needs for Water Balance

## GIS maps requested during site visit:

- Buildings
- Irrigation system
- Water distribution system
- Central plant distribution
- Water meter locations

JBLM Building GIS

### Category Code Description

-  Communication (Information Systems) Buildings
-  Indoor Morale, Welfare, and Recreation Facilities
-  Miscellaneous Utilities Measured in Square Feet
-  Personnel Support and Service Facilities





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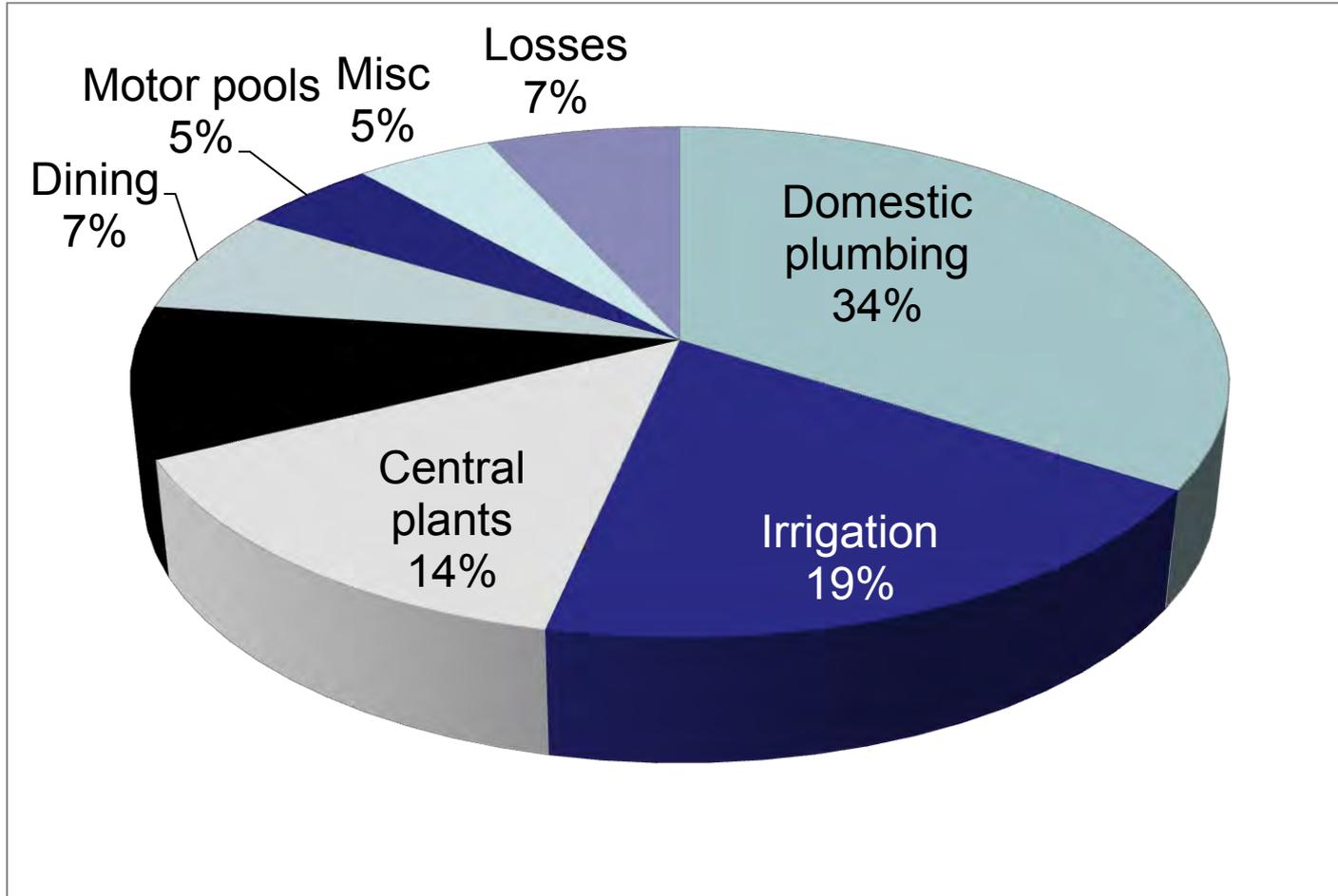
# Estimating Irrigation Water Use





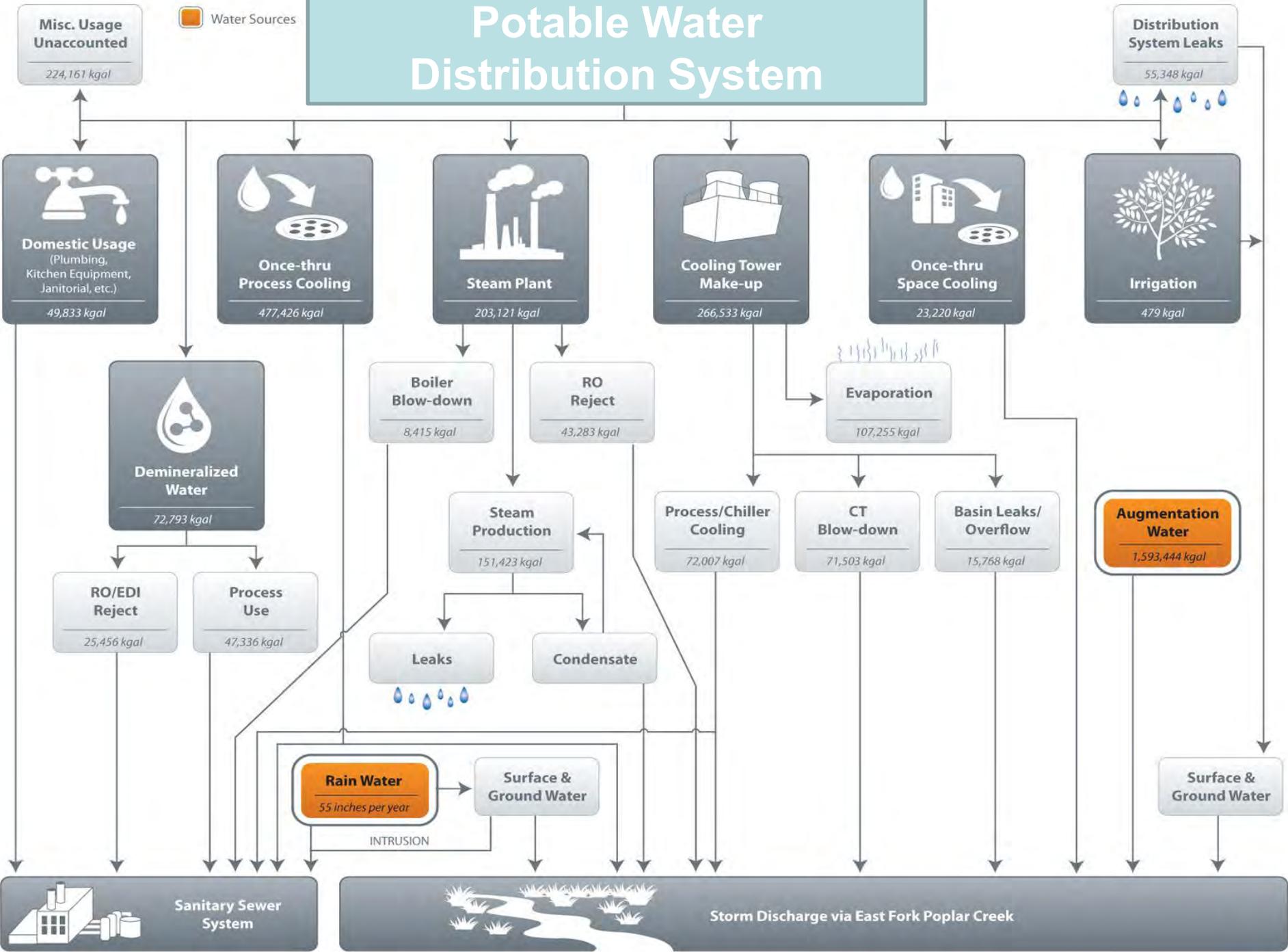
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# Water Balance Example



 Water Sources

# Potable Water Distribution System





# Progress at JBLM and Ft Carson

- **Water balance site visits completed in December 2011**
- **Audited 3.6 million ft<sup>2</sup>**
- **Interviewed key staff from:**
  - **Barracks**
  - **Family housing**
  - **MWR**
  - **Dining**
  - **Central plants**
  - **Operations and maintenance**



JBLM site visit with Mr. Joe Gibbens



# JBLM Net Zero Water Definition

**Eliminate discharge from the Wastewater Treatment Plant to Puget Sound by 2020**



Wastewater Treatment Plant at JBLM  
with Puget Sound in background



# Ft Carson Net Zero Definition

**Reduce freshwater use and increase reclaimed water use to the point that they are equivalent by 2020**



Discharge of treated wastewater to Fountain Creek

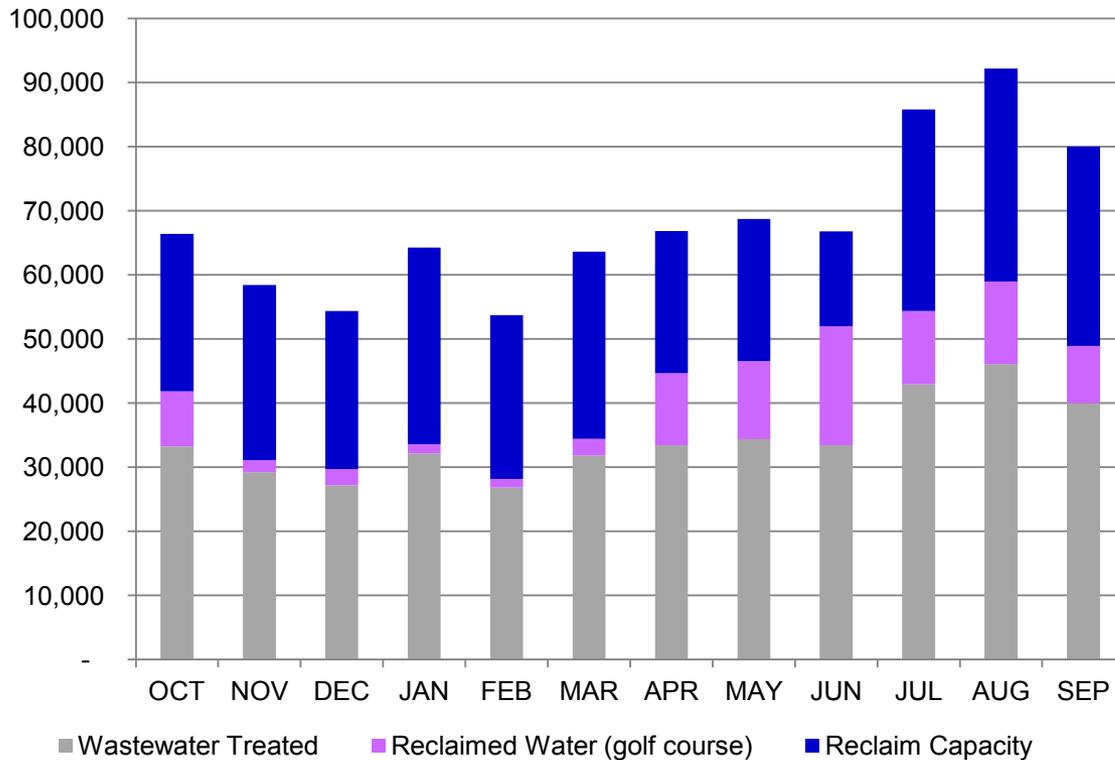


Reclaim Wastewater Plant at Ft Carson



# Ft Carson Reclaim Capacity

## Capacity of Wastewater Treatment Plant to Reclaim Effluent





# JBLM and Ft Carson

## Lessons Learned:

- **Scheduling with the right people has a big effect on success of site visit**
- **Observe buildings of different eras and different remodel activities**
- **Sites may have industrial equipment inventory available for use**
- **Central plant logs tell a story**
- **Operation and maintenance of water-using equipment is critical to know**



Central Vehicle Wash Facility at Ft Carson



# JBLM and Ft Carson

## Initial Observations:

- Domestic plumbing is a large water demand at training-dominated sites
- Irrigation is a significant water use at both sites
- Both sites have remodeled restrooms in older buildings



Renovated bathroom at JBLM

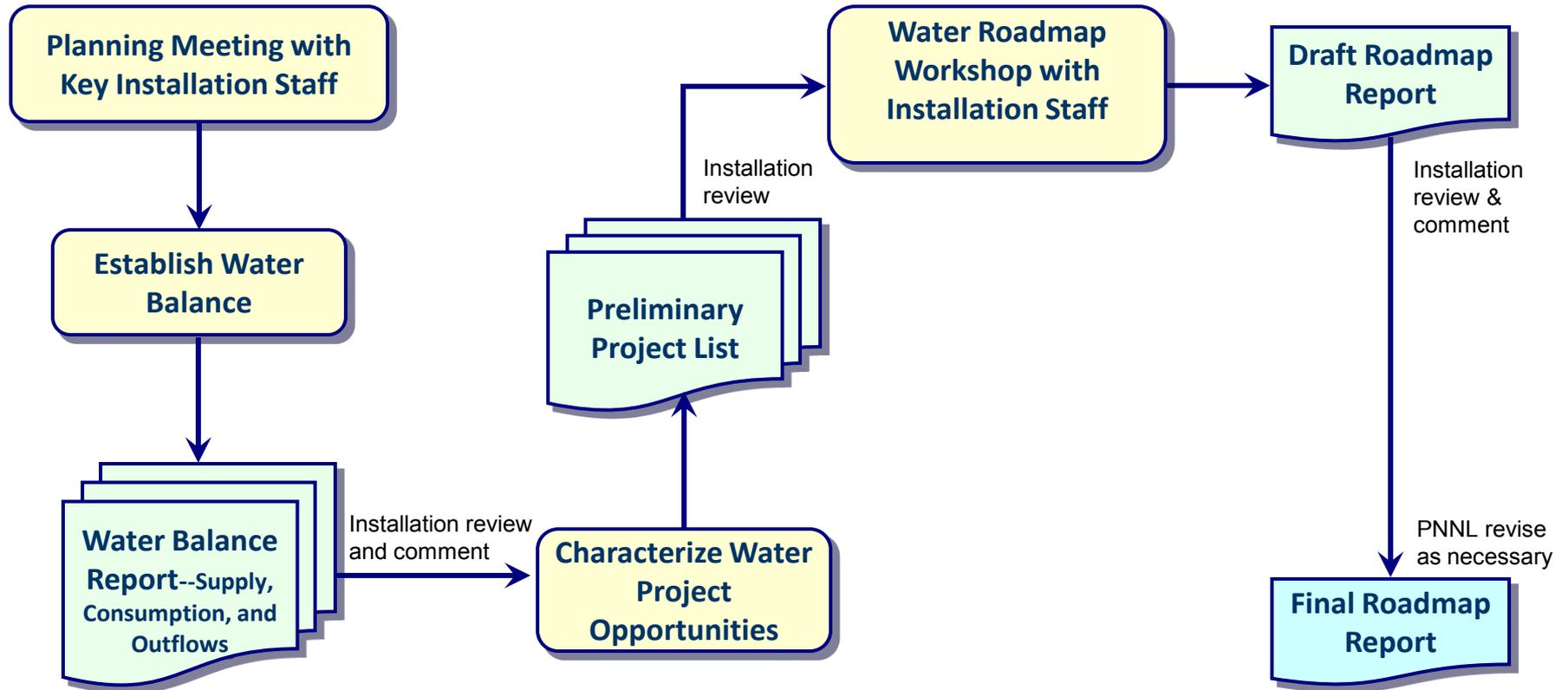


# Water Balance Schedule

Week of:	PNNL	Water Savers
23-Jan	Ft Bliss	Ft Riley
30-Jan		
6-Feb	Ft Buchanan	
13-Feb		Camp Rilea
20-Feb		
27-Feb		Tobyhanna
5-Mar		
12-Mar		Aberdeen



# Roadmap Process





# Roadmap Workshop

## Water Planning Workshop with Installation Staff

Review/correct water balance

Evaluate roadmap projects based upon  
insights from installation staff

Select preferred implementation approach  
and backup approach for each project

Prioritize projects assuming limited resources

Develop time-phased implementation plan  
that will ensure continuous mission readiness

Discussion: improved maintenance practices,  
reducing losses, other ways to improve water  
use efficiency.

