Six-Month Operational Test of Testing Well TW-E at Owens Lake

Joint Meeting of the Habitat and Groundwater Working Groups
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HH WATER RESOURCES · M2 Resource Consulting · LA DWP Los Angeles Department of Water & Power · Stantec · FORMATION ENVIRONMENTAL

Discussion Points

- **What** is proposed
- **Why** it is proposed
- **When** is it proposed
- **What** will be monitored
- **How to** safeguard groundwater-dependent resources

The complete plan is available at:

www.ladwp.com/olg

The Owens Lake Groundwater Development Program (OLGDP)

- **The OLGDP is an integral part of the Owens Lake Master Project**
- **Builds on groundwater studies at the lake begun in the 1990s, with intensive studies since 2009**
- **Involves extensive monitoring infrastructure and groundwater modeling**

Key Aspects of the OLGDP:

- Ensure protection of groundwater-dependent resources
- Utilize adaptive management strategy
- Begin slowly and carefully

Why Supplement Dust Mitigation with Groundwater?

- Groundwater will provide:
  - ✓ Reliability,
  - ✓ Redundancy
  - ✓ Operational flexibility
- Aligns with state-wide water supply perspective to conserve water and reduce deliveries from the Bay Delta

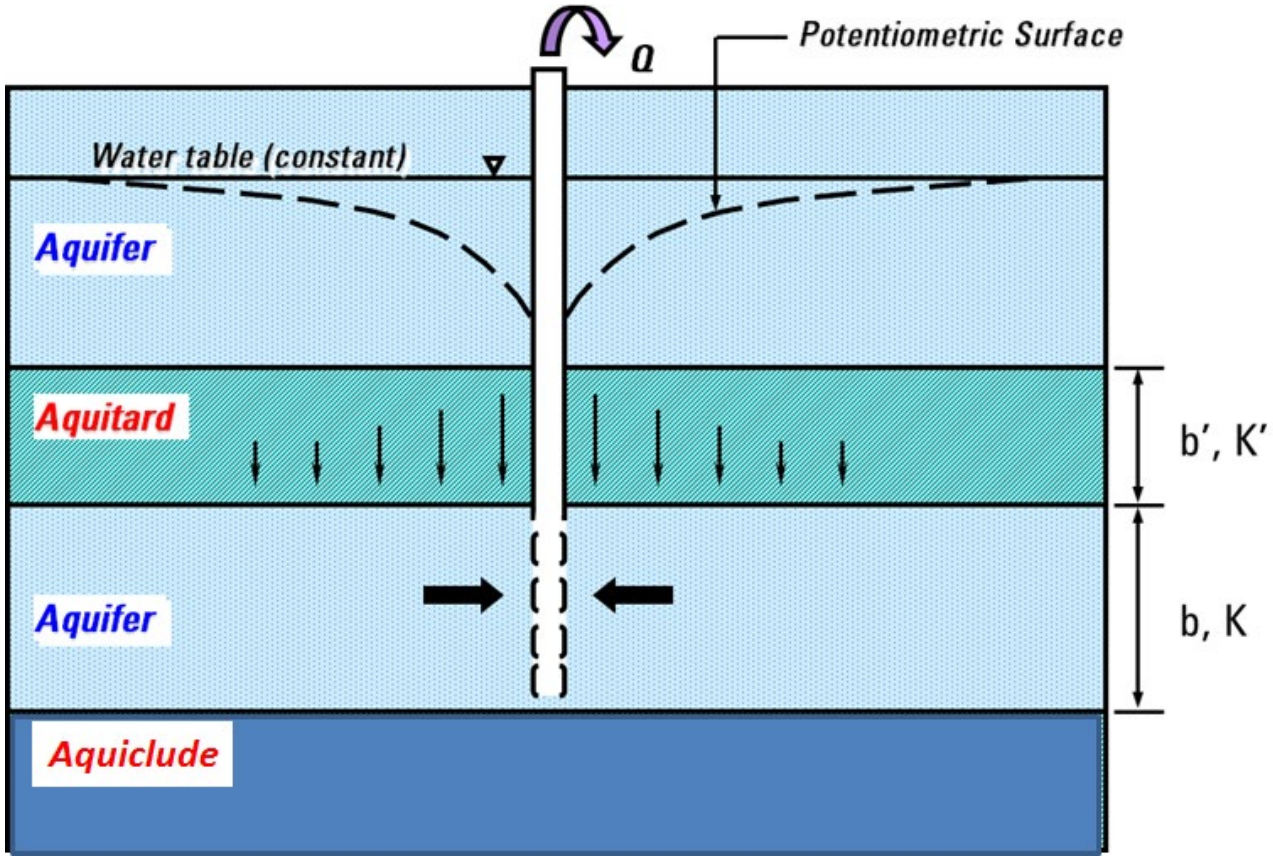
What is Proposed?

- Pump TW-E for 6 months at a rate of 3 cfs
- Water will discharge to the adjacent ponds (not for export)
- Extensive continued monitoring will be conducted before, during, and after the test
- Planned to start late September 2021

Why TW-E?
Test Rate Rationale?

- Previous testing was incomplete
- Depth and location are ideal to observe effects of faults
- The test will mimic the season and timing of potential use of groundwater

Why are We Proposing Testing?



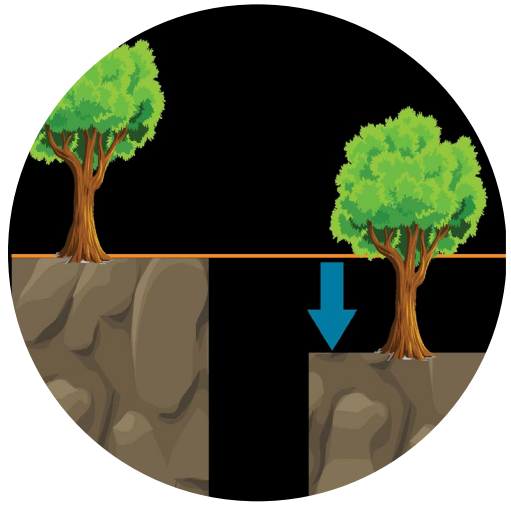
- To improve understanding of the effect of faults on groundwater flow and deeper aquifer characteristics
- To resolve data gaps associated with faults
- Improve conceptual and numerical (computer) models
- Assist in developing more robust measures to protect groundwater-dependent resources

What Do We Mean by “Groundwater-Dependent Resources”?

Non-LADWP Wells

Springs, Seeps, and Meadows

Vegetated Dune Areas



Potential for Subsidence

Extensive Monitoring is Proposed

Number of Sites	Type of Monitoring
1	Water Levels in Pumping Well
139	Water Levels in Monitoring Wells (primary & secondary)
26	Surface Water Flow Measurements in Flumes
7	Meteorological Sites
5	Ground Elevation Sites
15	Groundwater Quality Sites
22	Groundwater Quality Constituents
Entire Area	Before/After Vegetation Monitoring

Primary Monitoring Wells

- Deep and shallow
- 91 primary wells
- Includes VDA wells

Secondary Monitoring Wells

- Deep and shallow
- 49 secondary wells
- Current monitoring continues

Flume and Meteorological Sites

- Surface flow
- Weather observations

Proposed Monitoring Frequency

Type of Monitoring	Frequency
Water Levels in Pumping Well	1 minute to 4 hours
Water Levels in Monitoring Wells	Every 4 hours
Surface Water Flow Measurements in Flumes	Hourly
Meteorological Sites	Hourly
Ground Elevation Sites	1 month prior, 3 and 6 mos. after starting
Groundwater Quality Sites	Before test, at end of test
Before/After Vegetation Monitoring	Before test, after test

Data Download Interval

- Data from **24 trigger** wells will be downloaded and compiled after 24 and 72 hours, then weekly thereafter

- Data from **91 primary** monitoring wells will be downloaded at 1, 3, 5, 8, 11, 14, 17, 20, 23, 26 weeks after start of test

Public Reporting Interval

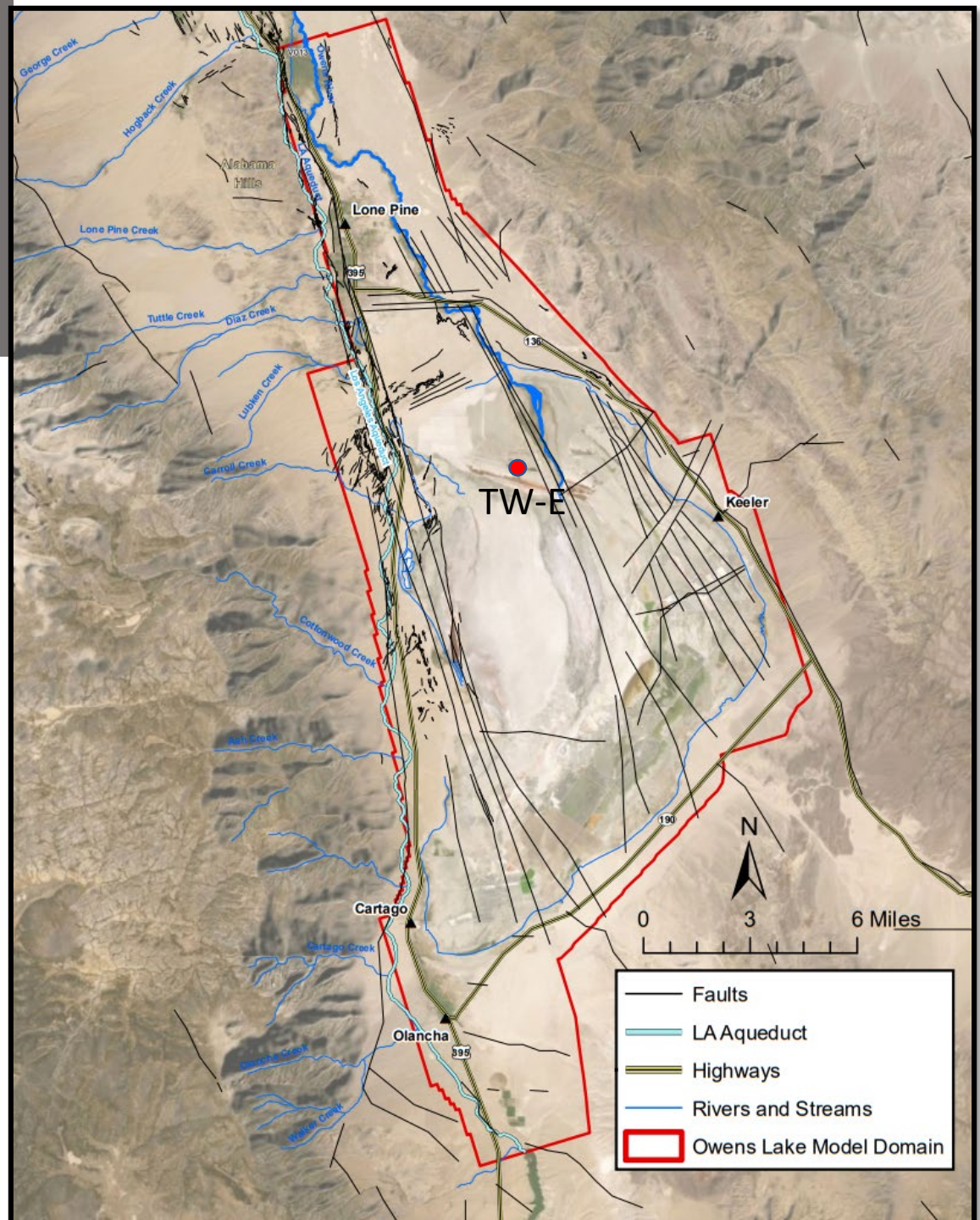
- Downloaded data will be **available to the public** within 10 business days via website (www.ladwp.com/olg) or email

- Adverse **trends** that appear to be leading toward a trigger value will be reported when they are observed

- **Management actions** based on adverse trends will include increasing the monitoring frequency, and/or decreasing the pumping rate at TW-E

How Was the Groundwater Model Used to Plan the Test?

- Define the area of influence
- Simulate effect of pumping
- Assist in development of the monitoring plan



What Are Triggers?

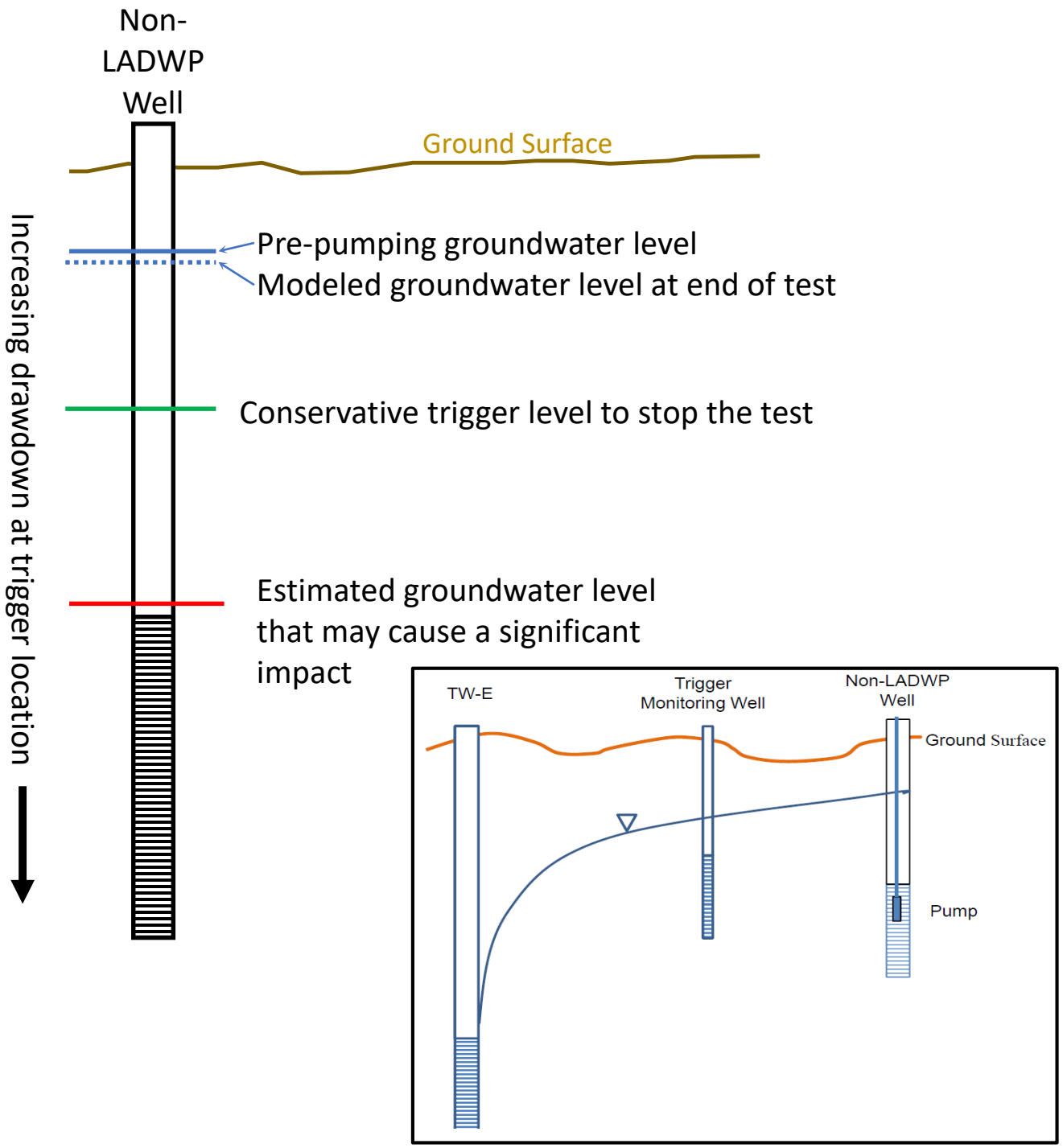
- **PURPOSE:** To set a quantitative change in groundwater levels to protect the environment

- **HOW DO YOU DETERMINE A TRIGGER?:**
  - ✓Estimate the point at which an adverse condition will occur
  - ✓Make sure you have appropriate monitoring facilities in place
  - ✓Set a limit which is much more conservative than would cause an adverse condition

- **WHAT HAPPENS IF THE TRIGGER IS REACHED?:** The operational test is stopped

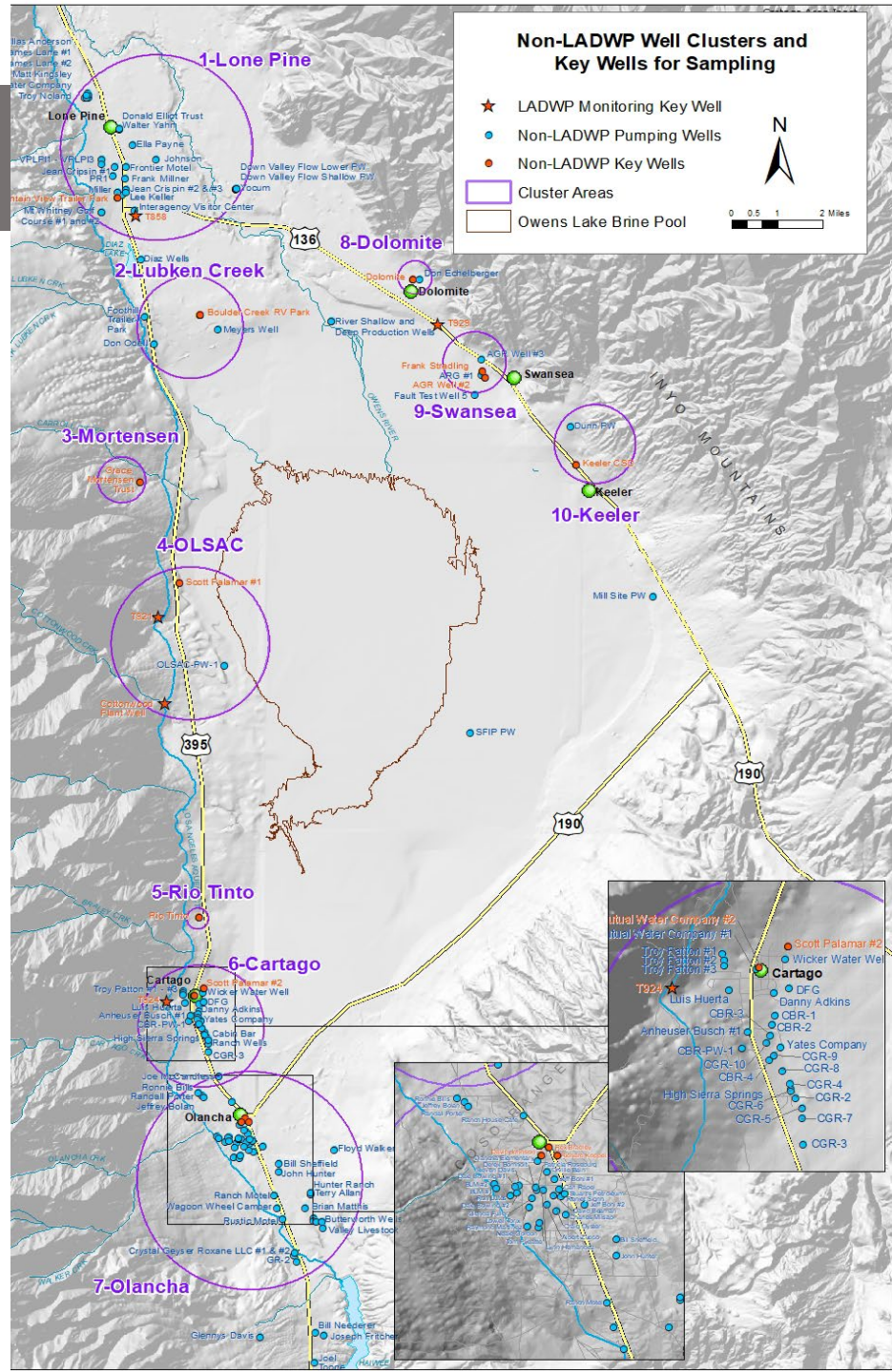
TRIGGER: Non-LADWP Wells

- Designed such that well owner's water supply is not affected
- Monitoring closer to the pumping wells more is conservative



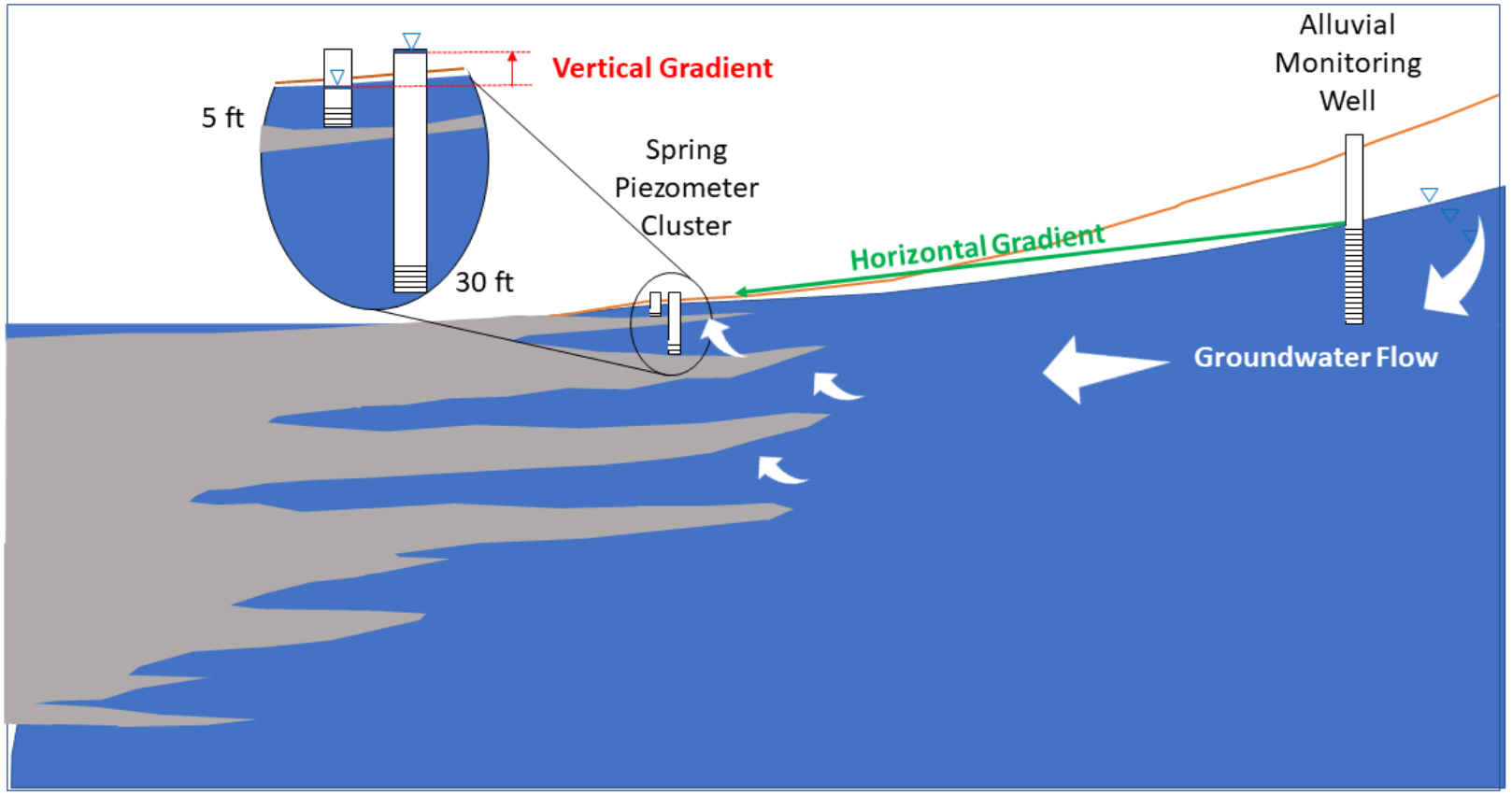
Setting Trigger Levels in Non-LADWP Wells

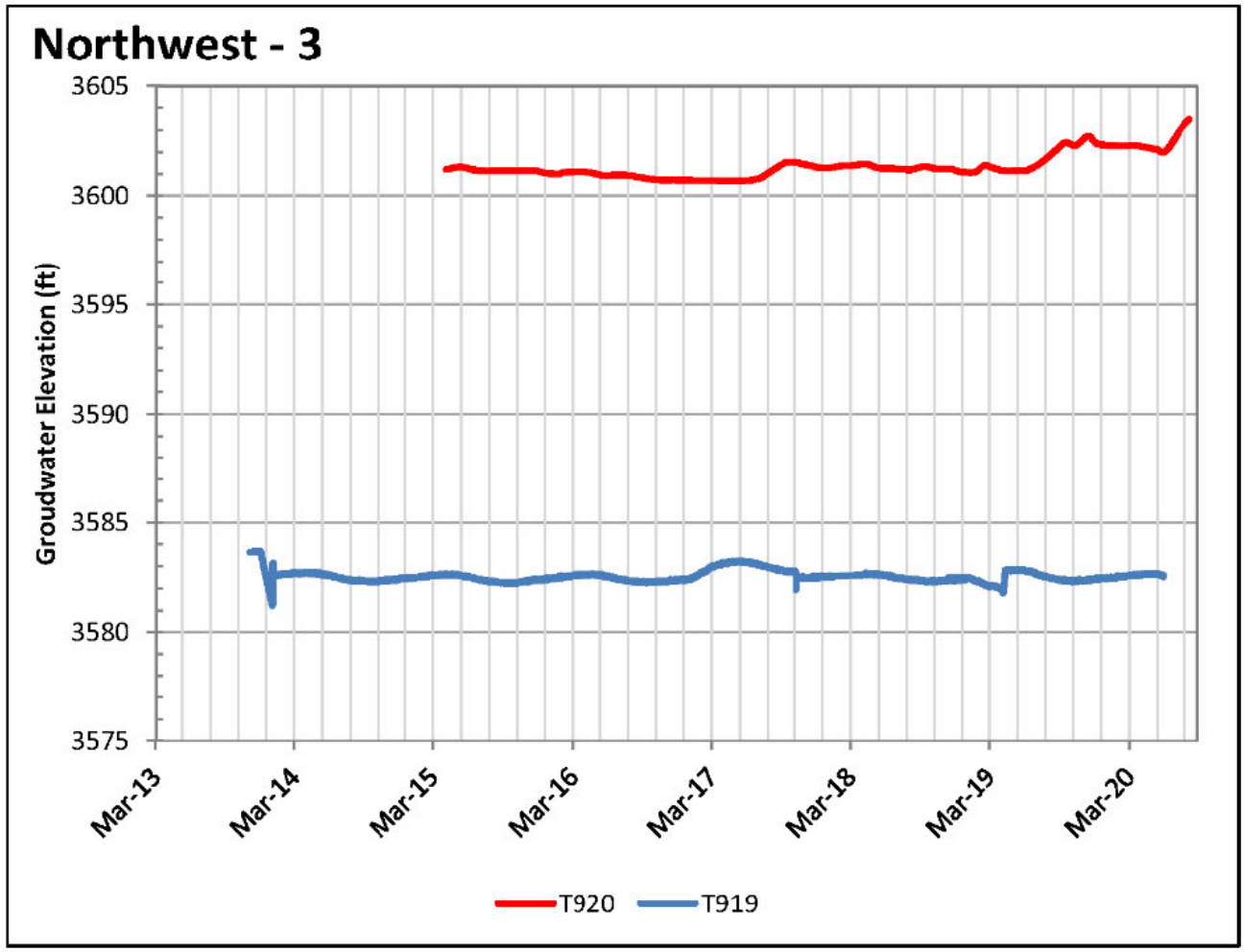
Well Name	Top of Screen (depth-ft)	Static Water Level (depth-ft)	Water Column Above Top of Screen (ft)	Trigger Level Based on Each Well (drawdown, ft)[1]
Jean Crispin #2	60	12	48	24
Don Odell	145	37	108	54
Don Echelberger	100	50	50	25
Stradling	43	0	43	21
Mortensen	300	275 (estimated)	25	12
Keeler CSD	51	41	10	5



TRIGGER:
Springs and Seeps

- Monitoring of vertical and horizontal flow
- Drawdown based on the historical range of variation at springs
- Spring flow is always maintained





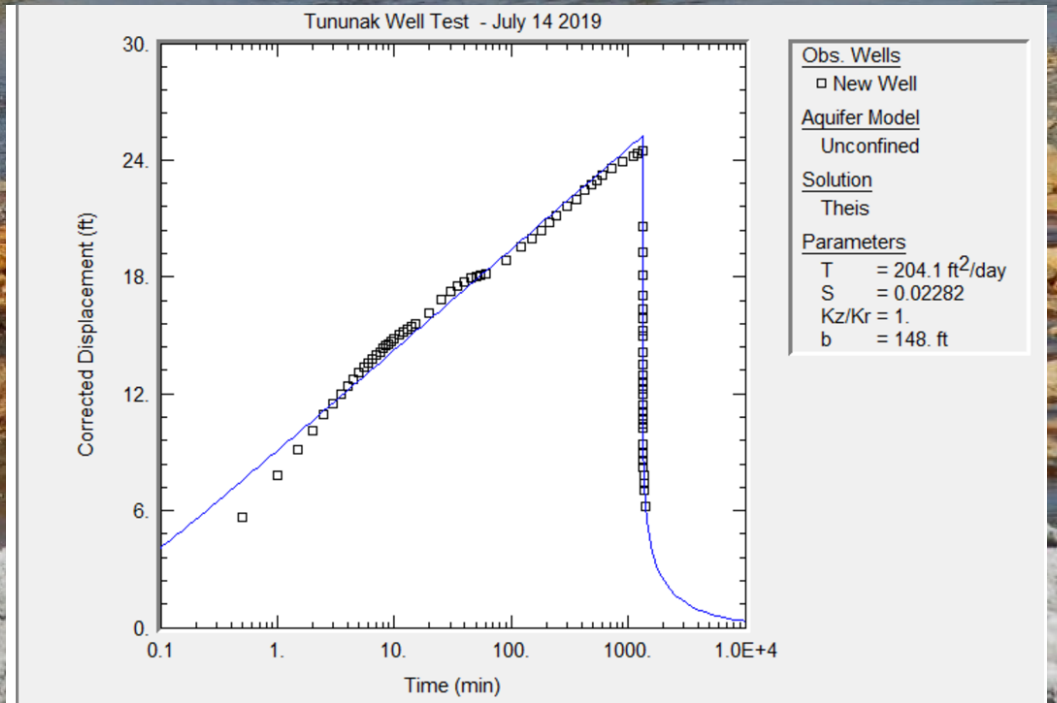
Example of Horizontal Gradient Monitoring Between T920 and T919

TRIGGER: Vegetated Dune Areas

- No more than 1 foot of drawdown due to pumping is a conservative trigger level based on literature review
- On-going studies are in progress to develop more robust protection protocols
- New monitoring wells have been constructed for VDAs

Data Analysis

- Graphical analysis
  - Hydrographs
  - Contour maps
- Specialized software to calculate aquifer parameters
- Groundwater model calibration
- Spatial analysis where response is measurable



Why develop groundwater to supplement dust mitigation?

It is an integral component of the Master Project because:

- **It provides for reliability and redundancy in dust mitigation**
- **It conserves critical potable water supplies**

Why conduct testing at TW-E?

- **Improve understanding of the aquifers**
- **Improve the understanding of how fault zones act as barriers**
- **Evaluate potential changes in shallow groundwater quality**
- **Utilize data collected to update and recalibrate the Owens Lake groundwater model**

The field data collection and improved groundwater model will greatly improve our ability to protect groundwater-dependent resources.

How will resources be protected?

- Short, finite period of operation
- Pre-test simulation with groundwater modeling
- Extensive and comprehensive monitoring
- Conservative triggers to protect groundwater dependent resources
- Winter operation during the dormant season

Thank you!
Questions and Comments?