

# Alamogordo Desalination Project

## WESCAS 2014 Fall Conference



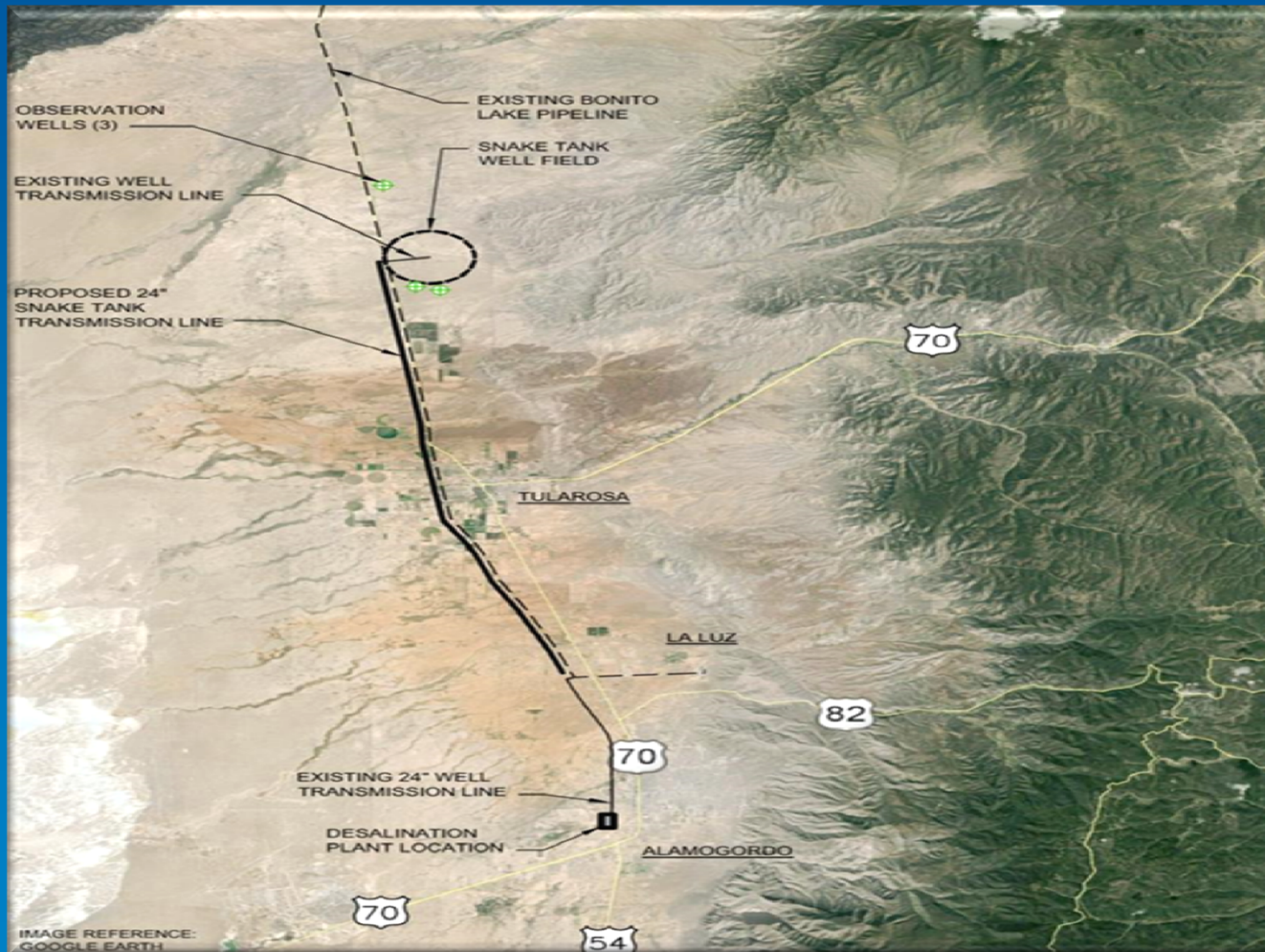
Robert Fowlie, PE

October 30, 2014

# Presentation Overview

- **Project Background**
- **Need for Project**
- **Plant Design and Challenges**
- **Schedule**

# Alamogordo Regional Water Supply Project

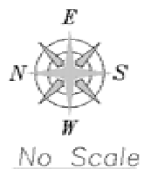
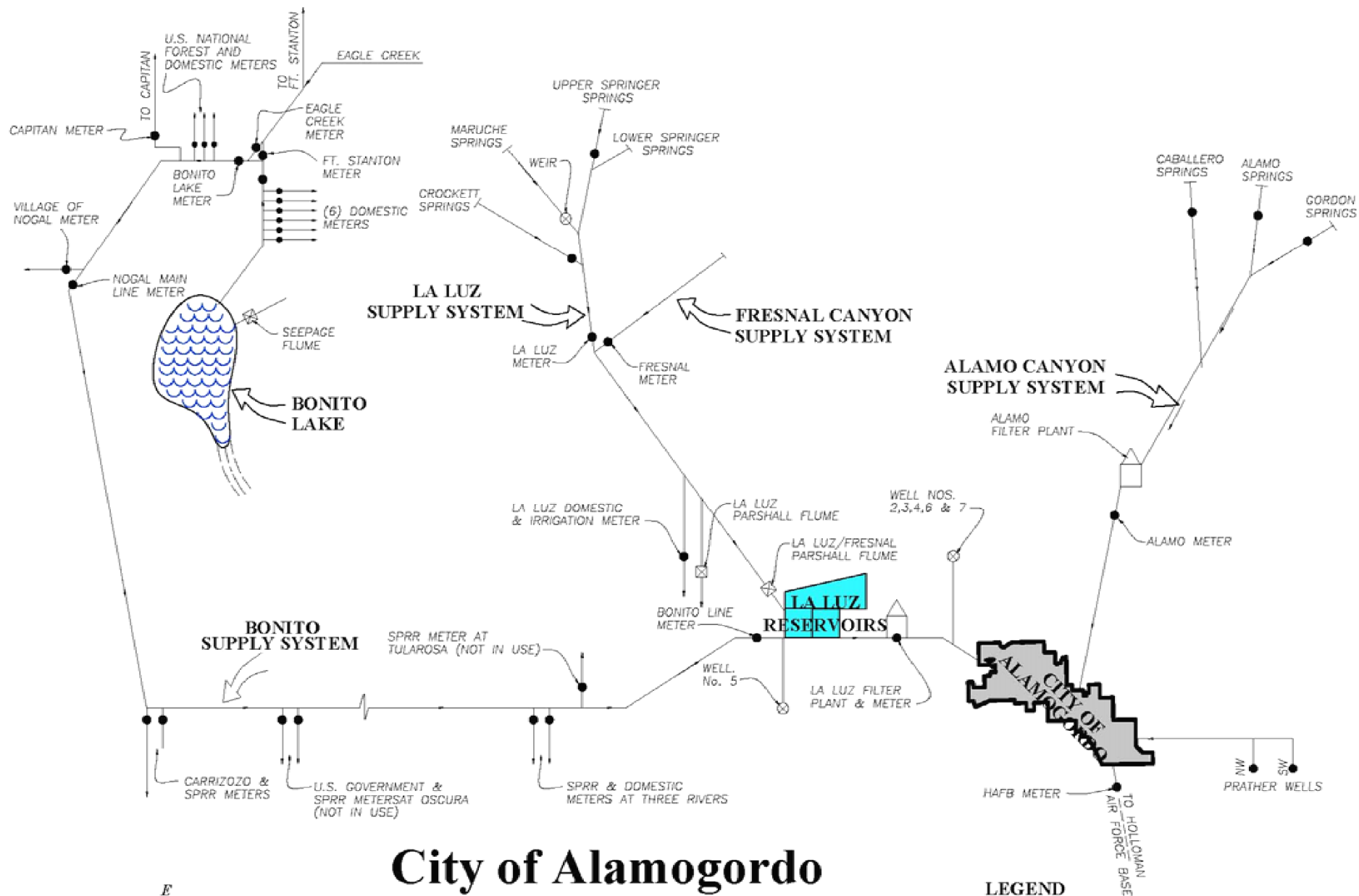


# Existing Water Sources – Surface Water

- **City has 5400 AFY of surface water rights.**
- **Approximately 70 percent of the City's water supply is provided by surface water sources.**
- **Surface water comes from the Sacramento Mountains east of the City and from Bonito Lake 90 miles northeast of the City.**
- **Bonito Lake supplies approximately 25 percent of City's water supply.**
- **Bonito Lake supply lost in 2012 due to Little Bear Fire.**

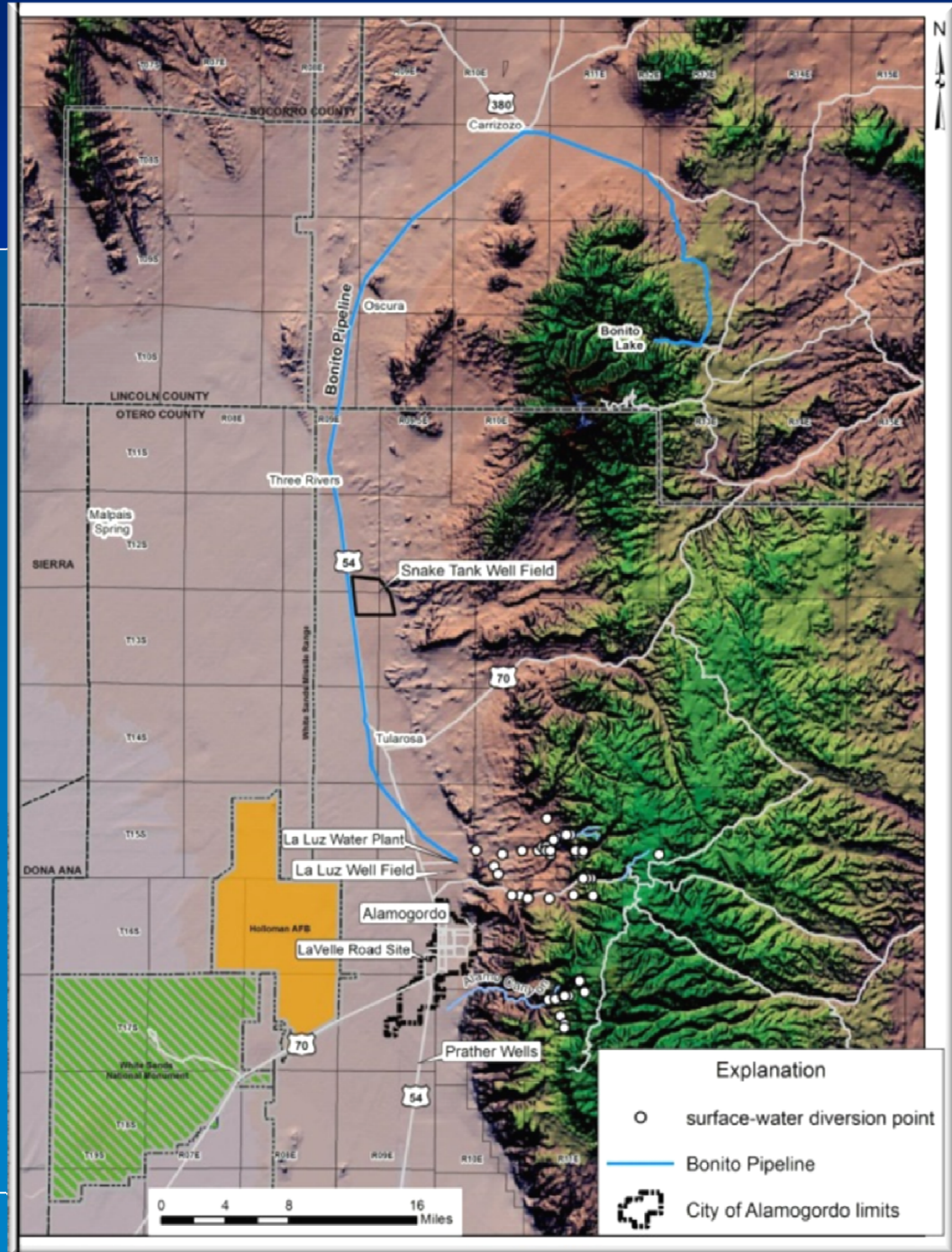
# Existing Water Sources – Ground Water

- City uses ground water to supplement surface water supply.
- 3900 AFY of ground water rights.
- Ground water supplied by 9 wells.
- Groundwater high in TDS (1500-1800 mg/L) – blended with surface water.
- Groundwater supply affected by drought (water levels dropping, production reduced).



# City of Alamogordo Water Collection System

# Water Sources



# Bonito Lake



# Need for Project – Increased Water Demand

## Projected Increases and Population and Water Demand

**Projected Water Demands for the City of Alamogordo 2015 to 2055<sup>1</sup>**

| Year | Projected Future Water Demand in AFY, MGY, Average MGD and Peak MGD |       |      |                       |
|------|---------------------------------------------------------------------|-------|------|-----------------------|
|      | AFY                                                                 | MGY   | MGD  | Peak MGD <sup>2</sup> |
| 2015 | 7,185                                                               | 2,341 | 6.4  | 14.1                  |
| 2020 | 7,626                                                               | 2,485 | 6.8  | 15.0                  |
| 2025 | 8,095                                                               | 2,637 | 7.2  | 15.9                  |
| 2030 | 8,594                                                               | 2,800 | 7.7  | 16.9                  |
| 2035 | 9,122                                                               | 2,972 | 8.1  | 17.9                  |
| 2040 | 9,685                                                               | 3,155 | 8.6  | 19.0                  |
| 2045 | 10,279                                                              | 3,349 | 9.2  | 20.2                  |
| 2050 | 10,914                                                              | 3,556 | 9.7  | 21.4                  |
| 2055 | 11,584                                                              | 3,774 | 10.3 | 22.7                  |

1 – Reference: Draft 40-Year Water Plan, Livingston Associates and John Shomaker and Associates 2014

2- Peak Day use estimated at 2.2 times Average Day use.

# Need for Project – Firm Water Supply

- **Need for future water supply** based on concept of “Firm Water Supply.”
- **Firm Water Supply** – “the reliable withdrawal rate of acceptable quality water that can be supplied by available flows and/or storage releases from reservoirs and/or groundwater reserves throughout a critical drought period”(AWWA M50).
- **Method uses past data** to estimate what can be expected in the future .
- **Same methodology** used to estimate firm supply of groundwater.

# Need for Project – Firm Water Supply

## Projected Water Demand and Water Supply Requirements 2015 to 2050

| Year | Total Demand (AFY) | Ground Water Supply <sup>2</sup> (AFY) | Surface Water Supply (AFY) | Additional ARSWP Supply Required (AFY) | Additional ARSWP Supply Required (MGD) |
|------|--------------------|----------------------------------------|----------------------------|----------------------------------------|----------------------------------------|
| 2015 | 7,185              | 3,909                                  | 2,254 <sup>3</sup>         | 1,022                                  | 0.91                                   |
| 2020 | 7,626              | 3,909                                  | 2,254 <sup>3</sup>         | 1,463                                  | 1.3                                    |
| 2025 | 8,095              | 3,909                                  | 2,525 <sup>4</sup>         | 1,661                                  | 1.5                                    |
| 2030 | 8,594              | 3,909                                  | 2,525                      | 2160                                   | 1.9                                    |
| 2035 | 9,122              | 3,909                                  | 2,525                      | 2,688                                  | 2.4                                    |
| 2040 | 9,685              | 3,909                                  | 2,525                      | 3,251                                  | 2.9                                    |
| 2045 | 10,279             | 3,909                                  | 2,525                      | 3,845                                  | 3.4                                    |
| 2050 | 10,914             | 3,909                                  | 2,525                      | 4,480                                  | 4.0                                    |

1- Reference: Draft 40-Year Water Plan, Livingston Associates and John Shomaker and Associates 2014

2- Existing ground water sources

3- Assumes Bonito Lake is out of service until 2020

4- Assumes Bonito Lake is in service

# Alamogordo Regional Water Supply Project

- **Develop 4000 AFY of brackish groundwater from Tularosa Basin as a new source of water for the City of Alamogordo.**
- **Project to completed in phases - First phase consists of development of 1 MGD treatment plant.**
- **Future expansions to ultimate capacity of 4 MGD.**

# Interim Desalination Plant Project

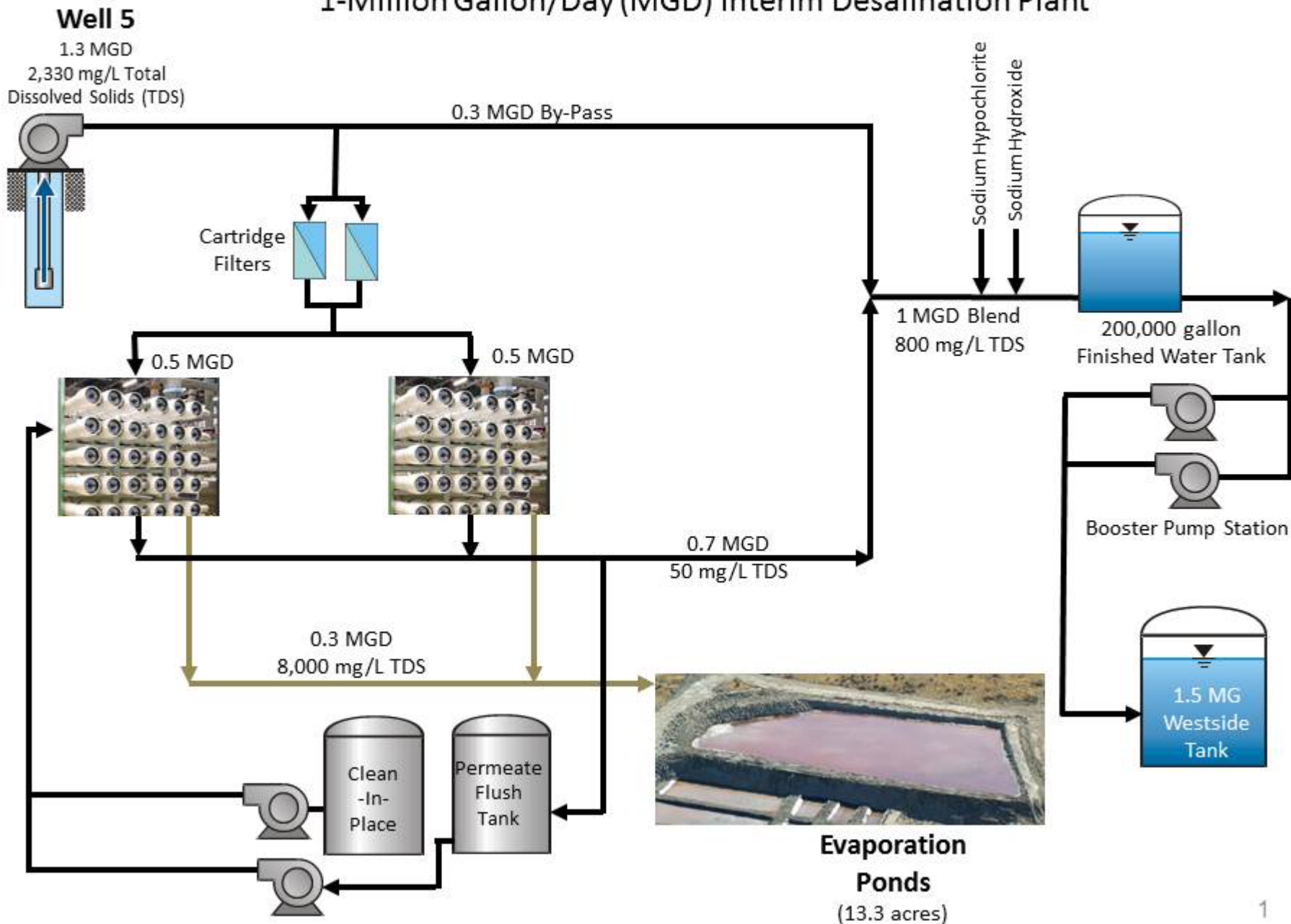
- **1-MGD treatment capacity; replace lost supply from Bonito Lake.**
- **Evaporation ponds for concentrate disposal.**
- **Finished water clearwell and booster pump station.**
- **Equip Well 5 in Snake Tank Well Field.**

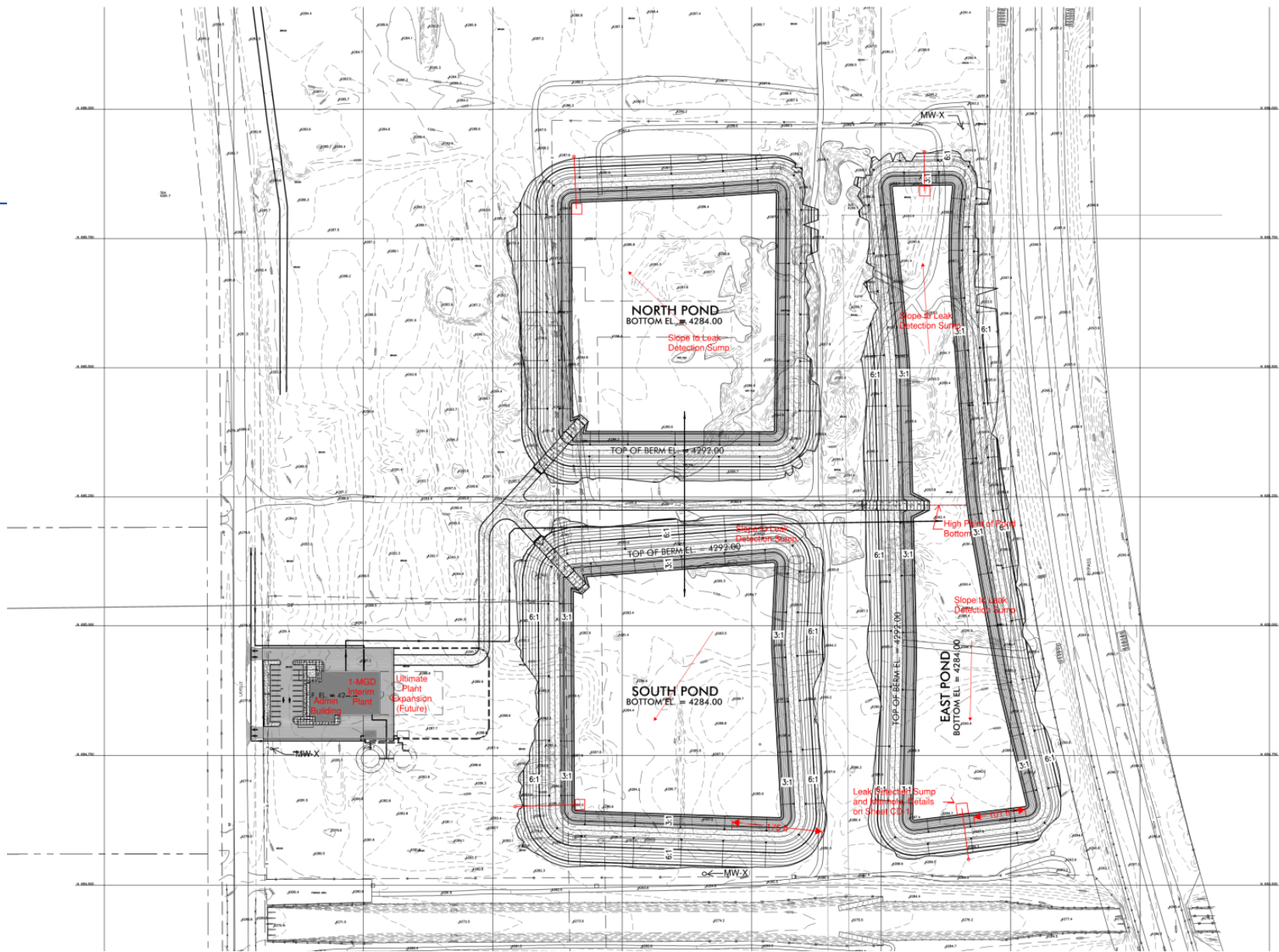
# Ultimate Plant

- **4-MGD treatment capacity**
- **Expand in 0.5-1 MGD increments**
- **Need for future expansions based on condition of existing supply and increased demand**
- **Evaluate need for expansion every 5 years - condition of NMOSE permit**
- **Future expansions require injection well for concentrate disposal**

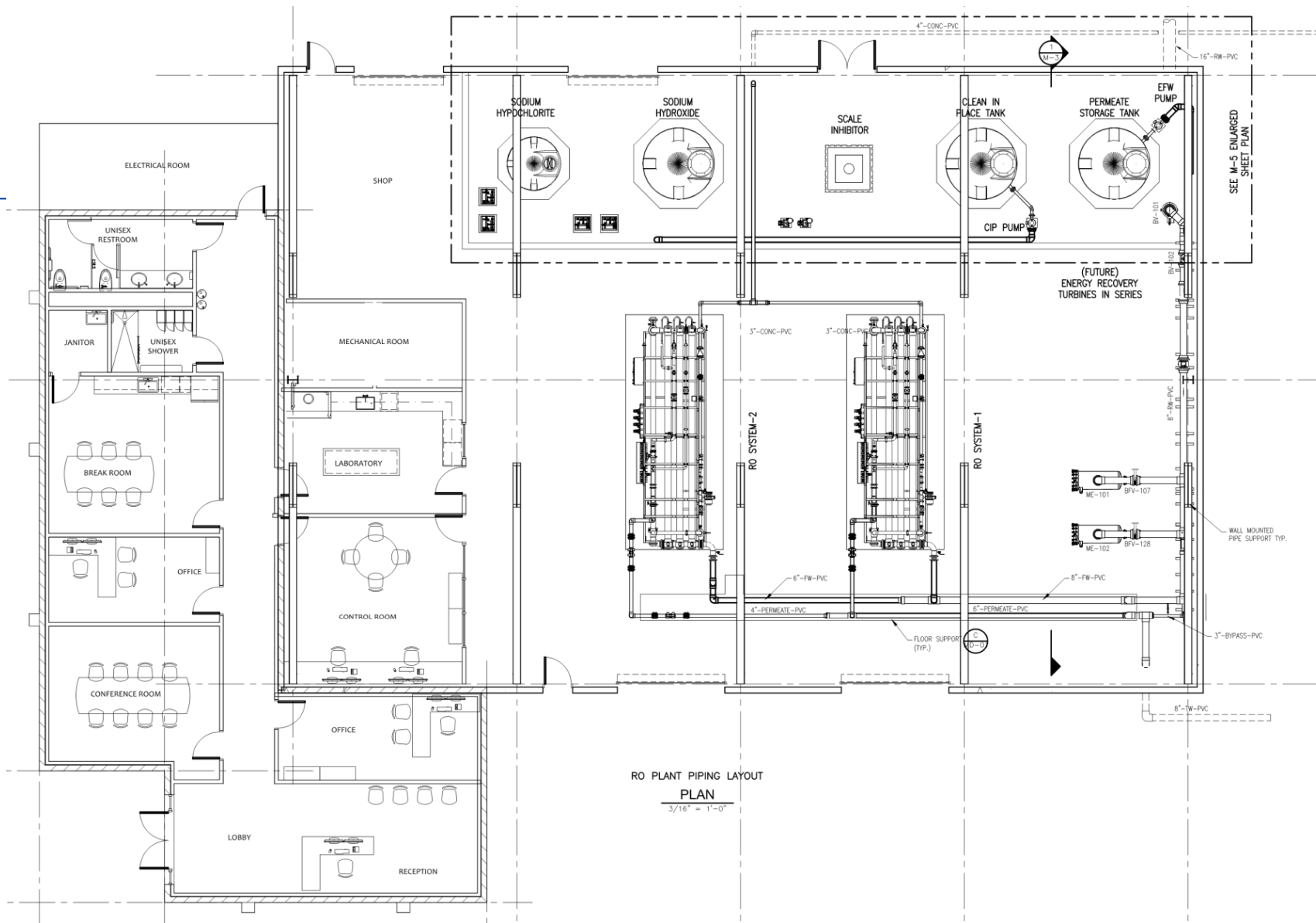
# City of Alamogordo

## 1-Million Gallon/Day (MGD) Interim Desalination Plant





Overall Site Plan



## RO Plant Building Layout

# Project Challenges

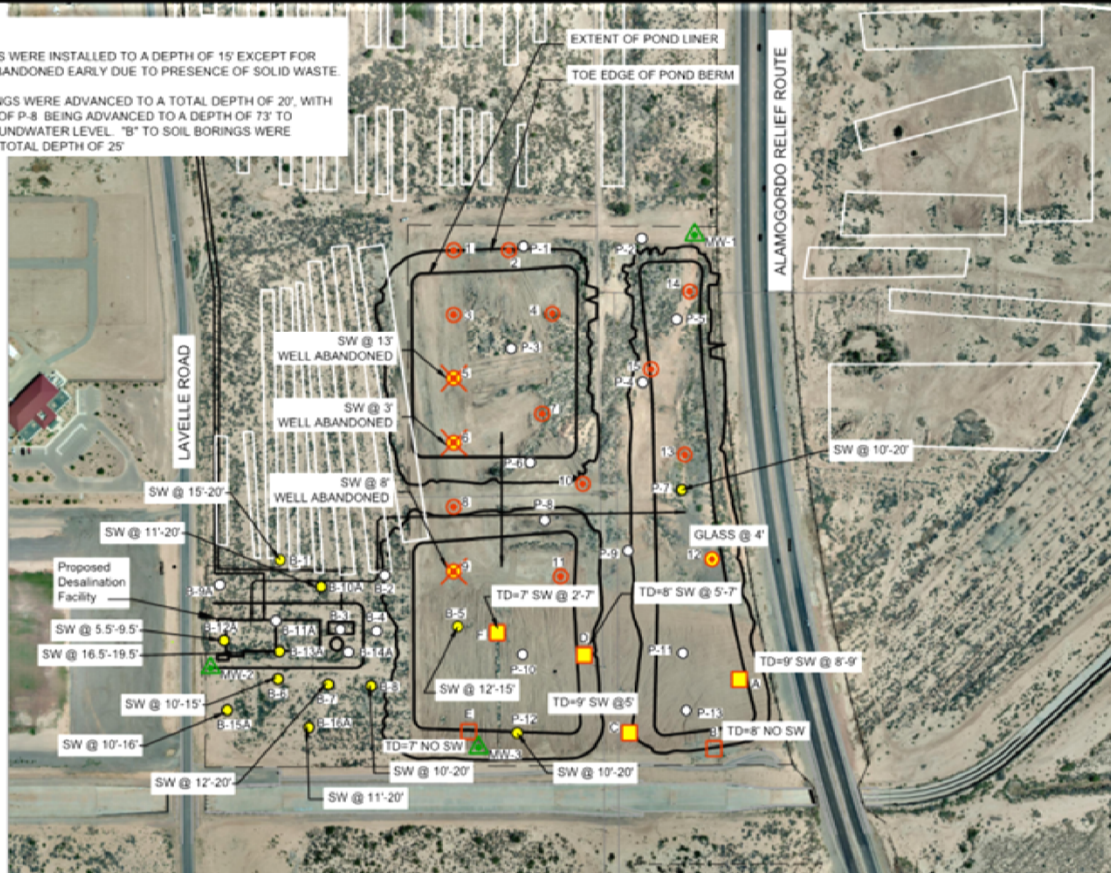
- Site selected for plant is former landfill site
- Plant area and evaporation ponds located away from known landfill cells
- Avoid existing power lines
- City conducted Focused Environmental Investigation and extensive geotechnical exploration program to characterize conditions on site

# Focused Site Investigation

## NOTES

1. ALL LFG WELLS WERE INSTALLED TO A DEPTH OF 15' EXCEPT FOR THOSE THREE ABANDONED EARLY DUE TO PRESENCE OF SOLID WASTE.

2. "P" SOIL BORINGS WERE ADVANCED TO A TOTAL DEPTH OF 20', WITH THE EXCEPTION OF P-8 BEING ADVANCED TO A DEPTH OF 73' TO DETERMINE GROUNDWATER LEVEL. "B" SOIL BORINGS WERE ADVANCED TO A TOTAL DEPTH OF 25'.



## LEGEND



SITE OF DESALINATION PLANT AND FACILITIES



INTERPRETED TRENCH OUTLINE (1)



TEMPORARY LFG WELLS



TEMPORARY LFG WELLS WITH SOLID WASTE PRESENT



ABANDONED LFG BORING



SOIL BORINGS



SOIL BORINGS WITH SOLID WASTE PRESENT



TEST PITS



TEST PITS WITH SOLID WASTE PRESENT



PROPOSED MONITORING WELL LOCATION



PROPOSED FACILITY



PROPOSED PIPELINE



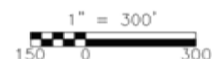
EXISTING OVERHEAD ELECTRIC LINES



TOTAL DEPTH



SOLID WASTE ENCOUNTERED AT APPROXIMATE DEPTH BELOW GROUND SURFACE



REFERENCE: EXTENT OF TRENCH OUTLINES FROM "GEOPHYSICAL INVESTIGATION AT THE ALAMOGORDO LANDFILL, ALAMOGORDO NEW MEXICO," SUNBELT GEOPHYSICS, JULY 2003

# Design Considerations and Protections

- **Evaporation Ponds**

- Settlement Analysis
- Evaporation ponds are double lined with leak detection system
- Monitoring wells for groundwater beneath the site
- Landfill gas venting system under liner

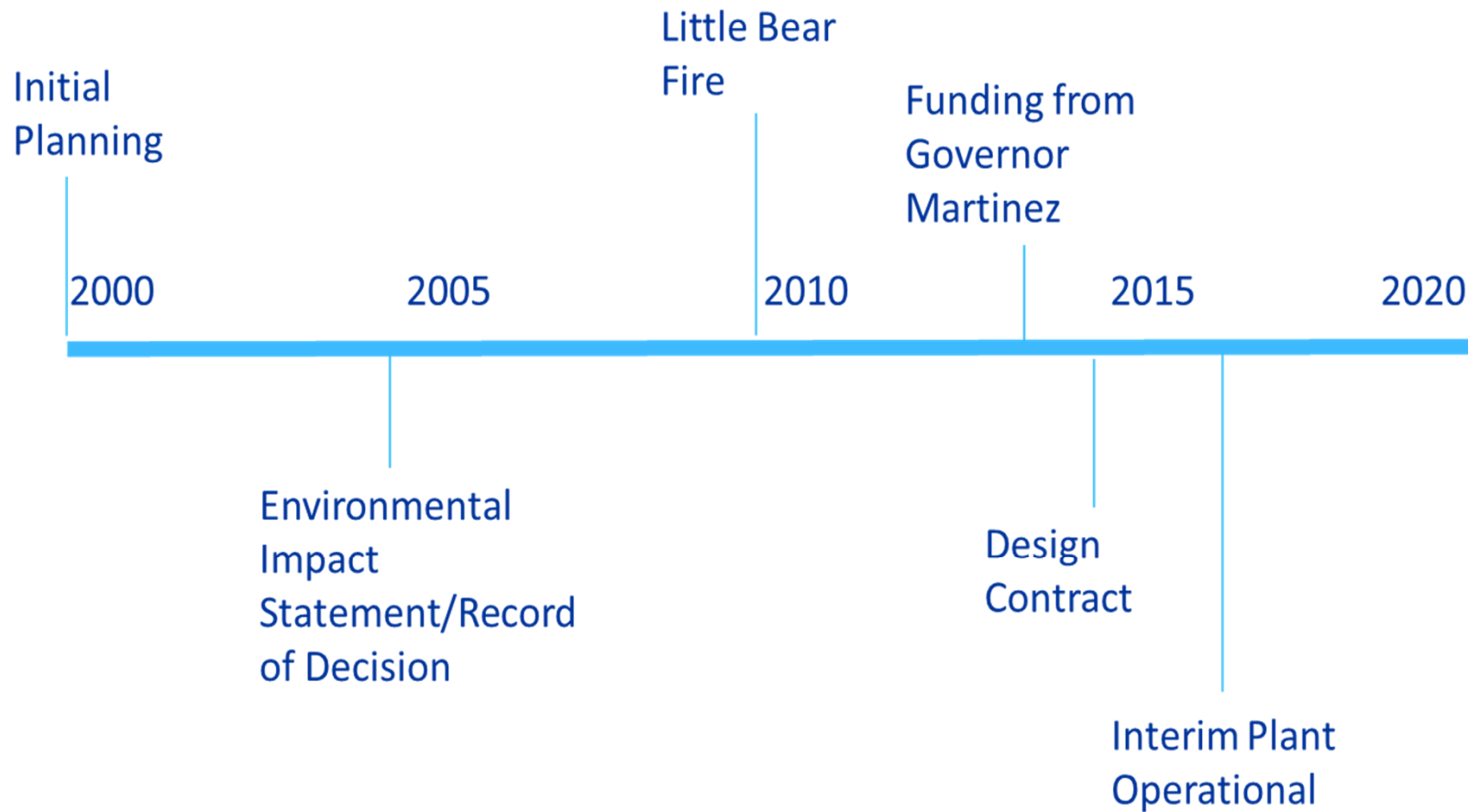
- **Desalination Plant**

- Landfill gas venting system
- Deep foundation system

# Future Challenges

- Expansion for future phases – based on demand, available surface water supply, or both?
- Bonito Lake expected to return to service 2-3 years
- Injection well required for concentrate disposal
  - Permitting challenges – no municipal injection wells in NM
  - Testing program required

# Project Timeline



# Project Milestones

- **Focused Environmental Investigation: July 2014**
- **Engineering Design Report: November 2014**
- **30% Design: September 2014**
- **Groundwater Discharge Permit Application: September 2014**
- **100% Design: March 2015**
- **Construction: May 2015- May 2016**