

TECHNICAL MEMORANDUM

DATE November 1, 2018 **Project No.** 1662766

TO Ms. Auralie Ashley-Marx
New Mexico Environment Department

CC Ms. Shirlene Sitton

FROM Matt Somogyi and Cameron Beul **EMAIL** msomogyi@golder.com

METHANE REMEDIATION PLAN, PASEO DE VISTA CLOSED LANDFILL, SANTA FE, SANTA FE COUNTY, NEW MEXICO

Ms. Auralie Ashley-Marx:

On behalf of the City of Santa Fe (the City), Golder Associates Inc. (Golder) has prepared this Methane Remediation Plan (Plan) for the Paseo de Vista Landfill (Landfill). On April 10, 2018, the New Mexico Environment Department's Solid Waste Bureau (NMED), Golder, Gordon Environmental/PSC (Gordon), and the City met at the Paseo de Vista Landfill for a site-walk and to discuss additional actions and data gathering necessary to address on-going regulatory exceedances of landfill gas (i.e. methane) concentrations measured during routine landfill gas monitoring and throughout the six-month long remedial action methane monitoring that was performed between November 2017 and April 2018. In a May 30, 2018 email to NMED, Golder summarized the action items that were agreed upon by the stakeholders at the April 10, 2018 meeting. NMED approved these action items in a letter dated June 6, 2018. The additional actions and data gathering discussed in the April 10, 2018 meeting are collectively referred to as the Plan discussed in this technical memorandum. The Plan will be implemented to comply with 20.9.5.9.C(3)(c) NMAC of the New Mexico Solid Waste Rules.

1.0 METHANE REMEDIATION PLAN – ACTION ITEMS

The following is a list of the four action items that are included in this Plan:

- 1) Additional methane monitoring after significant precipitation events;
- 2) Installation of a meteorological station at the Landfill;
- 3) Installation of passive gas vents at the Landfill; and
- 4) Installation of settlement benchmarks at the Landfill.

Additional details of each of these action items are discussed in more detail below.

1.1 Additional Methane Monitoring

Six additional methane monitoring events will be performed after precipitation events greater than or equal to 0.25 inches of precipitation as measured at the Santa Fe Airport until the meteorological station is installed at the Landfill. Monitoring will occur two to four weeks after 0.25 inches or greater precipitation. If two or more 0.25 inch or greater precipitation events occur in a two week period, monitoring will be performed two to four weeks after

the last precipitation event. The 0.25 inch trigger value is on the low end of “typical” storms on record during the rainy months in Santa Fe.

Concurrent with the first monitoring event after precipitation greater than 0.25 inches, four additional pairs of slam bar monitoring locations will be installed. The four new slam bar pairs will be installed at the approximate locations shown on Figure 1; identified as SP-13 through SP-20; and will be monitored at depths of 1-foot below ground surface (ft bgs) and 3-feet bgs. The slam bar locations installed for the six month long remedial action methane monitoring (SP-1 through SP-12) and the existing permanent methane monitoring probes (GV-10 through GV-13) will also be monitored during the six methane monitoring events after 0.25-inch or greater precipitation.

The six additional monitoring events described here will be in addition to the routine compliance (i.e. quarterly) methane monitoring performed at the Landfill unless a routine methane monitoring event, typically conducted in March, June, September, and December, falls within the two to four weeks from 0.25-inch or greater precipitation timeframe, as described above. The results of each of the six additional methane monitoring events will be summarized in a letter report and submitted to NMED.

1.2 Installation of a Meteorological Station

The City will install a meteorological station that will measure temperature, precipitation, wind speed, and wind direction. The data acquired by the meteorological station will be transmitted to and stored on a computer. Once the meteorological station is installed, the additional methane monitoring described in Section 1.1 will be triggered by precipitation measured at the Landfill’s meteorological station. Event’s greater than 0.25 inches will be alarmed, i.e., the computer will notify the party responsible for monitoring precipitation and scheduling the precipitation-triggered methane monitoring. The meteorological station will be installed at/near the materials recovery facility where there are existing utilities (electricity and internet) to facilitate a cost effective installation. The City will inform NMED of the proposed location prior to installation. The schedule for meteorological station installation is uncertain at this time as funding for this expenditure is not currently available. The City will install the meteorological station as soon as funding is available and will keep NMED apprised of the installation schedule.

1.3 Installation of Passive Gas Vents

The City will install a number of passive gas vents at the Landfill. The City will commence gas vent installation with an initial phase including the installation of four passive gas vents. The initial four passive gas vents will be installed along the eastern boundary of the Landfill where elevated methane concentrations have been detected. The proposed locations of the four initial passive gas vents are shown on Figure 3. It is understood that NMED may request the installation of additional gas vents, at which time the quantity and locations will be decided. Typical passive gas vent installation methods include mobilizing a large diameter bucket auger, advancing an approximately 24-inch boring through the entire thickness of waste and installing a 6-inch diameter, schedule 80, polyvinyl chloride (PVC) casing perforated across the entire waste interval. The annular space between the 6-inch perforated PVC casing and the borehole wall will be backfilled with washed pea gravel (or similar) and a minimum two-foot thick annular seal composed of hydrated bentonite chips or pellets will be installed above the pea gravel. The annular space between the solid PVC casing and the borehole wall immediately above the bentonite seal will be backfilled with auger spoils. The gas vents will be completed at the surface with aluminum turbine tops and sampling ports. The final design of the passive gas vents will allow for conversion to active extraction gas vents should active extraction of methane be required in the future. A general passive gas vent construction detail is presented on Figure 2. The City will propose the quantity and spacing of passive vents to NMED for approval prior to installation.

1.4 Installation of Settlement Benchmarks

Differential settling of the landfill cover can result in low areas that can catch and hold storm water allowing it to infiltrate through the cover and into the landfill rather than running off. Storm water infiltration through the landfill cover can contribute to excess methane generation. The City will install settlement benchmarks to monitor differential settlement of the landfill cover. Ten sets of eight settlement benchmarks will be installed on 100-foot spacing at the approximate locations shown on Figure 3. Upon installation of the benchmarks, each benchmark will be surveyed in NM State Plane Coordinates with vertical precision of 0.01 foot and the elevation of each newly installed benchmark will serve as the baseline value that future surveyed elevations will be compared to to evaluate whether or not settling of the landfill cover has occurred. After installation of the benchmark array and completion of the initial baseline survey, an as-built report will be submitted that will include a map showing the locations of the benchmarks, a tabular summary identifying the benchmarks with horizontal and vertical coordinates for each, a statement identifying the coordinate system and vertical datum that was used and a professional seal of a Registered Land Surveyor licensed in New Mexico. After the initial baseline survey the settlement benchmarks will be surveyed on an annual basis.

A brief settlement benchmark survey report will be prepared within four weeks of receipt of each event's survey data and will be submitted to NMED. The report will include a brief discussion of survey activities, the latest survey data for each of the 80 benchmarks, and a table of relative elevation change from the previous, and initial, survey for each benchmark. Annual surveying of the settlement benchmarks and associated reporting will be performed for a period of 5 years. Upon completion of the five year surveying period, a final report will be prepared and submitted to NMED summarizing the findings of the settlement evaluation. Appropriate recommendations for landfill cover improvements or maintenance, if necessary, will be included in the final report.

2.0 SCHEDULE

The following is a tentative schedule for the commencement of each of the proposed remedial actions:

- Six additional methane monitoring events will be conducted, starting in calendar year 2019, pursuant to NMED approval of this Plan, triggered by precipitation as described in Section 1.1;
- Installation of a meteorological station at the Landfill by December 31, 2019;
- Installation of passive gas vents: The initial phase including the installation of four passive gas vents will be completed by June 1, 2019. The remaining gas vents, if required, will be installed within 12 months after completion of the six additional methane monitoring events; and
- Installation of settlement benchmarks by December 31, 2019, pursuant to NMED approval of this Plan.

3.0 SUMMARY AND CLOSING

The City is submitting this Plan describing the remedial action items that will be implemented to address on-going regulatory exceedances of methane concentrations measured at the Landfill's property boundary and is prepared to implement the Plan per the tentative schedule presented above. Throughout the remedial action period, methane concentrations will be monitored at the Landfill per the requirements of 20.9.5.9.C(2) and the procedures set forth in the Paseo de Vista Post Closure Plan. Upon completion of the action items presented in this Plan, the City intends to continue routine methane compliance monitoring per the requirements of 20.9.5.9.B and C and the procedures set forth in the Paseo de Vista Post Closure Plan.

Should you have any questions regarding the contents of this Plan, please do not hesitate to contact the undersigned or the City.



Matt Somogyi
Sr. Project Hydrogeologist/Project Manager

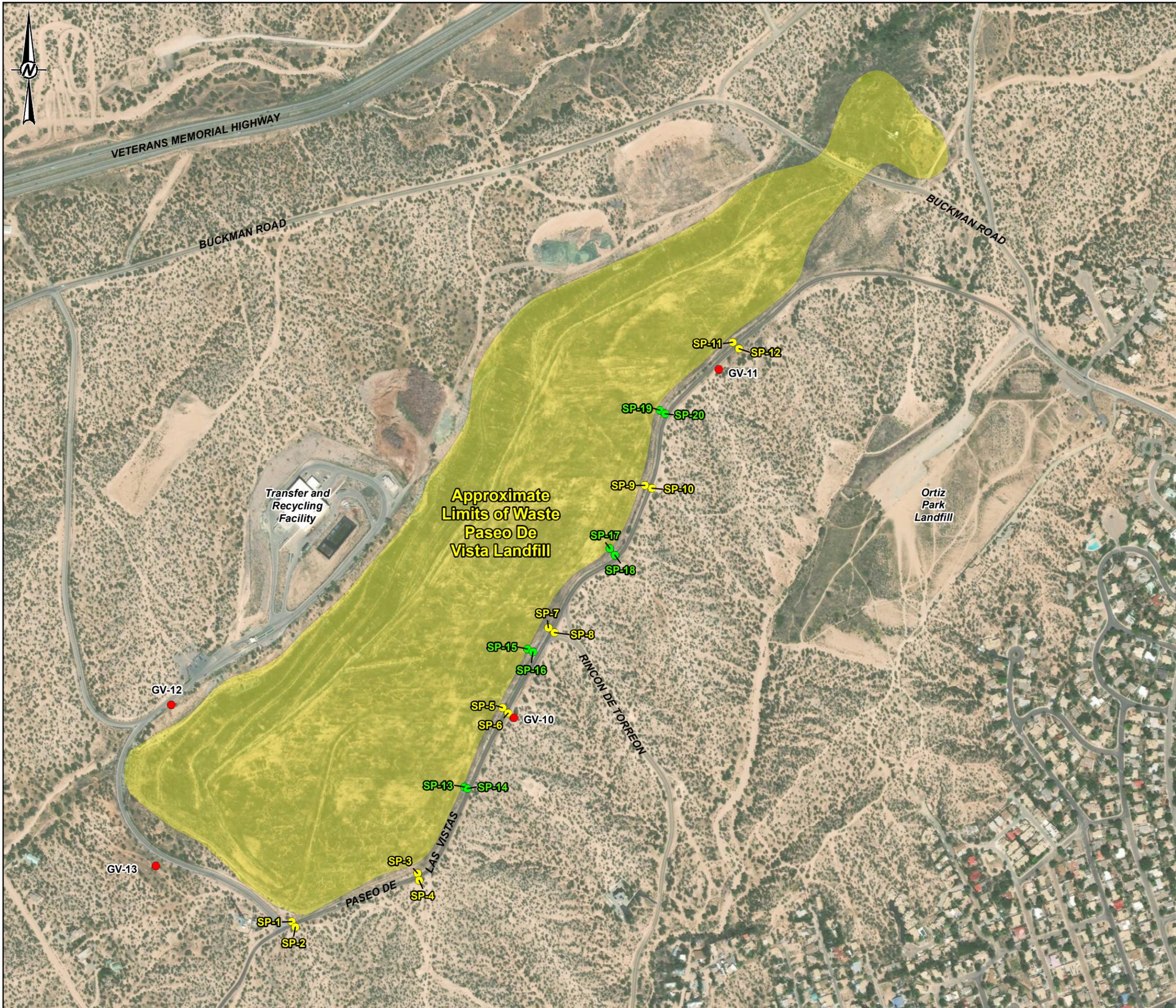


Cameron Beul, P.E. (In CO, MT, NE, and UT)
Associate Environmental Engineer

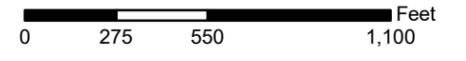
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Figures



- LEGEND**
- EXISTING MULTI-DEPTH DRIVE POINT SOIL PROBE
 - EXISTING LANDFILL CLOSURE METHANE MONITORING WELL
 - PROPOSED MULTI-DEPTH DRIVE POINT SOIL PROBE
 - APPROXIMATE LIMITS OF WASTE



REFERENCE

1. AERIAL IMAGERY: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP), USDA. IMAGE CAPTURED JUNE 21, 2016.

CLIENT
CITY OF SANTA FE, NEW MEXICO

PROJECT
PASEO DE VISTA LANDFILL
LANDFILL GAS COMPLIANCE

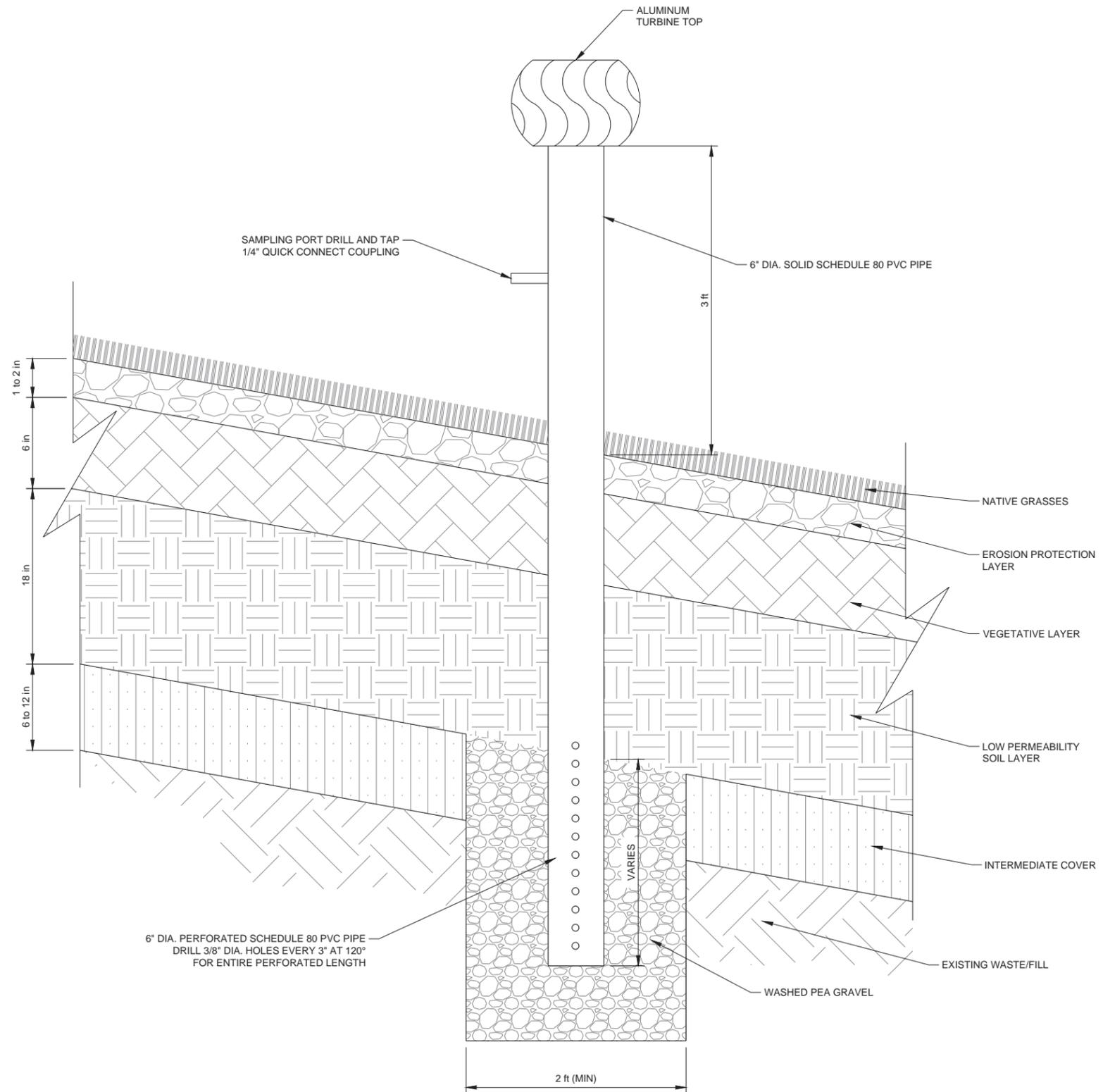
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METHANE MONITORING LOCATIONS

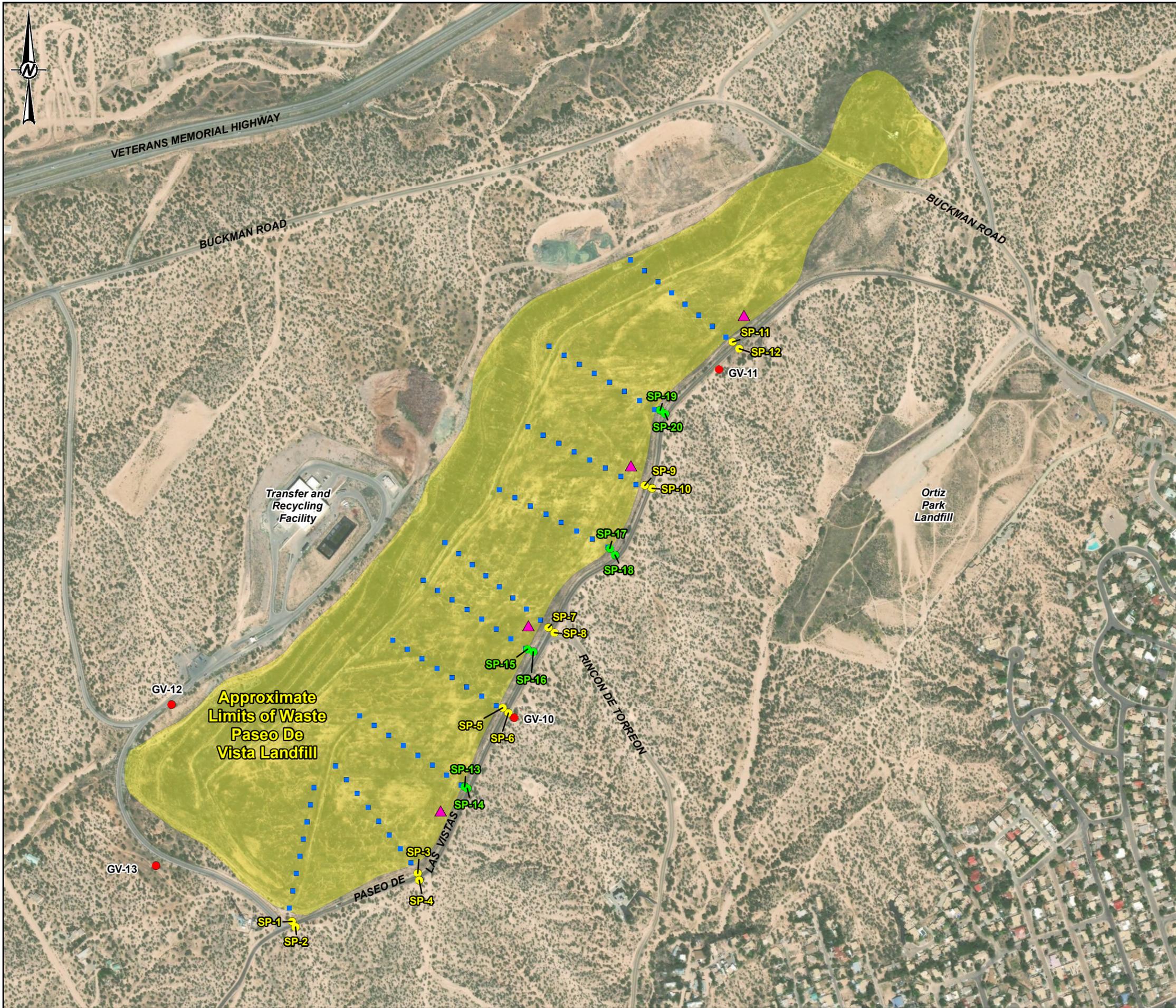
CONSULTANT	YYYY-MM-DD	2018-07-03
GOLDER	PREPARED	KJC
	DESIGN	KJC
	REVIEW	MKS
	APPROVED	CKB

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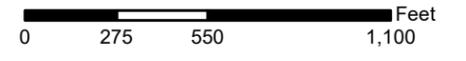
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- LEGEND**
- ▲ PROPOSED INITIAL GAS VENT LOCATION
 - SETTLEMENT BENCHMARK LOCATION
 - EXISTING MULTI-DEPTH DRIVE POINT SOIL PROBE
 - EXISTING LANDFILL CLOSURE METHANE MONITORING WELL
 - PROPOSED MULTI-DEPTH DRIVE POINT SOIL PROBE
 - APPROXIMATE LIMITS OF WASTE



REFERENCE

1. AERIAL IMAGERY: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP), USDA. IMAGE CAPTURED JUNE 21, 2016.

CLIENT
CITY OF SANTA FE, NEW MEXICO

PROJECT
PASEO DE VISTA LANDFILL
LANDFILL GAS COMPLIANCE

TITLE
**PASSIVE GAS VENT AND
SETTLEMENT BENCHMARK LOCATIONS**

CONSULTANT	YYYY-MM-DD	2018-09-20
GOLDER	PREPARED	KJC
	DESIGN	KJC
	REVIEW	MKS
	APPROVED	CKB

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