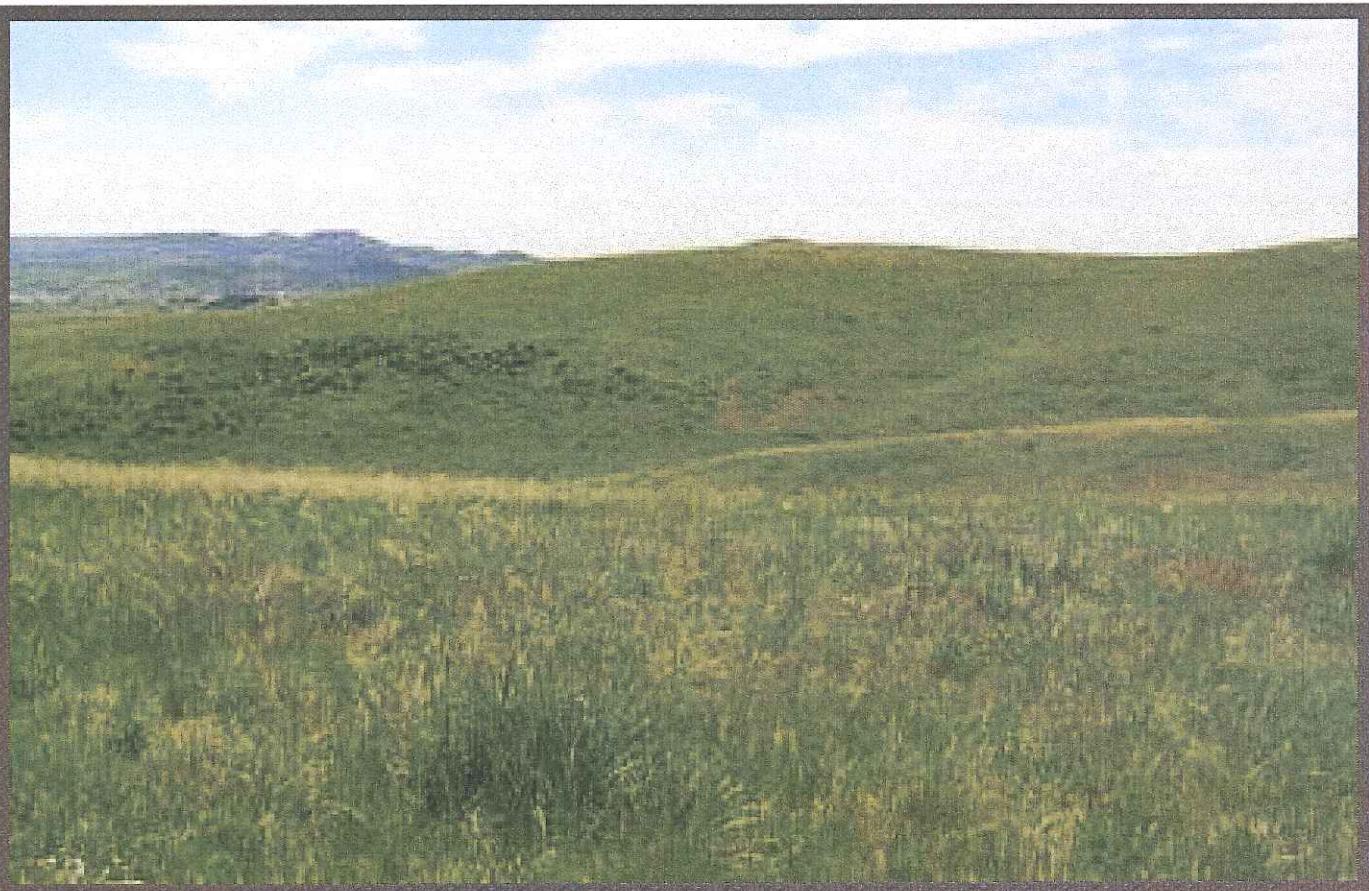
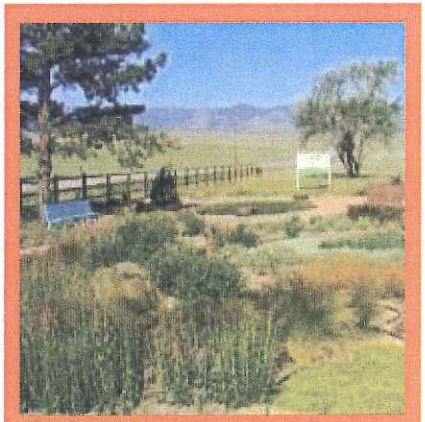


STERLING RANCH RAINWATER HARVESTING AND DEMAND MANAGEMENT

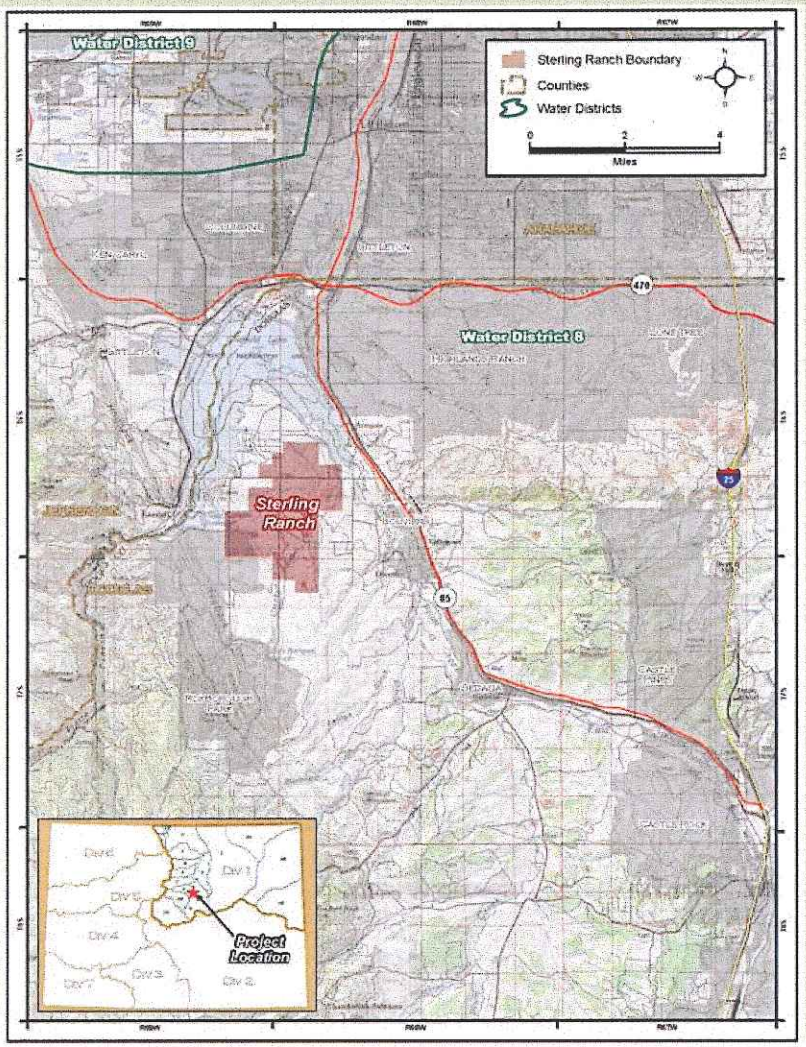


Sterling Ranch Briefing to Joint Ag Committee

3/20/2013

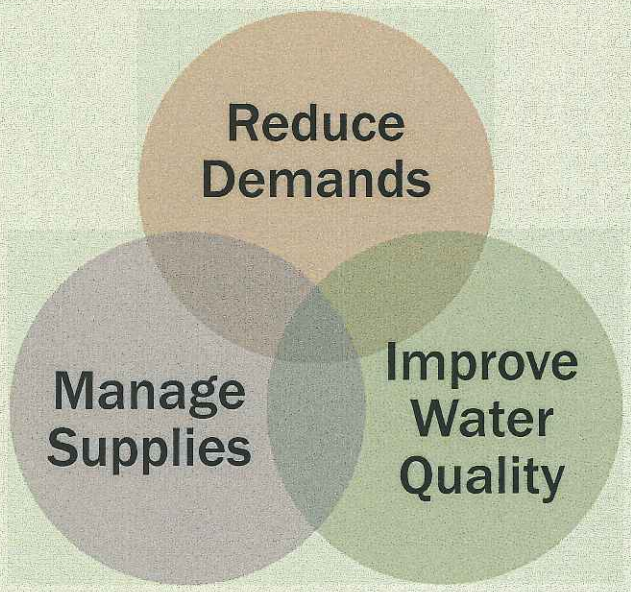
Attachment A

STERLING RANCH – WHO WE ARE



- 21st Century Sustainable Community
- Energy, water, lifestyle
- Recreation & open spaces
- Wildlife corridors
- Low impact development - 37% open space
- Community supported agriculture
- Leading water sustainability
  - Demand reduction incorporated into land plan
  - Rainwater harvesting
  - Storm water management
  - Water quality improvement

COLORADO WATER CHALLENGE



- 57% gap in 2050 municipal & industrial water supply for metro basin (SWSI 2010), or about 60,000 to 90,000 acre-feet/year.
- As the State concluded, the gap can be reduced. New growth has an opportunity to develop in new ways to reduce the gap.
- Sterling Ranch PD Water Plan - *commercial implementation of innovative water practices*:
  - Water demand reduction integrated into land plan with look-back adjustments.
  - Homes will use 1/3 of what Douglas County historically required.
  - Regional water supply solutions with conjunctive use.
  - State's 1st Rainwater Harvesting Pilot (not included in water plan until proven).

DEMAND MANAGEMENT VERSUS CONSERVATION

"Conservation"

- Retroactive
- May not be permanent (e.g. watering restrictions)
- Affects budgets and may require higher rates

Demand Reduction

- Essential for new projects
- Prospective for new systems and projects
- Produces permanent water savings
- Built into financing

RAINWATER HARVESTING

- Capturing natural precipitation – rain, snow, hail – and putting to beneficial use on the land it historically fell on.
- Must be done in a manner that does not injure existing water rights.
- Used effectively in many other states.
- Was used in Colorado for centuries.
- Should improve stream water quality by retaining nutrients and pollutants and keeping them out of the streams.
- Should result in lower water and stormwater costs to homeowners.
- Local application of rainwater saves significant water and energy costs compared to other renewable options in South Metro area.

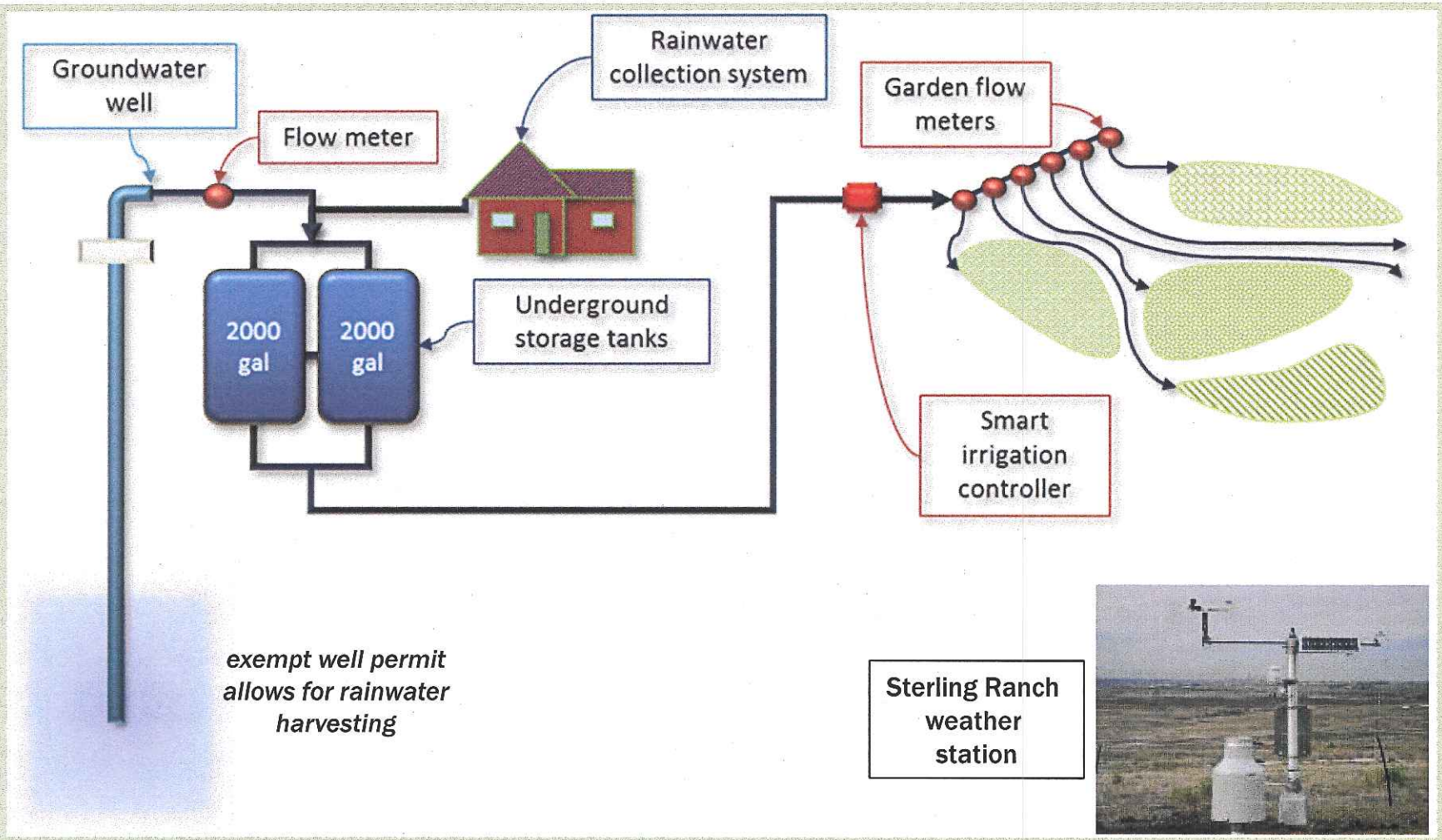
STERLING RANCH TECHNOLOGY DEMONSTRATION CENTER

- Rainwater harvesting
- Waterwise landscaping & edible gardens designed by DBG
- Irrigation technology

PRELIMINARY FINDINGS

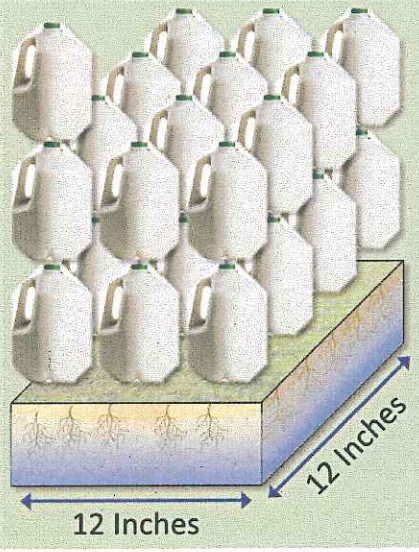
- Water Demand Management when incorporated into Land Planning Dramatically Reduces Consumption at the Home
  - 50% or more reduction over traditional lawn
  - Has a Colorado aesthetic that is pleasing to home builders and buyers
  - Can reduce the homeowner's cost of water even if water prices are high
- Rainwater Harvesting
  - A materially important water source when used with water demand management
  - Reliable water source relative to other renewable water supplies
  - Produces significant water even during drought conditions
  - Improves water quality
  - Is very cost efficient when used with stormwater management

TECHNOLOGY SITE LAYOUT

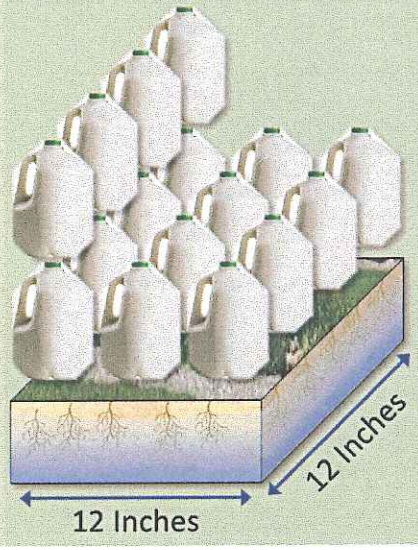


DEMAND MANAGEMENT EXAMPLES

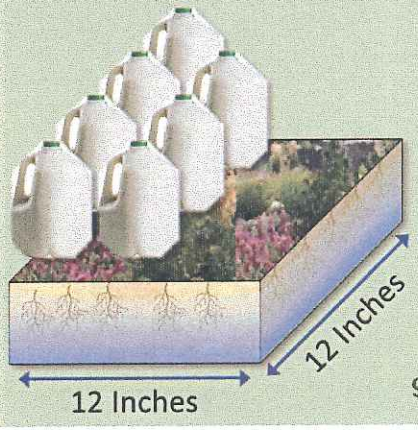
Traditional, 25 gallons



Moderate Conservation, 16 gallons

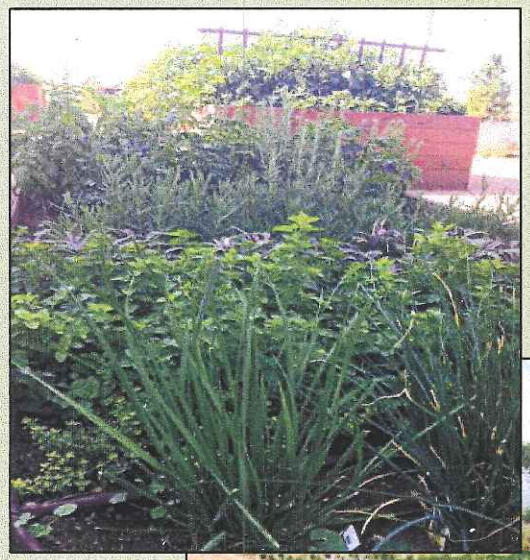


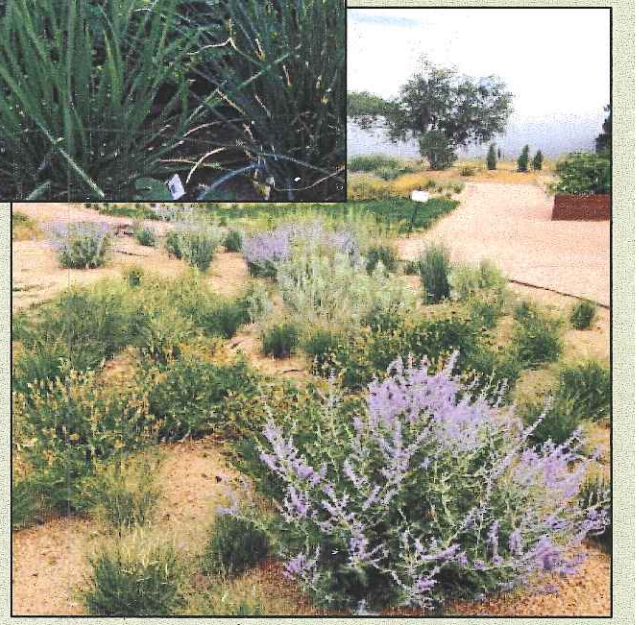
Waterwise, 7 gallons



2012 DEMO SITE RESULTS

- Record heat, temps 2-4°F above avg.
- Summer precip 40% below avg.
- Landscape stressed, came back by end of season; plants and shrubs handled prolonged heat better than irrigated turf.
- Overall water use ~12.5 gal/ft^2
  - ~30% less than Sterling Ranch Water Plan value, and
  - >50% less than usage for a typical landscape.
- Another year of data with 2013.



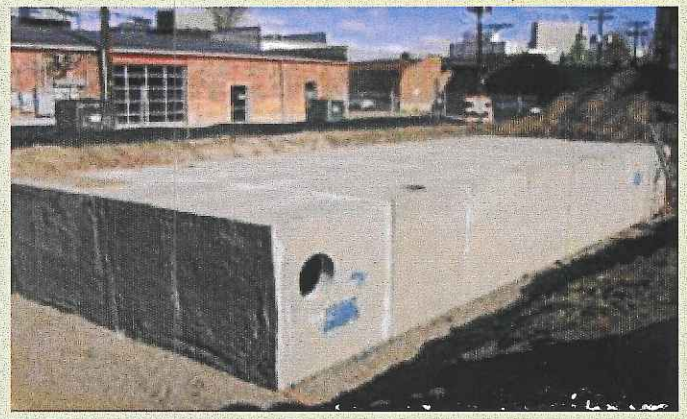


2012 RAINWATER CAPTURE

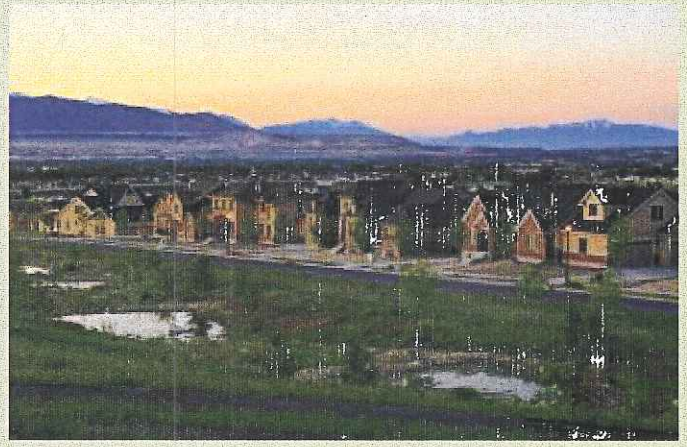
- ~9,600 gallons captured during 2012 water year (Nov to Oct, 14.9 inches).
  - 85% of average annual precipitation.
  - Volume = ~1/3rd demand of 1,500 sq-ft of irrigated area of a typical Sterling Ranch waterwise home.
- ~1/3rd of volume captured during the non-irrigation season.
- Cisterns filled and spilled in the spring.
- Hail storms may be a challenge with cistern capture.
- No problems with quality of captured water.

BEYOND INDIVIDUAL CISTERNS

- Regional systems make rainwater harvesting economically viable.
- Can be integrated into an enhanced storm drainage system:
  - Increase long-term storage capacity
  - Pond liners to reduce seepage losses
  - Reduce nutrient stream loading
- Targeted regional precipitation collection system could have captured ~480 acre-feet in 2012
  - About 1/4 of the annual outdoor demand at build-out.
- Current models show regional collection could save thousands of dollars per ac-ft over potable supply for irrigation. More data to refine.



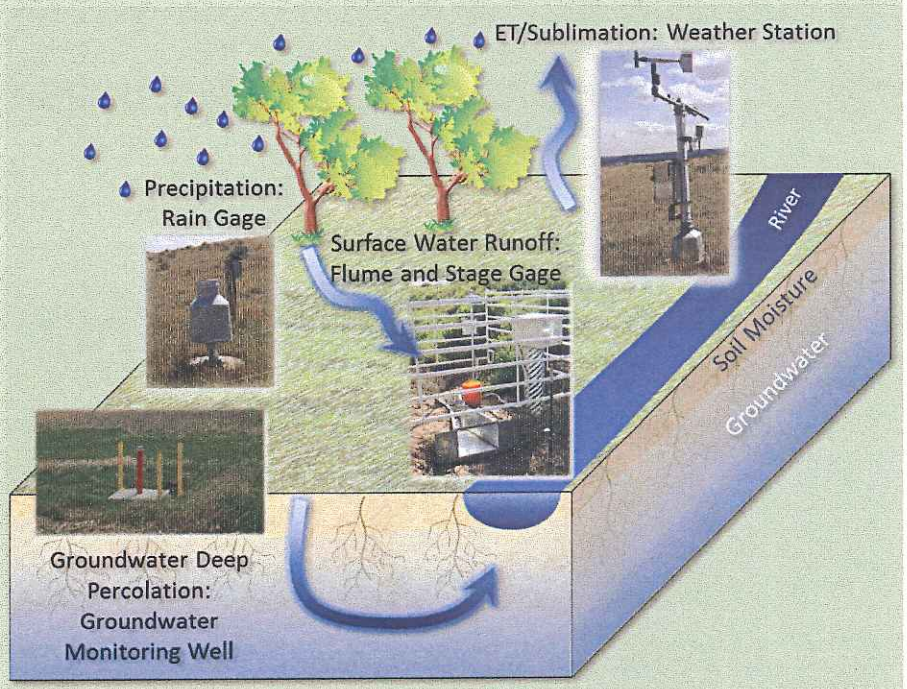
Underground Storage in Denver Metro Area source: Precast Concepts



Alternative to Cisterns – Regional Collection

PROGRESS TOWARD OBTAINING A WATER RIGHT

- Quantifying pre-development return flows from precipitation to create a plan that protects existing water rights:
  - Weather station (ET and precipitation) installed March 2010;
  - Surface water runoff monitoring started in June 2011;
  - Groundwater monitoring wells installed September 2011.
- Data will support a water court application for an augmentation plan.



RUNOFF UNDER NATURAL CONDITIONS

- Surface water monitoring station on Upper Sterling Gulch.
- Additional trail cameras to document real-time runoff from site at Titan Road.
- No runoff from site at Titan Road in 2011 or 2012.

NEXT STEPS

- Develop and analyze rainwater harvesting data under the existing law and prepare for an augmentation plan.
- One more year of data from the technology demonstration site on both rainwater and demand management.
- More research into the impact of rainwater harvesting on stream water quality.
- Study the operational integration of rainwater harvesting into stormwater management.
- Planning full scale development using both Demand Management and Rainwater Harvesting at Sterling Ranch.

DISCUSSION