

Technical Memorandum

To: Tyrone Water & Wastewater Association

Date: March 6, 2026

From: Alex Nuñez-Thompson and Jennifer Hill

Subject: Solar Array for Tyrone Water and Wastewater Association Sewage Lift Station

Daniel B. Stephens & Associates, Inc. (DBS&A) has prepared this technical memorandum to evaluate the space requirement and estimated cost of installing solar panels to power the existing sewage lift station serving the Tyrone townsite (Tyrone or the townsite) near Silver City, New Mexico. It also evaluates the amount of power that could be generated from a solar panel array constructed on property owned by Tyrone Water & Wastewater Association (TWWA).

Background

TWWA owns and operates a water system serving 326 connections for Tyrone, located northeast of the Tyrone mine and approximately 4.6 miles southwest of Silver City. Most of the sewer system connections are residential, though the town has a fire station, community building, and two commercial properties (both of which are currently vacant). The system was constructed in the 1960s by Phelps Dodge (now Freeport-McMoRan Inc. [FMI]), who owned and operated the mine. Figure 1 shows the location of the townsite in relation to Silver City and the Tyrone mine, and also indicates the location of property identified for the solar array.

At its inception, wastewater from the townsite was collected and conveyed approximately 1.2 miles to the east (across New Mexico Highway 90 [NM 90]) to a series of wastewater lagoons. The lagoons were eventually closed and filled in. Today, a lift station within the parcel boundary of the old lagoons collects and conveys wastewater from Tyrone to Silver City's sewer through a 6-inch force main to the Silver City sewer system. Power is provided to the lift station by Public Service Company of New Mexico (PNM).

The parcels owned by TWWA are identified by Uniform Parcel Codes (UPC) 308 1107 392 509 and 308 1108 318 011. For the purposes of estimating power-generating potential of the parcels, we rounded their combined area to 27 acres. These parcels are shown on Figure 3.

Lift Station Electrical Demand

The lift station is equipped with two Flygt pumps equipped with variable frequency drives (VFDs) that operate in an alternating, lead-lag configuration to pump sewage to the sewer system in Silver City. Based on information provided by TWWA, the stated design point is 251 gallons per minute (gpm) at 308 feet of total dynamic head (TDH). Wastewater is pumped approximately 2 miles through a 6-inch force main.

The pump motors are three-phase, 460 V, 78 A rated current with a rated power of 72 horsepower (hp).

The calculated electrical usage, based on a wastewater flow of 37,600 gallons per day (gpd) reported by TWWA, is 3,115 kilowatt hours (kWh) per month (104 kWh per day) at a cost of approximately \$7,550 per year.

Based on an electricity usage summary from PNM (Attachment 1), which includes usage and costs over 2025, the average daily usage was 116.06 kWh and the average cost per day was \$16.48. This equates to an average monthly usage of 3,481 kWh (using 30 days per month) and an average annual cost of \$6,015.

Estimated usage for February 2026 is more than double the usage than February 2025; therefore, it is likely that these averages underrepresent actual usage. However, based on our calculated estimates using the theoretical values, the estimate of \$7,550 per year is conservative.

Proposed Solar Array

DBS&A used PNM, U.S. Environmental Protection Agency (EPA), and National Renewable Energy Laboratory (NREL) databases and guidance documents for information on a potential solar array. The panels were assumed to be fixed-tilt ground-mount, 600 W modules, with a sun-to-electron efficiency of 22 percent and typical system losses of 22 percent. Based on these assumptions, a 38-square-foot array would be able to power the lift station.

If Tyrone were to maximize the area available for the solar array, the total power that could be generated would be approximately 12,850 MWh per year, assuming 40 percent usable for the solar array, and could power approximately 1,600 homes per year, as well as the lift station. The system is estimated to power 52 homes per acre of solar panels.

Engineer's Opinion of Probable Cost

Based on solar provider information, the cost of installation of the two-panel system with a three-day battery backup to power the lift station only is estimated at \$9,000 to \$12,000 installed.

If Tyrone were to maximize the available space of the roughly 27-acre lot they have, the cost to fill about 25 acres of that plot to generate usable power would be roughly \$8,000,000. It is important to note that the site requires further surveying by professionals to determine the actual usable space on the site. For this reason, a per-acre cost estimate has been prepared that can easily be multiplied by the number of usable acres to get an accurate total cost estimate. The estimated price per acre of a solar system is roughly \$330,000, equating to a total cost of about \$2.1 to 2.5 million to power the 326 assumed connections in Tyrone.

Conclusions and Recommendations

The fixed-tilt ground-mount photovoltaic system using middle-of-the-road photovoltaic panels and inverters is the optimal solution for the approximately 27-acre TWWA site. Based on 326 sewage connections in the Tyrone area, there are 326 assumed electrical connections as well; thus, 9 to 10 acres of photovoltaic panels may support the townsite at a cost of about \$2.1 to 2.5 million.

If TWWA desires to become a net exporter to nearby municipalities such as Silver City, the \$8,000,000 power generation facility may be feasible, paying for itself in under 13 years while also generating enough revenue by the end of its usable life to pay for another.

Figure 4 shows a conceptual layout for solar panels, maximizing the acreage available.

For the short term, solar panels to power the lift station alone are a relatively small investment, at an estimated cost of \$12,000.

We are available to discuss the contents of this memorandum at your convenience.

Figures



Aerial image: Vantor, 11/4/2023

TYRONE WATER & WASTEWATER ASSOCIATION
SOLAR EVALUATION
Vicinity Map



Aerial image: Vantor, 11/4/2023



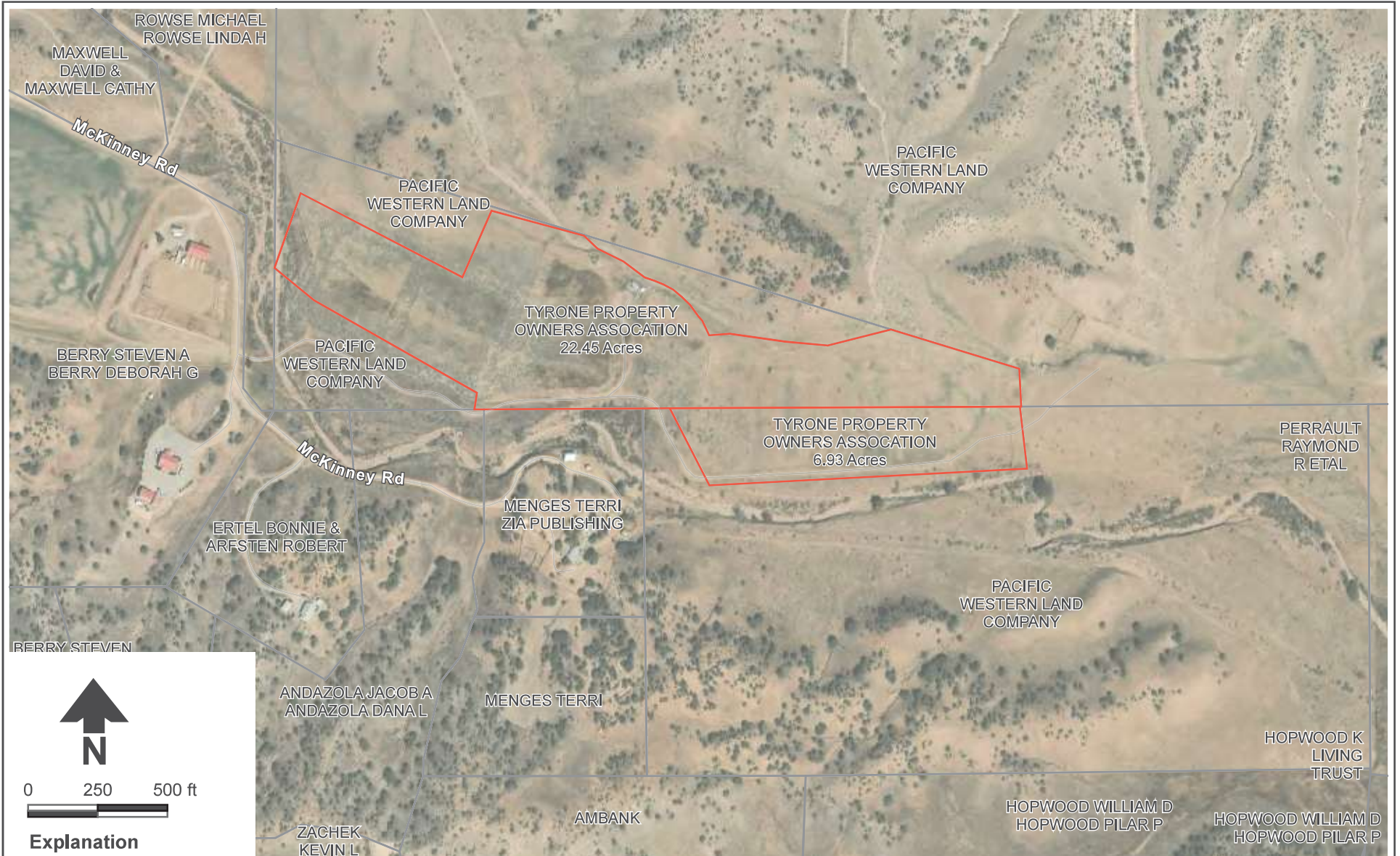
0 250 500 ft



Explanation

 Site location

 Parcel



Aerial image: Vantor, 11/4/2023



0 250 500 ft



Explanation

-  Site location
-  Parcel

Figure 3



Aerial image: Google Earth, 8/4/2024



0 250 500 ft

Explanation





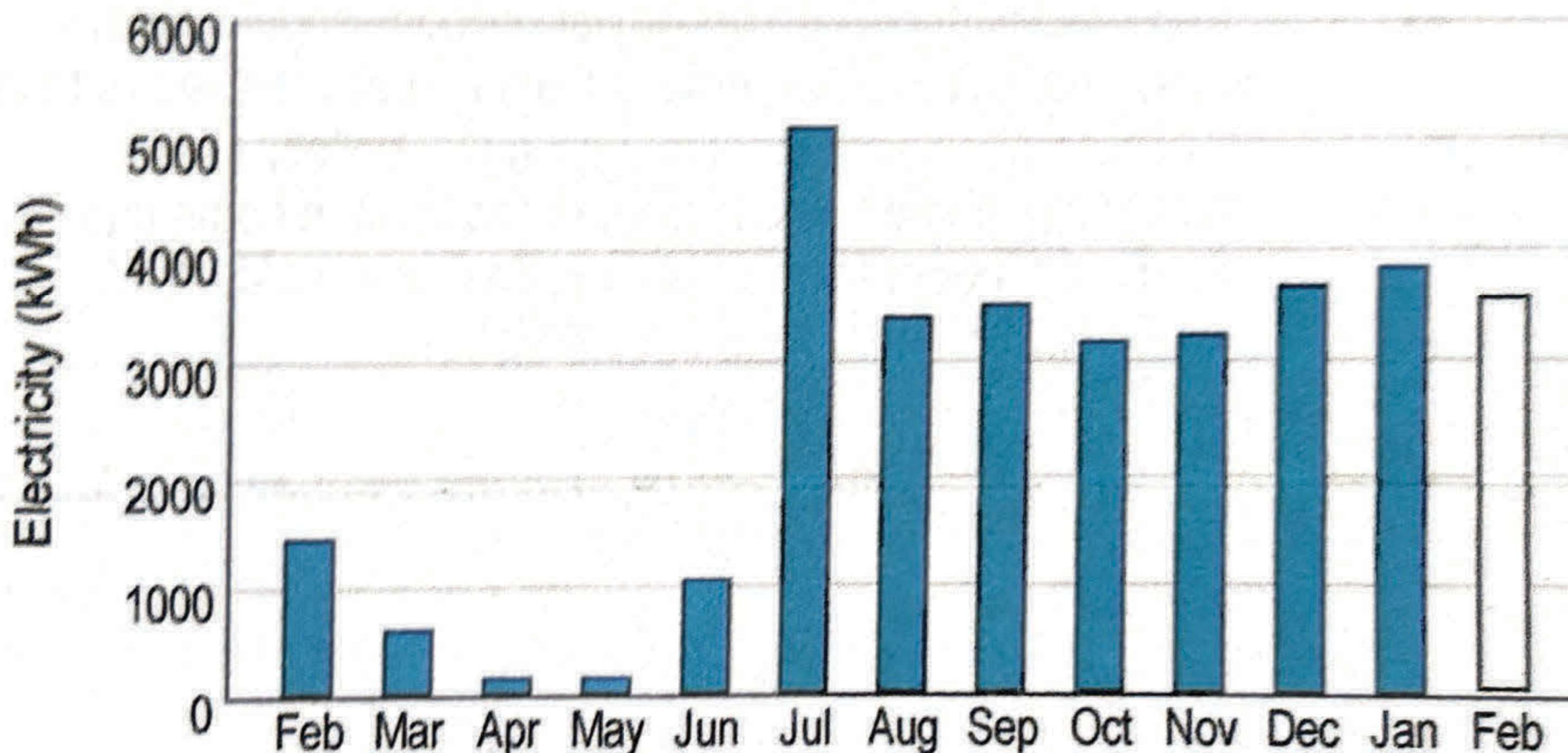
-  Parcel
-  Approximate site boundary
-  Solar array
-  Pond

Figure 3

Attachment 1

Electricity Usage

YOUR ELECTRICITY USAGE



Your average electricity cost per day was \$16.48

Your average usage per day was 116.06 kWh

■ Previous 12 months

□ This Bill