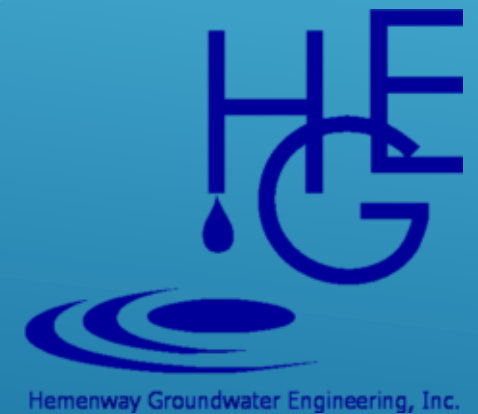


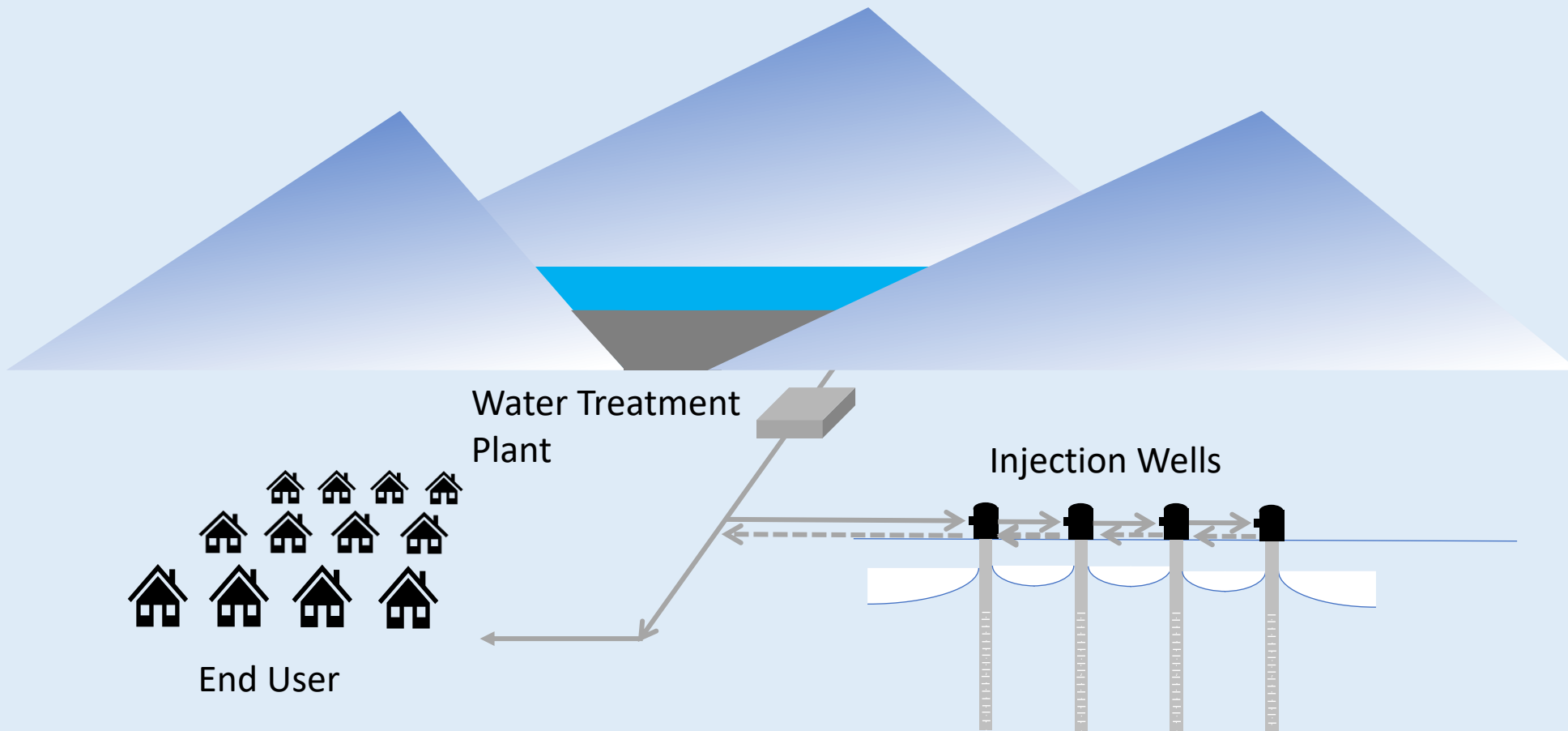
ALLUVIAL SUBSURFACE WATER STORAGE

Subsurface Water Storage Symposium

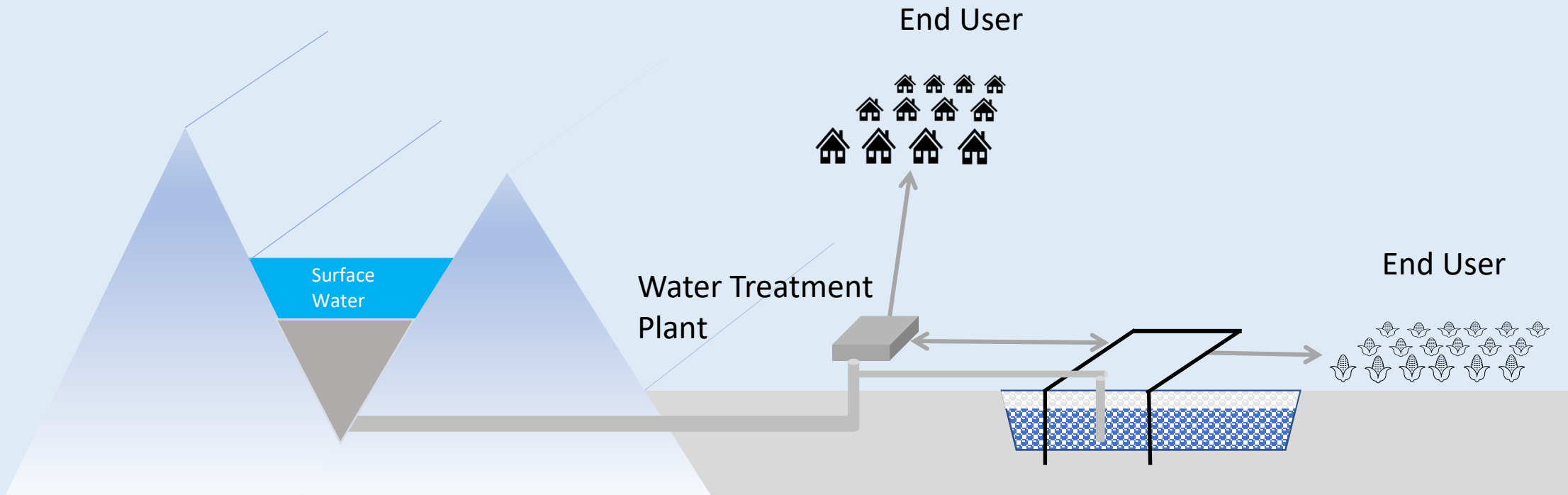
February 22 – 23, 2024

CSU Spur Campus

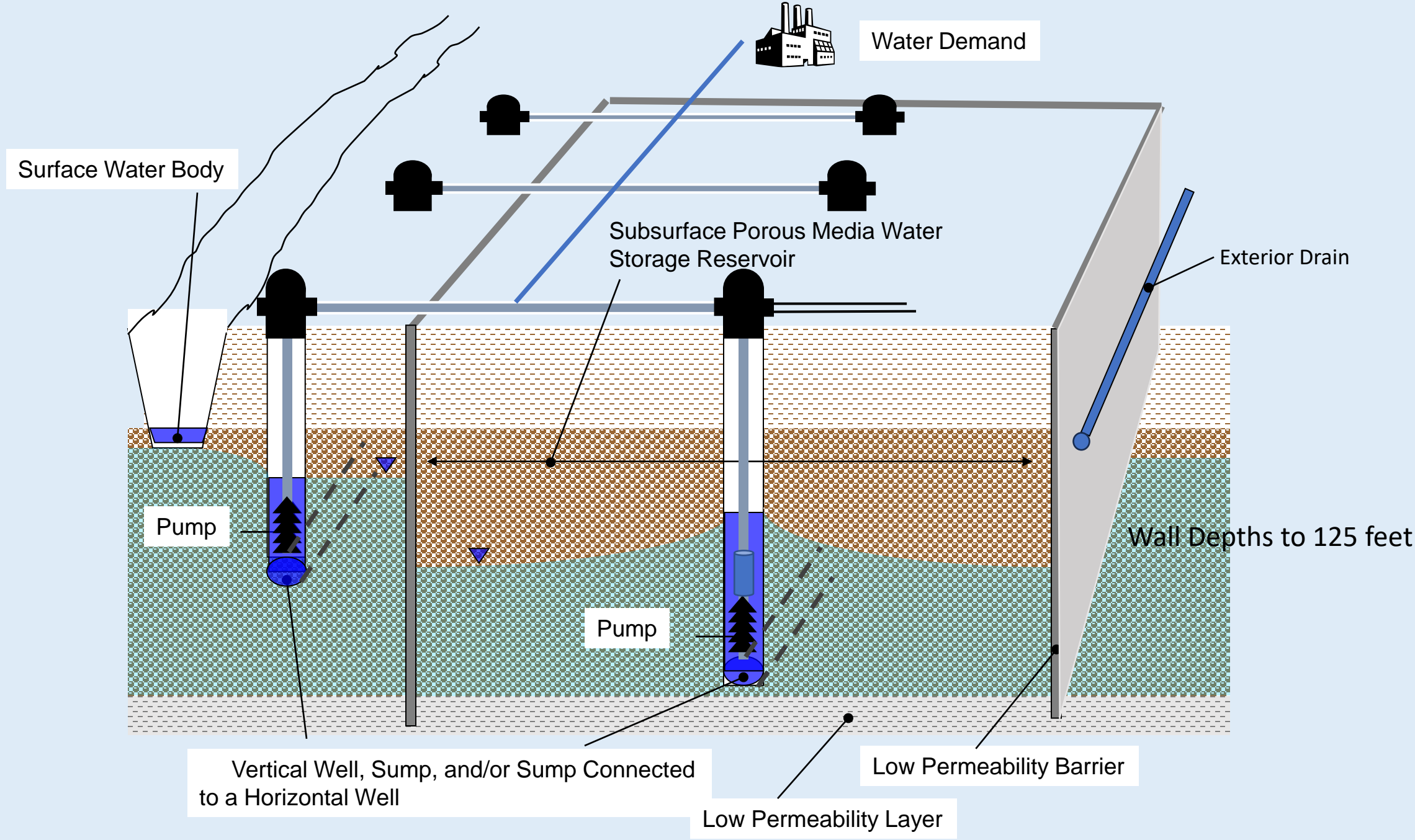




Symposium Icon – Traditional Aquifer Storage and Recovery



Alluvial Subsurface Water Storage



BENEFITS OF ALLUVIAL SUBSURFACE WATER STORAGE

1. No evaporation

* Salvaging evaporation saves water; salvage costs can pay for projects.

2. Lower cost versus traditional surface water storage

* Costs less than 10% of traditional surface water storage projects.

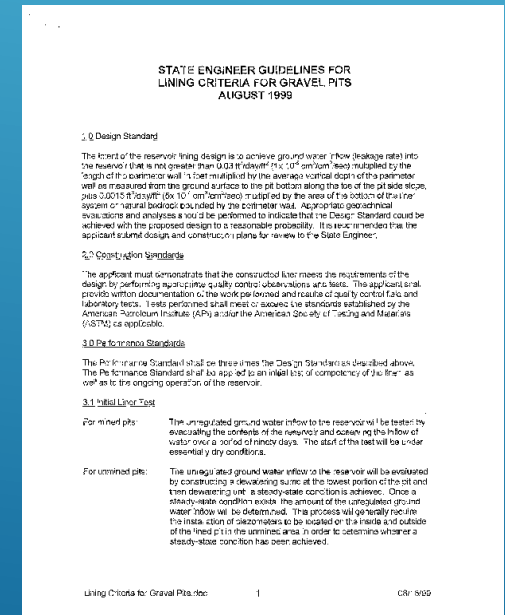
3. No loss of stream sections or large surface areas

4. Permitting straightforward, relatively fast, and economical

* No EIS – NISP permitting 2004 -2022

* Clear State Engineer Office permitting guidelines

* Months, not years to permit



BENEFITS OF ALLUVIAL SUBSURFACE WATER STORAGE

5. Flexible through modular development
 - * Responds to economic conditions and needs.
6. Minimal land disturbance



PHOTO FROM DEWIND ONE-PASS TRENCHING

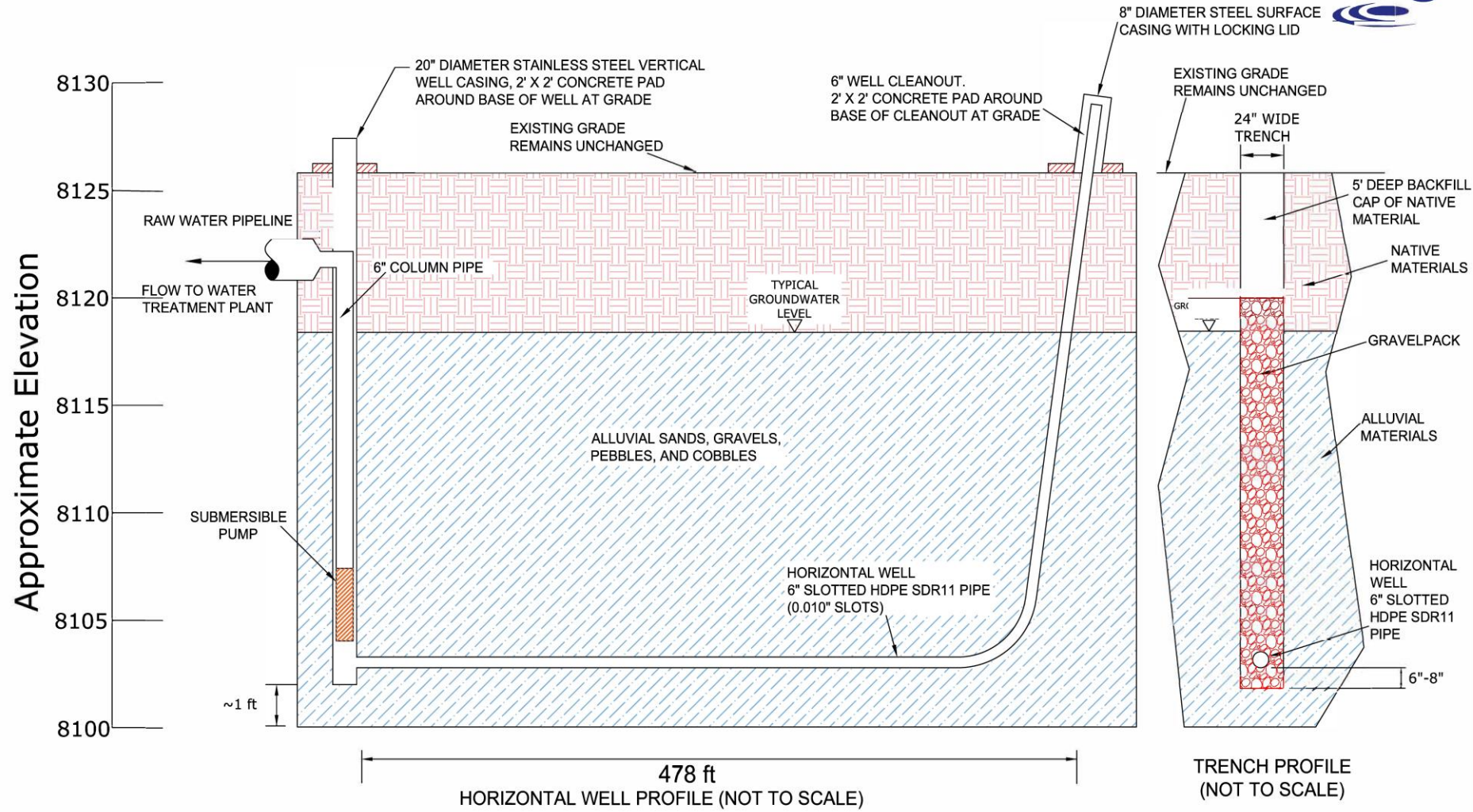


PHOTO FROM DEWIND ONE-PASS TRENCHING

BENEFITS OF ALLUVIAL SUBSURFACE WATER STORAGE

4. Flexible development through modular construction
 - *Responds to economic conditions and needs
5. Minimal land disturbance
6. Secure water storage in a shallow alluvial system
7. Minimal contamination concerns or mixing with native groundwater
8. Can be developed in a wide range of alluvial aquifer systems.
9. Vertical or horizontal wells can be used for high-capacity flows into and out of alluvial storage reservoirs.

Horizontal Well BVH-1 Schematic Town of Buena Vista, CO



SHALLOW ALLUVIAL HIGH-CAPACITY HORIZONTAL WELL

HORIZONTAL WELL INSTALLATION



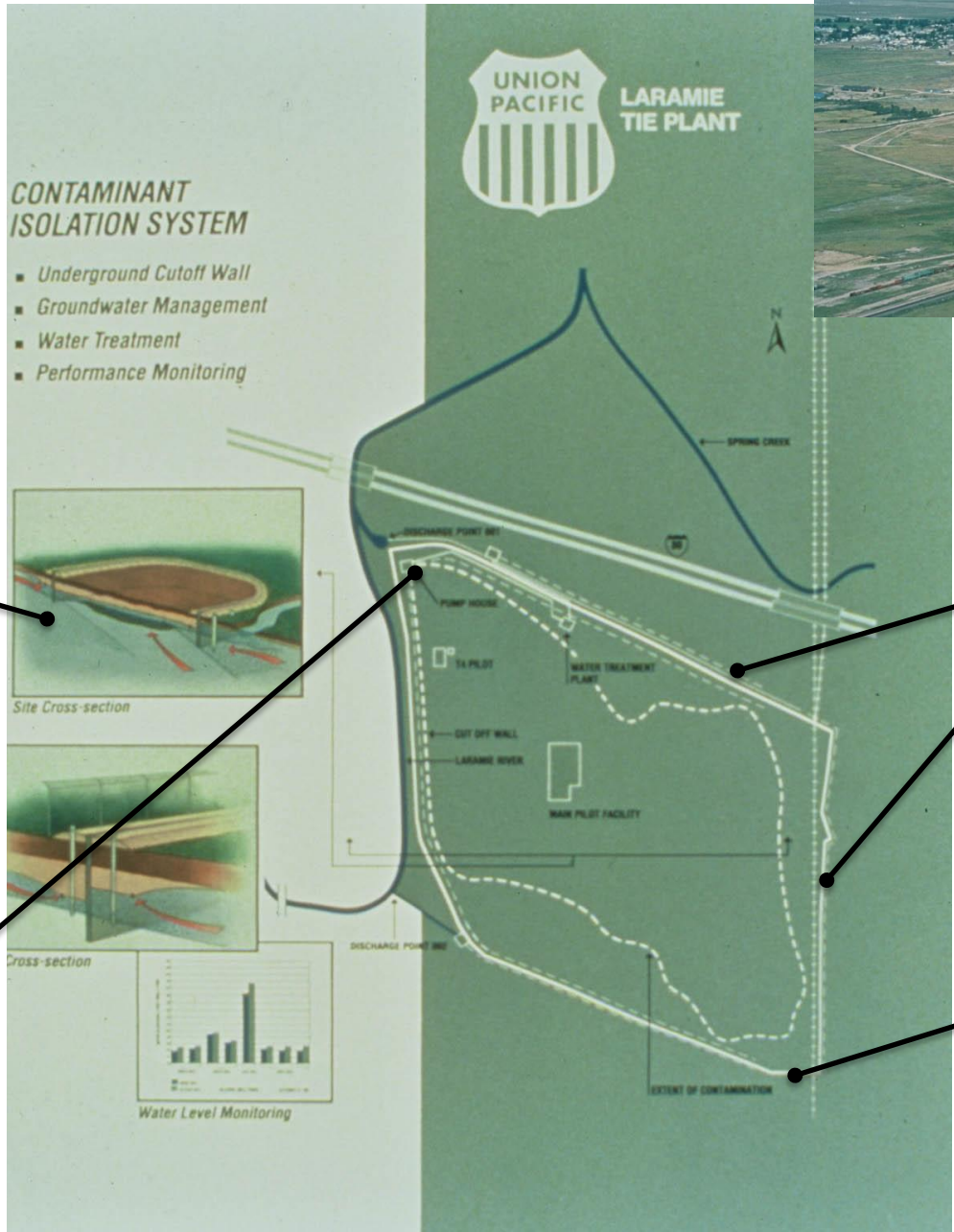
RELIABILITY, DURABILITY, AND LONGEVITY OF ALLUVIAL SUBSURFACE WATER STORAGE FACILITIES

1. No impact from stream flows with debris from forest fires
2. No loss of storage due to sedimentation over time
3. Minimal maintenance
4. Minimal surface facilities minimizing security issues and visual impacts
5. Long-lasting storage

Case History: Laramie Tie-Treating Facility



1986 to Present Day



Wall keyed into aquitard to control in-out hydraulic connection

Exterior drains to control water

~8,000 linear feet of interior drain for control of groundwater tied to a common sump for pumping

10,000 linear ft Bentonite slurry wall for hydraulic isolation of alluvium



► Questions?

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