Longevity Assessment for the City of Bandera Water Wells

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Innovative Water Technologies

Texas Water Development Board

City Council Meeting

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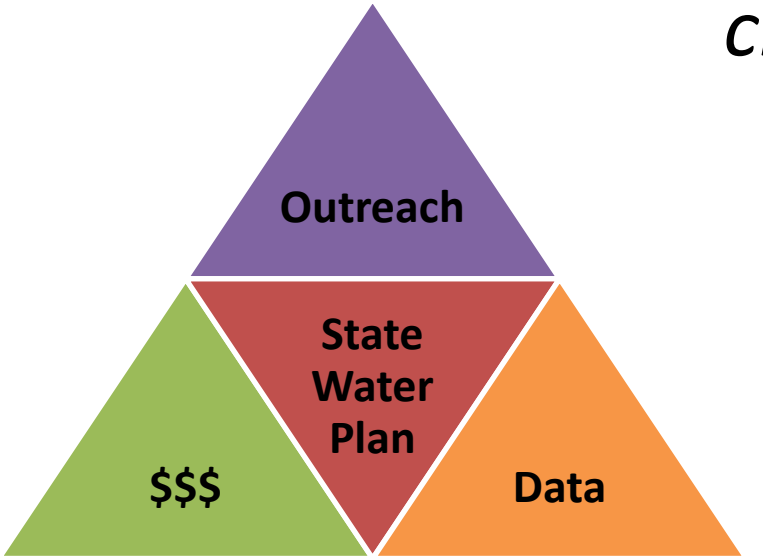
Texas Water Development Board

Mission Statement:

"To lead the state's efforts in ensuring a secure water future for Texas and its citizens"



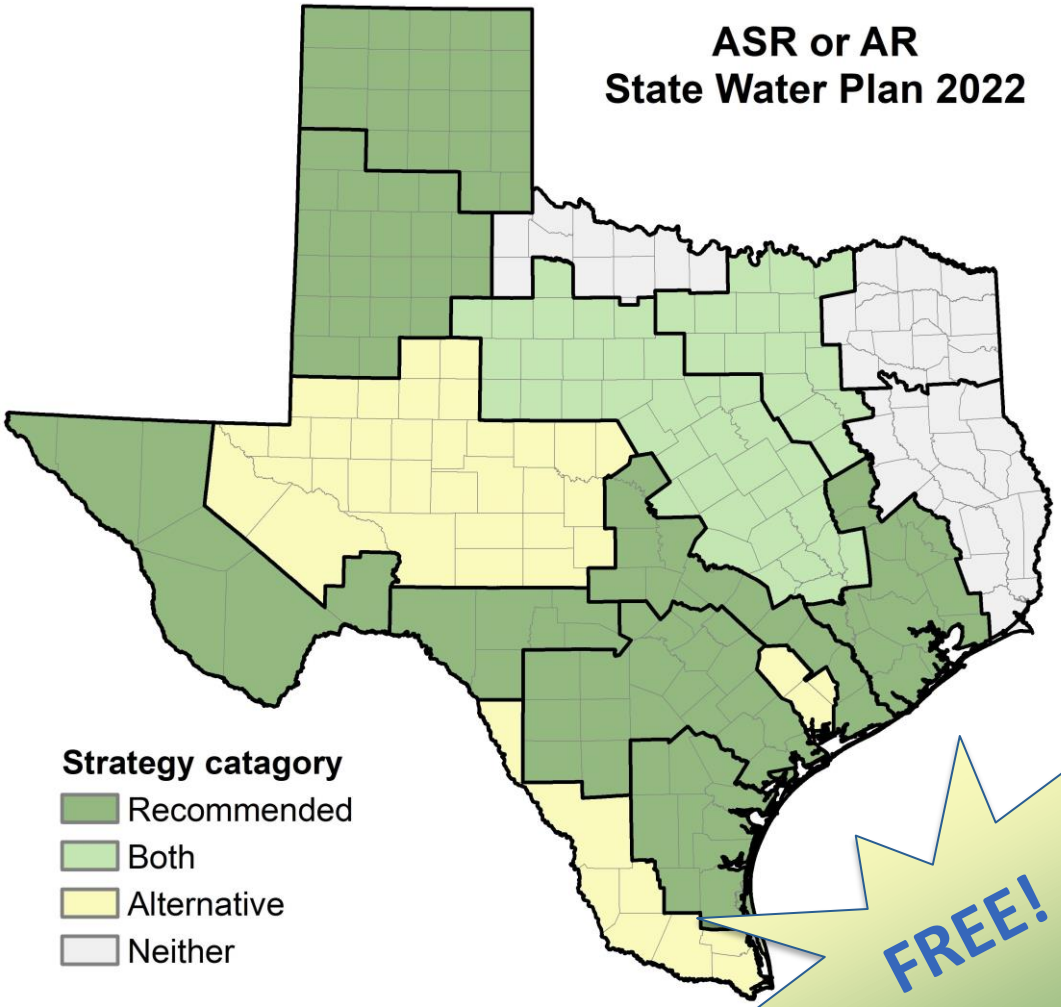
50-year State Water Plan

updated every 5 years

Background

Study

TWDB Aquifer Storage and Recovery (ASR) program



- Supports ASR in Texas since the 1990s
- Provides scientific research and data
- Facilitates the application of best practices
- Our mandates:
  - Conduct ASR studies
  - Share results

FREE!

Background

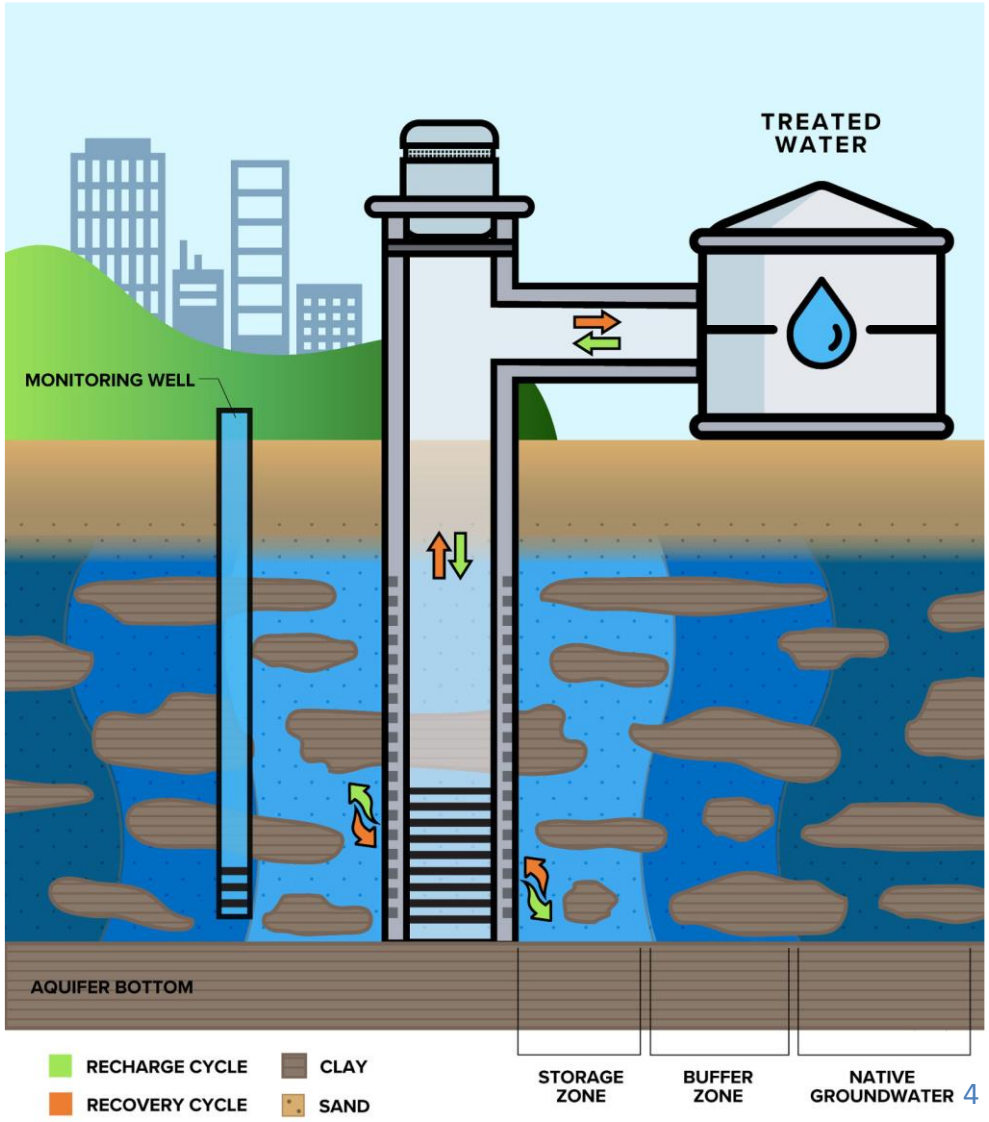
Study

What is ASR?

An underground water supply savings account

Texas Water Code § 27.151

"…a project involving the injection of water into a geologic formation for the purpose of subsequent recovery and beneficial use by the project operator."



Background

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The City of Bandera surface water acquisition, treatment and ASR

(2022 State Water Plan)

Phase 1: new water supply

- Medina River
- Storm water
- Water reuse

Other options:

- Water reuse for irrigation purposes
- Rainwater harvesting systems
- Drill additional middle Trinity aquifer wells
- Drill an additional lower Trinity aquifer well

Phase 2: ASR

- Store some of the new supply in the lower Trinity aquifer
- Use existing public supply wells initially
- Future plan: add 2 new wells

Longevity assessment for the City of Bandera water wells

- Water supply challenges
- Investigation methods
  - Daily operations
  - Long-term planning
- Results

Background

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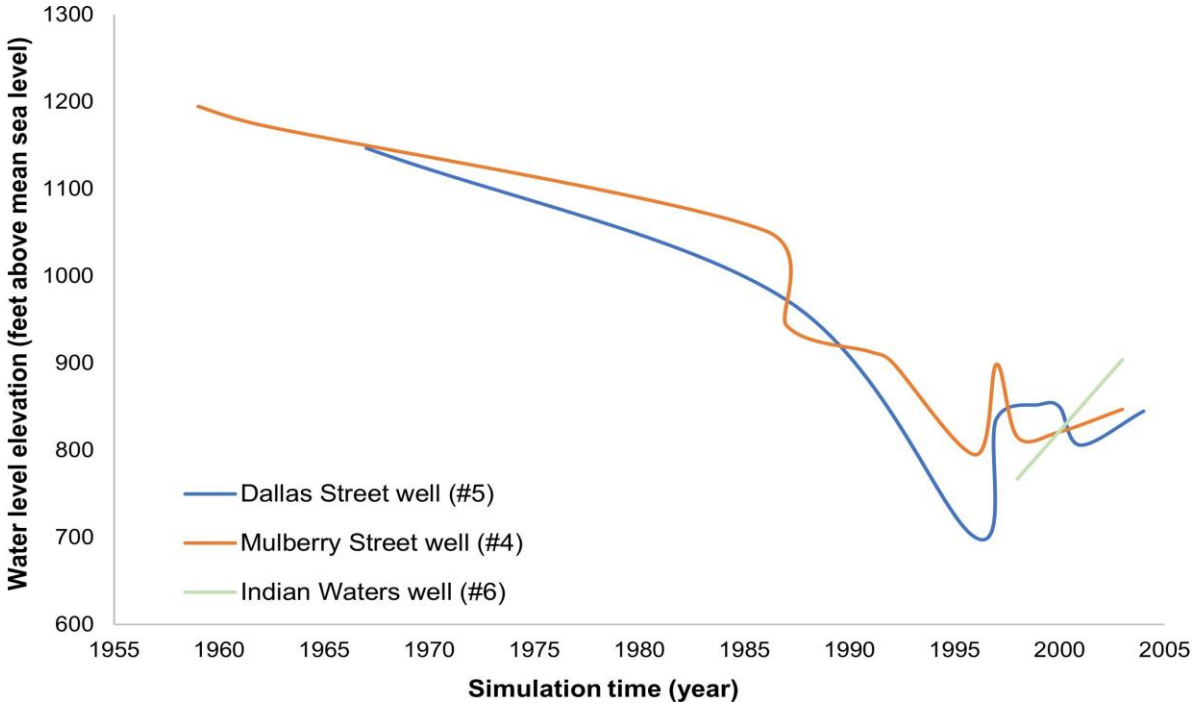
The City of Bandera water supply challenges

- Projected population growth
- Trinity Aquifer is the sole supply source currently
- Lower Trinity aquifer historic water level declines



- City of Bandera wells already near production capacity
- There is very little redundancy in case of failure

Background

Study

Investigation

Predict the longevity of the city's lower Trinity wells based on water levels and well configuration to move the project forward

Daily Operation

- **Current operation (run time and water level)**
- **Capacity of existing wells (configuration of well)**
- **Minimum operational requirements**

Long term planning

- **Lower Trinity aquifer historic and current water levels**
- **Projected levels based on planned use**

Background

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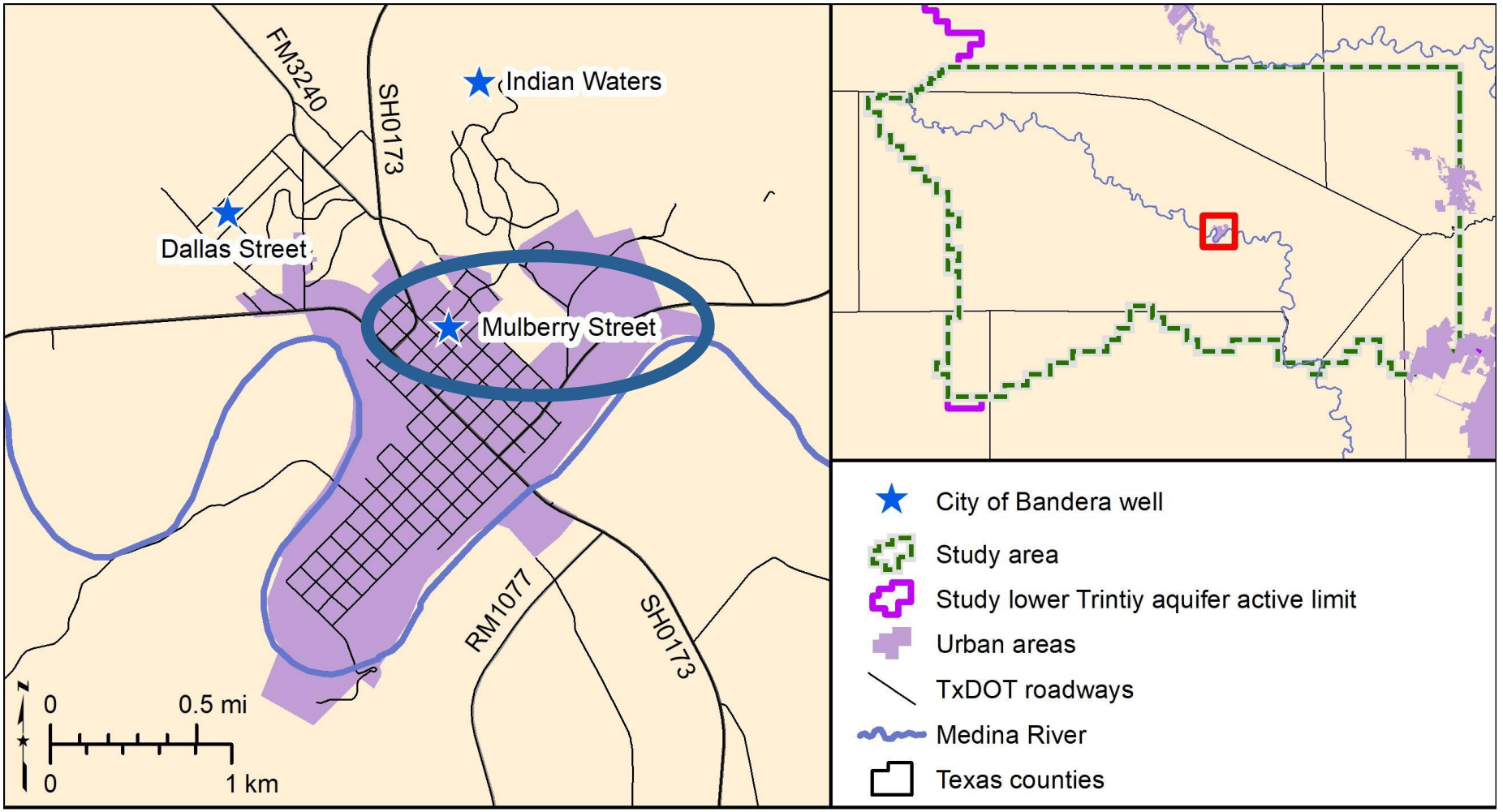
The City of Bandera water wells



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The City of Bandera water wells

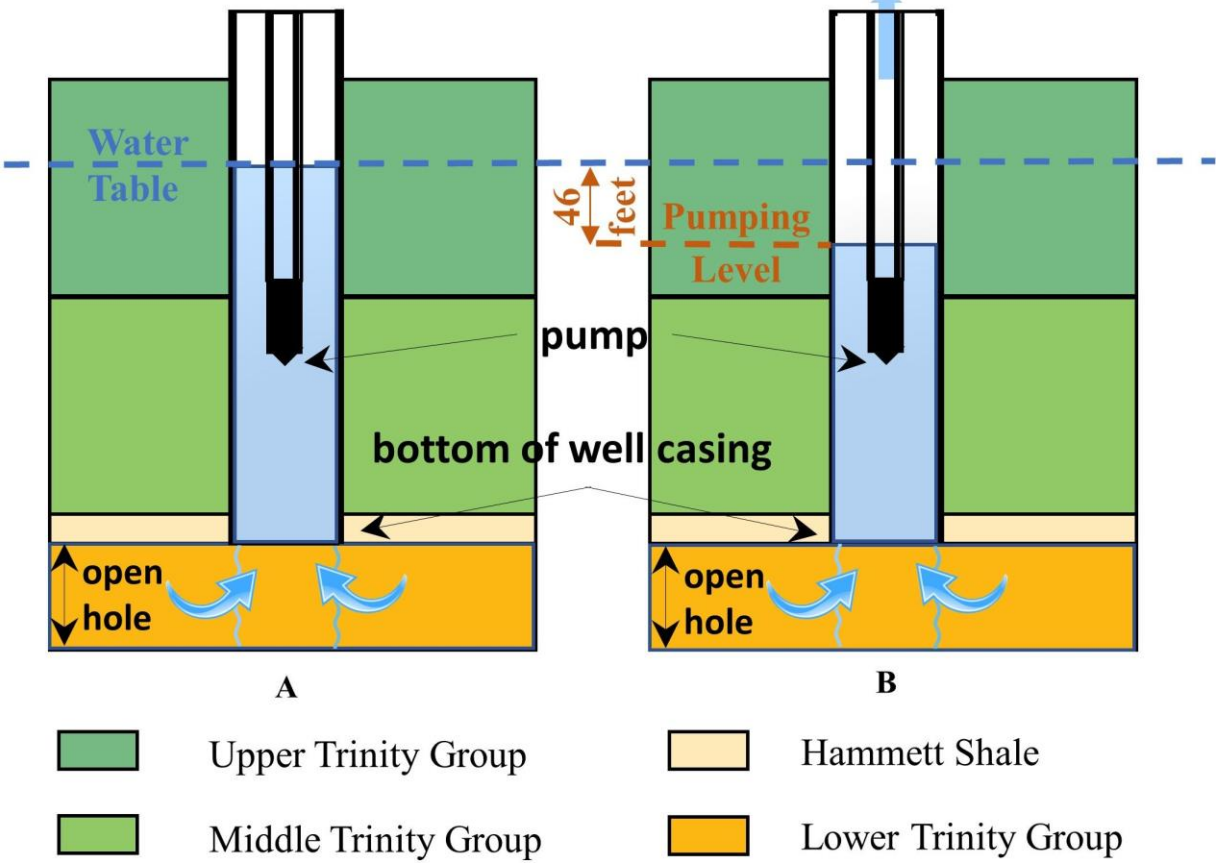
The Mulberry Street well (#4)

42% of the City's production

103,680 gallon per day

480 gallon per minute

Runs for 3.6 Hours

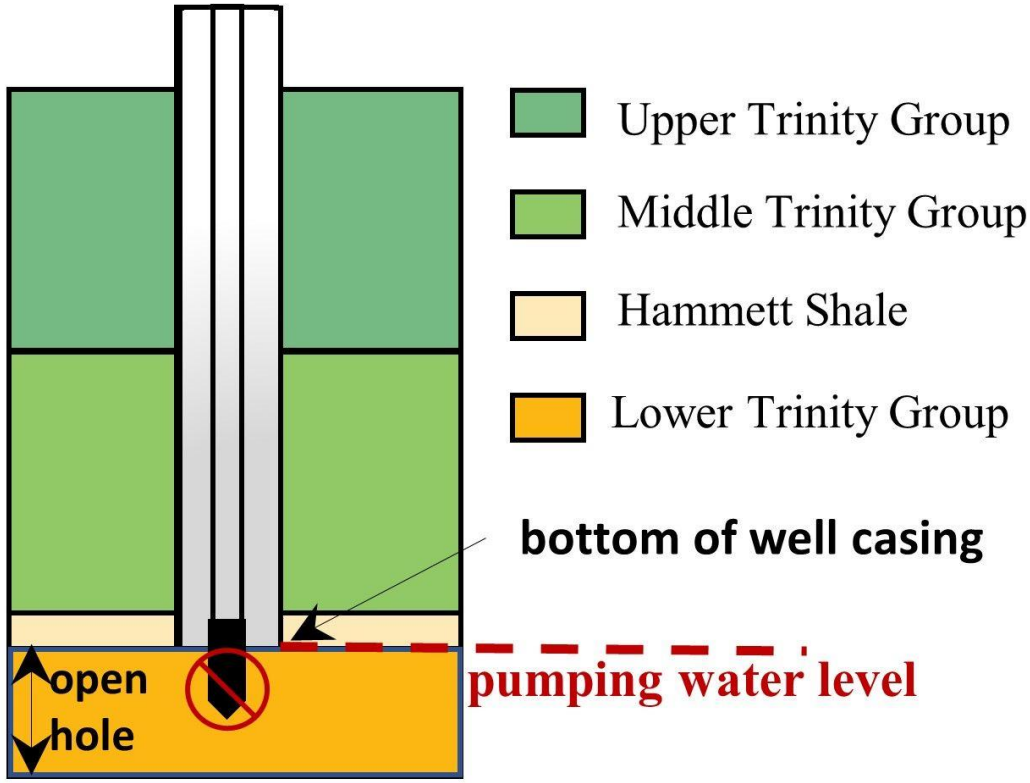


Well operational limit

Well Configuration

What would be the end of life for a well?

When water levels reach the bottom of the casing



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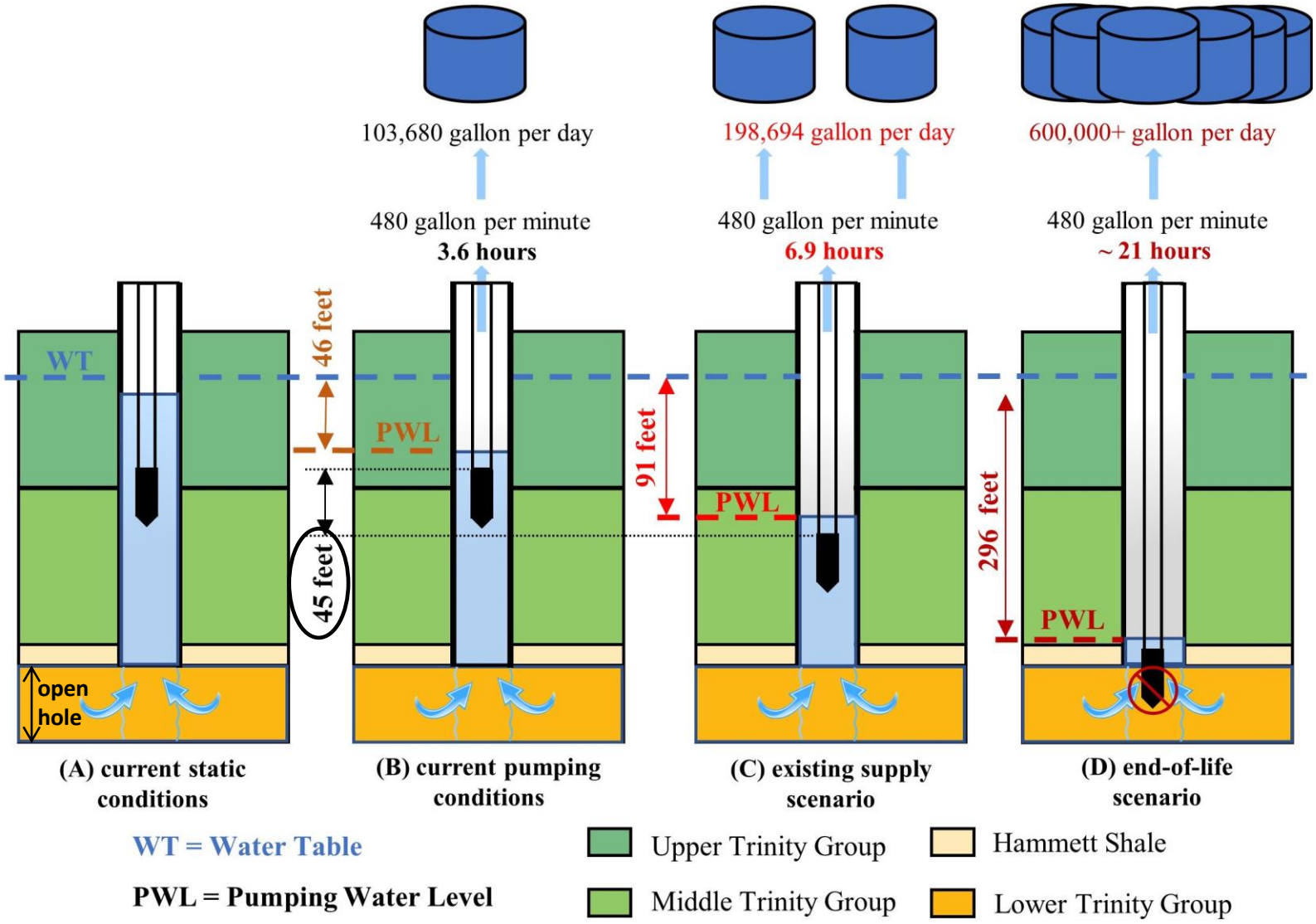
Operational analysis results

The Mulberry Street well

Existing Trinity Aquifer supply for City of Bandera = **534 AFY (476,726 gpd).** The Mulberry Street well = 198,694 gpd (42%)



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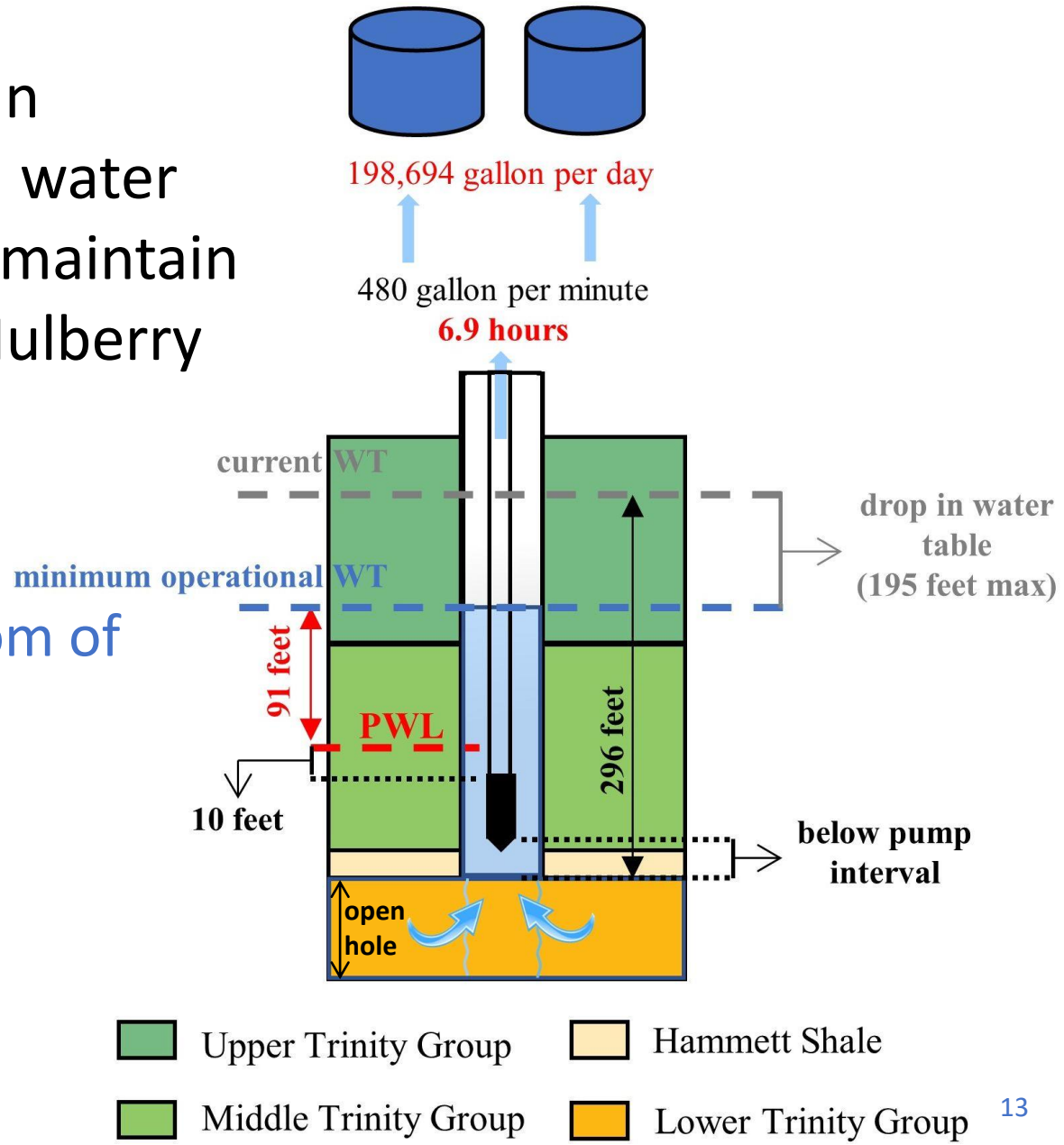
Minimum operational requirement

Then, what would be an approximate minimum water table level required to maintain the operation of the Mulberry Street well?

Criteria:

- Pump above the bottom of the well casing
- Water level above the pump
- Full recovery between pumping sessions



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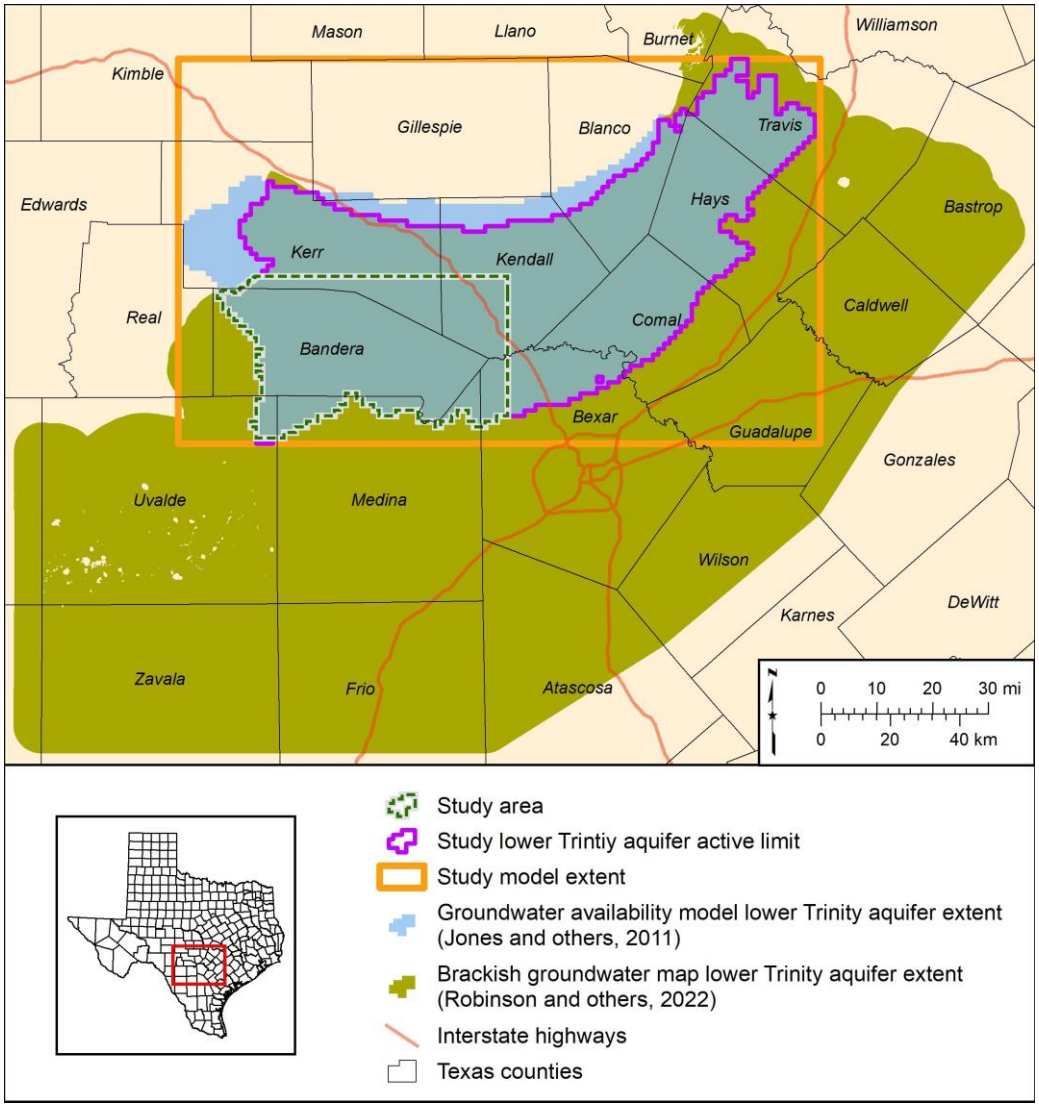
Long-term planning

Created the Bandera Well Longevity Model

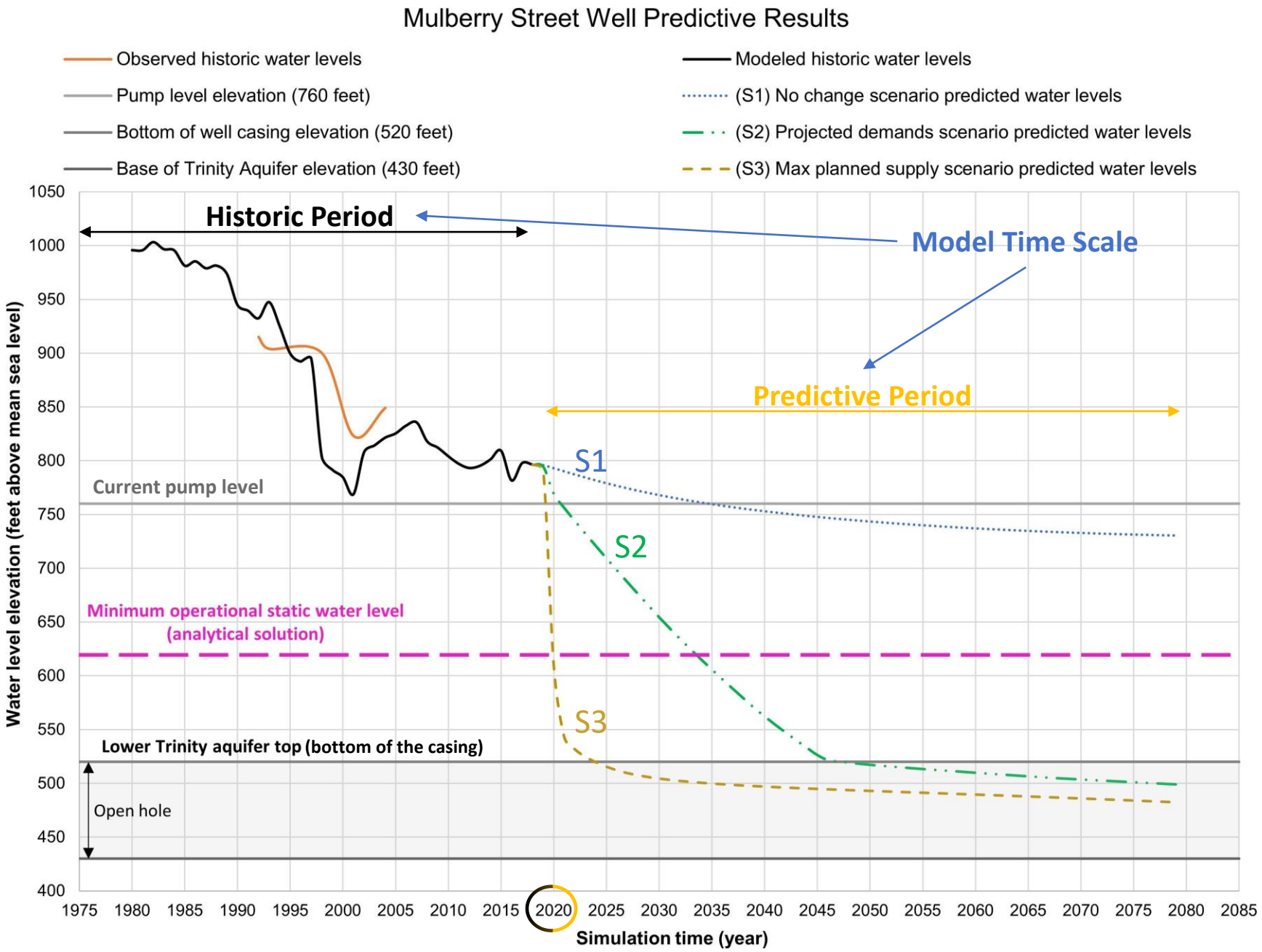


Prediction scenarios

The model was used to forecast future conditions based on three scenarios:

No change scenario	Projected use scenario	Max supply use scenario
		
No increase in pumping	Pumping will increase to match the projected demands in the 2022 State Water Plan	Pumping will increase to produce all groundwater listed as available to the City of Bandera in the 2022 State Water Plan

Predictive model results



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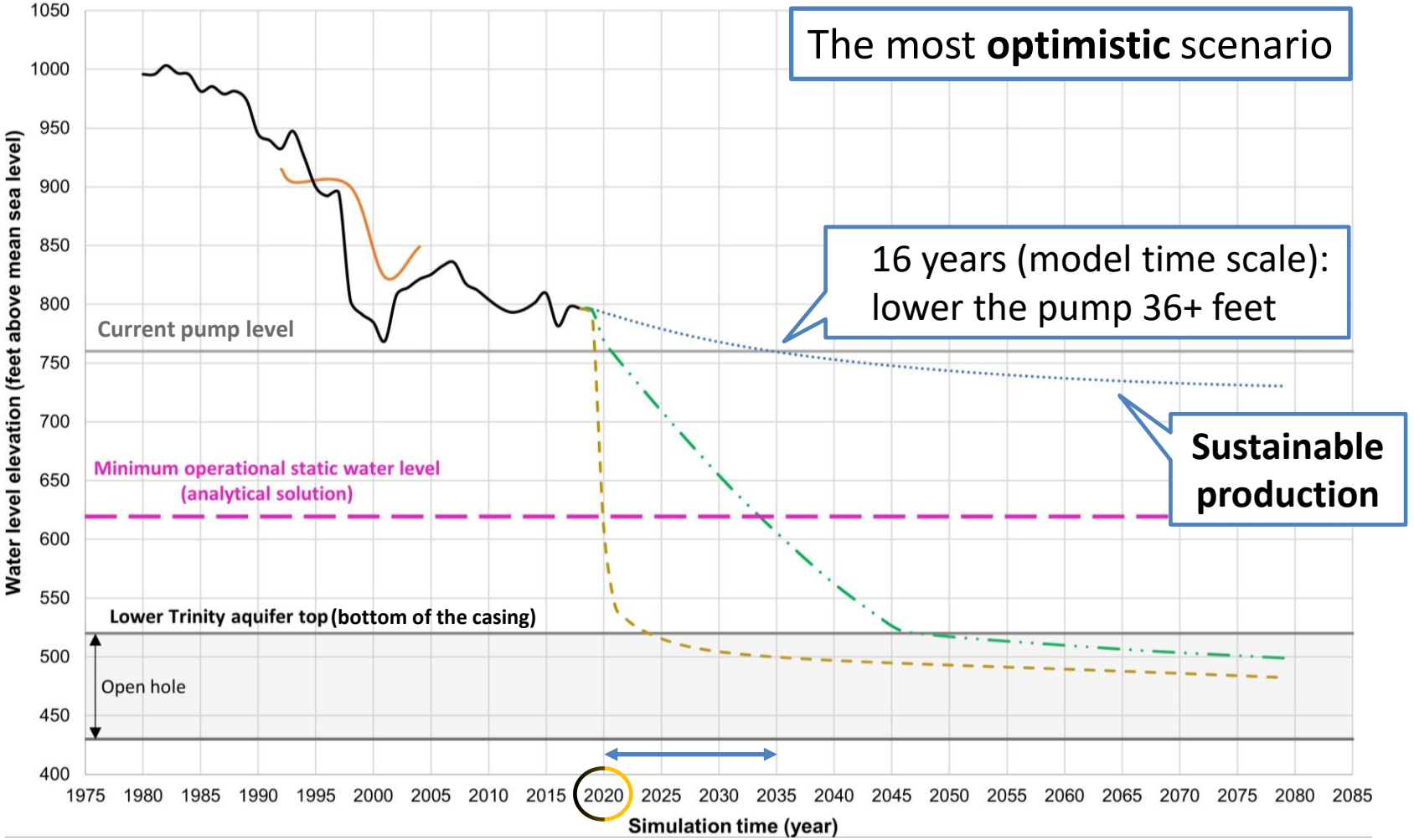
Predictive Model Results

The Mulberry Street Well

Scenario 1: **No change**



The City of Bandera has plenty of time to implement new water supply strategies

Background

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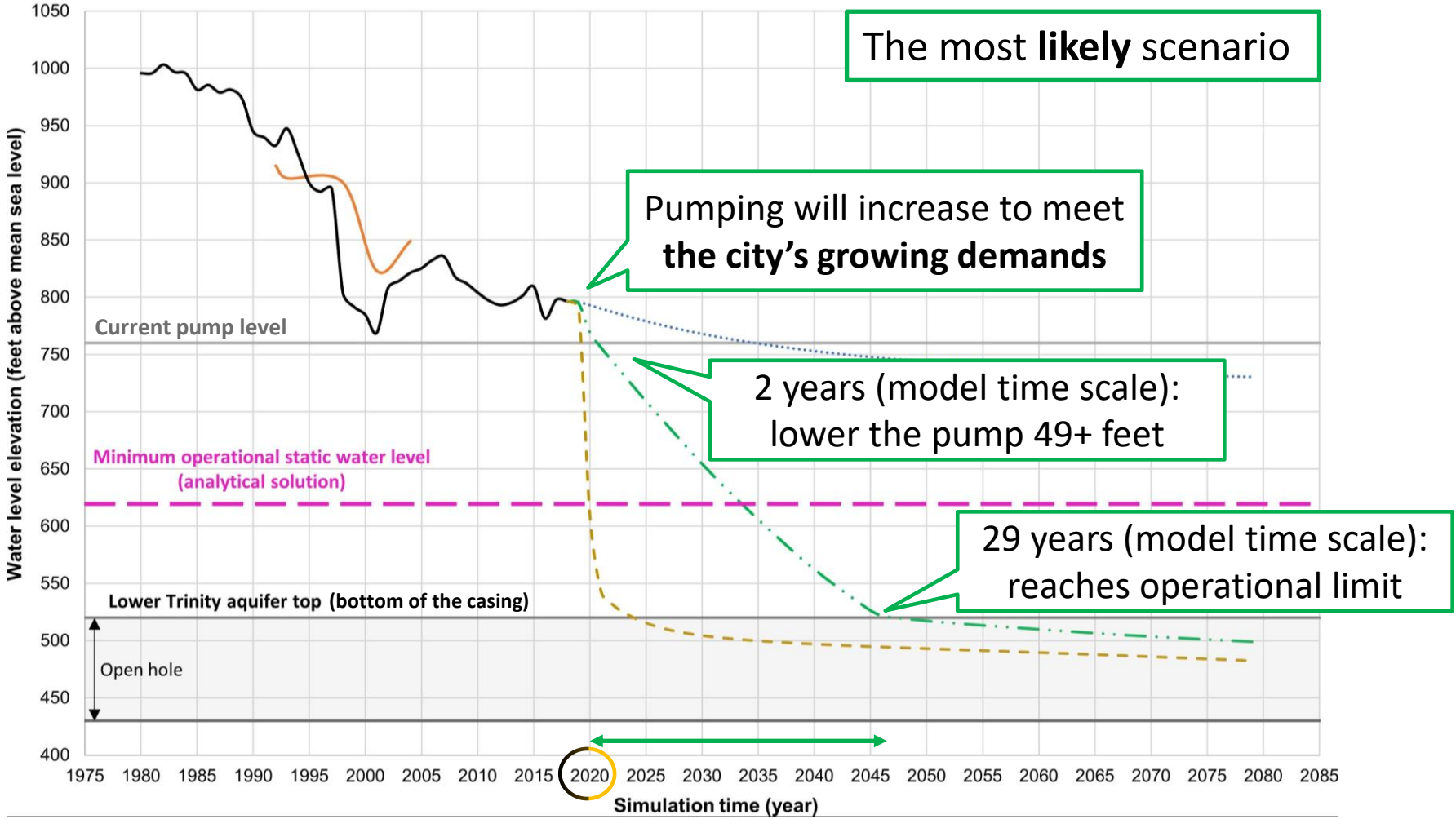
Predictive Model Results

The Mulberry Street Well

Scenario 2: **Projected demands**



The City of Bandera has less than 29 years margin to implement new water supply strategies

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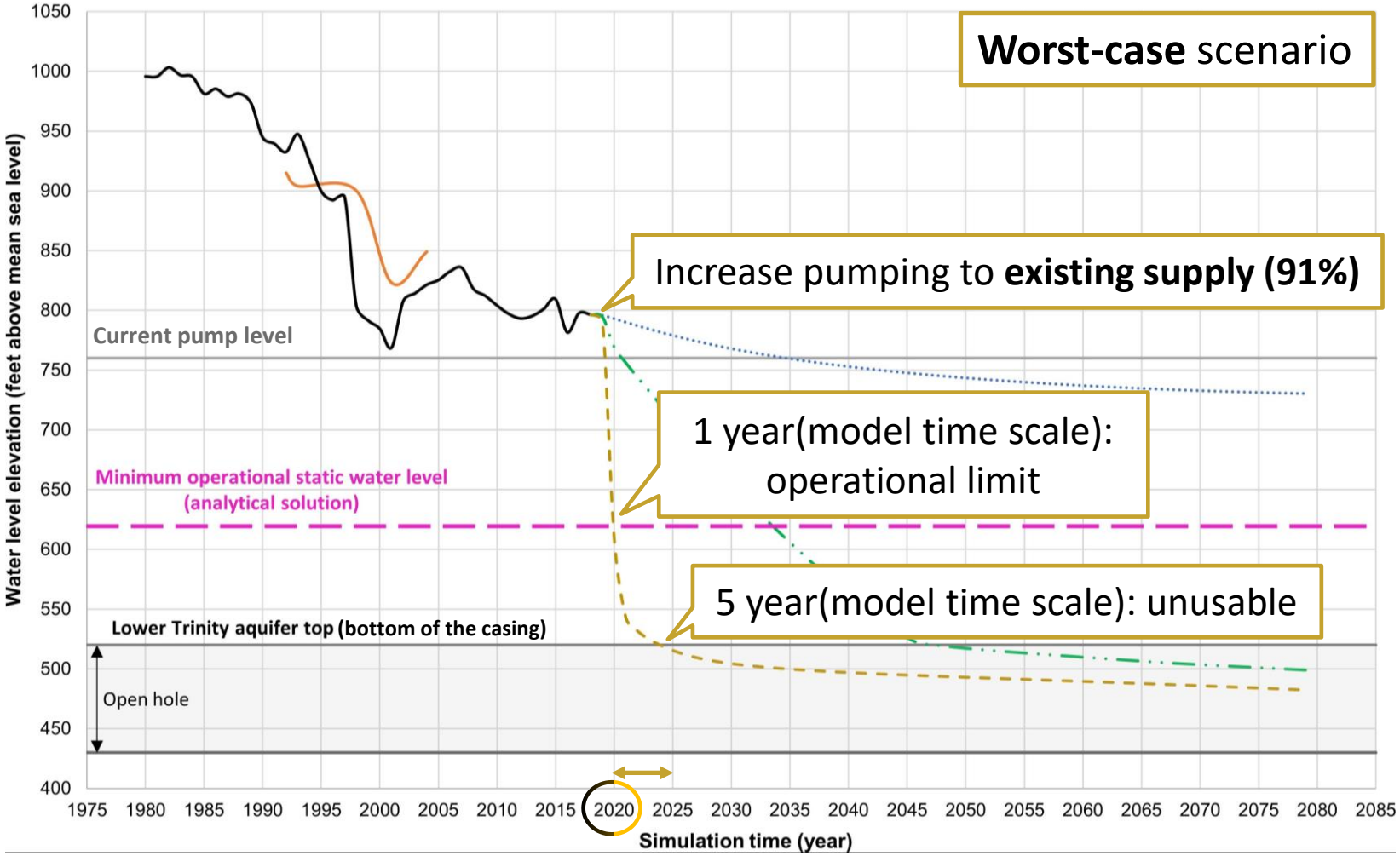
Predictive Model Results

The Mulberry Street Well

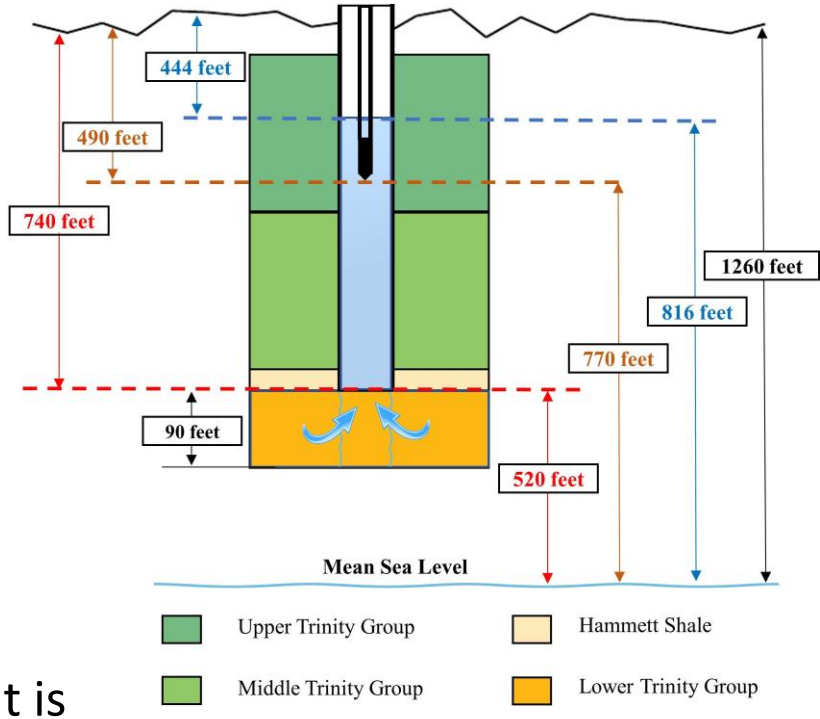
Scenario 3: **Maximum planned supply**



The City of Bandera would need to implement new strategies before considering this scenario

Key take-aways

- The City of Bandera lower Trinity aquifer wells:
  - Currently meet the city's needs but are reaching pumping limits
  - Pumps can be lowered to meet some increased demand but vulnerable to single well failures



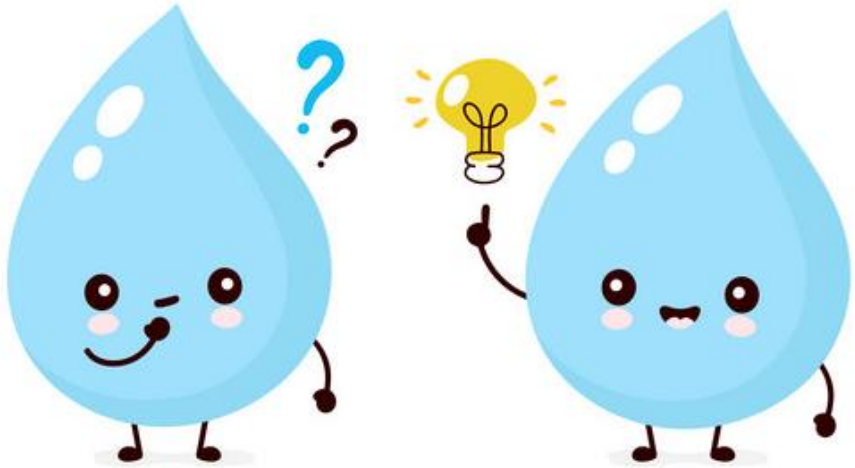
- The City of Bandera
  - Has an estimated groundwater supply that is almost twice the current use
  - Has 30% projected population growth by 2070
  - Has less than 29 years to implement new water management strategies to meet increasing demands

Final report by Spring of 2023

https://www.twdb.texas.gov/innovativewater/asr/projects/Bandera/index.asp

- **Rebeca Gibson**, the City of Bandera Mayor
- **David Jordan**, the former City Administrator, and
- **Lance Roy**, the City Public Water Director

- **Dave Mauk**, the Bandera County River Authority and Groundwater District (BCRAGD) General Manager
- **Alyssa Balzen**, the former Groundwater Science Manager, and
- **Luke Whitmire**, the Assistant General Manager



Let us know if you would like to know more!

Texas Water Development Board

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