

# Review of GeoScience's Groundwater Extraction Simulations for the Proposed CalAm Monterey Peninsula Water Supply Project

Preston Jordan, Christine Doughty,  
and Curt Oldenburg

1 September 2016



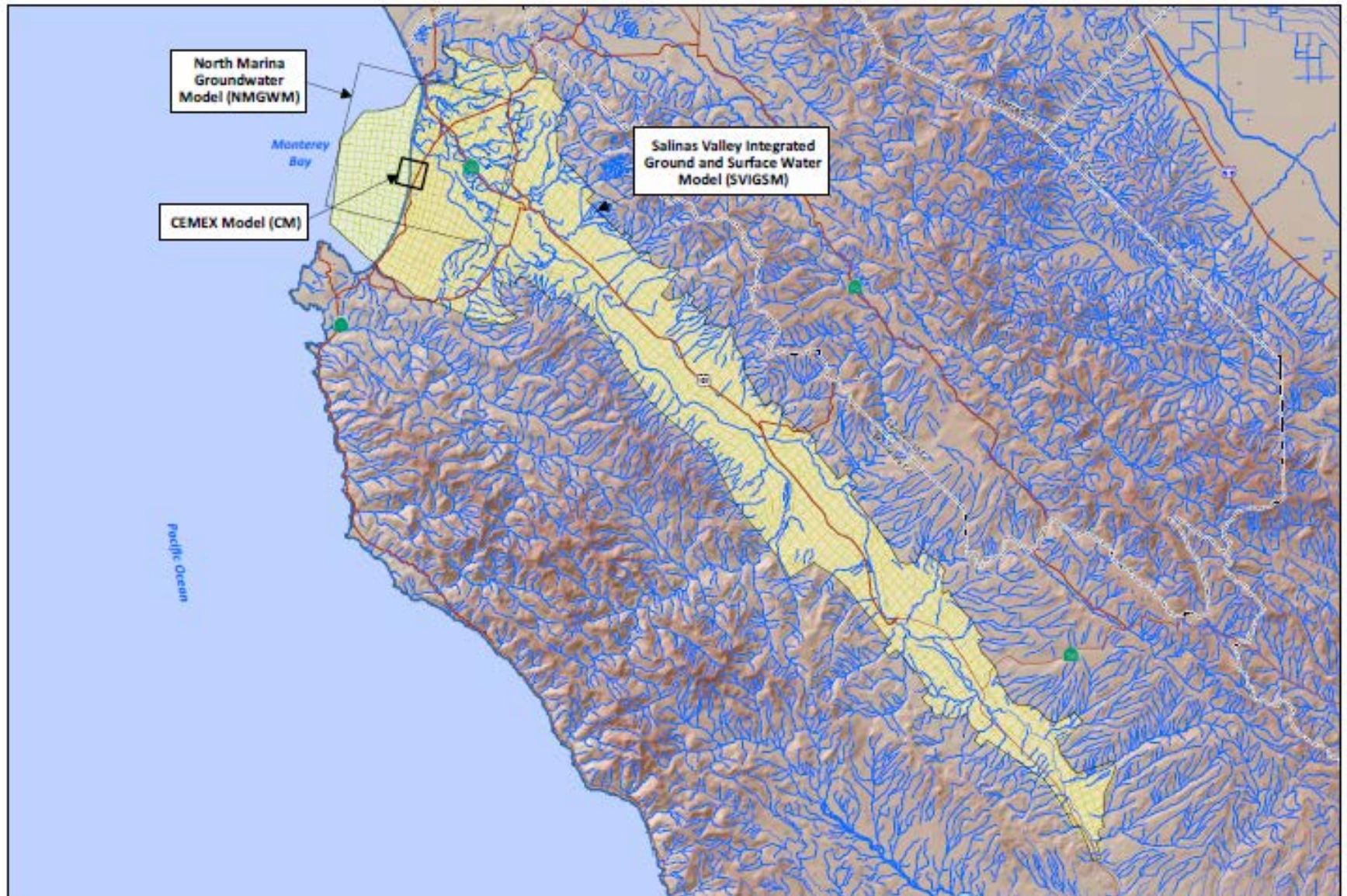
EARTH &  
ENVIRONMENTAL  
SCIENCES



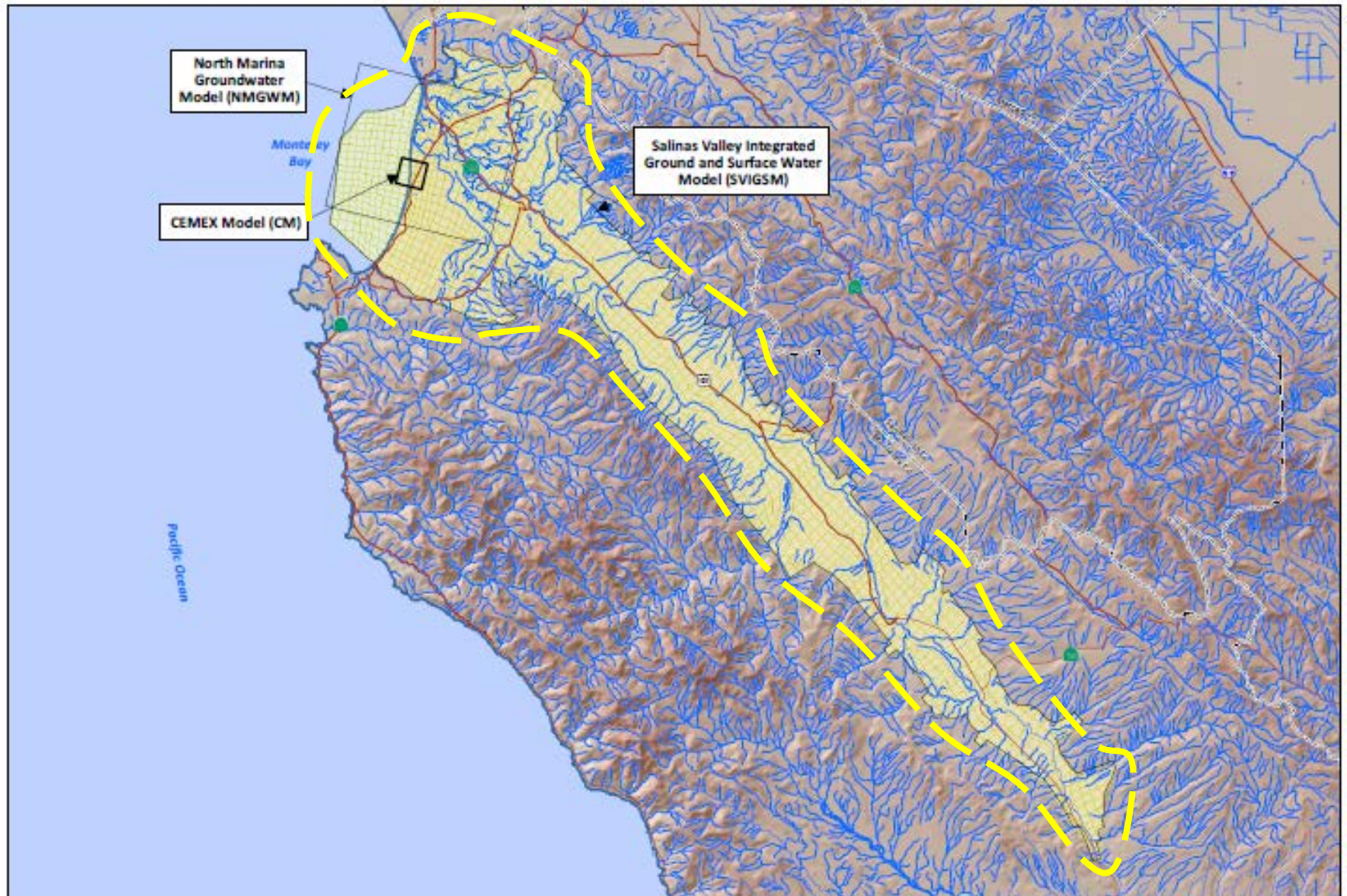
# Topics

- Given simulation inputs, verify outputs
- Review hydrostratigraphy used in simulations
- Review parameters used in simulations

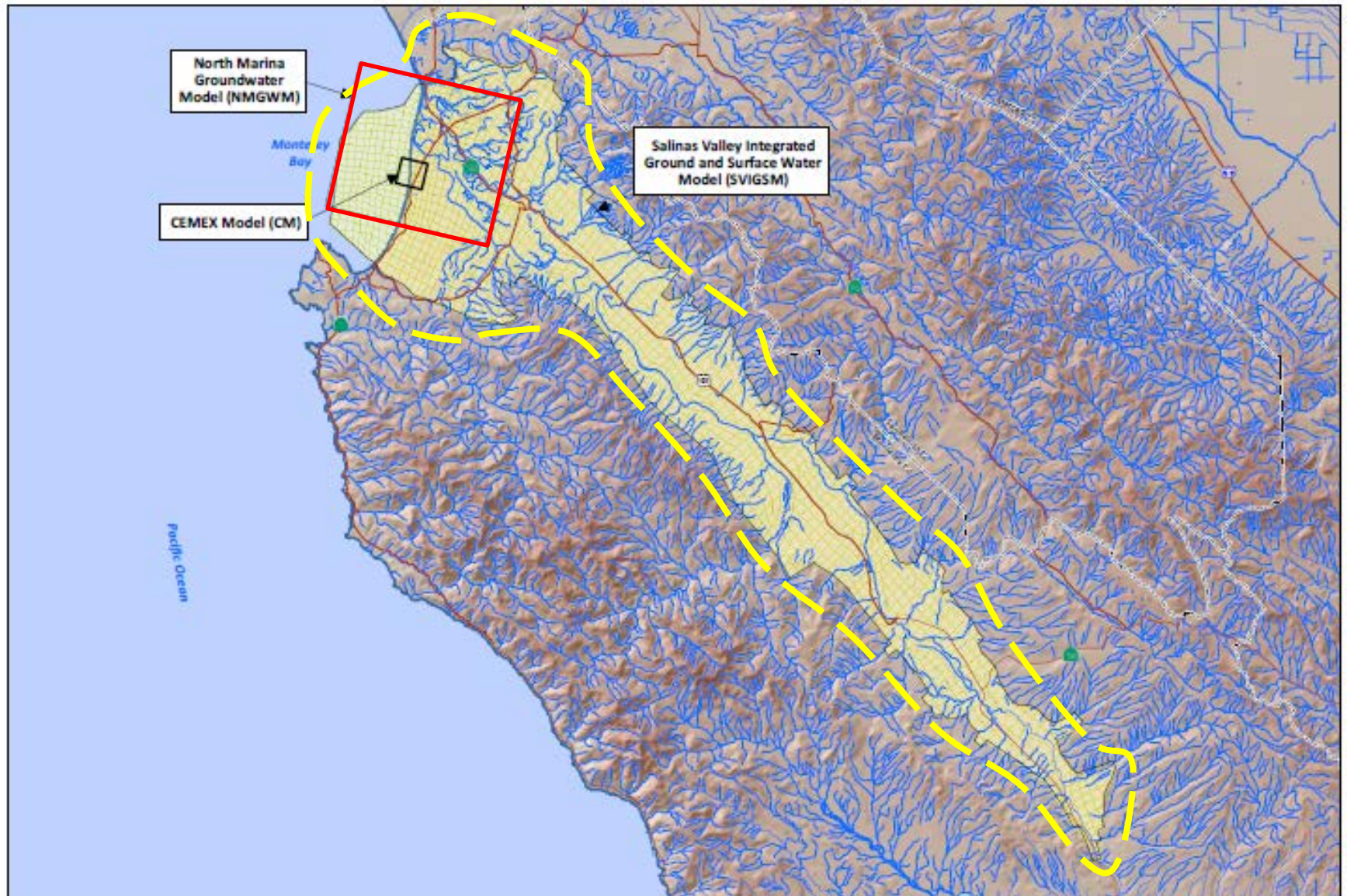
# “Nested” Groundwater Models



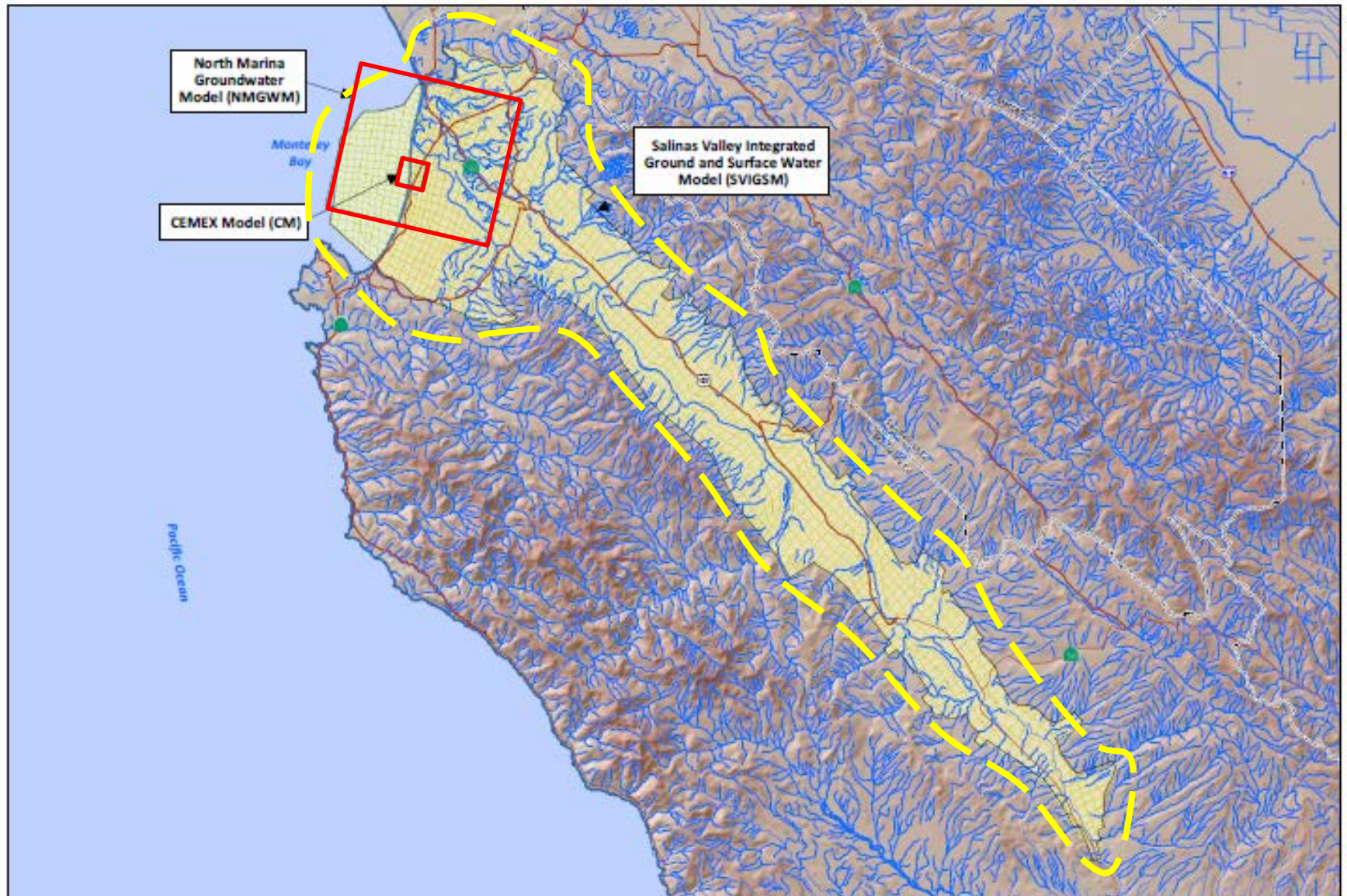
# “Nested” Groundwater Models



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# Verification of GEOSCIENCE Simulations

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## Procedure

- Input files, output files, and executables provided
- Run models on Windows computer
  - Compare new and original output files
  - Compare new simulation results to published water budgets



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## **North Marina Ground Water Model**

## **CEMEX Model**

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## North Marina Ground Water Model

- Calibration (1979– 2011)
- 17 Predictive Cases
  - 15 project variations (2011 – 2074)
  - 2 post-project rebound (2075 – 2137)

## CEMEX Model

2 Project Variations (2011 - 2074)

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## North Marina Ground Water Model

- Site: CEMEX or Potrero Road
- Size: 24.1 or 15.5 MGD
- Land Use: 2012 or 2060
- Alternative returning basin water
- SVWP and MCWD included or not

- Calibration (1979– 2011)
- 17 Predictive Cases
  - 15 project variations (2011 – 2074)
  - 2 post-project rebound (2075 – 2137)

## CEMEX Model

- Land Use: 2012 or 2060

2 Project Variations (2011 - 2074)

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## North Marina Ground Water Model

- MODFLOW for flow
  - 57 minutes computation time per case
  - New simulation results match existing simulation results within round-off error
  - New simulation results match published water budgets within round-off error
- MT3DMS for transport
  - 105 minutes computation time per case
  - New output files match existing output files *exactly* (i.e., every new simulation result matches every original simulation result)

## CEMEX Model

- SEAWAT for flow and transport combined
  - 12.5 days computation time per case
  - New output files (so far) match existing output files *exactly*

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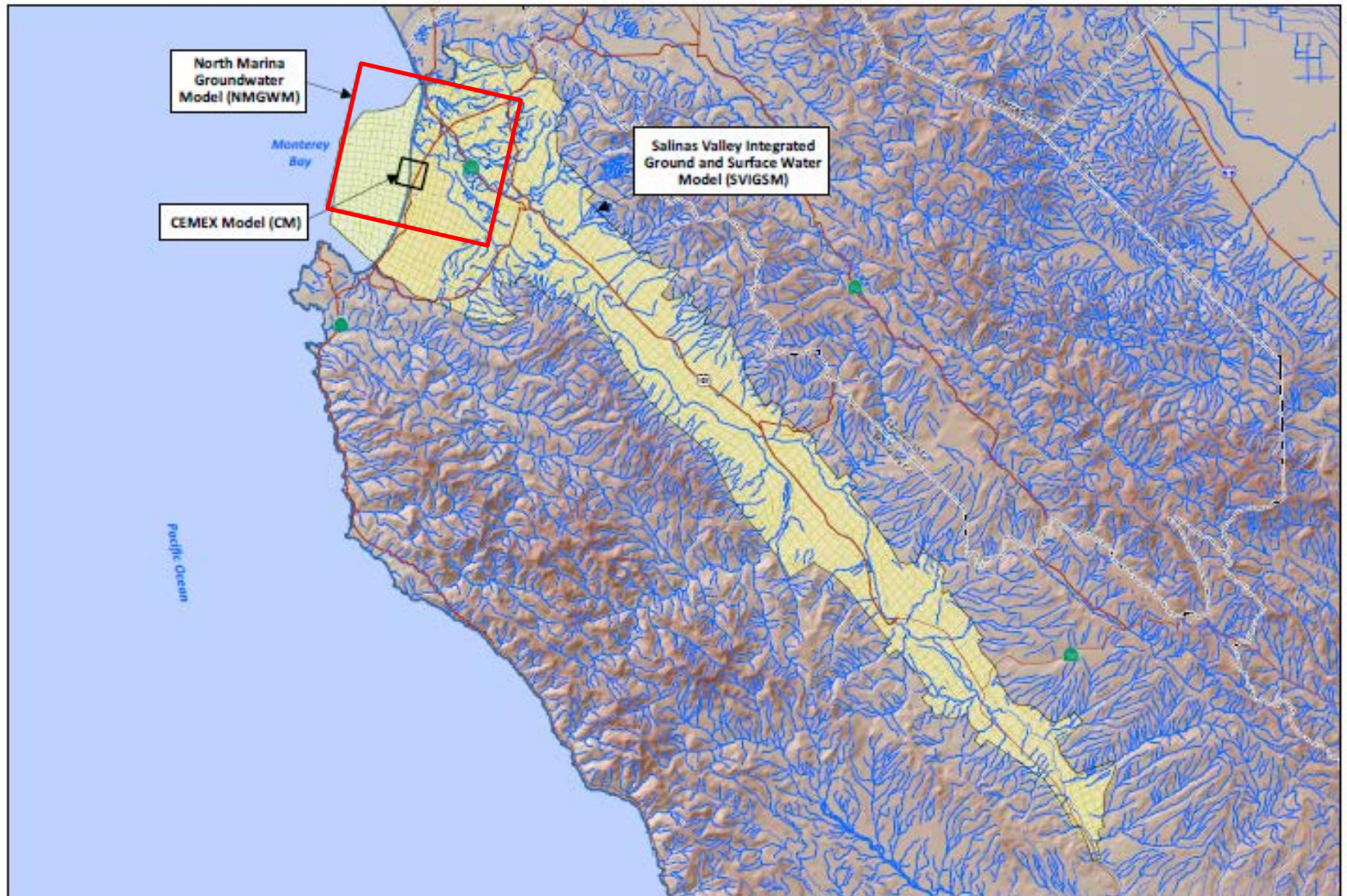
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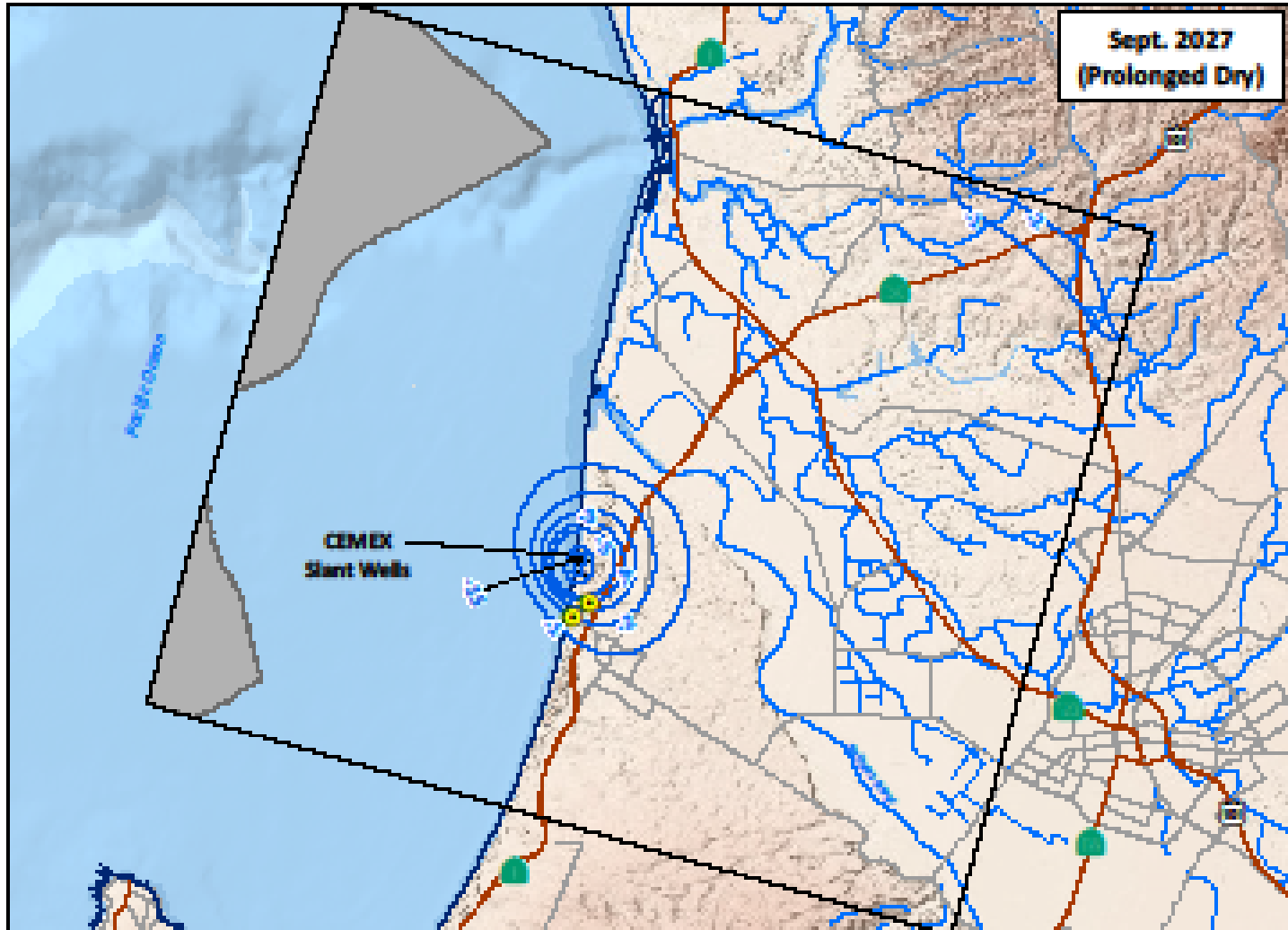
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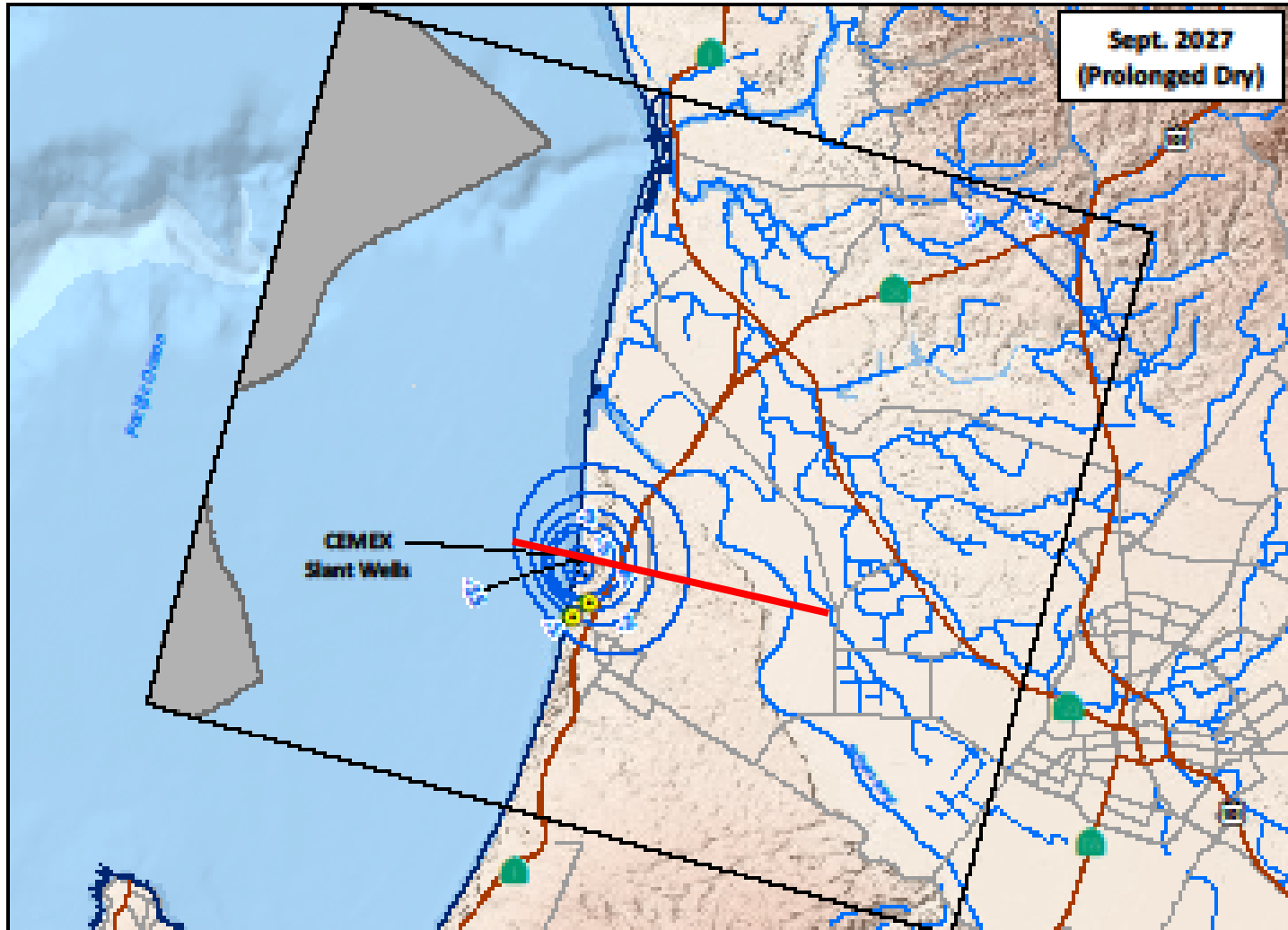
# Hydrostratigraphy and Property Review



# Simulated Water Level Decline in the 180-FTE Aquifer Due to Variant Project



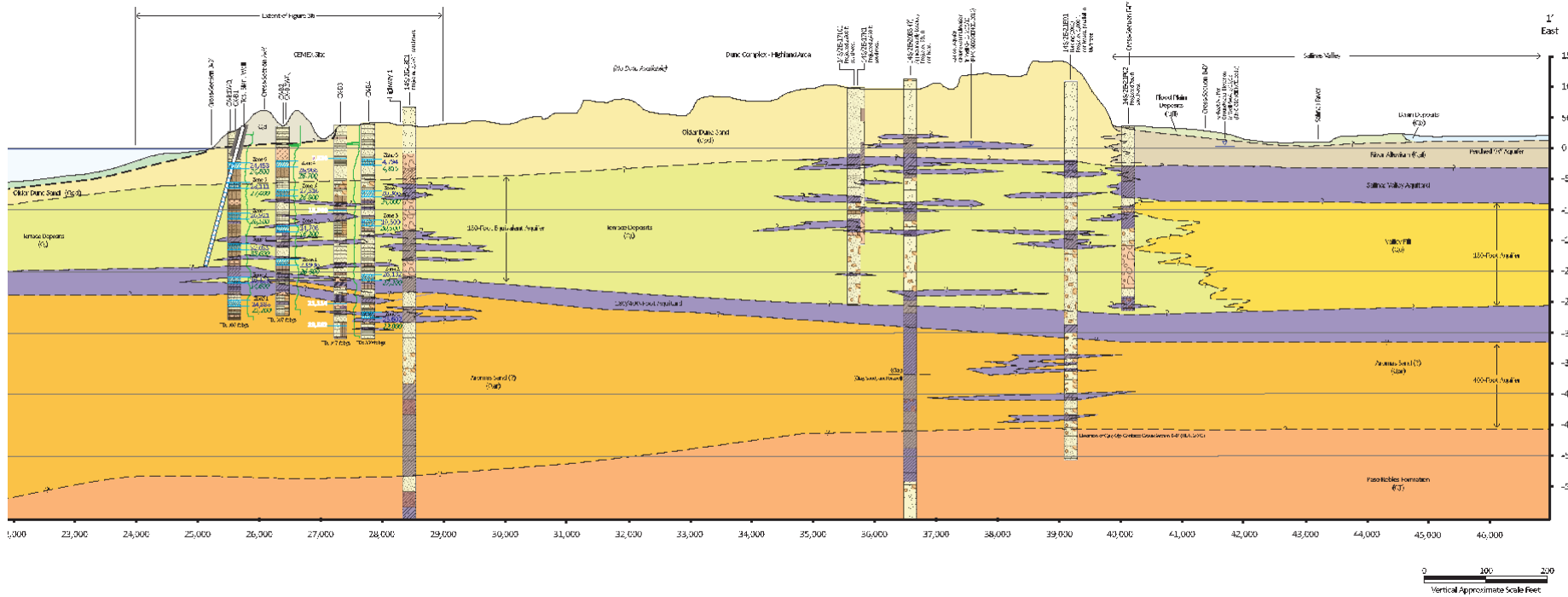
# Simulated Water Level Decline in the 180-FTE Aquifer Due to Variant Project





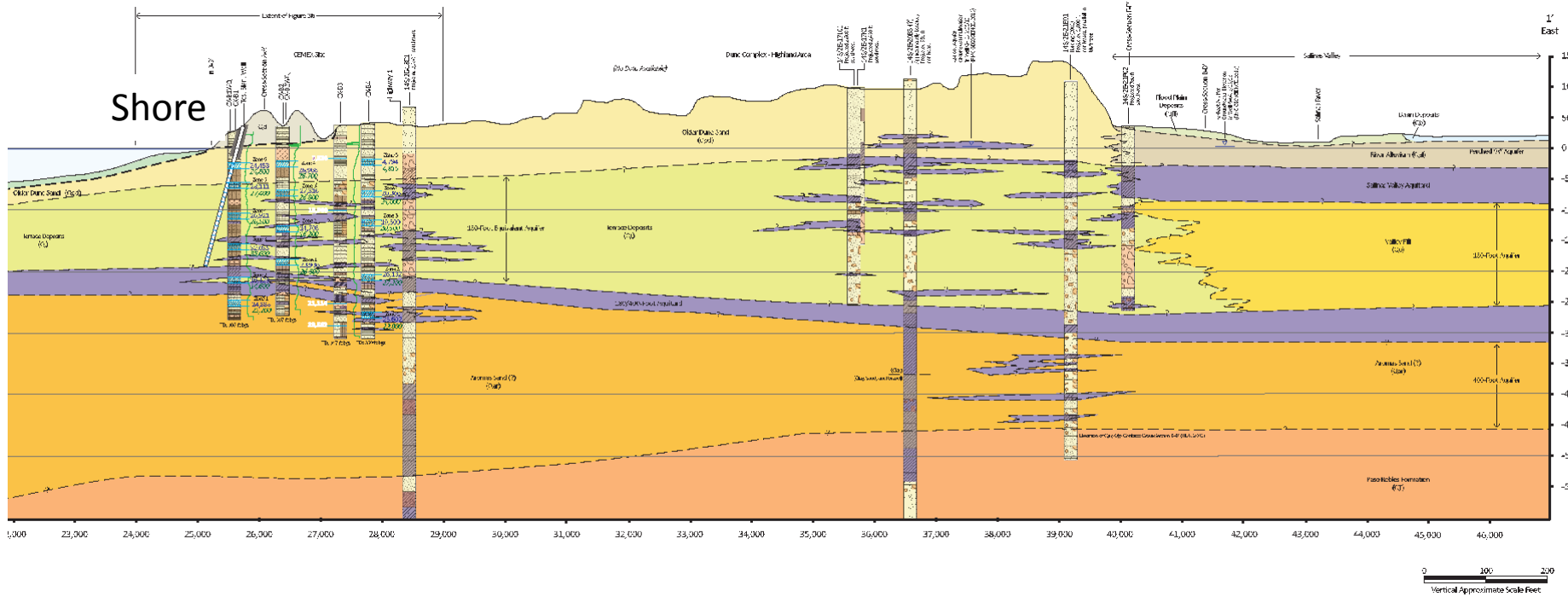
West

East



West

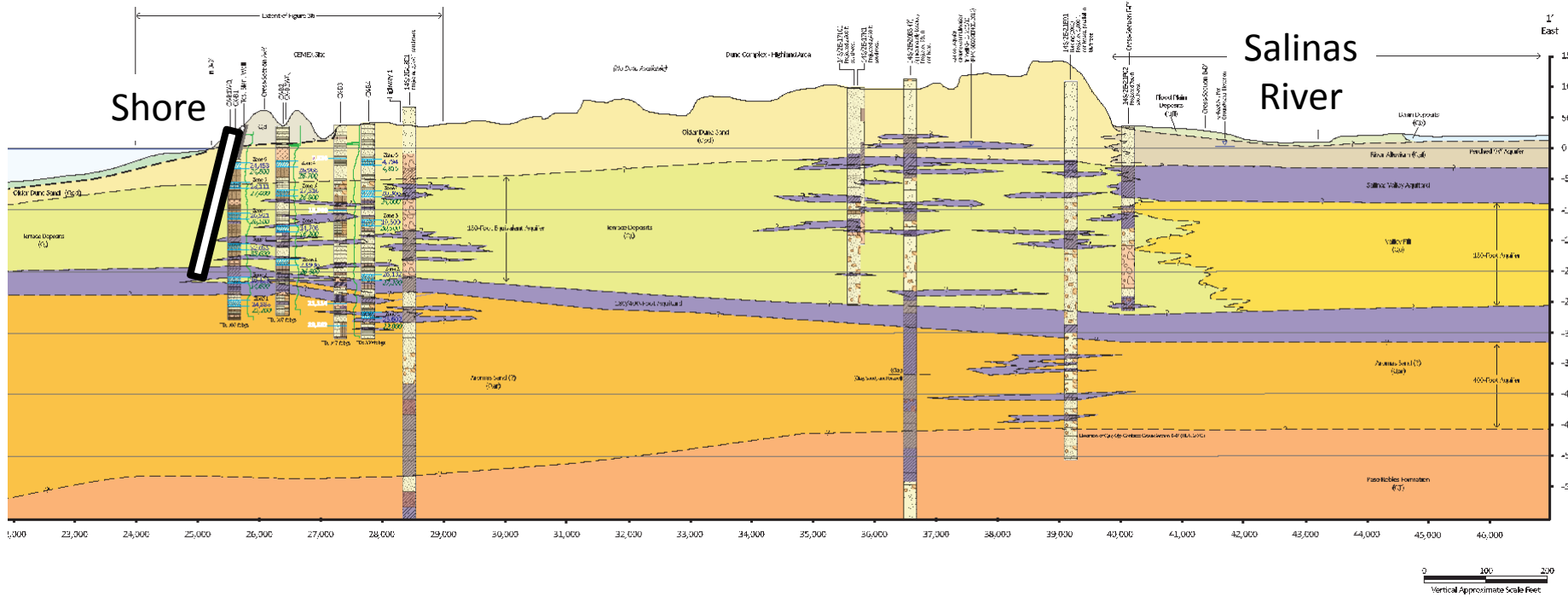
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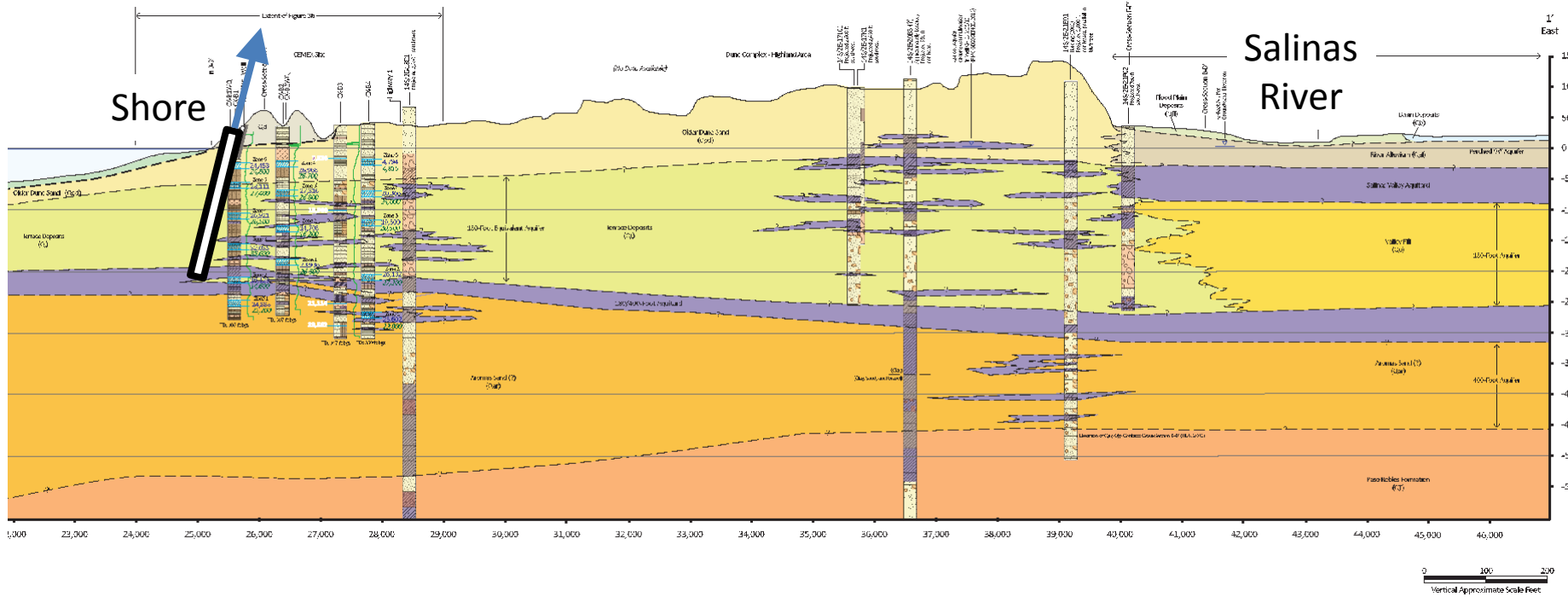
West

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West

East

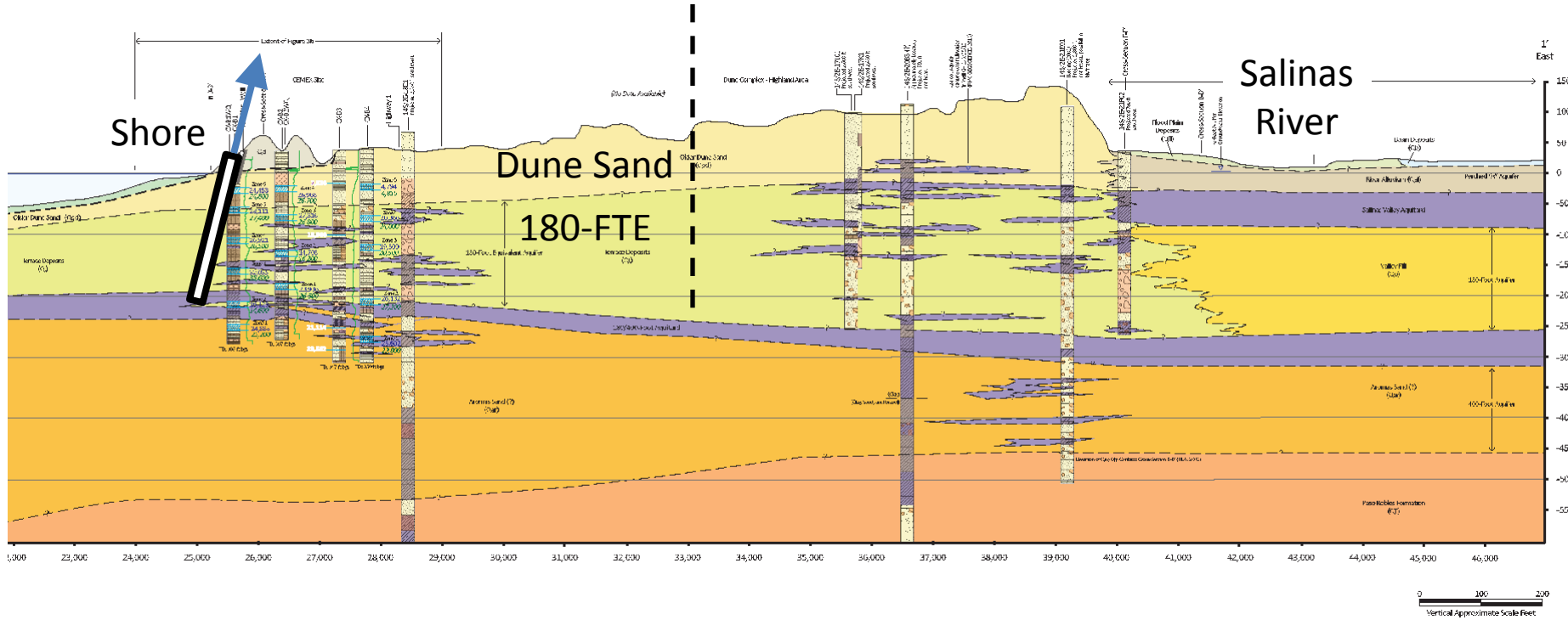




West

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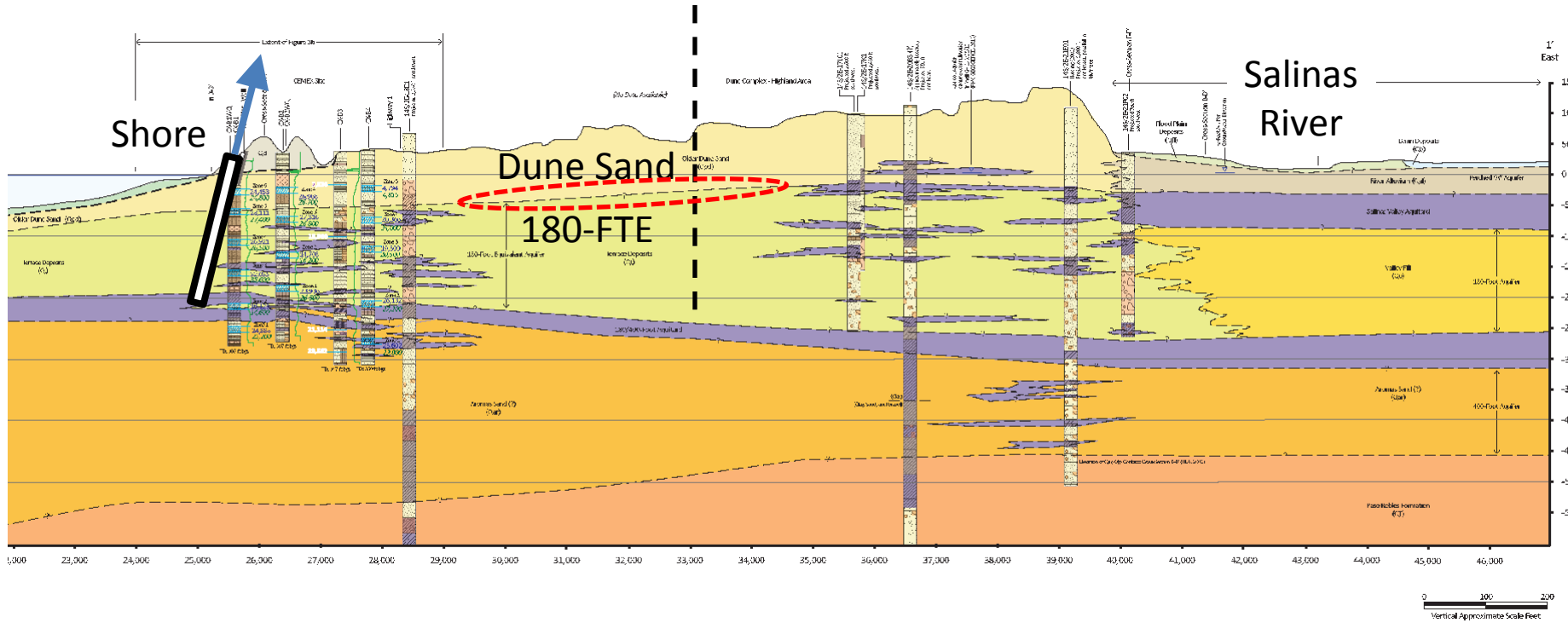
~1' drawdown



West

East

~1' drawdown



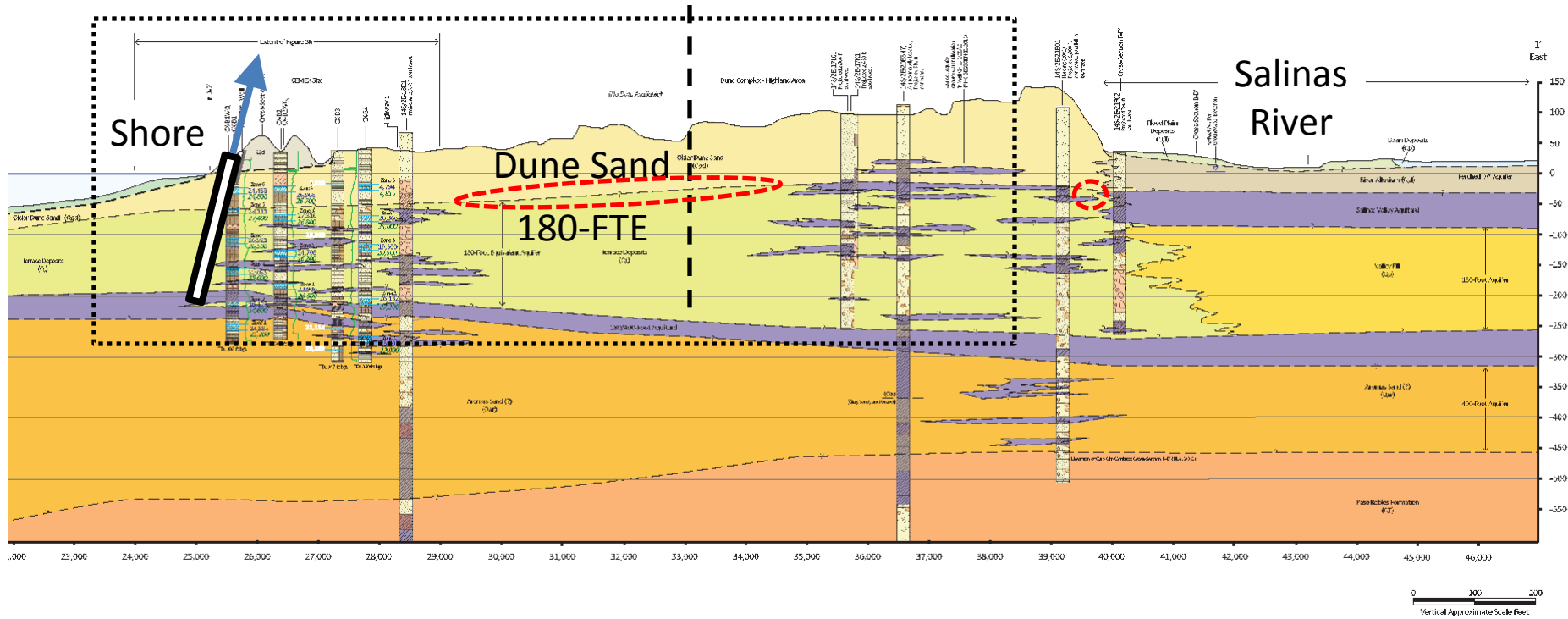




West

East

~1' drawdown



West

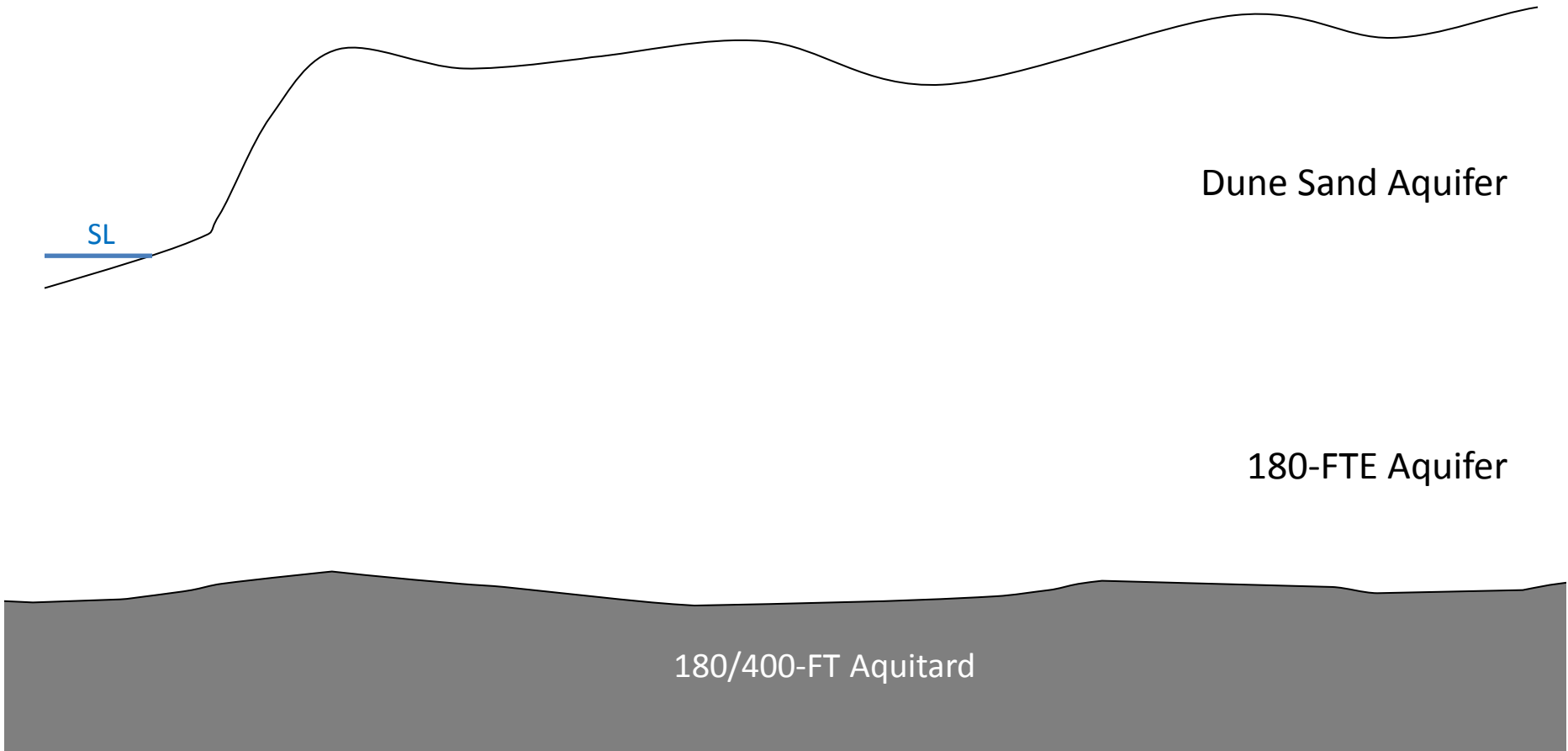
East

SL

Dune Sand Aquifer

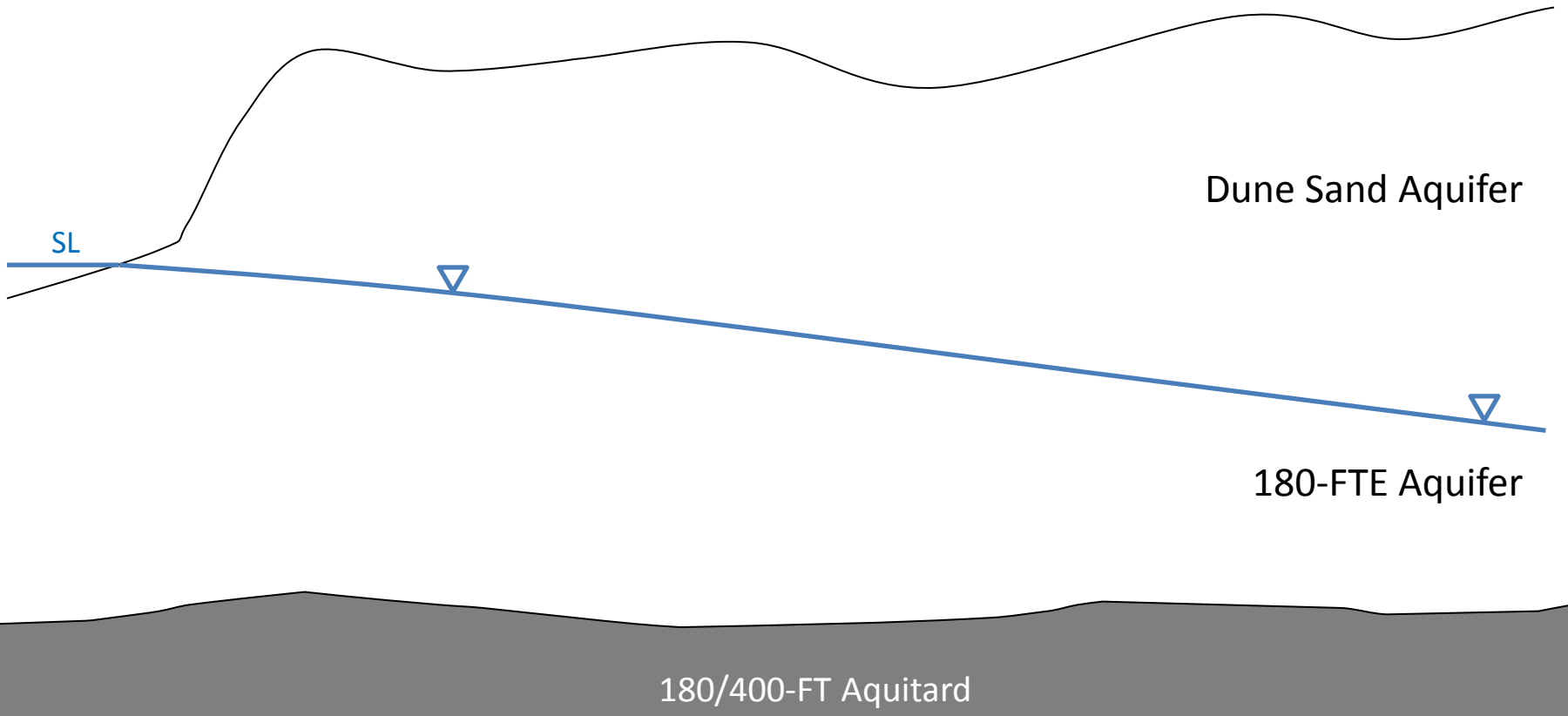
180-FTE Aquifer

180/400-FT Aquitard



West

East



Dune Sand Aquifer

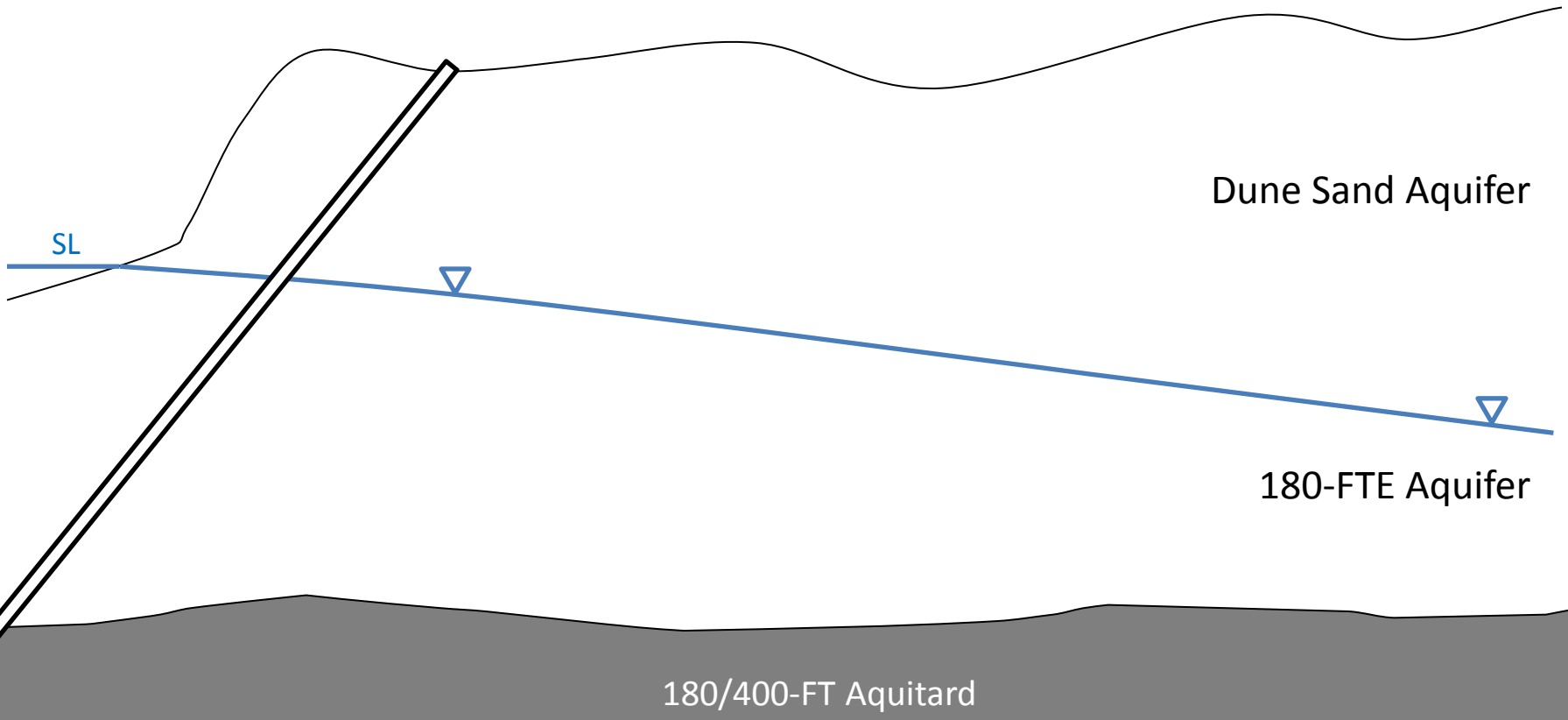
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180-FTE Aquifer

180/400-FT Aquitard

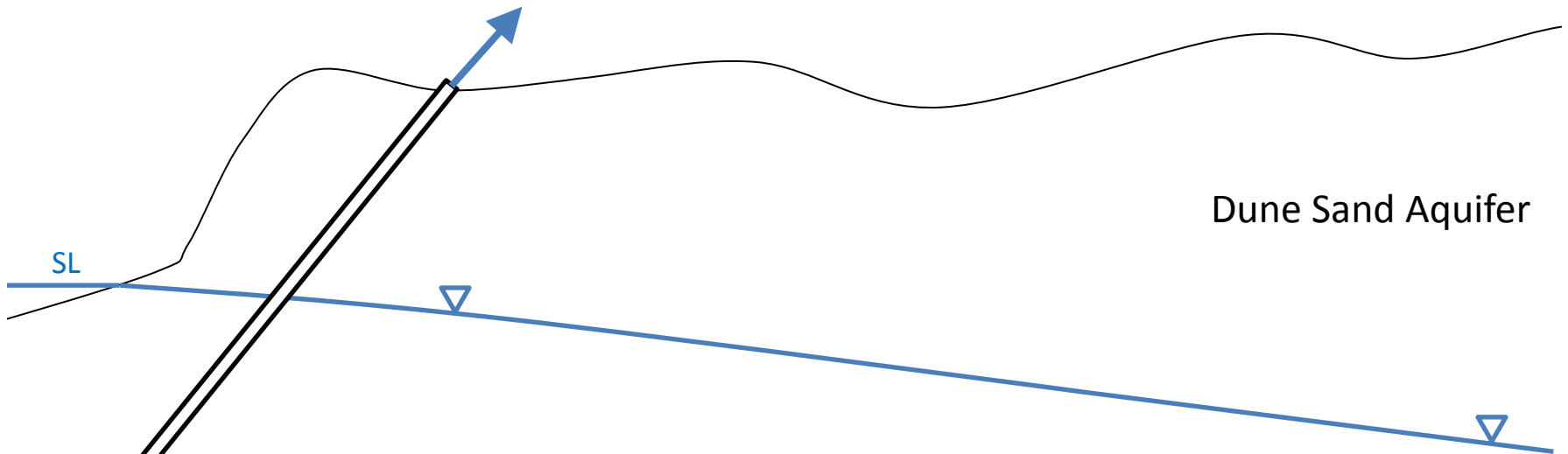
West

East



West

East



SL

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180-FTE Aquifer

180/400-FT Aquitard

West

East

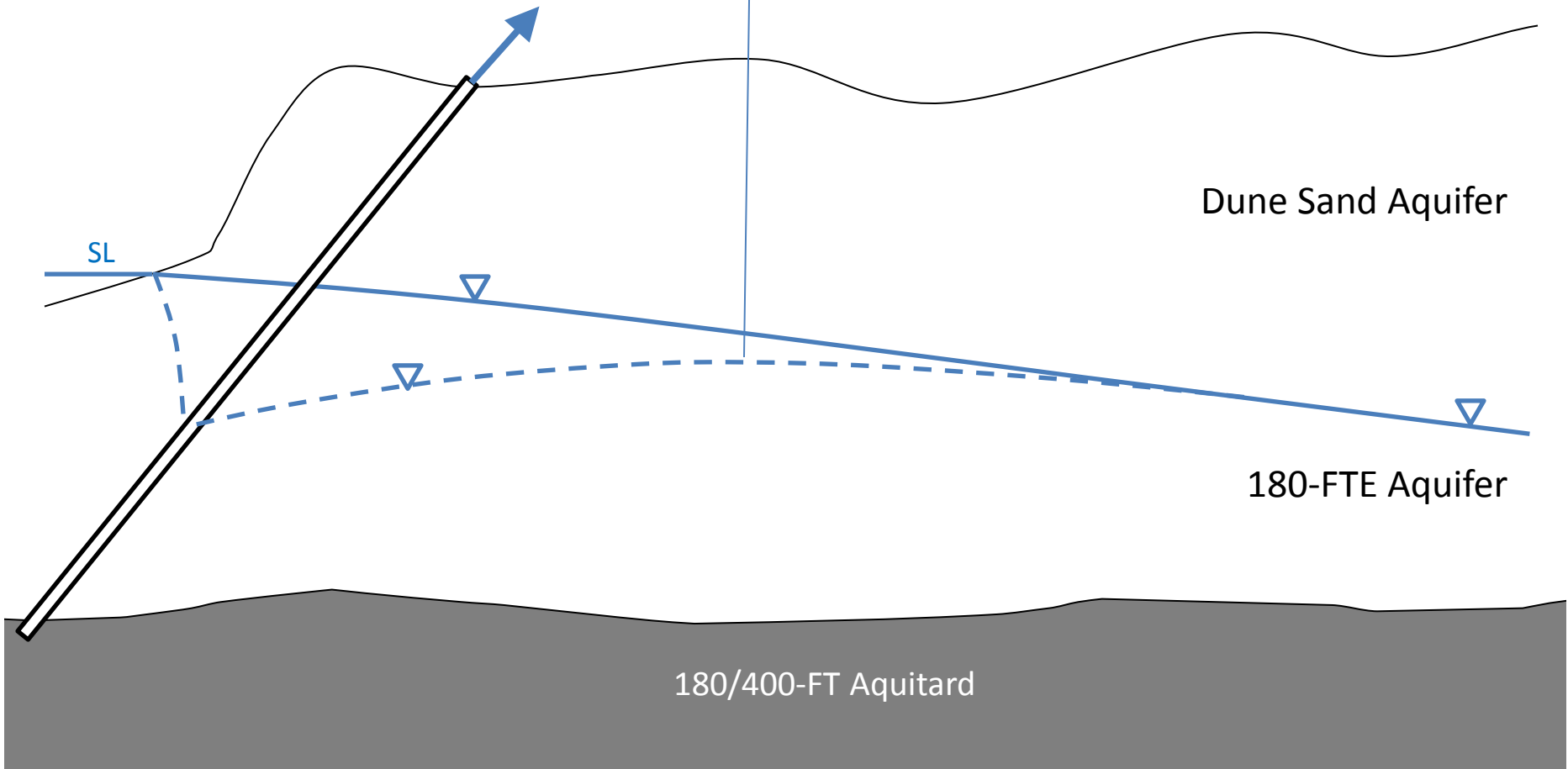
1' drawdown

SL

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West

East

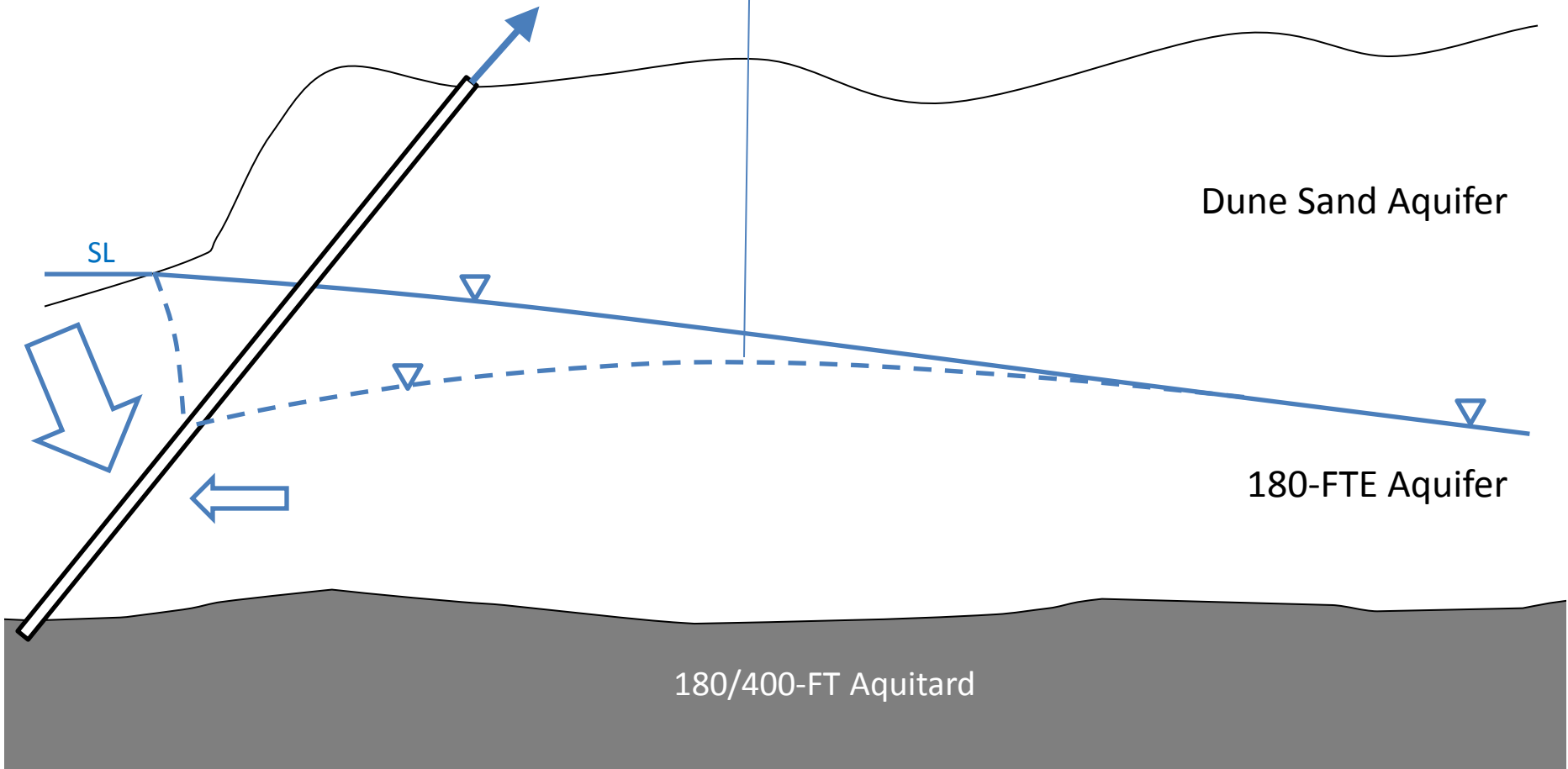
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180/400-FT Aquitard

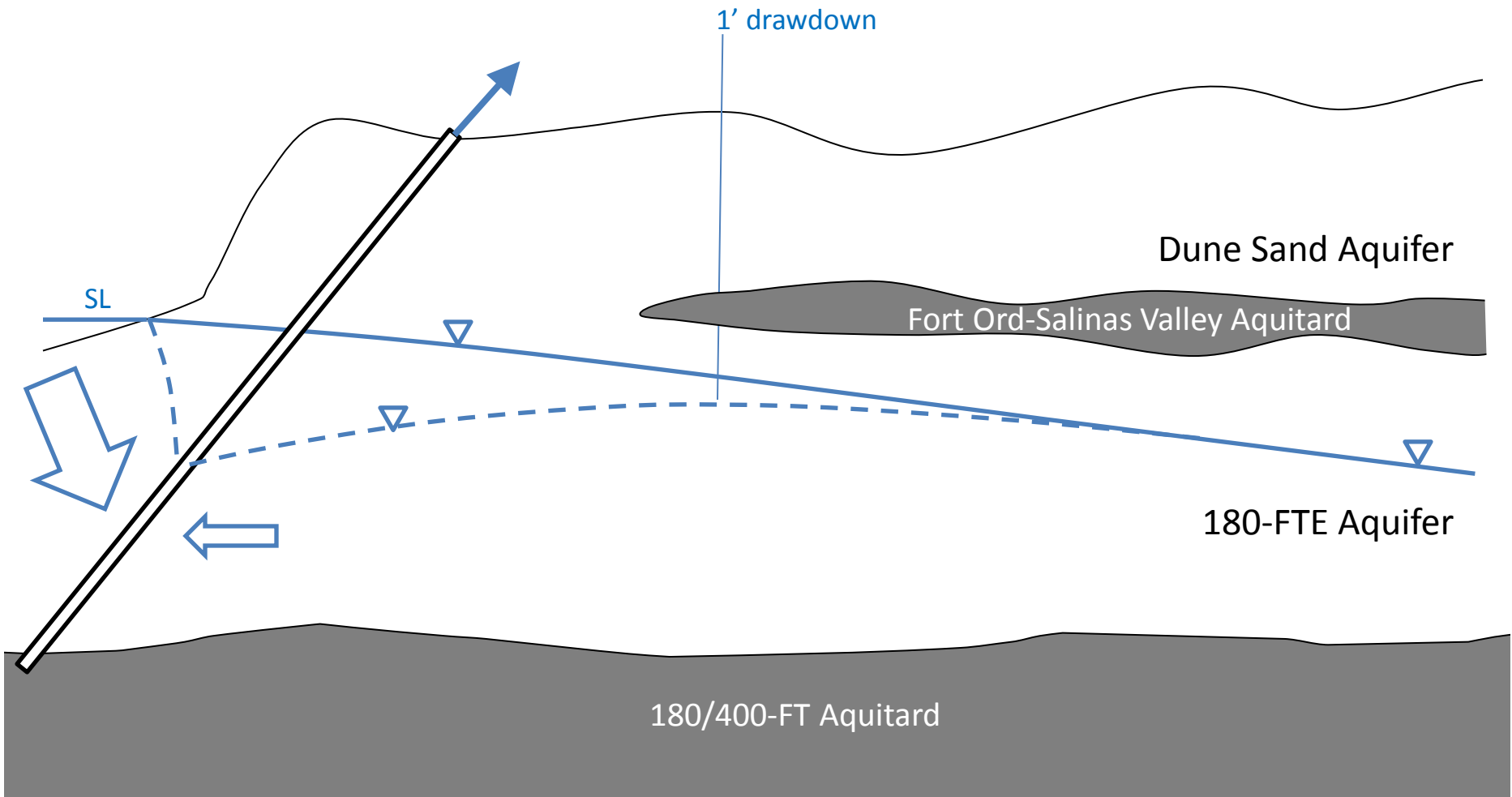




# Perched Dune Sand Aquifer Conceptual Model

West

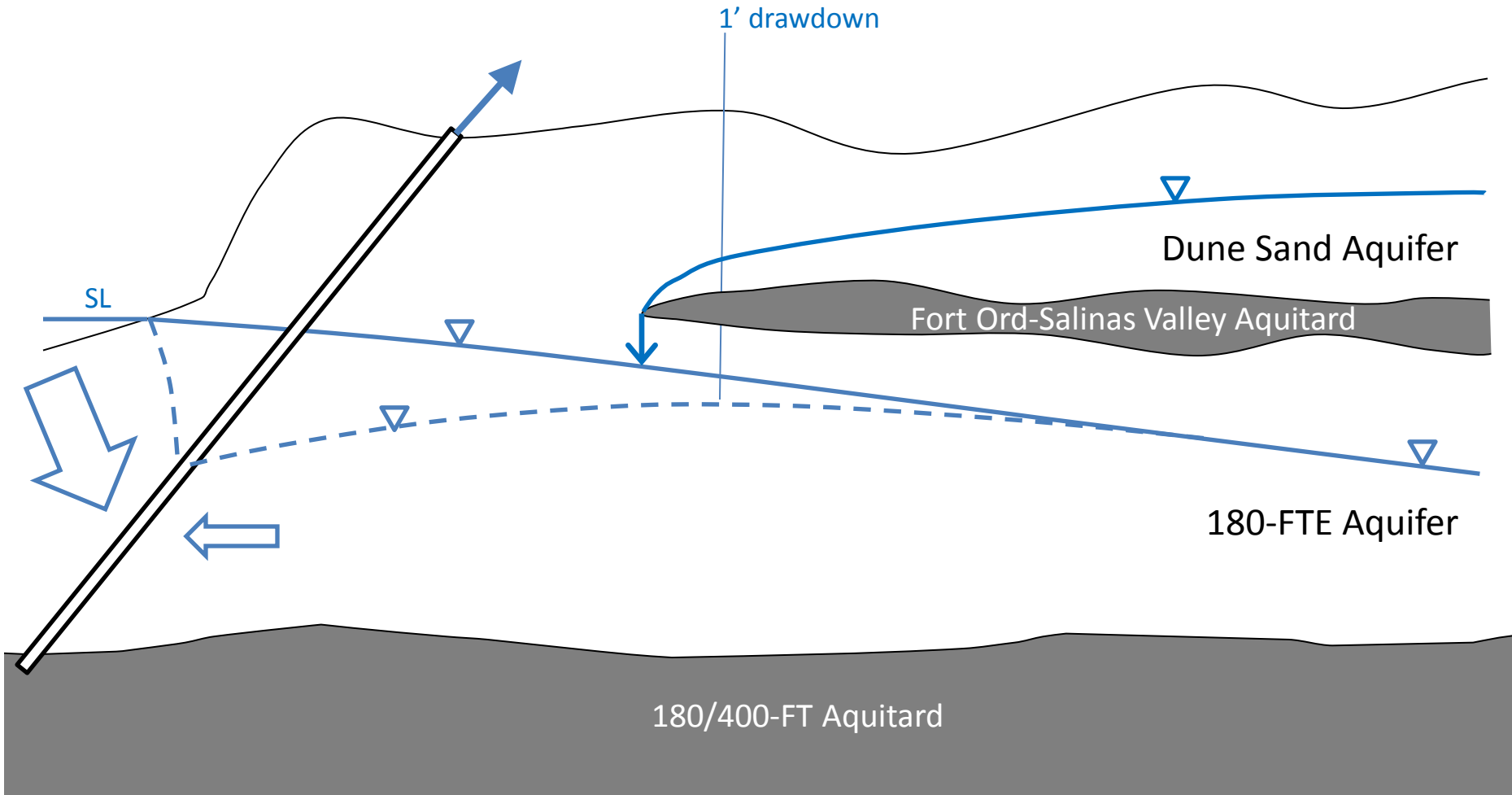
East



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West

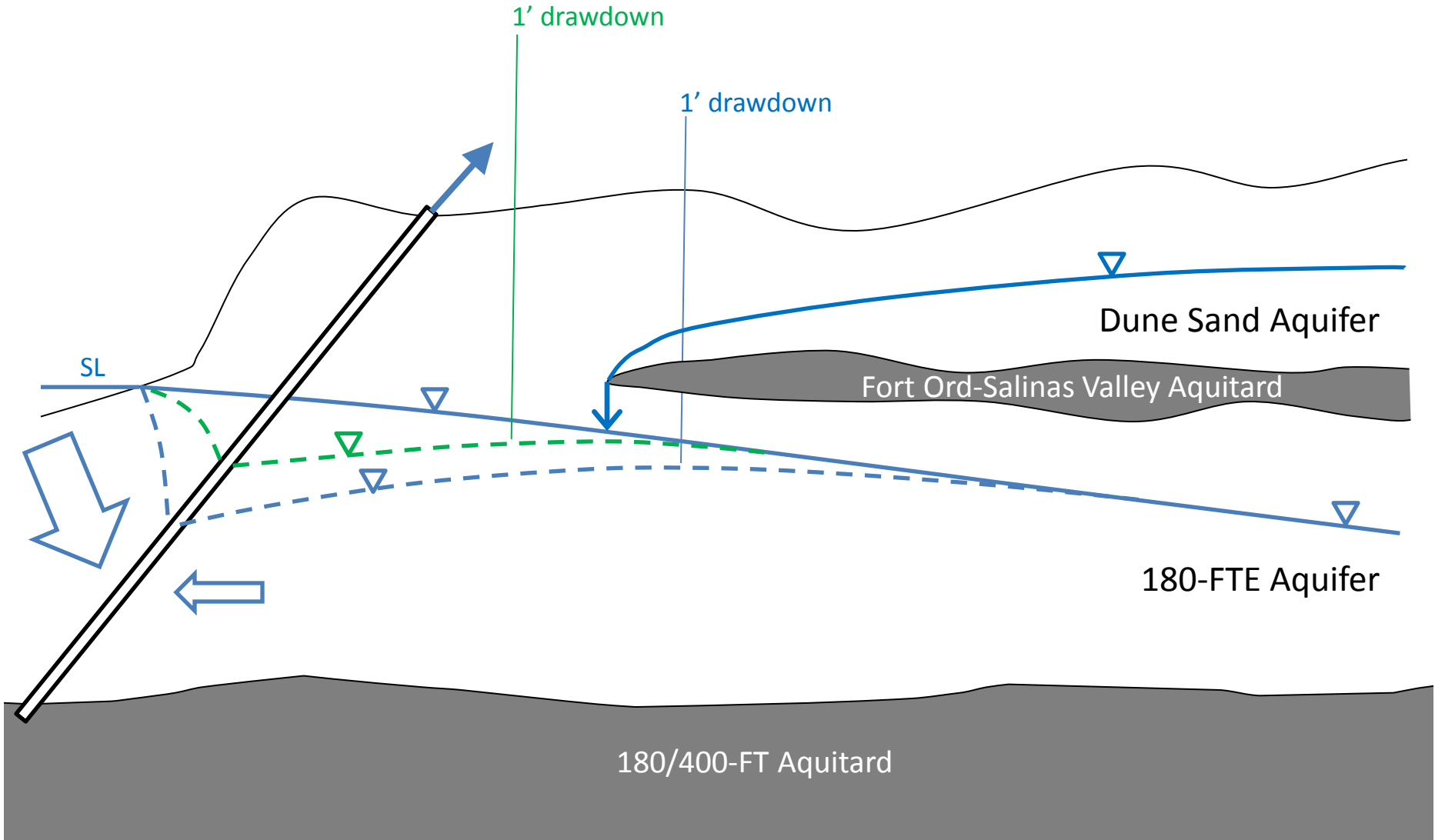
East



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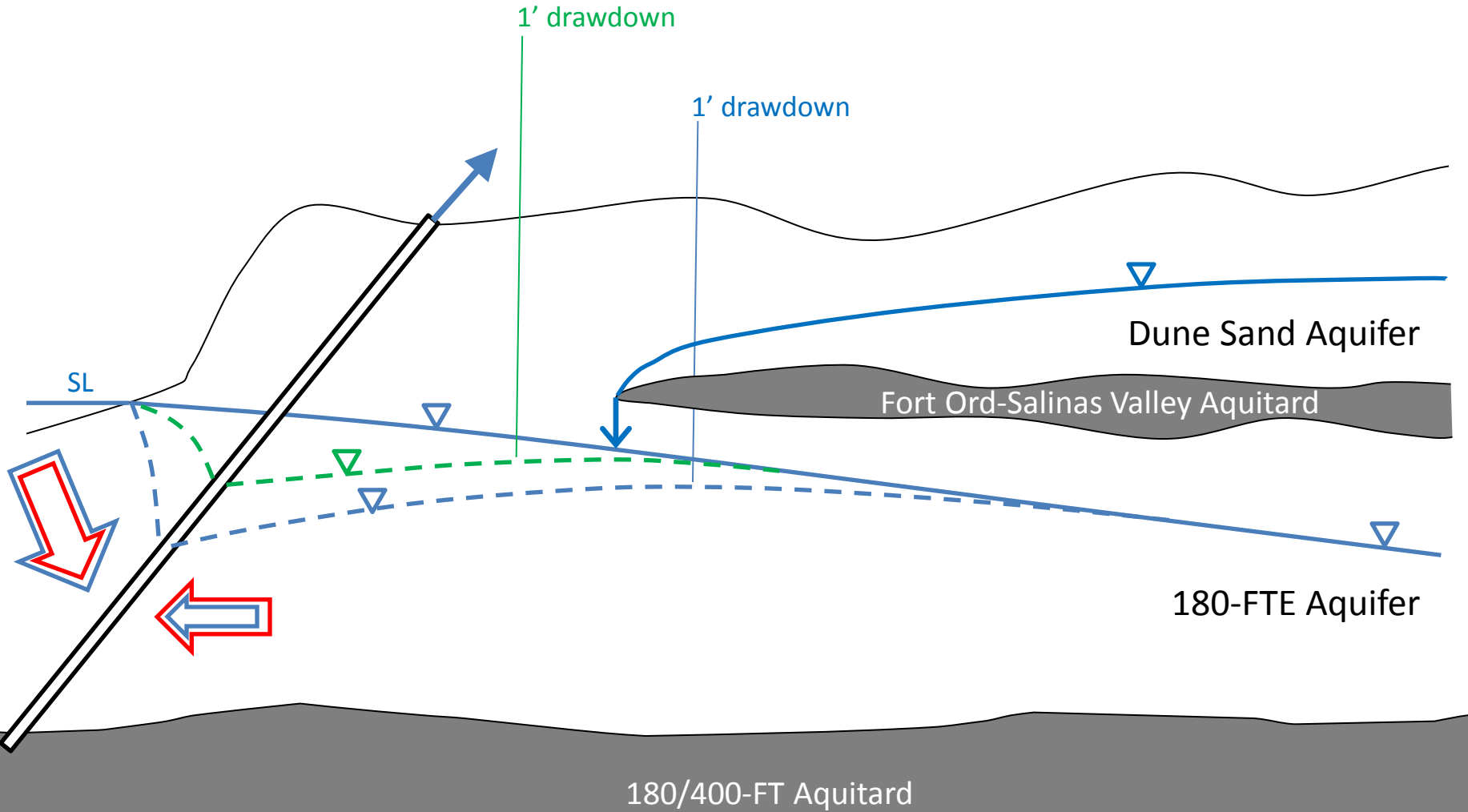
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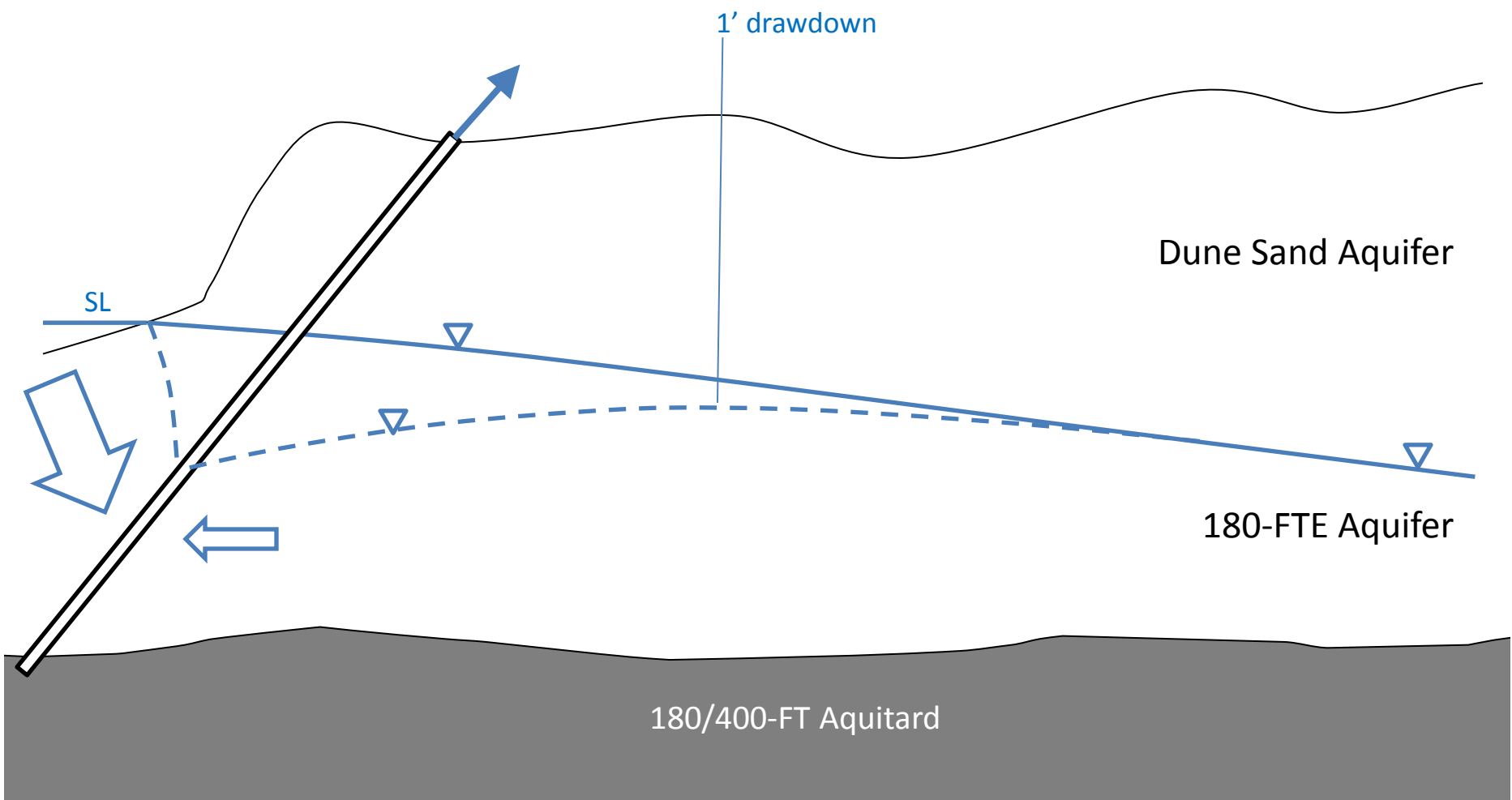
West

East



West

East



1' drawdown

SL

Dune Sand Aquifer

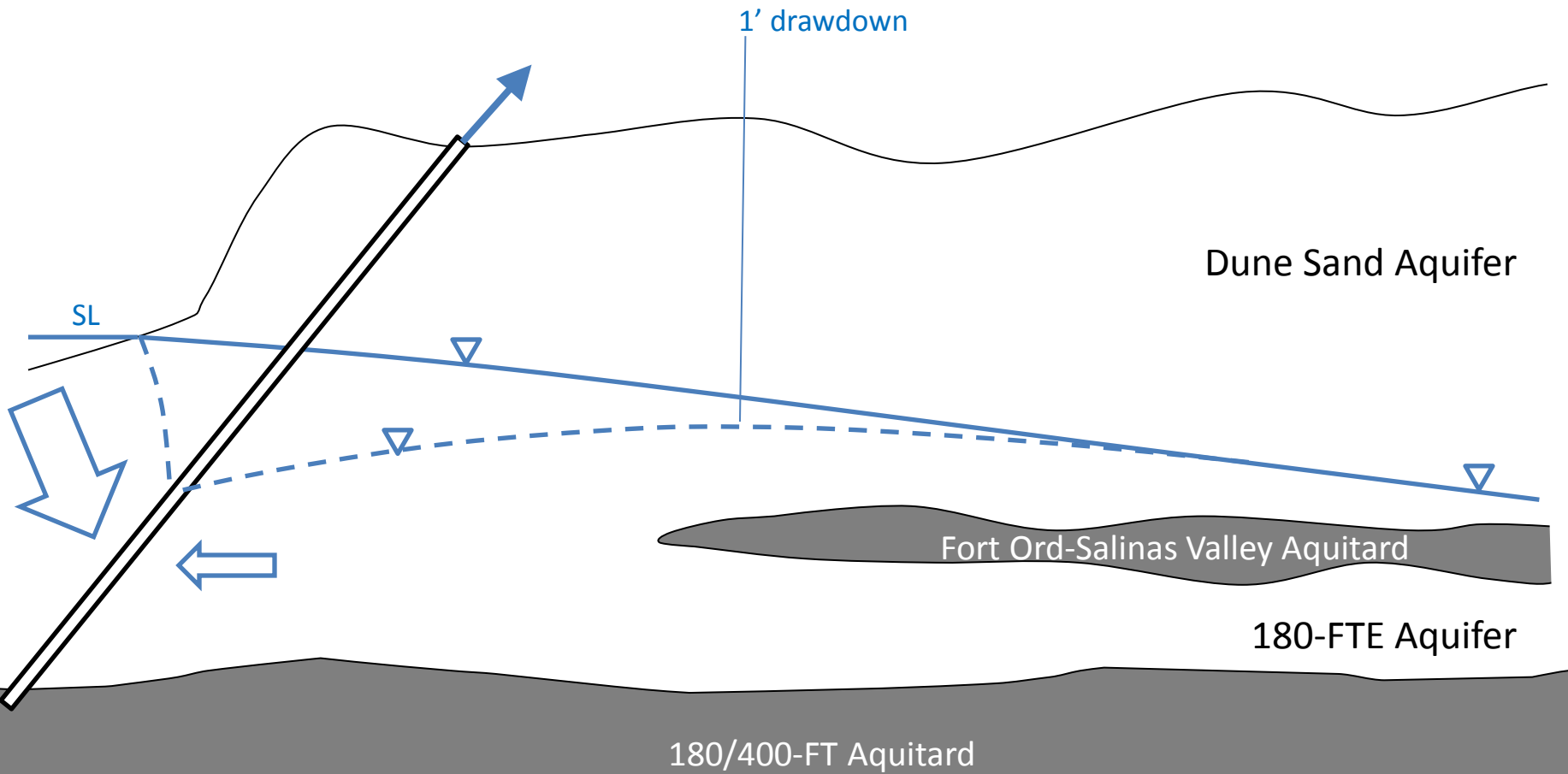
180-FTE Aquifer

180/400-FT Aquitard

# FO-SVA Below Water Level Conceptual Model

West

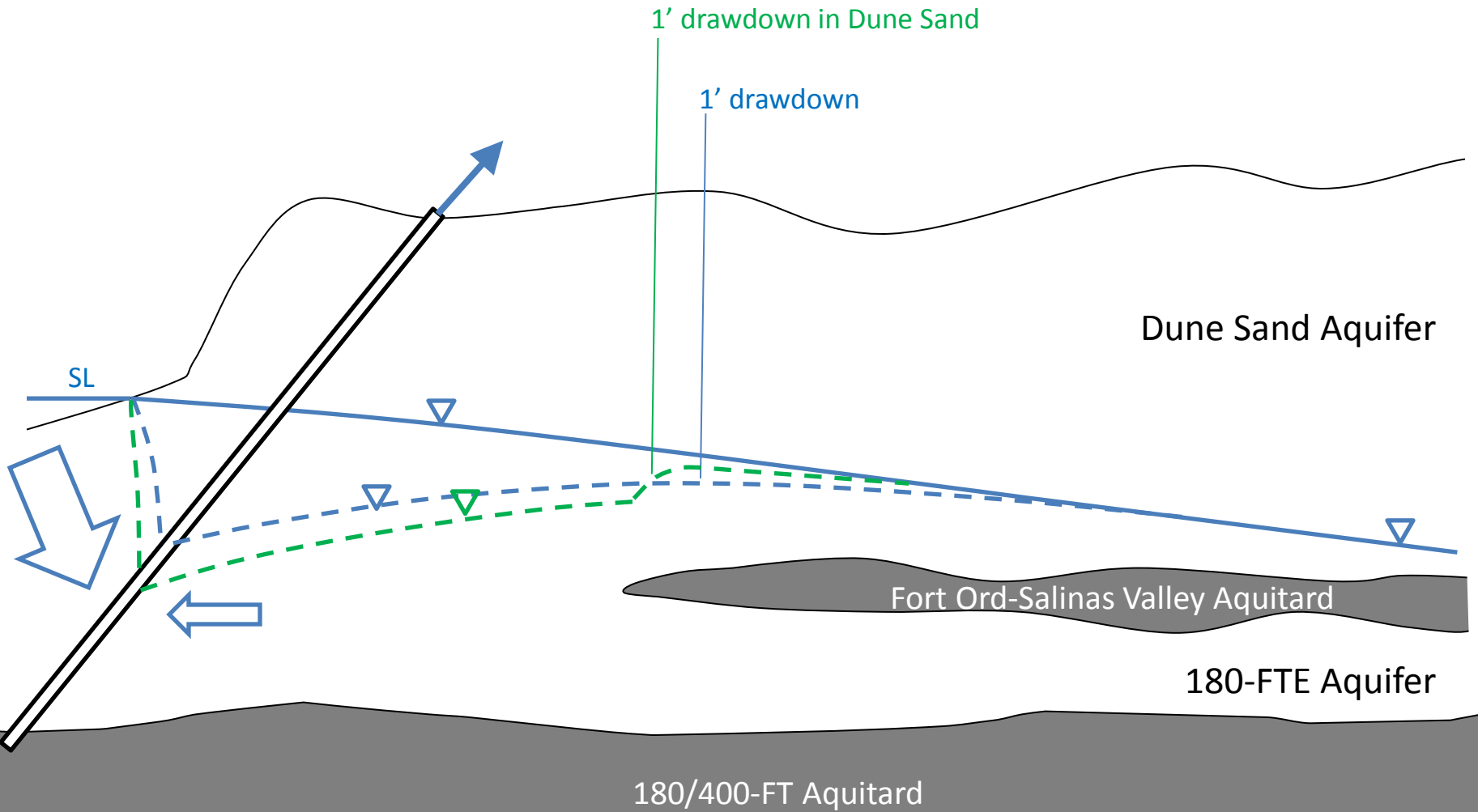
East



# FO-SVA Below Water Level Conceptual Model

West

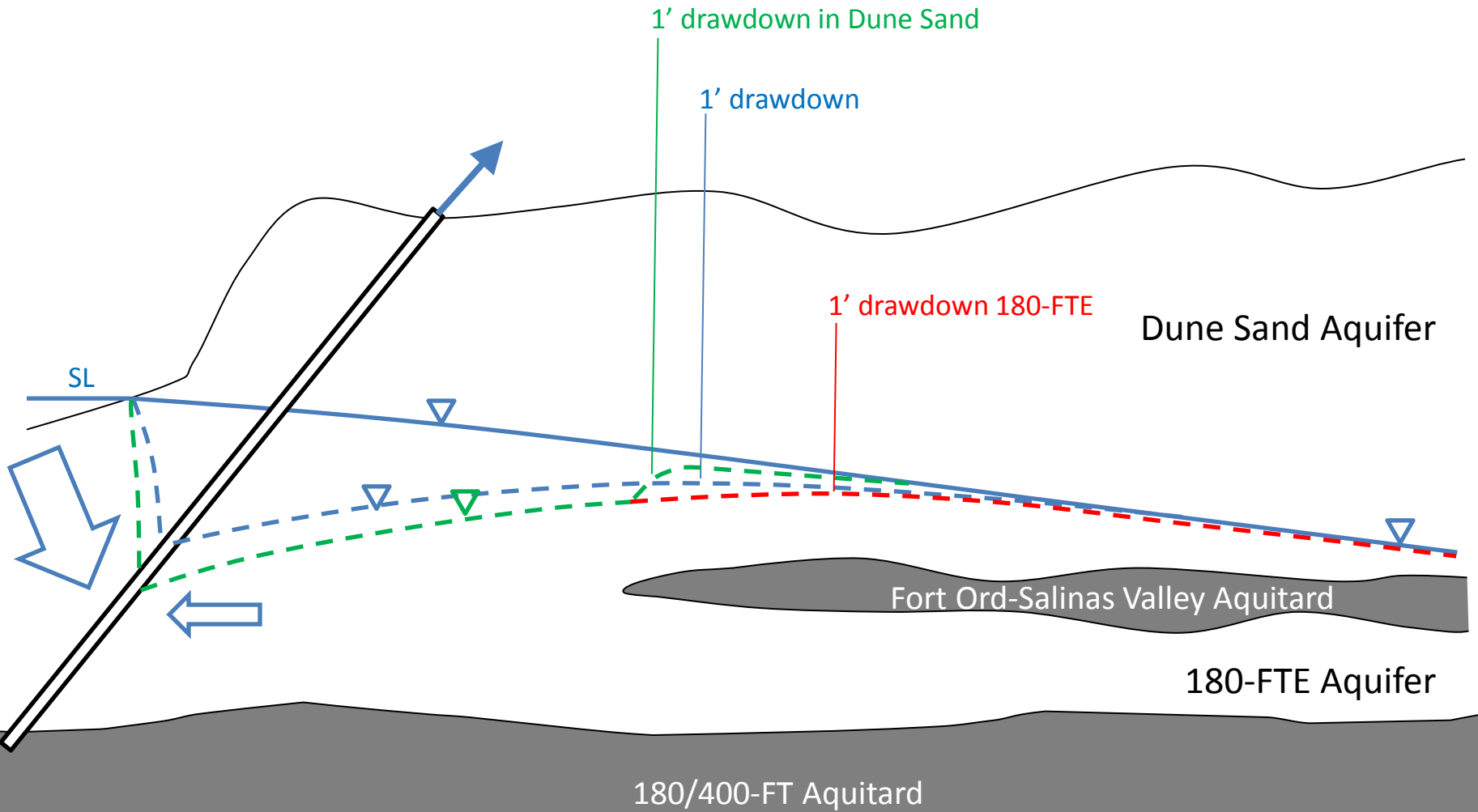
East



# FO-SVA Below Water Level Conceptual Model

West

East

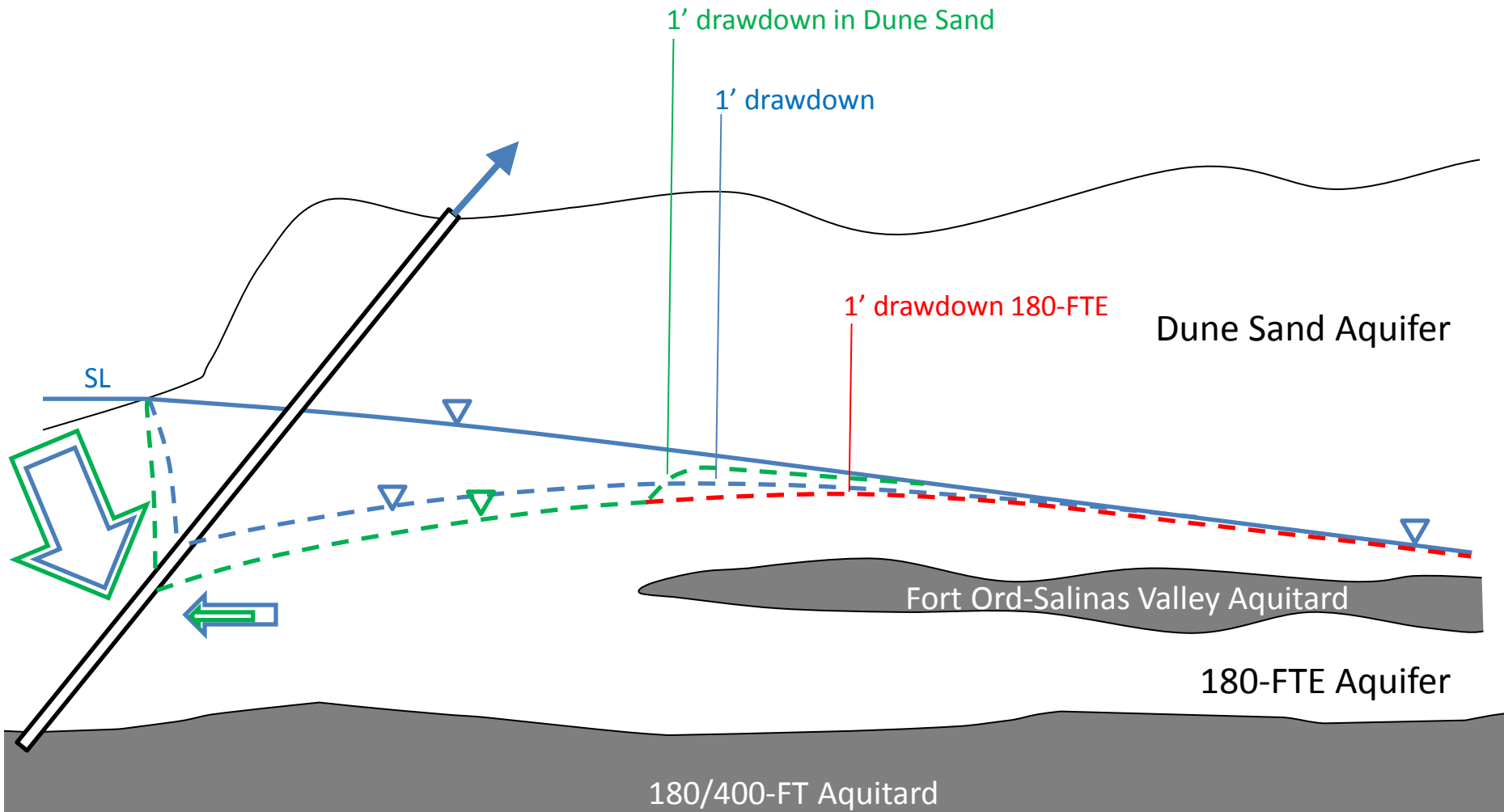




# FO-SVA Below Water Level Conceptual Model

West

East



West

East

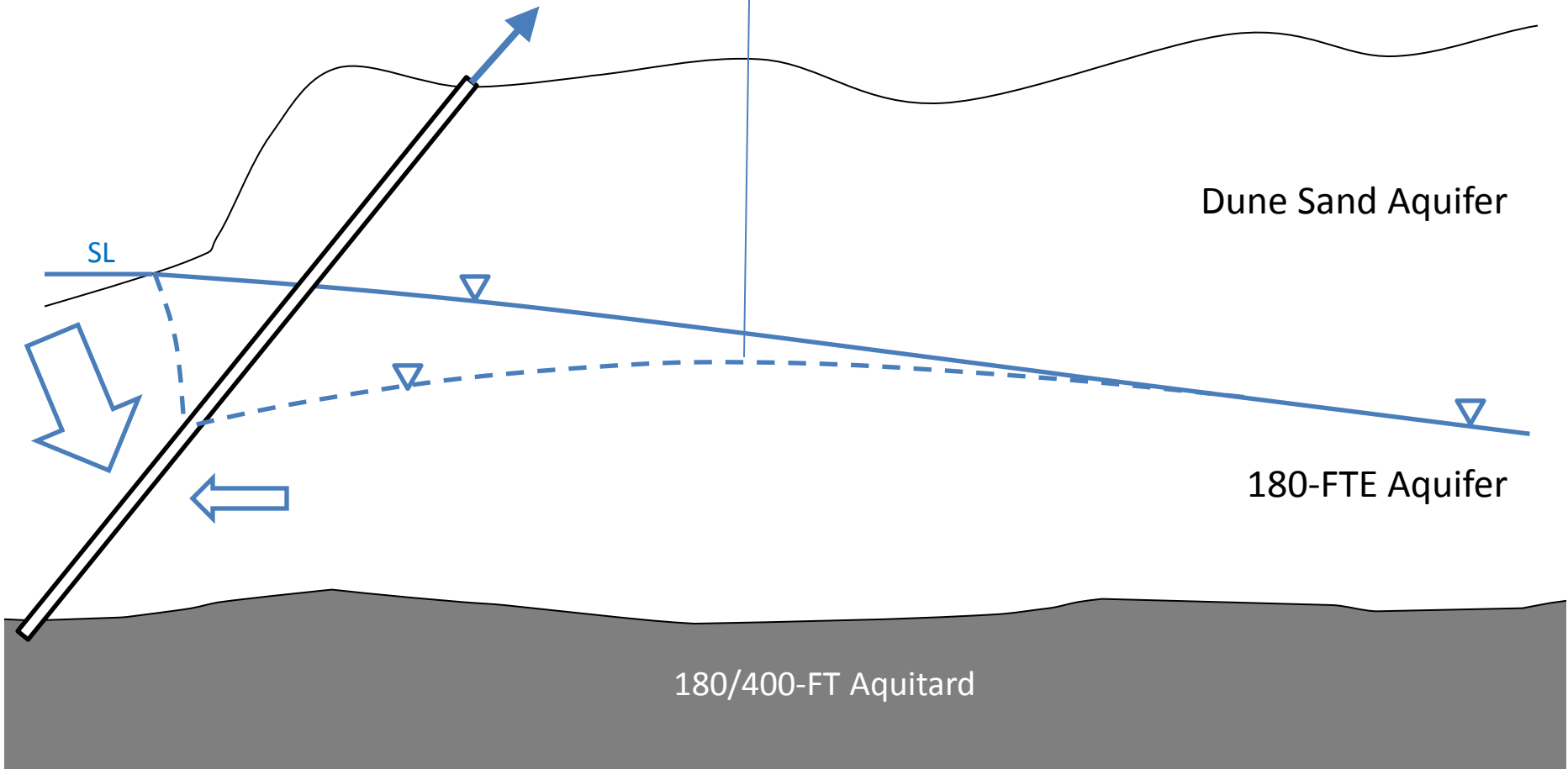
1' drawdown

SL

Dune Sand Aquifer

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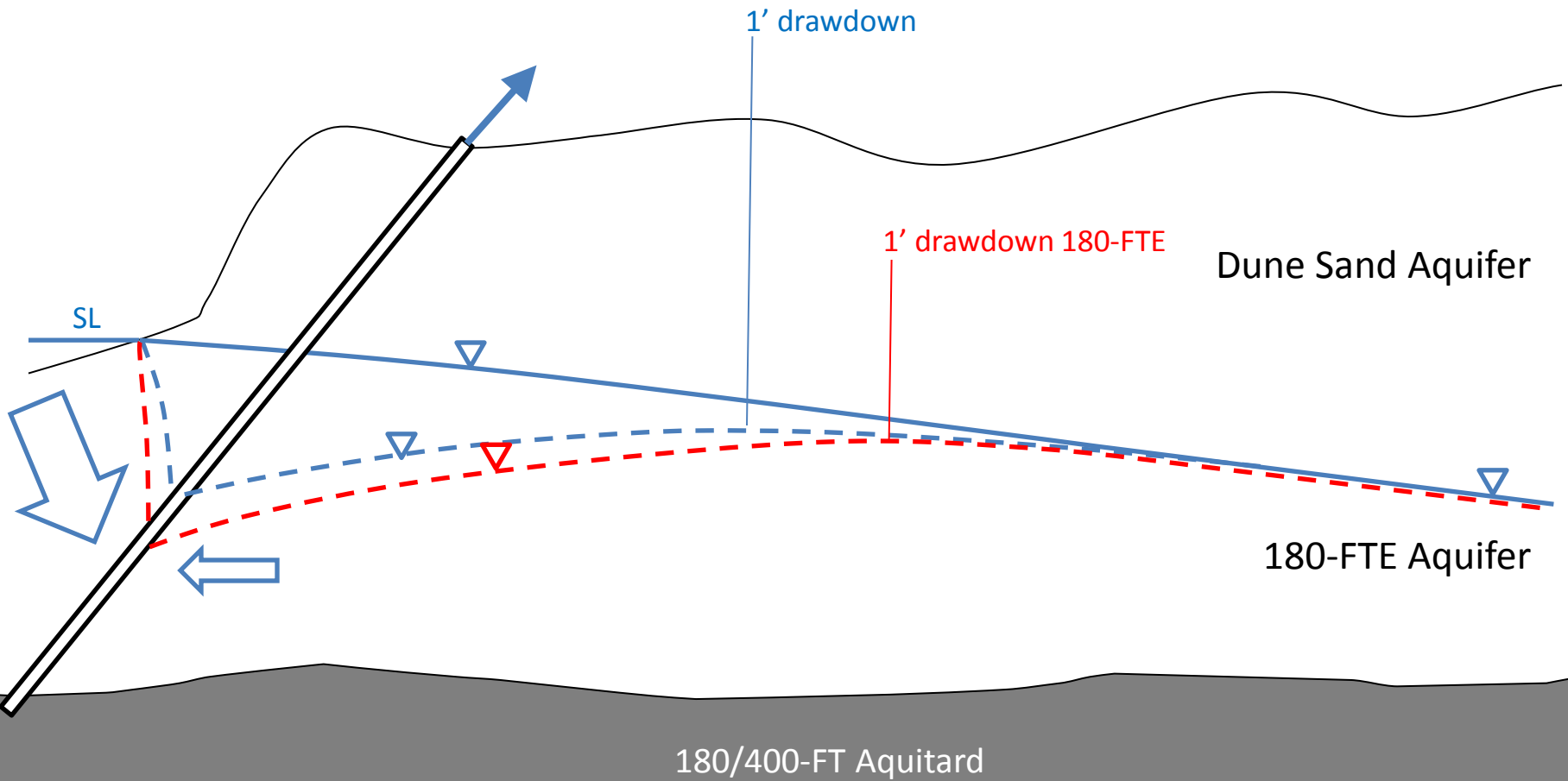
180/400-FT Aquitard



# Aquifer Hydraulic Conductivities Too Large

West

East



# Conclusions

- Groundwater simulation outputs verified using same inputs and same models
- Hydrostratigraphic model deficient due to absence of Fort Ord-Salinas Valley Aquitard
- Aquifer hydraulic conductivities input to simulations are too large