



**FIRST QUARTER 2020 STATUS REPORT
Maricopa County Cave Creek Landfill
Phoenix, Arizona**

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EXECUTIVE SUMMARY

In response to the detection of elevated levels of trichloroethene (TCE) in groundwater underlying Cave Creek Landfill, Maricopa County entered into a Consent Order in 1999 with the Arizona Department of Environmental Quality (ADEQ) to characterize the nature and extent of site groundwater contamination, develop a Remedial Action Plan (RAP) to address contamination impacts, implement the RAP, and provide quarterly status updates on project activities. This status report documents site assessment and remediation efforts conducted pursuant to the RAP during the first calendar quarter of 2020 (January through March 2020).

Groundwater Data Collection and Discussion. Quarterly groundwater levels were monitored on February 24 through 27, 2020 and March 9, 2020. During the reporting period, the predominant direction of groundwater flow was 174 degrees from north with a gradient of 0.002 feet per foot (ft/ft). Groundwater elevations at the site remained relatively stable in the year between First Quarter 2019 and First Quarter 2020, with an average site-wide increase in groundwater elevation of 0.31 feet (ft).

Maricopa County collected quarterly groundwater samples concurrent with quarterly groundwater level monitoring. Analytical results from First Quarter 2020 indicate that the highest concentrations of TCE underlie the southern and southwestern portions of the New Landfill near MW-02 and MW-10, respectively. The concentration of TCE in TSSV-03-PZ continued to decline and was 91 micrograms per liter ($\mu\text{g/L}$). The TCE concentrations in the samples collected from MW-02, 1,200 ft downgradient of TSSV-03-PZ, have remained relatively stable throughout 2019. The data indicate that if elevated concentrations at TSSV-03-PZ have migrated to the south with groundwater flow, they have not been observed at MW-02 to date. Elevated concentrations at MW-10 raise the possibility that contaminant flowpaths exist that are not concurrent with groundwater flow direction. The TCE concentration in the sample collected from MW-10, on the southwest boundary of the New Landfill, was 240 $\mu\text{g/L}$, which is a decrease in TCE concentrations from the previous reporting period. The concentration reported at MW-10 represents the highest concentration of TCE observed during site groundwater monitoring in First Quarter 2020. The TCE concentration at MW-05, 1,210 ft southwest of MW-10, was 50 $\mu\text{g/L}$ in First Quarter 2020, which is similar to concentrations in previous quarters dating back to the fourth quarter of 2017. The trend in concentrations at MW-05 suggest that a leading edge of TCE concentrations has passed through the well.

TCE was present above the Arizona Water Quality Standard (AWQS) for TCE of 5 $\mu\text{g/L}$ in off-site downgradient wells MW-05 (50 $\mu\text{g/L}$), MW-07 (29 $\mu\text{g/L}$), and MW-11 (30 $\mu\text{g/L}$). The TCE concentration in the sample collected from MW-08, south of the Old Landfill, was 24/23 $\mu\text{g/L}$ (original/duplicate sample). This represents a decrease from previous quarters and suggests that the tail of the presumed pulse that was observed to peak in MW-08 in 2018 is moving through this area.

Soil Vapor Data Collection and Discussion. Wood collected quarterly soil vapor samples between March 2 through 10, 2020. The analytical results from First Quarter 2020 indicate that the highest concentrations of TCE in site soil vapor occur in the above the water table and deep zones around MW-09, located at the western side of the New Landfill and at TSSV-07-D, located in the southwest of the Old Landfill. In general, compared to the historical results, TCE concentrations in soil vapor at all depth profiles have decreased. This suggests that the soil vapor extraction (SVE) system operating at the site is successfully extracting contaminated vapors from the subsurface. TCE concentrations in soil vapor samples collected from the shallow and middle zones were less than 20 milligrams per cubic meter (mg/m^3) excluding TSSV-01-M where TCE was detected at 30 mg/m^3 . Samples collected from SVE-03 and SVE-04 in the deep zone had TCE concentrations of 69 mg/m^3 and 100/130 (original/duplicate sample) mg/m^3 , respectively. TCE concentrations in soil vapor from MW-09 and MW-13 were the highest observed in the above water table zone, at 440 mg/m^3 and 82/98 mg/m^3 (original/duplicate sample), respectively. TCE concentrations in soil

vapor from SVE-04 and TSSV-07-D were the highest observed in the deep zone, at 100/130 mg/m³ (original/duplicate sample) and 120 mg/m³, respectively.

SVE System Performance. Based on the results of SVE system performance sampling, the soil vapor treatment system captured or destroyed over 99 percent (%) of extracted volatile organic compounds (VOCs), as defined by Maricopa County Air Quality Department Rule 100 Section 200.113, and over 99% of Federal Hazardous Air Pollutants (HAPs) present in extracted vapors during the reporting period. The calculated total mass of VOCs removed from the vadose zone since full-scale SVE system startup on September 15, 2015 is 44,076 pounds (lbs). During First Quarter 2020, the SVE system removed 428 lbs of VOCs, which is equivalent to a daily mass removal rate of approximately 5 lbs per day.

1.0 INTRODUCTION

In response to the detection of elevated levels of trichloroethene (TCE) in groundwater underlying Cave Creek Landfill, Maricopa County entered into a Consent Order (CO) in 1999 with the Arizona Department of Environmental Quality (ADEQ) to characterize the nature and extent of site groundwater contamination. Since that time, the CO has been revised based on the results of multiple site investigations, and the current CO (ADEQ Identification Number 30604, Docket No. S-2-10) requires Maricopa County to complete groundwater characterization, develop a revised Remedial Action Plan (RAP), and complete ADEQ-approved remedial activities (ADEQ, 2010). Maricopa County submitted the final version of the RAP in May 2016 which includes soil vapor extraction (SVE) to address TCE-impacted vapor that serves as a source of groundwater contamination and an on-site pump and treat groundwater system to contain and remediate the existing groundwater plume (Amec Foster Wheeler Environment & Infrastructure, Inc. [Amec Foster Wheeler], 2016a). ADEQ approved the RAP in their letter dated November 23, 2016 (ADEQ, 2016a).

Section IV of the CO requires quarterly status reports to document Maricopa County's progress implementing the stipulations of the CO and provide evidence of regulatory compliance (ADEQ, 2016b). This status report documents site assessment and remediation efforts conducted pursuant to the RAP during the first calendar quarter of 2020 (January through March 2020).

Wood Environment and Infrastructure Solutions, Inc. (Wood) prepared this quarterly report on behalf of Maricopa County Risk Management and Maricopa County Waste Resources & Recycling under the terms and conditions of Environmental Services Contract 13134-ITN.

2.0 SUMMARY OF MEASURES TAKEN TO IMPLEMENT THE RAP

Activities conducted in support of RAP implementation during the reporting period are as follows:

Monitoring Program

- Maricopa County collected quarterly groundwater levels and samples from site monitoring wells on February 24 through 26, 2020, with the exception of EW-01, where no sample was collected and IW-01 where depth specific samples and groundwater elevations were collected on March 9, 2020.
- SGS North America, Inc. (SGS), an environmental laboratory certified by the Arizona Department of Health Services (ADHS) (AZ0769), analyzed the groundwater samples.
- Maricopa County collected quarterly soil vapor samples between March 2 through 10, 2020.
- Airtech Environmental Laboratories (AEL), an environmental laboratory certified by the ADHS (AZ0740), analyzed the soil vapor samples for volatile organic compounds (VOCs) in air by United States Environmental Protection Agency (EPA) Method TO-15.

SVE System Operation and Compliance

- The SVE system operated in the First Quarter 2020 from January 10 through March 31, 2020.
 - The system remained off from the previous reporting period until January 10, 2020.
- Maricopa County collected monthly SVE system performance samples on January 24, February 21, and March 18, 2020.
- AEL analyzed the monthly SVE system performance samples for VOCs in air by EPA Method TO-15.
- On behalf of Maricopa County, Wood submitted the quarterly SVE system performance report in compliance with the Maricopa County Air Quality permit on March 20, 2020.

Design, Permitting, and Construction of the Groundwater Treatment System (GWTS):

- Maricopa County completed the following activities with regards to Phase 1, On-Site Infrastructure:
 - Construction bid walk on March 13, 2020 for APS electrical line redesign work to power the GWTS
 - JH Dykstra was selected to perform the work on March 24, 2020
 - Mobilization is planned to begin on July 6, 2020
- Maricopa County completed the following activities with regards to Phase 2, Conveyance Pipeline:
 - Construction was delayed on February 14, 2020 due to the migratory bird nesting season
 - City of Phoenix was notified on February 17, 2020
 - Mobilization is planned to begin on July 6, 2020
- Maricopa County completed the following activities with regard to Phase 3, Injection Well:
 - Completed well development and testing on January 27, 2020
 - All IW-01 installation equipment removed by February 7, 2020
 - Construction of the perimeter wall began on February 24, 2020
 - Design of the IW-01 infrastructure began;

Appendix A summarizes the progress of activities scheduled for Cave Creek Landfill RAP implementation. The schedule has been updated with the current status of project tasks. Notable revisions include:

- Phase 1 On-Site Infrastructure Construction has been extended to August 2020 due to delays in obtaining an easement from the City of Phoenix (COP) for the Arizona Power Service (APS) electrical service line.
- Phase 2 Conveyance Pipeline Contractor Procurement has been completed. Construction is projected to start in July 2020 and finish in November 2020. This projected start date was delayed based on the migratory bird nesting season which occurs from January through June.
- IW-01 testing was completed and reporting has been extended to April 2020 due to the increased depth of the pilot boring that was achieved during drilling and associated decision to install a deeper injection well.
- The groundwater model update has been extended to July 2020 (the update has a schedule dependency of IW-01 testing and reporting).
- GWTS operations are currently projected to begin in October 2021.
- An additional well installation program (2020 well installation program) has been added to the project schedule for further downgradient groundwater characterization as discussed in the Groundwater Characterization Work Plan (Wood, 2019).
 - Access agreements for the installation of off site wells will begin in Second Quarter 2020
- An additional extraction well (EW-02) installation has been added to the project schedule with a proposed location near the Phase 1 GWTS to maximize the Phase 1 GWTS capacity and accelerate remediation. Addition of EW-02 is possible due to the County extending the depth of injection well

IW-01, which will allow for a maximum 500 gallon per minute (gpm) injection rate of treated groundwater from the GWTS.

3.0 DATA COLLECTED DURING THE REPORTING PERIOD

3.1 Groundwater Elevations

On behalf of Maricopa County, Wood collected quarterly groundwater levels on February 24 through 26, 2020 and March 9, 2020 (IW-01 only). Locations and construction details of site wells are presented in **Figure 1** and **Table 1**, respectively. Groundwater elevations and the calculated groundwater flow direction and gradient for the reporting period are presented in **Table 2** along with groundwater elevations from the previous four reporting periods. Contoured water table elevations and the calculated flow direction and gradient are shown in **Figure 2**. During the reporting period, the direction of groundwater flow was 172 degrees from north with a gradient of 0.002 feet per foot (ft/ft). As discussed in the Fourth Quarter 2018 status report (Wood, 2019), only groundwater elevations derived from the groundwater monitoring wells (i.e., well identifiers starting with MW and PW) were used for contouring the water table surface.

3.2 Groundwater Quality Monitoring

Maricopa County conducts groundwater quality monitoring at Cave Creek Landfill in accordance with the requirements of 40 Code of Federal Regulations (CFR) 258.50, as detailed in the Post-Closure Care Plan for Maricopa County Solid Waste Landfills (Post-Closure Care Plan) (Hydro Geo Chem, 2014). Groundwater samples from applicable Cave Creek Landfill wells are collected and analyzed for VOCs on a quarterly basis (typically February, May, August, and November). In addition to the evaluation of organic constituents, Maricopa County also samples compliance wells (i.e., MW-02, MW-03, MW-04, MW-05, MW-06, MW-07, MW-08, and PW) semi-annually (typically in February and August) for 40 CFR 258 Appendix I inorganic constituents (total metals) and general chemistry parameters.

Wood, on behalf of Maricopa County, collected quarterly groundwater samples on February 24 through 26, 2020 with the exception of EW-01, which was not sampled due to limited access from installed extraction equipment and IW-01 which was not sampled until March 9, 2020 due to pump testing of the well. . In addition to the compliance wells noted above, the following site wells were also sampled: MW-09, MW-10, MW-11, MW-12, MW-13, TSSV-02-PZ, TSSV-03-PZ, TSSV-04-PZ, TSSV-05-PZ, TSSV-06-PZ, and TSSV-07-PZ. First Quarter 2020 groundwater samples were collected using passive sampling devices (i.e., passive diffusion bags [PDBs]) placed approximately 15 feet below the water table (ft bwt) during the previous quarterly sampling event (i.e., PDBs were placed in November 2019 for the February 2020 sampling event).

IW-01 was sampled at multiple depth-specific intervals for post-installation evaluation. Sampling depths with corresponding sampling intervals are listed below:

- 724 ft below top of casing (btoc): 15 ft bwt
- 730 ft btoc: 20 ft above top of first screen
- 750 ft btoc: 40 ft bwt and top of first screen
- 795 ft btoc: bottom of the first screen

SGS analyzed the groundwater samples for VOCs in water by EPA Method 8260. Laboratory results of analyses reports for samples collected during the reporting period are included in **Appendix B**.

Groundwater analytical results for 2020 are presented in **Table 3** (VOCs), **Table 4** (General Chemistry), and **Table 5** (Metals). The estimated extent of the TCE plume in groundwater and results of sampling at individual wells are shown in **Figure 2**.

3.3 Soil Vapor Monitoring

Maricopa County conducts quarterly soil vapor monitoring at the Cave Creek Landfill to evaluate the concentration and extent of contaminated soil vapors in the vadose zone. Wood, on behalf of Maricopa County, collected quarterly soil vapor samples from 51 site wells on March 2 through 10, 2020.

Wood collected the soil vapor samples using laboratory-supplied 1.0-liter passivated vacuum canisters. AEL analyzed the soil vapor samples for VOCs in air by EPA Method TO-15. Soil vapor analytical results for 2020 are presented in **Table 6**. The estimated extent of the TCE plume in soil vapor in the shallow, middle, deep, and above water table zones is shown in **Figures 3, 4, 5, and 6**, respectively. The estimated extent of 1,1-Dichloroethene (1,1-DCE) in soil vapor in the deep and above water table zones is shown in **Figure 7** and **Figure 8**, respectively. Laboratory results of analytical reports for samples collected during the reporting period are included in **Appendix B**.

3.4 SVE System Performance Monitoring

The SVE system is part of the remedy identified in the RAP and provides source control (extraction of contaminated soil vapors) at the site. It was fully operational with both skids functioning and had a runtime of 81 percent (%) from January 1 through March 31, 2020. The system extracted vapor from SVE-03 and SVE-04 during that time. The Carbon Adsorption System (CAS) treated the extracted vapor under pressurized flow (**Figure 9**).

The SVE system consists of three Granular Activated Carbon (GAC) vessels, identified as C1, C2, and C3, and one Hydrosil (i.e., potassium permanganate impregnated media) vessel, identified as H1. During routine operation, two GAC vessels are operated in lead/lag series configuration and the Hydrosil vessel is operated as the third and final vessel in the series. The remaining GAC vessel is a standby (offline) vessel and is placed into service as a lag vessel when the lead GAC vessel is spent and removed from service. During a change-out event, the lag vessel is moved into the lead position and the standby vessel is moved into the lag position. GAC is replaced in the former lead vessel and it becomes the new standby vessel.

Four GAC vessel change-outs were conducted during the reporting period. The change-outs occurred on the following dates:

- January 15, 2020
- February 7, 2020
- February 28, 2020
- March 16, 2020

No Hydrosil change-outs were required during the reporting period.

Discharge of treated effluent from the SVE system is permitted by Maricopa County Air Quality Permit 980398 (Maricopa County Air Quality Department, 2016a). Under this permit, Maricopa County is required to collect monthly samples to calculate 12-month rolling total emissions and quarterly performance samples to demonstrate compliance with the performance requirements of the site air quality permit. Wood collected monthly process samples on January 24 and March 20, 2020 and the monthly/quarterly

performance sample on February 21, 2020. Process samples were collected with laboratory-supplied 1.0-liter passivated vacuum canisters at four locations: entering the CAS (at sample port [SP]-01), after the lead carbon vessel (at SP-02), after the lag carbon vessel (at SP-03), and after the Hydrosil vessel (at SP-04). These samples are named using the following convention: the sample port (e.g., SP-02) – the vessel that is monitored (e.g., C1 or H1) – the sample date in MMDDYY format. Sample locations are shown in **Figure 9**.

AEL analyzed process samples for VOCs in air by EPA Method TO-15. Results of process sample analysis are presented in **Table 7**. Laboratory results of analyses for samples collected during the reporting period are included in **Appendix B**.

4.0 DISCUSSION OF COLLECTED DATA

4.1 Groundwater Elevations

The groundwater flow direction and gradient observed during the First Quarter 2020 were consistent with the groundwater flow direction and gradient observed during previous quarters (**Table 2**). The groundwater flow direction continues to be nearly due south (averaging 174 degrees from north for the past four quarters) and the gradient is steady at 0.002 ft/ft. Groundwater elevations at the site remained relatively stable between Fourth Quarter 2019 and First Quarter 2020 with an average site-wide increase in groundwater elevations measured at monitoring wells of 0.15 ft. Observed increases in groundwater elevations ranged from 0.08 ft (at TSSV-03-PZ) to 0.35 ft (at MW-02, and MW-05). Groundwater elevations rises from First Quarter 2019 to First Quarter 2020 ranged from 0.12 ft (at MW-04) to 1.13 ft (TSSV-02-PZ). Historically, groundwater elevations have been declining over time, whereas recent measurements reflect a moderate increase in groundwater elevations.

4.2 Groundwater Quality

Vicinity of the New Landfill. Analytical results from First Quarter 2020 indicate that the highest concentrations of TCE in groundwater are associated with monitoring locations MW-02 (93 micrograms per liter [$\mu\text{g/L}$]) and MW-10 (240 $\mu\text{g/L}$), which are located in the southern portion of the New Landfill and to the west of the New Landfill, respectively. Notably, TCE concentrations in TSSV-03-PZ, located near the center of the New Landfill, continue to decline from a peak concentration observed in the Fourth Quarter of 2017 (1,100 $\mu\text{g/L}$), suggesting that the higher concentrations previously observed at this well may have migrated to the south with groundwater flow. Concentrations of TCE at MW-10 and MW-02 have decreased from Fourth Quarter 2019 to First Quarter 2020. Data indicate that if elevated concentrations at TSSV-03-PZ have migrated to the south with groundwater flow, they have not been observed at MW-02 to date. The elevated concentrations at MW-10 raise the possibility that contaminant flowpaths exist that are not concurrent with groundwater flow direction. Groundwater monitor well MW-16B, proposed in the Groundwater Characterization Work Plan (Wood, 2019) and scheduled to be installed starting the second half of 2020 is intended in part to provide further data to evaluate this possibility. TCE concentrations in TSSV-04-PZ, on the northern boundary of the New Landfill, continue to decline from Third Quarter 2019 (110 $\mu\text{g/L}$) to First Quarter 2020 (75 $\mu\text{g/L}$) which was the highest TCE concentration detected at this location.

Downgradient of the Property Boundary. TCE was present above the Arizona Water Quality Standard (AWQS) for TCE of 5 $\mu\text{g/L}$ in off-site downgradient wells MW-05 (50 $\mu\text{g/L}$), MW-07 (29 $\mu\text{g/L}$), and MW-11 (30 $\mu\text{g/L}$). MW-11 was installed in 2018 and was intended to delineate the downgradient extent of the TCE plume as well as possibly monitor the future mounding influence of GWTS injection well IW-01, which was installed in Fourth Quarter 2019, approximately 1,000 feet down/cross-gradient of MW-11. Elevated concentrations of TCE in MW-11 prompted Maricopa County to conduct zonal sampling at IW-01 during the drilling process; results of the zonal sampling indicated concentrations of TCE were below the laboratory

reporting limit at all depths in IW-01. After all testing was completed at IW-01, additional sampling was performed to evaluate groundwater conditions prior to operations. TCE concentrations in all zonal samples were below the AWQS and highest in zones just below the water table.

TCE concentrations at MW-05, 1,200 ft southeast of MW-10, have been generally increasing since 2016; however, concentrations appeared to stabilize.

Vicinity of the Old Landfill. The TCE concentration in the sample collected from MW-08, south of the Old Landfill, was 24/23 µg/L (original/duplicate sample). TCE concentrations at MW-08 display an overall declining trend from a high of 140/130 µg/L in the original/duplicate samples collected in Fourth Quarter 2018. TSSV-07-PZ, on the southwest corner of the Old Landfill, continues to provide definition to the plume underlying this property as concentrations of TCE were less than the AWQS in First Quarter 2020. The concentration of TCE in MW-13, which was installed in 2018 near the center of the Old Landfill, was 1.4 µg/L in First Quarter 2020, providing definition to the northern extent of the plume underlying the Old Landfill.

Other Chlorinated VOCs and Compliance Constituents Present in Groundwater. Co-contaminants 1,1-DCE and PCE have been observed in groundwater samples collected from site monitoring wells for some time, although concentrations do not routinely exceed applicable AWQSs. Analytical results from First Quarter 2020 indicate that the highest concentrations of 1,1-DCE and PCE were generally observed in the wells that have the highest concentrations of TCE. The sample from MW-10, for example, has PCE concentrations of 12 µg/L (above the AWQS for PCE of 5 µg/L) and 1,1-DCE concentrations of 8.9 µg/L (above the AWQS for 1,1-DCE of 7 µg/L).

Arsenic was the only other constituent detected above the respective AWQS in previous reporting periods. Arsenic has historically exceeded the AWQS of 0.01 mg/L at groundwater wells MW-02, MW-04, MW-05, and PW with concentrations ranging from 0.012 mg/L (MW-05) to 0.015 mg/L (MW-02). These concentrations, while exceeding the AWQS, are below the upper background threshold value of 0.1 mg/L for naturally-occurring arsenic in groundwater at the site and are therefore attributed to background groundwater rather than site-specific impacts. No other samples collected from site monitoring wells contained concentrations of PCE, 1,1-DCE, arsenic, or other constituents above the respective AWQS.

Environmental Laboratory Selection. Due to contracting constraints with the environmental laboratory from the First Quarter 2019 reporting period, SGS was selected to analyze samples collected for the remainder of the 2019 analytical sampling. Wood conducted a review of First Quarter 2020 groundwater sample results to evaluate consistency with historical trends, laboratory dilution factors, and laboratory reporting limits. Based on a comparison of First Quarter 2020 data to historical data, First Quarter 2020 groundwater data are consistent with previous results and usable for evaluation of long-term trends in contaminant concentrations in groundwater at the site.

4.3 Soil Vapor

The analytical results from First Quarter 2020 indicate that the highest concentrations of TCE in site soil vapor occur in the deep zone and the above water table zone around SVE-04, SVE-03, MW-09, MW-13, TSSV-07-D, TSSV-07-PZ, and TSSV-04-PZ (**Figure 5**). In general, compared to the historical results, TCE concentrations in soil vapor at all depth profiles have decreased. This suggests the SVE system is successfully extracting contaminant mass from the subsurface.

Notable conditions in each depth profile are as follows:

Shallow Zone. TCE concentrations in soil vapor samples collected from the shallow zone were generally less than 10 milligrams per cubic meter (mg/m^3) (**Figure 3**) with the exception of samples collected from TSSV-01-S and SVE-01-S, which had TCE concentrations of 12 and 13 mg/m^3 , respectively. TCE concentrations at TSSV-01-S has shown a gradual increase from Second Quarter 2019. TCE concentrations at SVE-01-S have increased from Fourth Quarter 2019 (6.0 mg/m^3) but are similar to concentrations from First Quarter 2019 (17 mg/m^3).

Middle Zone. TCE concentrations in soil vapor samples collected from the middle zone were generally less than 20 mg/m^3 (**Figure 4**) with the exception of samples from TSSV-01-M, which had a TCE concentration of 30 mg/m^3 , respectively. TCE concentrations at TSSV-01-M remain relatively stable.

Deep Zone. TCE concentrations in the deep zone (**Figure 5**) exceeded 10 mg/m^3 at SVE-02, SVE-03, SVE-04, TSSV-07-D, and MW-13-D. SVE-03 and SVE-04 are currently extracting vapor from the deep zone, and elevated concentrations in these wells suggest that continued operation is warranted. SVE-04 has seen a decrease in TCE concentrations since Fourth Quarter 2019 (100 mg/m^3). The presence of elevated TCE in SVE-02, TSSV-07-D and MW-13-D is consistent with previous quarters.

Above Water Table Zone. TCE concentrations in the above water table zone (**Figure 6**) exceeded 10 mg/m^3 at MW-09, MW-10, MW-13, and TSSV-07-PZ. The highest concentrations of TCE in the vadose zone were detected in the above water table depth profile at MW-09 (440 mg/m^3) which is similar to concentrations observed at TSSV-04-PZ (410 mg/m^3) from Fourth Quarter 2019. TCE concentrations at MW-13 (82 mg/m^3) decreased from Fourth Quarter 2019 (270 mg/m^3) and are consistent with concentrations from Second Quarter 2019. TCE concentrations at MW-13 have increased from Fourth Quarter 2019 (4.6 mg/m^3) but have decreased from elevated concentrations observed in Third Quarter 2019 (460 mg/m^3). The presence of elevated TCE in MW-10 are consistent with previous quarters. There is currently no soil vapor extraction from the above water table zone, however, its feasibility is being evaluated. These locations will be continued to be monitored in 2020 to evaluate whether extraction from above water table zone SVE wells is warranted.

Other Chlorinated VOCs Present in Soil Vapor. 1,1-DCE is frequently observed in soil vapor samples collected from wells in and near the Old Landfill, specifically in the deep and above water table zones (**Figure 7** and **Figure 8**, respectively). 1,1-DCE concentrations exceeded 10 mg/m^3 at SVE-04, TSSV-07-D, TSSV-07-PZ, and MW-13. During First Quarter 2020, the highest concentrations of 1,1-DCE in the soil vapor occurred in the above-water table zone at MW-13 and TSSV-07-PZ at concentrations of 150/180 mg/m^3 (original/duplicate sample) and 68 mg/m^3 , respectively. These wells are located near the center of the Old Landfill (**Figure 8**).

4.4 SVE System Performance

Based on the results of SVE system performance sampling, the CAS captured or destroyed over 99% of extracted VOCs, as defined by Maricopa County Air Quality Department Rule 100 Section 200.113, and over 99% of Federal Hazardous Air Pollutants (HAPs) in extracted vapors, during the reporting period.

The calculated total mass removed from the vadose zone since SVE system startup is presented in **Table 8**. Mass removal rates are based on actual hours of operation (hour meter readings) and the estimated hourly VOC extraction rate derived from performance testing. During the reporting period, the SVE system removed 428 pounds (lbs) of VOCs over a time period of 90 days, which is equivalent to a daily mass extraction rate of approximately 4.8 lbs per day. Since operations began on September 15, 2015, the calculated total mass of VOCs removed through March 18, 2020 is 44,076 lbs.

The SVE system operated for 81% of the time in the First Quarter 2020. The system was commonly turned off for the weekend if on Friday, the field readings to estimate VOC removal efficiency of the CAS indicated that the removal efficiency on Saturday or Sunday would fall below the minimum VOC removal efficiency of 90% mandated by the air quality permit. The system was also turned off for several hours approximately every few weeks to change the GAC order. The SVE system was turned off at the beginning of the reporting period for repairs from Fourth Quarter 2019. The system was restarted on January 10, 2020. Operation of Skids 1 and 2 were intermittent from January 10, 2020 until bearings and seals were replaced on February 5, 2020. Skid 2 was briefly shutdown on February 12, 2020 for an alarm. This alarm was triggered again on February 24, 2020 and both skids remained off until February 28, 2020 when the carbon was changed out. Monthly testing of the CAS indicates that the system is operating as intended and is compliant with the air quality permit issued by Maricopa County.

5.0 FUTURE ACTIVITIES

Maricopa County will continue to conduct quarterly monitoring as described in Section 3.0 of this report. Other upcoming activities targeted for completion during the Second Quarter of 2020 and/or scheduled through the Fourth Quarter of 2020 include:

- Continued operation of the SVE system for source control;
 - Evaluate the feasibility of soil vapor extraction from the above the water tables zone;
- Continue quarterly groundwater and soil vapor monitoring across the site;
 - Monitor groundwater concentrations at IW-01 at two depth intervals (724 and 750 ft btoc) in April 2020 for monitoring frequency evaluations until the GWTS is operational;
- Installation of groundwater monitoring wells MW-16B and MW-19 as proposed in the Groundwater Characterization Work Plan:
 - Obtain access from the Arizona State Land Department to install the groundwater monitoring wells;
 - Solicit bids for installation of the groundwater monitoring wells from qualified drilling subcontractors;
- Continued Phase 1 GWTS construction and electrical service line design and permitting followed by electrical line installation and system commissioning. This activity is currently on-going and construction is planned to begin in July 2020;
- Installation of a second GWTS on-site groundwater extraction well (EW-02);
 - Finalize design of EW-02;
 - Solicit bids for installation of EW-02 from qualified drilling subcontractors;
- Initiation of Phase 2 construction which has a projected start date of July 31, 2020;
- Completion of well installation and testing reporting for the installation of IW-01; and,
- Continuation of Phase 3 construction of the injection well site perimeter wall and design, permitting and construction of the injection well infrastructure, which has a projected completion date of August 2021;
- Perform groundwater modeling to incorporate data collected during recent well drilling activities;
 - Complete particle tracking to evaluate the impacts of different injection and extraction scenarios;

- Update of the fate and transport model for the site.

6.0 REFERENCES

- Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), 2016. *Draft Final Revised Remedial Action Plan*. Prepared on behalf of the Maricopa County Risk Management and Maricopa County Waste Resources & Recycling Management. May 6, 2016.
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- Arizona Department of Environmental Quality (ADEQ), 2010. *Consent Order in the matter of Cave Creek Landfill located at 8.3 miles east of I-17 approximately ½ mile south of Carefree Highway Phoenix, Maricopa, Arizona, Azurite Place ID 1169*. Docket No. S-2-10. Filed on January 19, 2010.
- ADEQ, 2016a. *Letter to Ms. Rita Neill of Maricopa County from Ms. Laura Malone of ADEQ regarding Approval of the Revised Remedial Action Plan (RAP) dated 5-6-2016; Maricopa County, Cave Creek Landfill; Azurite Place ID Number 1169*. PRU16-513. Dated November 23, 2016.
- ADEQ, 2016b. *Amendment No. 1 to Consent Order in the matter of Cave Creek Landfill located at 8.3 miles east of I-17 approximately ½ mile south of Carefree Highway Phoenix, Maricopa, Arizona, Azurite Place ID 1169*. Docket No. S-2-10. Signed on September 27, 2016.
- Hydro Geo Chem, Inc. (Hydro Geo Chem), 2014. *Post-Closure Care Plan for Maricopa County Solid Waste Landfills*. Prepared for Maricopa County Waste Resources and Recycling. June 19, 2014.
- Maricopa County Air Quality Department, 2016a. *Air Quality Permit to Operate and/or Construct Issued to Cave Creek Landfill. Permit Number 980398*. Revision Date: June 16, 2016. Expiration Date: November 30, 2021.
- Wood, 2019. *Groundwater Characterization Work Plan*. Prepared on behalf of the Maricopa County Risk Management and Maricopa County Waste Resources & Recycling Management. September 13, 2019.

TABLES



Table 1. Well Construction Summary

Cave Creek Landfill, Maricopa County

WellName	Location Type	ADWR ID	Northing (NAD83SP Int'l Ft)	Easting (NAD83SP Int'l Ft)	TOC (ft amsl)	Ground Surface (ft amsl)	Total Well Depth (ft bgs)	Date Installed	Casing Diameter (I.D.)	CasingType	Top Screen Depth (ft bgs)	Bottom Screen Depth (ft bgs)	Top Screen Elevation (ft amsl)	Pump Intake Depth (ft bgs)	Pump Intake Elevation (ft amsl)	Comment
EW-01	Groundwater	55-226136	1012934.6	675653.9	1,854.5	1,852.9	830	8/20/2016	12	HSLA	729.1	809.4	1,123.8	-	-	-
IW-01	Groundwater	-	1010945.8	676381.8	1,863.2	1,865.1	1590	11/15/2019	20 inch	SS	750	800	1,115.1	-	-	Discrete Screen Interval
	Groundwater	-	1010945.8	676381.8	1,863.2	1,865.1	1590	11/15/2019	20 inch	SS	855	925	1,010.1	-	-	Discrete Screen Interval
	Groundwater	-	1010945.8	676381.8	1,863.2	1,865.1	1590	11/15/2019	20 inch	SS	1,045	1,100	820.1	-	-	Discrete Screen Interval
	Groundwater	-	1010945.8	676381.8	1,863.2	1,865.1	1590	11/15/2019	20 inch	SS	1,150	1,190	715.1	-	-	Discrete Screen Interval
	Groundwater	-	1010945.8	676381.8	1,863.2	1,865.1	1590	11/15/2019	20 inch	SS	1,295	1,580	570.1	-	-	Discrete Screen Interval
MW-01	Groundwater	55-538298	1013459.3	675955.8	1,895.6	1,895.6	820	5/1/1993	6 inch	LCS	660	820	1,235.6	-	-	Originally installed at 695 ft bgs; moved to 740 ft bgs (at bottom of pump) on 3/2/2005.
MW-02	Groundwater	55-538299	1012899.4	675673.9	1,856.0	1,855.0	805	5/1/1993	6 inch	LCS	630	805	1,225.0	-	-	Originally installed at 675 ft bgs; moved to 704 ft bgs (at bottom of pump) on 3/1/2005; moved to 714 ft bgs on 6/26/2009. Pump removed 8/2017
MW-03	Groundwater	55-216293	1013323.0	676495.2	1,866.4	1,867.0	830	12/13/2007	6 inch	LCS	679	799	1,188.0	-	-	Originally installed at 777 ft bgs; moved to 724 ft bgs on 6/25/2009. Pump removed 8/2017
MW-04	Groundwater	55-912575	1012613.0	675427.0	1,849.8	1,848.7	768	10/26/2010	6 inch	LCS	667.5	752.7	1,181.2	-	-	Pump removed 8/2017
MW-05	Groundwater	55-912728	1012467.6	674571.8	1,845.1	1,843.2	767	12/15/2010	6 inch	LCS	660	740.2	1,183.2	-	-	Pump removed 8/2017
MW-06	Groundwater	55-913112	1012139.1	675961.1	1,860.7	1,858.6	776.9	5/16/2011	6 inch	LCS	683	763	1,175.6	-	-	Pump removed 8/2017
MW-07	Groundwater	55-914001	1012607.3	675919.7	1,859.6	1,857.8	765	2/8/2012	8.25 inch	LCS	674.8	754.8	1,183.0	-	-	Pump removed 8/2017
MW-08	Groundwater	55-913859	1015700.0	676938.9	1,889.1	1,887.5	766.5	1/9/2012	8.25 inch	LCS	691.5	761.5	1,196.0	-	-	Pump removed 8/2017
MW-09	Groundwater	55-920632	1015090.4	675043.7	1,864.8	1,864.2	775	7/25/2017	6 inch	Sch 80 PVC	685	775	1,179.2	-	-	-
MW-09-S	Soil Vapor	55-920632	1015090.4	675043.7	1,864.8	1,864.2	160	7/25/2017	1 inch	Sch 80 PVC	140	160	1,724.2	-	-	-
MW-09-M	Soil Vapor	55-920632	1015090.4	675043.7	1,864.8	1,864.2	360	7/25/2017	1 inch	Sch 80 PVC	340	360	1,524.2	-	-	-
MW-09-D	Soil Vapor	55-920632	1015090.4	675043.7	1,864.8	1,864.2	585	7/25/2017	1 inch	Sch 80 PVC	535	585	1,329.2	-	-	-
MW-10	Groundwater	55-920633	1013594.3	674997.4	1,848.3	1,847.4	765	9/3/2017	6 inch	Sch 80 PVC	670	760	1,177.4	-	-	-

Table 1. Well Construction Summary

Cave Creek Landfill, Maricopa County

WellName	Location Type	ADWR ID	Northing (NAD83SP Int'l Ft)	Easting (NAD83SP Int'l Ft)	TOC (ft amsl)	Ground Surface (ft amsl)	Total Well Depth (ft bgs)	Date Installed	Casing Diameter (I.D.)	CasingType	Top Screen Depth (ft bgs)	Bottom Screen Depth (ft bgs)	Top Screen Elevation (ft amsl)	Pump Intake Depth (ft bgs)	Pump Intake Elevation (ft amsl)	Comment
MW-10-S	Soil Vapor	55-920633	1013594.3	674997.4	1,848.3	1,847.4	140	9/6/2017	1 inch	Sch 80 PVC	120	140	1,727.4	-	-	-
MW-10-M	Soil Vapor	55-920633	1013594.3	674997.4	1,848.3	1,847.4	340	9/6/2017	1 inch	Sch 80 PVC	320	340	1,527.4	-	-	-
MW-10-D	Soil Vapor	55-920633	1013594.3	674997.4	1,848.3	1,847.4	570	9/6/2017	1 inch	Sch 80 PVC	520	570	1,327.4	-	-	-
MW-11	Groundwater	55-229174	1011611.5	675676.7	1,850.8	1,851.1	781	10/8/2018	6 inch	Sch 80 PVC	686	776	1,165.1	-	-	-
MW-12	Groundwater	55-921934	1014678.7	676009.7	1,873.2	1,873.6	785	9/5/2018	6 inch	Sch 80 PVC	690	780	1,183.6	-	-	-
MW-12-S	Soil Vapor	55-921934	1014679.0	676009.8	1,873.5	1,873.6	196	9/5/2018	1 inch	Sch 80 PVC	146	196	1,727.6	-	-	-
MW-12-M	Soil Vapor	55-921934	1014678.8	676009.5	1,873.4	1,873.6	396	9/5/2018	1 inch	Sch 80 PVC	346	396	1,527.6	-	-	-
MW-12-D	Soil Vapor	55-921934	1014679.2	676009.7	1,873.3	1,873.6	596	9/5/2018	2 inch	Sch 80 PVC	546	596	1,327.6	-	-	-
MW-13	Groundwater	55-229175	1016320.9	676680.0	1,900.7	1,900.0	802	11/10/2018	6 inch	Sch 80 PVC	707	797	1,193.0	-	-	-
MW-13-S	Soil Vapor	55-229175	1016321.0	676680.3	1,900.5	1,900.0	223	11/10/2018	1 inch	Sch 80 PVC	173	223	1,727.0	-	-	-
MW-13-M	Soil Vapor	55-229175	1016321.1	676680.0	1,900.5	1,900.0	423	11/10/2018	1 inch	Sch 80 PVC	373	423	1,527.0	-	-	-
MW-13-D	Soil Vapor	55-229175	1016320.9	676679.8	1,900.5	1,900.0	623	11/10/2018	2 inch	Sch 80 PVC	573	623	1,327.0	-	-	-
PW	Groundwater	55-503913	1015806.0	675722.2	1,882.0	1,881.4	820	10/1/1982	6 inch	LCS	680	810	1,201.4	-	-	Originally installed at 750 ft bgs; moved to 729 ft bgs on 6/25/2009. Pump removed 8/2017
SVE-01	Soil Vapor Extraction	55-917896	1015834.8	675971.9	-	1,882.1	610	5/18/2015	6 inch	Sch 80 PVC	120	600	1,762.1	-	-	-
SVE-01-S	Soil Vapor	55-917896	1015834.8	675971.9	1,882.1	1,882.1	610	5/18/2015	1 inch	Sch 80 PVC	180	200	1,702.1	-	-	-
SVE-01-M	Soil Vapor	55-917896	1015834.8	675971.9	1,882.1	1,882.1	610	5/18/2015	1 inch	Sch 80 PVC	360	380	1,522.1	-	-	-
SVE-01-D	Soil Vapor	55-917896	1015834.8	675971.9	1,882.1	1,882.1	610	5/18/2015	1 inch	Sch 80 PVC	480	500	1,402.1	-	-	-
SVE-02	Soil Vapor Extraction	55-917897	1015472.6	675617.9	1,900.4	1,900.4	630	5/5/2015	6 inch	Sch 80 PVC	400	620	1,500.4	-	-	-
SVE-02-S	Soil Vapor	55-917897	1015472.6	675617.9	1,900.4	1,900.4	630	5/5/2015	1 inch	Sch 80 PVC	150	170	1,750.4	-	-	-
SVE-02-M	Soil Vapor	55-917897	1015472.6	675617.9	1,900.4	1,900.4	630	5/5/2015	1 inch	Sch 80 PVC	300	350	1,600.4	-	-	-
SVE-03	Soil Vapor Extraction	55-920634	1015112.6	675423.8	1,907.5	1,905.1	655	8/8/2017	6 inch	Sch 80 PVC	530	650	1,375.1	-	-	-
SVE-03-S	Soil Vapor	55-920634	1015112.6	675423.8	1,907.5	1,905.1	200	8/8/2017	1 inch	Sch 80 PVC	180	200	1,725.1	-	-	-

Table 1. Well Construction Summary

Cave Creek Landfill, Maricopa County

WellName	Location Type	ADWR ID	Northing (NAD83SP Int'l Ft)	Easting (NAD83SP Int'l Ft)	TOC (ft amsl)	Ground Surface (ft amsl)	Total Well Depth (ft bgs)	Date Installed	Casing Diameter (I.D.)	CasingType	Top Screen Depth (ft bgs)	Bottom Screen Depth (ft bgs)	Top Screen Elevation (ft amsl)	Pump Intake Depth (ft bgs)	Pump Intake Elevation (ft amsl)	Comment
SVE-03-M	Soil Vapor	55-920634	1015112.6	675423.8	1,907.5	1,905.1	400	8/8/2017	1 inch	Sch 80 PVC	380	400	1,525.1	-	-	-
SVE-04	Soil Vapor Extraction	55-920878	1015934.6	676182.8	1,893.0	1,890.8	644	10/4/2017	6 inch	Sch 80 PVC	514	639	1,376.8	-	-	-
SVE-04-S	Soil Vapor	55-920878	1015934.6	676182.8	1,893.0	1,890.8	185	10/4/2017	1 inch	Sch 80 PVC	165	185	1,725.8	-	-	-
SVE-04-M	Soil Vapor	55-920878	1015934.6	676182.8	1,893.0	1,890.8	385	10/4/2017	1 inch	Sch 80 PVC	365	385	1,525.8	-	-	-
TSSV-01-S	Soil Vapor	55-911519	1015918.8	675991.0	1,881.0	1,881.0	610	1/22/2010	2 inch	Sch 80 PVC	150	200	1,731.0	-	-	-
TSSV-01-M	Soil Vapor	55-911519	1015918.8	675991.0	1,881.0	1,881.0	610	1/22/2010	2 inch	Sch 80 PVC	350	400	1,531.0	-	-	-
TSSV-01-D	Soil Vapor	55-911519	1015918.8	675991.0	1,881.0	1,881.0	610	1/22/2010	2 inch	Sch 80 PVC	549	599	1,332.0	-	-	-
TSSV-02-S	Soil Vapor	55-915432	1015688.3	675875.9	1,880.2	1,881.4	210	5/3/2013	2 inch	Sch 80 PVC	150.3	200.3	1,731.1	-	-	-
TSSV-02-M	Soil Vapor	55-915432	1015688.3	675875.9	1,880.2	1,881.4	410	5/3/2013	2 inch	Sch 80 PVC	350.3	400.3	1,531.1	-	-	-
TSSV-02-D	Soil Vapor	55-915279	1015688.8	675860.8	1,880.2	1,881.2	609	4/24/2013	2 inch	Sch 80 PVC	549.3	599.3	1,331.9	-	-	-
TSSV-02-PZ	Groundwater	55-915279	1015688.8	675860.8	1,880.2	1,881.2	779	4/24/2013	2 inch	Sch 80 PVC	699.3	769.3	1,181.9	-	-	-
TSSV-03-S	Soil Vapor	55-915281	1014061.5	675688.5	1,902.7	1,901.8	230	4/26/2013	2 inch	Sch 80 PVC	170.5	220.5	1,731.3	-	-	-
TSSV-03-M	Soil Vapor	55-915281	1014061.5	675688.5	1,902.7	1,901.8	430	4/26/2013	2 inch	Sch 80 PVC	370.5	420.5	1,531.3	-	-	-
TSSV-03-D	Soil Vapor	55-915281	1014061.5	675688.5	1,902.7	1,901.8	629	4/26/2013	2 inch	Sch 80 PVC	569.5	619.5	1,332.3	-	-	-
TSSV-03-PZ	Groundwater	55-915281	1014061.5	675688.5	1,902.7	1,901.8	799	4/26/2013	2 inch	Sch 80 PVC	719.5	789.5	1,182.3	-	-	-
TSSV-03-P	Soil Vapor	55-915281	1014061.5	675688.5	1,902.7	1,901.8	73	4/26/2013	1 inch	Sch 80 PVC	60	70	1,841.8	-	-	-
TSSV-04-S	Soil Vapor	55-915282	1015319.7	675423.9	1,906.0	1,905.4	235	5/31/2013	2 inch	Sch 80 PVC	174.5	224.5	1,730.9	-	-	-
TSSV-04-M	Soil Vapor	55-915282	1015319.7	675423.9	1,906.0	1,905.4	435	5/31/2013	2 inch	Sch 80 PVC	374.5	424.5	1,530.9	-	-	-
TSSV-04-D	Soil Vapor	55-915629	1015319.7	675423.9	1,906.0	1,905.0	635	6/10/2013	2 inch	Sch 80 PVC	575	625	1,330.0	-	-	-
TSSV-04-PZ	Groundwater	55-915282	1015319.7	675423.9	1,906.0	1,905.8	804	5/31/2013	3 inch	Sch 80 PVC	723.5	793.5	1,182.3	-	-	-
TSSV-05-S	Soil Vapor	55-917870	1014659.1	675396.6	1,905.7	1,904.7	430	3/8/2015	2 inch	Sch 80 PVC	170	220	1,734.7	-	-	-
TSSV-05-M	Soil Vapor	55-917870	1014659.1	675396.6	1,905.7	1,904.7	430	3/8/2015	2 inch	Sch 80 PVC	370	420	1,534.7	-	-	-
TSSV-05-D	Soil Vapor	55-917892	1014659.1	675396.6	1,905.7	1,905.1	805	4/21/2015	2 inch	Sch 80 PVC	570	620	1,335.1	-	-	-

Table 1. Well Construction Summary

Cave Creek Landfill, Maricopa County

WellName	Location Type	ADWR ID	Northing (NAD83SP Int'l Ft)	Easting (NAD83SP Int'l Ft)	TOC (ft amsl)	Ground Surface (ft amsl)	Total Well Depth (ft bgs)	Date Installed	Casing Diameter (I.D.)	CasingType	Top Screen Depth (ft bgs)	Bottom Screen Depth (ft bgs)	Top Screen Elevation (ft amsl)	Pump Intake Depth (ft bgs)	Pump Intake Elevation (ft amsl)	Comment
TSSV-05-PZ	Groundwater	55-917892	1014659.1	675396.6	1,905.7	1,905.1	805	4/21/2015	4 inch	Sch 80 PVC	720	790	1,185.1	-	-	-
TSSV-06-S	Soil Vapor	55-917894	1015997.6	675654.5	1,876.9	1,876.5	610	3/18/2015	2 inch	Sch 80 PVC	150	200	1,726.5	-	-	-
TSSV-06-M	Soil Vapor	55-917894	1015997.6	675654.5	1,876.9	1,876.5	610	3/18/2015	2 inch	Sch 80 PVC	350	400	1,526.5	-	-	-
TSSV-06-D	Soil Vapor	55-917894	1015997.6	675654.5	1,876.9	1,876.5	610	3/18/2015	2 inch	Sch 80 PVC	550	600	1,326.5	-	-	-
TSSV-06-PZ	Groundwater	55-917895	1015997.6	675654.5	1,876.9	1,876.1	794	4/8/2015	4 inch	Sch 80 PVC	700	785	1,176.1	-	-	-
TSSV-07-S	Soil Vapor	55-917947	1015855.0	676202.1	1,889.9	1,889.5	620	3/30/2015	2 inch	Sch 80 PVC	160	210	1,729.5	-	-	-
TSSV-07-M	Soil Vapor	55-917947	1015855.0	676202.1	1,889.9	1,889.5	620	3/30/2015	2 inch	Sch 80 PVC	360	410	1,529.5	-	-	-
TSSV-07-D	Soil Vapor	55-917947	1015855.0	676202.1	1,889.9	1,889.5	620	3/30/2015	2 inch	Sch 80 PVC	560	610	1,329.5	-	-	-
TSSV-07-PZ	Groundwater	55-917946	1015855.0	676202.1	1,889.9	1,889.0	795	4/13/2015	4 inch	Sch 80 PVC	710	780	1,179.0	-	-	-

Notes: LFG - Landfill Gas
 ft - Feet
 ft bgs - Feet below ground surface
 ft amsl - Feet above mean sea level
 I.D. - Inner Diameter
 Pumps removed for wells MW-02 - MW-08 and PW 8/2017.

Table 2. Groundwater Elevation, Gradient, and Flow Direction

**Cave Creek Landfill,
Maricopa County**

Groundwater Elevation by Well (ft amsl)

Well ID	First Quarter 2019	Second Quarter 2019	Third Quarter 2019	Fourth Quarter 2019	First Quarter 2020
EW-01 ⁽¹⁾	1156.54	1156.22	NM	1157.28	1157.12
IW-01*	-	-	-	-	1153.47
PW	1162.45	1162.43	1162.54	1162.78	1162.95
MW-02	1156.61	1156.32	1156.37	1156.62	1156.97
MW-03	1157.33	1157.32	1157.38	1157.48	1157.57
MW-04	1156.15	1155.97	1156.09	1156.19	1156.27
MW-05	1155.74	1155.56	1155.81	1155.92	1156.27
MW-06	1154.93	1154.91	1154.88	1154.98	1155.07
MW-07	1156.21	1156.13	1156.00	1156.17	1156.15
MW-08	1162.06	1162.01	1162.11	1162.59	1162.77
MW-09	1161.11	1160.98	1161.13	1161.22	1161.43
MW-10	1158.20	1158.02	1158.12	1158.21	1158.45
MW-11	1153.97	1154.03	1154.06	1154.06	1154.25
MW-12	1158.46	1158.02	1158.43	1158.63	1158.73
MW-13	1162.93	1162.80	1163.04	1163.47	1163.66
TSSV-02-PZ ⁽¹⁾	1161.70	1162.24	1162.35	1162.62	1162.83
TSSV-03-PZ ⁽¹⁾	1158.72	1158.47	1158.68	1158.99	1159.07
TSSV-04-PZ*	1163.90	1160.04	1160.28	1160.65	1160.75
TSSV-05-PZ ⁽¹⁾	1160.06	1159.78	1160.12	1160.38	1160.51
TSSV-06-PZ ⁽¹⁾	1162.16	1162.20	1162.35	1162.48	1162.73
TSSV-07-PZ ⁽¹⁾	1161.98	1161.84	1162.00	1162.25	1162.51
Gradient (ft/ft)	0.002	0.002	0.002	0.002	0.002
Flow Direction (deg. from N)	174.3	176.2	171.4	174.0	171.8

Notes:

Flow direction measured in a clockwise rotation; North is 0 degrees, East is 90 degrees, South is 180 degrees, and West is 270 degrees.

deg. = degrees

ft amsl = Feet above mean sea level

ID = Identification

MW = Monitoring Well

NM = Not Measured

PW = Production Well

PZ = Piezometer

TSSV = Monitoring Well

* = not included in calculation of gradient or flow direction, all quarters

⁽¹⁾ = not included in calculation of gradient or flow direction starting in First Quarter

2019

Table 3. Groundwater Analytical Results - Summary of VOC Data

Cave Creek Landfill, Maricopa County

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Sample Method	1,1-Dichloroethane	1,1-Dichloroethene	Benzene	Bromoform	Carbon disulfide	Chlorobenzene	Chloroform	dis-1,2-Dichloroethene	Naphthalene	Tetrachloroethene	Toluene	trans-1,2-dichloroethene	Trichloroethene	Vinyl Chloride	Comments
IW-01																			
	3/9/2020	1,141.1	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	4.3	<1	--
	3/9/2020	1,135.1	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	4.1	<1	--
	3/9/2020	1,115.1	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	4.0	<1	--
	3/9/2020	1,070.1	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	2.6	<1	--
MW-02																			
	2/24/2020	1,142.0	µg/L	PDB	2.5	2.3	<1	<1	<5	<1	<1	3.3	<5	3.5	<1	<1	93	<1	--
MW-03																			
	2/26/2020	1,142.4	µg/L	PDB	<1	1.2	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	1.5	<1	--
MW-04																			
	2/26/2020	1,140.8	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<1	<1	--
MW-05																			
	2/24/2020	1,141.1	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	0.40 J	<5	0.45 J	<1	<1	50	<1	--
MW-06																			
	2/26/2020	1,139.7	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	3.5	<1	Duplicate
	2/26/2020	1,139.7	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	3.3	<1	--
MW-07																			
	2/26/2020	1,141.6	µg/L	PDB	<1	1.0	<1	<1	<5	<1	<1	0.68 J	<5	0.44 J	<1	<1	29	<1	--
MW-08																			
	2/25/2020	1,147.1	µg/L	PDB	0.40 J	6.6	<1	<1	<5	<1	<1	<1	<5	1.3	<1	<1	24	<1	--
	2/25/2020	1,147.1	µg/L	PDB	0.34 J	6.1	<1	<1	<5	<1	<1	<1	<5	1.5	<1	<1	23	<1	Duplicate
MW-09																			
	2/25/2020	1,145.8	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	11	<1	--
MW-10																			
	2/25/2020	1,143.3	µg/L	PDB	1.7	8.9	<1	<1	<5	<1	1.5	28	<5	12	<1	<1	240	<1	--
MW-11																			
	2/25/2020	1,138.8	µg/L	PDB	<1	1.2	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	30	<1	--
AWQS:					N/A	7	5	80	N/A	100	80	70	N/A	5	1,000	100	5	2	

Table 3. Groundwater Analytical Results - Summary of VOC Data

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Sample Method	1,1-Dichloroethane	1,1-Dichloroethene	Benzene	Bromoform	Carbon disulfide	Chlorobenzene	Chloroform	ds-1,2-Dichloroethene	Naphthalene	Tetrachloroethene	Toluene	trans-1,2-dichloroethene	Trichloroethene	Vinyl Chloride	Comments
MW-12																			
	2/25/2020	1,143.2	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<1	<1	--
MW-13																			
	2/25/2020	1,148.7	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	1.4	<1	--
PW																			
	2/24/2020	1,148.0	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<1	<1	--
TSSV-02-PZ																			
	2/25/2020	1,147.2	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<1	<1	--
TSSV-03-PZ																			
	2/25/2020	1,143.7	µg/L	PDB	<1	1.8	<1	<1	<5	<1	<1	5.8	<5	1.8	<1	<1	91	<1	--
TSSV-04-PZ																			
	2/25/2020	1,146.0	µg/L	PDB	<1	4.7	<1	<1	<5	<1	<1	5.3	<5	4.8	<1	<1	75	<1	--
TSSV-05-PZ																			
	2/25/2020	1,145.7	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	2.5	<1	--
TSSV-06-PZ																			
	2/25/2020	1,147.9	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	1.5	<1	--
TSSV-07-PZ																			
	2/25/2020	1,160.9	µg/L	PDB	<1	<1	<1	<1	<5	<1	<1	<1	<5	<1	<1	<1	<1	<1	--
AWQS:					N/A	7	5	80	N/A	100	80	70	N/A	5	1,000	100	5	2	

Notes: AWQS - Aquifer Water Quality Standard
 Grey text indicates result was less than the reporting limit
 Red text indicates a result detected above the AWQS
 µg/L - micrograms per liter
 ft amsl - feet above mean sea level
 bwt - below water table
 PDB - Passive Diffusion Bag
 TD - Total Depth
 VOC - Volatile Organic Compound
 Analytical method is VOCs by SW 8260B unless otherwise noted.
 - = data not applicable or not available
 * = approximate sample location
 J = Indicates and estimated value

Table 4. Groundwater Analytical Results - Summary of General Chemistry

Cave Creek Landfill, Maricopa County

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Alkalinity, (as CaCO ₃)	Chloride	Fluoride	Nitrate (As N)	Sulfate	Comments
MW-02									
	2/27/2019	1,142.0	mg/L	380	18	0.16	<0.1	<5	--
	8/22/2019	1,142.0	mg/L	310	18	<0.7	<0.5	2.8	--
MW-03									
	3/4/2019	1,142.4	mg/L	140	19	0.29	<0.1	<5	--
	8/21/2019	1,143.4	mg/L	120	18	<0.7	<0.5	1.3	--
MW-04									
	2/27/2019	1,141.8	mg/L	220	23	0.30	<0.1	6.9	--
	8/21/2019	1,141.8	mg/L	210	22	<0.7	<0.5	7.8	--
MW-05									
	2/27/2019	1,141.1	mg/L	220	20	0.63	<0.1	8.3	--
	8/22/2019	1,142.1	mg/L	210	18	<0.7	<0.5	9.0	--
MW-06									
	2/28/2019	1,140.7	mg/L	230	17	0.22	<0.1	9.8	--
	8/21/2019	1,140.7	mg/L	210	16	<0.7	<0.5	15	--
	8/21/2019	1,140.7	mg/L	200	16	<0.7	<0.5	15	Duplicate
MW-07									
	2/28/2019	1,141.6	mg/L	170	22	0.30	<0.1	<5	--
	8/21/2019	1,141.6	mg/L	150	22	<0.7	<0.5	0.98	--
MW-08									
	2/27/2019	1,147.1	mg/L	120	20	0.39	<0.1	<5	Duplicate
	2/27/2019	1,147.1	mg/L	120	20	0.39	<0.1	<5	--
	8/22/2019	1,148.1	mg/L	110	18	<0.7	<0.5	<0.5	--
AWQS:				N/A	N/A	4	10	N/A	

Table 4. Groundwater Analytical Results - Summary of General Chemistry

Cave Creek Landfill, Maricopa County

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Alkalinity, (as CaCO3)	Chloride	Fluoride	Nitrate (As N)	Sulfate	Comments
PW									
	2/28/2019	1,148.0	mg/L	240	21	0.33	1.3	18	--
	8/22/2019	1,098.0	mg/L	210	21	<0.7	1.4	19	--
AWQS:				N/A	N/A	4	10	N/A	

Notes: AWQS - Aquifer Water Quality Standard
 Grey text indicates result was less than the reporting limit
 Bold text indicates a result detected above the AWQS
 mg/L - milligrams per liter
 ft amsl - feet above mean sea level
 - = data not applicable or not available

Monday, April 13, 2020

Table 5. Groundwater Analytical Results - Summary of Metals Data

Cave Creek Landfill, Maricopa County

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Comments
MW-02																			
	2/24/2020	1,142.0	mg/L	<0.006	0.015	0.033	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.23	--
MW-03																			
	2/26/2020	1,142.4	mg/L	<0.006	<0.01	0.015	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.26	--
MW-04																			
	2/26/2020	1,140.8	mg/L	<0.006	0.012	<0.01	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.017	0.057	--
MW-05																			
	2/24/2020	1,141.1	mg/L	<0.006	0.012	0.015	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.16	--
MW-06																			
	2/26/2020	1,139.7	mg/L	<0.006	<0.01	<0.01	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.21	--
	2/26/2020	1,139.7	mg/L	<0.006	<0.01	<0.01	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.29	Duplicate
MW-07																			
	2/26/2020	1,141.6	mg/L	<0.006	<0.01	0.017	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.10	--
MW-08																			
	2/25/2020	1,147.1	mg/L	<0.006	<0.01	0.015	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.051	--
	2/25/2020	1,147.1	mg/L	<0.006	<0.01	0.015	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.050	Duplicate
PW																			
	2/24/2020	1,148.0	mg/L	<0.006	0.013	<0.01	<0.004	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.016	0.032	--
AWQS:				0.006	0.01	2.0	0.004	0.005	0.1	NA	NA	0.05	0.1	0.05	NA	0.002	NA	NA	
Upper Background Threshold Value:				*	0.1	0.25	*	*	0.025	0.025	0.025	0.1	0.25	0.05	*	*	0.045	0.7948	

Notes: AWQS - Aquifer Water Quality Standard
 Grey text indicates result was less than the reporting limit
 Red text indicates a result detected above the AWQS
 mg/L - milligrams per liter
 ft amsl - feet above mean sea level
 NA = data not applicable or not available
 * = Two consecutive detect values in downgradient wells
 B1 = Target analyte detected in method blank at or above the method reporting limit.

Table 6. Soil Vapor Analytical Results - Wellhead TO-15 Analysis Data

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Acetone	2-Butanone (MEK)	Chlorobenzene	Chloroform	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Freon 11	Freon 12	Freon 113	Methylene chloride	Tetrachloroethene	Tetrahydrofuran	Trichloroethene	Vinyl Chloride	Comments	
MW-09																						
	3/2/2020	1,179.2	µg/m³	<5,950	<7,380	<1,150	<1,220	<1,010	<1,010	7,660	2,080	<990	<1,410	<2,480	45,500	<3,470	28,700	<2,950	438,000	<640	--	
MW-09-S																						
	3/2/2020	1,724.2	µg/m³	<119	<148	<23.0	<24.4	<20.3	<20.3	<19.9	<19.8	<19.8	<28.1	<49.5	55.9	<69.4	570	<59.0	2,020	<12.8	--	
MW-09-D																						
	3/2/2020	1,329.2	µg/m³	<59.5	<73.8	<11.5	<12.2	<10.1	<10.1	<9.93	<9.90	<9.90	42.2	49.6	114	<34.7	725	<29.5	2,100	<6.40	--	
MW-10																						
	3/2/2020	1,177.4	µg/m³	<2,380	<2,950	<460	<488	4,900	<405	1,260	<396	<396	17,800	37,000	3,230	<1,390	9,830	<1,180	12,600	<256	--	
	3/2/2020	1,177.4	µg/m³	<2,380	<2,950	<460	<488	5,390	<405	1,560	<396	<396	17,600	34,400	3,220	<1,390	6,780	<1,180	14,400	<256	Duplicate	
MW-10-M																						
	3/2/2020	1,527.4	µg/m³	<2,380	<2,950	<460	<488	2,650	<405	1,320	<396	<396	16,100	43,300	3,420	<1,390	4,180	<1,180	1,440	<256	--	
MW-10-D																						
	3/2/2020	1,327.4	µg/m³	<2,380 R6	<2,950	<460	<488	11,000	<405	786	<396	<396	5,790	22,200	1,460	2,930	8,410	<1,180	3,750	<256	--	
MW-11																						
	3/4/2020	1,165.1	µg/m³	<119 R6	<148	<23.0	<24.4	<20.3	<20.3	216	<19.8	<19.8	46.1	69.3	469	<69.4	<67.8	<59.0	908	<12.8	--	
MW-12																						
	3/5/2020	1,183.6	µg/m³	<23.8	<29.5	<4.60	<4.88	<4.05	<4.05	<3.97	<3.96	<3.96	<5.62	<9.90	<7.66	<13.9	<13.6	<11.8 L5	<5.37	<2.56	--	
MW-12-M																						
	3/5/2020	1,527.6	µg/m³	<23.8	<29.5	<4.60	<4.88	5.83	<4.05	<3.97	<3.96	<3.96	78.2	122	738	<13.9	145	<11.8 L5	30.1	<2.56	--	
MW-12-D																						
	3/5/2020	1,327.6	µg/m³	99.2	<29.5	<4.60	<4.88	9.56	<4.05	9.93	<3.96	<3.96	36.8	66.7	45.5	<13.9	71.1	<11.8 L5	22.6	<2.56	--	
MW-13																						
	3/4/2020	1,193.0	µg/m³	<23,800	<29,500	<4,600	<4,880	<4,050	<4,050	150,000	5,070	<3,960	<5,620	<9,900	115,000	<13,900	36,500	<11,800	81,600	<2,560	--	
	3/4/2020	1,193.0	µg/m³	<11,900	<14,800	<2,300	<2,440	2,110	<2,030	175,000	7,720	<1,980	<2,810	10,300	128,000	11,000	50,300	<5,900	97,700	<1,280	Duplicate	

Table 6. Soil Vapor Analytical Results - Wellhead TO-15 Analysis Data

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Acetone	2-Butanone (MEK)	Chlorobenzene	Chloroform	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Freon 11	Freon 12	Freon 113	Methylene chloride	Tetrachloroethene	Tetrahydrofuran	Trichloroethene	Vinyl Chloride	Comments	
MW-13-S																						
	3/3/2020	1,727.0	µg/m³	<238	<295	99.4	<48.8	<40.5	<40.5	511	190	<39.6	151	13,700	196	<139	1,950	<118	447	105	--	
MW-13-M																						
	3/3/2020	1,527.0	µg/m³	<2,380	<2,950	2,180	<488	<405	<405	8,340	<396	<396	1,970	1,680	<766	<1,390	5,600	<1,180	2,710	<256	--	
MW-13-D																						
	3/3/2020	1,327.0	µg/m³	<5,950	<7,380	<1,150	<1,220	1,220	<1,010	7,070	6,690	<990	<1,410	<2,480	3,180	218,000	12,100	<2,950	11,000	<640	--	
	3/3/2020	1,327.0	µg/m³	<5,950	<7,380	<1,150	<1,220	<1,010	<1,010	5,200	4,510	<990	<1,410	<2,480	2,300	76,000	10,600	<2,950	8,060	<640	Duplicate	
PW																						
	3/10/2020	1,201.4	µg/m³	<238	<295	<46.0	55.6	<40.5	<40.5	<39.7	68.9	<39.6	<56.2	<99.0	357	<139	544	<118	4,250	<25.6	--	
SVE-01																						
	3/10/2020	1,762.1	µg/m³	<2,380	<2,950	3,030	<488	<405	<405	<397	713	<396	<562	<990	<766	<1,390	1,640	<1,180	13,400	<256	--	
SVE-01-S																						
	3/10/2020	1,702.1	µg/m³	<238	<295	229	250	<40.5	<40.5	<39.7	85.5	<39.6	147	<99.0	389	<139	1,450	<118	12,800	<25.6	--	
SVE-01-M																						
	3/10/2020	1,522.1	µg/m³	<238	<295	1,470	262	<40.5	<40.5	<39.7	326	<39.6	151	<99.0	404	<139	1,500	<118	6,980	<25.6	--	
SVE-01-D																						
	3/10/2020	1,402.1	µg/m³	<238	<295	1,000	238	<40.5	<40.5	<39.7	272	<39.6	141	<99.0	383	<139	990	<118	5,960	<25.6	--	
SVE-02																						
	3/10/2020	1,500.4	µg/m³	<2,380	<2,950	<460	<488	<405	<405	<397	<396	<396	<562	<990	<766	<1,390	2,060	<1,180	13,200	<256	--	
SVE-02-S																						
	3/10/2020	1,750.4	µg/m³	<238	<295	46.9	<48.8	<40.5	<40.5	<39.7	2,550	<39.6	187	427	<76.6	<139	601	<118	502	334	--	
SVE-03																						
	3/10/2020	1,375.1	µg/m³	<5,950	<7,380	<1,150	<1,220	<1,010	<1,010	2,560	3,190	<990	2,700	6,440	12,600	<3,470	5,150	<2,950	68,700	<640	--	
SVE-03-S																						
	3/10/2020	1,725.1	µg/m³	<59.5	<73.8	<11.5	<12.2	<10.1	<10.1	<9.93	39.6	<9.90	44.7	471	49.8	<34.7	699	<29.5	194	<6.40	--	

Table 6. Soil Vapor Analytical Results - Wellhead TO-15 Analysis Data

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Acetone	2-Butanone (MEK)	Chlorobenzene	Chloroform	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Freon 11	Freon 12	Freon 113	Methylene chloride	Tetrachloroethene	Tetrahydrofuran	Trichloroethene	Vinyl Chloride	Comments	
SVE-03-M																						
	3/10/2020	1,525.1	µg/m³	<59.5	<73.8	<11.5	12.9	<10.1	<10.1	<9.93	<9.90	<9.90	<14.1	<24.8	<19.2	<34.7	300	<29.5	124	<6.40	--	
SVE-04																						
	3/10/2020	1,376.8	µg/m³	<11,900	<14,800	<2,300	<2,440	<2,030	<2,030	61,100	14,500	<1,980	<2,810	<4,950	38,000	136,000	29,200	<5,900	128,000	<1,280	Duplicate	
	3/10/2020	1,376.8	µg/m³	<5,950	<7,380	1,540	<1,220	<1,010	<1,010	55,200	14,100	<990	<1,410	<2,480	31,900	119,000	22,200	<2,950	103,000	<640	--	
SVE-04-S																						
	3/10/2020	1,725.8	µg/m³	<238	<295	164	<48.8	<40.5	<40.5	<39.7	<39.6	<39.6	605	136	104	<139	384	<118	983	<25.6	--	
SVE-04-M																						
	3/10/2020	1,525.8	µg/m³	<5,950	<7,380	22,500	<1,220	<1,010	<1,010	<993	2,280	<990	<1,410	<2,480	<1,920	<3,470	5,220	<2,950	4,380	<640	--	
TSSV-01-S																						
	3/6/2020	1,731.0	µg/m³	<238	<295	<46.0	120	<40.5	<40.5	<39.7	48.3	<39.6	<56.2	<99.0	617	<139	1,330	<118	11,600	<25.6	--	
TSSV-01-M																						
	3/6/2020	1,531.0	µg/m³	<238	<295	2,850	1,400	<40.5	<40.5	<39.7	451	<39.6	194	<99.0	469	<139	4,140	<118	29,800	<25.6	--	
TSSV-01-D																						
	3/6/2020	1,332.0	µg/m³	<238	<295	671	509	<40.5	<40.5	81.8	918	<39.6	<56.2	<99.0	161	<139	1,220	<118	7,090	<25.6	--	
TSSV-02-S																						
	3/10/2020	1,731.2	µg/m³	<23.8	<29.5	<4.60	<4.88	<4.05	<4.05	5.32	<3.96	<3.96	<5.62	<9.90	7.81	<13.9	26.4	<11.8	59.0	<2.56	--	
TSSV-02-M																						
	3/10/2020	1,531.2	µg/m³	<59.5	<73.8	<11.5	<12.2	<10.1	<10.1	<9.93	<9.90	<9.90	<14.1	<24.8	<19.2	<34.7	77.6	<29.5	619	<6.40	--	
TSSV-02-D																						
	3/10/2020	1,331.9	µg/m³	<23.8	<29.5	17.2	13.8	-	<4.05	<3.97	59.9	<3.96	<5.62	<9.90	66.8	<13.9	109	<11.8	759	<2.56	--	
TSSV-02-PZ																						
	3/10/2020	1,181.9	µg/m³	<23.8	<29.5	<4.60	4.88	<4.05	<4.05	64.1	292	<3.96	<5.62	<9.90	48.9	<13.9	60.5	<11.8	380	<2.56	--	
TSSV-03-S																						
	3/5/2020	1,731.3	µg/m³	125	<29.5	<4.60	<4.88	<4.05	<4.05	<3.97	5.78	<3.96	<5.62	65.2	<7.66	<13.9	38.2	<11.8 L5	<5.37	<2.56	--	

Table 6. Soil Vapor Analytical Results - Wellhead TO-15 Analysis Data

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Acetone	2-Butanone (MEK)	Chlorobenzene	Chloroform	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Freon 11	Freon 12	Freon 113	Methylene chloride	Tetrachloroethene	Tetrahydrofuran	Trichloroethene	Vinyl Chloride	Comments	
TSSV-03-M																						
	3/5/2020	1,531.3	µg/m³	<119	<148	<23.0	28.8	993	<20.3	26.2	184	<19.8	1,150	3,460	323	749	1,230	<59.0 L5	271	<12.8	--	
TSSV-03-D																						
	3/5/2020	1,332.3	µg/m³	<23.8	<29.5	<4.60	<4.88	14.1	<4.05	<3.97	4.75	<3.96	14.2	44.3	<7.66	<13.9	26.0	<11.8 L5	<5.37	<2.56	--	
TSSV-03-PZ																						
	3/5/2020	1,182.3	µg/m³	<238	<295	<46.0	53.7	654	<40.5	249	43.6	<39.6	2,590	4,650	553	<139	2,120	<118 L5	4,320	<25.6	--	
TSSV-04-S																						
	3/6/2020	1,730.9	µg/m³	<238	<295	<46.0	190	<40.5	<40.5	<39.7	45.9	<39.6	114	715	<76.6	<139	1,040	<118 L5	415	<25.6	--	
TSSV-04-M																						
	3/6/2020	1,530.9	µg/m³	<23.8	<29.5	<4.60	101	6.08	<4.05	<3.97	5.23	<3.96	63.6	92.0	48.7	<13.9	690	<11.8 L5	157	<2.56	--	
TSSV-04-D																						
	3/6/2020	1,330.0	µg/m³	<238	<295	<46.0	<48.8	<40.5	<40.5	124	64.9	<39.6	71.9	248	4,260	<139	579	<118	4,050	<25.6	--	
TSSV-04-PZ																						
	3/6/2020	1,182.2	µg/m³	<119	<148	<23.0	<24.4	<20.3	<20.3	83.8	40.4	<19.8	<28.1	<49.5	141	<69.4	119	<59.0	726	<12.8	--	
	3/6/2020	1,182.2	µg/m³	<119	<148	<23.0	<24.4	<20.3	<20.3	71.5	36.0	<19.8	<28.1	<49.5	127	<69.4	92.9	<59.0	632	<12.8	Duplicate	
TSSV-05-S																						
	3/5/2020	1,734.7	µg/m³	54.3	<29.5	10.4	41.7	54.9	<4.05	<3.97	230	<3.96	<5.62	278	<7.66	<13.9	<13.6	<11.8 L5	<5.37	<2.56	--	
TSSV-05-M																						
	3/5/2020	1,534.7	µg/m³	<238	<295	<46.0	<48.8	48.6	<40.5	<39.7	49.1	<39.6	272	772	<76.6	<139	637	<118 L5	69.8	<25.6	--	
TSSV-05-D																						
	3/5/2020	1,335.1	µg/m³	<238	<295	<46.0	53.7	1,470	<40.5	190	588	<39.6	3,690	5,540	607	1,460	2,070	<118 L5	756	<25.6	--	
TSSV-05-PZ																						
	3/5/2020	1,185.1	µg/m³	<238	<295	<46.0	<48.8	55.9	<40.5	206	121	<39.6	1,780	3,470	538	<139	789	<118 L5	4,110	<25.6	--	
TSSV-06-M																						
	3/3/2020	1,526.5	µg/m³	<238	<295	<46.0	174	<40.5	<40.5	<39.7	119	<39.6	<56.2	<99.0	205	<139	823	<118	6,390	<25.6	--	

Table 6. Soil Vapor Analytical Results - Wellhead TO-15 Analysis Data

Well Name	Sample Date	Sample Elevation (ft amsl)	Units	Acetone	2-Butanone (MEK)	Chlorobenzene	Chloroform	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Freon 11	Freon 12	Freon 113	Methylene chloride	Tetrachloroethene	Tetrahydrofuran	Trichloroethene	Vinyl Chloride	Comments	
TSSV-06-D																						
	3/3/2020	1,326.5	µg/m³	<238	<295	115	380	<40.5	<40.5	139	1,260	<39.6	70.8	149	2,580	<139	2,690	<118	15,800	<25.6	--	
TSSV-07-M																						
	3/3/2020	1,529.5	µg/m³	<238	<295	848	<48.8	<40.5	<40.5	104	162	<39.6	543	726	124	<139	921	<118	2,010	<25.6	--	
TSSV-07-D																						
	3/3/2020	1,329.5	µg/m³	<5,950	<7,380	<1,150	<1,220	<1,010	<1,010	15,100	5,030	<990	<1,410	<2,480	7,660	<3,470	3,900	<2,950	118,000	<640	--	
TSSV-07-PZ																						
	3/3/2020	1,179.0	µg/m³	<5,950	<7,380	<1,150	<1,220	1,030	<1,010	67,500	12,600	<990	<1,410	3,540	42,600	<3,470	48,400	<2,950	77,300	<640	--	

Notes: Grey text indicates a non-detected compound
 µg/m³ - micrograms per cubic meter
 ft amsl - feet above mean sea level
 - = data not applicable or not available
 R6 = Blank Spike/Blank Spike Duplicate Relative Percent Difference exceeded the method detection limit. Recovery met acceptance criteria.

Table 7. Soil Vapor Analytical Results - Process Sample TO-15 Analysis Data

Sample Location Identifier	Sample Date	Sample Elevation (ft amsl)	Units	Acetone	2-Butanone (MEK)	Chloroform	Chlorobenzene	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Freon 11	Freon 12	Freon 113	Methylene chloride	Tetrachloroethene	Tetrahydrofuran	Trichloroethene	Vinyl Chloride	Comment
SP-01																					
	1/24/2020	-	µg/m³	<11,900	<14,800	<2,440	<2,300	<2,030	<2,030	27,800	9,460	<1,980	<2,810	<4,950	25,400	48,600	17,700	<5,900	98,300	<1,280	--
	2/21/2020	-	µg/m³	<11,900	<14,800	<2,440	<2,300	<2,030	<2,030	24,000	7,070	<1,980	<2,810	<4,950	20,900	60,700	20,400	<5,900	87,500	<1,280	--
	3/18/2020	-	µg/m³	<5,950	<7,380	<1,220	1,430	1,130	<1,010	31,400	10,200	<990	1,880	4,900	24,100	61,800	18,400	<2,950	84,800	<640	--
SP-02																					
	1/24/2020	-	µg/m³	<2,380	<2,950	<488	<460	<405	<405	611	<396	<396	<562	4,290	<766	18,400	<1,360	<1,180	<537	<256	--
	2/21/2020	-	µg/m³	<5,950	<7,380	<1,220	<1,150	<1,010	<1,010	<993	<990	<990	<1,410	3,810	<1,920	40,900	<3,390	<2,950	<1,340	<640	--
	3/18/2020	-	µg/m³	<11,900	<14,800	<2,440	<2,300	<2,030	<2,030	<1,990	<1,980	<1,980	<2,810	<4,950	<3,830	35,400	<6,780	<5,900	<2,690	<1,280	--
SP-03																					
	1/24/2020	-	µg/m³	<2,380	<2,950	<488	<460	<405	<405	<397	<396	<396	<562	3,320	<766	32,800	<1,360	<1,180	<537	<256	--
	2/21/2020	-	µg/m³	<5,950	<7,380	<1,220	<1,150	<1,010	<1,010	<993	<990	<990	<1,410	2,950	<1,920	37,100	<3,390	<2,950	<1,340	<640	--
	3/18/2020	-	µg/m³	<238	<295	<48.8	<46.0	<40.5	<40.5	<39.7	<39.6	<39.6	<56.2	2,780	<76.6	2,070	<136	<118	<53.7	86.5	--
SP-04																					
	1/24/2020	-	µg/m³	<2,380	<2,950	<488	<460	<405	<405	<397	<396	<396	<562	3,130	<766	34,000	<1,360	<1,180	<537	<256	--
	2/21/2020	-	µg/m³	<5,950	<7,380	<1,220	<1,150	<1,010	<1,010	<993	<990	<990	<1,410	3,840	<1,920	60,000	<3,390	<2,950	<1,340	<640	--
	3/18/2020	-	µg/m³	<238	<295	<48.8	<46.0	<40.5	<40.5	<39.7	<39.6	<39.6	<56.2	3,410	<76.6	2,410	<136	<118	<53.7	97.8	--

Notes: Grey text indicates a non-detected compound
 µg/m³ - micrograms per cubic meter
 ft amsl - feet above mean sea level
 - = data not applicable or not available
 L5 = Laboratory fortified blank/blank spike: The associated blank spike recovery was below method acceptance limits.
 R6 = Duplicates: 1fb/1fbd rpd exceeded the method control acceptance limit. Recovery met acceptance criteria

Table 8. Soil Vapor Extraction Mass Removal

Date of Reading [Mon-DD-YR]	Blower Hour Meter Reading [hrs]	Time Operated Since Last Reading [hrs]	System Uptime [%]	VOC		Hourly Rate of VOC Mass Extracted [lbs/hr]	VOC Mass Removed Since Last Reading [lbs]	Total VOC Mass Extracted Since Startup [lbs]
				Concentration in Extracted Soil Vapor [mg/m ³]	SVE Flow Rate [scfm]			
1/24/2020	29,374	327	37	139	600	0.31	153	43,649
2/21/2020	30,037	663	99	122	921	0.42	207	43,856
3/18/2020	30,560	523	84	128	918	0.44	220	44,076

Notes:

Startup of the full-scale SVE system occurred on September 15, 2015. Mass totals presented in this table reflect full-scale SVE operations only.

Acronyms and Abbreviations:

DD - day of the month

hrs - hours

lbs - pounds

lbs/hr - pounds per hour

mg/m³ - milligrams per cubic meter

Mon - month

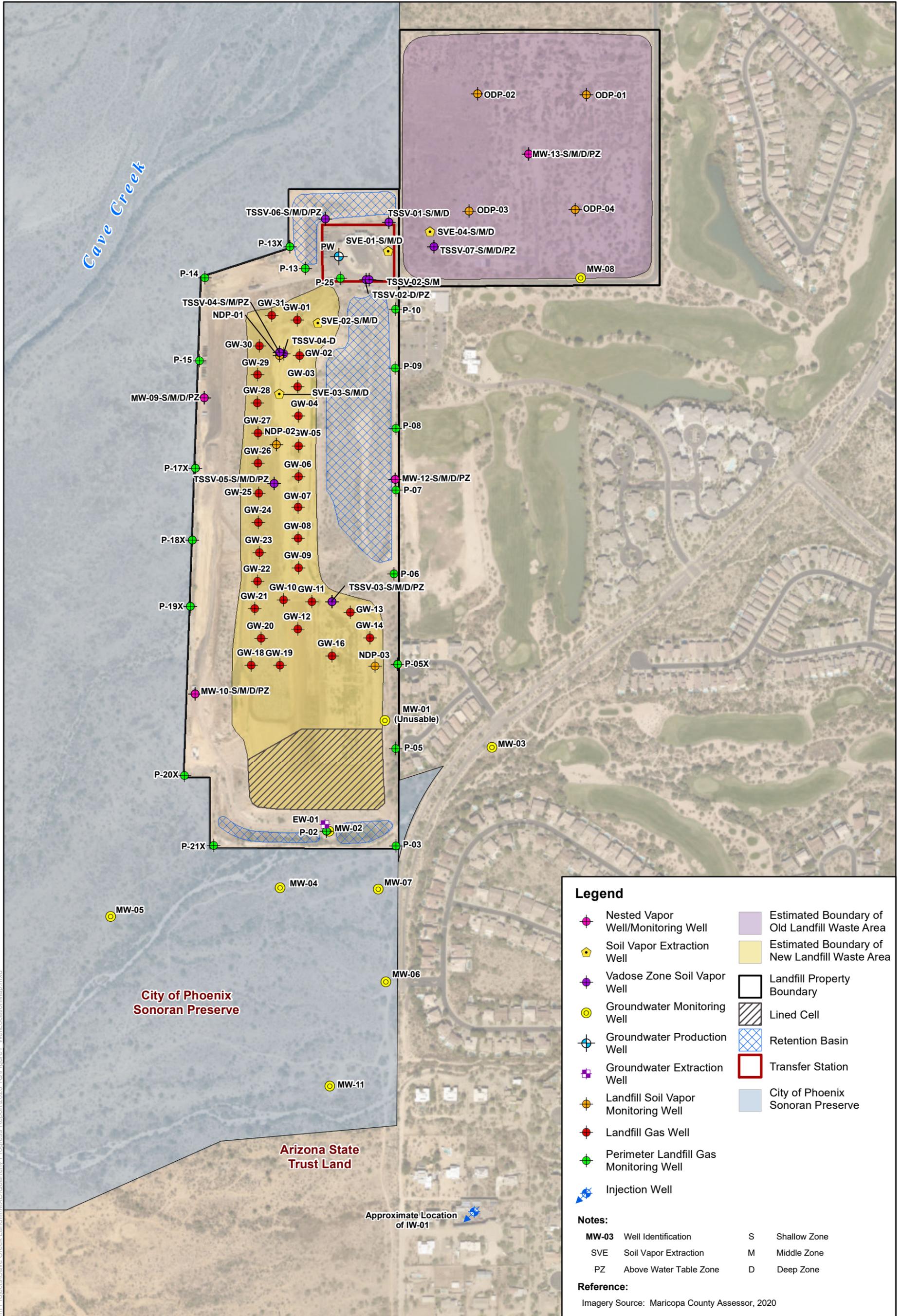
scfm - standard cubic feet per minute

YR - year

VOC - Volatile Organic Compound per Maricopa County Air Quality Department Rule 100 Section 200.113

FIGURES





Legend

	Nestled Vapor Well/Monitoring Well		Estimated Boundary of Old Landfill Waste Area
	Soil Vapor Extraction Well		Estimated Boundary of New Landfill Waste Area
	Vadose Zone Soil Vapor Well		Landfill Property Boundary
	Groundwater Monitoring Well		Lined Cell
	Groundwater Production Well		Retention Basin
	Groundwater Extraction Well		Transfer Station
	Landfill Soil Vapor Monitoring Well		City of Phoenix Sonoran Preserve
	Landfill Gas Well		
	Perimeter Landfill Gas Monitoring Well		
	Injection Well		

Notes:

MW-03	Well Identification	S	Shallow Zone
SVE	Soil Vapor Extraction	M	Middle Zone
PZ	Above Water Table Zone	D	Deep Zone

Reference:
Imagery Source: Maricopa County Assessor, 2020



Job No. 1420202004
 PM: DF
 Date: 4/14/2020
 Scale: 1" = 450'



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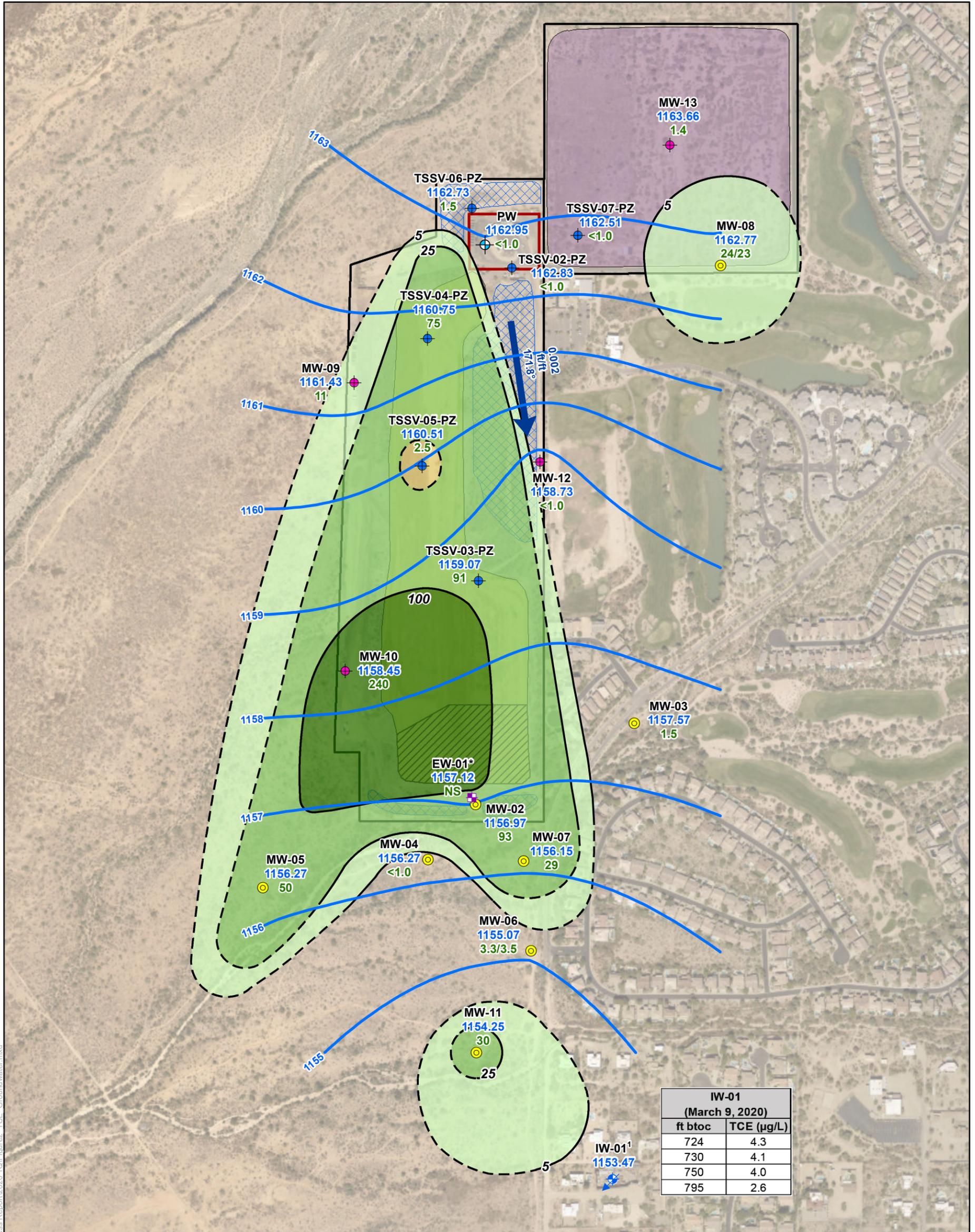
2020 1st Quarter Progress Report
 Maricopa County Cave Creek Landfill
 Phoenix, Arizona

Well Map

FIGURE
 1



Path: X:\Projects\20-Landfill\Maricopa County Cave Creek Landfill\MXD\Quarterly Progress Report\2020-1Q\Figure1 - Well Location Map.mxd



Legend

TCE Concentrations (µg/L) in Groundwater
(Dashed Where Inferred)

- 5-25
- 100-500
- 25-100
- Nested Vapor Well/
Monitoring Well
- Groundwater
Monitoring Well
- Production Well
- Groundwater
Extraction Well
- Nested Vapor Well/
Piezometer
- Injection Well

- Groundwater Elevation Contour (ft amsl) based
upon February 2020 Data
- Groundwater Flow Direction (degrees)
- Groundwater Flow Gradient (ft/ft)
- Estimated Boundary of
Old Landfill Waste Area
- Estimated Boundary of
New Landfill Waste Area
- Landfill Property
Boundaries
- Lined Cell
- Retention Basin
- Transfer Station

Notes:

- MW-07** Well Identification
- 1156.15** Groundwater Elevation (ft amsl) collected in February 2020
- 29** TCE Concentration (µg/L) collected in February 2020
- 24/23** Original/Duplicate Results
- *** EW-01 has a different screen interval and concentrations in this well are not comparable to the others on this figure.
- NS** Not Sampled
- µg/L** microgram per liter
- ft amsl** feet above mean sea level
- TCE** Trichloroethene
- 1** Groundwater elevation for IW-01 was collected during sample collection on March 9, 2020

Reference:

Imagery Source: Maricopa County Assessor, 2020

0 250 500 1,000 Feet

Job No. 1420202004
 PM: DF
 Date: 5/28/2020
 Scale: 1" = 500'

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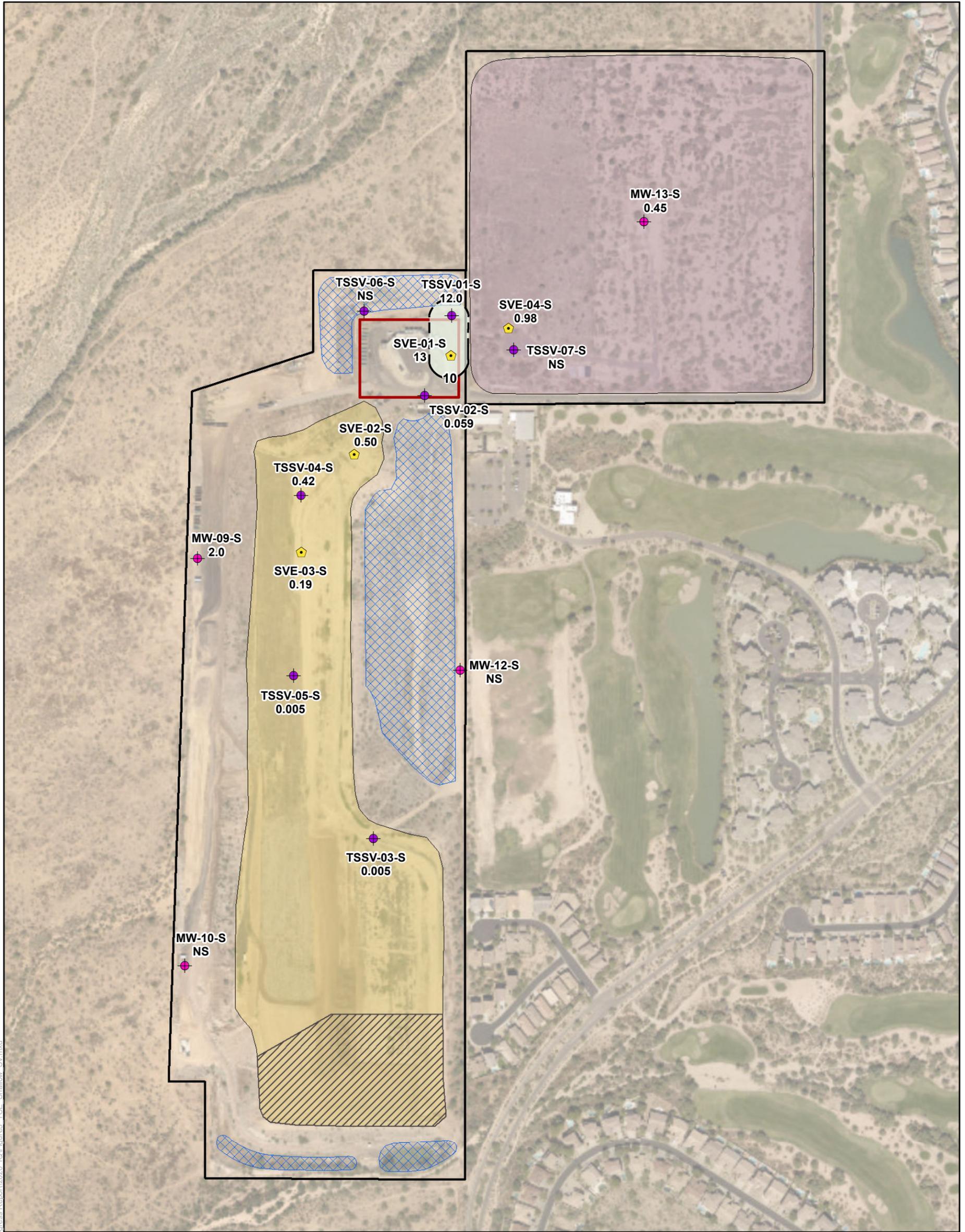
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 Maricopa County Cave Creek Landfill
 Phoenix, Arizona

Estimated Extent of TCE Plume in Groundwater
 February 2020

FIGURE
2

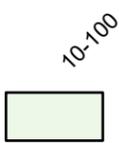


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Legend

TCE Concentrations (mg/m³) in Soil Vapor (Dashed Where Inferred)



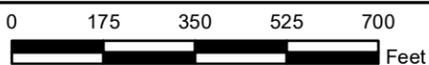
- Nested Vapor Well/Monitoring Well
- Soil Vapor Extraction Well
- Vadose Zone Soil Vapor Well
- Estimated Boundary of Old Landfill Waste Area
- Estimated Boundary of New Landfill Waste Area
- Landfill Property Boundaries
- Retention Basin
- Transfer Station
- Lined Cell

Notes:

TSSV-02-S
0.060
 Well Identification
 TCE soil gas result (mg/m³) collected March 2020
 ft amsl Feet above mean sea level
 mg/m³ Milligram per cubic meter
 NS Not Sampled
 TCE Trichloroethene
 Range of Vapor Well Screen Intervals: 1702 -1750 ft amsl

Reference:

Imagery Source: Maricopa County Assessor, 2020



Job No.: 1420202004
 PM: DF
 Date: 4/28/2020
 Scale: 1" = 350'



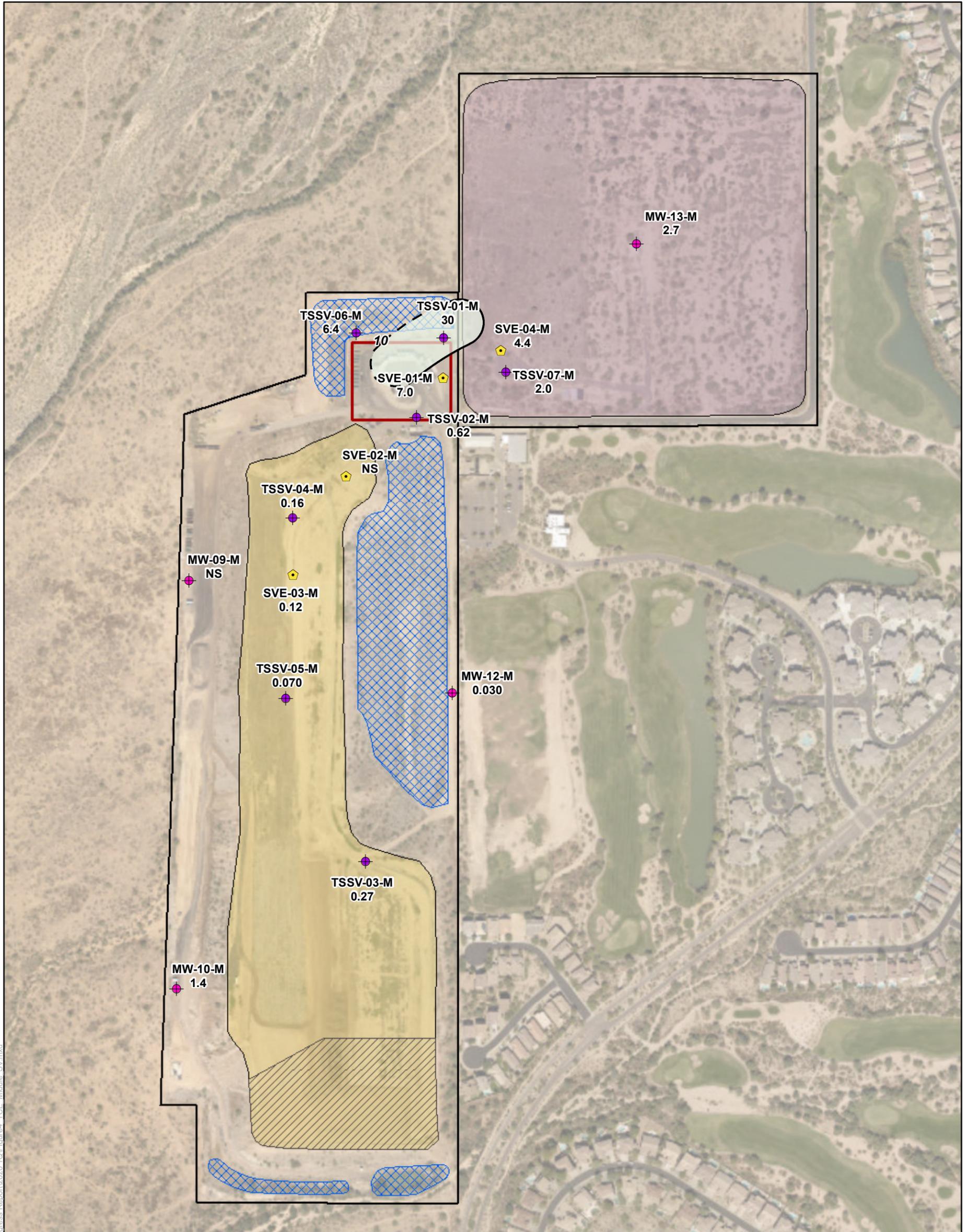
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 Maricopa County Cave Creek Landfill
 Phoenix, Arizona

**Shallow Zone TCE Soil Vapor Concentrations
 March 2020**

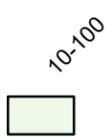
FIGURE
3





Legend

**TCE Concentrations (mg/m³) in Soil Vapor
(Dashed Where Inferred)**



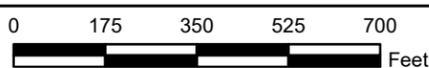
- Nested Vapor Well/Monitoring Well
- Soil Vapor Extraction Well
- Vadose Zone Soil Vapor Well
- Estimated Boundary of Old Landfill Waste Area
- Estimated Boundary of New Landfill Waste Area
- Landfill Property Boundaries
- Lined Cell
- Retention Basin
- Transfer Station

Notes:

- TSSV-07-M** Well Identification
 - 2** TCE soil gas result (mg/m³) collected March 2020
 - ft amsl Feet above mean sea level
 - mg/m³ Milligram per cubic meter
 - NS Not Sampled
 - TCE Trichloroethene
- Range of Vapor Well Screen Intervals: 1522 -1600 ft amsl

Reference:

Imagery Source: Maricopa County Assessor, 2020



Job No.: 1420202004
 PM: DF
 Date: 5/6/2020
 Scale: 1" = 350'



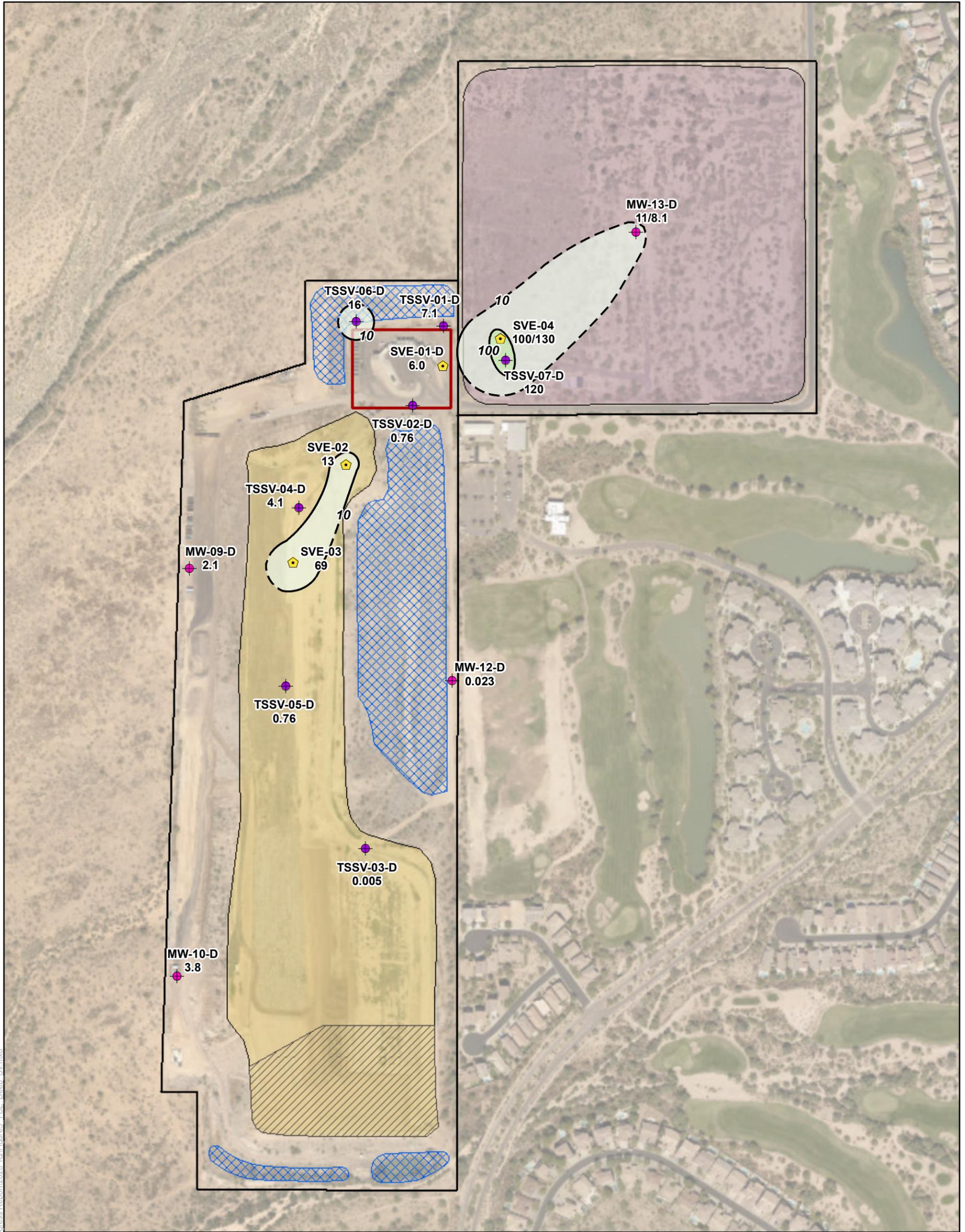
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 Maricopa County Cave Creek Landfill
 Phoenix, Arizona

**Middle Zone TCE Soil Vapor Concentrations
 March 2020**

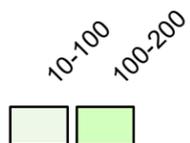
FIGURE
4





Legend

TCE Concentrations (mg/m³) in Soil Vapor
(Dashed Where Inferred)



- Nested Vapor Well/Monitoring Well
- Soil Vapor Extraction Well
- Vadose Zone Soil Vapor Well
- Estimated Boundary of Old Landfill Waste Area
- Estimated Boundary of New Landfill Waste Area
- Landfill Property Boundaries
- Lined Cell
- Retention Basin
- Transfer Station

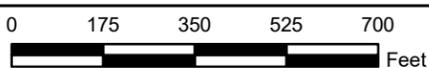
Notes:

- TSSV-01-D**
7.1 Well Identification
TCE soil gas result (mg/m³) collected March 2020
- 11/81/1**
ft amsl Duplicate Result
Feet above mean sea level
- mg/m³**
TCE Milligram per cubic meter
- Trichloroethene

Range of Vapor Well Screen Intervals: 1327-1500 ft amsl

Reference:

Imagery Source: Maricopa County Assessor, 2020



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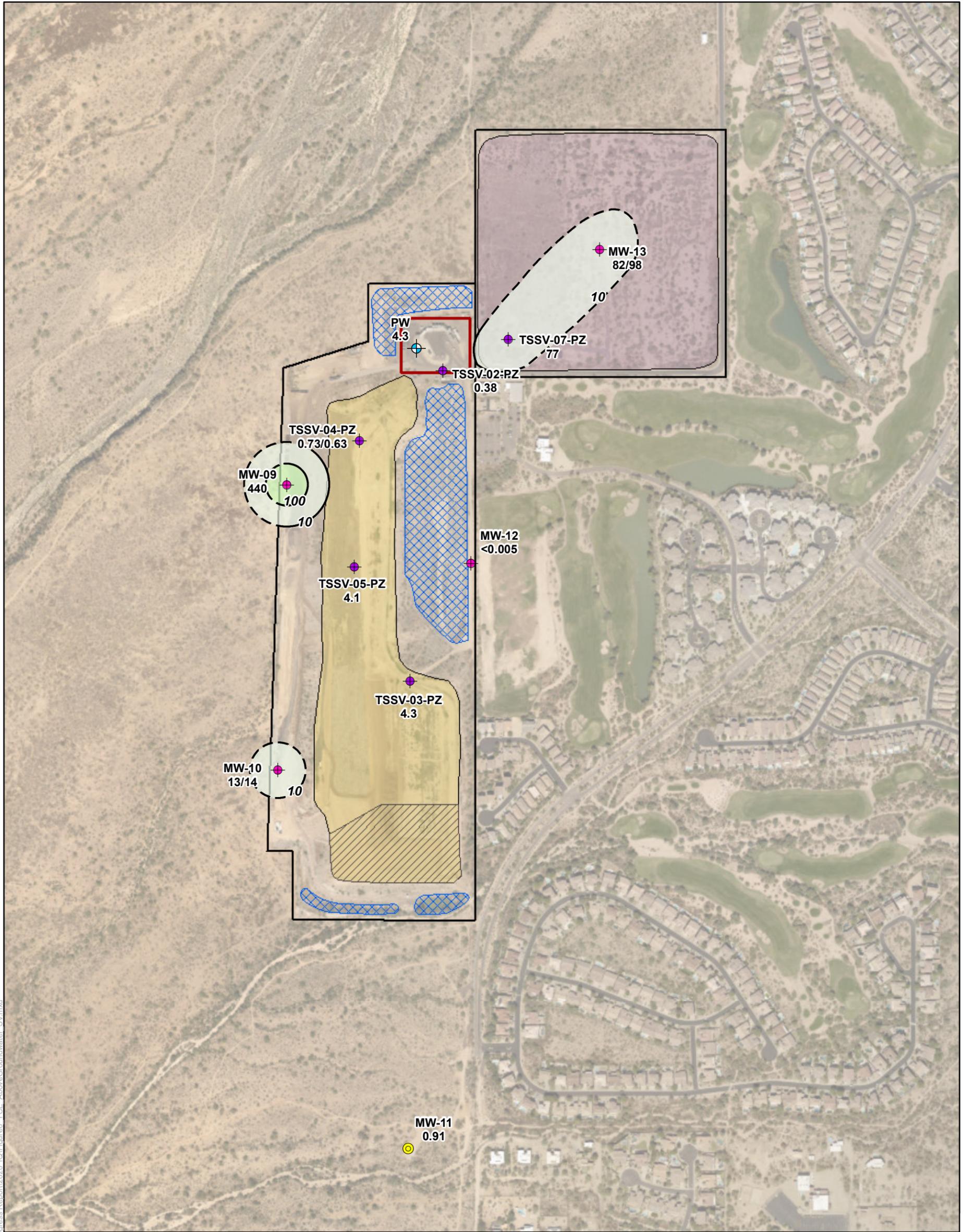
Job No.: 1420202004
PM: DF
Date: 5/7/2020
Scale: 1" = 350'

2020 1st Quarter Progress Report
Maricopa County Cave Creek Landfill
Phoenix, Arizona

Deep Zone TCE Soil Vapor Concentrations
March 2020

FIGURE
5





Path: X:\Projects\20-L-Longterm\Projects\Cave Creek Landfill\MXD\Quarterly Progress Report\2020-1Q\Figure6_TCE_AboveGroundwater_SV.mxd

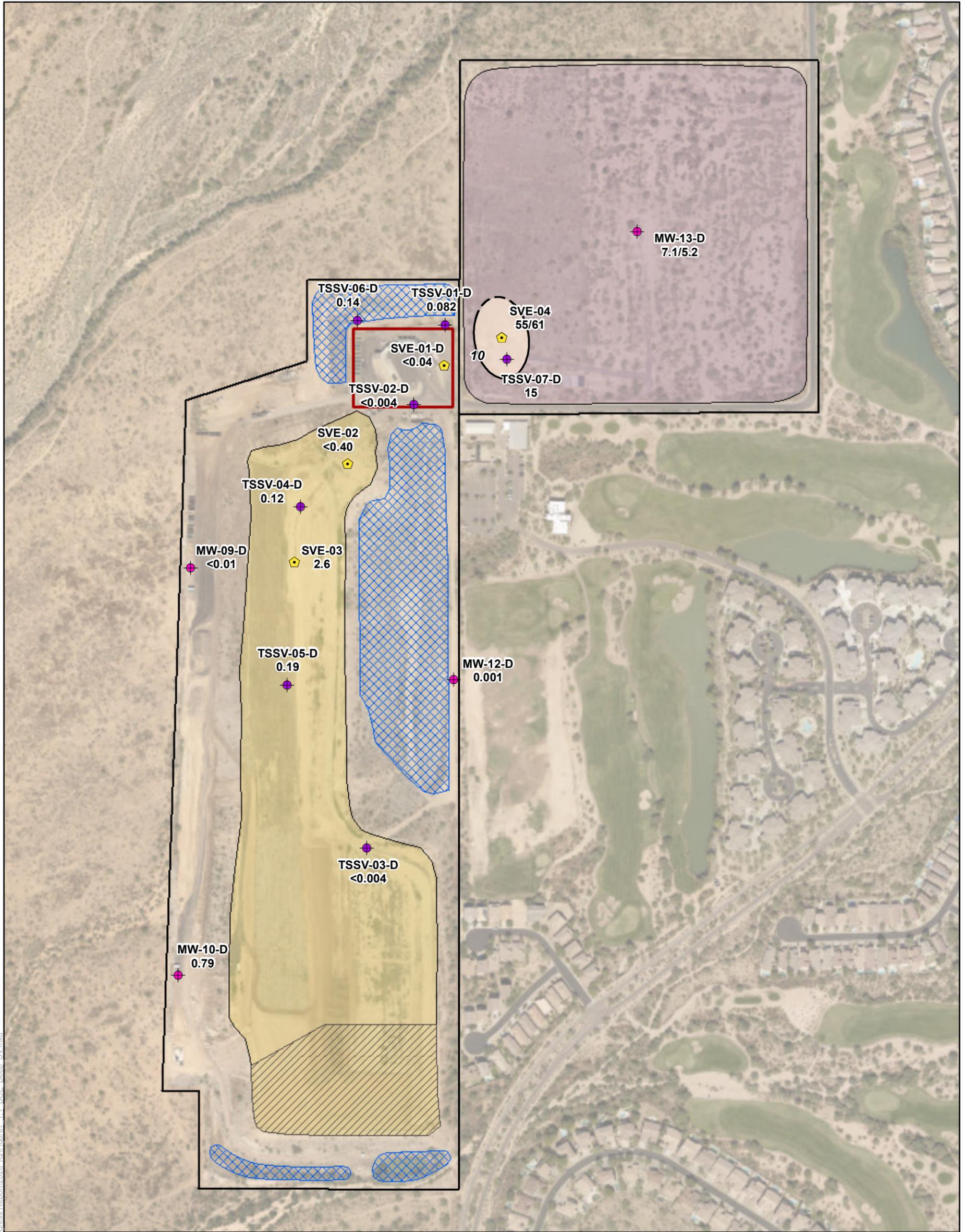
<p>Legend</p> <p>TCE Concentrations (mg/m³) in Soil Vapor (Dashed Where Inferred)</p> <p>10-100 100-500</p> <p> 10-100 100-500 </p>	<ul style="list-style-type: none"> Nested Vapor Well/Monitoring Well Deep Soil Vapor Well Groundwater Monitoring Well Production Well Estimated Boundary of Old Landfill Waste Area Estimated Boundary of New Landfill Waste Area 	<ul style="list-style-type: none"> Landfill Property Boundaries Lined Cell Retention Basin Transfer Station 	<p>Notes:</p> <p>MW-12 Well Identification</p> <p><0.005 TCE soil gas result (mg/m³) collected March 2020</p> <p>0.73/0.63 Duplicate Result</p> <p>ft amsl Feet above mean sea level</p> <p>mg/m³ Milligram per cubic meter</p> <p>NS Not Sampled</p> <p>TCE Trichloroethene</p> <p>Range of Vapor Well Screen Intervals: 1162-1201 ft amsl</p> <p>Reference:</p> <p>Imagery Source: Maricopa County Assessor, 2020</p>
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<p>0 250 500 750 1,000</p> <p>Feet</p>	<p>N</p>	<p>The map shown here has been created with all due and reasonable care and is strictly for use with Wood Environment & Infrastructure Solutions, Inc. Project Number 1420202004. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. Wood Environment & Infrastructure Solutions, Inc. assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.</p>
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<p>2020 1st Quarter Progress Report Maricopa County Cave Creek Landfill Phoenix, Arizona</p>	<p>Above Water Table TCE Soil Vapor Concentrations March 2020</p>	<p>FIGURE 6</p>
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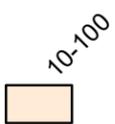


Job No.:	1420202004
PM:	DF
Date:	5/7/2020
Scale:	1" = 500'



Legend

1,1-DCE Concentrations (mg/m³) in Soil Vapor
(Dash Where Inferred)



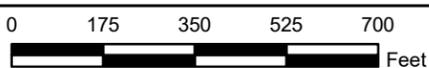
- Nested Vapor Well/Monitoring Well
- Vadose Zone Soil Vapor Well
- Soil Vapor Extraction Well
- Estimated Boundary of Old Landfill Waste Area
- Estimated Boundary of New Landfill Waste Area
- Landfill Property Boundaries
- Retention Basin
- Transfer Station
- Lined Cell

Notes:

MW-10-D Well Identification
0.79 1,1-DCE soil gas result (mg/m³) collected March 2020
7.1/5.2 Duplicate Result
 ft amsl Feet above mean sea level
 mg/m³ Milligram per cubic meter
 1,1-DCE 1,1-Dichloroethene
 Range of Vapor Well Screen Intervals: 1327-1500 ft amsl

Reference:

Imagery Source: Maricopa County Assessor, 2020



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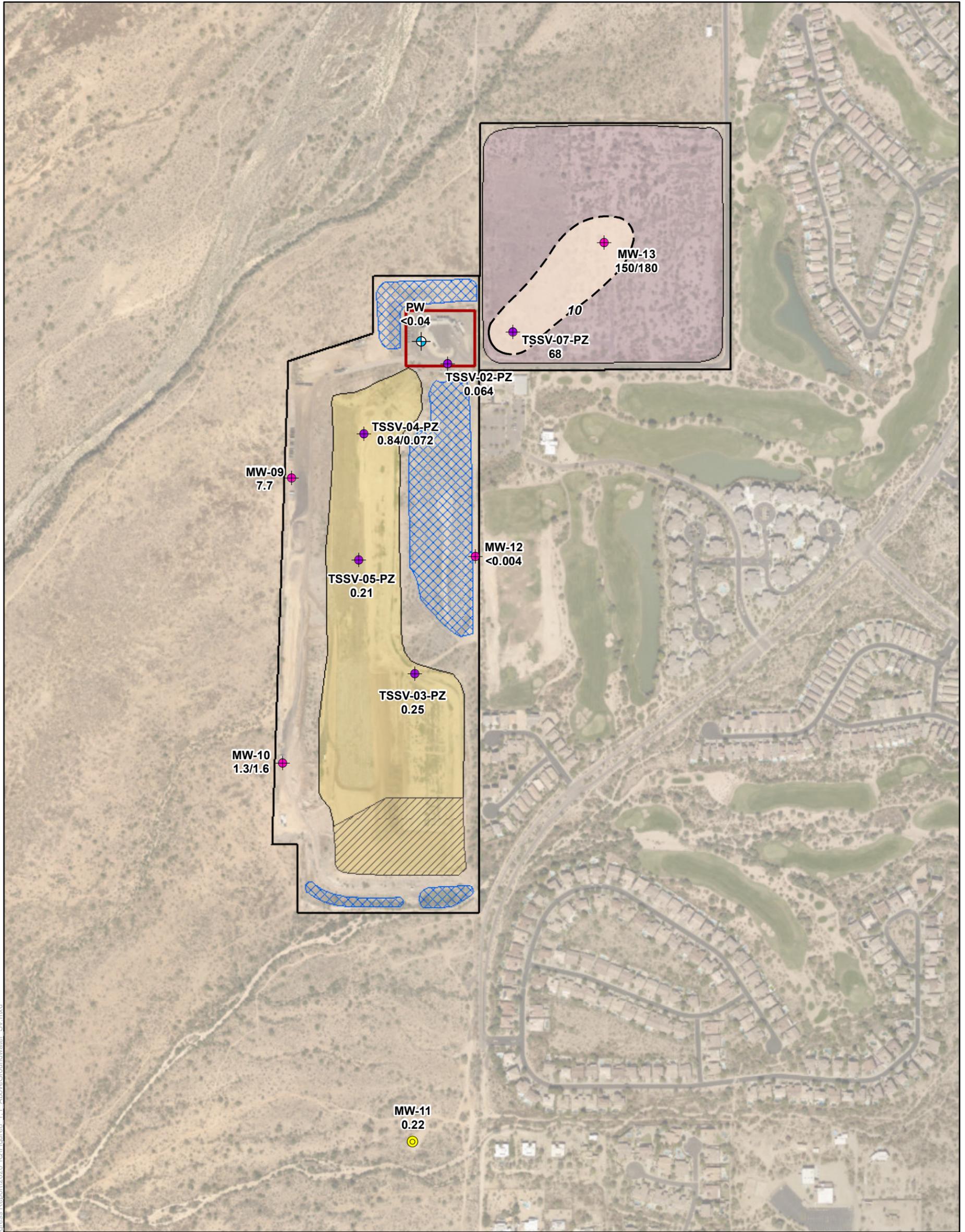
Job No.: 1420202004
 PM: DF
 Date: 5/7/2020
 Scale: 1" = 350'

2020 1st Quarter Progress Report
 Maricopa County Cave Creek Landfill
 Phoenix, Arizona

Deep Zone 1,1-DCE Soil Vapor Concentrations
March 2020

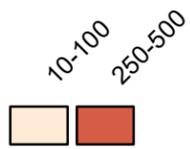
FIGURE
7





Legend

1,1-DCE Concentrations (mg/m³) in Soil Vapor
(Dash Where Inferred)



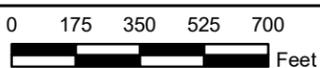
- Nested Vapor Well/Monitoring Well
- Vadoso Zone Soil Vapor Well
- Estimated Boundary of Old Landfill Waste Area
- Estimated Boundary of New Landfill Waste Area
- Landfill Property Boundaries
- Monitoring Well
- Production Well
- Lined Cell
- Retention Basin
- Transfer Station

Notes:

MW-12 Well Identification
<0.004 1,1-DCE soil gas result (mg/m³) collected March 2020
55/61 Duplicate Result
 ft amsl Feet above mean sea level
 mg/m³ Milligram per cubic meter
 1,1-DCE 1,1-Dichloroethene
 Range of Vapor Well Screen Intervals: 1327-1500 ft amsl

Reference:

Imagery Source: Maricopa County Assessor, 2020



Job No.: 1420202004
 PM: DF
 Date: 5/7/2020
 Scale: 1" = 350'



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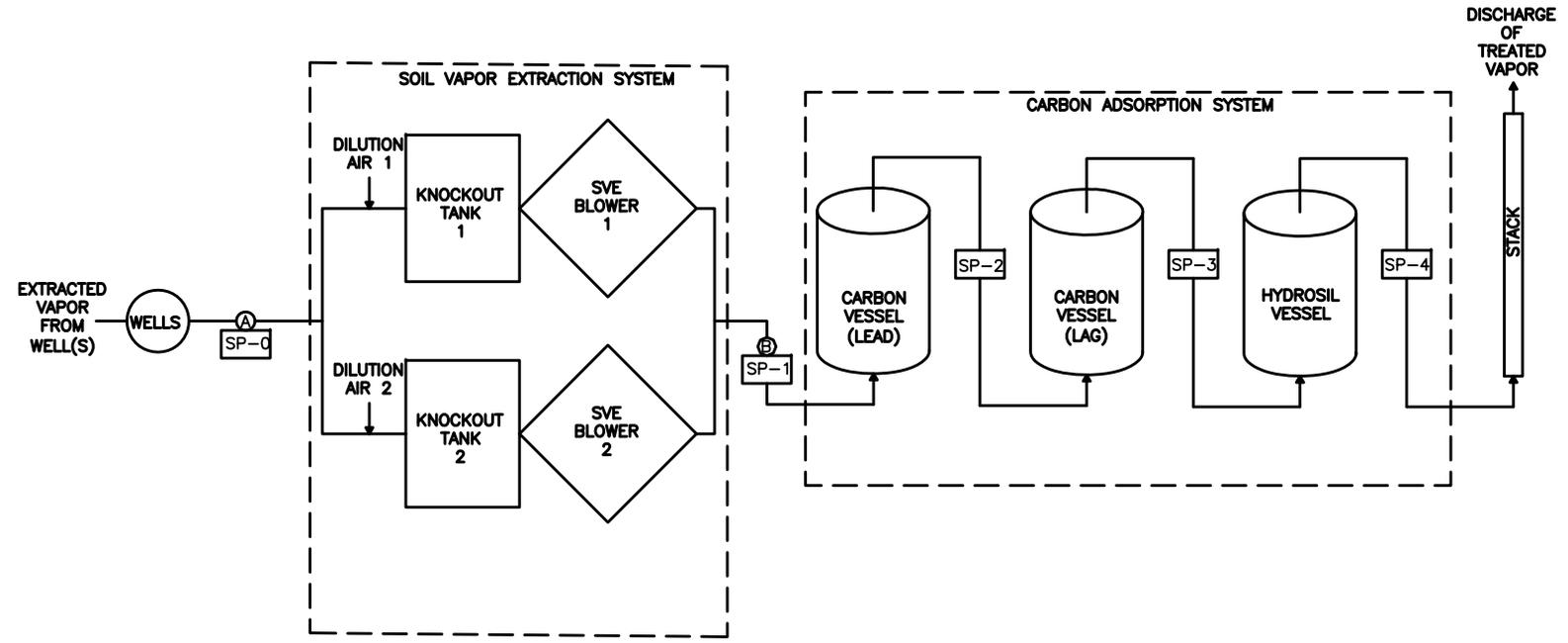
2020 1st Quarter Progress Report
 Maricopa County Cave Creek Landfill
 Phoenix, Arizona

**Above Water Table 1,1-DCE
 Soil Vapor Concentrations March 2020**

FIGURE
8



PRESSURE FLOW THROUGH CARBON ADSORPTION SYSTEM

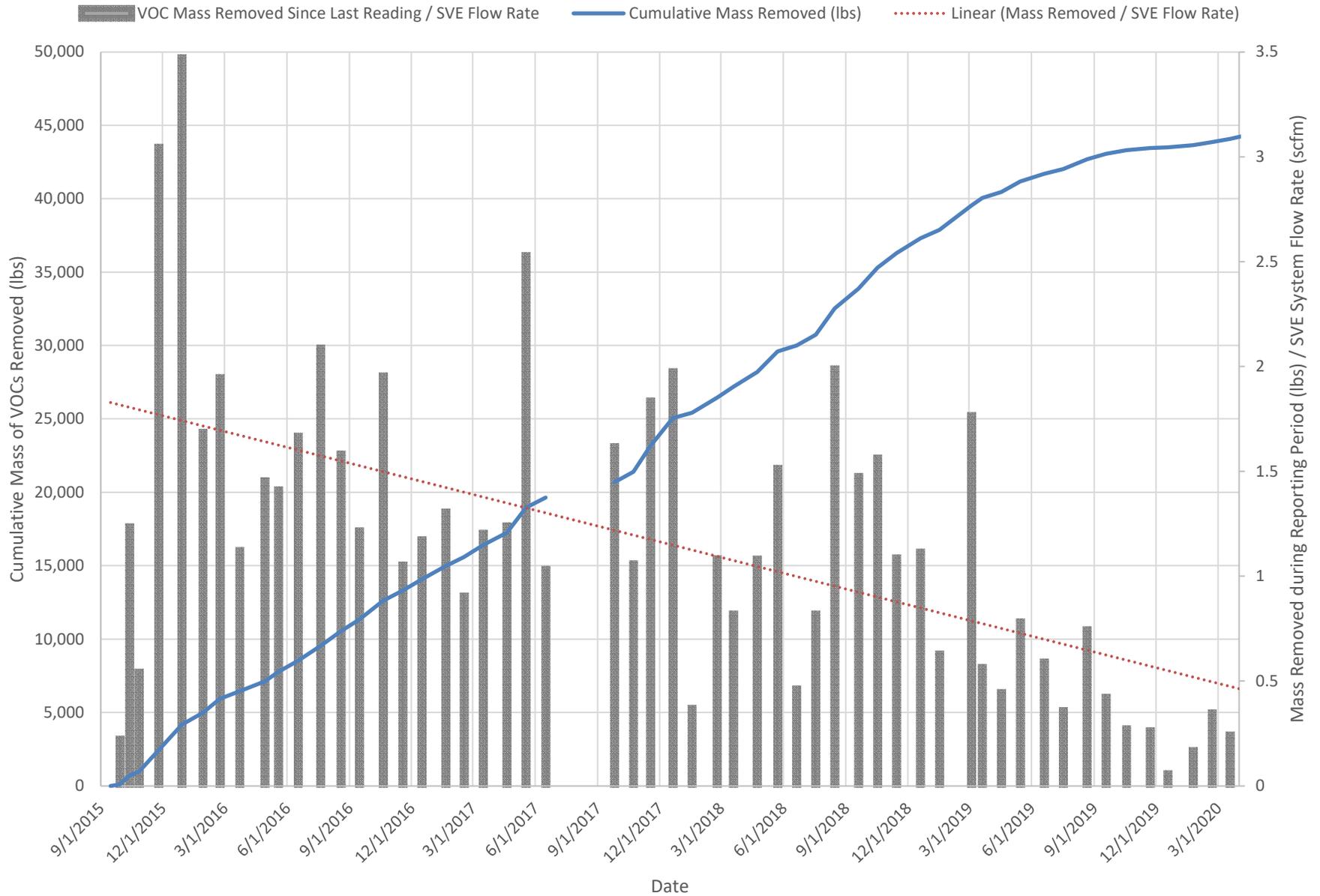


LEGEND

- (A) SYSTEM FLOW MEASUREMENT (PRE-DILUTION LOCATION)
- (B) SYSTEM FLOW MEASUREMENT (POST-DILUTION LOCATION)
- SP-0 SYSTEM INLET SAMPLE LOCATION
- SP-1 CAS INLET SAMPLE LOCATION
- SP-2 CAS LEAD VESSEL OUTLET SAMPLE LOCATION
- SP-3 CAS LAG VESSEL OUTLET SAMPLE LOCATION
- SP-4 CAS OUTLET SAMPLE LOCATION

CLIENT						MARICOPA COUNTY					
PROJECT						CAVE CREEK LANDFILL					
TITLE						SVE SYSTEM PROCESS FLOW DIAGRAM - PRESSURE FLOW					
DESIGNED BY	BJN	CHECKED BY	AY	DATE	ISSUED FOR						
DRAWN BY	BJN	APPROVED BY	NC	11/15/18	FINAL						
FILENAME		FIGURE No.		REV	PROJECT NO.						
FIGURE 9		9		1	14-2017-2034						

Figure 10. Mass Removal of VOCs - through March 2020



APPENDIX A

Cave Creek Landfill Progress Schedule



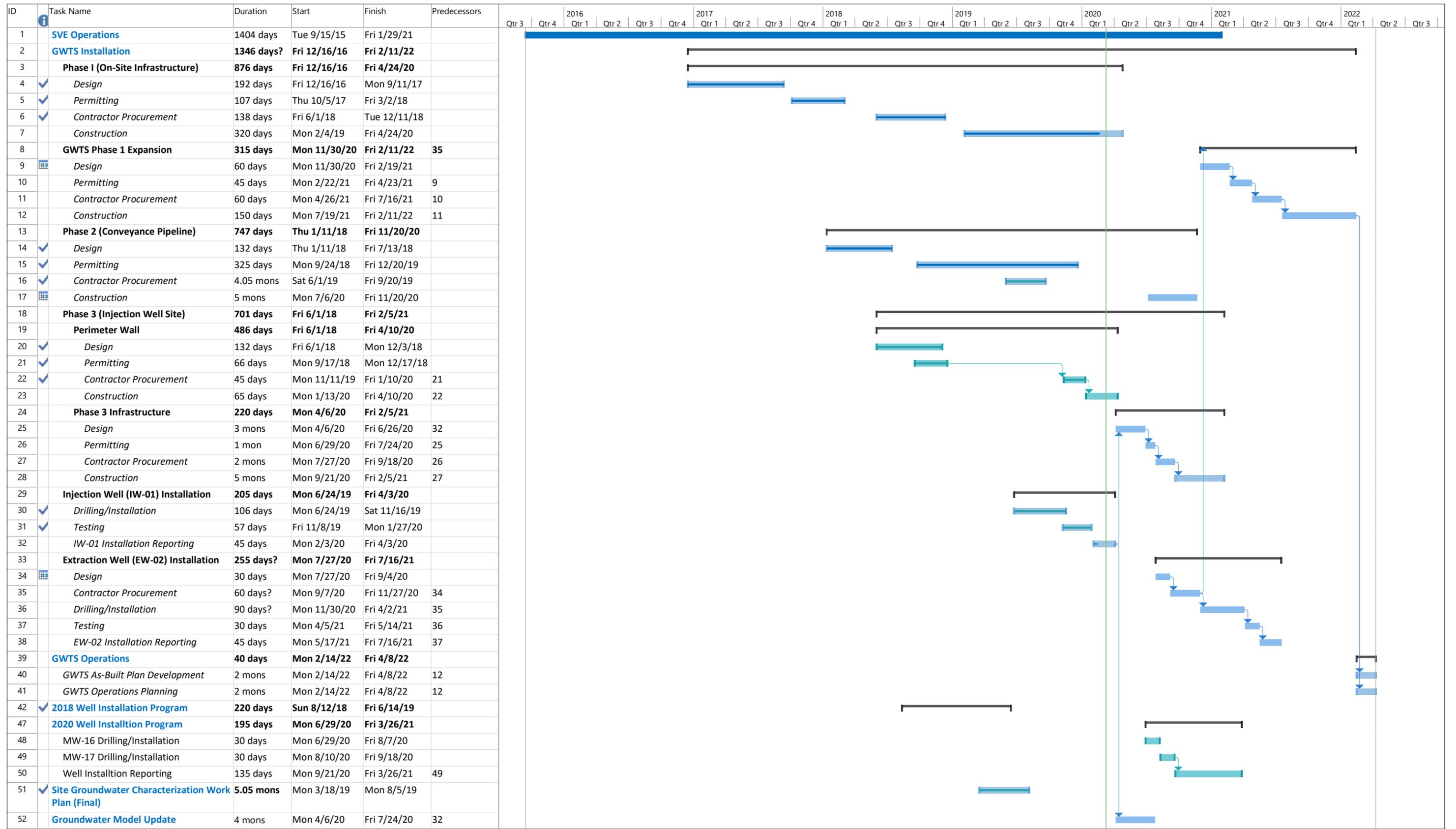
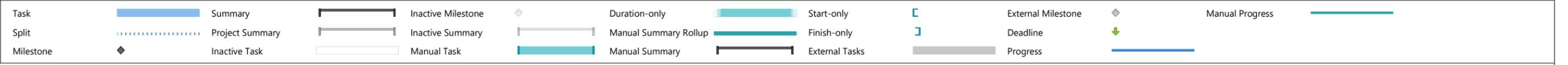


EXHIBIT 1
 CCL Project Progress Schedule
 Date: Mon 3/9/20



APPENDIX B

**Laboratory Reports of Analysis
(Not included in this Draft Final submittal)**

