

Sampling and Analysis Plan

For:
SGMP Confirmation Soil Sampling
Cleanup Grant for Symphony Park
Parcels J and K
Las Vegas, Clark County, Nevada

Prepared For:

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September 2026

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ABBREVIATIONS AND ACRONYMS

ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Response, Cleanup, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract laboratory program
CLV	City of Las Vegas
CWA	Clean Water Act
DQA	Data quality assessment
DQI	Data quality indicators
DQO	Data quality objectives
EPA	U.S. Environmental Protection Agency
ESA	Environmental site assessment
ESL	Environmental Screening Levels
FSP	Field sampling plan
GC/MS	Gas chromatography and mass spectrometry
IDW	Investigation-derived waste
LCS	Laboratory control sample
MDL	Method detection limit
MQO	Measurement quality objective
MS/MSD	Matrix spike and matrix spike duplicate
mg/L	Milligrams per liter
µg/L	Micrograms per liter
NDEP	Nevada Division of Environmental Protection
PARCCS	Precision, accuracy, representativeness, completeness, comparability, and sensitivity
PE	Performance Evaluation
QA	Quality assurance
QA/QC	Quality assurance/quality control
QAPP	Quality assurance project plan
QC	Quality control
QL	Quantitation limit
RCRA	Resource Conservation and Recovery Act
REC	Recognized environmental condition
RPD	Relative percent difference
RSL	Regional Screening Level
%R	Percent recovery
SAP	Sampling and analysis plan
SOP	Standard operating procedure
SOW	Statement of work
SVOC	Semi-volatile organic compounds
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
VOC	Volatile organic compounds

1.0 INTRODUCTION

1.1 *Site History*

This SAP has been developed in conjunction with the CLV Cleanup Grant for Symphony Park, QAPP. The QAPP was fully approved by the EPA on October 1, 2025 [EPA R9/QA DCN: FY25BNFD_450]. As noted in the approved QAPP, the reason there is additional soil sampling as part of a cleanup grant is a result of the site being closed by NDEP with a provision that each site that is developed requires soil sampling to refine the location of impacts and then remove impacts that are encountered during development. Additional evaluation of impacts outside of development areas is not required. The soil sampling effort will consist of confirmation soil sampling to provide the remediation contractor with data to design their excavation plan.

The “Site” is defined herein as Clark County Assessor Parcel Number (APN) 139-33-610-028, located at 505 Robin Leach Lane in Las Vegas, Clark County, Nevada. The Site location is shown on Plate 1 (Appendix A). The Parcel designations J and K are specific to parcels within Symphony Park. Occupying 61 acres in downtown Las Vegas, Symphony Park is the city's premier development that is home to arts, culture, science, and medicine. It offers one of the city's most exciting and prime opportunities for retail, restaurant, or mixed-use development.

Symphony Park was formerly a part of a Union Pacific Railroad (UPRR) facility that contained locomotive fueling, service, repair, and cleaning areas. During approximately 70 years of UPRR operations at the site, multiple releases of petroleum product, organic and inorganic compounds, and metals occurred. Some remediation occurred, but after an agreement between the NDEP and UPRR, areas remain that are potentially impacted by petroleum hydrocarbons, volatile organic compounds (VOC), semi-volatile organic compounds (SVOC), polychlorinated biphenyls (PCB), and/or metals.

The purpose of the Phase II Environmental Site Assessment (ESA) is to assess if impacts from previous UPRR operations remain in areas where development activities will potentially encounter such impacts. These impacts will need to be removed (remediated) prior to development of Parcels J and K so that redevelopment of these Parcels can proceed with limited impediment from encountering contamination. At this time, the western portion of the Site is planned to be developed with a 100,000 square foot medical office with the remainder planned for parking and as yet undetermined use.

1.2 *Site Name or Sampling Area*

The sampling areas for this investigation are shown on Plate 1. Parcels J and K at Symphony Park will be referred to as the “Site” throughout this report.

1.3 Site or Sampling Area Location

The Site is located at 505 Robin Leach Lane in Las Vegas, Nevada. The Site is currently vacant and unpaved. The Site location and sampling areas are shown on Plate 1.

1.4 Responsible Organization

The United States Environmental Protection Agency (EPA) awarded the CLV a Brownfields Cleanup grant (BF-98T69401) to address remediation and clean-up needs on combined Parcels J and K and combined Parcels L North and M4 in Symphony Park, Las Vegas, Nevada (this SAP is for Parcels J and K only). The Grant is being administered by the CLV. The NDEP will be the lead agency that will oversee the confirmation sampling and cleanup efforts.

To assist the CLV in performing the work required for the Grant, the CLV has contracted with the environmental consulting firm of Converse Consultants (Converse). Converse answers directly to the CLV through Ms. Tracy Reich. For additional information on organizational roles and responsibilities, please refer to Section A8 of the approved QAPP.

1.5 Project Organization

The following personnel will be the contact points for this project:

Key Project Personnel Contact Information and Responsibilities

Title	Name	Phone Number Email Address	Responsibilities
EPA Project Manager	Stephanie Steinbrecher	415-947-4256 steinbrecher.stephanie@epa.gov	SAP review, communications with grantee
EPA Quality Assurance Officer (QAO)	Audrey L. Johnson	johnson.audreyL@epa.gov	SAP review, quality assurance, quality control
NDEP Project Manager	David Friedman	dfriedman@ndep.nv.gov	Oversight of sampling and cleanup
Grantee Project Manager	Tracy Reich City of Las Vegas	702-229-2083 treich@LasVegasNevada.gov	Coordination with EPA project manager, property owner, and consultant
Contractor Project Manager	Robert Gegenheimer Converse Consultants	702-269-8336, ext. 2035 robkg@converseconsultants.com	Primary decision maker. Coordination with grantee and field team leader.
Contractor QAO	Tom Mix Converse Consultants	tmix@converseconsultants.com	Sr. review, quality assurance, quality control

Title	Name	Phone Number Email Address	Responsibilities
Contractor Field Team Leader	TBD Converse Consultants	702-269-8336	Coordinate and oversee field activities
Laboratory Quality Assurance Officer	Veritas Laboratories	702-321-8315 Bruce Cunningham	Quality assurance and quality control (laboratory testing)

2.0 BACKGROUND

2.1 Site or Sampling Area Description

The sampling areas for this investigation are as follows (see Plate 1):

- various locations within the development footprint on Parcel J
- various locations within the development footprint on Parcel K

These locations were determined based on the requirements of the SAP that is part of the overall Soil and Groundwater Management Plan (SGMP) that applies to all of Symphony Park (a copy of the SGMP is included in Appendix B). The SAP outlines the requirements for collecting samples in association with site development. Requirements for groundwater sampling are not specifically outlined as that is deemed dependent upon site development activities. Two options are provided for soil sampling. Soil sampling can be collected from stockpiled soil as site development occurs or they can be collected prior to development. This second option, termed Pre-excavation Soil Sampling (now required by the CLV due to space limitations at Symphony Park), provides details regarding how many sample locations are required and how many samples must be collected per location. The number of samples required for each pre-excavation sampling event will be based on the footprint of the excavation and the amount of soil to be removed (i.e., depth of planned excavation).

The Site occupies approximately 4.82 acres in downtown Las Vegas. It is bordered to the north by Robin Leach Lane followed by the Smith Center for the Performing Arts and a multi-story parking structure owned by the CLV, to the east by the Union Pacific Railroad tracks, to the south by West Bonneville Avenue followed by the Clark County Government Building, and to the west by Promenade Place followed by the Keep Memory Alive Event Center. The Site is located at an approximate latitude of 36 degrees 10'02"N and an approximate longitude of 115 degrees 09'56"W.

2.2 Operational History

The entire 61 acres of Symphony Park was part of UPRR's fueling and maintenance yard for over 70 years. Operations began in the early 1900s and the yard consisted of locomotive fueling, service, repair and cleaning activities. The UPRR yard was also used for material storage. Locomotive fueling and maintenance continued at the site until 1991. Parcels J and K are currently undeveloped and vacant and are located on the southern

border of Symphony Park. They were part of the former UPRR fuel storage area that included two aboveground storage tanks, a pump house, railroad siding tracks, and a portion of a fuel car loading area. By 1990, most of the last remnants of the UPRR site development were gone and they were completely gone from these parcels by the mid-1990s. From the mid-1990s until the mid-2000s, Parcels J and K were unused vacant lots and after that they were varyingly used for parking and/or storage related to the development of other parcels at Symphony Park.

2.3 Previous Investigation/Remedial Efforts and Regulatory Involvement

Parcels J and K are located in an area formerly occupied by the Fuel Storage Area of the UPRR Yard. Multiple investigative activities occurred at Symphony Park (including Parcels J and K) during the 1980s. The primary contaminant in the Fuel Storage Area is total petroleum hydrocarbons (TPH). TPH concentrations as high as 60,000 milligrams per Kilogram (mg/Kg) were historically identified in this area during previous investigations. Other contaminants of concern identified during historical investigations included toluene (up to 2,000 mg/Kg), chromium (up to 1,060 mg/Kg), and lead (up to 2,330 mg/Kg). In addition, relatively low concentrations of benzene (up to 1 microgram per Liter (ug/L)) and ethylbenzene (up to 2 ug/L) were detected in groundwater.

Remediation of the UPRR site began in 1992. Remediation occurred in specific areas across Symphony Park based on the results of previous site investigation activities. The NDEP approved a remedial action plan and Union Pacific negotiated site cleanup standards with the NDEP. These were as follows:

- Removal of all TPH impacted soil at concentrations exceeding 100 mg/Kg from ground surface to 2.5 feet below ground surface
- Removal of all TPH impacted soil exceeding 10,000 mg/Kg regardless of depth
- Having responsibility for all TPH impacted soil exceeding 100 mg/Kg that would be encountered during site development activities
- Removal of all lead-impacted soil in excess of 1,400 mg/Kg
- Recovery of free phased petroleum product on the groundwater to less than ½-inch in thickness

These were the previously negotiated remedial goals between the NDEP and UPRR and are provided to aid in the understanding of the Site history. These are not specific to this effort as our work will only involve characterizing soil (SGMP confirmation sampling) that will be encountered during redevelopment of the Site for the purpose of ensuring it is disposed of properly.

It is noteworthy that UPRR only remediated lighter end petroleum hydrocarbons, so heavier end hydrocarbons may be present even in areas previously remediated as the treated fill was used to backfill the remedial excavations. Treated fill has been agreed

upon by the NDEP and the CLV to be designated “legally clean” based on the no further action determination issued to UPRR in 1998. Results of groundwater monitoring at Symphony Park indicated that, as of 2000, limited (less than ½-inch in thickness) free product remained at the overall Symphony Park site.

A large portion of Parcel J and approximately half of Parcel K are located outside of the UPRR remediation area. Areas in the former UPRR remediation at these parcels are depicted on Plate 1. According to a final closure report submitted in 1997, approximately 103,000 tons of TPH impacted soil were removed from the Fuel Storage Area. Most of the remaining impacts at Parcel J are in the northern and eastern portions of the parcel with a small amount remaining in the southwest corner and are mostly expected to occur at depths from 5 to 7.5 feet. Remaining impacts at Parcel K are located throughout the central and northwestern portions of the parcel and are expected to occur at depths from 2.5 to 5 feet. While large portions of Parcels J and K are outside of the UPRR remediation area, any impacts encountered in those areas during development must be handled pursuant to the SGMP. For the purposes of this SAP, areas outside of the UPRR remediation area will not be evaluated. Contaminants of concern known and/or suspected to be encountered at Parcels J and K are TPH, VOCs, and SVOCs.

The above information is provided to give a framework for what is anticipated to be encountered based on historical assessment activities. This information will not dictate the proposed scope of work provided herein. Even though historical information indicates impacts are expected to occur at certain depths, the SGMP requires we evaluate soil conditions to the full depth of planned excavation for site redevelopment.

2.4 Scoping Meeting

Converse has had discussions with the CLV (site owner and grantee manager) regarding the proposed scope of the confirmation soil sampling. As noted, the purpose of sampling is to refine the locations that need excavation/cleanup, confirmation sampling, and waste characterization for disposal. This is considered adequate for the purpose of this effort.

2.5 Geological and/or Meteorological Information

The Las Vegas Valley is filled with Quaternary and Tertiary aged sediments. The valley sediments are alluvial and playa deposits surrounded by alluvial aprons derived from erosion of the mountains that surround the valley. Near surface soil in the area of the Site consists of fill from prior UPRR remediation efforts, which are typically silty and sandy gravel. Native soil is expected to consist of clay with interlayered clayey sand, silty sand, and clayey gravel. Cemented layers known as caliche are anticipated to be present at varying depths.

Annual precipitation in this area ranges from approximately 4 to 4.5 inches.

2.6 Impact on Human Health and/or The Environment

The NDEP closed the active case associated with the UPRR site that formerly occupied Symphony Park. This closure was based on a number of factors, including the potential risks to the environment and human health. The conditions discussed in Section 2.3 were part of the closure, which required future developers to handle impacted material appropriately. In addition, each individual developer at Symphony Park is required to evaluate environmental and human health impact via a Human Health Risk Assessment (HHRA).

Further investigation is required to confirm where impacts will be encountered during planned development of the Site. In this case, prior to development of the Site, it is planned to remediate the impacts identified during this soil sampling event. This will allow for limited impediment related to site development and make the Site more attractive to a developer. Ultimately, the data collected as a part of this effort and other historical data will be used in conjunction with site development plans to develop an HHRA for the Site.

3.0 PROJECT DATA QUALITY OBJECTIVES

3.1 Project Task and Problem Definition

The purpose of this investigation is to assess potential impacts at the Site such that they can be remediated prior to site development. Currently, the only planned use is as a 100,000 square foot medical office with the remainder planned for parking. This would be located primarily in the western portion of Parcel J. This investigation will focus on the former UPRR remediation areas as full development plans are not yet available. Areas outside of the UPRR remediation boundaries will not be assessed as a part of this investigation. Since the exact development plans are not known, a larger area will be assessed than may be required by the SAP that is a part of the Symphony Park SGMP.

Soil samples will be collected during this effort. Soil samples will be screened in the field using a PID for the full length of the split spoon once accessible (split spoon opened). If the PID detects elevated readings for VOC, we will collect additional samples notating the depth and boring from which the additional sample is collected (see Section 6.2).

3.2 Data Quality Objectives (DQOs)

The DQOs for this investigation are to provide valid data of known and documented quality. Specific DQOs in terms of accuracy, precision, completeness, representativeness, and comparability are discussed in detail in the approved QAPP. The accuracy of the field screening measurements will be measured by routine analysis of field standards and by comparison of field screening data with laboratory results. Table 3-1 lists the types of data that will be generated during field screening.

Table 3-1 Specific Data Reporting Limits
Matrix = Soil

Parameter	Units
Metals	mg/Kg
TPH	mg/Kg
VOCs in soil by PID	ppmv
VOCs and SVOCs in soil by laboratory	µg/Kg

TPH Total petroleum hydrocarbons
VOCs Volatile organic compounds
SVOCs Semi-volatile organic compounds
mg/Kg milligrams per kilogram
µg/Kg micrograms per kilogram
ppmv parts per million by volume

Table 3-2 table details the major analytes of concern and their corresponding action limits and laboratory method reporting limits.

Table 3-2 COPC, Laboratory Reporting Limits and Action Levels
Matrix = Soil

Parameter	Test Procedure	Action Level (RSL)	Reporting Limit*
Soil			
Volatile Organic Compounds (VOC)	EPA Method 5035/8260B	EPA Region 9 RSLs ⁴	See Appendix D
Semi-Volatile Organic Compounds (SVOCs)	EPA Method 8270C Selection Ion Monitoring (SIM)	EPA Region 9 RSLs	See Appendix D
TPH (Volatiles, Gasoline Range)	EPA Method 8015 (Modified) or TNRCC 1005	100 mg/kg ³	10 mg/kg
TPH (Extractable, Diesel Range)		100 mg/kg ³	20 mg/kg
TPH (Extractable, Oil Range)		100 mg/kg ³	20 mg/kg
Metals ¹	EPA Method 6010B		
Arsenic		15 mg/kg ²	3 mg/kg
Lead		200 mg/kg	1.5 mg/kg
Silver		39 mg/kg	0.5 mg/kg
Barium		1,500 mg/kg	0.3 mg/kg
Cadmium		0.71 mg/kg	0.3 mg/kg
Chromium		180,000 ⁵	0.5 mg/kg
Selenium		39	5 mg/kg

COPC Chemicals of potential concern
RC State reportable concentration
RSL Regional screening level (EPA Region 9)
TPH Total Petroleum Hydrocarbons
VOCs Volatile organic compounds
SVOCs Semi-volatile organic compounds
SIM Select Ion Monitoring
mg/Kg milligrams per Kilogram

* Where possible, all reporting limits will be below a regulatory reporting level. The reporting limits listed were provided by Veritas Laboratories or Asset Laboratories for SVOCs. The laboratory method detection limits and reporting limits are included in Appendix D. Asset Laboratories will be subcontracted to Veritas Laboratories to conduct SVOC analysis.

- ¹ If a metal(s) concentration exceeding an action level is reported in a sample(s), then the sample with the highest reported metal(s) concentration will be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) by EPA Method 1311 to evaluate leaching potential.
- ² A site specific action level for arsenic has been developed for Symphony Park and is used in the Symphony Park SGMP.
- ³ TPH does not have a specific action level with respect to Symphony Park; however, the specified concentration will be pertinent for soil handling and disposal purposes. The individual components are considered the COPCs with respect to handling of excavated soil per the SGMP.
- ⁴ The approved SGMP for Symphony Park, which has been used on multiple prior site development projects, specifies use of EPA RSLs (residential) in evaluating options for disposal of excavated soil during property redevelopment. The RSLs that will be used are from the November 2024 THQ 0.1 table.
- ⁵ Represents NDEP Reportable Concentration, which is based on the MCL-based SSL from the RSLs THQ 0.1 table.

3.3 Measurement Quality Objectives (MQOs)

MQOs are criteria established to assess the usability of data. These are for field and laboratory protocols to evaluate if the DQIs for PARCCS. Further, it is to evaluate if the DQIs meet the criteria established for the aspects of sampling and analysis. DQIs are covered in Section A6.3 of the approved QAPP. It should be noted that the QAPP serves as an umbrella document, but the established Symphony Park SGMP will be applied as the primary guidance document. Sampling design strategies will be used as guides to evaluate factors unique to a site, including redevelopment options, exposure potential, and projected site reuse. Assessment will be conducted pursuant to this SAP while adhering to the requirements of developing an SAP pursuant to the SGMP. The laboratory method detection limits and method reporting limits are provided in Appendix D.

Indicator	Matrix	Method/Parameter	Acceptance Criteria
Precision	Soil/Water	Field Duplicates	30% RPD (Soil) 20% RPD (Water)
Precision	Soil/Water	Lab Duplicate/MSD	20% RPD
Accuracy	Soil/Water	MS	75%-125% Recovery
Accuracy	Soil/Water	LCS	80%-130% Recovery
Accuracy	Water	Surrogate Spikes	70%-130% Recovery
Accuracy	All	Equipment Blank	< MDL
Accuracy	All	Trip Blank	< MDL
Completeness	All	All Samples	90% Valid Data Points
Sensitivity	Soil/Water	All Parameters	PALs

Note: In some instances the acceptance criteria may be method-specific.

RPD = Relative Percent Difference

MSD = Matrix Spike Duplicate

MS = Matrix Spike

LCS = Laboratory Control Sample

Method Detection Limit

Project Action Levels

3.4 Data Review and Validation

A tiered approach has been adopted by EPA Region 9 for data review. In general, these are:

- Tier 1: A cursory review of the QC data. At a minimum, all data should receive a Tier 1 review.
- Tier 2: Involves select validation based on factors defined in the DQOs for this project. This may be evaluation of data from a specific sampling area, of certain analytes, of decision making, or another factor(s). It may also focus on anomalies identified during the Tier 1 evaluation.
- Tier 3: This involves a full validation of data including raw data, logbooks, laboratory data, calibration data, etc. This is typically a “third party” review.

Mr. Rob Gegenheimer will manage the project team. He will be assisted by the Converse Field Team Leader (to be determined). Mr. Gegenheimer will verify field data through reviews of data sets to identify inconsistencies or anomalous values. Any inconsistencies that are discovered will be resolved as soon as possible by seeking clarification from field personnel responsible for data collection. Field personnel will be responsible for following the sampling and documentation procedures described in this SAP so that defensible and justifiable data are obtained. In this case, the “third party” would be someone within Converse not directly involved in the project. We will not contract an outside third party for this effort. This would be Mr. Tracy Johnston from Converse’s Reno office, who has extensive experience working on Brownfields projects in Region 9.

The steps for validating field activities include:

1. Evaluation of field records for completeness and consistency
2. Review of field Quality Control (QC) information
3. Summary of deviations to determine effects on data quality
4. Summary of number and type of samples collected

Converse personnel will notify the analytical laboratory if we expect any “high concentration” samples.

Laboratory personnel will verify analytical data at the time of analysis and reporting. Sample conformance with the requirements of the analytical method will be verified. Laboratory personnel will make a systematic effort to identify outliers or errors before the data is reported. Outliers that result from errors found during data verification will be identified and corrected. Outliers that cannot be attributed to errors in analysis, transcription, or calculation will be identified in the case narrative section of the analytical data package. Analytical data generated for this project will be verified by the laboratory. Once the laboratory reports are received by Converse, they will review the reports and evaluate the results against the results of any field screening conducted and field notes taken. We will also review any flagged data and any data where method detection or reporting limits are higher than regulatory levels. Any discrepancies noted will be addressed prior to issuance of a report containing the laboratory reports.

Verified data will be checked for a variety of topics including transcription errors, correct application of dilution factors, appropriate reporting of dry weight versus wet weight, and correct usage of conversion factors. Verified data may have laboratory qualifiers. Verified data is one output of this process.

Steps for validating laboratory data include:

1. Assemble planning documents and data to be validated
2. Review results of data verification to determine method, procedural, and contractual QC compliance or noncompliance
3. Review verified data for the data set as a whole, including laboratory qualifiers
4. Assign validated data qualifiers which supersede laboratory qualifiers, although both sets of qualifiers are retained in the database
5. Prepare data validation report

3.5 Data Management

Field data will be documented on field data sheets. Laboratory analytical data will be presented in a report(s) prepared by the analytical laboratory and will be summarized in a final report that will detail the work completed and the results obtained.

The data management procedures for this investigation will comply with those outlined in Section B7 of the approved QAPP. Chain-of-custody procedures will be adhered to during this investigation to maintain sample integrity. Chain-of-custody procedures are discussed in Section 9.4 of this SAP.

3.6 Data Collection Oversight

A Field Audit may be completed during this investigation to identify weaknesses in field practices and procedures. The audit would evaluate if the field personnel are following the procedures set forth in the SAP and the Standard Operating Procedures (SOPs). The field audits, if conducted, will be performed by senior staff members who are not part of the field team.

The QA Manager will review all field sampling data and laboratory analytical data to ensure the data meets the QA/QC criteria outlined herein. Any field data or laboratory analytical data that does not meet the QA/QC criteria outlined herein will be “flagged”. Flagged data will be documented in the report.

In section C1 of the approved QAPP for this project, we state that we “may” conduct one field audit. It is also stated that Converse personnel would conduct such an audit. The reason we may not conduct an audit is because this work is being conducted to evaluate where impacts may be expected to be encountered during site redevelopment so that they can be remediated prior to such development. This grant was a cleanup grant and not an area wide site assessment grant. An EPA cleanup grant allows data collection associated with refining the locations/areas requiring cleanup/excavation, post-excavation/cleanup confirming sampling (not anticipated for this project), and waste characterization for disposal. The sampling effort is required by the NDEP approved SGMP and CLV.

4.0 SAMPLING DESIGN AND RATIONALE

This investigation includes testing for various contaminants of concern in soil. The sampling areas are shown on Plate 1. Sample locations shown on Plate 1 may be adjusted in the field based on professional judgement; however, there will be four locations within each established grid (see below).

4.1 Soil Sampling

Soil sampling will be conducted pursuant to the requirements of the SAP contained in the SGMP for Symphony Park. The SAP discusses two methods of soil sampling that can be employed by developers. These are stockpile sampling and pre-excavation sampling. Developers were previously allowed to stockpile soils excavated during site development and then sample the material. This is no longer the preferred method due to ongoing development at Symphony Park, resulting in limited space for stockpiling. For this project, pre-excavation sampling will be employed. This will allow for development of a plan to remediate site soil prior to development of the Site.

For pre-excavation soil sampling (see Section 6.2 Pre-excavation Soil Sampling and Short-Term Staging of the SGMP and Section 4.1.2 Pre-Excavation Sampling of the SAP contained in the SGMP), the first step is to create a three-dimensional grid using the proposed site development plans and the extents of the UPRR remediation areas. Wherever excavation below existing site grade is to occur within the extent of the UPRR remediation areas as a part of site development, confirmation soil sampling must be conducted. The number of samples to be collected is based on the footprint of the proposed excavation(s) and the depth of the excavation(s). The SAP dictates the following regarding pre-excavation soil sampling (see Table 4-2 Pre-Excavation Sampling Frequency in the SAP that is part of the SGMP):

- Up to 1,500 square feet (SF): 4 samples per every three feet in depth composited into one sample at each depth interval
- 1,500 to 4,500 SF: 8 samples per every three feet in depth composited into two samples at each depth interval
- 4,500 to 10,000 SF: 12 samples per every three feet in depth composited into three samples at each depth interval
- Greater than 10,000 SF: The total area is to be divided into 1,500 SF areas and there will be 4 samples per each area collected at three foot depth intervals that will be composited into one sample at each interval.

Note: While compositing is called for in that SAP, we are not proposing compositing of VOC samples collected using EPA Method 5035 (see below).

In each case, sampling would be no shallower than 1-foot below grade. If an excavation extends beyond three feet, samples are collected at three-foot intervals to total depth.

The plan of development for Parcels J and K is not yet at a stage where it is known where building footprints will be and/or to what depths excavations are planned to extend. Because of this, we propose to conservatively assess the portions of the Site within the former UPRR remediation area (excluding utility easements that exist around the parcels). As a result, the proposed area to be assessed is greater than 10,000 square feet. Based on this, and per the requirements of the SGMP, the proposed excavation area within the UPRR remediation footprint will be divided into approximate 1,500 square foot grids. Based on this, a total of 49 grids have been created. Within each grid, 4 borings will be advanced. Since proposed depths of excavation for site development are not known, we will conservatively assume the total depth of the soil column to groundwater may be excavated (18-feet). Soil samples will be collected from 3-foot depth intervals in each boring to the approximate total depth of 18-feet. The four samples collected from each depth interval will be field composited into one sample (except for VOC analysis, see below). The table below provides details regarding the number of samples to be collected in each grid (see Plate 1).

Grid Number	Total Number of Grids	Proposed Boring Depth (ft)	Sample Intervals (ft)	Total Number of Grab Samples Per Grid	Total Number of Composite Samples Per Grid
1 – 49	49	18	3, 6, 9, 12, 15, 18	24	6
TOTAL SAMPLES				1,176	294

Each boring location within a grid will include one sample interval at the proposed depths. Each sample interval will be screened for VOCs. If a VOC sample is to be collected from that interval (due to PID or other criteria), it will be collected as a discrete sample per Method 5035. The other portion of the sample from that same interval will be used as part of the composite sample for the other analyses.

As shown in the above table, we propose collecting a total of 294 composite samples for submittal for laboratory analysis. As stated above, the rationale for this is to comply with the SAP that is part of the Symphony Park SGMP (see Section 4.1.2 of the SAP) and is based on the extent of the UPRR remediation areas at the Property and depth to groundwater. As indicated in Table 5-1, we are proposing to analyze a minimum of 345 samples for TPH, and 176 samples for VOCs, SVOCs and metals (this includes QC samples). See Section 4.1.1 for background information regarding the lesser number of samples proposed to be analyzed except for TPH.

In summary, the information in section 4.1.1 supports that the primary contaminants of concern at Symphony Park consist of heavy end hydrocarbons such as diesel fuel. Relatively low percentages of samples analyzed contained VOCs or SVOCs at concentrations above a laboratory method reporting/detection limit. Even less contained a VOC or SVOC above a regulatory action limit.

Considering this, and since this assessment is being conducted for waste characterization and not site assessment/risk evaluation, we are proposing a sampling plan that generally follows the SGMP established for Symphony Park with allowances for collection/analysis of lesser numbers of samples for analytes other than TPH. Table 5-1, below, shows the proposed number of samples to be collected/analyzed for each constituent of concern.

Per the SGMP, we will be drilling four borings per each established grid. There are 49 grids established for Parcels J and K. To address EPA comments and concerns for compositing the VOC samples for Method 5035 (while still honoring the structure of the SGMP), we will employ the following strategy. At each 3-foot depth interval, a sample will be collected from each boring. Each of the discrete (grab) samples from a specific depth will be composited (as planned) by the laboratory prior to analysis. However, the exception is that one of those discrete samples will be collected using EPA method 5035 and submitted to be analyzed for VOC. A minimum of 50% of samples will be analyzed for VOC, SVOC, and metals. These will be randomly selected. However, if a sample not intended to be analyzed for these constituents exhibits field evidence of impacts such as staining, odors, or elevated (from 6 to 10 ppm) PID readings, they will additionally be analyzed for all constituents with the sample for VOC analysis being collected using EPA Method 5035.

The sampling will include VOC samples from each proposed depth or at “multiple levels”, as described elsewhere in this SAP. Field staff will not be relying on the PID to correlate to RSLs because relying on a PID for screening against RSLs is considered invalid due to detection limits and non-specificity. Furthermore, this SAP is for pre-excavation cleanup grant field work; as such, all soil where these samples are collected will be excavated and removed.

Specific to samples collected for VOC analysis, we will randomly select one of the four samples collected from a specific depth for the VOC sample *unless* field evidence (see above) indicates a certain sample may be impacted. If that occurs, a sample for VOC analysis will be collected for each individual sample that exhibits indications of impacts using EPA Method 5035.

We have prepared a sample matrix for use by the field team outlining what samples will be analyzed for the various constituents of concern (see Appendix F). Note that we propose to collect the VOC and other analytes from the lowest depth intervals in each boring. Samples from the deepest interval will best represent any potential contamination that may remain in place post excavation and aid in assessing potential future risk.

Soil samples will be collected using the drill rig by driving a 140-pound hammer equipped with a split spoon into the soil at each depth interval. Samples for VOC analysis will be collected pursuant to EPA Method 5035 directly from the soil core in the split spoon using EnCore Sampling Devices, or equivalent. Samples for all other analyses at each depth interval samples for VOC's will be collected by compositing in Ziplock bags as described in Section 6.3 and then placed in laboratory-provided jars by transferring the soil into the jars by hand. Each of the samples collected from each depth interval will be maintained in laboratory supplied containers at the appropriate temperature for delivery to the laboratory.

The sampler will wear a unique pair of nitrile sampling gloves per sample. Sample equipment will be hand washed between each sampling event using a water/Liquinox mixture followed by a rinse with de-ionized water. A total of 30 (approximately 10%) duplicate composite soil samples will be collected for QA/QC purposes. Additionally, 15 MS/MSD samples will be collected (approximately 5%). The soil samples will be

preserved in a cooler on ice, and delivered under chain-of-custody protocol to an analytical laboratory. The laboratories used for this project will be certified by the State of Nevada for the analyses conducted.

4.1.1 Background of prior Assessment Work as Rationale for Limited VOC Concern

The following provide summaries of prior assessment activities conducted at various parcels at Symphony Park. As the entire Symphony Park site was occupied by the Union Pacific Railroad, the contaminants of concern for Parcels L North and M4 are similar to those for other Parcels at the site (some portions of the site had little historical use other than for storage; therefore, there are no historical documented impacts at these parcels such as Parcel E). The main contaminants of concern for Symphony Park have been documented as being heavy end hydrocarbons such as diesel fuel and bunker oil.

November 2007 report, Limited Subsurface Assessment, Parcel J

As a part of previously planned development of Parcel J, limited subsurface assessment was conducted at that parcel. A total of 15 soil samples were collected from 11 borings. The samples submitted for analysis were based on the results of field screening such as visual and olfactory evidence, along with PID readings. The samples were analyzed for TPH, VOCs, and SVOCs. Ten of the soil samples contained a TPH concentration in excess of the NDEP RC of 100 mg/Kg. Fourteen of the soil samples contained detectable concentrations of a VOC. Only one VOC, naphthalene, was identified in one sample above a current EPA Region 9 Regional Screening Level-Residential (RSLr). An SVOC was identified in nine of the 15 soil samples with none at a concentration exceeding a current EPA Region 9 RSLr.

October 2014 report, geotechnical evaluation at Parcel L

A geotechnical evaluation was conducted at Parcel L. One sample was collected and analyzed for environmental constituents of concern. This sample was collected from a depth of approximately 5 feet. Results of analysis indicated that no VOCs or SVOCs were detected at concentrations above the laboratory method reporting limits. TPH was detected at a concentration of 770 mg/Kg. Various metals were detected; however, none were detected at a concentration above a Region 9 RSLr.

November 2017 report, results of soil sample analysis at Parcels B and L

The report discusses the results of a geotechnical evaluation of these parcels. As a part of this work, 18 soil borings were drilled on each parcel. Soil samples were collected from many of these borings for analysis of TPH, VOC, and SVOC. Detectable concentrations of TPH were detected in 92 percent of samples and TPH was detected at a concentration exceeding the NDEP reportable concentration in 69 percent of samples. Detectable concentrations of a VOC were identified in 54 percent of samples; however, no individual VOC was detected at a concentration exceeding an EPA RSLr. Detectable concentrations of an SVOC were identified in 46 percent of samples. One individual SVOC was detected at a concentration exceeding an EPA RSLr (benzo(a)pyrene at a concentration of 0.018 mg/Kg).

Internal memorandum regarding work conducted in November 2017 at Parcel L

During geotechnical investigations at Parcel L, Converse collected soil samples in areas at or near where excavations for planned development of a parking garage were to be excavated. Detectable concentrations of TPH were identified in 12 of 13 samples collected with 9 of those samples containing a TPH concentration exceeding the NDEP RC of 100 mg/Kg. Detectable concentrations of a VOC were noted in 7 of those samples with none exceeding an EPA Region 9 RSLr. Detectable concentrations of an SVOC were noted in 6 samples with one at a concentration exceeding an EPA Region 9 RSLr. Benzo(a)pyrene was detected at a concentration of 0.18 mg/Kg.

December 2017 report, results of soil sample analysis for Box Culvert Extension

Environmental assessment was conducted in association with the extension of a box culvert along the eastern edge of Symphony Park. This is an area along the existing railroad line where some of the historically elevated concentrations of contaminants of concern were identified and subsequently remediated. The work was conducted at Parcels K, L, M4, N, O1, O2, and P/Q. Based on the SAP contained in the SGMP, 16 samples were submitted for laboratory analysis. Concentrations of TPH up to 1,600 mg/Kg were detected in the samples. The VOC toluene was detected in one sample and the VOC methylene chloride was detected in two samples, but none were detected at a concentration exceeding a regulatory level. Metals were detected in multiple samples, but only one was detected at a concentration exceeding a regulatory level (lead). This sample was analyzed using TCLP method and lead was not detected at a concentration exceeding the reporting limit of 0.015 mg/L.

April 2018 report, review of pre-excavation soil sampling, Parcels F and G

Prior to site development, as is common at Symphony Park, pre-excavation soil sampling was conducted. This was done using the plan of development along with the requirements of the SAP in the SGMP developed for Symphony Park. The area of planned development was divided into 68 separate cells and four soil borings were drilled in each cell. Drilling depths were only 3 feet as this was the extent of planned excavation into native soil at the site. Known/suspect contaminants of concern at Parcels F and G consisted of TPH, VOC, and metals. All composite samples were analyzed for TPH and metals, and samples with TPH concentrations in excess of the NDEP RC were also analyzed for VOC. This is considered compliant with the requirements of the SGMP. A total of 68 composite soil samples were collected with each composite soil sample consisting of four individual grab samples (per the requirements of the SGMP). TPH concentrations reportedly ranged from non-detectable to 1,200 mg/Kg with TPH concentrations exceeding the NDEP RC of 100 mg/Kg in 47 of 68 cells. VOC analysis was conducted on those 47 samples. The VOCs toluene, xylenes (total), tetrachloroethene, and methylene chloride were identified above their respective laboratory method reporting limits; however, none exceeded their respective action limits (EPA Region 9 RSLr). Detectable concentrations of metals were identified in multiple samples. However, only two samples contained a metals concentration (one lead, one arsenic) exceeding an action limit. These samples were subsequently analyzed using the TCLP method and neither contained a concentration above the laboratory method reporting limit. As such, two of the 68 cells (2.9 percent)

were classified as contaminated non-hazardous with the remaining being classified as legally clean. The contaminated non-hazardous soil was required to be removed from the site for disposal while the rest could be reused onsite or transported offsite for disposal or recycling.

June 2021 report, Environmental Subsurface Grid Study, Parcels C and D

In early 2021, pre-excavation soil sampling was conducted at areas required pursuant to development plans and the SGMP. Soil samples were composited based on the requirements of Table 4-2 "Pre-excavation Sampling Frequency" in the SAP in accordance with the SGMP. Per the requirements of the SAP, the site was divided into grids and four borings were drilled per grid with samples being composited at each three-foot depth interval. A total of 38 of 77 grids were drilled to a depth of 9-feet with the rest being drilled to a depth of 6-feet.

Soil samples were analyzed for TPH, metals, VOCs, and SVOCs. TPH was detected at concentrations up to 4,460 mg/Kg. TPH concentrations exceeded the NDEP RC of 100 mg/Kg in 66 of the 77 composite samples collected from 3 feet, 63 of 77 composite samples collected from 6 feet, and 22 of 38 composite samples collected from 9 feet. This totals 151 of 192 samples or 78.6 percent.

Multiple VOCs such as benzene, toluene, ethylbenzene, xylenes, acetone, naphthalene, etc. were detected in soil samples. However, none were detected at a concentration exceeding an NDEP RC, RSL, or SGMP action level. VOCs were detected in 62 of 192 samples, or 32.3 percent, with none being identified at a concentration above 1 mg/Kg.

The metals arsenic, chromium, and lead were detected at concentrations exceeding an action limit in only eight samples with none exceeding a limit after TCLP analysis.

Finally, only 12 of 192 (6%) samples contained a detectable concentration of an SVOC. Only two samples, or 1%, contained an SVOC above an action limit.

June 2021 report, review of documents, Parcels L North and M4

Converse reviewed documents related to work conducted at Parcels L North and M4. One of these was a risk evaluation report prepared by Sage Risk Solutions (Sage). Sage has conducted multiple risk evaluations at Symphony Park and has worked with the NDEP for years. Sage described that, in 2007, soil and soil vapor samples were collected at Parcel L (including L North). Several VOCs were detected in the soil vapor samples, but none were identified in soil samples. Based on their risk assessment, Sage concluded that residual VOC concentrations in soil vapor did not pose an unacceptable health hazard for future residential land use (the planned land use at that time was residential).

November 2021 report, review of geotechnical evaluation of Parcel M4

As part of a geotechnical evaluation, a boring was drilled on Parcel M4. Discolored soil was noted in the upper 5 feet, which was attributed to being the treated fill. Otherwise, no evidence of impacted soil was noted during drilling, which extended to 75 feet.

February 2022 report, review of Document Review, Parcels J and K

Among the documents reviewed were a Risk Evaluation for these parcels completed in January 2022. The report discusses two separate soil investigations conducted at these parcels. One, in 2007 (see above), and another conducted in 2021. In 2021, six additional soil samples were collected with various VOCs and SVOCs being detected above a laboratory detection limit, but below their respective RSL, and none were detected at a concentration exceeding one mg/Kg. Results of the Risk Evaluation indicated that concentrations of chemicals of concern were below a cancer risk of 1×10^{-6} and a hazard quotient of one.

January 2023 report, Updated Environmental Subsurface Grid Survey, Parcels C and D

This report was an update to the previous report regarding sampling at Parcels C and D. Areas not previously assessed were sampled and select areas were evaluated to greater depths (15 feet). As a part of this update, an additional 77 cells were assessed and 40 of the previously sampled cells were evaluated to greater depths. This resulted in the collection and analysis of an additional 389 samples.

As with the previous assessment, the majority of samples contained detectable concentrations of TPH. A total of 65 of the 389 (16.7%) samples contained a detectable concentration of a VOC. No VOC concentrations exceeded an action level, including EPA Region 9 RSLs.

A total of 20 soil samples (5%) contained a concentration of a metal that resulted in the sample being analyzed using the TCLP. None of the samples analyzed using the TCLP contained a concentration that would result in the material being considered hazardous waste.

Finally, 17 samples (4%) contained a detectable concentration of an SVOC with eight (2%) exceeding a regulatory limit.

Late 2023, laboratory analytical reports for soil samples, Parcel L

In late 2023, the existing parking garage on Parcel L was expanded. During this process, six soil samples were collected and analyzed for TPH, VOCs, and SVOCs. No VOCs were detected in any of the samples. A total of 13 SVOCs were detected in one sample with none being present at a concentration in excess of a Region 9 RSLr.

4.1.2 Additional Rationale Summary for Number and Method of Sampling

This section provides a synopsis of rationale for the number of samples proposed and sampling methods. The number of sample locations (via gridding) was stipulated by the NDEP SGMP. Each grid, as prescribed in the SGMP, has 4 borings with sampling at every 3 feet in depth (dictated by the depth of excavation required for development, or in this case, since no development plans are available, the total depth is based on depth to

groundwater). The SGMP stipulates the grid setup; however, it does not specifically dictate the number or type of analytes, nor does it exclude composite sampling. In this proposed SAP, each of the grid locations and depths will be screened and composite-sampled for TPH, and no less than 50% of those samples for all other analytes (VOC samples not to be composited). This is further explained below.

Specific to screening, each sample (split spoon or sleeve) for the locations described above, will be screened using a PID and composite-sampled for TPH. Based on the results of screening, a minimum of 50% of those sample sleeves would be additionally sampled for each of the other analytes using either a discrete 5035 method (for VOCs) or a composite method for the other analytes. Note that we propose to collect the VOC and other analytes from the deepest depth intervals in each boring. Samples from the deepest interval will best represent any contamination that may remain in place post excavation and aid in assessing potential future risk.

Other than just the deepest interval, the sample selection for VOCs will be based on PID screening threshold data (≥ 6 ppm). If there are no threshold VOCs, then a sample will be submitted from the sample depths shown on the Sample Matrix Grid (attached as Appendix F). In contrast, if the field screening of the soil indicates a reading of ≥ 6 ppm at every depth interval sampled in a grid, then there will be one discrete (not composited) En-Core soil sample extracted from the core via method 5035 and submitted to the laboratory for analysis representing every depth interval within that grid.

The remaining portion of the sample from each sleeve (based on the above criteria) would be composited for the other non-VOC parameters. This procedure would be followed for all sample collection depths. Note that none of the excavated soil, that may be deemed legally clean, is going to be used as non-regulated fill on site.

In summary, each grid at each 3-foot depth interval will have one composited sample for TPH and each grid at the depth intervals shown on the Proposed Sample Matrix will have all other analyses. Those “other analyses” include discrete VOCs samples and composite samples for non-VOC analytes.

Based on our tables, the number of samples would result in the following (not including QC samples). Note that some of these are minimums and will likely be exceeded based on field conditions encountered.

- Screened discrete sample sleeves = 1,176
- Composited TPH samples each level = 294
- Discrete VOCs every other level = 147 (min)
- Composite other (SVOC/metals) every other level = 147 (min)

Having one discrete VOC sample (collected via EPA method 5035) and one composited sample for SVOC and metals from each grid at every other depth (minimum) is deemed more than prudent for the developer to be able to confirm if their remedial contractor is going to put soil from a given grid into trucks for offsite disposal. NDEP has approved this sample effort in an effort to preserve actual cleanup funding.

4.2 Other Sampling

No other media are planned to be sampled at this time. Based on the plans for development, groundwater is not expected to be encountered. If plans change and groundwater will/may be encountered, groundwater will be sampled pursuant to the requirements of the SGMP for Symphony Park.

4.3 Cultural Resource Discoveries

Subsurface exploration activities can result in the unanticipated discovery of cultural resources. These include artifacts, relics, or other items that may be associated with prehistoric or indigenous site occupation and be of archeological significance. To address this, we have developed an Unanticipated Discovery Plan (Appendix E). This plan discusses recognizing cultural resources, steps to take if an unanticipated or suspected cultural resource is encountered, responsibilities, and contacts. As this site was previously developed as a part of the UPRR railyard, discovery of unanticipated cultural resources is not anticipated.

5.0 REQUEST FOR ANALYSIS

5.1 Analyses Narrative

Composite soil samples will be submitted for laboratory analysis for parameters identified in Table 5-1. This is based on the total number of composite samples to be analyzed (294) as shown in the table in Section 4.1.

Table 5-1 Analytical Services
Matrix = Soil

Sample Location	Special Designation	Analytical Methods			
		Metals ¹ (Method 6010B)	TPH (Method 8015)	VOCs (Method /8260B)	SVOCs (Method 8270C, SIM)
Soil Borings (composite) ²	Boring	Min. 50%	All Samples	Min. 50% ³	Min. 50%
Number of Samples to be Analyzed	--	Min. 147	294	Min. 147	Min. 147
Soil Borings (composite)	Dup ⁴	10%	10%	10%	10%
Number of Duplicate Samples	--	15	30	15	15
Number of MS/MSD Samples	--	8	15	8	8

Sample Location	Special Designation	Analytical Methods			
		Metals ¹ (Method 6010B)	TPH (Method 8015)	VOCs (Method /8260B)	SVOCs (Method 8270C, SIM)
Number of Field Blanks (Est.)	--	3	3	3	3
Number of Equipment Rinseates (Est.)	--	3	3	3	3
Total Samples per Analysis	--	Min. 176	345	Min. 176	Min. 176

Min. Minimum
 Dup Duplicate
 MS/MSD Matrix Spike/Matrix Spike Duplicate
 TPH Total Petroleum Hydrocarbons
 VOCs Volatile organic compounds
 SVOCs Semi-volatile organic compounds
 SIM Select Ion Monitoring
 Est. Estimated based on amount of time spent drilling

- 1 If a metals concentration exceeding the state action level is reported in a sample collected from the sample areas, the sample will be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) by EPA Method 1311 for waste classification purposes.
- 2 Compositing will not be employed for VOC analysis. These will be individual EnCore samples.
- 3 Per the above table, a minimum of 52 samples are proposed to be collected using EnCore samplers and ultimately analyzed for VOC. Refer to Section 4.1 for a complete discussion of field screening that will be used to determine if additional discrete EnCore samples will be collected for VOC analysis. For EnCore sample collection/preservation, see Table 5-2.
- 4 When calculating the 10% or 5% rate based on the number of samples collected, the number of duplicate samples will be based on a rounded up number.
- 5 QC samples include equipment rinseate blanks and field blanks (estimated at once to twice per week of drilling).

**Table 5-2: Analytical Method, Container, Preservation, and Holding Time Requirements
Matrix = Soil**

Analytical Parameter	Analytical Method Number	Containers (number, type, size/volume)	Preservation Requirements (chemical, temperature, light protection)	Maximum Holding Times
Metals	EPA Method 6010B	4-ounce glass jar	None, ≤4° C	6 months
TCLP	SW-846/Method 1311	4-ounce glass jar	None, ≤4° C	Varies by method
TPH	EPA Method 8015 or TNRCC 1005	4-ounce glass jar	None, ≤4° C	7 days to extract (analyze within 40 days)

Analytical Parameter	Analytical Method Number	Containers (number, type, size/volume)	Preservation Requirements (chemical, temperature, light protection)	Maximum Holding Times
VOCs	SW-846/EPA Method 8260B	EnCore Samplers ¹	≤4 ⁰ C	48 hours from time of collection
SVOCs	EPA Method 8270C, SIM	8-ounce glass jar	None, ≤4 ⁰ C	14 days to extract (analyze within 40 days)

1. EnCore samplers will not be composited. These will be discrete samples.

Each sample will be collected using a split spoon sampler. Once the EnCore samples for VOC have been collected from the sample, a remaining portion of the sample will be placed in a Ziplock bag representing that depth. Once all four borings from an individual grid are represented for that depth and included in the Ziplock bag, we will conduct a homogenization process which consists of turning the material from the bottom to the top and pouring it back onto itself horizontally and vertically such that all material mixes. After that, a sample from the bag will be placed into a laboratory provided jar as a composite sample.

5.2 Analytical Laboratory

Laboratory quality control information is included in Sections B4.2.2 and B4.2.3 of the approved QAPP. In addition, Laboratory QA/QC and Analytical Method Documentation are included in Appendix A of the approved QAPP.

All sample analyses will be conducted by a laboratory certified by the NDEP to conduct those analytical methods. Data Quality Indicators (DQI) are included in Appendix A of the approved QAPP. Any laboratory used for this project will be required to review and state that they can meet the DQIs.

The laboratory will flag any results that are outside of their QA/QC requirements. Laboratories will follow method criteria and the laboratory's QA/QC manual and procedures for corrective action during sample analysis.

Section A6.3 of the approved QAPP outlines the "Quality Control Limits" for sampling. The QC limits for precision and accuracy will be the same as those established by the laboratory used for the project.

With respect to the QC analyses to be conducted as a part of this project, the following applies: 1) results for duplicate or MS/MSD samples should be within 10% of the original samples and 2) no analytes should appear in field blanks or equipment blanks. If analytes are present that were also present in actual soil samples, then either there is a potential influence from ambient air (field blanks) or there could be potential for cross contamination (equipment blanks). If analytes are present in QC samples that are not present in actual soil samples, there may be an issue with the laboratory. This will be discussed with the laboratory and brought forward in a final report.

As previously mentioned, Asset Laboratories will be used as a subcontractor to Veritas Laboratories to conduct analysis for SVOCs. Asset Laboratories will meet the same requirements as Veritas Laboratories.

6.0 FIELD METHODS AND PROCEDURES

6.1 Field Equipment

6.1.1 List of Equipment Needed

A list of field equipment is included in Section 6 of Converse's Soil and Groundwater Sampling SOP (Appendix C).

6.1.2 Calibration of Field Equipment

The following information is contained in the approved QAPP and has been brought forward for clarity.

Field and laboratory analytical instruments and equipment will be tested, inspected, and maintained according to the manufacturer's guidelines and recommendations. Data collected from improperly functioning equipment will not be used. Records of equipment testing, inspection, and maintenance will be maintained with each piece of equipment.

Preventative maintenance for field equipment will be conducted in accordance with the procedures and schedules recommended in the equipment manufacturer's literature or operating manual.

Field instruments that are out of order or compliance will be segregated, clearly marked, and not used until it is repaired. The field team leader will be notified of equipment malfunctions so that service can be completed quickly, or substitute equipment can be obtained. When the condition of equipment is suspect; unscheduled testing, inspection, and maintenance will be conducted. Any significant problems with field equipment will be reported in the daily field report.

Calibration of analytical instrumentation is required to ensure that the analytical system is operating correctly and functioning at the sensitivity that is required to meet project specifications. Each instrument will be calibrated with standard solutions, appropriate to the instrument and analytical method, in accordance with the methodology specified by the manufacturer and at the frequency specified by the manufacturer or analytical method, whichever is more frequent.

Field equipment, if used, will be calibrated according to the manufacturer's specifications, but in most cases, will be calibrated daily at the beginning and end of the day to monitor for instrument "drift". The calibration frequency depends upon the type and stability of the equipment, the intended use of the equipment, and the recommendation of the manufacturer. Detailed calibration procedures for field equipment are available from the specific manufacturer's instruction manuals. Calibration information will be recorded and maintained with the field instruments.

6.2 Field Screening

EnCore samplers will be ready upon soil sleeve opening. PID screening will be conducted and samples that are screened to be equal to or greater than 6 ppm will be sampled by emplacing the EnCore to collect a sample, followed by retrieval, capping, packaging, labeling, and storage in a prepared cooler. The EnCore sampling procedure is provided in Appendix G.

6.3 Soil Sampling

Samples to be analyzed for VOCs will be collected first. Subsurface soil samples will be collected using a truck mounted drill rig equipped with hollow stem augers. A 140-pound hammer equipped with a split spoon sampler will be driven into the undisturbed soil column to facilitate sample collection. For VOC analysis, soil samples will be collected pursuant to EPA Method 5035 from the core in the split spoon using EnCore samplers or equivalent. The EnCore sampling procedure is provided in Appendix G.

Once the EnCore samples have been collected from the sample, a remaining portion of the sample will be placed in a Ziplock bag representing that depth. Once all 4 borings are represented for that depth and included in the Ziplock bag, we will conduct a homogenization process which consists of turning the material from the bottom to the top and pouring it back onto itself horizontally and vertically such that all material mixes. After that, a sample from the bag will be placed into a laboratory provided jar as a composite sample.

Additional methods and procedures for soil sampling are covered in Converse's Soil Sampling SOP (Appendix C). Sample collection methods and locations are discussed in Section 4.1.

6.4 Other Sampling

No other media are planned to be sampled at this time. Based on the plans for development, groundwater is not expected to be encountered. If plans change and groundwater will/may be encountered, groundwater will be sampled pursuant to the requirements of the SGMP for Symphony Park.

6.5 Decontamination Procedures

Decontamination procedures are outlined in Converse's Decontamination SOP (Appendix C). In general, non-dedicated or unique sampling equipment will be washed using tap water and a phosphate free detergent such as Liquinox, then a tap water rinse followed by a double rinse using deionized water. Drilling equipment will be steam cleaned prior to and between each boring. As noted in Section 4.1, we will collect equipment blanks to evaluate decontamination procedures. Deionized water will be poured over equipment after it has been cleaned and the water will be directly collected in laboratory-provided sample containers. Equipment blanks will be analyzed for VOCs. Decontamination water will be collected and sampled after the project is completed for disposal purposes.

7.0 SAMPLE CONTAINERS, PRESERVATION, PACKAGING AND SHIPPING

Soil samples will be collected in laboratory-provided glass containers (see Table 5-2). Labeled sample containers will be preserved on ice in a cooler. Ice will be placed in zip lock bags or other water-tight containers. Sample containers will be placed in the cooler in such a way as to avoid melted ice water entering the sample containers. A custody seal will be placed on each cooler prior to transporting to the laboratory. Soil samples not analyzed or not consumed by sample testing will be archived. Samples will be transported by Converse staff directly to laboratory personnel. Analyses are to be conducted by local laboratories; therefore, sample shipment using a third party shipping company will not be conducted.

8.0 DISPOSAL OF RESIDUAL MATERIAL

In the process of collecting environmental samples, the sampling team will generate diverse types of potentially contaminated Investigation-derived waste (IDW) that include the following:

- Used personal protective equipment (PPE)
- Decontamination fluids
- Soil cuttings

The EPA's National Contingency Plan (NCP) requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan will follow the Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 (May 1991), which provides the guidance for the management of IDW. In addition, other legal and practical considerations that may affect the handling of IDW will be considered.

Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. Decontamination fluids that will be generated in the sampling event may consist of dilute nitric acid, pesticide-grade solvent, deionized water, residual contaminants, and water with non-phosphate detergent. Decontamination water will be stored in appropriate containers (e.g., 55-gallon drums). The containerized water will be sampled and disposed of appropriately. Any soil cuttings that are not placed back into the borings will be spread upon the ground.

9.0 SAMPLE DOCUMENTATION

9.1 Field Notes

Copies of field and laboratory forms that will be used for sample documentation and shipment are included in the approved QAPP.

Logbooks will be used to record information related to this project. The field team will record, in ink, field activities in the logbook. For each sampling event, the field team must provide the Site name and location, date, sampling start and finish times, the names of field personnel, the level of protection, documentation of any deviation from protocol, and signatures of field personnel. For individual samples, field teams will ensure that field notes document the exact location and time the sample was taken, any measurements made (with real-time equipment), a physical description of the sample, the sample ID number, the sampling depth, the volume and type of sample and the equipment used to collect the sample. This information can be critical to future evaluations of the resulting data's usability.

At a minimum, the following information will be recorded:

- Sample location and description
- Sampler's name(s)
- Date and time of sample collection
- Type of sample
- Type of sampling equipment used
- Field instrument readings and calibration
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)
- Preliminary sample descriptions
- Sample preservation
- Name of recipient laboratory

In addition to the sampling information, the following specific information will be recorded:

- Team members and their responsibilities
- Time of arrival on Site and time of departure
- Other personnel on Site
- Summary of any meetings with contractor or federal agency personnel
- Summary of daily activities and significant events
- Discussions of issues encountered and their resolution
- Deviations from sampling plans, Site safety plans, and QAPP procedures
- Changes in personnel and responsibilities with reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

9.2 Photographs

When photographs are taken during this investigation, the following information will be recorded:

- Time, date, location, and weather conditions
- Description of the subject photographed
- Name of person taking the photograph

9.3 Sample Labeling

All samples collected will be labeled concisely for proper identification in the field and for tracking in the laboratory. A copy of a typical sample label is provided in the Converse SOP (Appendix C). The samples will have pre-assigned, identifiable, and unique numbers. Sample containers submitted to the laboratory will be labeled in the field with a Sharpie® or equivalent water-proof labeler with the following information:

- Sample location and description
- Date and time of sample collection
- Type of sample
- Sampler's name
- Sample preservation
- Analysis to be conducted
- Name of recipient laboratory

Each sample will be assigned a unique sample number.

9.4 Sample Chain-Of-Custody Forms and Custody Seals

Sample shipments for analyses will be accompanied by a chain-of-custody record. A copy of the form is provided in Converse's SOP (Appendix C). Similar information that will be placed on sample labels will be on the chain-of-custody. Form(s) will be completed and sent with the samples for each sample shipment. The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. A sample is considered to be in someone's custody if it is either in that person's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are delivered to the laboratory, the custody of the samples will be the responsibility of Converse. The sampling team leader or designee will sign the chain-of-custody form in the "relinquished by" box and note date and time. Custody seals will be placed on each cooler prior to delivery to the laboratory. If commercial shipment is needed, the samples will be packaged and shipped in accordance with U.S. Department of Transportation standards and custody seals will be placed on each cooler. Due to each cooler being protected under custody and the anticipated number of samples to be collected during the confirmation soil sampling activities, we do not propose using custody seals on each individual sample container. Samples will be delivered to the analytical laboratory on the same day as they are collected.

10.0 QUALITY CONTROL

Quality Control (QC) samples will be collected and analyzed to ensure the accuracy and precision of both field and laboratory data. The following sections summarize the QC samples that will be collected for laboratory analysis. Information regarding QC samples is also contained in Section B4.2 of the approved QAPP.

10.1 Field Quality Control Samples

Field-collected QC samples are collected to help evaluate whether contamination has been caused by the equipment, ambient conditions, sample containers, transit, or the laboratory. The field-collected QC samples will primarily consist of field duplicates, MS/MSDs, and blanks.

10.1.1 Temperature Blanks

For each cooler that is shipped or transported to an analytical laboratory, a small laboratory provided container filled with water will be included that is marked “temperature blank”. This blank will be used by the sample custodian to check for the temperature of samples upon receipt by the laboratory.

10.1.2 Field Duplicates and MS/MSDs

It is proposed to collect 30 (10%) duplicate soil samples for submittal for analytical testing (see Section 5.1). The duplicate samples will be collected at random locations. It is proposed to collect 15 (5%) MS/MSD soil samples for analytical testing.

10.1.3 Background Sample

As this is a soil sampling effort associated with remediation, no background soil samples will be collected.

10.1.4 Laboratory Quality Control Samples

A routinely collected soil sample (a full 8-oz sample jar) contains sufficient volume for both routine sample analysis and additional laboratory quality control (QC) analyses. Therefore, a separate soil sample for laboratory QC purposes will not be collected.

11.0 FIELD VARIANCES

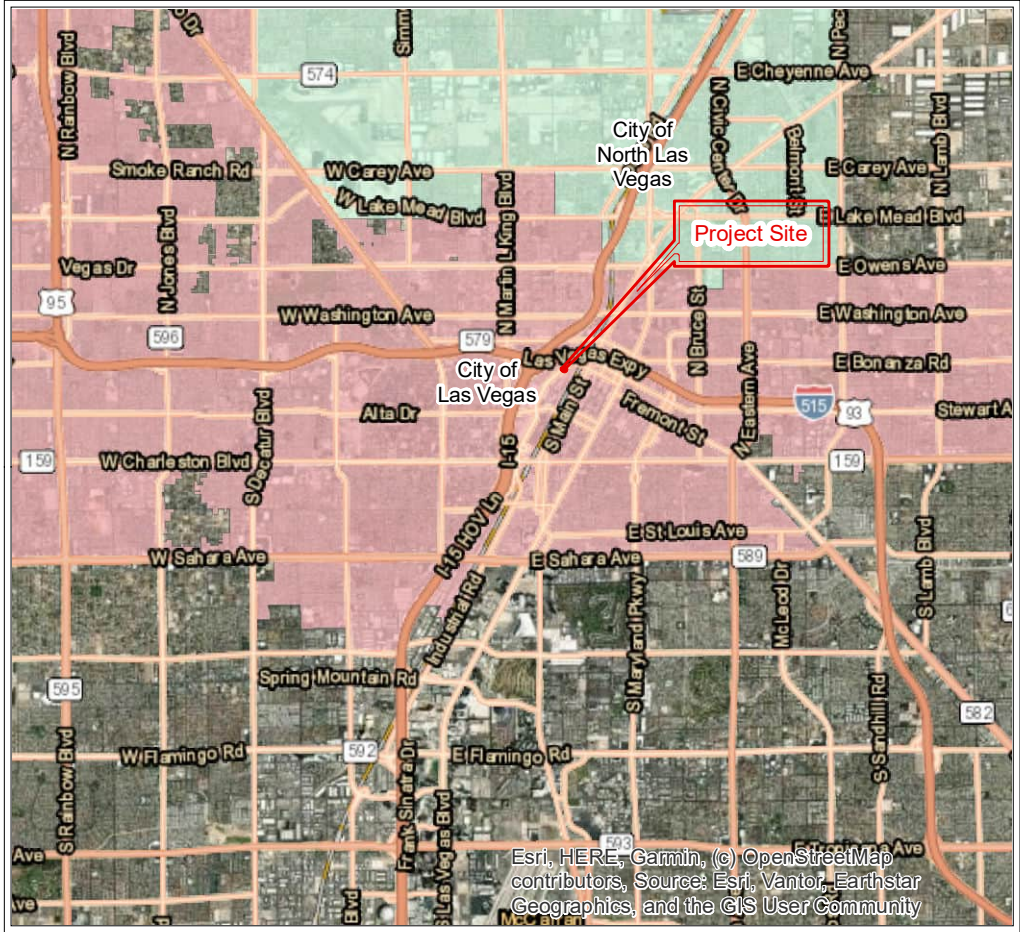
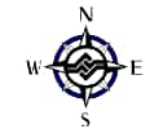
As conditions in the field may vary, it may become necessary to implement minor modifications to sampling, as presented in this plan. When appropriate, the Converse QA Office will be notified and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

12.0 FIELD HEALTH AND SAFETY PROCEDURES

A Health and Safety Plan (HASP) will be prepared to describe the safe use of equipment, evaluation of hazards, safe investigation procedures, personal protective equipment, emergency procedures, and training required to conduct Phase II ESA activities, including the OSHA certified 40-hour HAZWOPER class. A copy of the HASP will be available on-site during sampling activities for reference by the field sampling team.

Plate

Appendix A



1 inch = 2 miles

Legend

- Borings
- Remediation Area
- Soil Sample Grid
- J&K Parcel with Easements

SITE MAP

SYMPHONY PARK PARCELS J & K
93 South City Parkway
City of Las Vegas, Nevada

Plate 1

Appendix B



**SOIL AND GROUNDWATER MANAGEMENT PLAN
REVISION NO. 1**

**SYMPHONY PARK
[FORMERLY UNION PARK 61-ACRE SITE]
FORMER UNION PACIFIC RAILROAD
FUELING AND MAINTENANCE YARD
LAS VEGAS, NEVADA
FACILITY ID # H-000557
KLEINFELDER PROJECT NO.: 20154986.001A**

February 14, 2017

Reviewed and Approved by:
Nevada Division of Environmental Protection
Nevada Brownfields Program
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701
Brownfields Contract #DEP14-008
Task #K01R-14-3

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PROJECT FOR WHICH THIS REPORT WAS PREPARED.**



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901 South Stewart Street, Suite 4001
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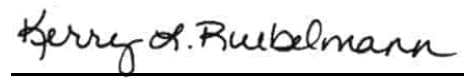
Prepared by:



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EM-2214 (expires 4/14/2017)

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state, and local statutes, regulations, and ordinances.

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February 14, 2017
Kleinfelder Project No.: 20154986.001A

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- C. Example Manifests

1 INTRODUCTION

City Parkway V, Inc. (City Parkway V) is redeveloping the 61-acre site known as Symphony Park located just west of downtown Las Vegas. The site is bounded on the north and west by Grand Central Parkway, on the east by the Union Pacific railroad, and on the south by Bonneville Avenue (Figure 1). The City Parkway V is acting as the master developer. The Symphony Park vision is to develop a new skyline and destination for local residents with mutually supportive mixed uses and not dominated by one or two large uses. All of the infrastructure for the site will be developed by the City Parkway V.

During the course of normal operations, former Union Pacific Railroad (UPRR) operations on the site resulted in releases of total petroleum hydrocarbons (TPH), various organic and inorganic solvents, and metals. Some of the petroleum-impacted soil has been removed and replaced with clean fill material according to an agreement between the Nevada Division of Environmental Protection (NDEP) and UPRR. However, subsequent analysis of soil and groundwater samples has revealed the presence of various contaminants of potential concern. Therefore, in order to have a common procedure to manage the materials to be encountered for the various redevelopment activities, City Parkway V desires an overall soil and groundwater management plan (SGMP) for the entire 61 acres.

This SGMP provides project-specific guidelines for soil and groundwater management of the Symphony Park site. A developer(s) may add to this plan, as long as it is a more stringent addition, based on their risk tolerance and specific parcel conditions.

The initial SGMP, dated March 21, 2007 (Kleinfelder 2007a), was prepared through funding provided by the NDEP's Brownfields Program, under Contract #NDEP 06-015-03, Task K-15. This revised SGMP was prepared under Contract #DEP14-008-04, Task K01-14.

The purpose of this revision is to (1) update the SGMP and bring it into accord with NDEP's constituent-based Reportable Concentrations (RCs) and the US Environmental Protection Agency's (EPA) updated Regional Screening Levels (RSLs) and (2) further clarify other items as noted by City Parkway V and its consultants.

UPRR did not excavate and remediate soils across the entire 61-acre Symphony Park site. This SGMP applies specifically to those areas inside the UPRR remediation extents. For those areas outside the UPRR remediation extents, NDEP and City Parkway V have agreed that the soils are *legally clean* based on the No Further Action determination by NDEP following UPRR's remediation activity. However if, during the course of excavation in an area outside of the UPRR remediation extents, the Certified Environmental Manager (CEM) observes indications of potentially impacted soils, the potentially impacted soils will be evaluated under the stipulations of this SGMP. Additionally, if impacted soils have been discovered by investigations after the No Further Action determination and prior to development, those impacted soils will be evaluated under the requirements of the SGMP. The CEM shall also inform City Parkway V when potentially impacted soils are observed.

A CEM shall be required to be present during development on the Symphony Park Site, regardless of the location of the development relative to the UPRR remediation extents. The UPRR remediation extents shown on Figure 4 and subsequent figures should be considered approximate. It is the developer's responsibility to define or verify the extents.

2 BACKGROUND

The Symphony Park site consists of 21 separate parcels within 61 acres (see Figure 2). Upon development, the site will have several right-of-ways extending in an approximate northwest-southeast and northeast-southwest alignment across the site, consisting of roads and walking promenades. The City Parkway V is acting as the master developer with the intent to develop a new skyline and destination for local residents. The development will have mutually supportive mixed uses and not be dominated by one or two large uses.

The past 70 years of UPRR operations on the site resulted in releases of TPHs, various organic and inorganic solvents, and metals during the course of normal operations. Some lead- and petroleum-impacted soil has been removed and replaced with clean fill material according to an agreement between NDEP and UPRR. Areas still remain that are potentially impacted by TPH, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), or metals.

2.1. SITE DESCRIPTION

The Symphony Park site consists of 61 acres of land that is partially developed. There are no surface features present that are related to previous rail road operations. Prior to 2007, the land was used in support of nearby construction activities at the World Market Center and the Molasky Corporate Center as construction parking, equipment staging, and construction material lay-down areas. Since the original SGMP was written in 2007, several parcels have been developed. Parcel A1 was developed as the Cleveland Clinic Lou Ruvo Center for Brain Health with Parcel A2 as an associated temporary paved parking area. Parcel H/I was developed as the Smith Center for the Performing Arts, the Discovery Children's Museum, and an associated parking garage. Parcel B has been developed as a paved temporary parking area. Parcels K, L, M4, N, O1, and O2 have been connected as a paved temporary parking area. Parcels M1, M2, and M3 have been developed as green space. The Phase I roadways (Symphony Park Avenue, West Clark Avenue, Promenade Place, and South City Parkway) have been placed and paved. The remaining parcels are undeveloped, and have been used as

2.2. OPERATIONAL HISTORY

The 61 acres was part of UPRR's fueling and maintenance yard for a more than 70 year period, beginning in the early 1900s. The site contained locomotive fueling, service, repair, and cleaning areas, and was also used for material storage. The property was used for locomotive fueling and maintenance purposes from the 1940s until 1991. Figure 3 shows the areas of operation.

2.3. PREVIOUS INVESTIGATIONS AND REGULATORY INVOLVEMENT

The Diesel Shop Area consists mostly of parcels M3, F, and G but also extends into Parcels N, D, H/I, and E. The major contaminant in this area was TPH, with concentrations reported in soils ranging from 20 to 21,000 mg/kg. Volatile organic compounds (VOCs) were also detected, with chlorotoluene (up to 42,000 micrograms per kilogram ($\mu\text{g/kg}$), tetrachloroethylene (up to 1,200 $\mu\text{g/kg}$), toluene (up to 1,800 $\mu\text{g/kg}$) and 1,2-dichlorobenzene (up to 610 $\mu\text{g/kg}$) being the most commonly detected and total xylenes reported at 5,100 $\mu\text{g/kg}$. Soil samples for which Resource Conservation and Recovery Act (RCRA) 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) were found to be above regulatory levels are: non-hexavalent chromium (up to 352 mg/kg) and lead (up to 1,500 mg/kg). Benzene, toluene, xylenes, and ethylbenzene (BTEX) constituents were detected in groundwater, with benzene concentrations between 2 and 12 micrograms per liter ($\mu\text{g/L}$). Concentrations of vinyl chloride (up to 54 $\mu\text{g/L}$) and cis-1, 2-dichloroethylene (up to 140 $\mu\text{g/L}$) have also been reported in groundwater underlying the Diesel Shop Area (Dames & Moore, 1989).

The Fuel Storage Area consists of Parcels J, K, H/I, L and M. The major contaminant in this area is TPH, with concentrations reported in soils ranging from 23 to 60,000 mg/kg. Toluene was detected in soils up to 2,000 $\mu\text{g/kg}$. Soil samples were reported with concentrations above regulatory levels for RCRA 8 metals: non-hexavalent chromium (up to 1,060 mg/kg), and lead (up to 2,330 mg/kg). Benzene was reported in groundwater up to 1 $\mu\text{g/L}$ and ethylbenzene was reported up to 2.0 $\mu\text{g/L}$ (Dames & Moore, 1989).

The Wash Track Area consists of Parcels A1, A2, B, and J. The major contaminant of in this area is TPH, with concentrations reported from below laboratory detection limits to

3,330 mg/kg. Soil sample results were reported as above regulatory levels for RCRA 8 metals: cadmium (up to 21 mg/kg) and lead (up to 860 mg/kg) (Dames & Moore, 1989).

The East of Diesel Shop Area consists of Parcels O1, O2, and P/Q. The major contaminant in this area is TPH, with concentrations reported in soils ranging from 40 to 8,300 mg/kg. Soil sample results were reported as above regulatory levels for RCRA 8 metals: arsenic (up to 140 mg/kg), non-hexavalent chromium (up to 1,270 mg/kg) and lead (up to 967 mg/kg). BTEX constituents were reported in groundwater, with benzene at concentrations up to 14 µg/L and ethylbenzene up to 17.0 µg/L (Dames & Moore, 1989).

The Evaporation Pond Area consists of Parcels M1, M2, C, southwest corner of D, and the western end of M3. Within this area, TPH concentrations were reported in soils ranging from 60 to 7,000 mg/kg. Elevated concentrations of semi-volatile organic compounds (SVOCs) in soils were reported, including naphthalene up to 3,900 µg/kg. Non-hexavalent chromium concentrations in soil were reported up to 15 mg/kg. Benzene was reported in groundwater at concentrations up to 2.7 mg/L (Dames & Moore, 1989).

The Eastbound Fueling Area consists of Parcel P/Q. Within this area, TPH concentrations were reported in soils at concentrations ranging from 26 to 48,000 mg/kg. Soil samples were reported as above regulatory levels for RCRA 8 metals: arsenic (up to 169 mg/kg), non-hexavalent chromium (up to 1,290 mg/kg), and lead (up to 1,230 mg/kg). Benzene was reported in groundwater at concentrations up to 1.5 µg/L (Dames & Moore, 1989).

The Day Storage Tank Area consists of Parcel P/Q. Within this area, TPH concentrations were reported in soils ranging from below laboratory detection limits to 23,000 mg/kg. Benzene was reported in groundwater at concentrations up to 2.1 mg/L (Dames & Moore, 1989).

In 1992, remedial activities at the UPRR site began per a NDEP-approved Remedial Action Plan (RAP). Figure 4 shows these areas of remedial excavation. Union Pacific negotiated cleanup standards with the NDEP consisting of five components. These five components were:

- 1) Removing all TPH impacted soil exceeding 100 milligrams per kilogram (mg/kg), as determined by United States Environmental Protection Agency (EPA) test method 8015M from the ground surface to a depth of 2.5 feet bgs;

- 1) Removing all TPH impacted soil exceeding 100 milligrams per kilogram (mg/kg), as determined by United States Environmental Protection Agency (EPA) test method 8015M from the ground surface to a depth of 2.5 feet bgs;
- 2) Removing all TPH impacted soil exceeding 10,000 mg/kg regardless of depth;
- 3) Responsibility for all TPH impacted soil exceeding 100 mg/kg which would be excavated during future site construction activities (such as the upcoming redevelopment projects);
- 4) Removing all lead-impacted soil in excess of 1,400 mg/kg; and
- 5) Recovering free phase TPH fuel product from the perched groundwater to a thickness of less than ½ inch in the formation.

Figure 5 shows the site's areas and depth to remaining TPH-impacted soils following UPRR remediation activities. Figure 6 shows the areas of remaining TPH concentrations in these areas. Additionally, it should be noted that UPRR remediated only the lighter petroleum hydrocarbons (C23 and lighter) so the presence of heavier petroleum hydrocarbons is possible inside the UPRR remediation extents. Existing treated fill on the Symphony Park site from the UPRR remediation activities is agreed by NDEP and City Parkway V to be *legally clean* based upon the No Further Action determination by NDEP in 1998. However, if indications of potentially impacted soils are observed by the CEM on-site during future development, the potentially impacted soils will be evaluated under the stipulations of this SGMP. Additionally, if impacted soils have been discovered by investigations after the No Further Action determination and prior to development, those impacted soils will be evaluated under the requirements of the SGMP.

A final closure report prepared in 1997 indicated that the requirements of the remedial action plan had been achieved. The lead-impacted soils were removed by excavation and transported offsite to an authorized disposal facility. Approximately 12,400 tons of lead-impacted soils were removed from the Wash Track Area. The TPH-impacted soils (as defined by the RAP) occurring at the targeted areas were removed by excavation and thermally treated onsite. Following treatment, the thermally treated soils were reused as on-site excavation backfill. According to the closure reports, approximately 26,000 tons of TPH-impacted soil were

removed from the Eastbound Fueling Area; approximately 13,500 tons from the Day Storage Tank Area; approximately 25,500 tons from the Diesel Shop Area; approximately 103,000 tons from the Fuel Storage Area; approximately 16,000 tons from the Wash Track; and approximately 49,000 tons from the Evaporation Pond Area. A groundwater recovery system was installed east of the Diesel Shop Area and at the Eastbound Fueling Area. These groundwater recovery systems consist of interceptor trenches that pumped total fluids (groundwater and product) through an oil/water separator to recover the free product. The water was discharged to city drains under permit.

According to results of the on-site groundwater monitoring wells in December 2000, fuel product thickness was measured in one well at the Fuel Storage area at 0.19 feet and in three wells at the Diesel Shop Area at thicknesses ranging from 0.04 to 0.53 feet. Fuel product was also measured in wells at the Eastbound Fueling Area. These wells were situated on the adjoining property to the northeast. In addition, low levels of TPH and VOCs (toluene, ethylbenzene, and xylene) were detected in the wells. The monitoring report indicated that no free product was recovered during the second half of 2000 from either the central or eastbound recovery systems. The report stated that very little recoverable petroleum product was left at the site and the recovery systems have since been shut-down.

2.4. CURRENT REMEDIATION AREA CLASSIFICATIONS

As shown on Figure 4, UPRR did not excavate and remediate soils across the entire 61-acre Symphony Park site. This SGMP applies specifically to those areas inside the UPRR remediation extents. For those areas outside the UPRR remediation extents, it is assumed that the soils are clean. However if, during the course of development in an area outside of the UPRR remediation extents, the developer's CEM observes indications of potentially impacted soils, the potentially impacted soils will be evaluated under the stipulations of this SGMP. A CEM shall be required to be present during excavation on the Symphony Park Site, regardless of the location of the development relative to the UPRR remediation extents and within areas containing treated undocumented fill. The UPRR remediation extents shown on Figure 4 and subsequent figures should be considered approximate. It is the developer's responsibility to define or verify the extents.

Additionally, it should be noted that UPRR remediated only the lighter petroleum hydrocarbons (C23 and lighter) so the presence of heavier petroleum hydrocarbons is possible inside the UPRR remediation extents. Existing treated fill on the Symphony Park site from the UPRR remediation activities is agreed by NDEP and City Parkway V to be *legally clean* based upon the No Further Action determination by NDEP in 1998. However, if indications of potentially impacted soils are observed by the CEM on-site during future excavation, the potentially impacted soils will be evaluated under the stipulations of this SGMP. Additionally, if impacted soils have been discovered by investigations after the No Further Action determination and prior to development, those impacted soils will be evaluated under the requirements of the SGMP.

2.5. ENVIRONMENTAL AND/OR HUMAN IMPACT

As part of the due diligence effort, each individual developer on the site is required to evaluate the environmental and human health impact to their project. Each evaluation is performed independently and addresses these impacts based on historical data, site specific data collection, building design and future intended land use. Structures that will be located on or near the areas found to have been most impacted from past releases may require mitigation measures.

As required under appropriate EPA and Occupational Safety and Health Administration (OSHA) regulations, worker health and safety during construction activities shall be addressed separately by the respective parcel contractors. Information provided in the historical documentation, this SGMP, and the sampling and analysis plan (SAP, Appendix A) shall be used to develop the proper precautions to be set forth related to possible hazardous material exposure.

3 ROLES AND RESPONSIBILITIES

The roles and responsibilities for the management of soils and groundwater are based upon the 2015 settlement between the City of Las Vegas and UPRR, in which the City of Las Vegas assumes all cost and risk for existing on-site contamination and relieved UPRR of their environmental obligations.

The roles and responsibilities for the Symphony Park project can be divided into four primary categories, which are 1) the regulatory agencies, 2) the current property owner (City Parkway V), 3) the Developer/General Contractor (various), and 4) the Certified Environmental Manager (CEM). These roles and responsibilities are summarized below.

3.1. REGULATORY AGENCIES

The regulatory agencies have various responsibilities per federal, state, and local regulations. The primary enforcement agency for this endeavor is the NDEP, with air quality enforcement falling under the jurisdiction of the Clark County Department of Air Quality (DAQ).

3.1.1. NDEP

The NDEP is the regulatory agency overseeing the project, and will be involved as appropriate. Unless NDEP specifies otherwise, all soil categorization will be performed by the CEM in accordance with this SGMP before transportation and disposal/treatment occurs. NDEP will review and approve this SGMP prior to its implementation. Soil categorization in accordance with this SGMP replaces NDEP approval for individual soil determinations.

3.1.2. CCDAQ

The DAQ will enforce the air quality regulations pertaining to fugitive dust and permitting and dust control. The Developer/General Contractor will be responsible for obtaining these permits and for permit compliance.

3.2. CITY PARKWAY V, INC.

City Parkway V will have overall coordination responsibility for the site as a whole and of the rights-of-ways. City Parkway V will designate area(s) for temporary stockpiling of soils and will arrange for disposal of contaminated, non-hazardous or RCRA hazardous soils.

3.3. THE DEVELOPER/GENERAL CONTRACTOR

Each Developer/General Contractor will have primary control of their respective sites, and will be responsible for their subcontractors and on-site personnel's adherence with this document. The Developer/General Contractor is responsible for all permits relating to their construction and facility activities such as air quality stationary source permits, dust permits, storm water pollution prevention permits, National Emissions Standards for Hazardous Air Pollutants (NESHAP) permits, and construction dewatering discharge permits or others as required.

The UPRR remediation extents shown on Figure 4 and subsequent figures should be considered approximate. It is the Developer/General Contractor's responsibility, with the assistance of the CEM, to define or verify the extents.

The Developer/General Contractor will be responsible for excavation of materials and placement of materials at a temporary stockpiling area(s), designated by City Parkway V. If a stockpiling area is not available, the Developer/General Contractor, assisted by the CEM, will be responsible for characterizing the soils prior to excavation by designing a three-dimensional sampling grid in accordance with the SAP. The CEM shall assist with precharacterization.

The CEM will sample the soils in accordance with the SAP and if the materials are considered useable on the site, the Developer/General Contractor will then be responsible for the material. If the material is considered contaminated, non-hazardous or RCRA hazardous, as defined in Section 4 – Soil and Waste Classifications, the material will be handled, transported, and disposed of by others.

The Developer/General Contractor will be required to assist the CEM with quantity estimates of all soil stockpiles that are not considered clean (as defined in Section 4) and with as-built documentation of the location and activity where these soils were generated (as defined in Sections 6 and 9).

3.4. CERTIFIED ENVIRONMENTAL MANAGER

The CEM has the authority to implement the SGMP in areas of known and unknown conditions. The CEM shall be present on-site during soil characterization, excavation, and removal activities. The CEM may be provided by City Parkway V or the Developer/General Contractor. CEM responsibilities for this project will include the following:

3.4.1. Permits

The CEM may assist with necessary environmental permits for construction of the projects that would be required by the Developer/General Contractor, or City Parkway V, for construction and facility activities, such as dust permits, storm water pollution prevention permits, NESHAP permits, New Source Performance Standard (NSPS) permits, and construction dewatering discharge permits.

3.4.2. Oversight

The CEM shall assist the Developer/General Contractor to define or verify the extents of the UPRR remediation. If potentially impacted soils are observed outside of the UPRR remediation area, the CEM will implement the requirements of this SGMP for those potentially impacted soils. The CEM shall provide direction to the Developer/General Contractor regarding soils inside the UPRR remediation extents and potentially impacted soils outside of the UPRR remediation extents.

The CEM shall provide direction to the Developer/General Contractor regarding the segregation and stockpiling of those soils classified in Section 4 of this document. If a stockpiling area is not available for excavated soils, the CEM shall assist the Developer/General Contractor in characterizing the soils prior to excavation by designing a three-dimensional sampling grid in accordance with the SAP, and performing sampling and characterization of that

three-dimensional sampling grid. The CEM shall implement the sampling and analysis plan (SAP), provided in Appendix A.

The CEM shall provide oversight of the testing, storage, handling, treatment, and transportation of any Hazardous Substances encountered during construction of the projects. The CEM shall coordinate with City Parkway V to provide onsite information. The CEM shall prepare for submittal the necessary environmental reports with NDEP. The CEM shall maintain an estimated volumetric accounting (as described in Sections 6 and 9 of this document) of all soil stockpiles that are not considered clean (as defined in Section 4). On a monthly basis, this accounting shall be sent to City Parkway V.

4 SOIL AND WASTE CLASSIFICATIONS

As shown on Figure 4, UPRR did not excavate and remediate soils across the entire 61-acre Symphony Park site. This SGMP applies specifically to those areas inside the UPRR remediation extents. For those areas outside the UPRR remediation extents, it is assumed that the soils are clean. However if, during the course of development in an area outside of the UPRR remediation extents, the CEM observes indications of potentially impacted soils, the potentially impacted soils will be evaluated under the stipulations of this SGMP.

Additionally, it should be noted that UPRR remediated only the lighter petroleum hydrocarbons (C23 and lighter) so the presence of heavier petroleum hydrocarbons is possible inside the UPRR remediation extents and within areas containing treated undocumented fill.

Testing of soils will be conducted in accordance with the Sampling and Analysis Plan (SAP) and method detection limits shall be lower than the appropriate regulatory limit, defined below in Table 4.1. Based upon the analytical results, the soil will be classified as discussed in this Section.

Classifications of soil and wastes for regulatory compliance, as well as for tracking and payment purposes, are described in this section. The decision tree matrix for classifying the soil, as defined in this Section, is provided as Figure B-1 in Appendix B.

Under the initial SGMP (Kleinfelder 2007a), the contaminant action levels for contaminants other than TPH were based upon the EPA Region 9 Preliminary Remediation Goals (PRGs) (October 2004). Due to the overall future use of the site, the Residential PRGs for soil have been selected as appropriate. The PRGs were replaced in 2009 with Regional Screening Levels (RSLs) which were developed by the EPA by harmonizing the Region 9 PRGs with similar risk-based screening levels used by EPA Regions 3 and 6. NDEP's Draft Guidelines for Discovery Events provide Reportable Concentrations (RCs) based on the EPA RSLs. The EPA RSLs are currently updated twice per year.

Under the initial SGMP, hydrocarbon-impacted soils were characterized based on the concentration of TPH, with soils containing 100 mg/kg or more of TPH being considered *contaminated*. Under this revised SGMP, hydrocarbon-impacted soils will be characterized based on the concentration of the hydrocarbon constituents, such as benzene. The 100 mg/kg threshold for TPH may be applicable, however, for contaminated soils being exported from the 61-acre Symphony Park site for recycling and disposal or possible reuse.

It is understood that the NDEP is continuously evaluating and updating their RCs and that the EPA updates their RSLs twice per year. It is the responsibility of the user of this SGMP or CEM to ensure that the latest applicable RCs, RSLs, or other applicable standards are being used.

A risk assessment performed in 2007 determined a range of 1 to 15 mg/kg for background concentrations of arsenic, which was used to establish a site-specific action level for the Symphony Park site of 15 mg/kg (Converse, 2007a).

4.1. CLEAN

Soils that are tested and found to be below laboratory detection limits for the constituents of concern are considered as *clean*. The constituents of concern are: BTEX (benzene, toluene, ethylbenzene, and total xylenes), RCRA 8 Metals (arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver), and other VOCs, SVOCs, and PCBs as appropriate based on individual project location. This material has no environmental reuse restrictions and, depending on its geotechnical suitability, can either be used on-site as backfill material, or transported off-site for reuse by others.

It should be noted that for off-site reuse by others, the receiving entity may have specific soil acceptance criteria that are not part of the Symphony Park suite of analyses. The Developer/General Contractor may be required to provide a copy of the analytical results and should verify each receiving entity's acceptance criteria.

4.2. LEGALLY CLEAN

Soils that are tested and found to contain constituents of concern at concentrations less than their respective regulatory limits are considered as *legally clean*. *Legally clean* soils may contain

one or more of the following: BTEX (benzene, toluene, ethylbenzene, and total xylenes), RCRA 8 Metals (arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver), and other VOCs, SVOCs, and PCBs at less than their respective EPA RSL for residential soils or the site-specific action level in the case of arsenic. Table 4-1 provides these criteria.

TABLE 4-1
CONTAMINANT ACTION LEVELS

TARGET COMPOUND ¹	EPA RSL ² (MG/KG)	SITE-SPECIFIC ACTION LEVEL (MG/KG)
Benzene	1.2 ³	None
Toluene	4,900 ⁴	None
Ethylbenzene	5.8 ³	None
Xylenes, total	580 ⁴	None
PCBs (Aroclor 1016)	4.1 ⁴	None
PCBs (Aroclor 1254)	0.24 ³	None
Arsenic	0.68 ³	15 ⁵
Barium	15,000 ⁴	None
Cadmium	71 ⁴	None
Chromium (total)	None	None
Lead	400 ⁴	None
Mercury	23 ⁴	None
Selenium	390 ⁴	None
Silver	390 ⁴	None

TABLE 4-1 Notes:

- 1) The individual compounds most likely to be present in the soil are presented.
- 2) Based on the overall future use of the project, the EPA Regional Screening Levels for Residential Soil are listed (May 2016). Where both are provided, the lesser of the carcinogenic and non-carcinogenic RSL is presented.
- 3) Carcinogenic RSL.
- 4) Non-carcinogenic RSL.
- 5) Kleinfelder 2007d, Document 80359/LVE7L139.

4.2.1. Legally Clean, On-Site Reuse

This material can be used on-site as backfill material.

4.2.2. Legally Clean, Off-Site Transport

If *legally clean* material will be taken off-site, it should be noted that the receiver may have specific acceptance criteria which may require additional testing and/or a project-specific risk assessment. The Developer/Site General Contractor will need to verify the acceptance criteria for off-site disposal or reuse.

4.3. CONTAMINATED, NON-HAZARDOUS

Soil that has been tested and found to contain constituents of concern at concentrations exceeding their respective regulatory limits (Table 4.1), but whose concentrations are less than their respective RCRA limits (Tables 4.2 and 4.3), are considered to be *contaminated, non-hazardous* soil.

If *contaminated, non-hazardous* soil will be reused on the 61-acre Symphony Park site, a use-specific risk assessment must be conducted for the soil prior to its placement. If a developer gains approval to reuse *contaminated, non-hazardous* soil on-site, CEM oversight is required during that reuse.

It should be noted that intended reuse sites may have requirements for accepting the soil which may require additional testing and/or a project specific risk assessment. If *contaminated, non-hazardous* soil will be transported off site for reuse, additional testing for Total Petroleum Hydrocarbons (TPH) may be required to determine reuse acceptability.

If *contaminated, non-hazardous* soil will be transported off site for either disposal or recycling, it must go to a facility capable of accepting the material. Within southern Nevada, *contaminated, non-hazardous* soil is typically accepted by the following facilities:

- Las Vegas Paving's petroleum impacted soils recycling facility, located in Clark County, Nevada
- Republic Services of Southern Nevada's APEX Regional Landfill, located in Clark County, Nevada
- US Ecology Nevada facility, located in Nye County, near Beatty, Nevada

City Parkway V will be notified to coordinate/arrange for the transport and disposal. The CEM will assist with the coordination, if requested.

If an analyte result exceeds its respective RSL or site-specific limit, it may be necessary to request soil sample(s) be additionally run for Toxicity Characteristic Leaching Procedure (TCLP) analyses, to verify if such soils may be classified as *RCRA hazardous*. *RCRA hazardous* soils are discussed in Section 4.4.

4.4. RCRA HAZARDOUS (FEDERALLY DESIGNATED WASTES)

As previously stated, if the result of an analyte exceeds its respective RSL or site-specific limit, it may be necessary to further evaluate the soil to determine whether it should be classified as *RCRA hazardous* instead of *contaminated, non-hazardous* prior to disposal off-site.

For metals, initial screening would be determined by use of the 20 times rule. For non-metals, this would be determined by comparing the concentration of the analyte in question to its respective TCLP limit, if established. Tables 4-2 and 4-3 provide these criteria for metals and non-metals, respectively. If initial laboratory analysis results in a concentration that exceeds the constituent's 20 times rule (metals) or TCLP limit (non-metals), then TCLP analysis must be performed.

Soil that has been tested by TCLP and found to contain constituents of concern at concentrations exceeding their respective RCRA TCLP limits, are considered to be *RCRA hazardous*. Soil that is reported to contain PCB is considered as *RCRA hazardous*. *RCRA hazardous* soils shall not be reused on the 61-acre Symphony Park site and must be exported for disposal. *RCRA hazardous* wastes require a hazardous waste transporter, a hazardous waste manifest, and disposal at a facility capable of accepting the material. Within southern Nevada, *RCRA hazardous* soil is typically accepted by US Ecology Nevada facility, located in Nye County, near Beatty, Nevada.

TABLE 4.2
RCRA TCLP CRITERIA – METALS

ANALYTE	TCLP LIMITS (MG/L)	20 TIMES TCLP CRITERIA (MG/KG)
Arsenic	5.0	100
Barium	100	2000
Cadmium	1.0	20
Chromium	5.0	100
Lead	5.0	100
Mercury	0.2	4.0
Selenium	1.0	20
Silver	5.0	100

TABLE 4.3
RCRA TCLP CRITERIA – NON-METALS

ANALYTE	TCLP LIMITS (MG/L)
Benzene	0.5
Carbon Tetrachloride	0.5
Chlordane	0.03
Chlorobenzene	100.0
Chloroform	6.0
o-Creosol	200.0 ¹
m-Creosol	200.0 ¹
p-Creosol	200.0 ¹
2,4-D	10.0
1,4-Dichlorobenzene	7.5
1,2-Dichlorobenzene	0.5
1,1-Dichloroethylene	0.7
2,4-Dinitrotoluene	0.13
Hexachlorobenzene	0.13
Hexachlorobutadiene	0.5
Hexachloroethane	3.0
Tetrachloroethylene	0.7
Trichloroethylene	0.5
Vinyl Chloride	0.2

Note: ¹ If o-, m-, and p-Creosol concentrations cannot be differentiated, the total Creosol concentration is used. The regulatory level of total creosol is 200 mg/L.

City Parkway V will be notified to coordinate/arrange the transport and disposal. The CEM will assist with the coordination, if requested.

4.5. IMPORT FILL MATERIAL

If import material is required, fill import will need to meet the definition of *clean* or *legally clean*, as defined in Sections 4.1 and 4.2. The Developer/General Contractor shall certify the material as *clean* or *legally clean*.

5 LOCATIONS OF KNOWN SOIL AND GROUNDWATER IMPACT

During development, the quantities and categories (refer to Section 4) of soil excavated will vary by parcel. While the locations of soil and groundwater impacts within the 61 acres comprising the Symphony Park property have been documented in previous investigations and remedial actions, the property will be developed by various Developer/General Contractors. Individually, the parcels' known soils and groundwater impacts, along with what is mapped as remaining, is summarized below. Figure 2 shows these parcel locations within the Symphony Park site. It should be noted that the requirements of this SGMP apply to future development of the Symphony Park site, including redevelopment and/or expansion of currently developed areas.

5.1. PARCEL A1

Parcel A1 is located in the southwestern-most corner of the property. This parcel is located in the former UPRR Wash Track Area, which was used for cleaning out railroad cars and later for storage of railroad cars and lumber. During UPRR's past remediation activities, soil with TPH concentrations up to 3,300 mg/kg was removed from this parcel to depths of 2.5 feet in the eastern portion of the parcel.

This parcel is currently developed as the Cleveland Clinic Lou Ruvo Center for Brain Health. During pre-excavation investigation, buried debris was encountered in the south and southeastern areas of the parcel, including arsenic/creosote treated wood, steel, and transite pipe. During the mass excavation and sewer trenching activities, the excavated soils were found to be impacted with arsenic concentrations ranging from 1.1 to 31 mg/kg, which was above then-current action level of 0.39 mg/kg. The site-specific action level for arsenic for the Symphony Park site was subsequently established as 15 mg/kg. Approximately 1,039 cubic yards of TPH-impacted soils were excavated, with concentrations up to 124 mg/kg, primarily in the C12-C35 range (Kleinfelder 2007b, 2007c).

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.2. PARCEL A2

Parcel A2 is located in the southwestern corner of the site, on the northern boundary of Parcel A1. This parcel is located in the former UPRR Wash Track Area, which was used for cleaning out railroad cars and later for storage of railroad cars and lumber. During UPRR's past remediation activities, soil with TPH concentrations up to 3,300 mg/kg were removed from this parcel to depths of 2.5 feet in the eastern portion of the parcel.

Future development plans for this parcel include Class A office or medical office building construction. This parcel is now developed as a temporary parking area for the Cleveland Clinic Lou Ruvo Center for Brain Health located on parcel A1. An underground power utility trench was excavated along the western boundary of the parcel, feeding to parcel A1. The excavated soils were found to be impacted with arsenic at a concentration of 2.9 mg/kg, which was above the then-current action level of 0.39 mg/kg. The site-specific action level for arsenic for the Symphony Park site was subsequently established as 15 mg/kg. TPH was found in the soil below the action limit of 100 mg/kg. Current known contaminants of concern on this parcel consist of TPH. Suspected or potential contaminants of concern consist of lead and arsenic. Figures 9 and 10 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPHs.

5.3. PARCEL B

Parcel B is located on the western side of the property, along the northern boundary of Parcel A2. This parcel is located in the former UPRR Wash Track Area, which was used for cleaning out railroad cars and later for storage of railroad cars and lumber. During UPRR's past remediation activities, soil with negligible concentrations of TPHs was removed from along the northern boundary of this parcel to depths of 2.5 feet.

Future development plans for this parcel include Class A office or medical office building construction. This parcel is now developed as a temporary parking area for the Smith Center for the Performing Arts. During mass grading and utility trenching for the parking lot, TPH- and metals-impacted soils were encountered from the ground surface to a depth of approximately

two feet over most of the parcel. Elevated concentrations of arsenic, chromium, and lead were encountered, and approximately 30 tons of soil was impacted with lead above RCRA levels and handled as RCRA hazardous material (Kleinfelder 2014).

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.4. PARCEL C

Parcel C is located on the northwestern side of the property, along the northern boundary of Parcels M1 and M2. This parcel is located in the former UPRR Evaporation Pond Area, which was used for waste water treatment and included two excavated evaporation ponds, a steel tank oil-water separator, and an equalization basin with skimmer. During UPRR's past remediation activities, soil with TPH concentrations up to 19,000 mg/kg was removed from this parcel to depths of 2.5 feet over most of the parcel. Soil with TPH concentrations up to 3,000 mg/kg was removed from this parcel to depths of 5 feet in the southwest corner of the parcel.

Future development plans for this parcel include residential construction. A human health risk assessment was performed in 2007 determined that the residual VOCs in the soil vapor do not pose an unacceptable health hazard under a future residential land use scenario involving construction of high rise residential housing units (Kleinfelder 2007e). Soil sampling results during this investigation included TPH up to 2,500 mg/kg, and VOCs and PAHs detected below their action limits. Sign footings were placed in the southwest corner of the parcel in 2011. Soils were excavated to depths of two to three feet, with TPH and metals concentrations determined to be below action limits. Current known contaminants of concern on this parcel consist of TPH. Suspected or potential contaminants of concern consist of associated VOCs and SVOCs. Figures 11 and 12 show soil depths to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.5. PARCEL D

Parcel D is located on the northwestern side of the property, along the northern boundary of Parcel C. Figure 2 shows this parcel's location within the Symphony Park site. Portions of this parcel are located in the former UPRR Evaporation Pond Area, which was used for waste water treatment and included two excavated evaporation ponds, a steel tank oil-water separator, and an equalization basin with skimmer; and in the former Diesel Shop Area, which was used for service, maintenance, and storage of diesel locomotives. During UPRR's past remediation activities, soil with TPH concentrations less than 100 mg/kg was removed from the southwestern corner of this parcel to depths of 2.5 feet.

Future development plans for this parcel include residential construction. A human health risk assessment was performed in 2007 determined that the residual VOCs in the soil vapor do not pose an unacceptable health hazard under a future residential land use scenario involving construction of high rise residential housing units (Kleinfelder 2007e). Soil sampling results during this investigation included TPH up to 2,500 mg/kg, and VOCs and PAHs detected below their action limits. Current known contaminants of concern on this parcel consist of TPH. Figures 13 and 14 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

The majority of Parcel D is outside the UPRR remediation extents. For those areas outside the UPRR remediation extents, it is assumed that the soils are clean based on the No Further Action determination by NDEP following UPRR's remediation activity. However if, during the course of development in an area outside of the UPRR remediation extents, the CEM observes indications of potentially impacted soils, the potentially impacted soils will be evaluated under the stipulations of this SGMP. The CEM shall also inform City Parkway V when potentially impacted soils are observed.

5.6. PARCEL E

Parcel E is located on the northern side of the property, along the northeastern boundary of Parcel D. This Parcel is not located within any former UPRR operations areas, and no soil has been removed from this parcel during UPRR's past remediation activities.

Future development plans for this parcel include a sporting event arena or stadium. A limited site investigation was performed on this parcel in 2007 with soil samples collected from depths up to 24 feet (Terracon 2007). TPH was found at concentrations up to 18,000 mg/kg and TPH in groundwater exceeded the National Pollution Elimination Discharge Permit (NPDES) limit of 1 mg/L. The samples were not analyzed for metals. Sign footings were placed in the northwest corner of the parcel in 2011. Soils were excavated to depths of two to three feet, with TPH and metals concentrations determined to be below action limits.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

Parcel E is outside the UPRR remediation extents. For those areas outside the UPRR remediation extents, it is assumed that the soils are clean based on the No Further Action determination by NDEP following UPRR's remediation activity. However if, during the course of development in an area outside of the UPRR remediation extents, the CEM observes indications of potentially impacted soils, the potentially impacted soils will be evaluated under the stipulations of this SGMP. The CEM shall also inform City Parkway V when potentially impacted soils are observed.

5.7. PARCEL F

Parcel F is located near the center of the property, on the southern boundary of Parcel E and the eastern boundary of Parcel D. This parcel is located in the former UPRR Diesel Shop Area, which was used for service, maintenance, and storage of diesel locomotives. During UPRR's past remediation activities, soil with TPH concentrations up to 21,000 mg/kg was removed from this parcel to depths of 7.5 feet on the southern end of the parcel and around the locations of former structures. Soil with TPH concentrations up to 1,100 mg/kg was removed from this parcel to depths of five feet along the southern boundary and between the locations of former structures on the parcel.

Future development plans for this parcel include residential construction. A human health risk assessment was performed in 2007 determined that the residual VOCs in the soil vapor do not pose an unacceptable health hazard under a future residential land use scenario involving construction of high rise residential housing units (Kleinfelder 2007e). Soil sampling results during this investigation included TPH up to 2,500 mg/kg, and VOCs and PAHs detected below their action limits. Current known contaminants of concern on this parcel consist of TPH. Suspected or potential contaminants of concern consist of VOCs, including chlorinated solvents. Figures 15 and 16 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

The northern portion of Parcel F is outside the UPRR remediation extents. For those areas outside the UPRR remediation extents, it is assumed that the soils are clean based on the No Further Action determination by NDEP following UPRR's remediation activity. However if, during the course of development in an area outside of the UPRR remediation extents, the CEM observes indications of potentially impacted soils, the potentially impacted soils will be evaluated under the stipulations of this SGMP. The CEM shall also inform City Parkway V when potentially impacted soils are observed.

5.8. PARCEL G

Parcel G is located near the center of the property, on the eastern/northeastern boundaries of Parcels F and D and the northern boundary of Parcel M3. This parcel is located in the former UPRR Diesel Shop Area, which was used for service, maintenance, and storage of diesel locomotives. During UPRR's past remediation activities, soil with TPH concentrations up to 21,000 mg/kg was removed from this parcel to depths of 7.5 feet on the southern end of the parcel and around the locations of former structures. Soil with TPH concentrations up to 1,100 mg/kg was removed from this parcel to depths of five feet between the locations of former structures on the parcel.

Future development plans for this parcel include a hotel. A subsurface investigation was performed on this parcel in 2007, with TPH concentrations reported up to 2,027 mg/kg in soil and above the NPDES limit in groundwater (Western Technologies, Inc. 2007). Current known

contaminants of concern on this parcel consist of TPH. Arsenic was found at concentrations up to 5.2 mg/kg, which was above the then-current limit. The site-specific action level for arsenic for the Symphony Park site was subsequently established as 15 mg/kg. Suspected or potential contaminants of concern consist of VOCs, including chlorinated solvents. Figures 15 and 16 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.9. PARCEL H/I

Parcel H/I is located near the center of the property, on the southern boundary of Parcel M3. This parcel is located in the former UPRR Fuel Storage Area, which included the Cal-Nev pipeline terminal, four above-ground storage tanks (ASTs), a fuel car loading area, and a pump house with associated piping. Specifically, this parcel contains the former locations of the Cal-Nev pipeline terminal, two of the ASTs, and a portion of the fuel loading area. During UPRR's past remediation activities, soil with TPH concentrations up to 44,000 mg/kg was removed from this parcel to depths of five feet in the southeastern half of the parcel. Soil with TPH concentrations up to 14,000 mg/kg was removed from this parcel to depths of 7.5 feet along the western part of the southern boundary of the parcel. Soil with TPH concentrations up to 6,800 mg/kg was removed from this parcel to depths of 10 feet along the eastern part of the southern boundary of the parcel.

This parcel is now developed as The Smith Center for the Performing Arts and the Discovery Children's Museum. Pre-excavation sampling was performed in 2010 to depths between nine and 12 feet, with TPH concentrations up to 3,450 mg/kg (Kleinfelder 2010). One grid cell from a depth of three to six feet contained lead at a concentration of 840 mg/kg. Other RCRA 8 metals concentrations during the pre-excavation investigation were below action limits. Piers were drilled for the Discover Children's Museum in 2011, with TPH up to 66 mg/kg and metals below action limits (Kleinfelder 2011a).

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.10. PARCEL J

Parcel J is located on the southern border of the property, along the southern boundary of Parcels H/I and the eastern boundary of Parcels A1 and A2. This parcel is located in the former UPRR Fuel Storage Area, which included the Cal-Nev pipeline terminal, four above-ground storage tanks (ASTs), a fuel car loading area, and a pump house with associated piping. Specifically, this parcel contains the former locations of two of the ASTs, a portion of the fuel loading area, and the pumphouse. During UPRR's past remediation activities, soil with TPH concentrations up to 44,000 mg/kg was removed from this parcel to depths of 7.5 feet in the northern and eastern portions of the parcel.

Future development plans for this parcel include Class A office or medical office construction. A limited subsurface assessment in 2007 found TPH-impacted soil with concentrations in the north/central area of the parcel up to 1,000 mg/kg and concentrations in the eastern area of the parcel up to 10,000 mg/kg (Converse 2007b). VOCs and SVOCs were detected below RCs and RSLs, and metals were not analyzed. Sign footings were placed in the southwest corner of the parcel in 2011. Soils were excavated to depths of two to three feet, with TPH and metals concentrations determined to be below action limits. Figures 19 and 20 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Prior to monitoring well abandonment activities on this parcel, groundwater samples were collected and analyzed (Kleinfelder 2008a). TPH, VOCs and SVOCs were not detected, and metals and other inorganic constituents were below RCs.

The majority of Parcel J is outside the UPRR remediation extents. For those areas outside the UPRR remediation extents, it is assumed that the soils are clean based on the No Further Action determination by NDEP following UPRR's remediation activity. However if, during the course of development in an area outside of the UPRR remediation extents, the CEM observes indications of potentially impacted soils, the potentially impacted soils will be evaluated under the stipulations of this SGMP. The CEM shall also inform City Parkway V when potentially impacted soils are observed.

5.11. PARCEL K

Parcel K is located in the southeastern corner of the property, along the eastern boundary of Parcel J. This parcel is located in the former UPRR Fuel Storage Area, which included the Cal-Nev pipeline terminal, four above-ground storage tanks (ASTs), a fuel car loading area, and a pump house with associated piping. Specifically, this parcel contains the former locations of railroad siding tracks. During UPRR's past remediation activities, soil with TPH concentrations up to 380 mg/kg was removed from this parcel to depths of five feet in the northwestern quarter of the parcel.

Future development plans for this parcel include Class A office or medical office construction. This parcel is now developed as a temporary paved parking lot for the Smith Center for the Performing Arts. A box culvert and temporary parking area were constructed on this parcel in 2011/2012, with TPH concentrations up to 120 mg/kg, and metals and VOCs reported below their action limits. Footings for a pedestrian bridge were placed between Parcels K and L in 2012. Pre-excavation sampling to a depth of 8 feet found TPH up to 2,000 mg/kg, and metals, VOCs, SVOCs, and PCBs were either below laboratory detection limits or below action limits. Current known contaminants of concern on this parcel consist of TPHs. Suspected or potential contaminants of concern consist of VOCs and SVOCs associated with diesel fuel. Figures 21 and 22 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Prior to monitoring well abandonment activities on this parcel, groundwater samples were collected and analyzed (Kleinfelder 2008a). TPH, VOCs and SVOCs were not detected, and metals and other inorganic constituents were below RCs.

5.12. PARCEL L

Parcel L is located on the southeastern border of the property, along the northern boundary of Parcel K and the eastern boundary of Parcels H/I. This parcel is located in the former UPRR Fuel Storage Area, which included the Cal-Nev pipeline terminal, four above-ground storage tanks (ASTs), a fuel car loading area, and a pump house with associated piping. Specifically, this parcel contains the former locations of railroad siding tracks. During UPRR's past remediation activities, soil with TPH concentrations up to 1,800 mg/kg was removed from this

parcel to depths of five feet over most of the parcel. Soil with concentrations up to 860 mg/kg was removed from depths of 10 feet in the northwest portion of the parcel.

Future development plans for this parcel include medical offices and a senior housing/independent living facility. This parcel is now developed as a temporary paved parking lot for the Smith Center for the Performing Arts. A box culvert and temporary parking area were constructed on this parcel in 2011/2012, with TPH concentrations up to 690 mg/kg, and metals and VOCs reported below their action limits. A human health risk assessment in 2007, updated in 2012, determined that trichloroethene concentrations in soil vapor are at levels that do not require further investigation, remediation, or mitigation (Kleinfelder 2007f, 2012b). A pedestrian bridge was constructed in the southeastern corner of the parcel in 2012 (Kleinfelder 2012c). Pre-excavation sampling to a depth of 8 feet found TPH up to 2,000 mg/kg, and metals, VOCs, SVOCs, and PCBs were either below laboratory detection limits or below action limits. Current known contaminants of concern on this parcel consist of TPHs. Suspected or potential contaminants of concern consist of VOCs and SVOCs associated with diesel fuel. Figures 23 and 24 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.13. PARCEL M1

Parcel M1 is located on the northwestern side of the property, along the northern boundary of Parcel B, the southern boundary of Parcel C, and the western boundary of Parcel M2. This parcel is located in the former UPRR Evaporation Pond Area, which was used for waste water treatment and included two excavated evaporation ponds, a steel tank oil-water separator, and an equalization basin with skimmer. During UPRR's past remediation activities, soil with TPH concentrations up to 19,000 mg/kg was removed from this parcel to depths of 2.5 feet over most of the parcel. Soil with TPH concentrations up to 3,100 mg/kg was removed from this parcel to depths of 7.5 feet on the western side of the parcel.

This parcel is currently developed as green space. During development of the parcel, TPH-impacted soils were encountered with concentrations up to 450 mg/kg (Kleinfelder 2012a). Metals, VOCs, SVOCs and PCBs were not found to exceed their action limits.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.14. PARCEL M2

Parcel M2 is located on the northwestern side of the property, along the northern boundary of Parcel B, the southern boundary of Parcel C, and the eastern boundary of Parcel M1. This parcel is located in the former UPRR Evaporation Pond Area, which was used for waste water treatment and included two excavated evaporation ponds, a steel tank oil-water separator, and an equalization basin with skimmer. During UPRR's past remediation activities, soil with TPH concentrations up to 19,000 mg/kg was removed from this parcel to depths of 2.5 feet over most of the parcel.

This parcel is currently developed as green space. During development of the parcel, TPH-impacted soils were encountered with concentrations up to 18,500 mg/kg (Kleinfelder 2012a). Metals, VOCs, SVOCs and PCBs were not found to exceed their action limits.

Groundwater impacts on the site are known to be associated with past site uses consist of TPH.

5.15. PARCEL M3

Parcel M3 is located near the center of the property, bounded by Parcels F, G, M4, H/I, and M2. This parcel is located in the former UPRR Diesel Shop Area, which was used for service, maintenance, and storage of diesel locomotives. During UPRR's past remediation activities, soil with TPH concentrations up to 560 mg/kg was removed from this parcel to depths of five feet in the southern two-thirds of the parcel.

This parcel is currently developed as green space. During pre-excavation investigation of the parcel, TPH-impacted soils were encountered with concentrations up to 4,700 mg/kg (Kleinfelder 2011b). Arsenic was found at concentrations up to 140 mg/kg and depths up to 11 feet. One surface soil sample contained chromium at a concentration of 240 mg/kg.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.16. PARCEL M4

Parcel M4 is located on the eastern border of the property, along the southern boundary of Parcel N, the northern boundary of Parcel L and the eastern boundary of Parcel M3. This parcel is located in the former UPRR Fuel Storage Area, which included the Cal-Nev pipeline terminal, four above-ground storage tanks (ASTs), a fuel car loading area, and a pump house with associated piping. Specifically, this parcel contains the former location of railroad siding tracks. During UPRR's past remediation activities, soil with TPH concentrations up to 35,000 mg/kg was removed from this parcel to depths of five feet over most of the parcel.

This parcel is now developed as a temporary paved parking lot for the Smith Center for the Performing Arts. A temporary parking area was constructed on this parcel in 2011/2012, with TPH concentrations up to 190 mg/kg, and metals and VOCs reported below their action limits. Current known contaminants of concern on this parcel consist of TPHs. Suspected or potential contaminants of concern consist of VOCs and SVOCs associated with diesel fuel. Figures 29 and 30 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.17. PARCEL N

Parcel N is located along the eastern border of the property, along the southern boundary of Parcel O1, the northern boundary of Parcel M4 and the eastern boundary of Parcels F/G. This parcel is located in the former UPRR Area East of Diesel Shop, which included a pipeline that ran from the fuel storage area to the eastbound fueling area. During UPRR's past remediation activities, soil with TPH concentrations up to 3,600 mg/kg was removed from this parcel to depths of five feet in the southwestern quarter of the parcel and along the pipeline location. Soil with TPH concentrations up to 8,300 mg/kg were removed from this parcel to depths of 7.5 feet along an alignment parallel to the pipeline location.

Future development plans for this parcel include residential construction. This parcel is now developed as a temporary paved parking lot for the Smith Center for the Performing Arts. A human health risk assessment in 2007 determined that VOC concentrations in soil vapor are at

levels that do not require further investigation, remediation, or mitigation (Kleinfelder 2007f). A temporary parking area was constructed on this parcel in 2011/2012, with TPH concentrations up to 212 mg/kg, and metals and VOCs reported below their action limits. Current known contaminants of concern on this parcel consist of TPHs. Suspected or potential contaminants of concern consist of VOCs associated with diesel fuel. Figures 31 and 32 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.18. PARCEL O1

Parcel O1 is located along the eastern border of the property, along the southern boundary of Parcel O2, the northern boundary of Parcel N and the eastern boundary of Parcel E. This parcel is located in the former UPRR Area East of Diesel Shop, which included a pipeline that ran from the fuel storage area to the eastbound fueling area. During UPRR's past remediation activities, soil with TPH concentrations up to 1,900 mg/kg was removed from this parcel to depths of five feet along the pipeline location. Soil with TPH concentrations up to 6,300 mg/kg were removed from this parcel to depths of 7.5 feet from a location north of the pipeline location.

Future development plans for this parcel include residential construction. This parcel is now developed as a temporary paved parking lot for the Smith Center for the Performing Arts. A human health risk assessment was performed in 2007 determined that the residual VOCs in the soil vapor do not pose an unacceptable health hazard under a future residential land use scenario involving construction of high rise residential housing units (Kleinfelder 2007e). Soil sampling results during this investigation included TPH up to 2,500 mg/kg, and VOCs and PAHs detected below their action limits. A box culvert and temporary parking area were constructed on this parcel in 2011/2012, with TPH concentrations up to 6,800 mg/kg, and metals, VOCs, and PCBs reported below their action limits. Buried piping was encountered, which tested negative for asbestos. Current known contaminants of concern on this parcel consist of TPHs. Suspected or potential contaminants of concern consist of VOCs associated with diesel fuel. Figures 33 and 34 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.19. PARCEL O2

Parcel O2 is located along the eastern border of the property, along the southern boundary of Parcel P/Q, the northern boundary of Parcel O1 and the eastern boundary of Parcel E. This parcel is located in the former UPRR Area East of Diesel Shop, which included a pipeline that ran from the fuel storage area to the eastbound fueling area. During UPRR's past remediation activities, soil with TPH concentrations up to 880 mg/kg was removed from this parcel to depths of five feet along the pipeline location.

Future development plans for this parcel include residential construction. This parcel is now developed as a temporary paved parking lot for the Smith Center for the Performing Arts. A human health risk assessment was performed in 2007 determined that the residual VOCs in the soil vapor do not pose an unacceptable health hazard under a future residential land use scenario involving construction of high rise residential housing units (Kleinfelder 2007e). Soil sampling results during this investigation included TPH up to 2,500 mg/kg, and VOCs and PAHs detected below their action limits. A box culvert and temporary parking area were constructed on this parcel in 2011/2012, with TPH concentrations up to 146 mg/kg, and metals and VOCs reported below their action limits. Current known contaminants of concern on this parcel consist of TPHs. Suspected or potential contaminants of concern consist of VOCs associated with diesel fuel. Figures 35 and 36 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.20. PARCEL P/Q

Parcel P/Q is located along the eastern border of the property, the northern boundary of Parcel O2 and the eastern boundary of Parcel E. This parcel is located in three former UPRR Areas: East of Diesel Shop, which included a pipeline that ran from the fuel storage area to the eastbound fueling area, and Eastbound Fueling Area, which was used for fueling locomotives departing to the east, and part of the Day Storage Tank Area, which contained a pump station and three diesel ASTs. During UPRR's past remediation activities, soil with TPH concentrations

up to 1,100 mg/kg was removed from this parcel to depths of five feet along the pipeline location, soil with TPH concentrations up to 7,900 mg/kg was removed to depths of five feet in the northeastern corner of the parcel, and soil with TPH concentrations up to 480 mg/kg was removed to depths of five feet in the northwestern corner of the parcel.

Future development plans for this parcel include a casino/hotel. A human health risk assessment was performed on this parcel in 2008 which determined that indoor air concentrations of the VOCs investigated will not reach a level requiring further investigation or mitigation (Kleinfelder 2008c). Soil samples collected during the investigation contained TPH at concentrations up to 3,100 mg/kg (primarily C10-C35) and selenium above the RC at a concentration of 87 mg/kg. VOCs and SVOCs were detected at concentrations below the RCs and RSLs. A box culvert was constructed on this parcel in 2011/2012, with TPH concentrations reported up to 42 mg/kg, and metals and VOCs reported below their action limits. A pedestrian bridge was constructed on the east edge of the parcel in 2015, with TPH concentrations reported up to 490 mg/kg (Kleinfelder 2015). Figures 37 to 40 show soil depth to remaining TPH-impacted soils and the remaining TPH concentrations, respectively.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

5.21. RIGHT-OF-WAYS

Right-of-ways are located along the parcel boundaries. Right-of-ways will transect various Parcels, discussed previously within this Section, and will be handled by City Parkway V. Figures showing the depth to remaining TPH-impacted soils and the remaining TPH concentrations for the right-of-ways are shown on Figures 5 through 40.

Groundwater impacts on the site known to be associated with past site uses consist of TPH.

6 SOIL MANAGEMENT REQUIREMENTS

As discussed in Section 5, the quantity of impacted soil, the contaminants of concern, and the concentrations of those contaminants of concern will vary by parcel. Initial on-site handling of soil will be performed by the Developer/General Contractor. The Developer/General Contractor should plan on segregating the soil based upon the information presented in Sections 4 and 5 of this document, and when unexpected conditions are encountered, as directed by the CEM.

Regardless of the method of soil removal, there are two soil management scenarios anticipated for the site activities involving removal of soils. These are 1) on-site stockpiling and sampling and 2) pre-excavation sampling and short-term staging. Soil management is dependent, in part, upon these scenarios and is discussed in this Section. Sampling protocol for both scenarios is discussed in the SAP.

During ongoing excavation activities in areas where contamination is anticipated to be encountered, or which during excavation activities, soils (or the excavation face) exhibit evidence of odors, staining, or vapors; the on-site CEM may, at his/her discretion decide to screen the soils for the purpose of stockpile segregation. Screening would consist of one or more of the following techniques: PID readings, visual observations, or field testing for arsenic, lead, or PCBs.

UPRR did not excavate and remediate soils across the entire 61-acre Symphony Park site. This SGMP applies specifically to those areas inside the UPRR remediation extents. For those areas outside the UPRR remediation extents, it is assumed that the soils are clean. However if, during the course of development in an area outside of the UPRR remediation extents, the CEM observes indications of potentially impacted soils, the potentially impacted soils will be evaluated under the requirements of this SGMP.

6.1. ON-SITE STOCKPILING AND SAMPLING

To allow for proper handling, documentation and record keeping of each soil classification, their source location and the purpose of their removal (Sections 4 and 9), City Parkway V shall

designate separate stockpile areas for each parcel. These can be located within one large designated area, or within various areas. Consideration should be given to haul routes and distance of travel so that temporary transport and stockpile storage remains within the Symphony Park boundary property (to minimize crossing roadways or public accessible areas).

Stockpiles will be separated and identified by excavation location and depth. It should also be noted that the Clark County Department of Air Quality (DAQ) Dust Control Handbook limits stockpile height to eight feet.

All stockpiled soils will be placed within a bermed containment area on an impervious working surface. To prevent entry of vehicles into the storage area, the containment berm should be a minimum of three feet in height but not high enough to prevent loading of trucks parked outside the containment. Examples of containment berm materials would be clean soil, pre-cast concrete separators (Jersey rails, K-rail medians), or hay bales. Whichever material is selected, it must be sufficiently constructed and maintained to prevent soils and water from exiting or entering the area. A single entrance point into the bermed area should be constructed and sufficiently ramped so that the storage area can be entered by rubber-tired loading equipment; can be used by loaded haul trucks to dump into the bermed areas; can be used for loading material from the ramp into empty haul trucks; and does not allow storm water sheet flow runoff into or out of the storage area. An example of a soil storage area is included in Appendix B, as Figure B-2.

The following three potential occurrences at the stockpiled soil storage area(s) can be mitigated through the use of the requirements of Section 8.1, which discusses how dust control and mitigation should be conducted as required by Clark County Air Quality Regulations:

- Total petroleum hydrocarbon (TPH) and/or volatile organic compound (VOC) vapor emissions from the stockpile(s).
- Dust emissions from the stockpile(s).
- Odor emissions from the stockpile(s).

6.1.1. Containment of Semi-Liquid Soils

Construction requirements may call for drilled shaft piers as foundation support for the structures being built which may result in drilling spoils that need to be contained on-site while awaiting analytical results. As drilled shaft spoils are a semi-liquid mixture of soil, groundwater, and drilling mud, the spoils shall be contained in a bermed area, lined with an impervious layer, such as visqueen. This containment area shall be constructed in such a way that the drilled shaft spoils do not run off onto the surrounding ground or seep through to the underlying ground. Additionally, since the site contamination is primarily associated with petroleum hydrocarbons in the soils above groundwater and at the groundwater interface, soils should be segregated by excavation depths.

6.2. PRE-EXCAVATION SAMPLING AND SHORT-TERM STAGING

At the discretion of City Parkway V, the Developer/General Contractor with the assistance of the CEM shall characterize the subsurface soils to be excavated, prior to excavation activities, by creating a three-dimensional grid of the soil area to be excavated. Pre-excavation characterization would be accomplished through the use of test pits, trenches, or boreholes. If a three-dimensional pre-excavation characterization of the entire excavation volume is not feasible, other sampling techniques could be used such as a phased excavation schedule with pre-excavation characterization performed prior to each phase.

Short-term staging of investigation spoils on-site may be required and shall follow the requirements outlined in Section 6.1 for stockpiled soils. Short-term staging may include utilizing containers (e.g. 40-cubic yard containers) instead of exposed stockpiles. In either case, the requirements of an impervious working surface shall be maintained.

Based on the analytical results of the pre-excavation characterization the CEM will direct the Developer/General Contractor during excavation activities, so that the soils are excavated from the ground and placed directly into trucks or containers for offsite disposal or recycling, or stockpiled on-site for on-site reuse.

6.2.1. Short-Term Containment of Semi-Liquid Soils

Construction requirements may call for drilled shaft piers as foundation support for the structures being built which will result in drilling spoils that need to be contained on-site for a short time pending transport. As drilled shaft spoils are a semi-liquid mixture of soil, groundwater, and drilling mud, the spoils shall be contained in a bermed area, lined with an impervious layer, such as visqueen. This short-term containment area shall be constructed in such a way that the drilled shaft spoils do not run off onto the surrounding ground or seep through to the underlying ground.

6.3. RIGHT-OF-WAYS

Other than for the installation of utilities, right-of-ways are anticipated to require limited soil removal. Soils excavated within the right-of-ways will be stockpiled as described in Section 6.1 or loaded and hauled directly as described in Section 6.2.

6.4. TRANSPORT AND DISPOSAL OF SOILS

Transport and disposal procedures will depend on the soil classification, defined in Section 4.

6.4.1. Clean Soils

Soils that are tested and found to be *clean* have no environmental reuse restrictions. Therefore, for transport and disposal purposes, these soils can be handled as general fill material, subject to standard hauling practices. The Developer/General Contractor shall be responsible for these soils.

6.4.2. Legally Clean Soils

Soils that are tested and found to be *legally clean* have no on-site environmental reuse restrictions, but may have off-site environmental reuse restrictions as defined by the off-site destination and/or receiver. If *legally clean* material will be taken off-site, it should be noted that the receiver may have specific acceptance criteria which may require additional testing and/or a

project-specific risk assessment... The Developer/Site General Contractor will need to verify the acceptance criteria for off-site disposal or reuse.

6.4.3. Contaminated, Non-Hazardous Soils

Soils that are tested and found to be *contaminated, non-hazardous* will be transported to, and disposed of at, a facility approved for the material. This will be coordinated by the City Parkway V. These soils would require transport under non-hazardous waste manifest, or bill of lading sheets, as directed by the disposal facility.

6.4.4. RCRA Hazardous Soils

Soils that are tested and found to be *RCRA hazardous* must be transported by a licensed hazardous materials transporter to a permitted facility, under hazardous waste manifests. This will be coordinated by the City Parkway V.

6.4.5. Construction Debris

Any construction debris encountered will be addressed as discussed in Section 8.4.

6.5. WASTE MANIFESTS

The type of the manifest required to transport and dispose of wastes depends on the classification of the waste. Non-hazardous waste manifests will be prepared for *contaminated, non-hazardous* wastes. Hazardous waste manifests will be prepared for *RCRA hazardous* wastes. Preparation and signature of manifests will be decided by City Parkway V.

6.5.1. Non-Hazardous Manifests

Each disposal facility will have its own manifest/waste characterization form and analytical requirements for acceptance of wastes. Wastes that have been classified as *contaminated, non-hazardous*, will require either a non-hazardous waste manifest, or a bill of lading for transport and disposal. The CEM shall coordinate with the transporter's representative for their

signature on the manifests or bill of lading (as appropriate) and will be provided copies of all final weigh tickets. An example non-hazardous waste manifest is included in Appendix C.

6.5.2. RCRA Hazardous Waste Manifest

Wastes classified as *RCRA hazardous* wastes will require a hazardous waste manifest. In addition to the manifest, a Land Disposal Restriction Certification/Notification may be required for the acceptance of wastes. An example hazardous waste manifest and an example land disposal notification are included in Appendix C.

City Parkway V will decide who will prepare the Uniform Hazardous Waste Manifest and the Land Disposal Restriction Certification/Notification forms. The manifest must be prepared and processed in accordance with USEPA, NDEP, and DOT regulations. Once the manifests are prepared and signed by the generator (as decided by City Parkway V), the CEM will obtain the signature of the transporter and retain two copies of this manifest. The CEM will send one copy of the manifest to NDEP and one copy to City Parkway V.

6.6. RECORD KEEPING

The CEM will keep records of all waste manifests, waste certificates, and weight tickets for inclusion in any reports that are required, and for verifying quantities for payment of contaminated/hazardous soils handling and disposal, as necessary.

7 GROUNDWATER MANAGEMENT REQUIREMENTS

Groundwater may be encountered during construction activities. The type of groundwater management required is dependent upon the groundwater quality and the site specific construction requirements. Therefore, groundwater management will be required to be addressed on a case-by-case basis by each Developer/General Contractor. Depending on the water volume and the construction needs, groundwater management techniques are anticipated to consist of onsite storage for removal and disposal at a recycling or disposal facility; onsite storage, treatment, and discharge to a permitted discharge point; or a combination of both methods.

Regardless of the technique, groundwater management will require planning in advance of construction, so that the appropriate site specific information can be obtained for disposal profiling, for the NPDES permit application process; and for negotiating the discharge point(s) and piping alignments. It is anticipated that, if necessary, discharge can occur to a storm sewer conveyance. An existing sewer line is located in City Parkway.

It is recommended that the Developer/General Contractor use steel fractionation (frac) tanks (or equivalent) for storage of the pumped groundwater prior to disposal or discharge. The storage tanks should be capable of settling out solids. If discharge is planned, the Developer/General Contractor should plan for sufficient capacity for the suspended sediments to settle before discharge. In addition, water treatment for contaminants may be required before discharge can occur.

Further discussion on these permits and the information and process required for obtaining them is presented below in Section 7.1.

7.1. PARCELS

As described in Section 5, each parcel has unique characteristics related to historical railroad operations. Additionally, past studies and historical information indicates that groundwater is potentially impacted with TPH and VOCs. For instance, it is well documented that those parcels

in and around the former Fuel Storage Area have groundwater with approximately $\frac{1}{4}$ inch of free product remaining in it.

Volatile organic compounds are potentially present in groundwater underlying the Symphony Park site. Given the potential for groundwater to be contaminated, the Developers/General Contractors should be prepared to bring in appropriate treatment systems to be used to clean the water prior to discharge to meet NDEP permit limits. This is further discussed in Section 7.5.

While groundwater flows in an easterly direction generally following local topography toward the Las Vegas Wash, local conditions such as construction activities may affect the flow direction. Given these considerations, the Developers/General Contractors on a given parcel should be aware that even if their respective parcels have no restrictive soil management considerations, the potential for encountering contaminants in the groundwater is still present.

7.2. RIGHT-OF-WAYS

Groundwater management may be necessary within the right-of-ways boundaries. However, if groundwater is to be managed during construction work on a right-of-ways segment then the same guidelines presented above will apply.

7.3. CEM ASSISTANCE AND OVERSIGHT

The Developers/General Contractors should arrange for assistance from a CEM for preparation of a temporary discharge permit application and a compliance program at least two months prior to commencing those construction activities where groundwater will be encountered. This will allow time for the CEM to arrange for sampling (if needed), develop a treatment approach, prepare the permit application package, and NDEP to issue the permit. A CEM is required to oversee the compliance activities under the permit (sampling, analysis, and reporting) and prepare the monthly Discharge Monitoring Reports (DMRs) during the discharging period.

7.4. STORAGE AND DISPOSAL

When a parcel's construction activities will encounter groundwater, but the volume of groundwater is insufficient for discharge, groundwater management by pumping the groundwater into a storage tank for later removal by a pump truck may be desired. This scenario would include the displacement of water during grouting pier foundations, or other support structures.

This will also apply to water (stormwater) within the soil stockpile storage area described in Section 6.1.

7.5. NPDES DISCHARGE PERMITTING

The NPDES permit program is managed by the NDEP Bureau of Water Pollution Control (WPC). The WPC issues three types of NPDES permits relevant to groundwater pumping and discharge: a De Minimis permit (250 gallons per minute limit), a Temporary permit with Authorization to Discharge (six months or less of discharging), and a Permanent permit with Authorization to Discharge. For construction jobs only a De Minimis or Temporary permit will be needed, depending on the anticipated discharge flow rate. New Temporary permits can be obtained for consecutive and multiple six month windows as needed during construction as long as the discharging will remain temporary.

7.5.1. De Minimis NPDES Discharge Permitting

De Minimis permits are obtained for construction activities that require dewatering activities such as deep drill shaft excavations and pilings placement, installation of grade beams, and other below surface construction work that would require groundwater pumping with a flow rate of 250 gallons per minute (gpm) or less.

The following presents a general list of the information required to compile the De Minimis Notice of Intent (NOI) application package:

- Name and contact information for responsible party, operator, and billing information.

- Date of anticipated discharge commencement and completion.
- Nature of the business and a detailed description of the whole project.
- Detailed description of the dewatering activities, including a process flow diagram.
- Anticipated flow rates.
- Analytical data from groundwater samples representing the water to be discharged.

The majority of the information listed above will be presented within the NOI application form. The current application fee for a temporary permit is \$200.00. This fee is due upon submittal of the application.

As discussed above in Section 7.3, the discharging activities will require CEM oversight that includes sampling, analyses, and reporting. The permit's Authorization to Discharge once issued will contain discharge limits for flow rate, various VOCs, TPH, and possibly metals and other inorganic compounds and a required frequency of sampling. The sampling and analyses activities will need to be properly coordinated and managed to ensure proper compliance.

7.5.2. Temporary NPDES Discharge Permitting

Temporary permits are obtained for construction activities that require dewatering activities such as deep drill shaft excavations and pilings placement, installation of grade beams, and other below surface construction work that would require groundwater pumping on a temporary basis. If more than six months are required for temporary discharging on a construction project then a new temporary permit application can be submitted to receive a new six month permit. This new application should be submitted at least one month prior to the expiration of the existing permit.

The following presents a general list of the information required to compile the temporary permit application package:

- Name and contact information for responsible party.

- Date of anticipated discharge commencement.
- Nature of the business and a detailed description of the whole project.
- Detailed description of the dewatering activities, including a process flow diagram.
- Anticipated flow rates.
- Analytical data from groundwater samples representing the water to be discharged.
- Description of planned water treatment to be used.
- A drawing showing the site plan of the construction project and also showing the discharge points into the existing storm sewer that will be used to discharge the groundwater.
- Latitude and longitude of each discharge point.
- A drawing that shows the storm drain conveyance that will receive the discharge and the receiving water it discharges into.
- A letter of authorization or encroachment permit authorizing the discharge to the conveyance from the City of Las Vegas.

The majority of the information listed above will be presented within the NDEP temporary permit application form. The current application fee for a temporary permit is \$250.00. This fee is due upon submittal of the application.

As discussed above in Section 7.3, the discharging activities will require CEM oversight that includes sampling, analyses, and reporting. The permit's Authorization to Discharge once issued will contain discharge limits for flow rate, various VOCs, TPH, and possibly metals and other inorganic compounds and a required frequency of sampling. The sampling and analyses activities will need to be properly coordinated and managed to ensure proper compliance.

7.5.3. Permanent NPDES Discharge Permitting

A permanent NPDES permit application would be required for those projects that will involve installation of a permanent dewatering system. This would be relevant to a building that would have permanent occupied structures below the groundwater. Examples include a deep underground parking garage or shopping malls with below grade levels. Construction activities will not require permanent permits as noted above in Section 7.5.1.

The permit application process is slightly more involved than the temporary permitting. More forms would be required for submittal. These include EPA Form 1, General Information and EPA Form 2E, Facilities Which Do Not Discharge Process Wastewater, and NDEP's NPDES Supplemental Form. Much of the information required in these forms includes all of that required in the temporary application as listed above in Section 7.5.1.

Additional information for a permanent permit includes:

- Daily maximum and 30-day average flow rates, including the design capacity and requested limits.
- Nature of business of the applicant and process.
- Detailed effluent characteristics with specific analytes to be included in the water sampling.
- More detailed information on treatment systems, including sketches and process flow diagrams.

Permit fees for permanent NPDES permit applications are based on average flow rates for each system. The application process and NDEP review could take one to two months longer than the temporary discharge permit applications.

7.6 GROUNDWATER TREATMENT

It is highly recommended that all groundwater to be discharged at the Symphony Park site be treated prior to discharge regardless of parcel-specific conditions. Pumping gradients created during construction dewatering on the site could cause contaminated groundwater to migrate to areas of the site otherwise deemed clean. If no treatment is applied, the Developer/General Contractor takes the risk of significant construction delays while bringing in a treatment system later. This could occur due to obtaining water samples during compliance monitoring that show a VOC or TPH above discharge limits caused by a pumping gradient bringing in nearby contamination to the construction area.

As mentioned above in Section 7.1, TPH (including free product) and VOCs are likely to be detected in the groundwater on the Symphony Park site. Developers/General Contractors should be prepared to procure a temporary treatment system to clean the water prior to discharging to meet the discharge limits that each permit will require. Projected key discharge limits based on precedent temporary discharge permits are listed below.

These would most likely be the constituents exceeding discharge limits if no treatment were to be applied:

TPH – 1 mg/L

PCE – 5 µg/L

Benzene – 5 µg/L

Based on the potential groundwater characteristics and the NPDES permit requirements, the components of a treatment system listed below would be typical of what would be needed to meet discharge limits. Additional treatment components may be deemed necessary on a case-by-case basis. These include but are not limited to the following:

- Hoses and fittings such as Cam-Lock or equivalent with enough length to reach the nearest discharge point from the storage tanks. Hoses should be traffic-rated to allow trucks and construction equipment to drive over them without causing damage.
- Centrifugal pump or equivalent with a generator.
- Flow meter to monitor ongoing flow and to generate average flows for the DMR.
- Bag filtration unit. Some of these units can be rented along with carbon adsorption units. The carbon vendor can provide specifications on the appropriate filters, such as 5 micron, 10 micron, etc., for solids removal.
- Oil/water separator to remove potential free product. These units can be rented or purchased depending on how long it would be needed. Rental fees can be high enough to warrant a purchase. Some tank vendors who support UST work in the Las Vegas Valley have these units available for renting.
- Carbon adsorption for treatment of VOCs. Carbon units should be filled with oleophilic media (OMC units) to allow polishing of TPH and/or free product not captured in the oil/water separator. The OMC units allow for the oil to be captured without compromising the ability of the water to flow through and be treated for VOCs.

The Developer/General Contractor should work with their CEM during permitting to select an efficient and cost effective treatment system. The CEM can assist in coordinating with vendors to obtain all the necessary components, equipment, and materials for proper and compliant water discharging.

8 OTHER REQUIREMENTS

8.1. DUST CONTROL AND MITIGATION

As required by the Clark County DAQ Rules and by Clark County Air Quality Regulations, Sec. 94, the Developer/General Contractor will be responsible for taking actions to prevent, reduce, or mitigate fine particulate matter (PM-10) emissions. Depending on the size of the project a Dust Control Permit and a Dust Mitigation Plan may be required. It will be the responsibility of each parcel's Developer/General Contractor to determine which criteria they will need to follow when applying for the dust permit. Supplemental permits may also be needed for activities such as (but not limited to) stockpiling, backfilling or crushing, etc. A complete list of the necessary Supplemental permits can be found on the Clark County web site. The Developer/General Contractor is responsible for preparation of and adherence to this plan, as well as adhering to other pertinent requirements referenced. It should be noted that the DAQ Dust Control Handbook limits stockpile height to eight feet. Further information concerning these and other possible County requirements is available through the County's web site:

<http://www.clarkcountynv.gov/depts/airquality/pages/default.aspx>

Dust suppression shall be performed by the Developer/General Contractor, as required, by spraying with a light mist of water or other dust suppressant acceptable to DAQ to prevent visible dust emissions. Dust suppression activities and techniques must comply with DAQ standard and requirements.

8.2. STORM WATER POLLUTION PREVENTION

Storm water management may be required by the NDEP's Bureau of Water Pollution Control, for compliance with construction activities defined under Category X of 40 CFR §122.26. As appropriate, the Developer/General Contractor shall obtain a Construction Storm Water Permit and implement a site specific Storm Water Pollution Prevention Plan (SWPPP). The Contractor is responsible for preparation of, and adherence to, the SWPPP.

The SWPPP must include provisions for containing storm water that contacts stockpiles of impacted materials and preventing runoff onto other areas of the project site. Best management practices (BMPs) must be utilized to prevent soil (impacted or otherwise) from washing into storm drains, or being tracked or washed offsite. Best Management Practices should also protect open excavations to the extent practical, to prevent flooding and the subsequent need for over-excavation.

8.3. SPILLS OR RELEASES

The Contractor shall implement and maintain the appropriate BMPs necessary to prevent and mitigate construction activity that could cause releases (spills) in excess of the Reportable Quantities (40 CFR PART 302). Any release above the Reportable Quantities must be reported to the NDEP. A release can be described as any pollutant, hazardous waste or contaminant that has been spilled, leaked, pumped, poured, emitted, emptied, discharged, injected, escaped, leached, dumped, or disposed into the environment. This would then be deemed a spill.

The reportable quantity for petroleum products such as gasoline, diesel, and hydraulic fluid is 25 gallons or three cubic yards of contaminated material, or the presence on or in groundwater. A spill of any quantity that affects a waterway within the State of Nevada must be reported, regardless of the quantity. This would apply to releases that enter a storm drain.

Spills must be reported to the NDEP as soon as possible, but no later than the end of the first working day of the release by calling the in state spill reporting hotline: **1-888-331-6337**.

The spill reporting form and contact information is available through the NDEP's Bureau of Corrective Action's web site: <http://www.ndep.nv.gov/bca/bca01.htm>

8.4. UNEXPECTED CONDITIONS

If unexpected conditions are encountered during excavation activities, construction activities at, and within the immediate vicinity of, the excavation should be suspended until the nature and extent of the unexpected condition can be evaluated and procedures implemented for worker protection. The CEM has the authority to determine the appropriate course of action based on

the principles of this SGMP when dealing with unexpected conditions and the Developer/General Contractor shall follow the CEM's direction. Unexpected conditions are defined as contaminated soils in areas not anticipated; contamination that does not appear to be petroleum or volatile organics; encounters of transite pipe (asbestos); or encounters of subsurface structures or debris. All encounters will be documented on the as-built drawings, as specified in Section 9.

8.4.1. Unknown or Unexpected Contamination

Unknown or unexpected contamination may be observed by the CEM or the Developer/General Contractor who will then report the discovery to the CEM. The CEM will evaluate the discovery and if necessary, notify NDEP (e.g. determined to be a contaminant other than anticipated for the parcel; determined to be a quantity greater than the reportable quantity; free product; or, is categorized as hazardous). Any sampling required during the evaluation will be done in accordance with the SAP. Assistance from the Developer/General Contractor may be required during the evaluation of the discovery, through further excavation and/or removal and transport of the discovery to another area of the site for temporary storage, as deemed appropriate by the CEM.

8.4.2. Underground Structures or Debris

Underground structures or debris will be reported to the CEM and to NDEP. The CEM will evaluate the discovery and, in conference with NDEP, the handling will be determined. Assistance from the Developer/General Contractor may be required during the evaluation of the discovery, through further excavation and/or removal and transport of the discovery to another area of the site for temporary storage, as deemed appropriate by the CEM. Siting and use of a temporary storage area will fall under the requirements of Section 6.1 as regards stockpile storage areas, and temporary storage areas will be designated by the City Parkway V. Any sampling required during the evaluation will be done in accordance with the SAP. If suspect asbestos containing materials are encountered, then Section 8.4.3 should be followed.

8.4.3. Suspect Asbestos Containing Materials

If the material is suspected to contain asbestos, the area should be cordoned off to prevent further disturbance, the material wetted and/or covered with plastic sheeting, which should be secured in place. The Developer/General Contractor and CEM shall work with the City Parkway V to have a State of Nevada certified asbestos consultant-inspector evaluate or test the material for asbestos. If determined to be asbestos-containing, the Developer/General Contractor or the City Parkway V will then arrange for an asbestos abatement contractor to remove the material, as appropriate based on the contractual agreement between the Developer/General Contractor and the City Parkway V. All asbestos abatement personnel shall have the appropriate Nevada certifications; and all abatement shall be done in accordance with state and federal requirements.

Depending on the type and quantity of asbestos containing material, NESHAP notification to Clark County may be required prior to abatement.

An asbestos project design for the abatement of asbestos containing debris in soil should be developed by a State of Nevada certified asbestos consultant-project designer. The design should include provisions for worker protection, wind fencing, stabilization, wetting, controlled removal, packaging, transportation, and disposal. Separate designs should be developed for friable and non-friable materials.

The remediation shall be overseen by an appropriately certified State of Nevada asbestos consultant (inspector and monitor) with at least 6 months of experience identifying and overseeing asbestos debris in soil.

All asbestos material must be transported off site for disposal at a facility capable of accepting the material. Within southern Nevada, asbestos containing material is typically accepted by the following facility:

- Republic Services of Southern Nevada's APEX Regional Landfill, located in Clark County, Nevada

9 AS-BUILT DOCUMENTATION

Encountered contaminated soils which are left in place will need to be accurately documented on as-built drawings. This information is to be recorded concurrently with construction progress. Similarly, any unexpected subsurface conditions that are encountered will also need to be documented, whether removed or not.

As-built documentation will be necessary to account for quantities and source. This will be prepared by the CEM, with the assistance of the Developer/General Contractor (through their as-built documents) or City Parkway V, as appropriate.

9.1. PARCELS

The formal, accurate as-built documentation will be the responsibility of the Developer/General Contractor. As part of his/her field notes, the on-site CEM shall maintain the approximate locations, thorough sketches, written description, or non-surveyed field mapping.

9.2. RIGHT-OF-WAYS

The formal, accurate as-built documentation will be the responsibility of City Parkway V. As part of his/her field notes, the on-site CEM shall maintain the approximate locations, thorough sketches, written description, or non-surveyed field mapping.

9.3. REPORTING REQUIREMENTS

If the containment area and stockpiling soil management method is used, the CEM will maintain an approximate volumetric accounting of each *contaminated, non-hazardous* and *RCRA hazardous* soil stockpile, consisting of the location of the excavation and the purpose of the excavation. The CEM will send a copy of the stockpile accounting to City Parkway V on a monthly basis.

If petroleum product in free or liquid phase is observed in thicknesses greater than ½ inch prior to, or during, on site construction activities, NDEP and City Parkway V will be notified of such observations by the CEM.

The notice should include the following information:

- The observed location of the free or liquid phase product;
- The method of discovery (groundwater well, open excavation, etc.);
- Lab analysis of the free or liquid phase product; and
- Status of construction activity on site.

Similarly, if heavy metals are observed in soil or groundwater on site, or heavy metals are observed in soil or groundwater emanating from the site, NDEP and City Parkway V will be notified of such observation by the CEM. The notice should include the following information:

- The observed location of the heavy metals;
- A summary of the field work done to collect soil or groundwater samples contaminated with heavy metals;
- Lab analysis of soil or groundwater contaminated with heavy metals; and
- Status of construction activity on site.

10 HEALTH AND SAFETY

All parties involved with construction activities of the Symphony Park project shall need to develop their own site-specific Health and Safety Plan (HASP), based upon their roles and upon the site specific hazards and job hazards associated with those roles and hazards. Subcontractors may, at the discretion of their Developer/General Contractor, accept the Developer/General Contractor's requirements. Site visitors may be required to review and accept the Developer/General Contractor's on-site safety requirements. The HASP, as a minimum, should address the following:

- Hazards commonly associated with contractors/subcontractors work;
- Health and Safety Training;
- Medical Surveillance Program;
- Hazard Evaluation;
- Air and Personal Monitoring;
- Personal Protective Equipment;
- Site Control;
- Decontamination;
- Safe Work Practices;
- Emergency Procedures; and
- Standard Operating Procedures

All contractors and subcontractors, including waste handlers, waste haulers and emergency response subcontractors, who have the potential to be exposed to hazardous substances, health hazards, or safety hazards and their supervisors and management responsible for the Site work must receive appropriate training in accordance with local, state, and federal regulations, including but not limited to 29 CFR 1910.120 and 29 CFR 1926 in the federal OSHA requirements. Contractors and subcontractors are responsible for the identification and implementation of the appropriate training of their employees. There may also be railway safety training requirements for parcels bordering tracks.

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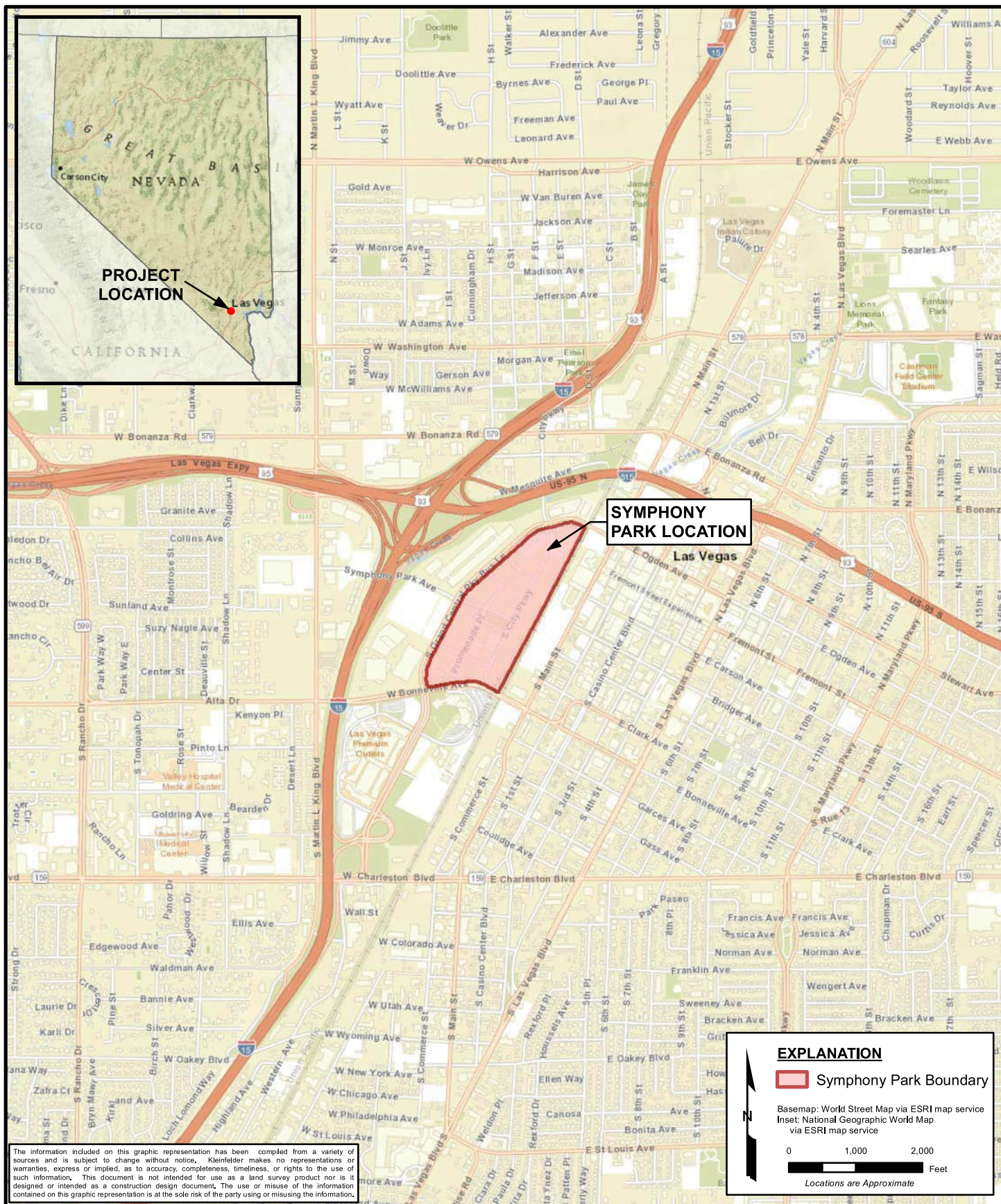
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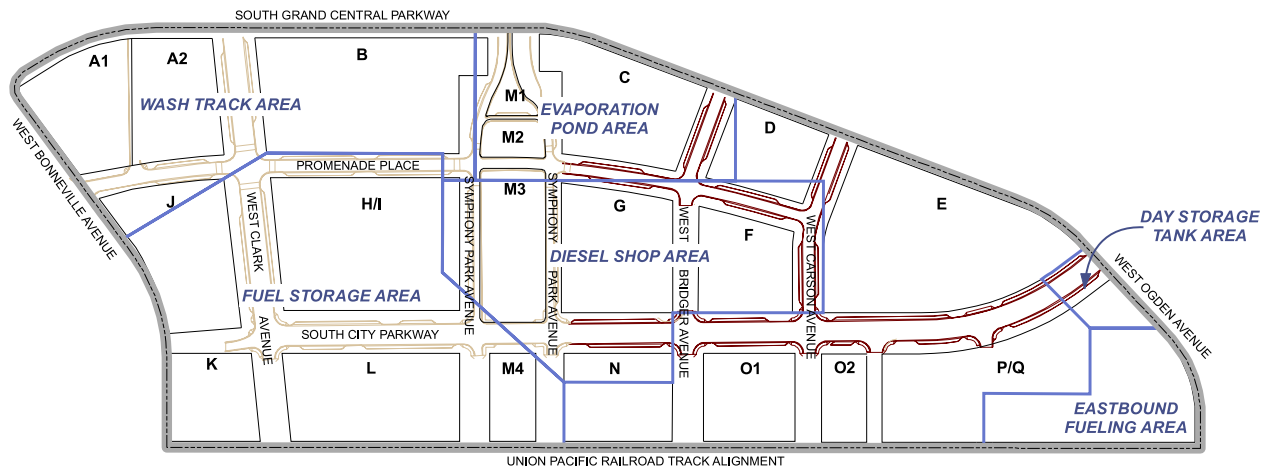




	PROJECT NO.	20154986	SITE LOCATION MAP	FIGURE 1
	DRAWN:	JAN 2017		
	DRAWN BY:	KFH	SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA	
	CHECKED BY:	KLR		
	FILE NAME:	SGMP_Figure1.mxd		



EXPLANATION Symphony Park Boundary Parcel Boundary, Planned Developer as of January 20, 2011 Phase 1 Development Phase 2 Development 0 200 400 Feet Locations are Approximate Aerial imagery: ESRI World Imagery, USDA NAIP 6/6/2015. The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a field survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.	KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com	PROJECT NO. 20154986 DRAWN: JAN 2017 DRAWN BY: KFH CHECKED BY: KLR FILE NAME: SGMP_Figure2.mxd	SITE LAYOUT SYMPHONY PARK SITE, PARCEL, AND RIGHT-OF-WAY LOCATIONS SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA	FIGURE 2
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EXPLANATION

	Symphony Park Boundary		Parcel Boundary
	Former Operations Area		Phase 1 Development
			Phase 2 Development

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



0 200 400 Feet
Locations are Approximate



PROJECT NO.: 20154986
DRAWN: JAN 2017
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CHECKED BY: KLR
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SGMP_Figure3.mxd

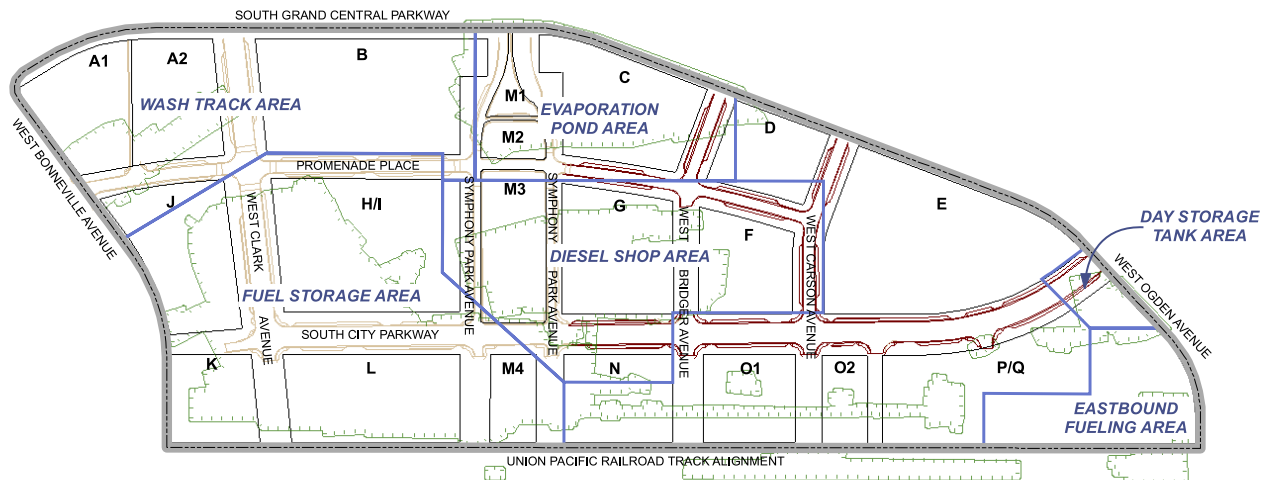
SITE LAYOUT UNION PACIFIC FORMER OPERATIONS AREAS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

3

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EXPLANATION

	Symphony Park Boundary		Parcel Boundary
	Former Operations Area		Phase 1 Development
	Historical Remedial Excavation		Phase 2 Development

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



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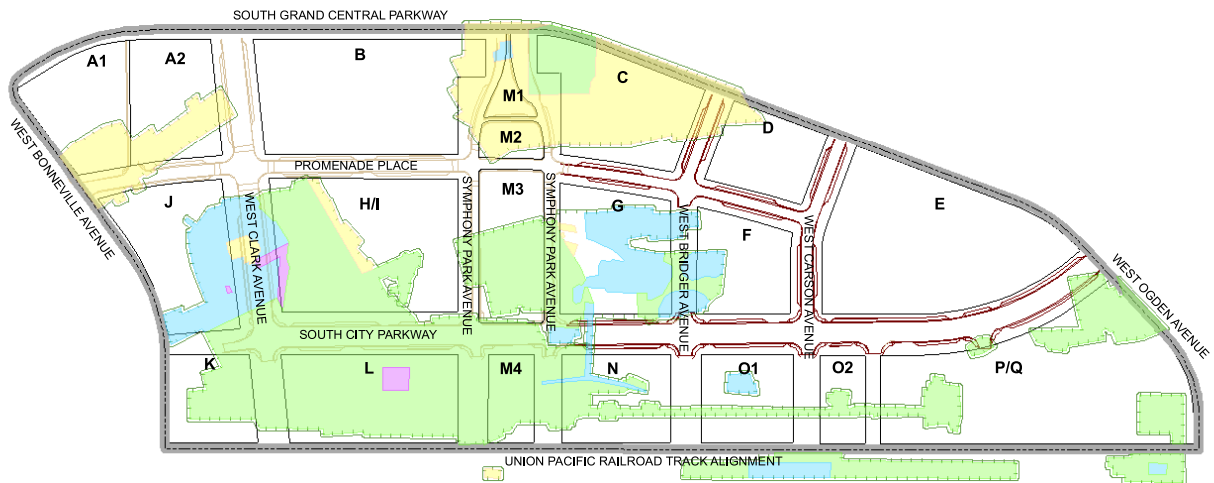
PROJECT NO.	20154986
DRAWN:	JAN 2017
DRAWN BY:	KFH
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SITE LAYOUT - UNION PACIFIC FORMER OPERATIONS AREAS AND HISTORICAL REMEDIAL EXCAVATION BOUNDARIES

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

4

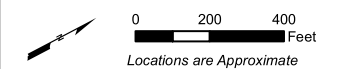


EXPLANATION

Depth to Impacted Soil, ft

Not Excavated or Sampled	Symphony Park Boundary	Parcel Boundary
0 - 2.5	Historical Remedial Excavation	Phase 1 Development
2.5 - 5.0		Phase 2 Development
5.0 - 7.5		
7.5 - 10.0		

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



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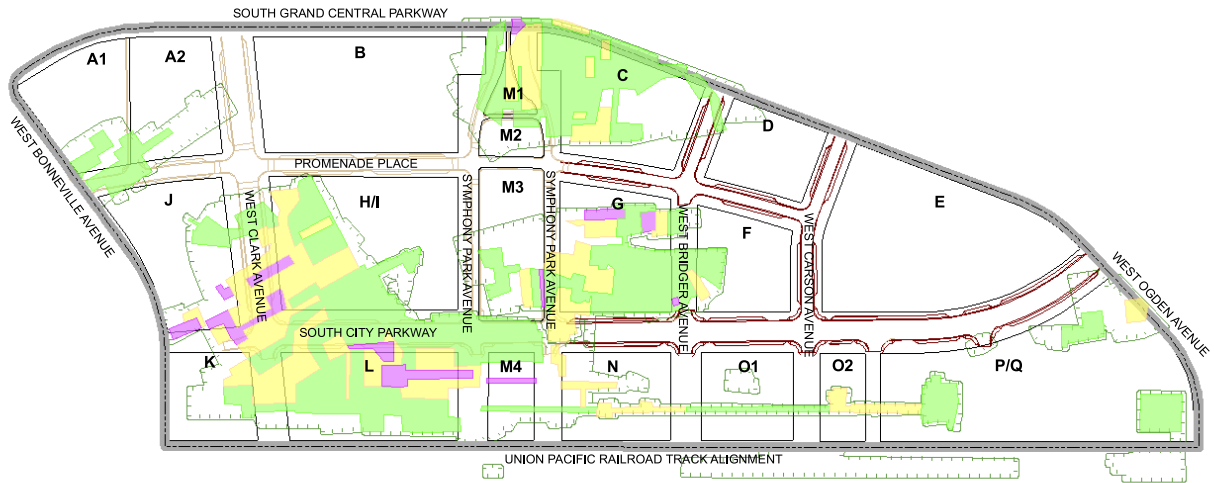
PROJECT NO.	20154986
DRAWN:	JAN 2017
DRAWN BY:	KFH
CHECKED BY:	KLR
FILE NAME:	SGMP_Figure5.mxd

SITE LAYOUT AREAS AND DEPTHS TO REMAINING TPH IMPACTED SOILS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

5



EXPLANATION

TPH in ppm

□ < 100 or Not Sampled

■ 100 - 1,000

■ 1,000 - 5,000

■ 5,000 - 10,000

▭ Symphony Park Boundary

▭ Historical Remedial Excavation

— Parcel Boundary

— Phase 1 Development

— Phase 2 Development

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



0 200 400 Feet
Locations are Approximate



PROJECT NO. 20154986
DRAWN: JAN 2017
DRAWN BY: KFH
CHECKED BY: KLR
FILE NAME:
SGMP_Figure6.mxd

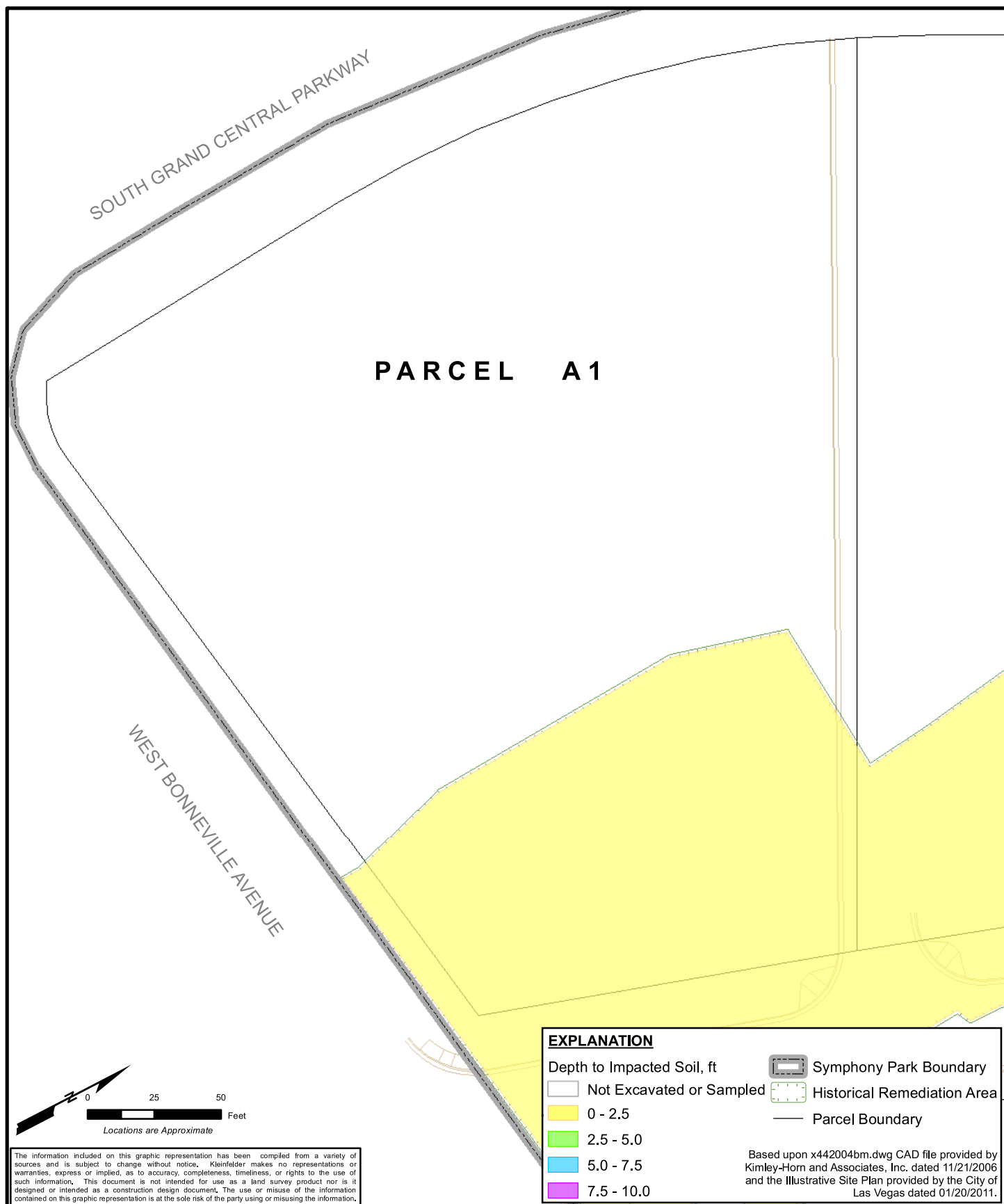
SITE LAYOUT AREAS OF REMAINING TPH CONCENTRATIONS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

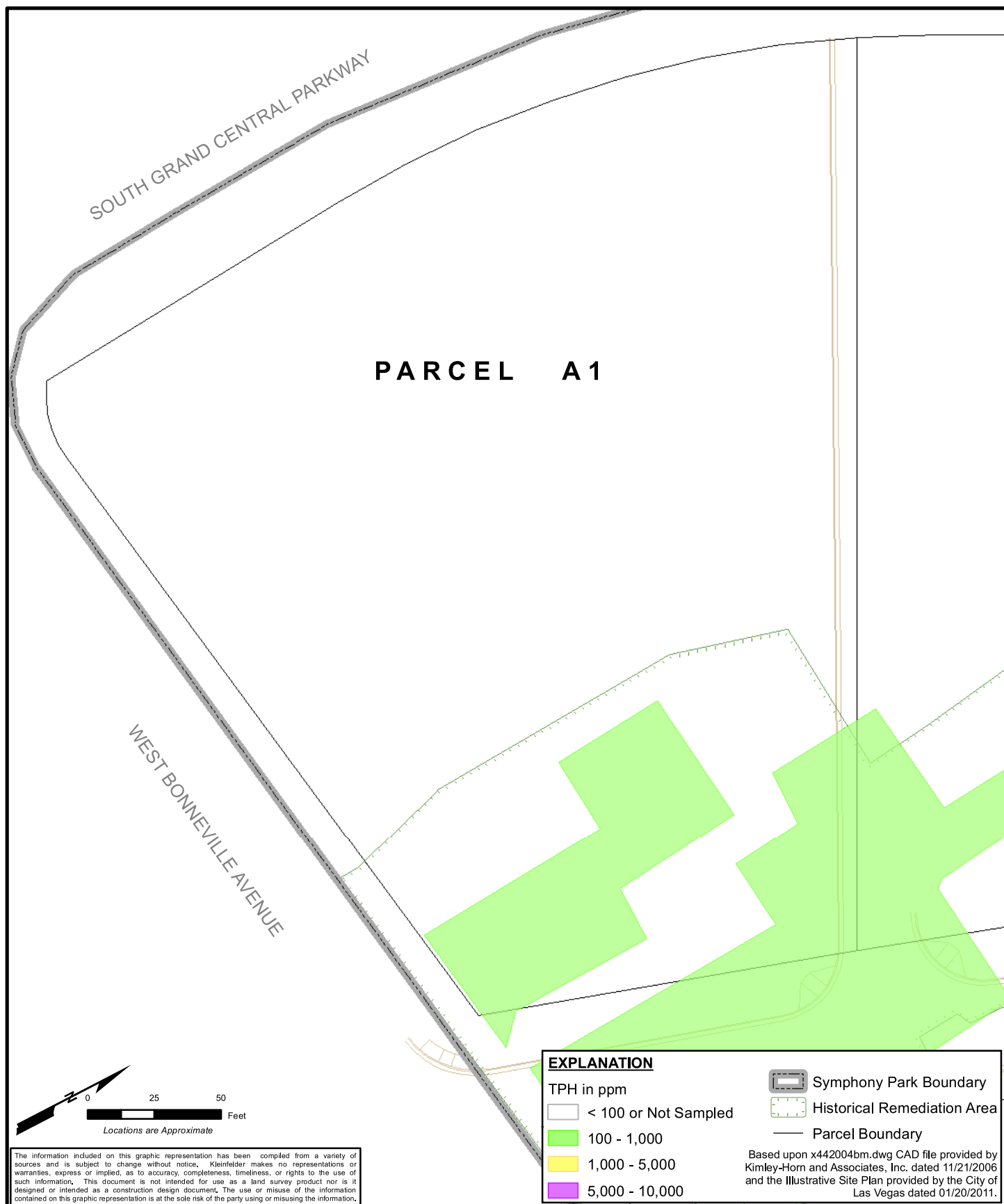
FIGURE

6

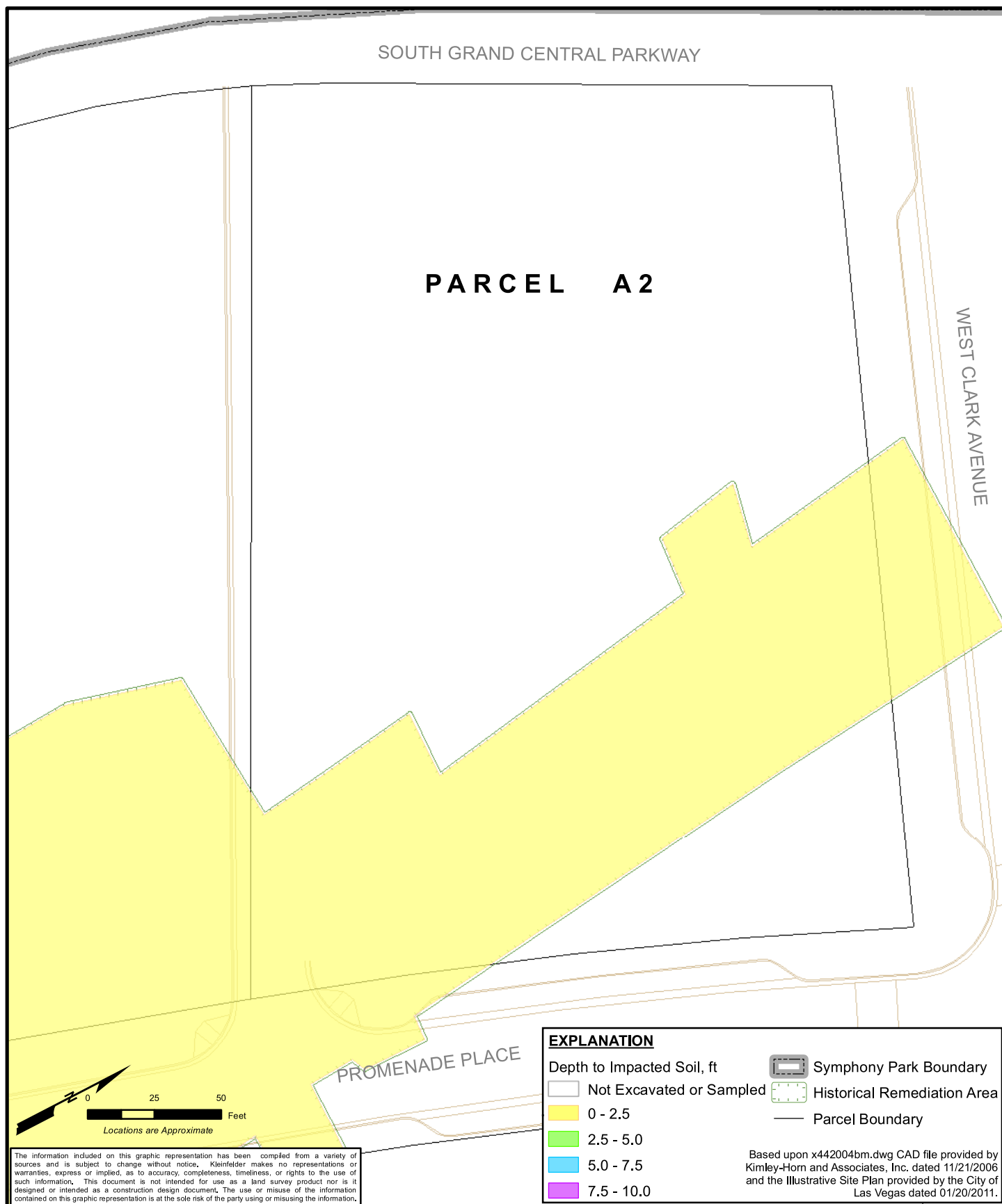
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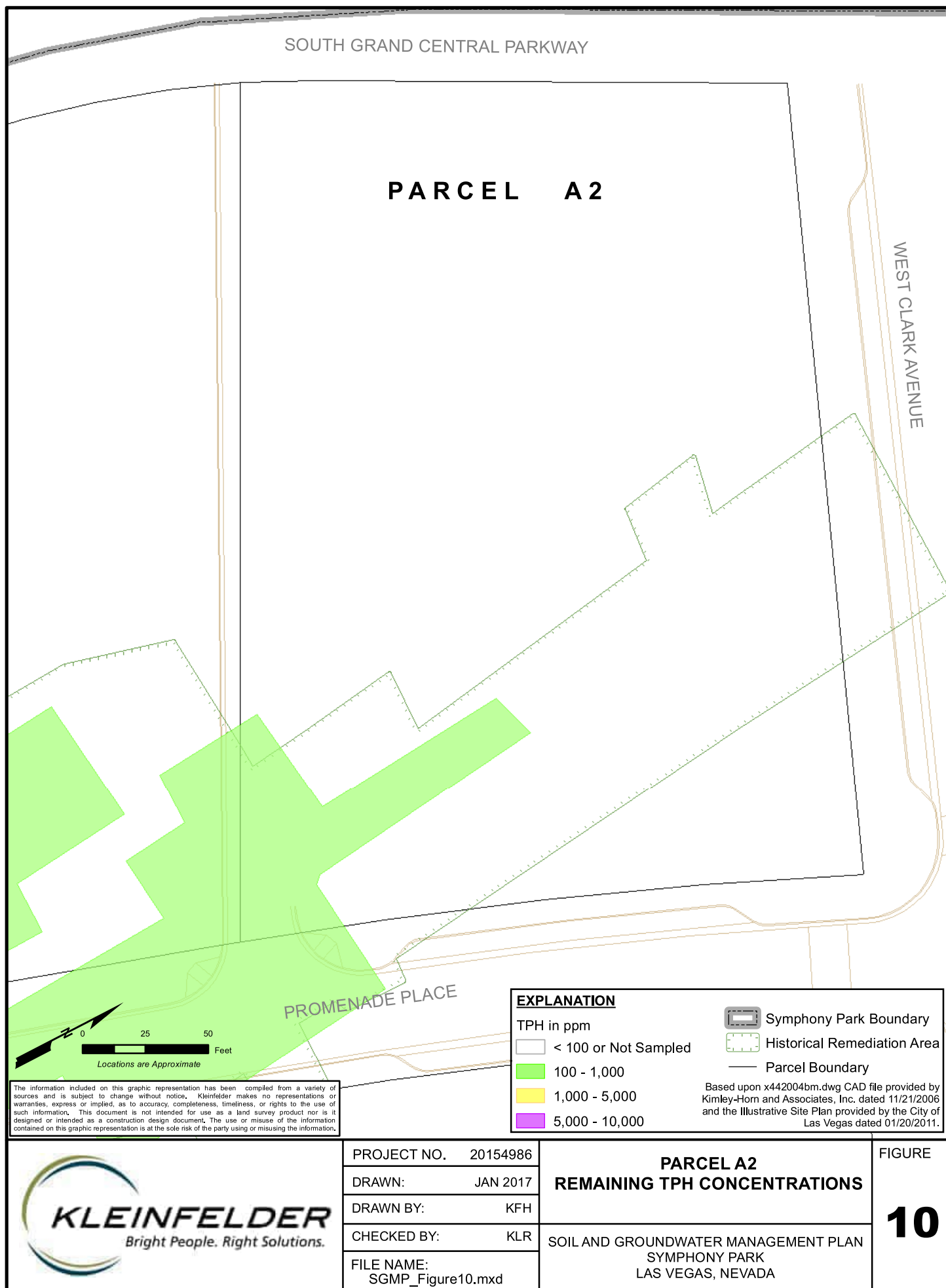
	PROJECT NO.	20154986	PARCEL A1 DEPTH TO REMAINING TPH IMPACTED SOILS	FIGURE 7
	DRAWN:	JAN 2017		
	DRAWN BY:	KFH		
	CHECKED BY:	KLR		
	FILE NAME:	SGMP_Figure7.mxd	SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA	

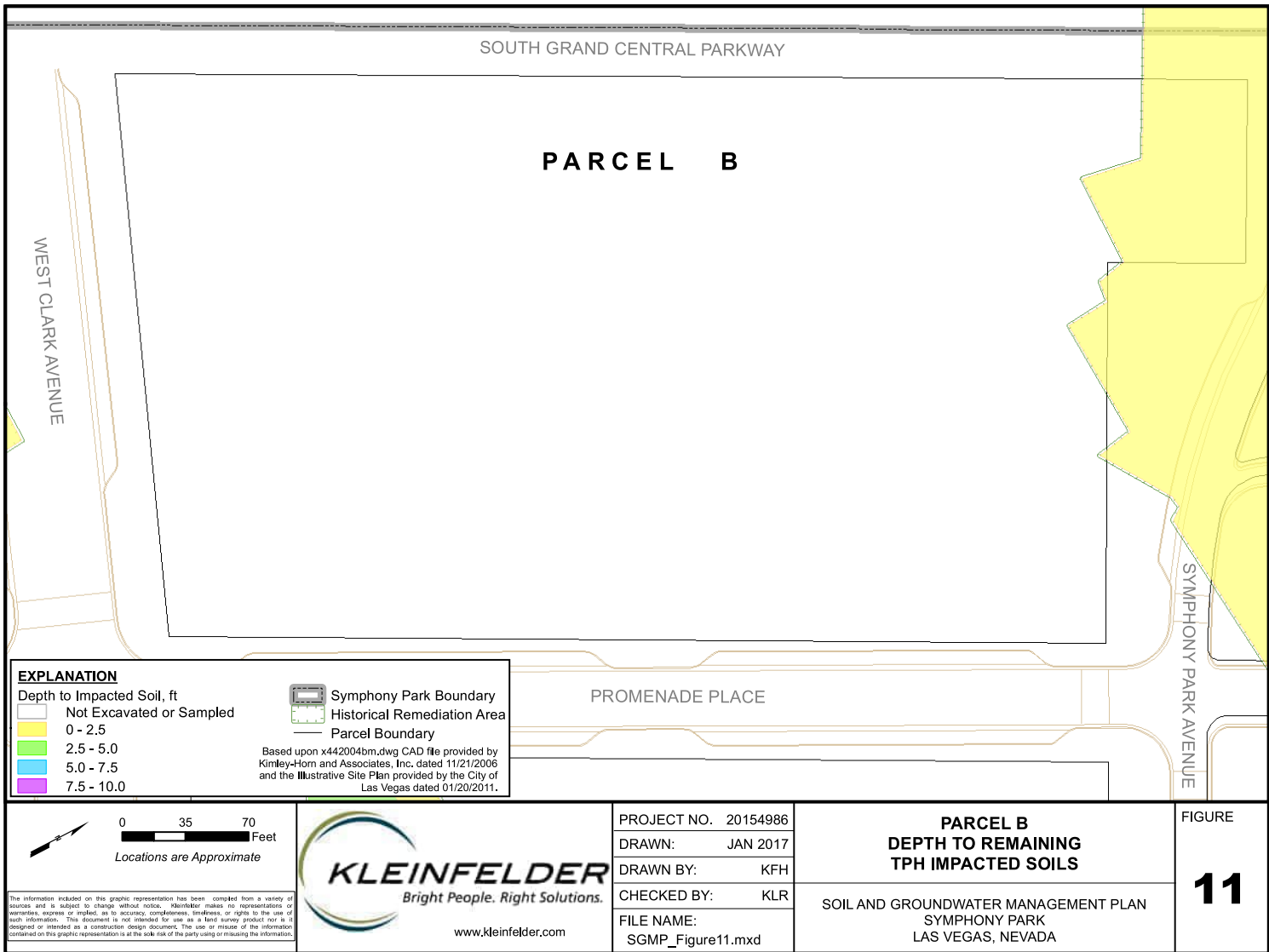


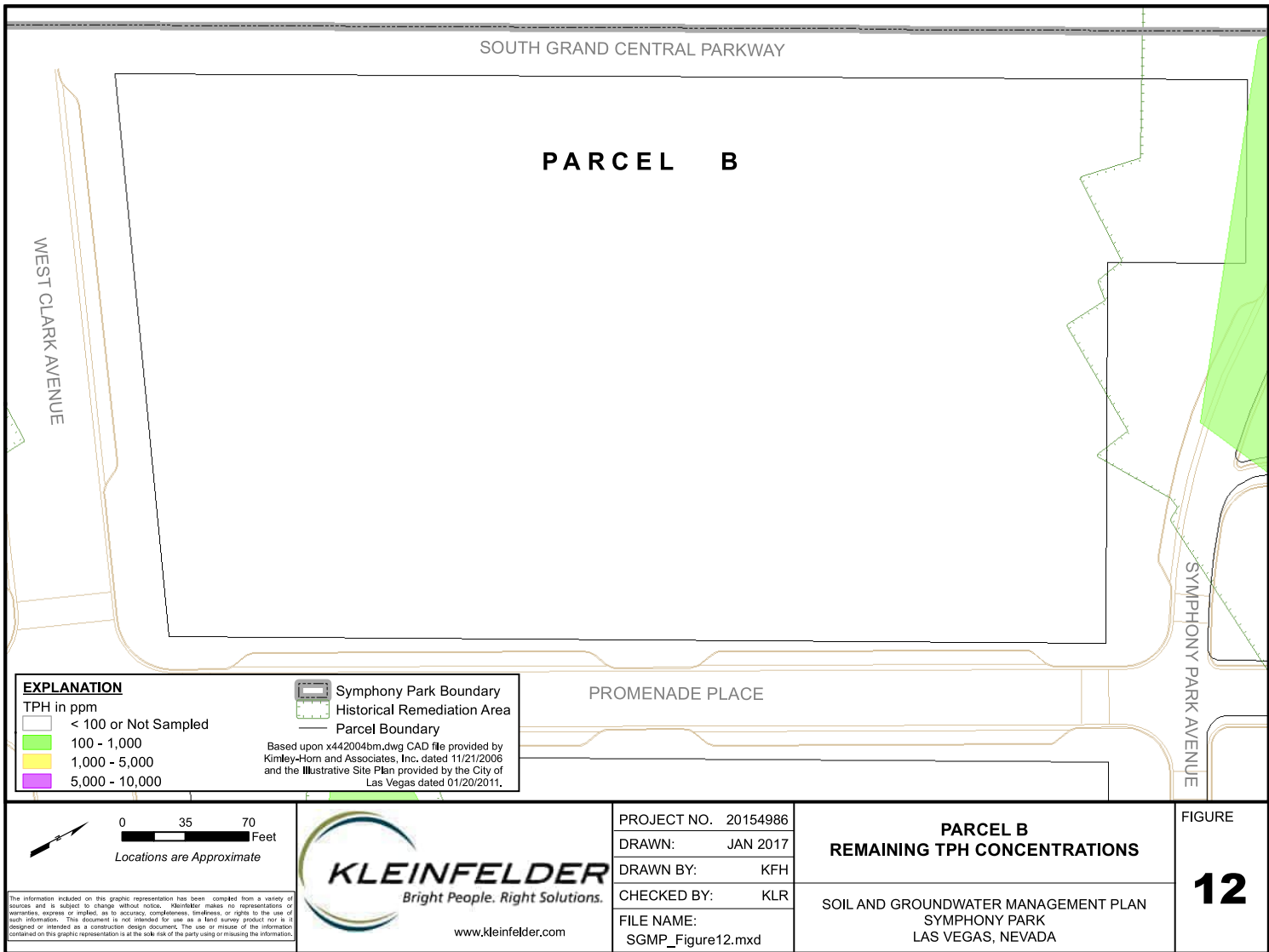
	PROJECT NO.	20154986	PARCEL A1 REMAINING TPH CONCENTRATIONS	FIGURE 8
	DRAWN:	JAN 2017		
	DRAWN BY:	KFH		
	CHECKED BY:	KLR		
	FILE NAME:	SGMP_Figure8.mxd		
			SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA	

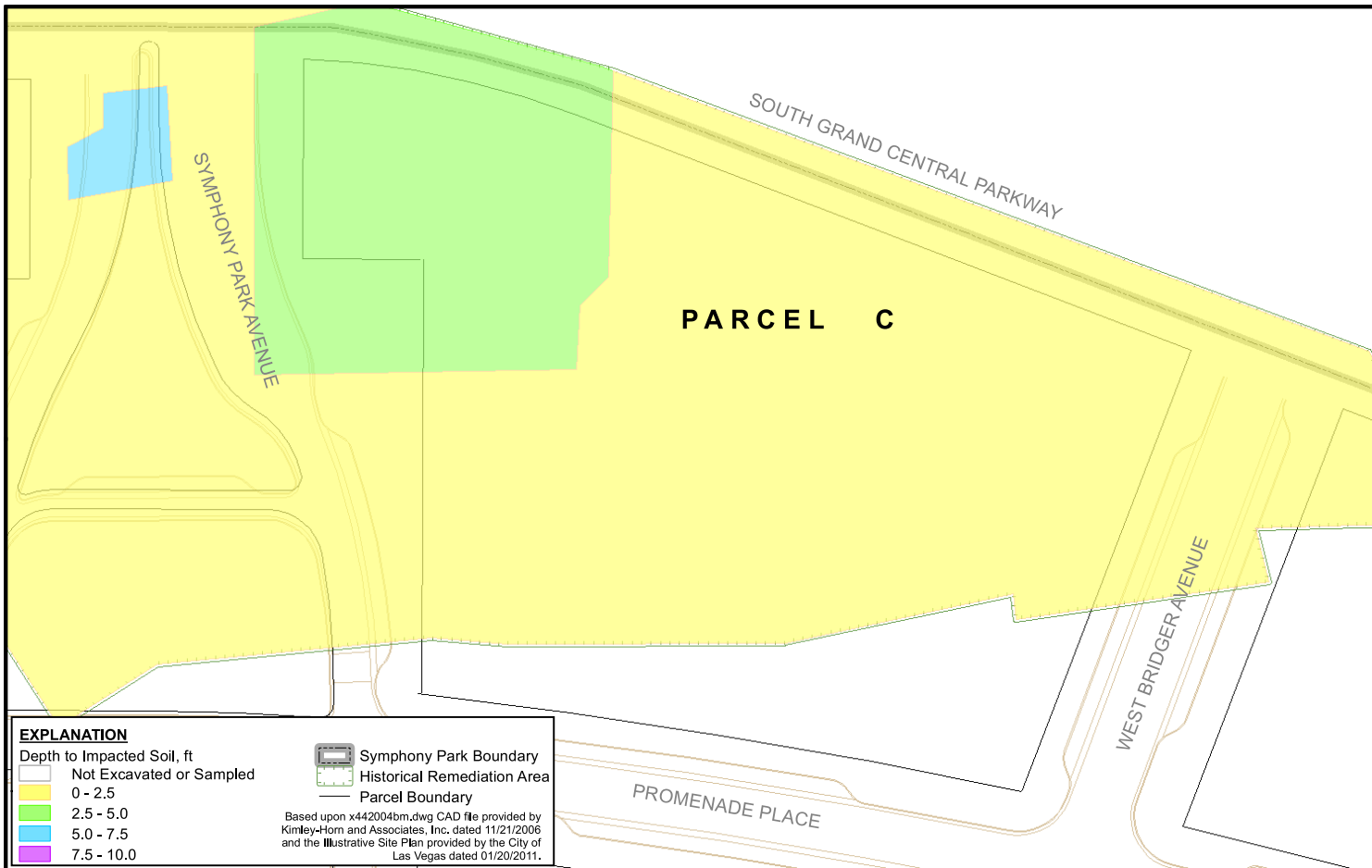


	PROJECT NO.	20154986	PARCEL A2 DEPTH TO REMAINING TPH IMPACTED SOILS	FIGURE 9
	DRAWN:	JAN 2017		
	DRAWN BY:	KFH		
	CHECKED BY:	KLR		
	FILE NAME:	SGMP_Figure9.mxd	SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA	

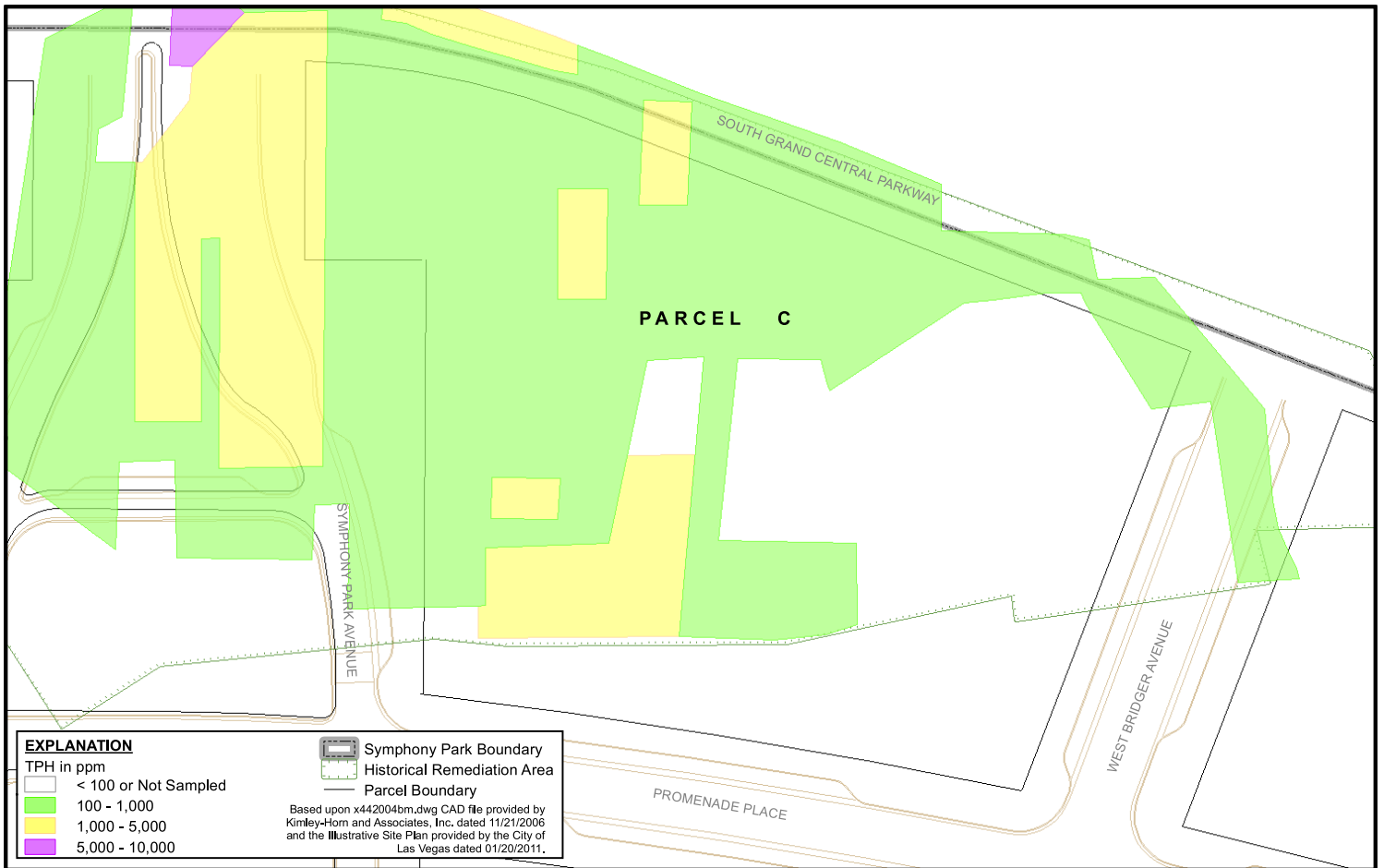




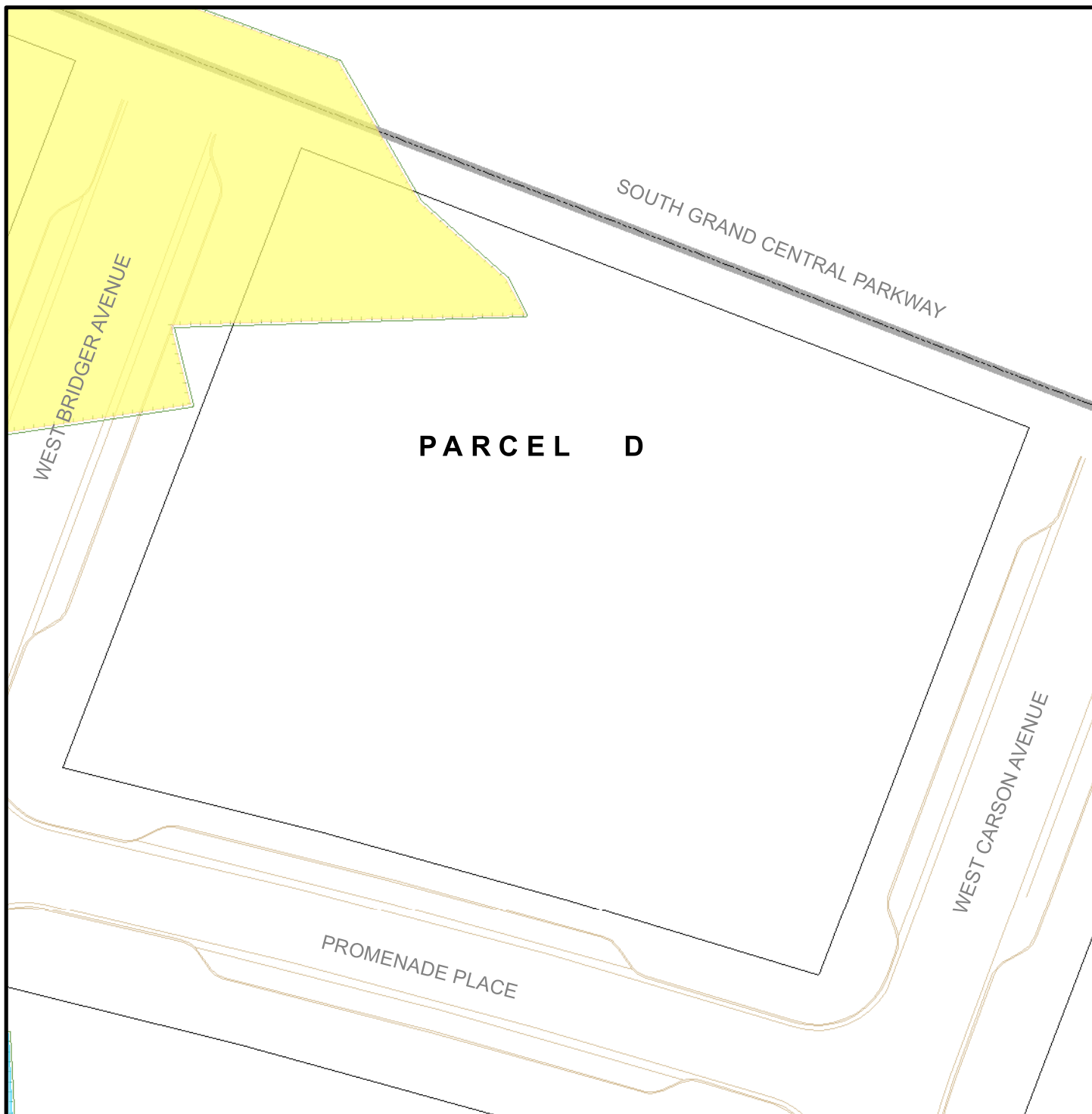




EXPLANATION Depth to Impacted Soil, ft Not Excavated or Sampled 0 - 2.5 2.5 - 5.0 5.0 - 7.5 7.5 - 10.0 Symphony Park Boundary Historical Remediation Area Parcel Boundary Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011. 0 35 70 Feet Locations are Approximate The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness or rights to the use of such information. This document is not intended for use as a field survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.	KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com	PROJECT NO. 20154986 DRAWN: JAN 2017 DRAWN BY: KFH CHECKED BY: KLR FILE NAME: SGMP_Figure13.mxd	PARCEL C DEPTH TO REMAINING TPH IMPACTED SOILS SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA	FIGURE 13
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 03570 Feet Locations are Approximate The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a field survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information. www.kleinfelder.com		PROJECT NO. 20154986	PARCEL C REMAINING TPH CONCENTRATIONS	FIGURE 14
		DRAWN: JAN 2017		
		DRAWN BY: KFH		
		CHECKED BY: KLR	SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA	
		FILE NAME: SGMP_Figure14.mxd		



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EXPLANATION

Depth to Impacted Soil, ft	Symphony Park Boundary
Not Excavated or Sampled	Historical Remediation Area
0 - 2.5	Parcel Boundary
2.5 - 5.0	
5.0 - 7.5	
7.5 - 10.0	

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



PROJECT NO. 20154986

DRAWN: JAN 2017

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CHECKED BY: KLR

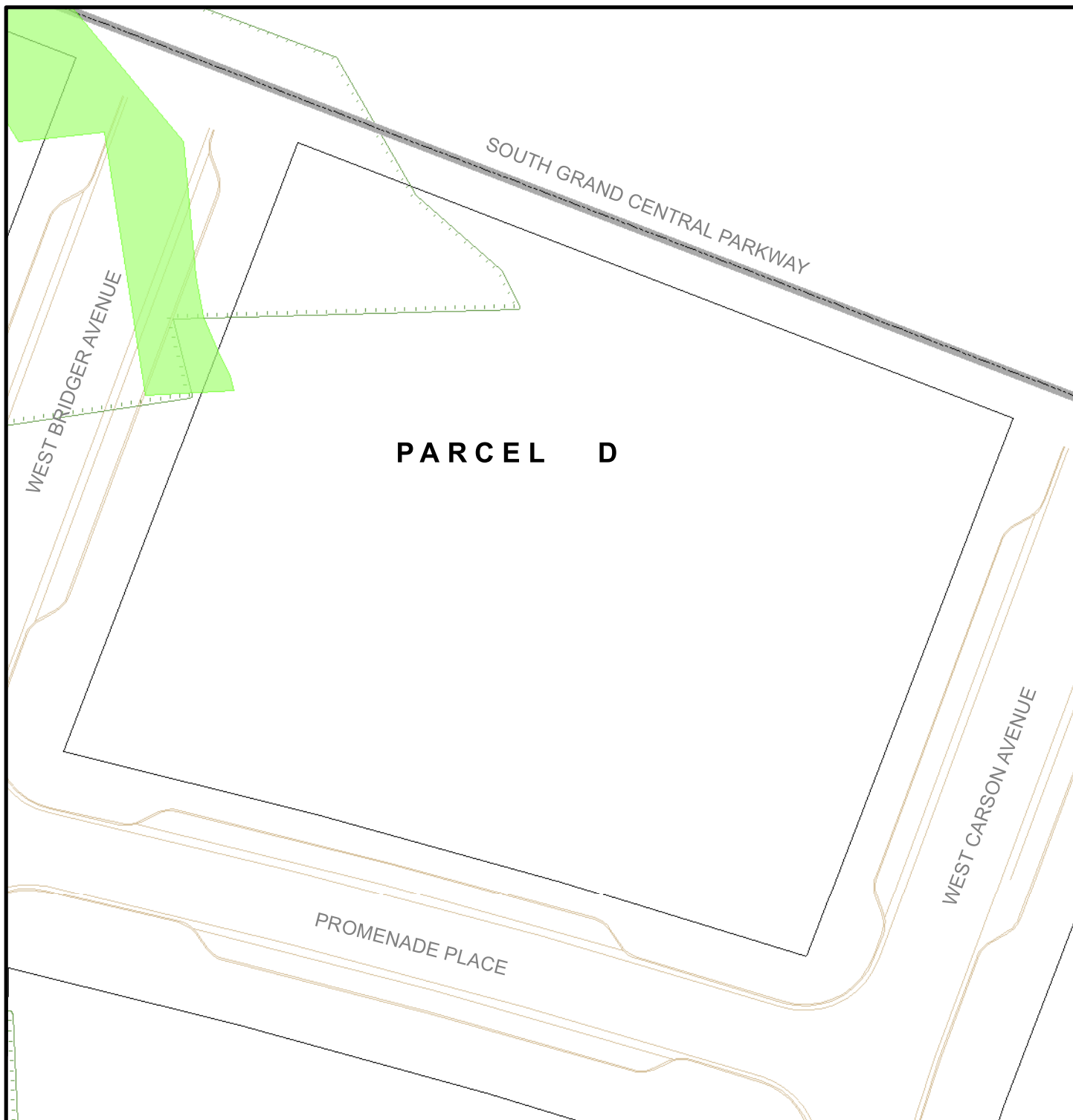
FILE NAME:
SGMP_Figure15.mxd

PARCEL D DEPTH TO REMAINING TPH IMPACTED SOILS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

15



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EXPLANATION

TPH in ppm

< 100 or Not Sampled

100 - 1,000

1,000 - 5,000

5,000 - 10,000



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



PROJECT NO. 20154986

DRAWN: JAN 2017

DRAWN BY: KFH

CHECKED BY: KLR

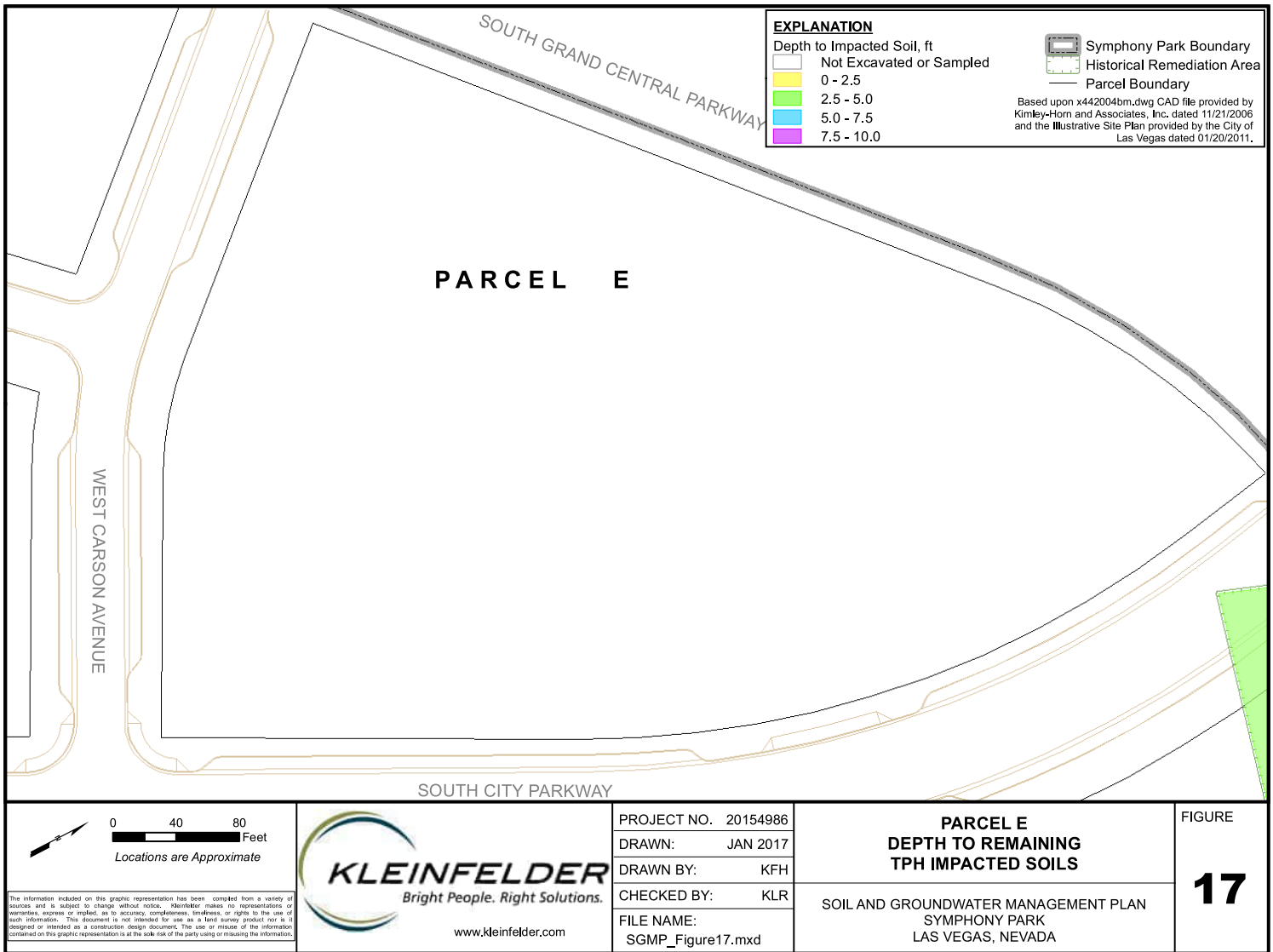
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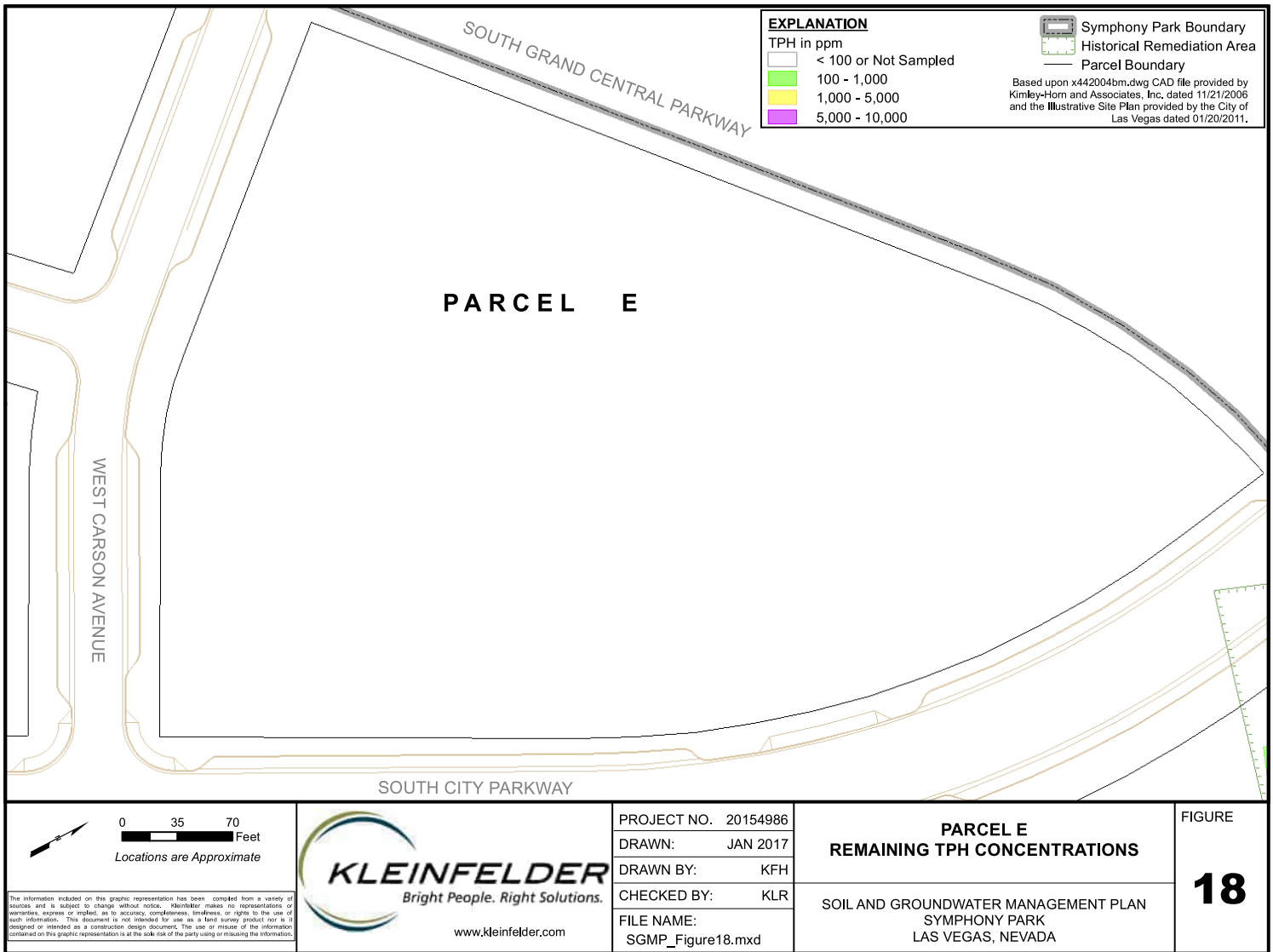
PARCEL D REMAINING TPH CONCENTRATIONS

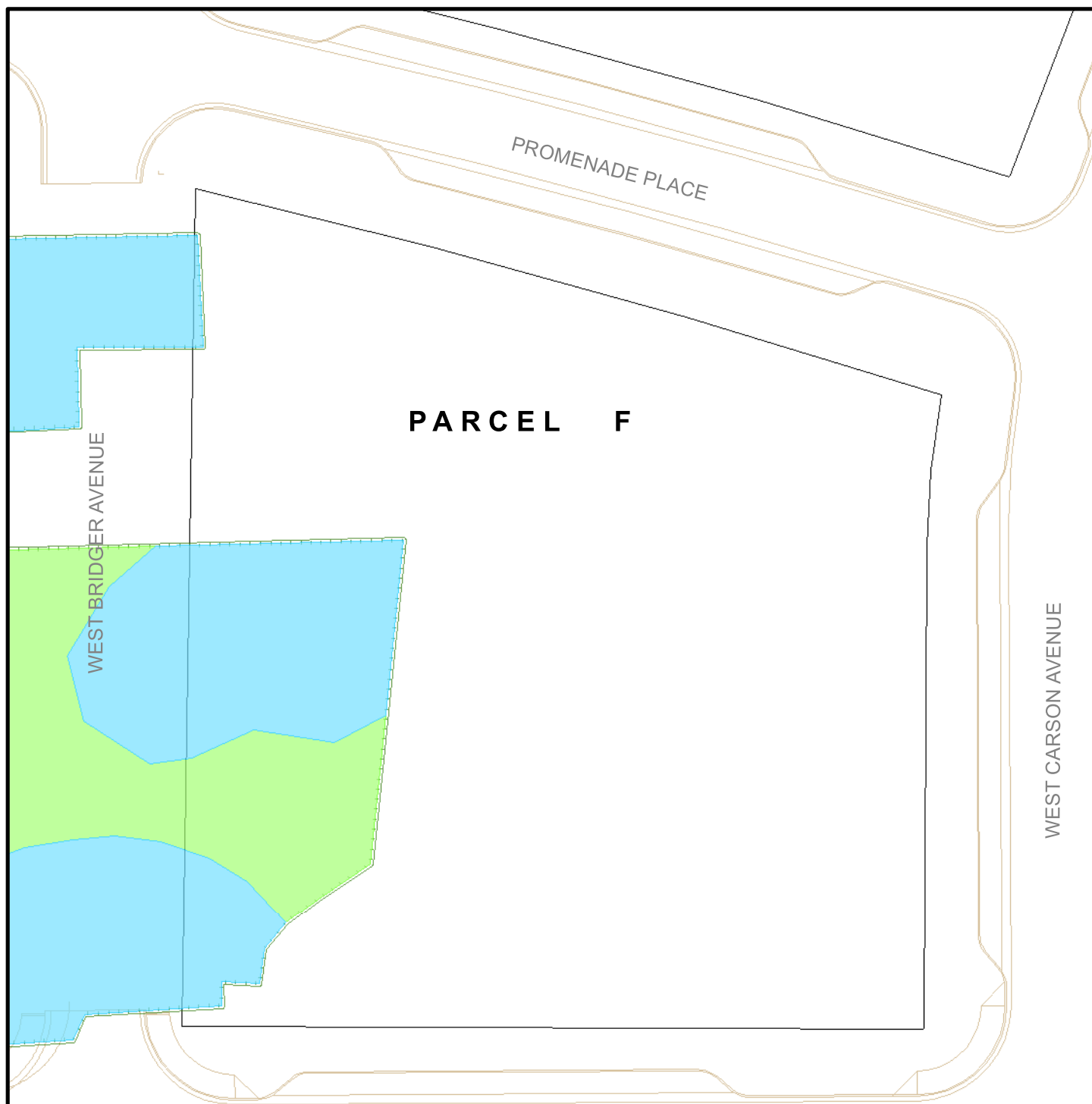
SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

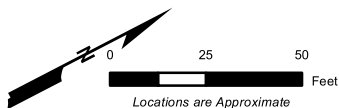
16







SOUTH CITY PARKWAY



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EXPLANATION

Depth to Impacted Soil, ft

Not Excavated or Sampled

0 - 2.5

2.5 - 5.0

5.0 - 7.5

7.5 - 10.0



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



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CHECKED BY: KLR

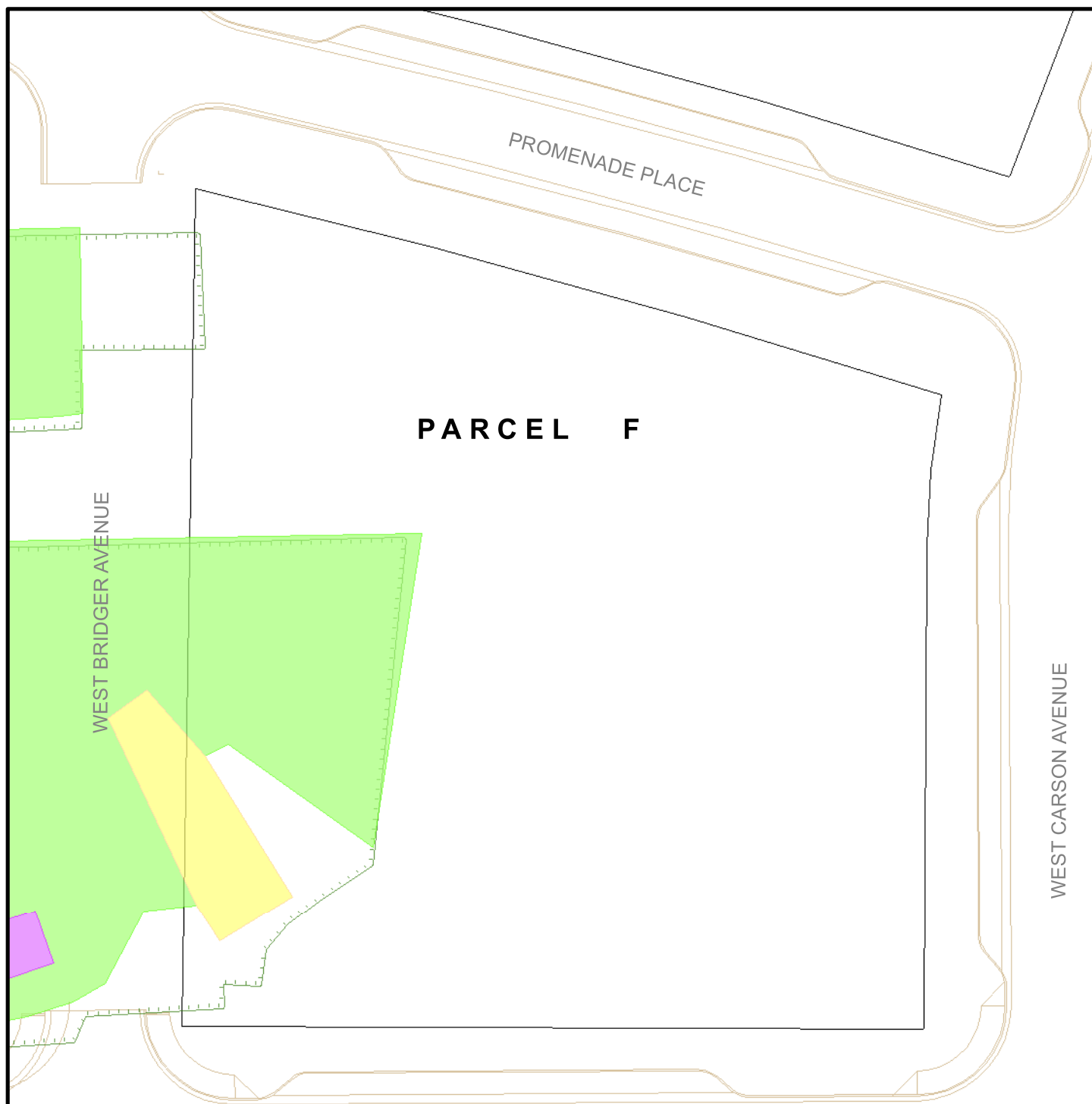
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SGMP_Figure19.mxd

PARCEL F DEPTH TO REMAINING TPH IMPACTED SOILS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

19



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EXPLANATION

TPH in ppm

< 100 or Not Sampled

100 - 1,000

1,000 - 5,000

5,000 - 10,000



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



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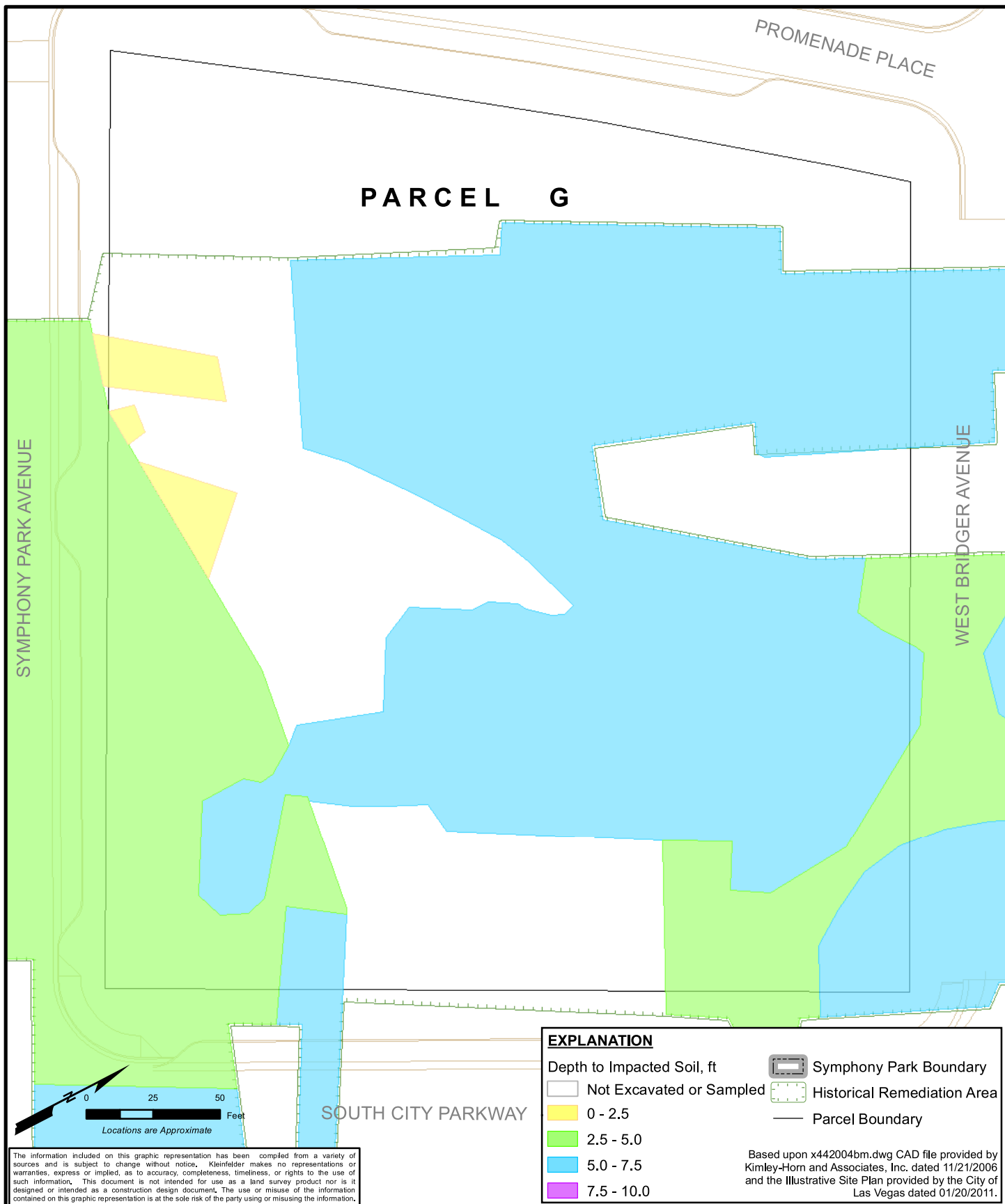
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PARCEL F REMAINING TPH CONCENTRATIONS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

20



PROJECT NO. 20154986

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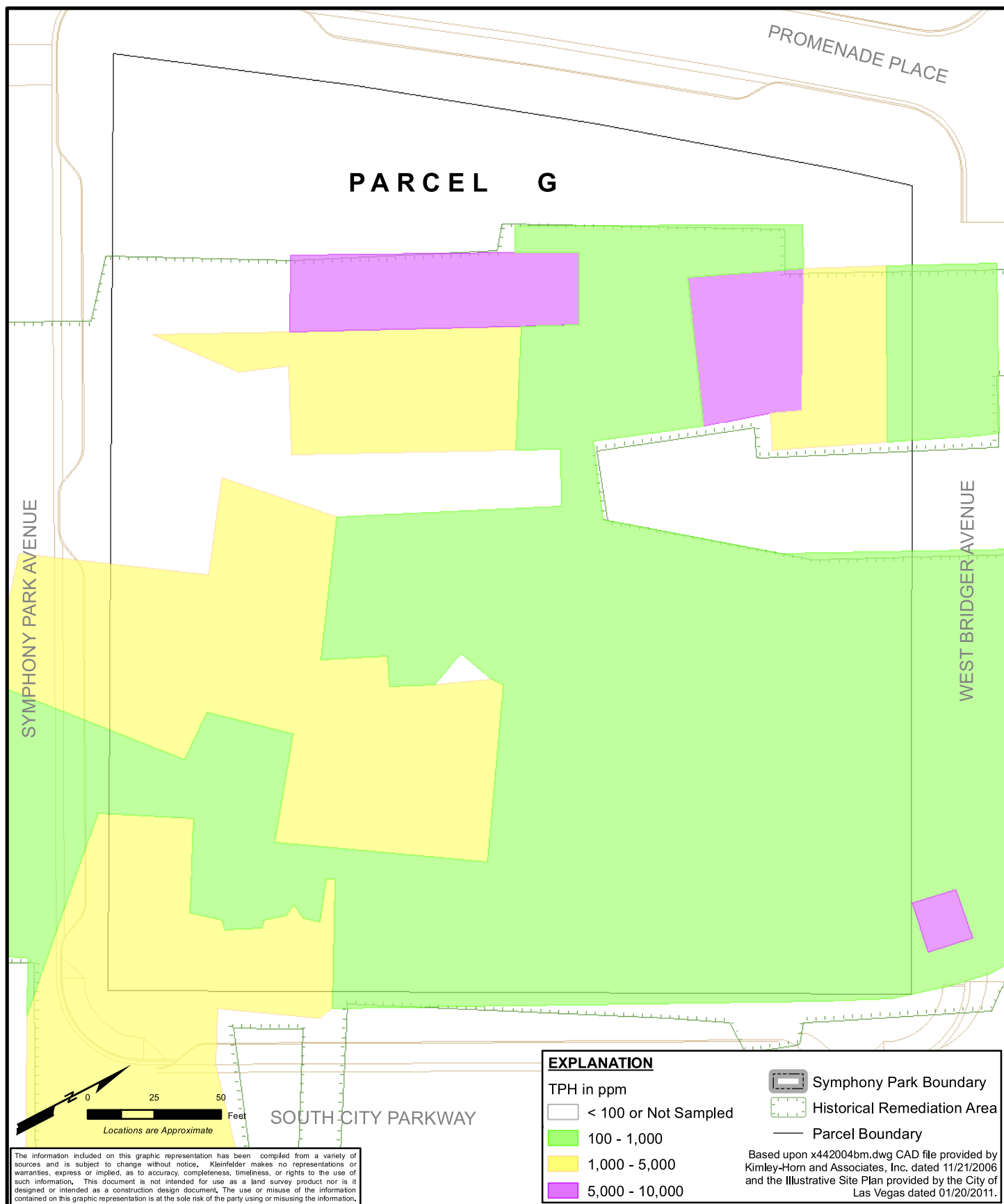
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SGMP_Figure21.mxd

PARCEL G
DEPTH TO REMAINING
TPH IMPACTED SOILS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

21



PROJECT NO. 20154986

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CHECKED BY: KLR

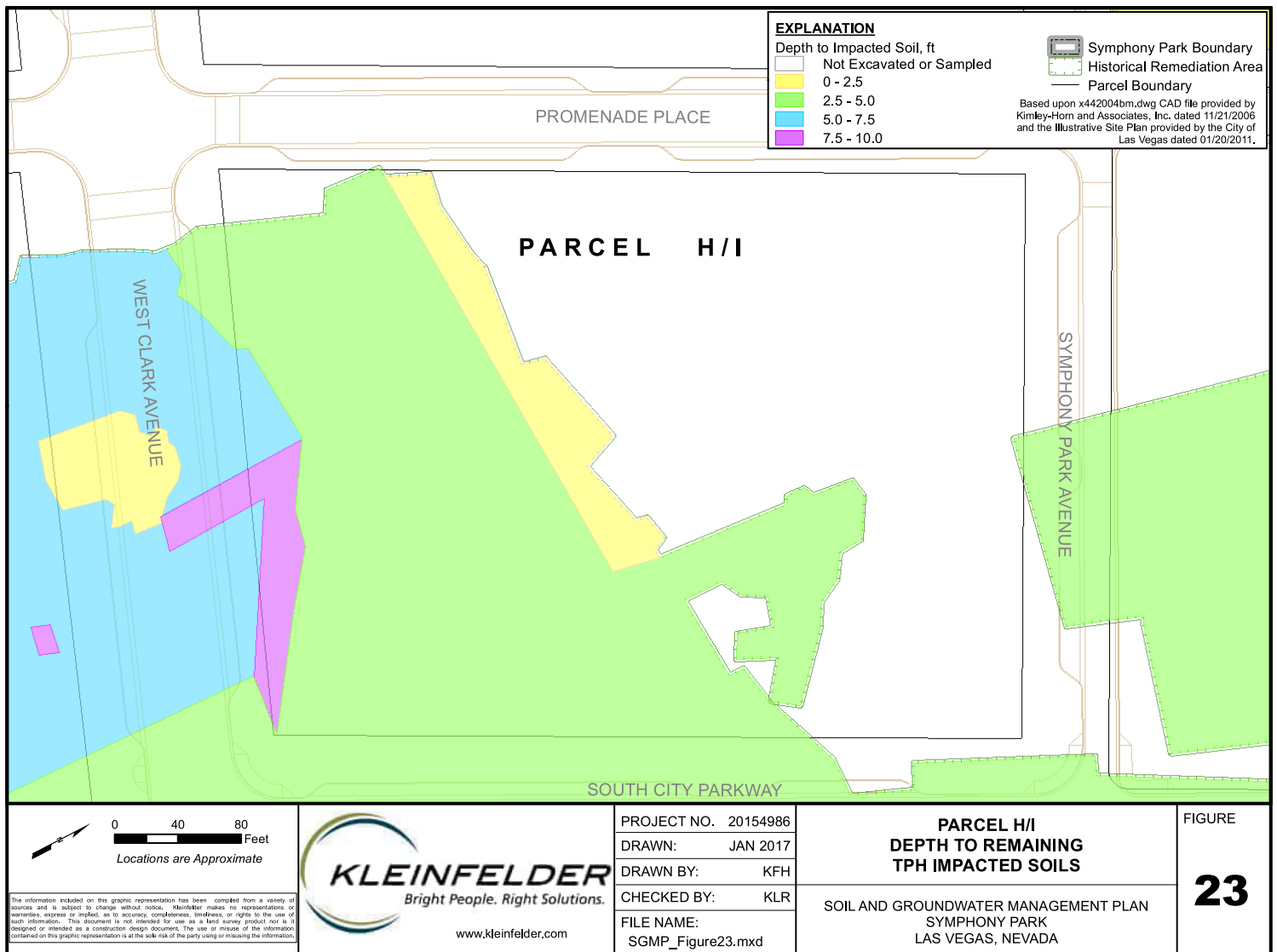
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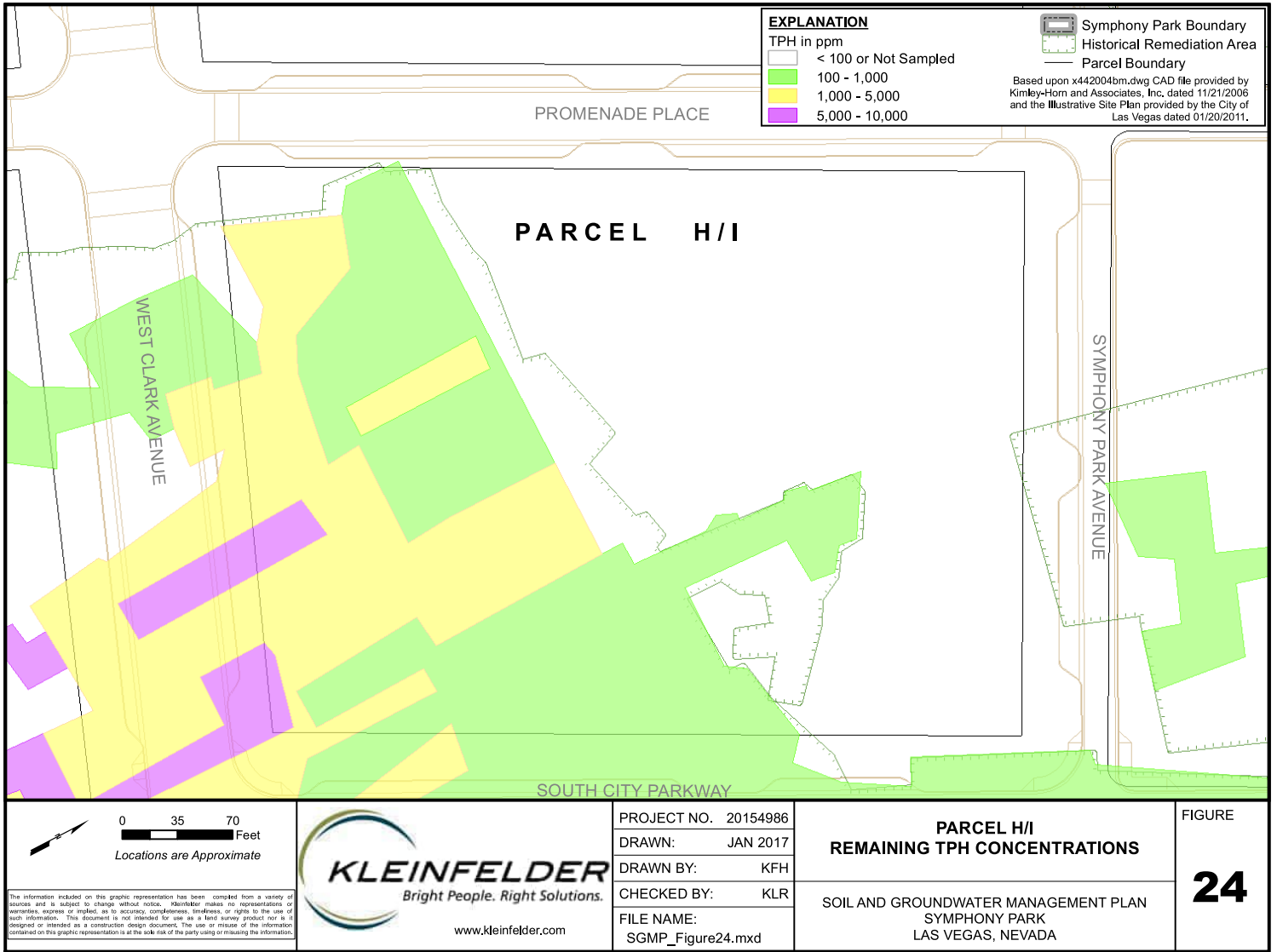
**PARCEL G
REMAINING TPH CONCENTRATIONS**

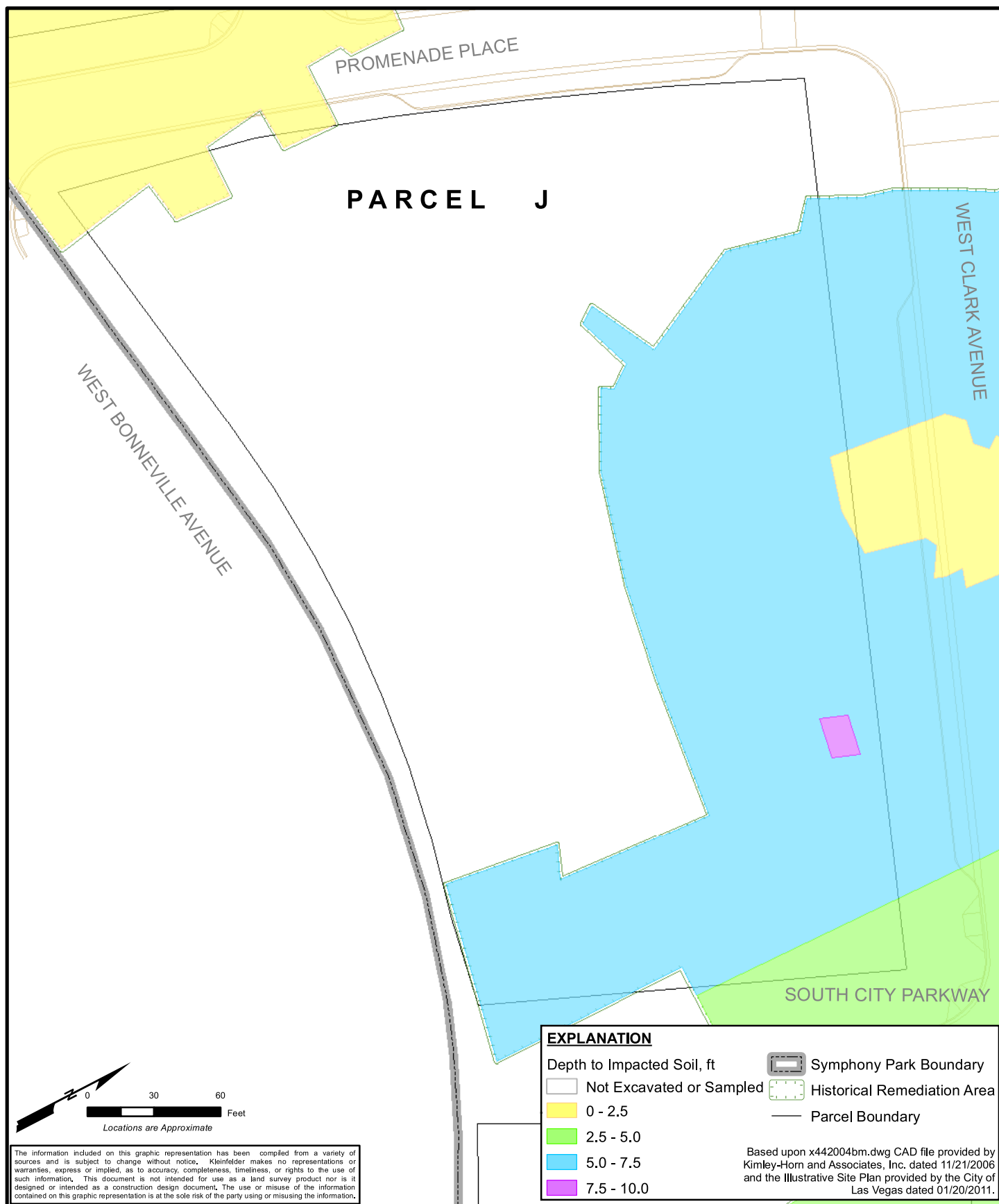
SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

22







PROJECT NO. 20154986

DRAWN: JAN 2017

DRAWN BY: KFH

CHECKED BY: KLR

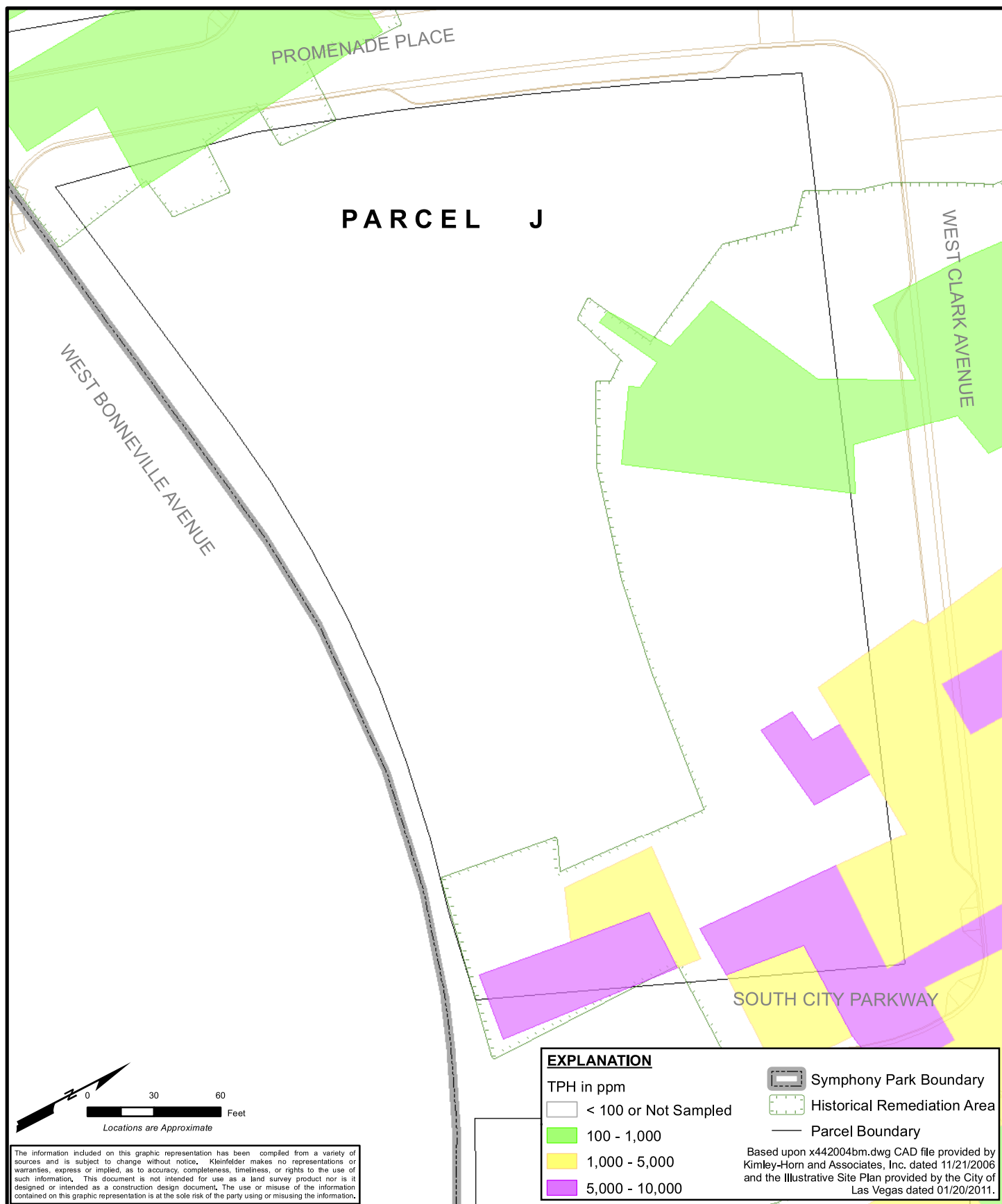
FILE NAME:
SGMP_Figure25.mxd

PARCEL J
DEPTH TO REMAINING
TPH IMPACTED SOILS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

25



PROJECT NO. 20154986

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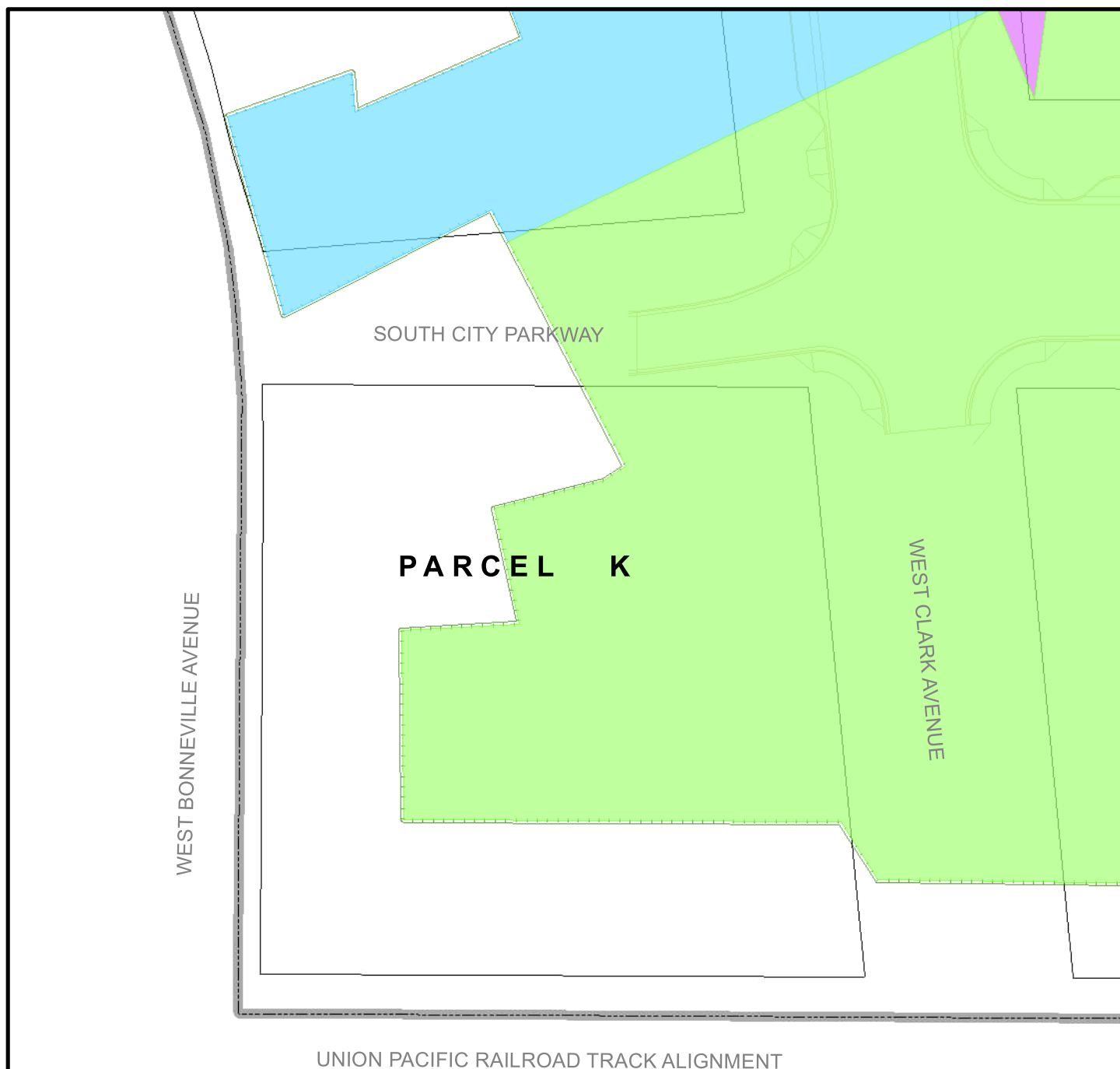
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**PARCEL J
REMAINING TPH CONCENTRATIONS**

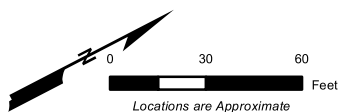
SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

26



UNION PACIFIC RAILROAD TRACK ALIGNMENT



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EXPLANATION

Depth to Impacted Soil, ft

Not Excavated or Sampled

0 - 2.5

2.5 - 5.0

5.0 - 7.5

7.5 - 10.0



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



PROJECT NO. 20154986

DRAWN: JAN 2017

DRAWN BY: KFH

CHECKED BY: KLR

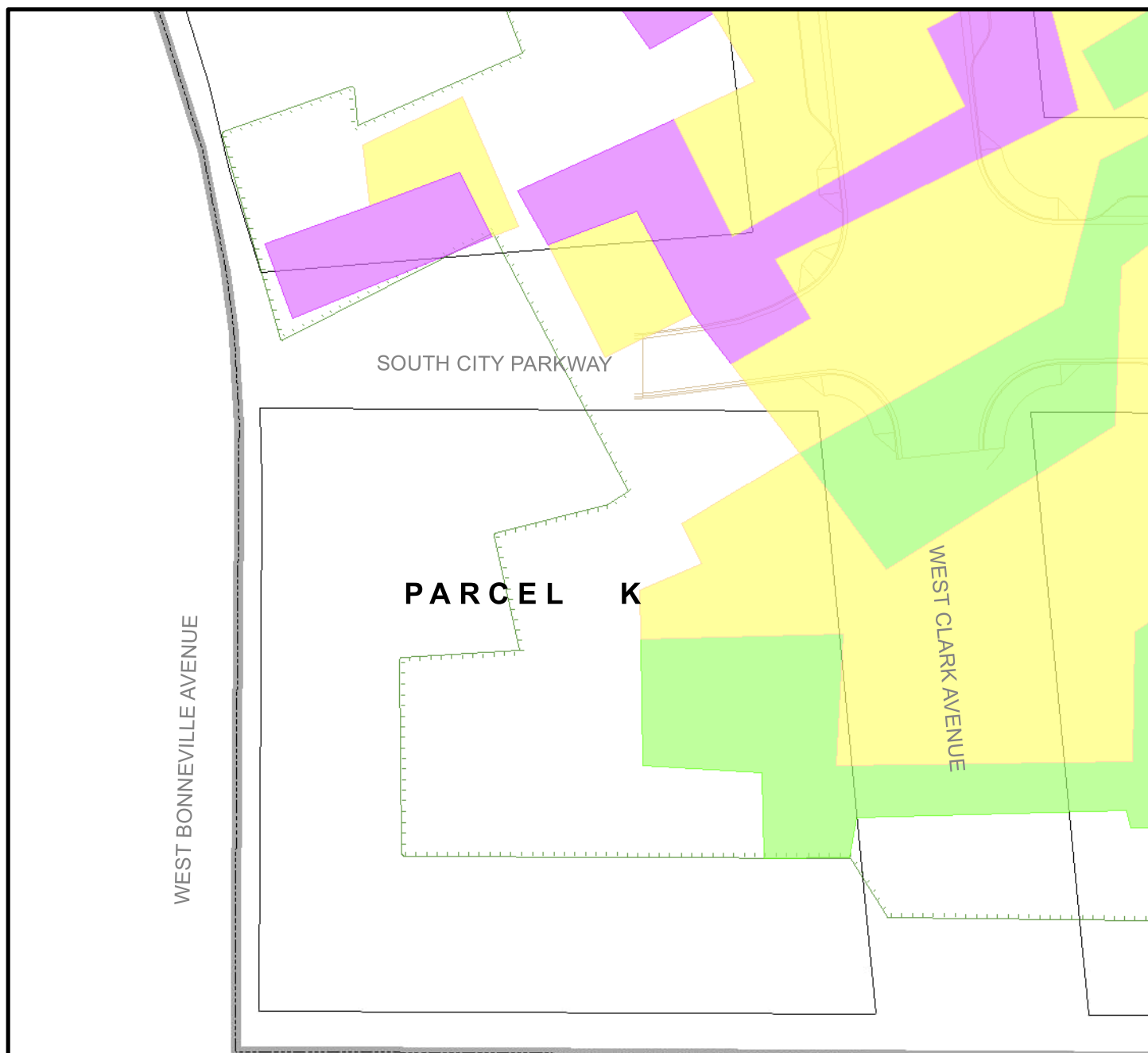
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PARCEL K DEPTH TO REMAINING TPH IMPACTED SOILS

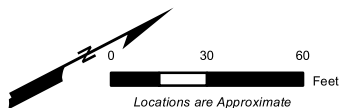
SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

27



UNION PACIFIC RAILROAD TRACK ALIGNMENT



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EXPLANATION

TPH in ppm

< 100 or Not Sampled

100 - 1,000

1,000 - 5,000

5,000 - 10,000



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



PROJECT NO. 20154986

DRAWN: JAN 2017

DRAWN BY: KFH

CHECKED BY: KLR

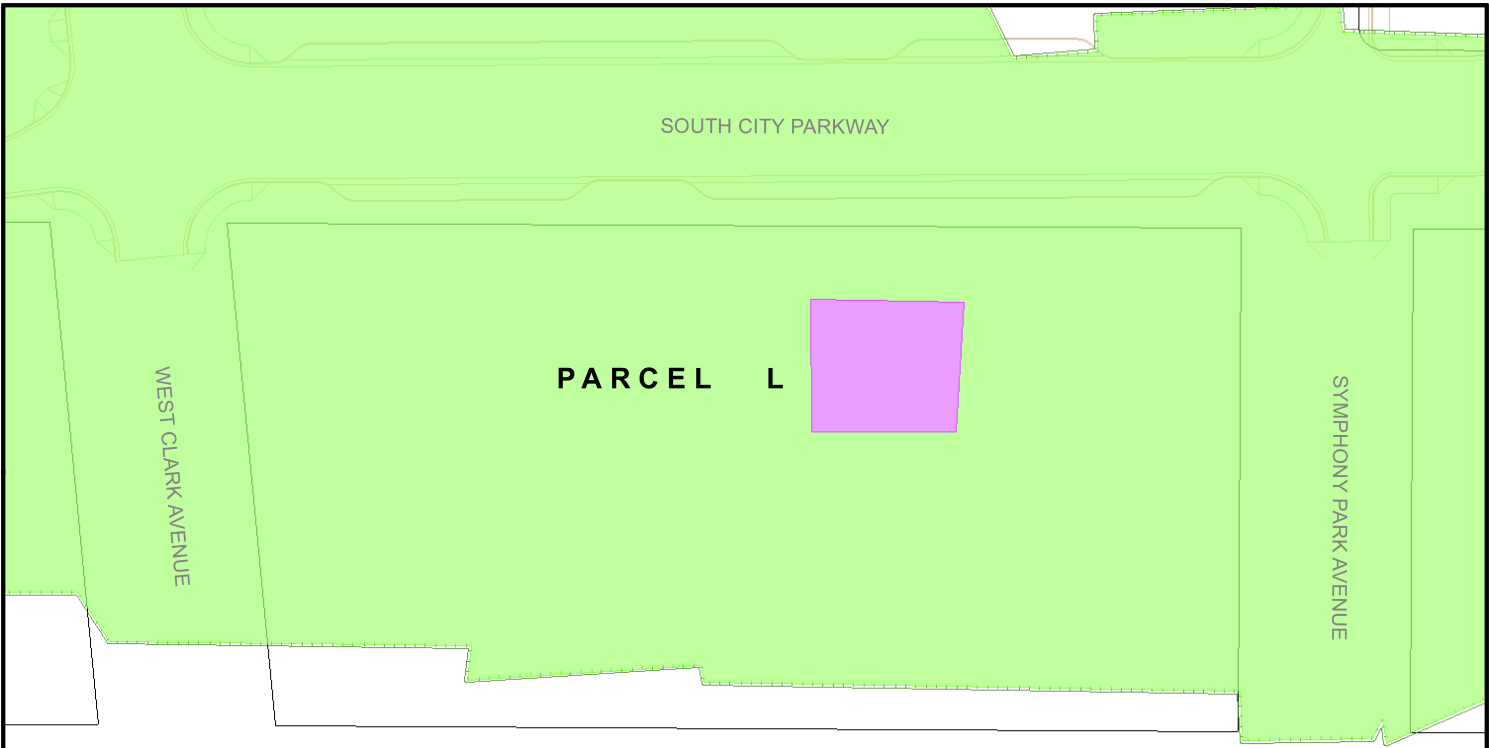
FILE NAME:
SGMP_Figure28.mxd

PARCEL K REMAINING TPH CONCENTRATIONS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

28



EXPLANATION

Depth to Impacted Soil, ft

Not Excavated or Sampled

0 - 2.5

2.5 - 5.0

5.0 - 7.5

7.5 - 10.0



Symphony Park Boundary

Historical Remediation Area

Parcel Boundary

Based upon x442004bm.dwg CAD file provided by
Kimley-Horn and Associates, Inc. dated 11/21/2006
and the Illustrative Site Plan provided by the City of
Las Vegas dated 01/20/2011.

UNION PACIFIC RAILROAD TRACK ALIGNMENT



0 35 70
Feet
Locations are Approximate



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DRAWN BY: KFH

CHECKED BY: KLR

FILE NAME:
SGMP_Figure29.mxd

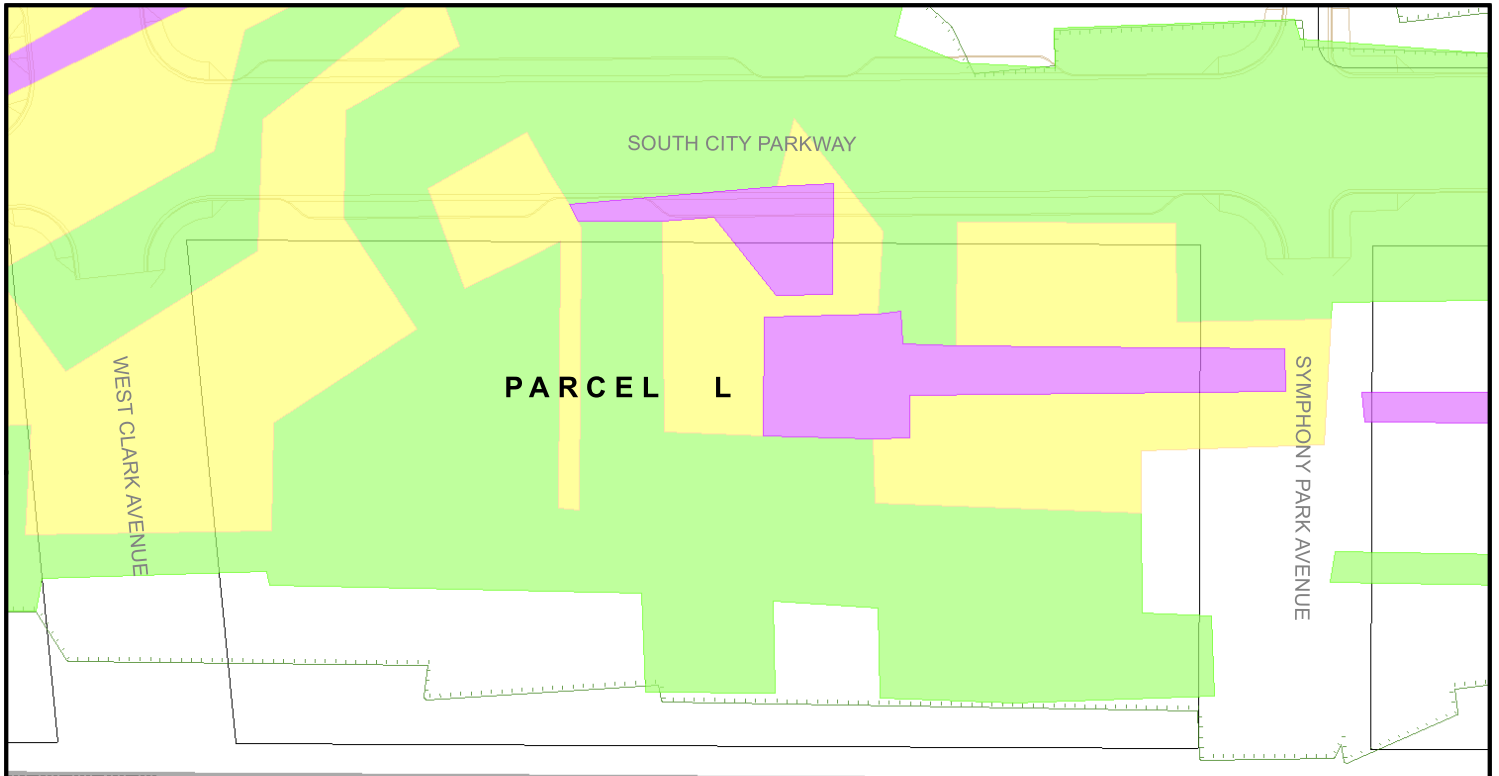
PARCEL L DEPTH TO REMAINING TPH IMPACTED SOILS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

29

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EXPLANATION

TPH in ppm

- < 100 or Not Sampled
- 100 - 1,000
- 1,000 - 5,000
- 5,000 - 10,000



Symphony Park Boundary

Historical Remediation Area

Parcel Boundary

Based upon x442004bm.dwg CAD file provided by
Kimley-Horn and Associates, Inc. dated 11/21/2006
and the Illustrative Site Plan provided by the City of
Las Vegas dated 01/20/2011.

UNION PACIFIC RAILROAD TRACK ALIGNMENT



0 35 70
Feet
Locations are Approximate



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DRAWN: JAN 2017

DRAWN BY: KFH

CHECKED BY: KLR

FILE NAME:
SGMP_Figure30.mxd

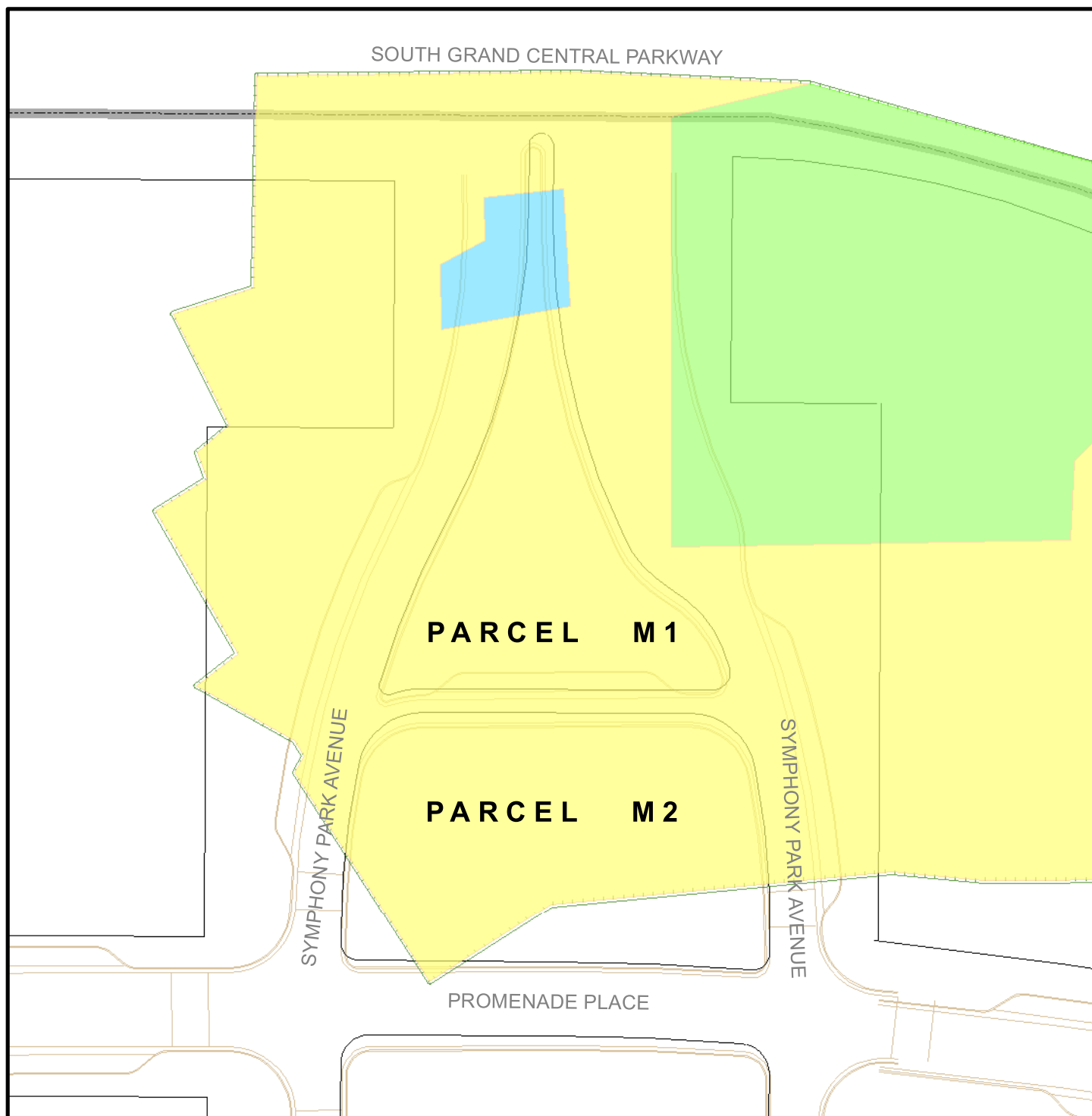
PARCEL L REMAINING TPH CONCENTRATIONS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

30

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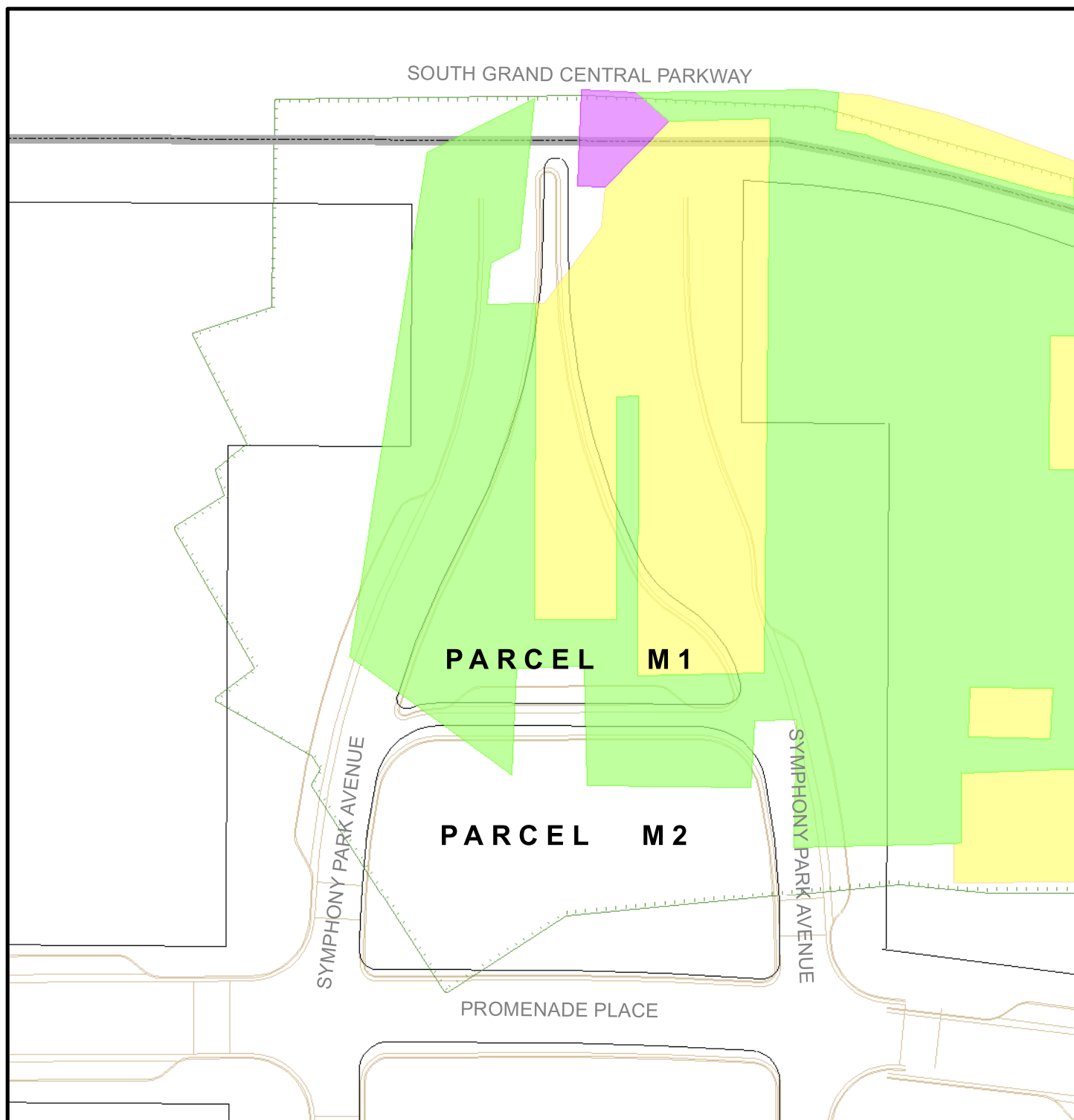


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EXPLANATION	
Depth to Impacted Soil, ft	Symphony Park Boundary
Not Excavated or Sampled	Historical Remediation Area
0 - 2.5	Parcel Boundary
2.5 - 5.0	
5.0 - 7.5	
7.5 - 10.0	

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.

	PROJECT NO. 20154986	PARCELS M1 AND M2 DEPTH TO REMAINING TPH IMPACTED SOILS	FIGURE 31
	DRAWN: JAN 2017		
	DRAWN BY: KFH		
	CHECKED BY: KLR		
	FILE NAME: SGMP_Figure31.mxd	SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA	



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EXPLANATION

TPH in ppm

< 100 or Not Sampled

100 - 1,000

1,000 - 5,000

5,000 - 10,000



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



PROJECT NO. 20154986

DRAWN: JAN 2017

DRAWN BY: KFH

CHECKED BY: KLR

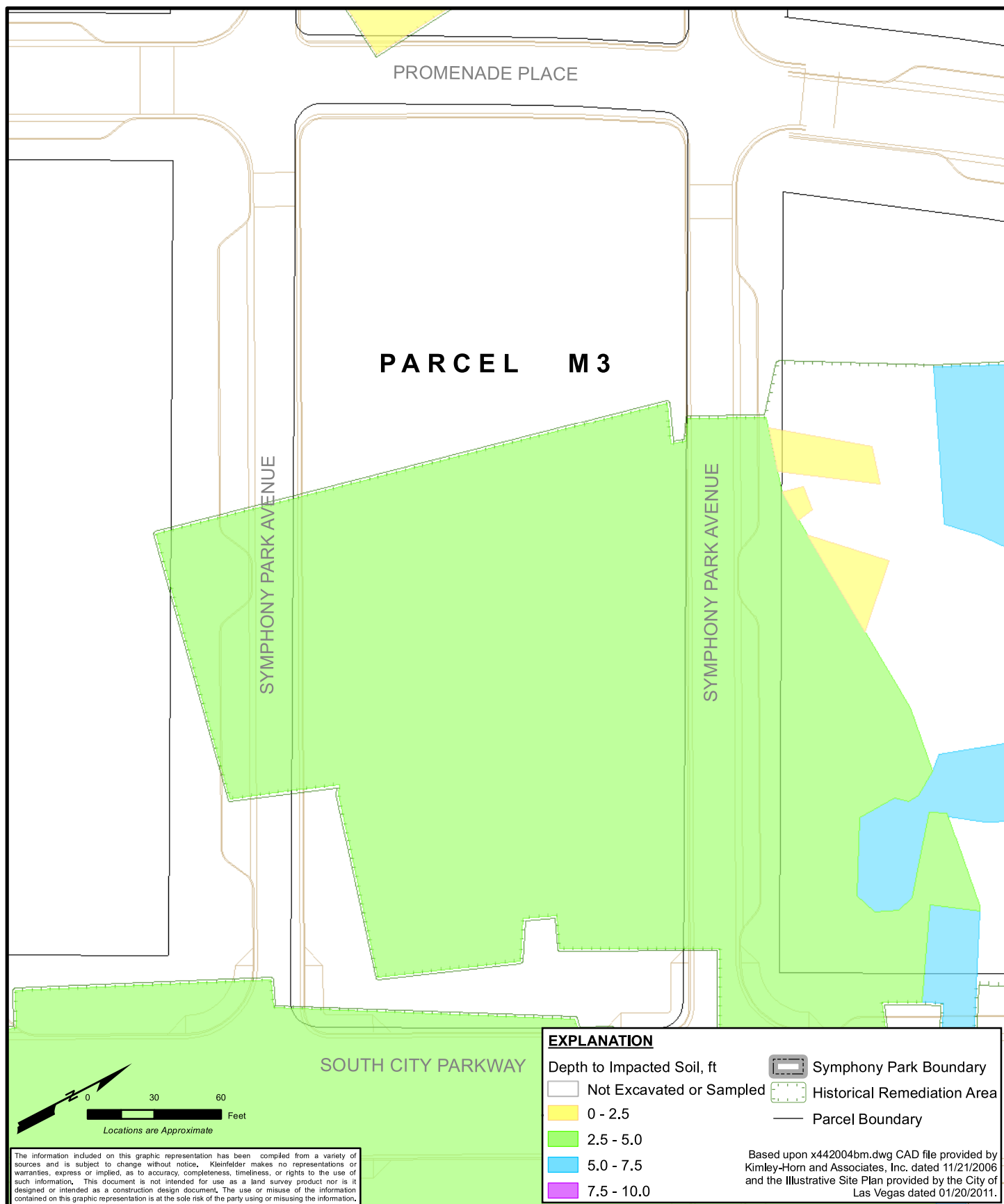
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PARCELS M1 AND M2 REMAINING TPH CONCENTRATIONS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

32



PROJECT NO. 20154986

DRAWN: JAN 2017

DRAWN BY: KFH

CHECKED BY: KLR

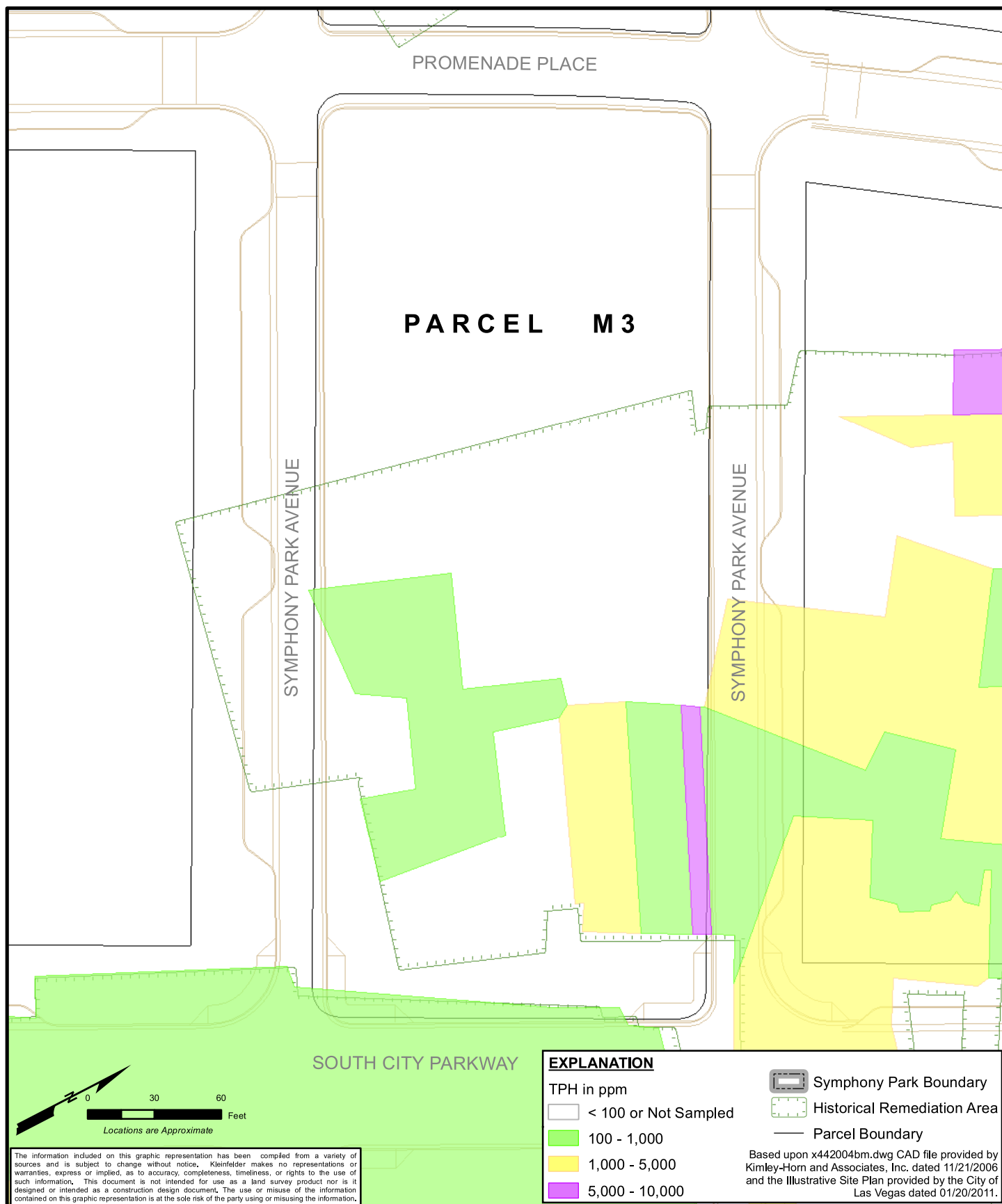
FILE NAME:
SGMP_Figure33.mxd

**PARCEL M3
DEPTH TO REMAINING
TPH IMPACTED SOILS**

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

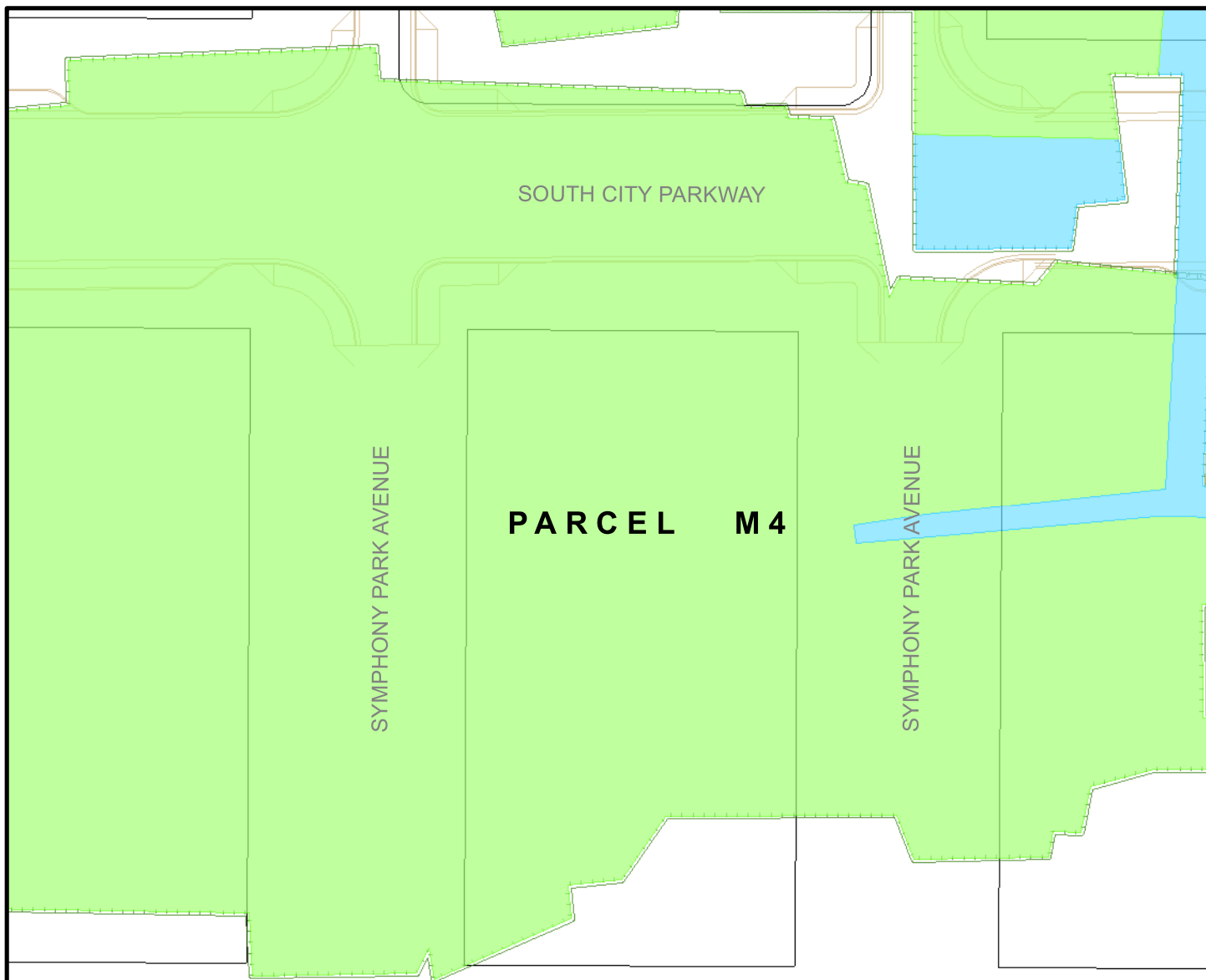
FIGURE

33



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	PROJECT NO.	20154986	PARCEL M3 REMAINING TPH CONCENTRATIONS	FIGURE 34
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	DRAWN BY:	KFH		
	CHECKED BY:	KLR		
	FILE NAME:	SGMP_Figure34.mxd		
			SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA	



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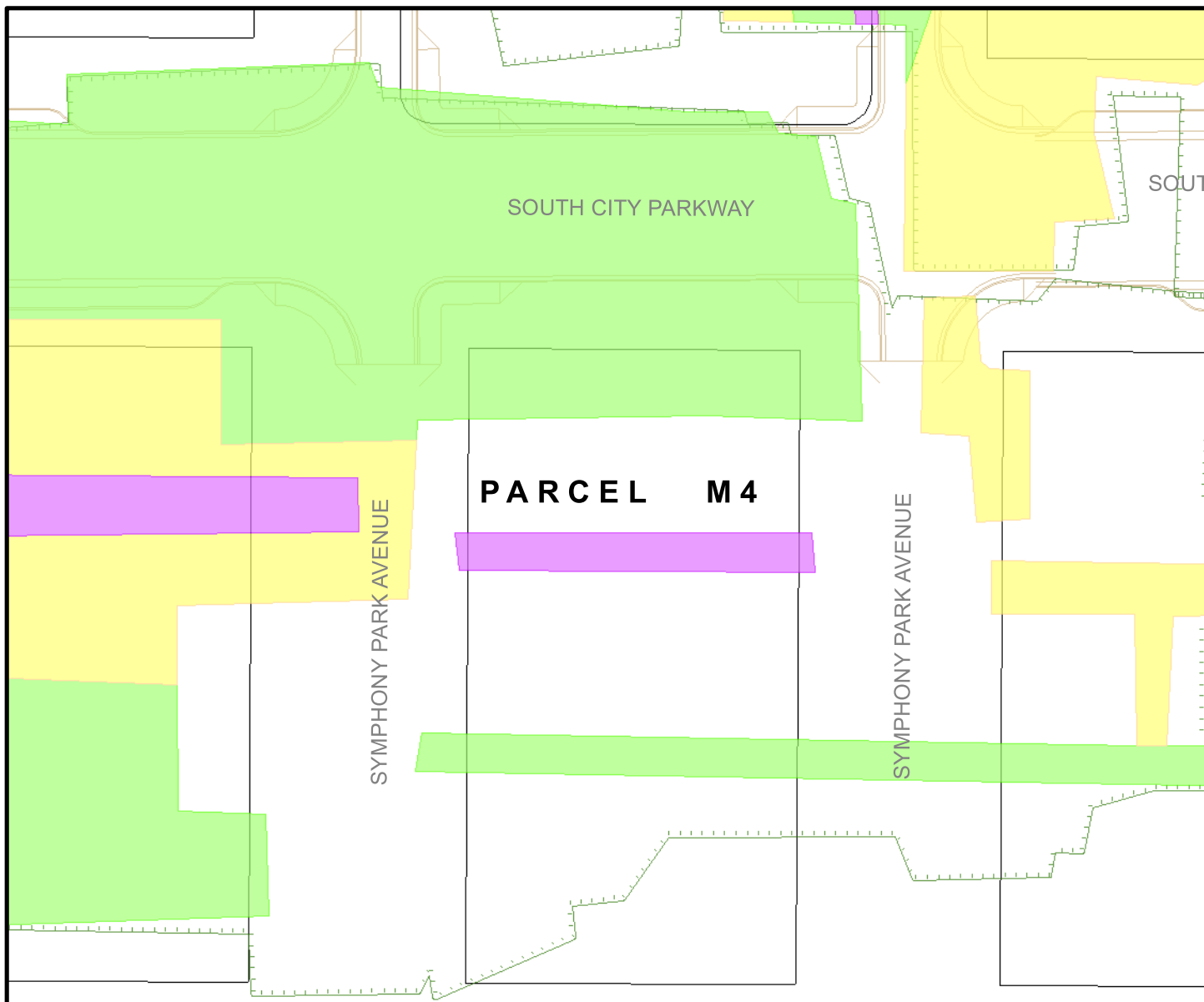
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PARCEL M4
DEPTH TO REMAINING
TPH IMPACTED SOILS

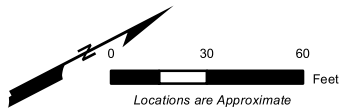
SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

35



UNION PACIFIC RAILROAD TRACK ALIGNMENT



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EXPLANATION

TPH in ppm

< 100 or Not Sampled

100 - 1,000

1,000 - 5,000

5,000 - 10,000



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

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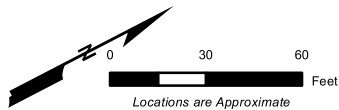
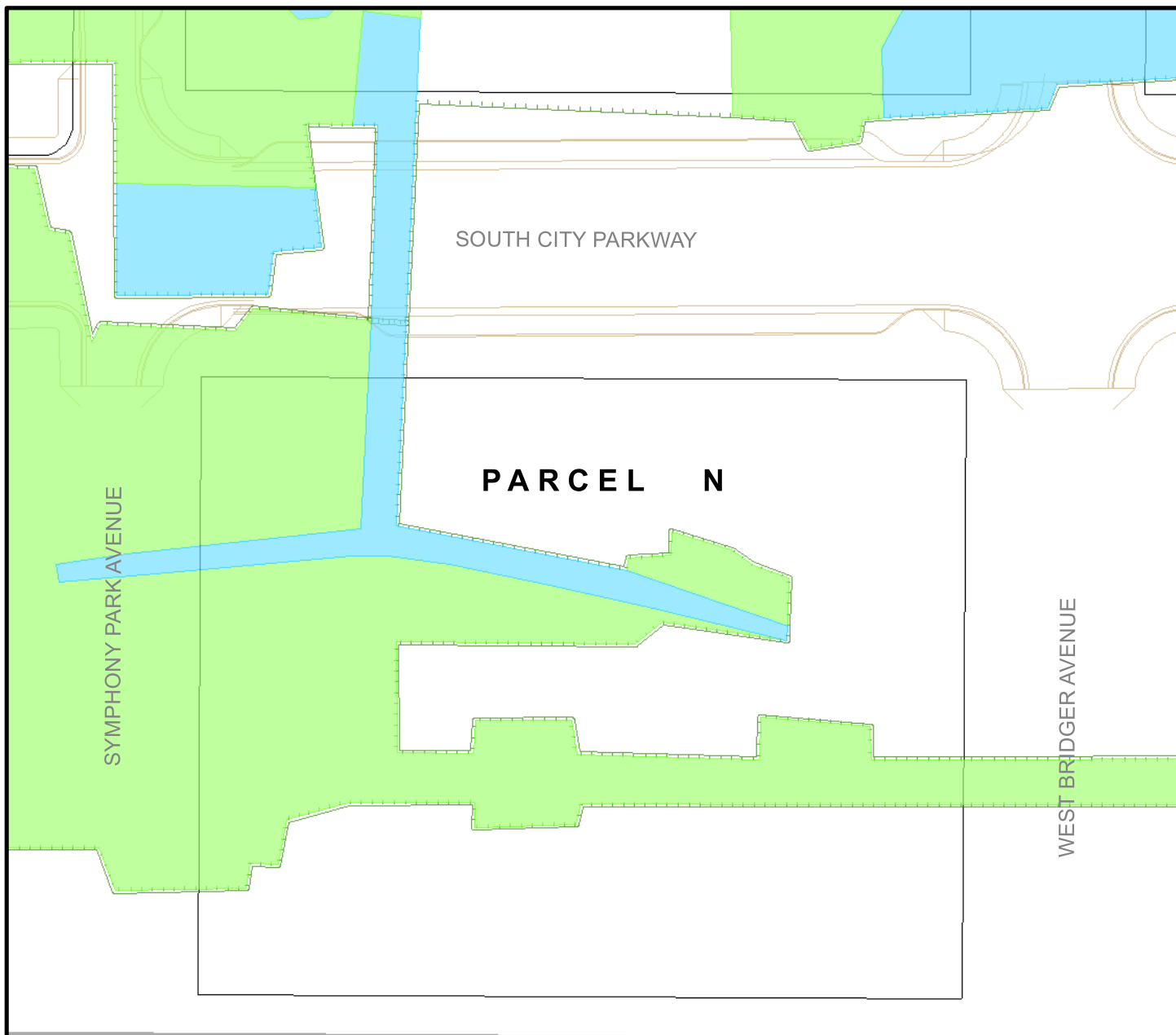
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SGMP_Figure36.mxd

PARCEL M4 REMAINING TPH CONCENTRATIONS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

36



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EXPLANATION

Depth to Impacted Soil, ft

Not Excavated or Sampled

0 - 2.5

2.5 - 5.0

5.0 - 7.5

7.5 - 10.0



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

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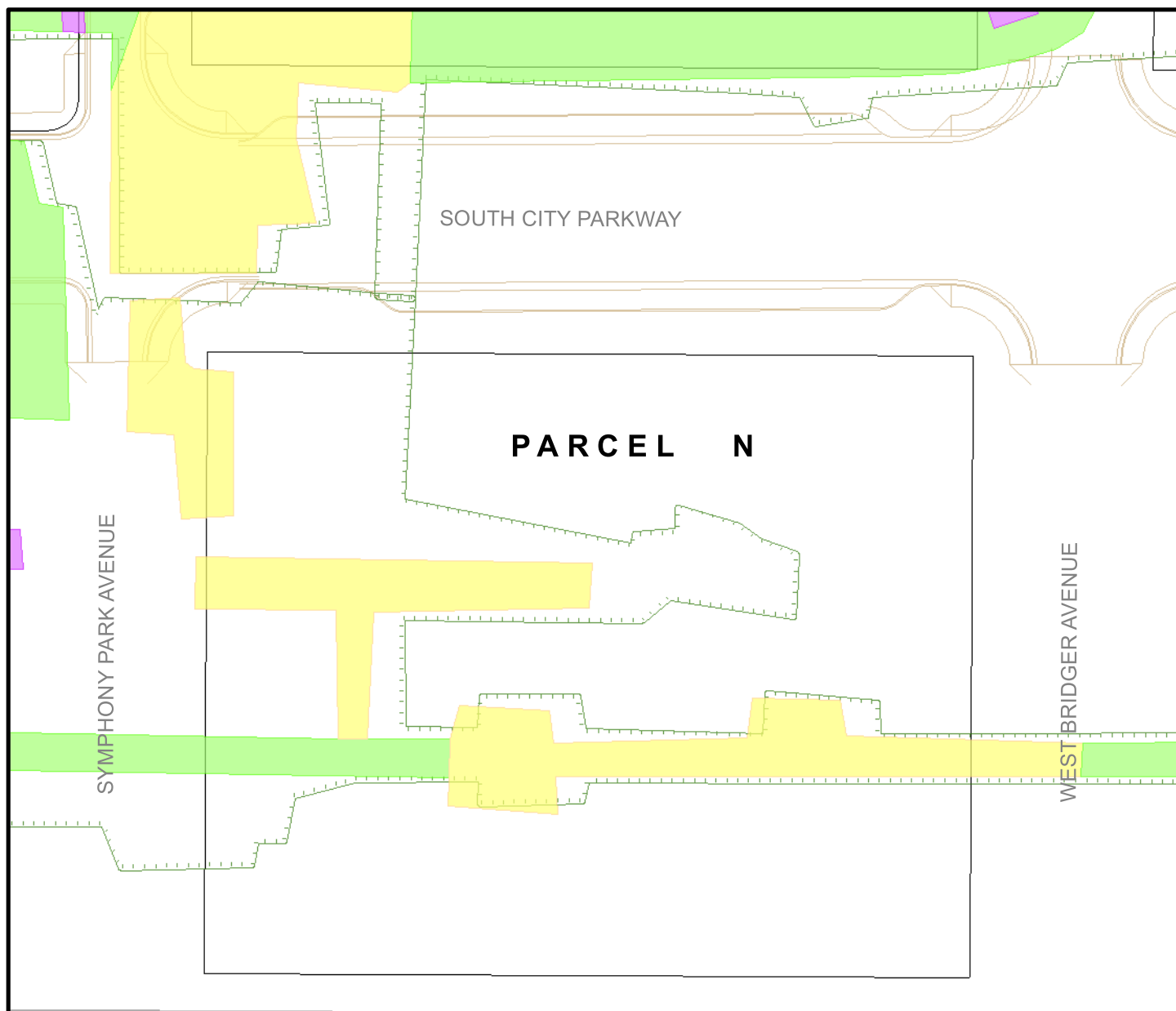
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PARCEL N DEPTH TO REMAINING TPH IMPACTED SOILS

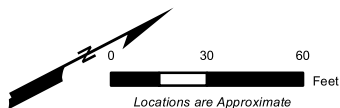
SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

37



UNION PACIFIC RAILROAD TRACK ALIGNMENT



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EXPLANATION

TPH in ppm

< 100 or Not Sampled

100 - 1,000

1,000 - 5,000

5,000 - 10,000



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

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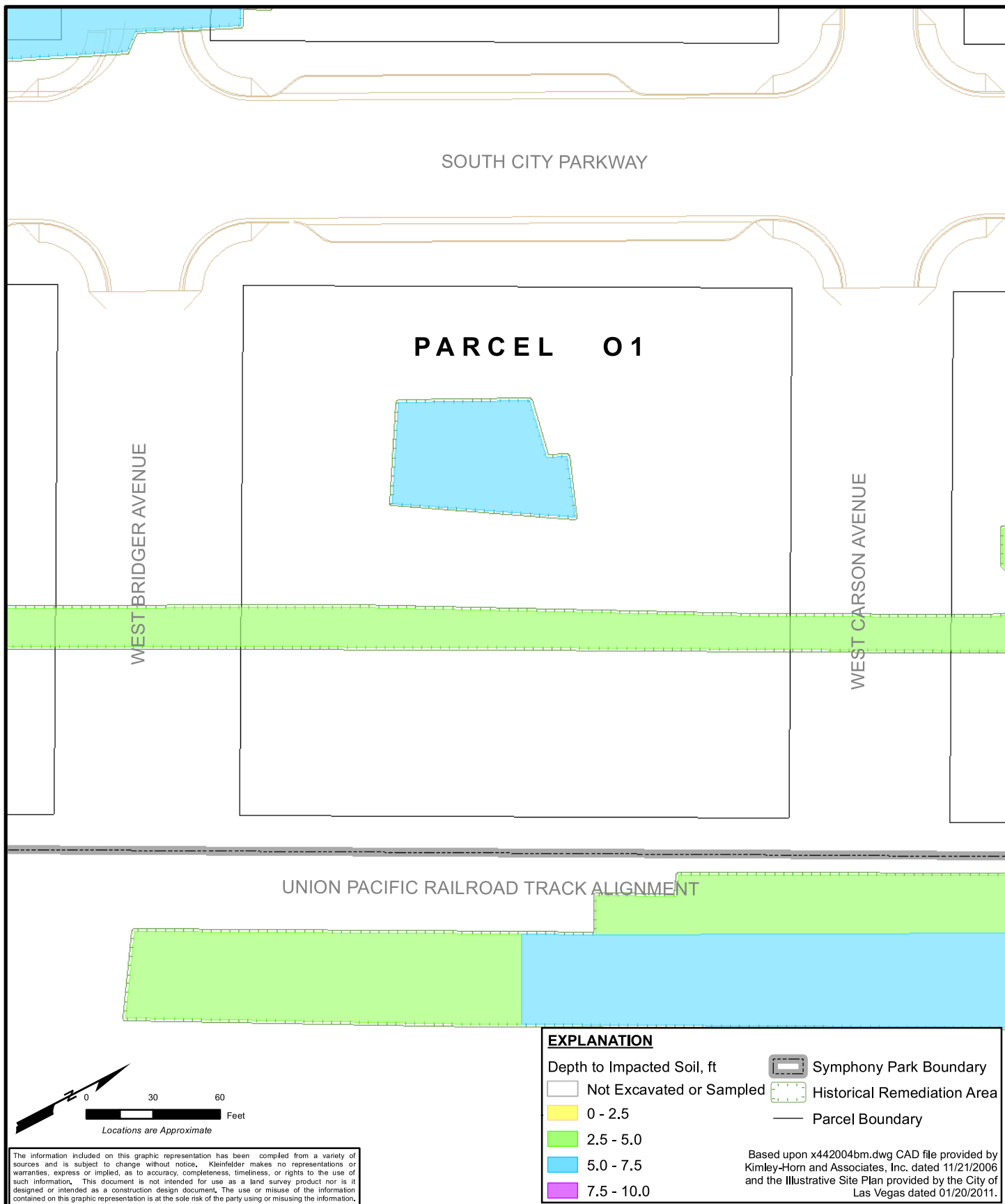
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PARCEL N REMAINING TPH CONCENTRATIONS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

38



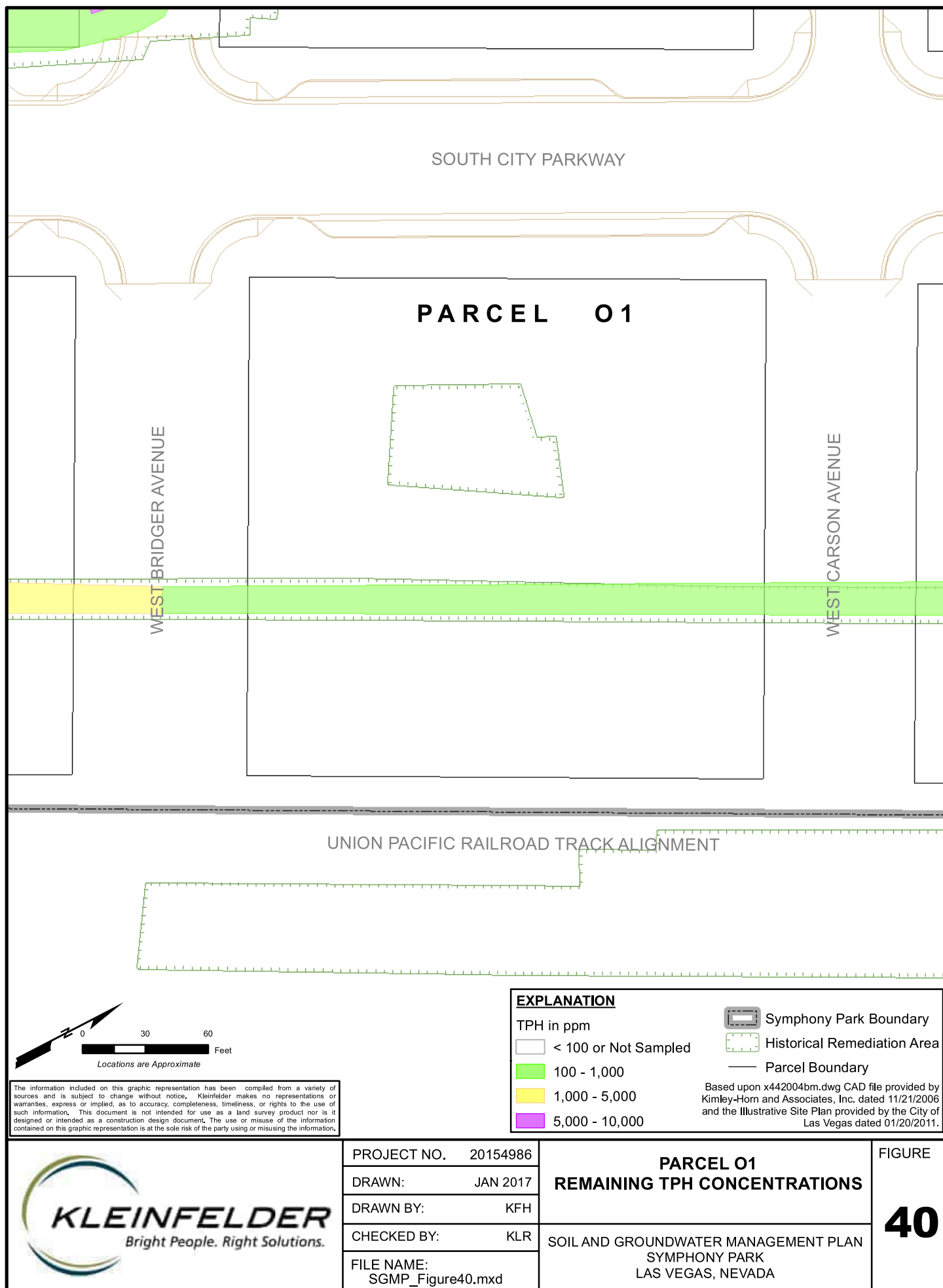
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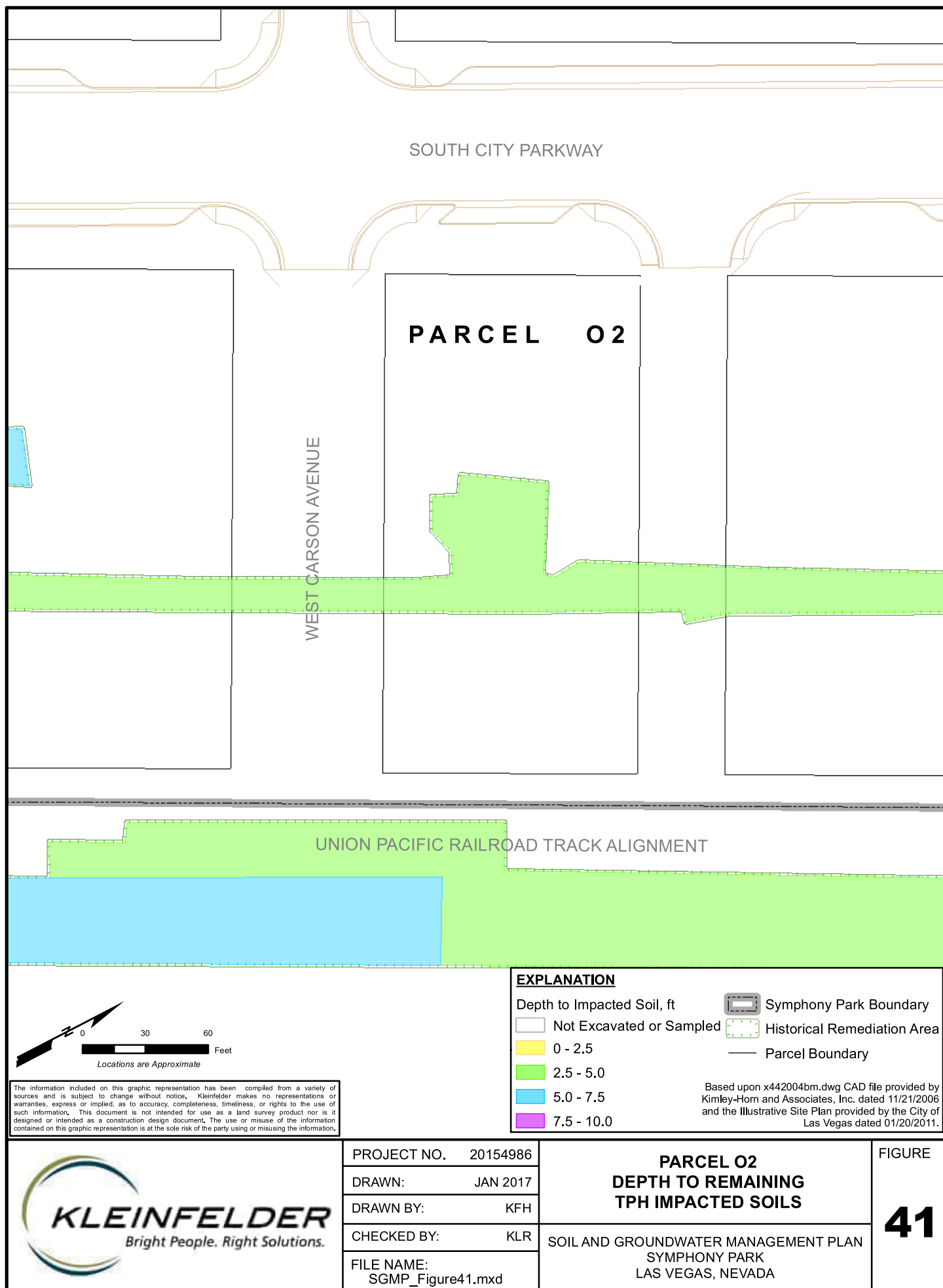


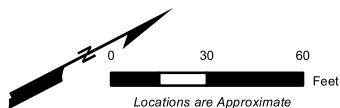
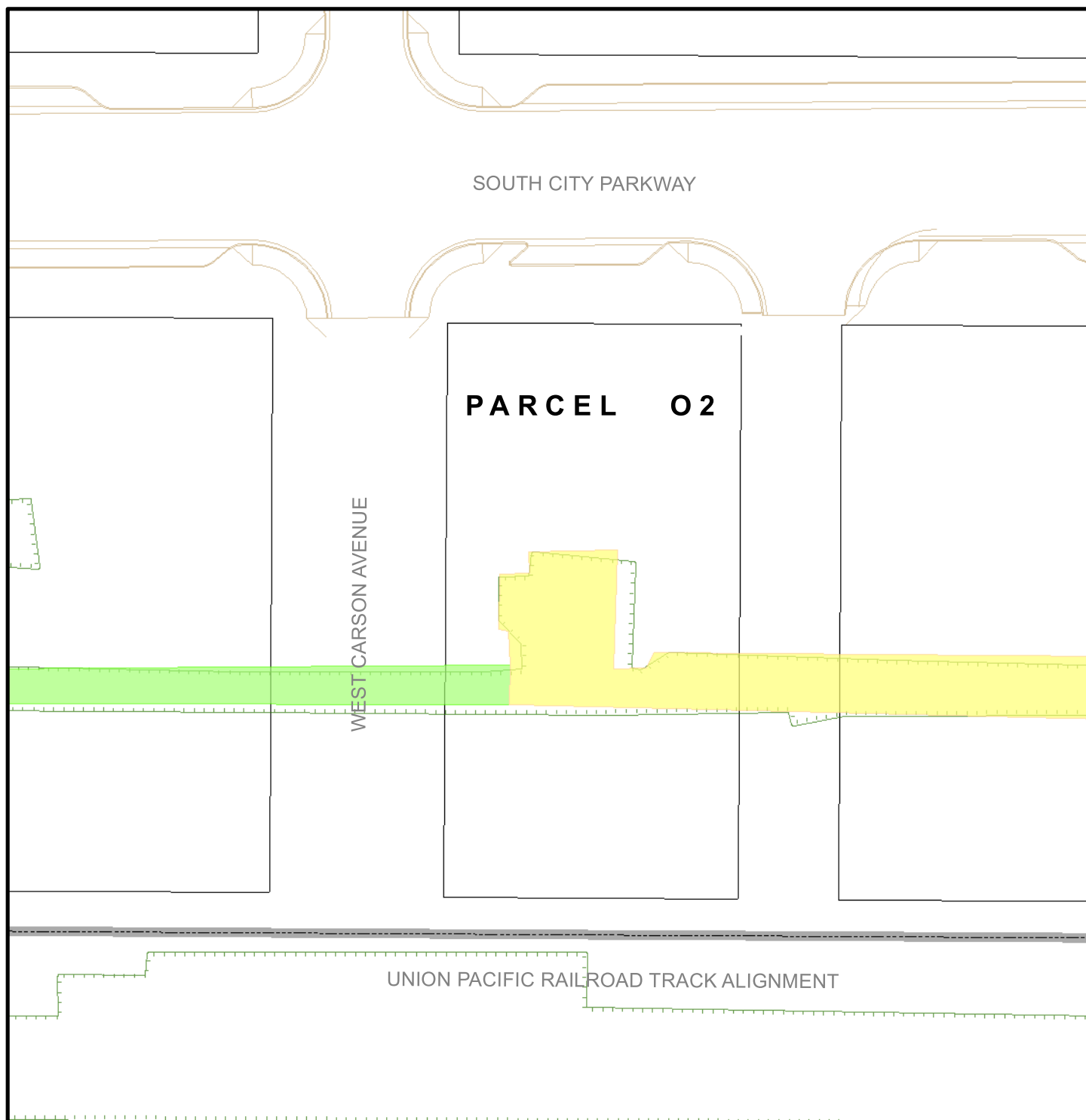
PROJECT NO.	20154986
DRAWN:	JAN 2017
DRAWN BY:	KFH
CHECKED BY:	KLR
FILE NAME:	SGMP_Figure39.mxd

PARCEL 01 DEPTH TO REMAINING TPH IMPACTED SOILS	SOIL AND GROUNDWATER MANAGEMENT PLAN SYMPHONY PARK LAS VEGAS, NEVADA
--	---

FIGURE
39







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EXPLANATION

TPH in ppm

< 100 or Not Sampled

100 - 1,000

1,000 - 5,000

5,000 - 10,000



Symphony Park Boundary



Historical Remediation Area



Parcel Boundary

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



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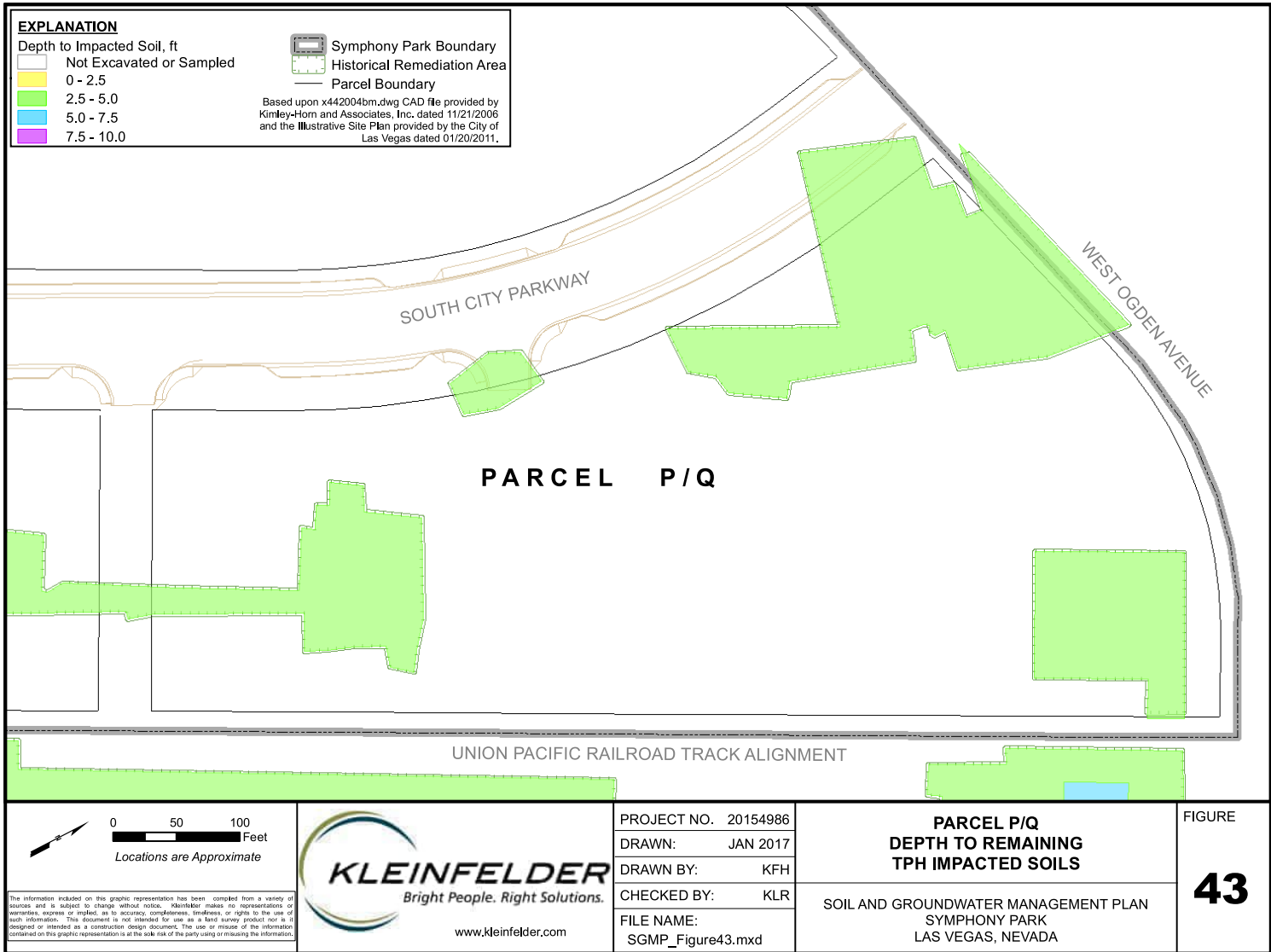
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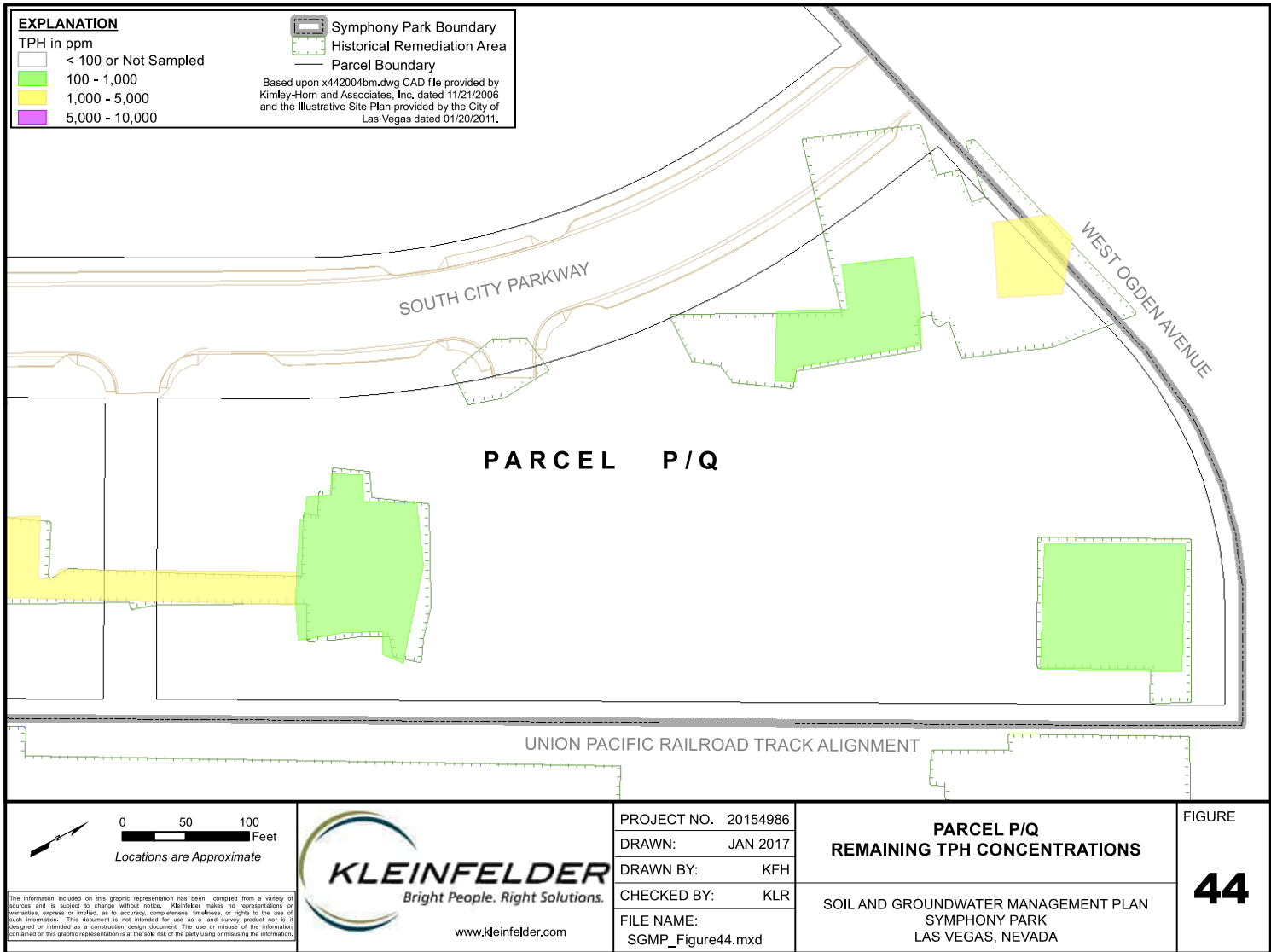
PARCEL 02 REMAINING TPH CONCENTRATIONS

SOIL AND GROUNDWATER MANAGEMENT PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

42







APPENDIX A
SAMPLING AND ANALYSIS PLAN



**SAMPLING AND ANALYSIS PLAN
REVISION NO. 1**

**SYMPHONY PARK
[FORMERLY UNION PARK 61-ACRE SITE]
FORMER UNION PACIFIC RAILROAD
FUELING AND MAINTENANCE YARD
LAS VEGAS, NEVADA
FACILITY ID # H-000557
KLEINFELDER PROJECT NO.: 20154986.001A**

February 14, 2017

Reviewed and Approved by:
Nevada Division of Environmental Protection
Nevada Brownfields Program
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701
Brownfields Contract #DEP14-008
Task #K01R-14-3

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Nevada Division of Environmental Protection
Nevada Brownfields Program
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701
Brownfields Contract #DEP14-008
Task #K01R-14-3

**SAMPLING AND ANALYSIS PLAN
REVISION NO. 1**

**SYMPHONY PARK
[FORMERLY UNION PARK 61-ACRE SITE]
FORMER UNION PACIFIC RAILROAD
FUELING AND MAINTENANCE YARD
LAS VEGAS, NEVADA
FACILITY ID # H-000557
KLEINFELDER PROJECT NO.: 20154986.001A**

Prepared by:



Karin F. Hagan, C.E.M.
Project Professional
EM-2214 (expires 4/14/2017)

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state and local statutes, regulations and ordinances.

Reviewed by:



Kerry L. Ruebelmann, PG
Vice President

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February 14, 2017
Kleinfelder Project No.: 20154986.001A

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A	Data Quality Indicators
B	Example Daily Field Report and Sample Log Form
C	Chain-of-Custody Form

1 INTRODUCTION

The City Parkway V, Inc. (City Parkway V) is redeveloping the 61-acre site known as Symphony Park located just west of downtown Las Vegas. The site is bounded on the north and west by Grand Central Parkway, on the east by the Union Pacific railroad, and on the south by Bonneville Avenue. The City Parkway V is acting as the master developer. The Symphony Park vision is to develop a new skyline and destination for local residents with mutually supportive mixed uses and not dominated by one or two large uses. All of the infrastructure for the site will be developed by the City Parkway V.

During the course of normal operations, former Union Pacific Railroad (UPRR) operations on the site resulted in releases of petroleum hydrocarbons, various organic and inorganic solvents, and metals. Some of the petroleum-impacted soil has been removed and replaced with clean fill material according to an agreement between the Nevada Division of Environmental Protection (NDEP) and UPRR. However, subsequent analysis of soil and groundwater samples has revealed the presence of various contaminants of potential concern. Therefore, in order to have a common procedure to evaluate the materials to be encountered for the various redevelopment activities, the City desires a sampling and analysis plan (SAP) for the entire 61 acres.

This SAP would be used in conjunction with the separate Soil and Groundwater Management Plan (SGMP, Kleinfelder 2016) to provide the project-specific procedures for collecting samples from excavated soil stockpiles and obtaining the analytical data to be used in the decision criteria to be established in the SGMP for soil management. The constituents of concern are: volatile organic compounds (VOCs [alkyl benzenes, toluene, ethylbenzene, total xylenes, naphthalene, and etc.]), the Resource Conservation and Recovery Act (RCRA) 8 Metals (arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver), semi-volatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs) as appropriate based on individual project location. The specific analyses for samples taken from the different areas within the 61 acres will be determined by the CEM based on the historical data from past reports.

Groundwater sampling and analysis is not covered in this SAP. Groundwater should be addressed on a case-by-case basis by the individual contractors depending on whether building construction requires dewatering activities. If groundwater is encountered, it will require management under the SGMP. Sampling and analyses will need to follow the requirements set forth in the National Pollution Discharge Elimination System (NPDES) permitting guidelines. Based on previous projects on the Symphony Park site, it is anticipated that groundwater to be managed on the Symphony Park site can be discharged to the storm sewer requiring NPDES permits. This is further discussed in the SGMP.

1.1. SITE NAME

The sampling of the excavated soils will be located on various parcels and city right-of-ways within the site collectively known as the Symphony Park site in Las Vegas, Nevada.

1.2. SITE LOCATION

The site is located in the northwest $\frac{1}{4}$ of the northwest $\frac{1}{4}$ of Section 34, Township 20 South, Range 61 East. A site location map is presented as Figure 1-1. A detailed site layout showing the parcels and right-of-ways is presented as Figure 1-2.

1.3. RESPONSIBLE AGENCY

The field sampling will be performed per this SAP for the City Parkway V, Inc. The SAP was developed by Kleinfelder, under the direction of a Certified Environmental Manager (CEM).

1.4. ROLES AND RESPONSIBILITIES

The roles and responsibilities for the management of soils and groundwater are based upon the 2015 settlement between the City of Las Vegas and UPRR, in which the City of Las Vegas assumes all cost and risk for existing on-site contamination and relieved UPRR of their environmental obligations and are discussed in more detail in Section 3 of the SGMP.

1.4.1. NDEP

The NDEP is the regulatory agency overseeing the project, and will be involved as appropriate. Unless NDEP specifies otherwise, soil characterization will be performed by the CEM in accordance with this SAP before transportation and disposal/treatment occurs. NDEP will review and approve this SAP prior to its implementation. Soil characterization in accordance with the SGMP and this SAP replaces NDEP approval for individual soil determinations.

1.4.2. City Parkway V, Inc.

City Parkway V will have overall coordination responsibility for the site as a whole and of the rights-of-ways. City Parkway V will designate area(s) for temporary stockpiling of soils.

1.4.3. Certified Environmental Manager

The CEM has the authority to implement the SAP in areas of known and unknown conditions. The CEM shall be present on-site during soil characterization, excavation, and removal activities. The CEM may be provided by City Parkway V or the Developer/General Contractor.

A CEM shall be required to be present during excavation on the Symphony Park Site, regardless of the location of the development relative to the UPRR remediation extents. The UPRR remediation extents shown on Figure 4 and subsequent figures should be considered approximate. It is the developer's responsibility to define or verify the UPRR remediation extents.

1.5. STATEMENT OF THE SPECIFIC PROBLEM

The presence of contaminated soil beneath the Symphony Park has been identified in various previous site characterization studies performed over the past several years. A summary of the relevant findings and conclusions to date is as follows:

- The site was extensively utilized as a fueling and maintenance yard by Union Pacific Railroad for more than a 70 year period, beginning in the early 1900s. The site contained locomotive fueling, service, repair, and cleaning areas, and was also used for

material storage. From the 1940s to 1991, the property was used for locomotive fueling and maintenance purposes.

- Site characterization studies began in the late 1980s identifying areas of soil and groundwater contamination that included TPH, metals, VOCs, and SVOCs.
- The predominant contaminants at the site are petroleum hydrocarbons. Localized areas of soil are impacted with metals, VOCs, and SVOCs.
 - Eastbound Fueling Area - most of this area is situated on the adjoining property to the north.
 - Day Storage Tank – formerly located on the north end of the site.
 - Diesel Shop Area – formerly located on the center portion of the site.
 - Fuel Storage Area – formerly located on the south central portion of the site.
 - Wash Track Area – formerly located on the southwest portion of the site.
 - Evaporation Pond Area – formerly located on the west-central portion of the site.
 - The former areas where the contamination was found are shown on Plate 1-3 and identified as:
- Hydrocarbon impacted soils were found throughout the site from surface to the groundwater saturated zone. Measurable plumes of free phase floating product existed in the groundwater at the Eastbound Fueling Area, the Diesel Shop Area, and the Fuel Storage Area.
- Lead impacted soils were found in the Wash Track Area but did not extend beneath a depth of six feet below ground surface (bgs).
- VOCs and SVOCs were predominantly found at the Diesel Shop Area and were reported to be minor in extent.
- Contaminated soil (from surface to 2.5 feet bgs) and free product in the groundwater was removed by Union Pacific in the early 1990's, but there are still areas with TPH concentrations exceeding the NDEP action level of 100 mg/kg. There is also some residual free product in the groundwater in the vicinity of the former Fuel Storage Area and Diesel Shop Area.

Much of this site has been investigated, areas have been remediated, and the extent of remaining impacted soil, as well as areas of impacted groundwater, have been delineated. Those remaining potential areas of contamination have been documented. For those areas outside the UPRR remediation extents, NDEP and City Parkway V have agreed that the soils are *legally clean* based on the No Further Action determination by NDEP following UPRR's remediation activity. However, if during the course of excavation in an area outside of the UPRR remediation extents, the CEM observes indications of potentially impacted soils, those potentially impacted soils will be evaluated under the stipulations of the SGMP. Additionally, if impacted soils have been discovered by investigations after the No Further Action determination and prior to development, those impacted soils will be evaluated under the requirements of the SGMP. The CEM shall also inform City Parkway V when potentially impacted soils are observed. This SAP has been designed so that excavation activities can be subsequently managed per the protocols of a separate soil management plan.

2 BACKGROUND

The Symphony Park site consists of 21 separate parcels within 61 acres (see Figure 1-2). Upon development, the site will have several right-of-ways extending in an approximate northwest-southeast and northeast-southwest alignment across that include roads and walking promenades. The City Parkway V is acting as the master developer with the intent to develop a new skyline and destination for local residents. The development will have mutually supportive mixed uses and not be dominated by one or two large uses.

As previously described, over 70 years of UPRR operations on the site resulted in releases of petroleum hydrocarbons, various organic and inorganic solvents, and metals during the course of normal operations. Some lead-impacted soil has been removed and some of the petroleum-impacted soil has been removed and replaced with clean fill material according to an agreement between NDEP and UPRR. Areas still remain that are impacted by TPH, VOCs, SVOCs, some PCBs, or metals.

2.1. SITE DESCRIPTION

The Symphony Park site consists of 61 acres of land that is partially developed. There are no surface features present that are related to previous rail road operations. Prior to 2007, the land was used in support of nearby construction activities at the World Market Center and the Molasky Corporate Center as construction parking, equipment staging, and construction material lay-down areas. Since the original SGMP was written in 2007, several parcels have been developed. Parcel A1 was developed as the Cleveland Clinic Lou Ruvo Center for Brain Health with Parcel A2 as an associated temporary paved parking area. Parcel H/I was developed as the Smith Center for the Performing Arts, the Discovery Children's Museum, and an associated parking garage. Parcel B has been developed as a paved temporary parking area. Parcels K, L, M4, N, O1 and O2 have been connected as a paved parking area. Parcels M2, and M3 have been developed as green space. The Phase I roadways (Symphony Park Avenue, West Clark Avenue, Promenade Place, and South City Parkway) have been placed and paved. The remaining parcels remain undeveloped, and have been used as construction

parking, equipment staging, construction material lay-down areas, and stockpile storage containment areas during construction activities since 2007.

2.2. OPERATIONAL HISTORY

The site served as a fueling and maintenance yard for UPRR for over a 70 year period, beginning in the early 1900s. The site contained locomotive fueling, service, repair, and cleaning areas, and was also used for material storage. The property was used for locomotive fueling and maintenance purposes from the 1940s until 1991.

2.3. PREVIOUS INVESTIGATIONS AND REGULATORY INVOLVEMENT

In 1992, remedial activities at the UPRR site began per a NDEP-approved Remedial Action Plan (RAP). Union Pacific negotiated cleanup standards with the NDEP consisting of:

- 1) Removing all petroleum hydrocarbon impacted soil exceeding 100 milligrams per kilograms (mg/kg), as determined by EPA test method 8015M from the ground surface to a depth of 2.5 feet bgs;
- 2) Removing all hydrocarbon impacted soil exceeding 10,000 mg/kg regardless of depth;
- 3) Responsibility for all hydrocarbon impacted soil exceeding 100 mg/kg which would be excavated during future site construction activities (such as the upcoming redevelopment projects);
- 4) Removing all lead-impacted soil in excess of 1,400 mg/kg; and
- 5) Recovering free phase hydrocarbon fuel product from the perched groundwater to a thickness of less than ½ inch in the formation.

It should be noted that UPRR remediated only the lighter petroleum hydrocarbons (C23 and lighter) so the presence of heavier petroleum hydrocarbons is possible inside the UPRR remediation extents. Existing treated fill on the Symphony Park site from the UPRR remediation activities is agreed by NDEP and City Parkway V to be *legally clean* based upon the No Further Action determination by NDEP in 1998. However, if indications of potentially impacted soils are observed by the CEM on-site during future development, the potentially impacted soils will be evaluated under the stipulations of the SGMP. Additionally, if impacted soils have been

discovered by investigations after the No Further Action determination and prior to development, those impacted soils will be evaluated under the requirements of the SGMP.

A final closure report prepared in 1997 indicated that the requirements of the remedial action plan had been achieved. The lead-impacted soils were removed by excavation and transported offsite to an authorized disposal facility. Approximately 12,400 tons of lead-impacted soils were removed from the Wash Track Area. The TPH-impacted soils (as defined by the RAP) occurring at the targeted areas were removed by excavation and thermally treated onsite. Following treatment, the thermally treated soils were reused as on-site excavation backfill. According to the closure reports, approximately 26,000 tons of TPH-impacted soil were removed from the Eastbound Fueling Area; approximately 13,500 tons from the Day Storage Tank Area; approximately 25,500 tons from the Diesel Shop Area; approximately 103,000 tons from the Fuel Storage Area; approximately 16,000 tons from the Wash Track; and approximately 49,000 tons from the Evaporation Pond Area. A groundwater recovery system was installed east of the Diesel Shop Area and at the Eastbound Fueling Area. These groundwater recovery systems consist of interceptor trenches that pumped total fluids (groundwater and product) through an oil/water separator to recover the free product. The water was discharged to city drains under a City wastewater permit.

According to results of the on-site groundwater monitoring wells in December 2000 (Converse, 2000), fuel product was measured in one well at the Fuel Storage area at a thickness of 0.19 foot and in 3 wells at the Diesel Shop Area at thickness ranging from 0.04 to 0.53 foot. Fuel product was also measured in wells at the Eastbound Fueling Area. These wells were situated on the adjoining property to the northeast. In addition, low levels of TPH and VOCs (toluene, ethylbenzene, and xylene) were detected in the wells. The monitoring report indicates that no free product was recovered during the second half of 2000 from either the central or eastbound recovery systems. The report stated that very little recoverable petroleum product was left at the site and the recovery systems have since been shut-down (Converse, 2000).

2.4. GEOLOGICAL INFORMATION

The Las Vegas Valley is a topographic basin located in southern Nevada in the Basin and Range Physiographic Province in a transitional area between the “younger” Great Basin of Nevada and Utah and the “older” Basin and Range topography of Arizona and California. The

Las Vegas Valley is bounded on the west by the Spring Mountains; on the north by the Desert, Sheep, and Las Vegas Ranges; on the east by the Frenchman and Sunrise Mountains; and on the south by the River Mountains and the McCullough Range. The mountains to the north, east, and west consist primarily of Paleozoic and Mesozoic sedimentary rocks. The mountains to the south consist predominantly of Tertiary volcanic rocks overlying Precambrian metamorphic and granitic rocks.

Groundwater is anticipated to initially flow toward the northeast, and then east following local topography and toward the Las Vegas Wash. The Las Vegas Wash lies approximately five miles to the east of the site. During recent activities on Parcel P/Q (February 2015), the depth to groundwater was measured between 24 and 33 feet bgs.

2.5. ENVIRONMENTAL AND/OR HUMAN IMPACT

As part of the due diligence effort, each individual developer on the site is required to evaluate the environmental and human health impact to their project by performing a Human Health Risk Assessment (HHRA). Each evaluation is performed independently and addresses these impacts based on environmental sampling, historical data, site specific data collection, building design and future intended land use. Structures that will be located on or near the areas found to have been of most impacted from past releases may require mitigation measures.

As required under appropriate EPA and OSHA regulations, worker health and safety during construction activities shall be addressed separately by the respective parcel contractors. Information provided in the historical documentation, this SAP and the SGMP shall be used to develop the proper precautions to be set forth related to possible hazardous material exposure.

3 DATA QUALITY OBJECTIVES

3.1. PROJECT TASK AND PROBLEM DEFINITION

Soil samples will be collected and analyzed to evaluate if the soil being excavated during construction activities can be reused on-site, should be transported off-site for treatment by Las Vegas Paving at their thermal unit, or properly disposed of at an appropriately permitted facility. The CEM will determine the analyses required for each project based on information available from previous investigations. Soil samples may be analyzed for VOCs (EPA 8260), SVOCs (EPA 8270), PCBs (EPA 8082), and RCRA-8 metals (EPA 6010/7470). Additionally, soils may be analyzed for purgeable and extractable TPH (EPA 8015M), for reuse or disposal purposes. Analytical results will be used by the contractors and the CEM to determine the proper destination of the excavated soils.

3.2. DATA QUALITY OBJECTIVES

Four Quality Control (QC) levels are used to define the quality of analytical data:

Level I – Level I data have the lowest level of QC. These data are collected on-site using real-time monitoring equipment, such as portable field instruments.

Level II – Level II data are also collected on-site. However, additional QC procedures are required. Examples of Level II data include survey data or analytical data generated by a mobile laboratory.

Level III – Level III data have an intermediate to high level of QC. Level III data include results of organic and inorganic chemical analyses using laboratory procedures such as SW-846 or hazardous waste characteristic tests. Level III analytical methods are equivalent to those used for Level IV; however, the QC documentation requirements are less stringent.

Level IV – Level IV data are generated in accordance with EPA Contract Laboratory Program (CLP) protocol. Level IV data are produced using the highest level of QC documentation procedures.

Data quality will be evaluated based on data quality objectives (DQOs), which specify quantitative and qualitative requirements for the data. The required DQOs are based on the end uses of the data, and are determined by the methods of analyses and by the level of QC and documentation that are used to produce the data. The data quality objectives for the sampling of excavated soil per this SAP is Level III, intermediate QC.

Contaminant concentrations relative to the EPA Regional Screening Levels (RSLs), or the site-specific action level in the case of arsenic, are the primary criteria of interest for this project. While the management of soil, based on these levels, is detailed in the SGMP, the contaminants of concern and their action levels are presented in Table 3-1 so that the analytical laboratory method detection limit can be verified for sample testing.

**TABLE 3-1
CONTAMINANT ACTION LEVELS**

TARGET COMPOUND¹	EPA RSL² (MG/KG)	SITE-SPECIFIC ACTION LEVEL (MG/KG)
Benzene	1.2 ³	None
Toluene	4,900 ⁴	None
Ethylbenzene	5.8 ³	None
Xylenes	580 ⁴	None
PCBs (Aroclor 1016)	4.1 ⁴	None
PCBs (Aroclor 1254)	0.24 ³	None
Arsenic	0.68 ³	15 ⁵
Barium	15,000 ⁴	None
Cadmium	71 ⁴	None
Chromium (total)	None	None
Lead	400 ⁴	None
Mercury	23 ⁴	None
Selenium	390 ⁴	None
Silver	390 ⁴	None

TABLE 3-1 Notes:

1. The individual compounds most likely to be present in the soil are presented.
2. Based on the overall future use of the project, the EPA Regional Screening Levels for Residential Soil are listed (May 2016). Where both are provided, the lesser of the carcinogenic and non-carcinogenic RSL is presented.
3. Carcinogenic RSL.
4. Non-carcinogenic RSL.
5. Kleinfelder 2007d, Document 80359/LVE7L139.

3.3. DATA QUALITY INDICATORS

Data Quality Indicators (DQIs) for VOCs, SVOCs, PCBs, and metals are presented in Appendix A. These DQIs will be included in the contract with the selected Nevada-certified analytical laboratory. The analytical laboratory used would have to agree to the DQIs set forth in this project.

3.4. DATA REVIEW AND VALIDATION

All data will be initially reviewed and processed by the analytical laboratory's analysts using appropriate methods (e.g., chromatographic software, instrument printouts, hand calculation, etc.). The resulting data set will be transferred into an electronic report form, printed and reviewed by the analyst for accuracy. The data will be forwarded to the laboratory supervisor or the department manager for review and recheck of a minimum of 10% of the calculations. When the entire data set has been found to be acceptable, a final copy of the report will be printed and signed by the laboratory's supervisor, departmental manager or senior laboratory staff. The entire data package will be placed into the appropriate service request file, and an electronic copy of the final data package will be forwarded to the appropriate personnel for archiving.

When the laboratory's analyst determines that the data package has met the data quality objectives of the methods and has qualified any anomalies in a clear, acceptable fashion, the data package will be reviewed by a trained chemist. Prior to release of the report, the project chemist will review and approve the entire report for completeness and to ensure that any and all client-specified objectives were successfully achieved. A case narrative may be written by the project chemist to explain any unusual problems with a specific analysis or sample. The original raw data, along with a copy of the final report, will be filed in project files for archiving.

Upon receipt of the data packages, the integrity of the data will be assessed by the project Quality Assurance Manager. The results of the analysis of method blanks, laboratory control samples, sample duplicates, matrix spiked samples, QC samples, etc. will be assessed.

3.5. DATA MANAGEMENT

Sample chain-of-custody protocol will be followed throughout the investigation to maintain sample integrity from collection to analysis. For all samples, the chain-of-custody will be maintained during sample collection, transfer of samples between personnel, shipment to the laboratory, handling at the laboratory, and final disposal of the sample. Chain-of-custody forms will be used to document and track samples submitted for laboratory analysis. An example chain-of-custody form is provided in Appendix C.

Chain-of-custody procedures are detailed in Section 9.3, but are summarized below:

- The sampler will be responsible for custody of the samples until they are transported or shipped to the laboratory.
- All samples will be accompanied by a completed chain-of-custody form. The sampler will keep one copy of the completed chain-of-custody form. If transfer of custody is required prior to shipment, the parties relinquishing and receiving the samples will sign, date, and include the time of transfer on the chain-of-custody form.
- Custody during shipping will be maintained by shipping samples in insulated coolers sealed with custody seals. Each cooler will contain a separate signed chain-of-custody form identifying the contents. The completed chain-of-custody form will be placed in a zippered plastic bag inside the cooler. Unless delivered to the lab by the sampler and picked up by the laboratory courier, the cooler lid will be secured with strapping tape by wrapping the cooler completely in at least two locations.
- All sampling will be recorded in the daily field reports, complete with a hand sketch showing the arrangement(s) of the soil piles and the locations where samples were collected.
- The sampler will also record each sample onto the project sample log form. An example daily field report and an example sample log form are provided in Appendix B.
- All field notes, log forms, chain-of-custody forms, will be reviewed on a weekly basis by the Project Quality Assurance Manager to confirm their completeness, consistency, and clarity. The Project Quality Assurance Manager will also review the analytical data reports upon receipt along with the field notes, logs, and chain-of-custody.

4 SAMPLING RATIONALE

During construction activities on the parcels and the right-of-ways (ROW), materials being excavated may be encountered which may not be suitable for on-site use as fill due to the presence of contaminants exceeding their respective project specific action limits. To evaluate the environmental usability of the material, samples will be collected during excavation activities as described in Section 4.1. The results of the sampling and analysis will be used to manage the soil as prescribed in the Soil and Groundwater Management Plan document.

4.1. SOIL SAMPLING

Two methods of soil assessment are discussed; Stockpile Sampling and Pre-excavation Sampling. City Parkway V has the discretion to determine which method will be implemented.

4.1.1. Stockpile Sampling

Soil shall be placed in stockpiles based on the location of the soil in the excavation, for example: Stockpile 1 could contain soil excavated between grid lines A and B and from depths of zero to three feet below ground surface. The original location of the soil in the stockpile will be recorded by the on-site CEM, and the CEM will mark the stockpiles with stakes indicating their assigned number and date of excavation.

The purpose of sampling the stockpiles is to obtain information for deciding whether the soil can be reused on the property, or whether the soil must be transported off-site for disposal or treatment and recycling. This determination is based upon the collection and analyses of samples obtained from the excavated material, is dependent upon the contaminant(s) of concern and the parcel (or location within a parcel) from which the material was excavated, and any specific testing requirements by the desired end user(s).

The number of samples required for each soil stockpile sampling event will be based upon the estimated quantity of the soil stockpile. Table 4-1 will be used as a guide in determining the appropriate number of minimum samples collected. Based on site observations, the on-site

CEM can modify this frequency to a more strict frequency for all or part of the project site. This change will be documented as described in Sections 9 and 11 of this document.

Unless the on-site CEM observes conditions that would in his/her judgment require collecting a sample from a different depth, samples will be collected as 'grab' samples from a depth of between 6-inches and one (1) foot into the excavated material to preserve VOCs that may be present in the stockpiled soil. Locations will be selected by the on-site CEM based on their observations at the time of the sampling event, with the intent to evenly distribute the locations across the stockpile based on the stockpile dimensions.

Depending on the soil quantity, the 'grab' samples shall be collected at the frequency listed in Table 4-1 and composited for analysis by the analytical laboratory at the direction of the CEM.

TABLE 4-1
STACKPILE SAMPLE FREQUENCY

ESTIMATED SOIL QUANTITY IN STOCKPILE (YD ³)	SAMPLE TYPE	
	NUMBER OF GRAB SAMPLES COLLECTED	NUMBER OF COMPOSITE SAMPLES CREATED FROM GRAB SAMPLES
0-200	4	1
200-300	8	2
300-400	8	2
400-500	8	2
500-800	12	3
800-1000	12	3
>1000 (per each 200 yd ³)	4	1

Based on the Minnesota Department of Agriculture Soil Sampling Guidance (2011).

To collect the 'grab' samples, the CEM will visually divide the stockpile into sections based on the number of 'grab' samples required. The CEM will then use a hand auger or other hand sampling tool to collect one to three subsamples at various depths within a single stockpile section, which will then make up the 'grab' sample for that stockpile section. Subsamples will be collected from depths within the stockpile greater than one foot, and the CEM will ensure that all depths and locations within the stockpile are sampled. Example stockpile sampling locations are presented in Figure 4-1, as recommended by the Minnesota Department of Agriculture (2011).

The constituents of concern are: VOCs (alkyl benzenes, toluene, ethylbenzene, total xylenes, naphthalene, and etc.), RCRA 8 Metals (arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver), SVOCs, and PCBs as appropriate based on individual project location. The samples will be collected per the sample collection techniques discussed in Sections 6 and 7.

4.1.2. Pre-excavation Sampling

At the discretion of City Parkway V, the Developer/General Contractor with the assistance of the CEM shall characterize the subsurface soils to be excavated, prior to excavation activities, by creating a three-dimensional grid of the soil area to be excavated. In this case, samples will be collected from an excavation footprint rather than from a stockpile.

For those instances, to allow for contractor planning, the sampling will be performed in advance of the scheduled excavation. Pre-excavation sampling will be accomplished through the use of test pits, trenches, or boreholes. The contractor will need to provide a trackhoe or backhoe and operator for the pre-excavation sampling event to occur. If a trackhoe or backhoe and operator are not available, or the depth of planned excavation exceeds the reach of the excavator, other sampling techniques could be used, as coordinated with the contractor (such as a phased excavation schedule).

The number of samples required for each pre-excavation sampling event will be based upon the excavation footprint and the quantity of soil planned to be removed. Table 4-2 shall be used as a guide in determining the appropriate number of minimum samples collected. Based on the excavation footprint location and its dimensions, the on-site CEM can modify this frequency to increase, but not decrease, the number of samples. This change will be documented as described in Sections 9 and 11 of this document.

All samples will be collected as 'grab' samples from a depth of at least one foot beneath the planned excavation area (i.e., not surface samples); and if the planned excavation extends past three feet beneath grade, additional samples would be collected for each three feet of depth, or fraction of a three-foot depth interval, to the final excavation depth. A depth interval of three feet was chosen to roughly equate to the stockpile sampling frequency presented in Table 4-1.

As with stockpiling samples, the pre-excavation sample locations selected by the on-site CEM would be collected based upon the contaminants of concern, the parcel (or location within a parcel) being excavated, any specific testing requirements by the desired end user(s), and the depth of planned excavation. The intent is to distribute the locations across the pre-excavation print in a random pattern. Depending on the footprint dimensions, the 'grab' samples shall be collected at the frequency listed in Table 4-2. If the excavation footprint is greater than 1,000 square feet, the grab samples would be composited into one sample for analyses by the analytical laboratory. Figure 4-2 provides a graphical example of the sampling of the pre-excavation scenario.

TABLE 4-2
PRE-EXCAVATION SAMPLING FREQUENCY

AREA OF EXCAVATION FOOTPRINT (FT ²) PER 3- FOOT DEPTH INTERVAL	GRAB SAMPLES COLLECTED PER EACH 3- FOOT DEPTH INTERVAL	COMPOSITES CREATED FROM GRAB SAMPLES PER EACH 3-FOOT DEPTH INTERVAL
0 to 1,500	4	1
1,500 to 2,500	8	2
2,500 to 3,500	8	2
3,500 to 4,500	8	2
4,500 to 7,500	12	3
7,500 by <10,000	12	3
Greater than 10,000	4 per each 1,500 ft ² area	1 per each 1,500 ft ² area

Adapted from the Minnesota Department of Agriculture Soil Sampling Guidance (2011).

The constituents of concern are: VOCs (alkyl benzenes, toluene, ethylbenzene, total xylenes, naphthalene, and etc.), RCRA 8 Metals (arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver), SVOCs, and PCBs as appropriate based on individual project location. The samples will collected per the sample collection techniques discussed in Sections 6 and 7.

4.1.3 Excavation Monitoring and Screening

During ongoing excavation activities in areas where contamination is anticipated to be encountered, or which during excavation activities, soils (or the excavation face) exhibit evidence of odors, staining, or vapors; the on-site CEM may, at his/her discretion decide to screen the soils for the purpose of stockpile segregation. Screening would consist of one or more of the following techniques: Petroflag kit, PID readings, or visual observations for

hydrocarbons, or field testing for arsenic, lead or PCBs. Field testing, if done, would follow the procedures discussed in Section 6.2

5 REQUEST FOR ANALYSES

5.1. ANALYSES NARRATIVE

Each soil sample submitted for analyses will be analyzed for BTEX, RCRA 8 metals, and other VOCs, SVOCs, and PCBs as shown in Table 5-1. Four ounce (4 oz) wide mouth glass jars will be used for soil sampling containers. Upon collection and labeling as described in Sections 7 and 9, the samples will be placed immediately into an ice chest to be chilled to four degrees Celsius (°C). Samples will be analyzed under a normal turnaround time (TAT) typically between five and seven days. A quicker TAT can be coordinated if results are needed sooner.

TABLE 5-1
LABORATORY ANALYSIS PROTOCOL

ANALYSIS / METHOD	BOTTLE SIZE / TYPE	NO. OF BOTTLES	PRESERVATION	HOLDING TIME
TPH Full Range/EPA 8015M	4oz. WMGJ	1	Cool, 4° C	14 Days
Volatiles/EPA8270	4oz. WMGJ	1	Cool, 4° C	14 Days
Semi-Volatiles/EPA 8270	4oz. WMGJ	1	Cool, 4° C	14 Days for extraction/ 40 Days for analysis
PCBs/EPA 8082	4oz. WMGJ	1	Cool, 4° C	14 Days for extraction/ 40 Days for analysis
RCRA 8 Metals/EPA 6010/7470	4oz. WMGJ	1	Cool, 4° C	6 Months
All of the Above	4oz. WMGJ	2	Cool, 4° C	14 Days

WMGJ – Wide Mouth Glass Jar

If one or more metal analyte results exceeds the action level and the soil will be transported off-site for recycling or disposal, it may be necessary to request soil sample(s) be additionally run for Toxicity Characteristic Leaching Procedure (TCLP) analyses, as determined by use of the 20 times rule for metals. While this is a soil management plan component, and should be discussed in that plan, it is also discussed in this section because it includes an analytical procedure component.

Comparing the total metals analyte sample results to their respective 20 times characteristic hazardous waste concentration provides the criteria as to whether TCLP needs to be run and forms the basis for whether further action is recommended. The 20 times factor is used because for solids, Section 2.2 of SW846 1311 indicates “...*The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase.*” It is the extraction that is analyzed during TCLP analyses, and the TCLP limits are based upon the extraction. Therefore, the total analyte result for a soil sample is compared to 20 times their respective TCLP limits (40CFR 266 Appendix VII), listed in Table 5-2.

According to the Nevada Administrative Code (NAC) 445A.2272 “Contamination of soil: Establishment of Action Levels,” the state of Nevada has adopted by reference the Toxicity Characteristic Leaching Rule, 40 CFR Part 261.24. The Toxicity Characteristic Leaching Procedure (TCLP) criteria is a part of this rule and has been established as USEPA SW846 Analytical Method 1311 (Method 1311). Within Method 1311, Section 1.2 of SW846 1311 indicates “*If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are in such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run.*”

The verbiage “*total analysis of the waste*” would refer to the total metals analyses of the soil samples to be collected and analyzed by USEPA SW846 Analytical Methods 6010/7470. The verbiage “*analytes are not present in the waste, or that they are in such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run.*” means that if an analyte is reported by the analytical laboratory as below the reporting limit, or at levels less than the concentration that defines the material as a hazardous waste, then that analyte would not need to be further analyzed by TCLP analysis. If there is a detection of a metal that could characterize the excavated soil as *RCRA hazardous*, the CEM will make the determination if TCLP analysis is necessary to characterize the soil as either *contaminated, non-hazardous* or *RCRA hazardous* under the SGMP.

TABLE 5-2
TCLP CRITERIA FOR RCRA 8 METALS

ANALYTE	TCLIP LIMIT (MG/KG)	20 TIMES TCLP CRITERIA (MG/KG)
Arsenic	5.0	100
Barium	100	2000
Cadmium	1.0	20
Chromium	5.0	100
Lead	5.0	100
Mercury	0.2	4.0
Selenium	1.0	20
Silver	5.0	100

5.2. ANALYTICAL LABORATORY

The laboratory selected by the City Parkway V, the CEM, or the Developer/General Contractor is required to meet all appropriate requirements at this SAP including method detection limits and the criteria stipulated in the DQIs presented in Appendix A.

6 FIELD METHODS AND PROCEDURES

6.1. FIELD EQUIPMENT

Soil samples may be collected using stainless steel shovels, stainless steel and/or disposable trowels or spoons. Other field equipment will include coolers, buckets, brushes, detergent, distilled water, zip-lock bags, photo-ionization detector (PID), and personal protective equipment (PPE) such as steel-toed boots, nitrile gloves, hard hats, and safety glasses.

6.2. FIELD SCREENING

A PID may be used on-site as a possible field screening tool to determine how to best segregate piles, if necessary. The PID will not always detect TPH in soil, especially at lower concentrations or with heavier end hydrocarbons. However, it can be used at the discretion of the CEM when soils have higher concentrations and when workers can smell petroleum and/or organic odors. The PID will be calibrated according to manufacturer's instructions and guidelines before every day of field use. Petroflag kits and field testing for arsenic, lead, or PCBs may also be used to screen soil. Field testing procedures for arsenic, lead or PCBs may be used primarily for segregation purposes and will follow the manufacturer's recommended procedures.

6.3. SOIL SAMPLE COLLECTION

Soil samples will be collected primarily from excavated piles using a shovel or hand trowel to dig into the pile to the desired depth as discussed in Section 4. If samples are collected from a pre-excavation area sampling event, samples will be collected from the excavation bucket, or auger flights. Once the number of samples to be collected and their locations have been determined based on the rationale provided in Section 4, each sample will be collected and packaged into four-ounce jars per Sections 5 and 9. The jars will be placed together in labeled zip-lock bags and placed into the ice chest. The sample log, field report, and chain-of-custody will be filled out after sample collection from each stockpile.

For example, a soil stockpile to be sampled that is between 100 and 200 cubic yards in size will have three distinct grab sample locations. The sampler will label each set of two jars following the guidance set forth in Section 9.2, collect a sample at the first location and place it into the first set of jars, then repeat for the other two grab sample locations. After the three locations are sampled, the sampler will place each set of two jars into zip-lock bags and then into the cooler on ice. The sampler will then:

- Fill out the sample log with the sample identification numbers, date, and time of sampling;
- Record the sampling on the daily field report showing a sketch of the pile location on the site and the locations of the grab samples, and their identification numbers; and
- Fill out the chain-of-custody form indicating to the lab to create a composite sample from the three grab samples for each of the analyses to be performed.

6.4. SEDIMENT SAMPLING

This section is not applicable to this project.

6.5. GROUNDWATER SAMPLING

Based on previous projects at the Symphony Park site, it is anticipated that groundwater to be managed on the Symphony Park site will be discharged to the storm sewer requiring NPDES permits. It is not known if groundwater will be encountered during the planned construction activities on the site. Therefore, groundwater will be addressed on a case-by-case basis by the individual contractors depending on whether building construction on their sites warrant dewatering activities. This should be further discussed in a separate project specific soil and groundwater management plan.

The individual contractors will be responsible for acquiring the appropriate NPDES permits for discharging groundwater to the storm sewer. If groundwater is to be encountered and managed on the site, the sampling and analyses will follow the requirements set-forth in the NPDES permitting guidelines and the NDEP Bureau of Water Pollution Control.

6.6. BIOLOGICAL SAMPLING

This section is not applicable to this project.

6.7. DECONTAMINATION PROCEDURES

The decontamination procedures that will be followed are in accordance with generally followed industry procedures. Decontamination of sampling equipment must be conducted consistently as to assure the quality of samples collected. Any equipment (shovels, trowels, spoons) that comes into contact with potentially contaminated soil will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. All sampling devices used, including trowels and spoons, will be decontaminated in sequence, according to the following procedures.

- Non-phosphate detergent and tap water wash, using a brush if necessary
- Distilled water rinse

Equipment will be decontaminated in a predesignated area on plastic sheeting. Cleaned small equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

7 SAMPLE CONTAINERS, PRESERVATION, AND STORAGE

The number of sample containers, the required sample volumes, the preservation, and the holding times are listed in Section 5.0. The sample containers shall be provided by the contracted analytical laboratory. The containers should be pre-cleaned and will not be rinsed prior to sample collection. Preservatives, if required, will be added to the containers by the laboratory prior to shipment prior to use in the field.

7.1. SOIL SAMPLES

Soil samples will be analyzed for VOCs, RCRA-8 metals, SVOCs, and PCBs as appropriate based on individual project location. The samples will be collected as specified in Section 6 and placed into four-ounce (oz), wide-mouth glass jars. For each sample location, two 4-oz wide-mouth glass jars will be collected to satisfy the volume needed for the analyses. Upon collection, the samples will be labeled and packaged per Sections 6 and 9 and placed into an ice chest to be chilled for preservation purposes. Samples will be controlled under a chain of custody and will be in the sampler's possession unless under custody seal. Samples will be submitted to the analytical laboratory the same day of collection, or first thing the following day.

8 DISPOSAL OF RESIDUAL MATERIALS

In the process of collecting environmental samples at Symphony Park during the site excavation, the sampling team will generate different types of potentially contaminated investigation-derived waste (IDW) that include the following:

- Used personal protective equipment (PPE)
- Disposable sampling equipment
- Decontamination fluids

The EPA's National Contingency Plan (NCP) requires that management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable. The sampling plan follows the *Office of Emergency and Remedial Response (OERR) Directive 9345.3-02* (May 1991), which provides guidance for the management of IDW.

- Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE and disposable equipment that is to be disposed of which can still be reused will be rendered inoperable before disposal in the refuse dumpster.
- Decontamination fluids that will be generated in the sampling event will consist of deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) may be poured onto the stockpile.

9.1. FIELD NOTES

9.1.1. Field Logbooks

As appropriate, the following information will be legibly recorded using ink (not pencil or erasable ink) during the collection of each sample:

- Sample location and description
- Site or sampling area sketch showing sample location and measured distances
- Sampler's name(s)
- Date and time of sample collection
- Designation of sample as composite or grab
- Type of sample (soil, sediment or water)
- Type of sampling equipment used
- Field instrument readings and calibration
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)
- Preliminary sample descriptions (e.g., for soils: clay loam, very wet)
- Sample preservation, if any
- Lot numbers of the sample containers, sample identification numbers and any explanatory codes, and chain-of-custody form numbers
- Name(s) of recipient laboratory(ies)

In addition to the sampling information, the following specific information will also be recorded in the field logbook for each day of sampling:

- Team members and their responsibilities
- Date and weather conditions
- Time of arrival/entry on site and time of site departure
- Other personnel on site
- Summary of any meetings or discussions with city, contractor, or state agency personnel
- Deviations from the SAP, site safety plans, and QAPP procedures
- Changes in personnel and responsibilities with reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

9.1.2. Photographs

Photographs will be taken at the sampling locations and at other areas of interest on site or sampling area. If the camera being used has a date/time stamp function, that function should be used. Photographs will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- Time, date, location, and weather conditions
- Description of the subject photographed
- Name of person taking the photograph

9.2. LABELING

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. The samples will have preassigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information: location, date of collection, analytical parameter(s), and method of preservation. Every sample will be assigned a unique sample number. Sample labeling format is discussed in the following subsections.

9.2.1. Stockpile Sample Labeling

The stockpile labeling system will be based on the location ID of the excavation, the sample date, stockpile number, and the grab sample number, as follows:

Stockpile Soil Samples: Location ID – Date – Stock Pile Number – Sample Number

For Example: A1 - 031507 - 3 - 1: **A1** denotes the location (i.e. parcel number), **031507** identifies the sample collection date (March 15th, 2007), **3** indicates the stock pile number, and **1** denotes the grab sample number.

9.2.2. Pre-Excavation Soil Sample Labeling

As presented in Section 4, it may become necessary to sample an area in-situ before it is excavated in order to plan for coordinating proper handling or disposal of potentially contaminated soils during the excavation. In this event, the labeled sample identification will be represented in the following manner:

Pre-excavation Soil Samples: Location ID – Date – pre-excavation hole number – Depth interval

For Example: M4 – 040107 – PRE 2 – 3-6: **M4** denotes the location (i.e. parcel number), **040107** identifies the sample collection date (April 1st, 2007), **PRE 2** represents the pre-excavation hole number (hole #2), and **3-6** indicates the sample depth.

9.2.3. Drilled Shaft Spoils Sample Labeling

Drilled shaft spoils samples will be labeled in the following manner:

Drilled Shaft Samples: Location ID – Date – Shaft ID - Depth Interval

For Example: L – 042016 – ShaftA – 0-10: **L** denotes the location (i.e. parcel number), **042016** identifies the sample collection date (April 20th, 2016), **ShaftA** represents the drilled shaft number, and **0-10** indicates the depth interval from which the spoils were generated.

9.3. SAMPLE CHAIN-OF-CUSTODY FORMS AND CUSTODY SEALS

Chain-of-custody record forms are used to document sample collection and shipment to laboratories for analysis.

All sample shipments for analyses will be accompanied by a chain-of-custody record. An example of the form is found in Appendix C. Form(s) will be completed and accompany the samples for each shipment (i.e., each day). If multiple coolers are sent to the laboratory on a single day, form(s) will be completed and sent with the samples for each cooler.

The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in their physical possession, in their view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of the sampler. The sampling team leader or designee will sign the chain-of-custody form in the "relinquished by" box and note date, time, and air bill number, if appropriate.

The sample numbers for field collected quality control samples will also be documented on this form. Before submittal, a photocopy will be made of the form for the project files.

9.4. PACKAGING AND SHIPMENT

All sample containers will be placed in a sturdy ice-filled cooler and delivered to/picked up by the laboratory. If samples are to be shipped to an analytical laboratory, the following outlines the packaging procedures that will be followed:

1. When ice is used, pack it in zip-locked, double plastic bags. Seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler.
2. The bottom of the cooler should be lined with bubble wrap to prevent sample container breakage during shipment.
3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink.
4. Affix sample labels onto the containers with clear tape.
5. Wrap glass sample containers in bubble wrap to prevent breakage.
6. Seal sample containers in heavy duty plastic zip-lock bags. Write the sample numbers on the outside of the plastic bags with indelible ink.
7. Enclose the appropriate COC(s) in a zip-lock plastic bag affixed to the underside of the cooler lid.
8. Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage of sample containers during shipment.
9. Ice used to cool samples will be double sealed in two zip lock plastic bags and placed on top and around the samples to chill them to the correct temperature.
10. Each ice chest will be securely taped shut with fiberglass strapping tape, and custody seals will be affixed to the front, right and back of each cooler.

Records will be maintained by the sample custodian of the following information:

- Sampling contractor's name
- Name and location of the site or sampling area
- Total number(s) by estimated concentration and matrix of samples shipped to each laboratory
- Carrier, air bill number(s), method of shipment (priority next day)
- Shipment date and when it should be received by lab
- Irregularities or anticipated problems associated with the samples
- Whether additional samples will be shipped or if this is the last shipment.

10.1. FIELD QUALITY CONTROL SAMPLES

Field quality control (Field QC) samples will be collected and used to help evaluate conditions resulting from field activities. Field QC Samples are intended to accomplish two primary goals, the evaluation of field contamination and the evaluation of sampling variability.

10.1.1. Field Contamination Evaluation (Blanks)

Field contamination arising from inadequately decontaminated sampling equipment will be evaluated through the use of equipment blanks collected in the field.

10.1.1.1. Equipment Blanks

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring commercially available distilled water over the decontaminated sampling equipment. A minimum of one equipment rinsate blank will be collected each day with one per 20 samples collected while sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed for RCRA-8 metals, VOCs, PCBs, and SVOCs

The equipment rinsate blanks will be preserved, packaged, and sealed as described in Section 9.

10.1.1.2. Field Blanks

No field blanks will be collected for this project.

10.1.1.3. Trip Blanks

Unless water samples are collected, no trip blanks will be included as part of this project.

10.1.1.4. Temperature Blanks

Temperature blanks will not be included with the samples. For each cooler that is shipped or transported to an analytical laboratory, the laboratory will take a temperature reading of the cooler interior. This temperature reading will be used by the sample custodian to check the temperature of samples upon receipt.

10.1.2. Field Variability Evaluation (Field Duplicate or Co-located Samples)

At the discretion of the on-site CEM, duplicate soils samples may be collected at sample locations of moderate contamination.

10.2. BACKGROUND SAMPLES

No background samples are planned to be collected as part of this project.

10.3. FIELD SCREENING AND CONFIRMATION SAMPLES

No field screening or confirmation samples will be collected as part of this project.

10.4. LABORATORY QUALITY CONTROL SAMPLES

Full 4-oz sample jar of soil contains sufficient volume for both routine sample analysis and additional laboratory QC analyses. Therefore, a separate soil sample for laboratory QC purposes will not be collected.

11 FIELD VARIANCES

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. When appropriate, the designated QA representative will be notified and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

12 FIELD HEALTH AND SAFETY PROCEDURES

Field Health and Safety procedures shall need to be developed for implementation of this SAP, based upon the site specific hazards.

These procedures shall contain the components specified in 29 CFR 1910 and 29 CFR 1926 for environmental and construction activities.

13 REFERENCES

Converse Consultants, 2000, Environmental Risk Management, Former Union Pacific Railroad Property, Lot 5, Las Vegas, Nevada, dated November 3.

Kleinfelder, 2015, Environmental Sampling and Geotechnical Exploration Report, Pedestrian Bridge at Symphony Park, South of Parcel P/Q, Las Vegas, Nevada, dated April 27.

Minnesota Department of Agriculture, 2011, Soil Sampling Guidance. Guidance Document 11. July. <http://www.mda.state.mn.us/chemicals/spills/incidentresponse/guidelist/gd11.aspx>

Nevada Division of Environmental Protection, 1997, Regulatory Closure Letter, dated April 3.

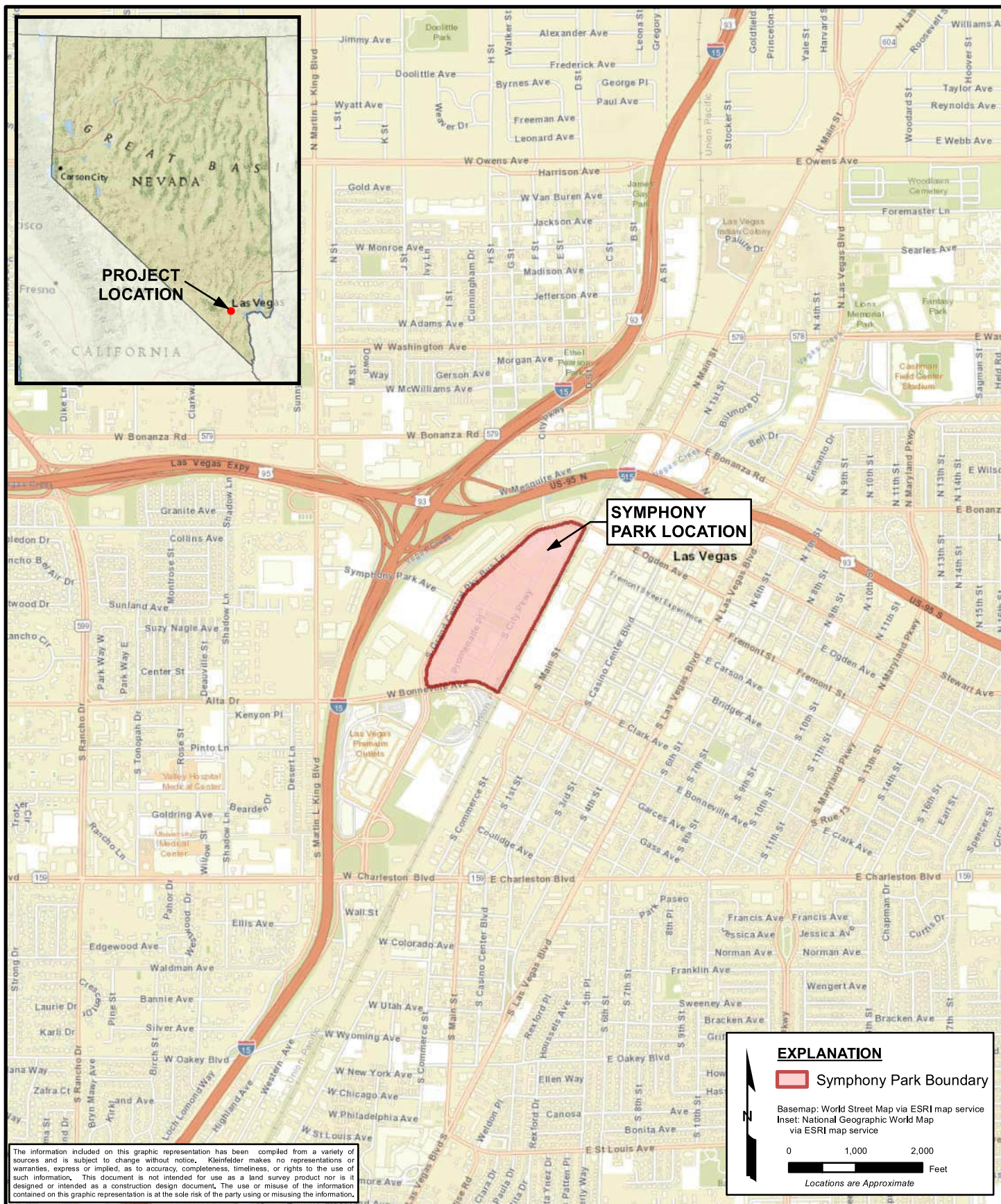
Ninyo & Moore, Sampling and Analysis Plan for Phase II Site Investigation, Cornerstone Redevelopment Area, Henderson, Nevada, Project No. 301340002, May 27, 2004.

Terracon, Phase II Environmental Site Assessment for 61 Acre Undeveloped Parcel, NEC Bonneville Avenue & Grand Central Parkway, Las Vegas, Nevada, Terracon Project No. 64037025, April 2, 2003.

United States Environmental Protection Agency (EPA), Sampling and Analysis Plan Guidance and Template, Version 4 General Projects, R9QA/009.1, EPA Region 9, May 2014.

United States EPA, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA publication SW-846, Third Edition, Final Updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), and V (2015), <https://www.epa.gov/hw-sw846/sw-846-compendium>.





PROJECT NO.	20154986
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CHECKED BY:	KLR
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SITE LOCATION MAP

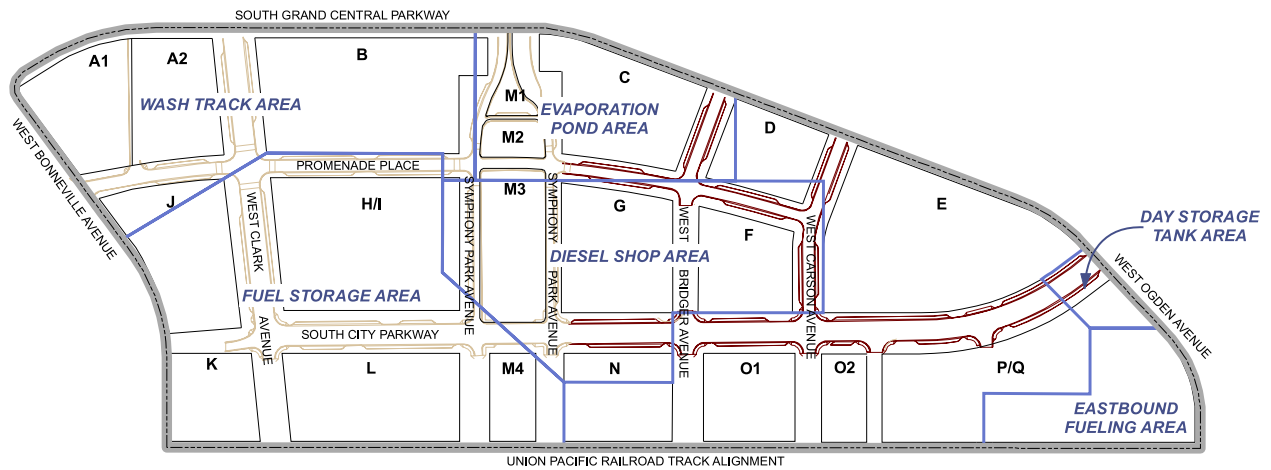
SAMPLING AND ANALYSIS PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

1-1



EXPLANATION Symphony Park Boundary Parcel Boundary, Planned Developer as of January 20, 2011 Phase 1 Development Phase 2 Development 0 200 400 Feet Locations are Approximate Aerial imagery: ESRI World Imagery, USDA NAIP 6/6/2015. The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a field survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.	KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com	PROJECT NO. 20154986 DRAWN: JAN 2017 DRAWN BY: KFH CHECKED BY: KLR FILE NAME: SAP_Figure1-2.mxd	SITE LAYOUT SYMPHONY PARK SITE, PARCEL, AND RIGHT-OF-WAY LOCATIONS SAMPLING AND ANALYSIS PLAN SYMPHONY PARK LAS VEGAS, NEVADA	FIGURE 1-2
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EXPLANATION

	Symphony Park Boundary		Parcel Boundary
	Former Operations Area		Phase 1 Development
			Phase 2 Development

Based upon x442004bm.dwg CAD file provided by Kimley-Horn and Associates, Inc. dated 11/21/2006 and the Illustrative Site Plan provided by the City of Las Vegas dated 01/20/2011.



0 200 400 Feet
Locations are Approximate



PROJECT NO.: 20154986
DRAWN: JAN 2017
DRAWN BY: KFH
CHECKED BY: KLR
FILE NAME:
SAP_Figure1-3.mxd

SITE LAYOUT UNION PACIFIC FORMER OPERATIONS AREAS

SAMPLING AND ANALYSIS PLAN
SYMPHONY PARK
LAS VEGAS, NEVADA

FIGURE

1-3

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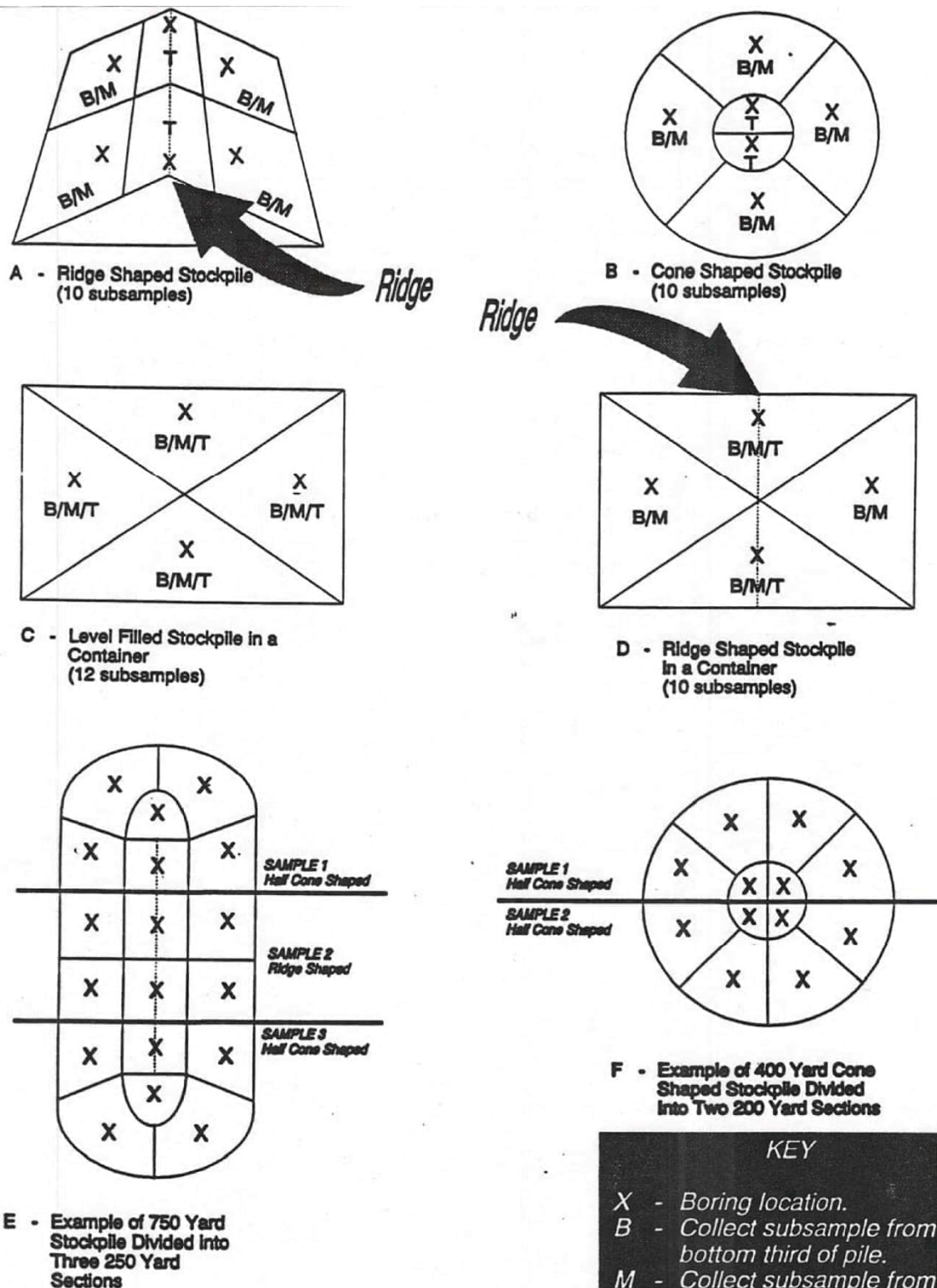
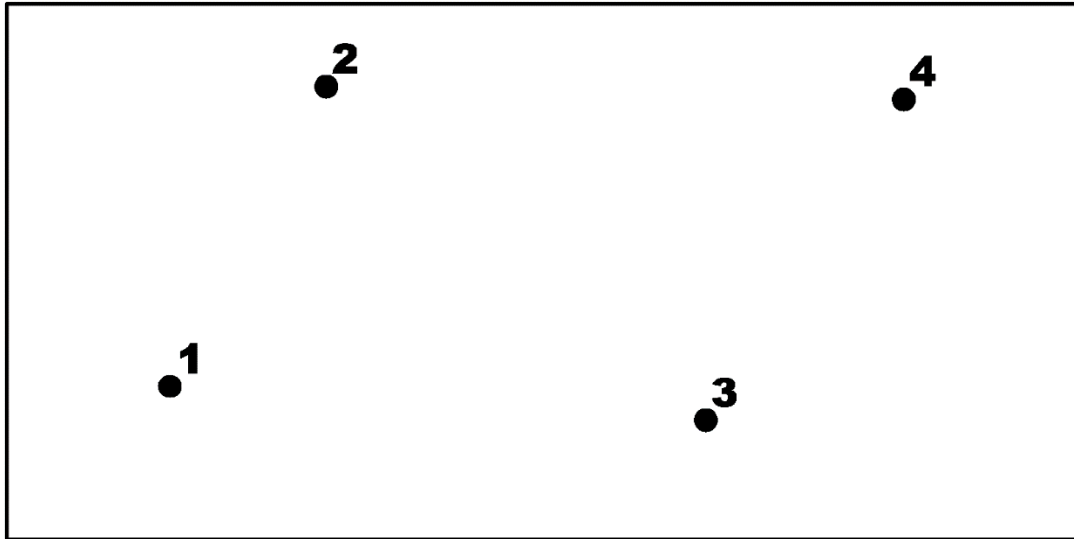
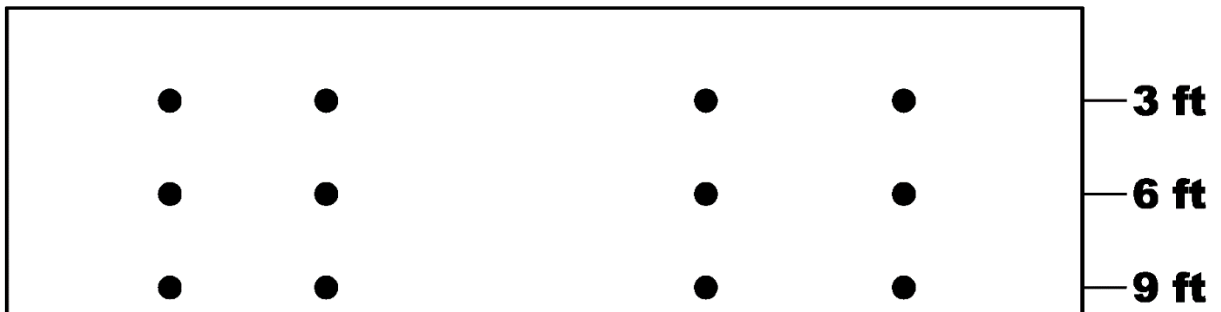


Figure 1, reproduced from the Minnesota Department of Agriculture, 2011, Soil Sampling Guidance. Guidance Document 11. July.
<http://www.mda.state.mn.us/chemicals/spills/incidentresponse/guidelist/gd11.aspx>



PLAN VIEW



PROFILE VIEW



APPENDIX A
DATA QUALITY INDICATORS

1.0 CALIBRATION PROCEDURES

Any equipment or methodology used to provide numerical data that influences a measured value is calibrated to the accuracy required for its use. Records are kept of all calibrations whether made externally or within the laboratory. Calibration schedules are established for all aspects of physical and chemical measurements and are strictly observed.

Physical calibration of instruments are carried out with standards or measuring devices traceable to national standards when available. Physical calibration schedules are dictated by the manufacturer and by the SOP for that instrument.

Chemical calibrations and standardizations are made using secondary standards traceable to primary standards. The primary standards, which include multi-component mixes, are made using materials of the highest obtainable purity prepared by analysts trained in the proper methods. The materials used to prepare the primary standards are traceable to the National Institute of Standards and Technology (NIST) or the Environmental Protection Agency (EPA) whenever possible.

Primary standards obtained commercially adhere to the requirements of internally prepared primary standards. Whenever possible NIST or EPA traceable standards are obtained. Suppliers must certify compliance and provide evidence of the quality of services and materials upon request.

Secondary standards used for calibration and standardization are validated by comparison to secondary standards prepared from another source and/or EPA/NIST traceable reference materials.

2.0 QUALITY CONTROL SAMPLES

Various types of quality control samples generated and used by the laboratory, in addition to client-submitted samples, are described in this section.

2.1 FIELD QC SAMPLES

Client should periodically prepare quality control (QC) samples in the field and submit for analysis with regular samples. These QC samples should consist of field blanks, travel blanks and replicate samples. QC samples should be given fictitious sample designations and handled and transported in the same manner as regular samples.

Both the correct and fictitious sample designations should be recorded on the sampling forms and on the chain-of-custody record. The frequency of QC samples should be as follows:

- One field travel blank is prepared in the field for every sampling event using laboratory-grade organic free water. The field travel blank is poured into a bottle at one of the sampling sites, which is noted on the field sampling form. The field travel blank is analyzed for the complete set of organic parameters requested for the regular samples.

- One replicate sample is collected for every sampling event and submitted for analysis. The replicate is analyzed for the complete set of parameters requested for the regular sample.

2.2 LABORATORY QC SAMPLES

2.2.1 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD is used to check for precision and accuracy. These are replicate samples spiked with a known spike concentration that are taken through the whole sample preparation and analysis process. MS/MSD analyses are performed on one sample in each group of 20 samples (5%) on each type of sample matrix. An MS must be performed on one sample in each group of 10 samples (10%) for drinking water analyses.

The sample analysis process and the spike sample process differ in the adding of known amounts of the substances to be analyzed to the aliquot of the replicate sample. The amount of spike added varies according to the working range of the analytical instrument.

Should the sample also have the native analyte present, the concentration of that analyte in the sample is subtracted from the value of the spiked sample and the percent (%) recovery of the spike is calculated using the following equation:

$$\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Added}} \times 100\%$$

$$\text{Post Digestion Spike} = \frac{(\text{Spike Sample Result} - \text{df} \times \text{Sample Result})}{\text{Spike Value}} \times 100\%$$

At times the sample value is outside the operating range of the analytical instrument. In such cases, it is impossible to know the concentration of the analytes before the spike is added. Occasionally, the sample and the spiked sample require dilutions to allow analysis within the linear range of the instrument. This dilution adjusts the concentrations into the proper range, but it may also dilute the other spiked analytes below the range of detection. In this case, it is not possible to report spike recovery for those particular analytes. The data should be reported with the appropriate data qualifier.

The lack of spike recovery data for an analyte that has been diluted to levels outside the working concentration of the instrument are supplemented by the periodic analysis of laboratory control samples (LCS) and other additional sample data.

In the event that a matrix spike(s) recovery is outside the established control limits, the sample and the matrix spike must be sent through the entire sample preparation and analysis procedure a second time if there is not a documented matrix effect. Many metals analysis methods call for an external spike to be performed on the extract if the matrix spike(s) recovery is outside the established control limits. If the reanalysis of the sample and the matrix spike(s) are acceptable, the results of the reanalysis will be reported without a data qualifier. If the reanalysis of the

sample and the matrix spike(s) are outside the established control limits again, the results of the original analysis will be reported with the appropriate data qualifiers.

The calculated percent recoveries are then used to assess data precision expressed as relative percent deviation (RPD). It is calculated using the following equation:

$$\text{RPD} = \frac{(\text{MS Result} - \text{MSD Result})}{\text{Mean of MS and MSD Results}} \times 100$$

Percent recoveries and RPD values outside of contract, method, or laboratory-determined control limits require addressing in the narrative, and a corrective action may be required based on the problem.

Blind replicate samples (inserted by QA Officer as "unknown" to analyzers) are replicate aliquots of a sample whose results are compared for precision using the RPD equation and laboratory-established acceptance criteria; they may be spiked at concentrations known to the QA Officer for determining accuracy (as percent recoveries).

2.2.2 Method Blanks

Method blanks, also known as reagent blanks, are analyzed for each matrix and each batch of sample analyses (about 1 per group of up to 20 samples) prepared at the same time. An aliquot equal in volume or weight to the sample is used for method blank analyses. The method blank is taken through the whole analytical process. The method blank must be free of any substances being analyzed, or interferences, as defined in method-specific SOPs, or corrective actions will be taken. For volatiles analyses, a method blank is run after the standard or standards and before any samples during every batch to demonstrate that the system is performing properly and there is no carryover.

2.2.3 Holding Blank

A holding blank is an aliquot of VOA-free laboratory reagent water or methanol contained in a 40-mL septum-sealed VOA vial free of headspace. It is prepared and carried through the holding period of a batch of sample shipments received and is used to monitor sample storage cross-contamination for volatile organics.

Presence of volatile organics in the holding blank indicates possible diffusion of volatile organics (particularly fluorocarbons and methylene chloride) past the septum seal of the contaminated sample during storage and handling.

2.2.4 Calibration Blank/System Blank

A calibration blank/system blank is prepared by analyzing the same matrix used for the preparation of the calibration standards. It is used to establish the analytical curve by taking into account background responses during the calibration process. It is also used to check for carry-over contamination after a standard run or after a contaminated sample run.

2.2.5 Laboratory Control Samples

The Laboratory Control Sample (LCS) is a standard of known concentration spiked into a consistent (homogeneous) matrix of soil or water, which is prepared and analyzed along with a batch of samples. The spiked materials are representative of the materials to be quantitated by the analysis.

LCS spiking solutions are obtained from USEPA Quality Assurance Branch, Environmental Monitoring and Support Laboratory (EMSL), by the National Institute of Standards and Technology (NIST), or they are prepared internally by the laboratory. The quality control samples are prepared for analysis in strict accordance with the procedures provided with the materials. LCS are prepared and analyzed with each sample batch to check accuracy of analysis and to monitor standard degradation. LCS are also used to check efficiency of the digestion, extraction and the instrumental analysis. For metals, commercially obtained/prepared LCS soils are used to check EPA 3050B digestion efficiency.

Results from LCS must be within the target range values (i.e., 99% confidence limits of the given values) or within the 99% confidence limits of the "true" value of the check standard as determined from running replicate analyses of the check standard; otherwise, corrective actions are taken.

2.2.6 Surrogate Spike Analyses

For GC/MS and GC methods, the analytical process includes the addition, subsequent detection, and recovery calculation of surrogate spiking compounds. Surrogate compounds are analyte compound substitutes, (i.e., compounds not specifically requested to be determined as analytes) that do not occur naturally. Surrogate compounds are added after sample aliquots have been measured out, prior to beginning the sample preparation process. Surrogate compounds must not interfere with the determination of the analytes of interest. Surrogates also must be chemically similar to the analytes of interest and capable of emulating the analyte responses. Surrogate standard determinations are performed on all samples, blanks and quality control samples. All samples, blanks and quality control samples are spiked with surrogate spiking compounds before purging or extraction in order to monitor preparation and analysis of samples.

Percent recovery of the surrogates is determined and checked against laboratory established control limits.

Laboratory established control limits are used when method- or contract-specific criteria are not provided or when the lab can demonstrate tighter control of a system than given in the method. These results are plotted by the analyst to alert them to any trends that may suggest a problem. If a trend suggests a problem in the system, preventative action is taken to remedy the situation before a problem arises. If a surrogate fails the established control limits, the sample preparation and analysis must be repeated.

2.2.7 Method of Standard Addition

The method of standard additions is used to check the accuracy of the analysis method under optimum conditions and to provide an estimate of concentrations in the presence of chemical interferences from a sample matrix.

2.2.8 ICP Interference Check Sample Analysis

An ICP interference check sample verifies inter-element and background correction factors of the ICP instrument.

2.2.9 EPA, NIST, and/or Commercial Reference Standards

These standards are analyzed routinely for the parameter of interest. Commercial standards are checked for standard traceability. Secondary source standards are used to check the accuracy of the commercial standard and the laboratory preparation of the standards in use. Secondary source standards are also used in all MS, MSD and LCS to confirm the accuracy of the standard.

2.2.10 Internal Standards Analysis

For some methods, internal standard areas are monitored as a measure of instrument performance. Internal standard determinations are made on all samples and blanks to monitor instrument efficiency, and they are used as a reference retention-time indicator, to check retention-time shifts of peaks of interest. A known amount of internal standard is added to a sample extract prior to analysis. Like the surrogate standard, it must not interfere with the determination of the analytes of interest. It also must be chemically similar to the analytes of interest and capable of emulating the analyte response. Often these are isotopically-labeled materials, which can be distinguished by the mass spectrometer from native analytes.

2.2.11 Calibration Standards

Calibration standards are used to quantitate the concentrations of analytes present in the sample. These are analyzed prior to any sample analyses.

2.2.12 ICP, GFAA, and CVAA multi-point

Initial calibration verification and continuing calibration verification used for metals analysis at $\leq 10\%$ ICV is second vendor.

3.0 QUALITY CONTROL CHARTS

Control charts are recognized as a prime means to document the statistical control of the measurement process and to describe measurement proficiency. It is a matter of policy that suitable control charts for all critical operations and sub-operations be developed. When the use of control charts and specific control samples are specified in a given SOP, they are maintained in as close to real time as possible and are the basis for corrective actions when indicated. The control

charts are either generated by the LIMS system or generated in a spreadsheet program by the LIMS system.

3.1 USE OF CONTROL CHARTS

The performance of a measurement system can be demonstrated by the measurement of homogeneous and stable control samples in planned repetitive process. The data generated are plotted as a control chart to indicate whether the system is providing adequate process control (i.e., staying within performance specifications). It alerts the laboratory to possible deviation from 95% confidence level by identifying systematic errors, drifts, or other types of problems.

The uses of control charts are summarized as follows:

- They provide graphic assessment of accuracy and precision for the analysis of each analyte and detection of erroneous data.
- They allow efficient observation of recovery trends for a particular analyte, and they provide a long-term mechanism for self-evaluation of analytical output.
- They provide assessment of the analytical capability of the staff chemists, with regard to the output of valid analytical data.

A system must be verified as being in control, in order to be maintained in control. A system is not in control if it is observed to produce unexpected data more than once every 20-25 runs or a trend of seven points on one side of the mean. Control limits usually become tighter once a process is under a controlled protocol (i.e., the original limits were based on data produced during uncontrolled operation).

3.2 TYPES OF CONTROL CHARTS USED

Control charts are used to monitor method performance:

- Accuracy Control Charts (e.g., Surrogate Recovery, LCS/LCSD Recovery, MS/MSD Recovery)
- Precision Control Charts (e.g., MS/MSD Relative percent difference, LCS/LCSD Relative percent difference)

3.3 CONTROL CHART PREPARATION

In methods for which quality control acceptance limits and corrective actions are not specifically established (e.g., non-CLP), control charts are used to evaluate lab performance. As a minimum for other methods, the Laboratory shall prepare a control chart for each type of analysis and sample matrix. Each control chart shall consist of a centerline, two warning limits, and two control limits, as described on page 42 of the HAZWRAP DOE/HWP-65/R1 and EPA Handbook on Analytical

Quality Control in Water and Wastewater Laboratories. Until the laboratory has 20 points to use in setting control chart limits, the recommended EPA recoveries for the methods shall be used.

3.4 APPROACH TO CONTROL CHART INTERPRETATION

For each method, representative concentrations of material described in reference methods and lab SOPs are spiked into a selected percentage of samples. A data base of percent recovery (%R) for QC reference samples or spiked samples is collected. The mean ($\bar{x}$) and standard deviation(σ) of this set (usually at least 20 points are necessary) are calculated. From this information, warning and control limits for the method are determined. These are defined as:

- Warning Limits are defined as $\bar{x} \pm 2\sigma$
- Control Limits are defined as $\bar{x} \pm 3\sigma$. The %R of each QC sample or spike sample is plotted on a control chart and compared with the control limits.

Data precision (RPD) is evaluated based on the results of spiked samples analyzed in duplicate. Calculations for warning and control limits are the same as above for spiked samples.

Interpretation of control charts for out of control:

- one or more points outside the control limit (3σ)
- a run of two or more consecutive points outside warning limits (2σ)
- a run of seven or more consecutive points on the same side of the mean ($\bar{x}$) indicating trends or shifts
- cycles or non-random patterns in the data
- a run of six or more consecutive points in the same direction

Corrective actions taken for out-of-control points are described in Nonconformance and Corrective Action.

4.0 NONCONFORMANCES AND CORRECTIVE ACTION

4.1 DEFINITIONS

An out-of-control event is defined as any occurrence failing to meet pre-established criteria. Nonconformance is a deficiency in documentation, or procedure sufficient to make the quality indeterminate or unacceptable. An out-of-control event is a subcategory of nonconformance.

When either situation is identified, it will be categorized as:

- Deficiency: recognition of a specific requirement (e.g., program, process or procedure) that has been violated.
- Observation: recognition of an activity or action that might be improved but is not in violation of a specific requirement. Left alone, the activity or action may develop into a deficiency.

4.1.1 Criteria Used for Determination of an Out-of-Control Event

Factors that affect data quality (failure to meet calibration criteria, inadequate record keeping, improper storage or preservation of sample) require investigation and corrective actions.

Some factors can be easily assessed through the use of control charts. Control charts can reveal shifts, trends, biases and conditions where parts of the analytical system are out of control.

The detection of one of these conditions is an indication that the analytical system is out of control. The out-of-control value(s) is placed on the control chart, circled and documented in a corrective action form according to SOP 4003. The Laboratory Manager is notified and both the analyst and Laboratory Manager investigate and determine whether the condition indicates a procedure that is truly out of control or which reflects a possible random error. The Laboratory Manager shall document corrective actions taken (i.e., whether the sample run was repeated or whether the data were reviewed and released for reporting to the client) on the corrective action form and submit to the QA Officer for placing in the permanent records.

SUMMARY OF QUALITY CONTROL PROCEDURES FOR METALS BY ICP

QC ELEMENT	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
Method Blank (MB)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	< RL < 0.5*RL for all USACE projects RL = laboratory reporting limit	1) Check calculations. 2) Investigate contamination source 3) Take and document appropriate corrective action. 4) Reanalyze blank. If passes, report. 5) If still out, re-extract/reanalyze all samples. 6) Flag sample result associated with contaminated method blank.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method specific requirements until in-house limits can be determined.	1) Check calculations. 2) Run external spike and external spike duplicate on original sample. 3) If still out, reanalyze external spike and external spike duplicate on original sample at a dilution. 4) If still out report with suspected matrix interference.
Laboratory Control Sample (LCS)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method requirements until in-house limits can be determined.	1) Check calculations. 2) Identify correct and document problem. 3) Reanalyze LCS, if passes report. 4) If still out, re-extract/reanalyze LCS and associated samples.
Serial Dilution	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	$\pm 10\%$ of original concentration	1) Evaluate data for interference.
Interference Check Sample	Initial calibration	$\pm 20\%$	1) Recalculate inter-element correction factors and reanalyze.
Reporting Limit Verification	Beginning of each run	$\pm 100\%$ of the true value	1) Reanalyze a new aliquot of RLV solution. 2) If still out, reanalyzed calibration blank. 3) Reprint correlation coefficient. 4) Reanalyze instrument detection limit (IDL).
Continuing Calibration Verification Sample	1 per every 10 samples	Method requirements.	1) Reanalyze, if passes continue with analyses. 2) If still out, recalibrate.

SUMMARY OF QUALITY CONTROL PROCEDURES FOR METALS BY ICP/MS

QC ELEMENT	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
Method Blank (MB)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	< RL < 0.5*RL for all USACE projects RL = laboratory reporting limit	1) Check calculations. 2) Investigate contamination source 3) Take and document appropriate corrective action. 4) Reanalyze blank. If passes, report. 5) If still out, re-extract/reanalyze all samples. 6) Flag sample result associated with contaminated method blank.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method specific requirements until in-house limits can be determined.	1) Check calculations. 2) Run external spike and external spike duplicate on original sample. 3) If still out, reanalyze external spike and external spike duplicate on original sample at a dilution. 4) If still out report with suspected matrix interference.
Laboratory Control Sample (LCS)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method requirements until in-house limits can be determined.	1) Check calculations. 2) Identify correct and document problem. 3) Reanalyze LCS, if passes report. 4) If still out, re-extract/reanalyze LCS and associated samples.
Serial Dilution	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	$\pm 10\%$ of original concentration	1) Evaluate data for interference.
Interference Check Sample	Initial calibration	$\pm 20\%$	1) Recalculate inter-element correction factors and reanalyze.
Reporting Limit Verification	Beginning of each run	$\pm 100\%$ of the true value	1) Reanalyze a new aliquot of RLV solution. 2) If still out, reanalyzed calibration blank. 3) Reprint correlation coefficient. 4) Reanalyze instrument detection limit (IDL).
Internal Standard (IS)	Every sample including QC	Method requirements	1) Check calculations. 2) Dilute the digest. Repeat if necessary.
Continuing Calibration Verification Sample	1 per every 10 samples	Method requirements	1) Reanalyze, if passes continue with analyses. 2) If still out, recalibrate.

SUMMARY OF QUALITY CONTROL PROCEDURES FOR METALS BY CVAA

QC ELEMENT	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
Method Blank (MB)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	< RL < 0.5*RL for all USACE projects RL = laboratory reporting limit	1) Check calculations. 2) Investigate contamination source 3) Take and document appropriate corrective action. 4) Reanalyze blank. If passes, report. 5) If still out, re-extract/reanalyze all samples. 6) Flag sample result associated with contaminated method blank.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method specific requirements until in-house limits can be determined.	1) Check calculations. 2) Run external spike and external spike duplicate on original sample. 3) If still out, reanalyze external spike and external spike duplicate on original sample at a dilution. 4) If still out report with suspected matrix interference.
Laboratory Control Sample (LCS)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method requirements until in-house limits can be determined.	1) Check calculations. 2) Identify correct and document problem. 3) Reanalyze LCS, if passes report. 4) If still out, re-extract/reanalyze LCS and associated samples.
Continuing Calibration Verification Sample	1 per every 10 samples	Method requirements	1) Reanalyze, if passes continue with analyses. 2) If still out, recalibrate.

SUMMARY OF QUALITY CONTROL PROCEDURES FOR ORGANICS BY GC

QC ELEMENT	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
Method Blank (MB)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	< RL < 0.5*RL for all USACE projects RL = laboratory reporting limit	1) Check calculations. 2) Investigate contamination source 3) Take and document appropriate corrective action. 4) Reanalyze blank. If passes, report. 5) If still out, re-extract/reanalyze all samples. 6) Flag sample result associated with contaminated method blank.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method specific requirements until in-house limits can be determined.	1) Check calculations. 2) Reanalyze MS/MSD and sample. 3) If still out, re-extract/reanalyze MS/MSD and sample. 4) If still out report with suspected matrix interference.
Laboratory Control Sample (LCS)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method requirements until in-house limits can be determined.	1) Check calculations. 2) Identify correct and document problem. 3) Reanalyze LCS, if passes report. 4) If still out, re-extract/reanalyze LCS and associated samples.
Surrogate spike	Every sample including QC	Method requirements until in-house limits can be established.	1) Check Calculations. 2) Evaluate batch for trends. 3) Reanalyze sample, if acceptable report. 4) If not acceptable, re-extract/reanalyze sample.
Continuing Calibration Verification Sample	1 per every 10 samples	Method requirements	1) Reanalyze, if passes continue with analyses. 2) If still out, recalibrate.

SUMMARY OF QUALITY CONTROL PROCEDURES FOR ORGANICS BY GC/MS

QC ELEMENT	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
Method Blank (MB)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	< RL < 0.5*RL for all USACE projects RL = laboratory reporting limit	1) Check calculations. 2) Investigate contamination source 3) Take and document appropriate corrective action. 4) Reanalyze blank. If passes, report. 5) If still out, re-extract/reanalyze all samples. 6) Flag sample result associated with contaminated method blank.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method specific requirements until in-house limits can be determined.	1) Check calculations. 2) Reanalyze MS/MSD and sample. 3) If still out, re-extract/reanalyze MS/MSD and sample. 4) If still out report with suspected matrix interference.
Laboratory Control Sample (LCS)	1 per batch, not to exceed 20 samples (non-drinking water samples) 1 per batch, not to exceed 10 samples (drinking water samples)	Project specific requirements. If there are not project specific requirements use method requirements until in-house limits can be determined.	1) Check calculations. 2) Identify correct and document problem. 3) Reanalyze LCS, if passes report. 4) If still out, re-extract/reanalyze LCS and associated samples.
Surrogate spike	Every sample including QC	Method requirements until in-house limits can be established.	1) Check Calculations. 2) Evaluate batch for trends. 3) Reanalyze sample, if acceptable report. 4) If not acceptable, re-extract/reanalyze sample.
Internal Standard spike (IS)	Every sample including QC	IS area 50-200% of the IS area in the CCV	1) Check sensitivity of instrument and sample. 2) Reanalyze sample or standard. 3) If still out and the failure is sample specific report data with suspected matrix interference.
MS Tune	Every 12 hours	Method abundance criteria.	1) Rerun tune. 2) If still out take and document appropriate corrective action.
Continuing Calibration Verification Sample	1 per every 10 samples	Method requirements	1) Reanalyze, if passes continue with analyses. 2) If still out, recalibrate.

4.2 RESPONDING TO NONCONFORMANCES; ROLES & RESPONSIBILITIES

When a nonconformance is recognized, each individual involved with the analysis in question has the following interactive role responsibilities:

- The Analyst: must be able to recognize nonconformance and immediately notify the QA Officer or Laboratory Manager as to the corrective action taken to solve the problem. Each analyst is responsible for documenting and correcting problems that might affect quality.
- The Data Reviewer: must review all analytical and QC data for reasonableness, accuracy, and clerical errors; he is also responsible for monitoring QC charts (in terms of control limits). In an out-of-control event, the Laboratory Manager works with the analyst and QA Officer to solve the problem and prevent the reporting of suspect data by stopping work on the analysis. All results that are suspect are repeated, if possible, after the source of the error is determined and remedied.
- Laboratory Manager: In the event that an out-of-control situation occurs that is unnoticed at the bench or review level, (i.e., performance failure on a QC sample), the Laboratory Manager will notify the analyst, help identify and solve the problem where applicable, ensure the work is stopped on the analysis, and verify that no suspect data are reported. The Laboratory Manager must review and approve all corrective action reports and submit them to the QA Officer for review. The QA Officer is responsible for reviewing nonconformance report forms, recommending or approving proposed corrective actions, maintaining an up-to-date nonconformance log, verifying that corrective actions have been completed, distributing and filing nonconformance report forms, and assisting in resolving disagreements.

4.3 PROCEDURES FOR STOPPING ANALYSIS

Whenever the analytical system is out of control, investigation-correction efforts are initiated by all concerned personnel.

If the problem is instrumental or specific only to preparation of a sample batch, any samples prepared after the out-of-control event are reprocessed after the instrument has been repaired and recalibrated, provided holding times have not been exceeded.

If a sample batch is still out of control after reanalysis, all method-related activities shall stop immediately. A detailed laboratory-wide investigation shall be conducted to isolate and correct faulty operations. Sample security, integrity of standards, reagents, glassware, laboratory notebooks, instrument performance, and adherence to the methods shall be included in the investigation.

All actions taken shall be documented and placed in their respective case/contract file.

4.4 CORRECTIVE ACTION

The need for corrective action comes from several sources: equipment malfunction, failure of internal QA/QC checks, failure of follow-up on performance or system audit findings, and noncompliance with QA requirements. When measurement equipment or analytical methods fail QA/QC requirements, the problems will immediately be brought to the attention of the Laboratory Manager. Corrective measures will depend on the type of analysis, the extent of the error, and whether the error is determinant or not. The corrective action will be determined by the Laboratory Manager, the analyst, and the QA Officer or by all of them in conference, if necessary.

A corrective action can be as extensive as replacing a complete lot of contaminated extraction solvent and reextracting and reanalyzing a complete batch of samples due to reagent blank contamination; or it can be as simple as recalculating a series of results because an incorrect dilution factor was applied. Furthermore, the "right" corrective action must be determined on a case-by-case basis.

If failure is due to equipment malfunction, the equipment will be controlled by segregation or tagging until its repair; precision and accuracy will be reassessed, and the analysis will be rerun. All attempts will be made to reanalyze all affected parts of the analysis so that in the end, the product is not affected by failure of QC requirements.

When a result in a performance audit is unacceptable, the laboratory will identify the problems and implement corrective actions immediately. A step-by-step analysis and investigation to determine the cause of the problem shall take place as part of the corrective action program. If the problem cannot be controlled, the laboratory will analyze the impact on the data.

When a system audit reveals an unacceptable performance, work shall be suspended until corrective action has been implemented and performance can be verified as acceptable.

If the external audit (system or performance) report identifies deficiencies that require corrective action, the QA Officer shall notify the responsible Laboratory Manager and log the pertinent information, including the date a response is due, in the nonconformance log.

The QA Officer and the Laboratory Manager shall assure that corrective action is taken. The QA Officer shall verify that the problem has been corrected. With the responsible supervisor, the QA Officer shall prepare a formal written response to the external organization, if required. The Laboratory Manager shall transmit the response to the external organization, with copies to other cognizant managers, as deemed necessary.

All incidents of QA failure and the corrective actions will be documented. Those reports will be placed in the appropriate case/contract file. Corrective action will be taken promptly for any deficiencies noted during the spot-check of raw data. When corrective actions are implemented, evidence of correction of deficiencies will be presented. Corrective action documentation will be forwarded to the Laboratory Manager for evaluation and approval.

4.5 DOCUMENTING CORRECTIVE ACTION

If at any time during analysis a process is out of control, corrective action shall be taken and documented with regard to:

- what actions were taken to bring the process back into control;
- what actions were taken to prevent recurrence of the out of control situation;
- what was done with the data obtained while the process was out of control.

This is accomplished by filling out a corrective action form. This form is initiated either by the Laboratory Manager or the QA Officer, depending on where the problem is recognized. The report will include the following information:

- nature of the problem
- analytical parameter affected
- sample lot affected
- corrective action measure(s) taken and final disposition/resolution of the problem
- dates (date recognized, date occurred, date corrected)
- signature of the Laboratory Manager

All corrective action forms will be submitted to the QA Officer for archiving and investigation to ensure that the proper corrective actions were taken and the system is performing correctly and considered in control.

5.0 DATA VALIDATION AND REPORTING

5.1 LABORATORY DATA

All bench chemists document sample preparation activities in bound laboratory notebooks or prenumbered, bound benchsheets. These serve as the primary record for subsequent data reduction. The data for GC/MS and GC analyses are generated by stand-alone computers and integrators, respectively. The data for atomic absorption analysis are collected using the instrument recorder to measure absorbance readings and strip charts to record absorbance expressed in peak height units. Results of each analysis are transferred onto analytical results forms specific to the particular analysis. Data are checked for accuracy and precision at the bench and instrument operator/analyst level, the Data Reviewer level, and the Laboratory Manager level. The validity of instrument-generated data shall be supported by the maintenance and inspection of the following records:

- description of the calibration performed;
- description of routine instrument checks (noise levels, drift, linearity, etc.);
- documentation of the traceability of instrument standards, samples and data;
- documentation of analytical methodology and QC methodology;
- description of the controls taken to determine and minimize interference contaminants in analytical methods (use of reference blanks and check standards for method accuracy and precision);
- description of routine maintenance performed; and
- documentation of sample preservation
- documentation of transport when shipped elsewhere.

Concentration of the analytes is expressed according to the required units, depending on the sample matrix (i.e., $\mu\text{g/L}$ for aqueous samples and $\mu\text{g/kg}$ for soil samples).

5.1.1 Gas Chromatograph Results

Calculations are performed for each analyte after its identity is determined. Identification is based on retention time of the suspect peak compared to the retention time of the standard; identifications are confirmed on a second GC column when specified by the method. The concentration of the analyte is determined by using the calibration curve and the peak area of the analyte. A response factor is determined from the calibration curve and used to calculate the concentration. Final results will be rounded to two significant figures.

5.1.2 Gas Chromatograph/Mass Spectrometry Results

Qualitative identifications are determined by obtaining extracted ion current profiles (EICPs) for the primary ion mass-to-charge ratio (m/z) and the secondary masses for each analyte. Positive identification is based on the following criteria:

- The intensity of the three characteristic masses of each analyte must maximize in the same ratio ($\pm 20\%$), within one scan of each other.
- The retention time must fall within ± 30 seconds of the retention time of the authentic compound (± 0.06 RRT units).
- The relative peak heights of the three characteristic masses in the EICPs must fall within $\pm 20\%$ of the relative intensities of these masses in a reference mass spectrum (standard analysis or reference library).

Structural isomers to be listed as separate analytes must have an acceptable resolution. Acceptable resolution is achieved if, in a standard mix, the baseline to valley height between the isomers is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

The calculation for the concentration of the suspect peak is made using the average response factor (RF) for each analyte.

$$\text{Concentration} = \frac{(A_s) (C_{is})}{(A_{is}) (RF)}$$

where:

A_s = Area of characteristic m/z for the analyte to be measured

A_{is} = Area of characteristic m/z for the internal standard

C_{is} = Concentration of the internal standard, in ug/l

RF = Average response factor as calculated from the area on an intensity plot of the ion of interest.

A linear or quadratic calibration model may be used in place of the RF procedure. A minimum of 5 points must be used in a linear calibration model, the origin can not be forced through the origin. In addition the r-squared value for the linear calibration model must be at least 0.990. A minimum of 6 points must be used in a quadratic calibration model. The quadratic calibration model must not be used to compensate for detector or system saturation. The curve can not be forced through the origin when using a quadratic calibration model.

5.2 LABORATORY DATA VALIDATION AND DATA REPORTING

Data validation is the process whereby data are filtered and accepted or rejected, based on a set of criteria. It is a systematic procedure of reviewing a body of data against a set of criteria to provide assurance of its validity prior to its intended use.

Data validation is performed by the analyst, data reviewer, and the Laboratory Manager. Validation is accomplished through routine audits of the data collection and flow procedures and by monitoring of QC sample results.

Data validation includes dated and signed entries by analysts on the worksheets and logbooks used for all samples; the use of sample tracking and numbering systems to track the progress of samples through the laboratory; and the use of quality control criteria to reject or accept specific data. The process consists of data editing, screening, checking, auditing, verification, certification and review. The Laboratory shall certify in writing that the data have been validated in accordance with the defined process.

5.2.1 **Validation Requirements**

The minimum requirements for each analytical run are:

- at least three point calibrations (five points are recommended) and a continuing calibration check standard;
- continuing calibration check using an EPA or NIST reference, if available;
- laboratory control samples/QC sample included in each analysis;
- one method blank per matrix and per concentration level for every sample batch analyzed not to exceed 20 samples, for drinking water analyses 1 matrix spike for every sample batch analyzed not to exceed 10 samples.
- matrix spike and matrix spike duplicate per concentration level and per matrix for every sample batch analyzed not to exceed 20 samples.

Steps and checks used to validate precision and accuracy of the measured parameters and to support the representativeness, comparability, and completeness include:

- correlation coefficient > 0.990;
- documentation of the traceability of instrument standards;
- routine maintenance performed, found in instrument logs;
- documentation of sample preservation and transport.

5.2.2 **Review of QC Samples Data**

When the analyses of a sample set are completed, the results will be reviewed and evaluated to assess the validity of the data set. General principles for all parameters and methods apply as follow:

- Blank Evaluations - The reagent, instrument system, method and/or holding blank results are evaluated for high readings characteristic of background contamination. If high blank values are observed, laboratory glassware, air, and reagents will be checked for contamination and the analysis halted until the system is brought under control; no further sample analysis proceeds. A high background is defined as a background value sufficient to result in a difference in the sample value, if not corrected, greater than or equal to smallest significant digit known to be true.
- Field Blank Evaluation - field blank results are evaluated for high readings similar to the reagent and/or method blanks described above. If high field blank readings are encountered, the procedure for sample collection, shipment, and laboratory analysis should

be reviewed. If both the reagent and/or method blanks and the field blanks exhibit significant background contamination, the source of contamination is probably within the laboratory.

- Matrix Spike/Matrix Spike Duplicate Evaluation - If the observed recovery of the spike accuracy and/or precision values exceeds the acceptance criteria for the given parameters, the sample set must be reanalyzed for the parameter in question. Here the sample set is defined to be the matrix spike/matrix duplicate and the sample which was spiked.
- Calibration Standard Evaluation - The calibration curve is evaluated to determine linearity through its full range and to verify that sample values are within the range defined by the low and high standards. If the curve is nonlinear, plot sample concentrations on a graph or use an appropriate algorithm to fit a nonlinear curve to the standards. Alternately, the method of standard additions can be used.
- Duplicate Sample Evaluation - Duplicate sample analysis for the sample set is used to determine the precision of the analytical method for the sample matrix. The duplicate results are used to calculate the precision as defined by the relative percent difference (RPD). If the precision value exceeds the acceptance criteria for the given parameter in question, the QA Officer is notified. The sample set may be reanalyzed for the parameter in question. Here the sample set is defined to be the sample and its duplicate.
- Blind Replicate Evaluation - The blind replicate analysis is evaluated in the same manner as described above for the duplicate sample analysis and is treated as a duplicate result for purposes of evaluating the precision of the analytical method.
- Reference Standard Evaluation - Standard Reference Materials analyses are compared with "true" values and acceptable ranges.

Values outside the acceptable ranges require corrective action to determine the source of error and provide corrective action. All sample analyses should be halted pending this evaluation. Following correction of the problem, the Standard Reference Material should be reanalyzed.

- Laboratory Control Sample Evaluation (LCS) - The results of LCS analysis are compared with the "true" values, and the percent recovery is calculated. If correction is required, the LCS should be reanalyzed to demonstrate that the corrective action has been successful.
- Surrogate Spike Evaluation - The results of surrogate spike determinations are compared with the "true" values spiked into the sample matrix prior to extraction and analysis and the percent recoveries of the surrogate standards are determined.

5.3 DATA COLLECTION AND FLOW AUDITS

Data collection and flow audits include the following:

- review of sample documents for completeness by the analyst(s) at each step of analysis;
- periodic review of instrument logs, performance test results, and analyst performance by the QA Officer;
- daily review of performance indicators (such as blanks, surrogate recoveries, duplicate/matrix spike duplicate analyses, matrix spike analyses, etc.) by analysts, data reviewer, and Laboratory Manager;
- random calculation checks;
- review of all reports prior to and subsequent to data entry.

5.4 DATA REVIEW

In the data review process, the data are compared to information such as sample history, sample preparation, and QC sample data to evaluate the validity of the results. Corrective action is minimized through the development and implementation of routine internal system controls. Analysts are provided with specific criteria that must be met for each procedure, operation or measurement system.

The review of data quality involves several levels of evaluation. In general, the analysts and the data reviewer are responsible for reviewing the data relative to instrument calibration, standard preparation, method blanks, raw data, calculations and transcriptions. The analyst normally reviews 100% of the raw analytical data generated, including the calibration data and all calculations. Upon completion of the analyst review, a second level of review of the raw data is performed by the data reviewer or Laboratory Manager who is generally responsible for a review of 100% of the data generated. The emphasis is on the data acceptability relative to the data quality indicators and on the accuracy of the final data summaries.

The Laboratory Manager, if not already involved in the review process, performs the subsequent review, where 25-100% of the data quality indicators (such as method blanks, replicate analyses and spike recovery determinations) are compared to the acceptance criteria described in the analytical procedures. The QA Officer randomly audits raw data and data quality indicators to ensure the quality of the overall system.

All analytical problems encountered during sample analysis are properly addressed to provide explanations for data users.

Once both field and analytical data have been combined, the resulting technical documentation is validated against the following criteria by the Laboratory Manager, or Project Manager:

- stated objectives of the work plan;
- stated QA objectives of the Quality Assurance Project Plan (QAPP);
- analysis date versus the applicable holding times;
- percentage of QA analyses conducted;
- field and laboratory blank contamination;
- laboratory accuracy (percent recovery versus control limits);
- laboratory and field precision (RPD versus control limits).

Descriptive statistics for completeness are to be calculated and reported, as a percentage of total valid data points, with explanations describing reasons for achieving less than stated objectives.

5.5 DATA REPORTING

The format and content of a data report shall be dependent upon project needs such as whether explanatory text is required, client or contract requirements, and government agency reporting formats.

Reports are prepared in a format suited to the end use. Each report contains the following information:

- complete description of samples (client and Laboratory ID, and other information submitted by the client)
- description of the methodology or a reference to a method
- summary of the sample data
- summary of QC data

Written results include only those analytes requested by the client. A list of personnel authorized to sign final reports is maintained by the Laboratory Manager. Signatories attest that data and associated information in the report are believed to be correct. Oral preliminary release of data is prohibited.

The content and format of data reports are approved by the Laboratory Managers and the QA Officer. Once a format is agreed upon, a report may not be issued that deviates from the format without the approval of the Laboratory Managers and the QA Officer.

The laboratory maintains on file all laboratory QA/QC documentation, reviewed for completeness. The following QA/QC is performed:

- The dates of sample extraction and analysis are compared with sample collection dates to ensure that the samples were analyzed within EPA established holding times.
- The respective sets of values from duplicate samples are compared for agreement. Results from field blanks are reviewed. Re-analyses are performed as necessary.
- Charge, mass and analyte balances are performed as appropriate to assure internal consistence of reported data.

Any discrepancies within the above QA/QC procedures are further investigated. Laboratory QA/QC documents are checked for accuracy. Analyses are repeated as warranted. Samples may be collected a second time and re-analyzed.

Any significant problems in the measurement process are resolved before reporting or the data are qualified by a statement describing the problem and its implications.

5.6 Data Archive

Client confidentiality and data integrity are of a high priority. All active client files and those files that are less than six months old are maintained by the Customer Service Representative. All raw data less than six months old are maintained by the analysts in daily files. These daily files contain all information necessary to reconstruct all analyses performed on that instrument in a day.

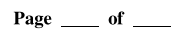
All data and original observations that are greater than six months old or existing in a completed log book are maintained in the laboratory archives. All data backup tapes are also maintained in the archives. Access to the archives requires approval by the archivist, who tracks archive activity.

The laboratory facility is kept under tight security. The facility is equipped with fire alarm systems and motion sensitive burglary systems. All visitors are required to be escorted through the facility and are not allowed access to any client records.

All data are maintained for a period of five years, unless other arrangements are made.



APPENDIX B
EXAMPLE DAILY FIELD REPORT
AND SAMPLE LOG FORM





APPENDIX C
EXAMPLE CHAIN-OF-CUSTODY FORM

(702) 321-8315 Phone

(702) 597-2098 Fax

6245 Harrison Drive, Suite 4, Las Vegas, NV 89120

Email: veritaslabs@msn.com

Company:

Address:

Attention:

Invoice To:

Sampled by:

Telephone:

Fax:

Email:

Project Name:

Project Number

Client P.O. No.

Sampler attests to authenticity and validity of information on this Chain of Custody _____ (initial).

Falsification of information on this Chain of Custody may be considered fraud.

Retention of information on this Chain of Custody may be considered liable.														Comments
Client Sample Identification	Veritas Lab ID #	Sampling Date	Sampling Time	Composite	Grab	Matrix Code*								
Relinquished by: (Signature)	Date/Time:	<u>Turnaround Time:</u>		<u>*Matrix Code</u>			<u>**Preservation Codes</u>							Received Temperature:
Received by: (Signature)	Date/Time:	____ 24 Hours ____ 48 Hours ____ 72 Hours ____ Normal ____ Other		GW=Groundwater WW=Wastewater DW=Drinking Water A=Air S=Soil/Solid SL=Sludge OL=Organic Liquid W=Wipe O=Other			I=Iced H=HCL N=HNO ₃ S=H ₂ SO ₄ X=NaOH T=Na ₂ S ₂ O ₃ Z=ZnAc O=Other NO=None							Received in Good Condition? Yes/No
Relinquished by: (Signature)	Date/Time:													Custody Seals? Yes/No
Received by: (Signature)	Date/Time:	_____ Date Needed												

CHAIN OF CUSTODY

All Data Reported on a Wet-Weight Basis, Unless Otherwise Specified

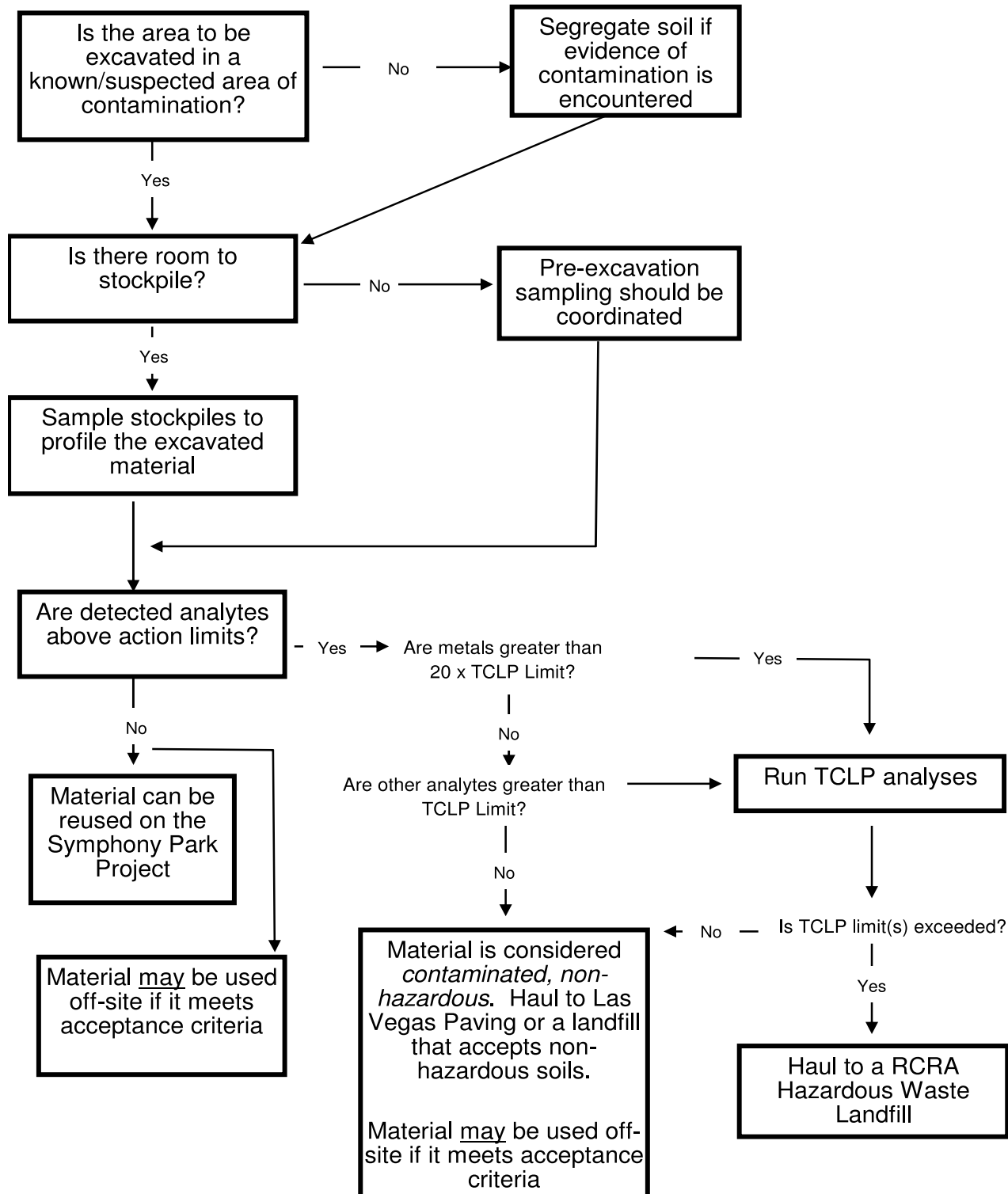
Page of

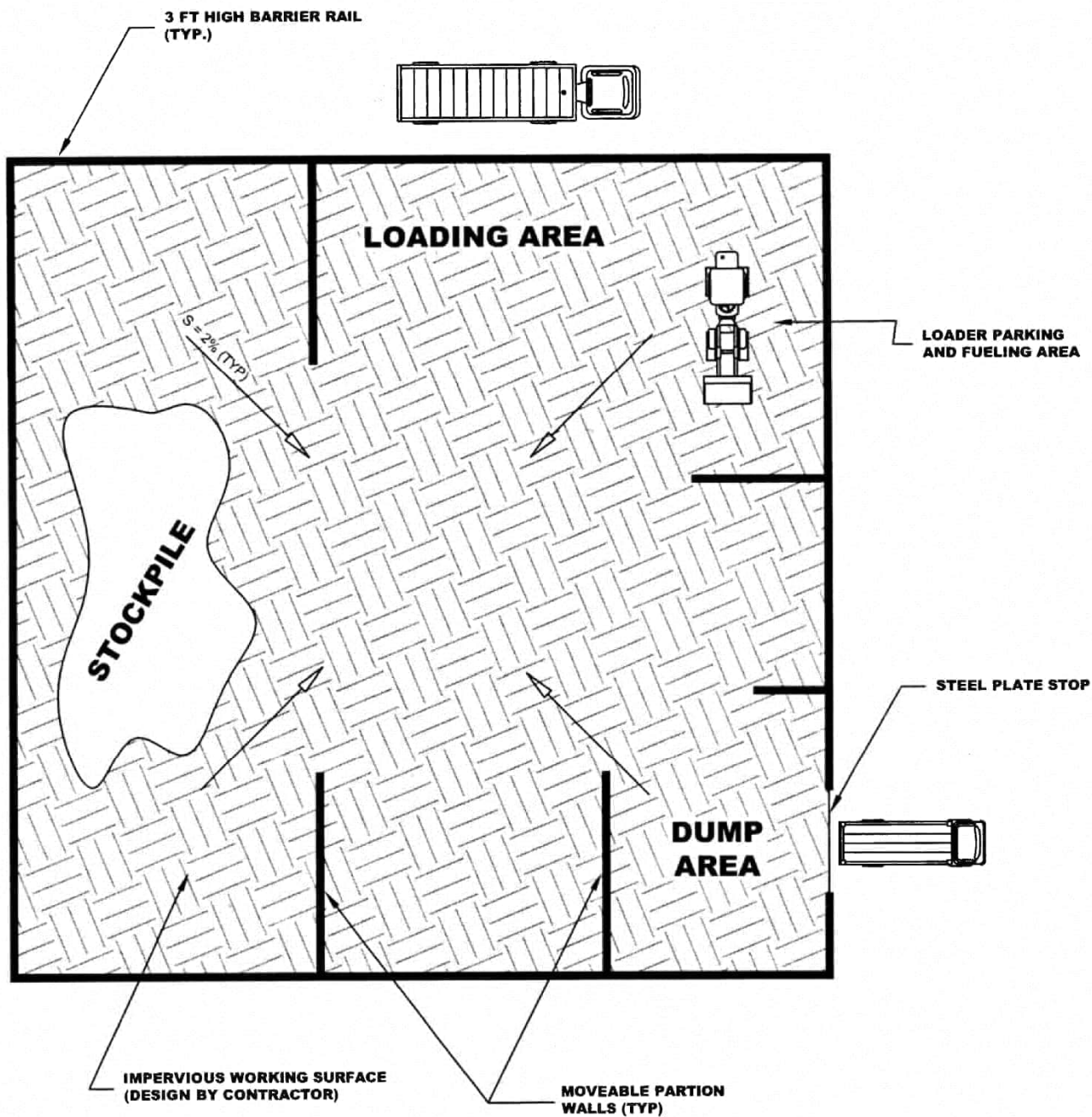


KLEINFELDER

Bright People. Right Solutions.

APPENDIX B
SOIL/WASTE CLASSIFICATION MATRIX
AND
EXAMPLE SOIL STORAGE AREA DIAGRAM







APPENDIX C
EXAMPLE MANIFESTS

American Ecology Corporation Land Disposal Restriction Form

GENERATOR: _____ EPA I.D. NUMBER: _____

WASTE STREAM or PROFILE NUMBER: _____ MANIFEST DOC. NO. _____ LINE NO. _____

WASTE IS A: ☐ WASTEWATER ☐ NON-WASTEWATER ☐ DEBRIS

NOTIFICATION FREQUENCY: ☐ ONE TIME ☐ REQUIRED WITH EACH SHIPMENT

EPA WASTE CODES (from 40 CFR 268.40): _____

UNDERLYING HAZARDOUS CONSTITUENTS (from 40 CFR 268.48): _____

A. ☐ Restricted Waste Meets Treatment Standards (40 CFR 268.7(a) (3))

The restricted waste identified above meets the treatment standards in 40 CFR 268.40 or **Alternative LDR treatment standards for contaminated soil 40CFR268.49** and can be landfill disposed without further treatment. I have attached all supporting analytical data, where available.

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

B. ☐ Restricted Waste Treated To Treatment Standards (40 CFR 268.7(b) (1) & 268.7 (b) (2))

The treatment residue, or extract of such residue, or the restricted waste identified above has been tested to assure that the treatment residues or extract meet all applicable treatment standards in 40 CFR 268.40 and/or performance standards in 40 CFR 268.45. I have attached all supporting analytical data, where available.

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

C. ☐ Restricted Waste With Technology Based Treatment Standards (40 CFR 268.7(b) (4))

I certify under penalty of law that I personally have examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and that based on my inquiry of those individuals immediately responsible for obtaining this information. I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40, without impermissible dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

D. ☐ Restricted Waste Decharacterized But Requires Treatment For UHC (40 CFR 268.9)

I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic. This decharacterized waste contains Underlying Hazardous Constituents (UHC) that require further treatment to meet the universal treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

E. ☐ Restricted Waste Subject To Treatment (40 CFR 268.7(a) (2))

The restricted waste identified above must be treated to the applicable treatment standards in 40 CFR 268.40, or treated to comply with applicable prohibitions set forth in Part 268.32 or RCRA Section 3004(d). I have attached all supporting analytical data, where available.

F. ☐ Hazardous Debris Subject To Treatment (40 CFR 268.45)

This hazardous debris identified above must be treated to the alternative treatment standards in 40 CFR 268.45.

G. ☐ Restricted Waste Subject To A Variance or Extension (40 CFR 268.7(a) (4))

This restricted waste identified above is subject to a case by case exemption under 40 CFR 268.5, an exemption under 40 CFR 268.6 or a nationwide capacity variance under Subpart C of 40 CFR 268, and is not prohibited from land disposal. LDR prohibitions become effective on _____ (date) for this restricted waste. The corresponding treatment standard(s) are promulgated in 40 CFR 268.40. I have attached all supporting analytical data, where available.

H. ☐ Restricted Waste Managed In A "Lab Pack" (40 CFR 268.7(a) (9))

I certify under penalty of law that I personally have examined and am familiar with the waste and that the lab pack contains only waste that have been excluded under appendix IV to 40 CFR Part 268 and that this lab pack may be sent to a combustion facility in compliance with the alternative treatment standards for lab packs at 40 CFR 268.42(c). I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

I certify and warrant that the information that appears on this form, and appended documents, is true and correct. I have correctly indicated how my waste is to be managed in accordance with 40 CFR 268. My certification is based on personal examination of the information submitted, or is based on my inquiries of those individuals responsible for obtaining the information.

Authorized Signature _____ Title _____ Date _____

UHC list from 40 CFR Part 268.48 available upon request

NO.0144

NON-HAZARDOUS WASTE DATA FORM

TO BE COMPLETED BY GENERATOR

EPS
I.D.
NO.

NAME _____

PROFILE
NO.

ADDRESS _____

CITY, STATE, ZIP _____

PHONE NO. _____

CONTAINERS: No. _____

VOLUME _____

WEIGHT _____

TYPE:

☐TANK
TRUCK☐DUMP
TRUCK☐

DRUMS

☐

CARTONS

☐

OTHER _____

WASTE DESCRIPTION

COMPONENTS OF WASTE

PPM

%

GENERATING PROCESS

COMPONENTS OF WASTE

PPM

%

1. _____

5. _____

2. _____

6. _____

3. _____

7. _____

4. _____

8. _____

PROPERTIES:

pH _____

☐

SOLID

☐

LIQUID

☐

SLUDGE

☐

SLURRY

☐

OTHER _____

HANDLING INSTRUCTIONS: _____

THE GENERATOR CERTIFIES THAT THE
WASTE AS DESCRIBED IS 100% NON-
HAZARDOUS.

TYPED OR PRINTED FULL NAME & SIGNATURE

DATE

TRANSPORTER

EPA
I.D.
NO.

NAME _____

ADDRESS _____

SERVICE ORDER NO. _____

CITY, STATE, ZIP _____

PICK-UP DATE _____

PHONE NO. _____

TRUCK, UNIT, I.D. NO.

TYPED OR PRINTED FULL NAME & SIGNATURE

DATE

TSD FACILITY

EPA
I.D.
NO.

NAME

Las Vegas Paving Corp.

NVD986768174

ADDRESS

5300 North 5th Street

DISPOSAL METHOD

☐

LANDFILL

☒

OTHER _____

CITY, STATE, ZIP

North Las Vegas, NV 89031

Incineration

PHONE NO. (702) 649-7423

TYPED OR PRINTED FULL NAME & SIGNATURE

DATE

GEN	OLD/NEW	L	A	TONS
TRANS		S	B	
C/Q		RT/CD	HWDF	NONE

DISCREPANCY

UNIFORM HAZARDOUS WASTE MANIFEST		1 Generator's US EPA ID No. 		Manifest Document No. 		2. Page 1 of		Information in the shaded areas is not required by Federal law					
3. Generator's Name and Mailing Address						A. State Manifest Document Number							
						B. State Generator's ID							
4. Generator's Phone ()													
5. Transporter 1 Company Name			6. US EPA ID Number 			C. State Transporter's ID							
						D. Transporter's Phone							
7. Transporter 2 Company Name			8. US EPA ID Number 			E. State Transporter's ID							
						F. Transporter's Phone							
9. Designated Facility Name and Site Address			10. US EPA ID Number 			G. State Facility's ID							
						H. Facility's Phone							
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)						12. Containers		13. Total Quantity		14. Unit Wt/Vol		I. Waste No.	
						No. Type							
						a.							
						b.							
						c.							
d.													
J. Additional Descriptions for Materials Listed Above						K. Handling Codes for Wastes Listed Above							
15. Special Handling Instructions and Additional Information													
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.													
Printed/Typed Name					Signature					Month Day Year			
TRANSPORTER	17. Transporter 1 Acknowledgement of Receipt of Materials					Signature					Month Day Year		
	Printed/Typed Name					Signature					Month Day Year		
	18. Transporter 2 Acknowledgement of Receipt of Materials					Signature					Month Day Year		
	Printed/Typed Name					Signature					Month Day Year		
FACILITY	19. Discrepancy Indication Space												
ITY	20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.												
	Printed/Typed Name					Signature					Month Day Year		

Appendix C

1) INTRODUCTION

The purpose of this Standard Operating Procedure (SOP) is to provide a description of the procedures for the collection of representative soil samples. Soil samples will consist of two types, grab samples and composite. Samples can also be taken at variable depths below ground surface. In some cases, hand sampling equipment can be used, in other cases power equipment may be utilized. Power equipment may include back-hoes or drill-rigs (direct push or hollow stem auger).

These are standard (i.e. typically applicable) operating procedures which may be varied or changed, as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

2) SAMPLE TYPES

Grab Samples:

A grab sample is defined as a discrete aliquot representative of a specific location at a given point in time. The sample is collected all at once at one particular point in the sample medium. The representativeness of such samples is defined by the nature of the materials being sampled. In general, as sources vary over time and distance, the representativeness of grab samples will decrease.

Grab samples will be collected using disposable or decontaminated instruments. The samples will be collected directly into acetate or brass sleeves or transferred into a sterile laboratory supplied container. The containers will be handled as described in SECTION 4 of this SOP.

Composite Samples

Composites are non-discrete samples composed of more than one specific aliquot collected at various sampling locations and/or different points in time. Analysis of this type of sample produces an average value and can, in certain instances, be used as an alternative to analyzing a number of individual grab samples and calculating an average value. It should be noted, however, that compositing can mask problems by diluting isolated concentrations of some hazardous compounds below detection limits. Compositing is often used for environmental samples and may be used for hazardous samples under certain conditions. For example, compositing of hazardous waste is often performed after compatibility tests have been completed to determine an average value over a number of different locations (group of drums). This procedure generates data that can be useful by providing an average concentration within a number of units, can serve to keep analytical costs down, and can provide information useful to transporters and waste disposal operations.

Once the need for composite sampling is identified in the Field Sampling Plan (FSP), the location of the sample points will be identified by one of two methods. The first method will involve identifying a sub-area within the larger area to be sampled, and then a set number of random samples would be collected within that area and composited. The second method would be to identify a grid in the area to be sampled and a sample would be collected at each grid point. Soil from a given number grid points would then be composited.

To composite a soil sample, a predetermined amount of soil will be identified in the FSP (this is generally one spade full). This amount of soil will be collected from each identified location and placed in a pre-cleaned container (plastic bucket). The soil will then be mixed thoroughly using the collection spade. After mixing, a sample will be removed and placed in a sterile laboratory supplied container.

3) TYPES OF SAMPLE COLLECTION

3.1 Near Surface Soil Samples

Near surface samples (0-2 feet below grade) can be collected with hand tools which include spades, scoops, or bucket auger. These tools must be properly decontaminated before, between, and after sampling events. The Converse SOP for Decontamination must be followed.

Once the soil is collected, it will be placed in a sterile laboratory supplied container. The containers can include 4 or 8 ounce glass jars or plastic container. Glass containers must be used for soil samples that will be analyzed for organic compounds.

A portion of each sample to be analyzed VOCs will be collected in accordance with the Environmental Protection Agency (EPA) method EPA Method 5035 using single-use EnCore sample containers. Care should be taken to disturb the sample as little as possible during collection. Sub-samples will be collected from the primary sample containers by pushing the EnCore samplers into the primary sample. Please note these samples only have a 24 hour hold time.

3.2 Collection of Soil Samples Utilizing a Backhoe

For collection of deeper samples, test pits and trenches can be dug utilizing a backhoe or excavator. The trench or test pits deeper than 5 feet cannot be entered unless they are sloped or scored. In most cases, soil samples can be collected from the backhoe bucket using the following procedure:

- Have the backhoe operator place his back hoe against the test pit wall or bottom of excavation in the area where you wish to collect the sample.

- Roll the bucket so the teeth of the back hoe scrapes the area where you wish to collect the sample.
- Lift the bucket straight up and place bucket on ground where the sampling personnel can reach it. The sampling personnel will then remove the soil from the teeth of the backhoe with a clean, gloved hand. Care must be taken to collect soil in a way to gather the soil that has not come into direct contact with the backhoe bucket.

Once the soil is collected it will be placed in a sterile laboratory supplied container. The containers can include 4 or 8 ounce glass jars or plastic containers. Glass containers must be used for soil samples that will be analyzed for organic compounds.

A portion of each sample to be analyzed VOCs will be collected in accordance with the Environmental Protection Agency (EPA) method EPA Method 5035 using single-use EnCore sample containers. Care should be taken to disturb the sample as little as possible during collection. Sub-samples will be collected from the primary sample containers by pushing the EnCore samplers into the primary sample. Please note these samples only have a 24 hour hold time.

3.3 Collection of Soil Samples Direct Push

Samples can be collected at depth using direct push technology. The technician will sample at the depth identified on the FSP. A four to five foot acetate liner will be pushed into the ground at selected depths. Based upon the field screening required for the project, selected lengths of samples will be chosen and the liner cut in the lengths required. Teflon film and tight fitting plastic caps will be placed on each end of the cut sample sleeves.

As an alternative, the acetate sleeves can be cut open and the soil removed and placed in sterile laboratory supplied container. The containers can include 4 or 8 ounce glass jars or plastic containers. Glass containers must be used for soil samples that will be analyzed for organic compounds.

A portion of each sample to be analyzed VOCs will be collected in accordance with the Environmental Protection Agency (EPA) method EPA Method 5035 using single-use EnCore sample containers. Care should be taken to disturb the sample as little as possible during collection. Sub-samples will be collected from the primary sample containers by pushing the EnCore samplers into the primary sample. Please note these samples only have a 24 hour hold time.

3.4 Collection of Soil Samples from a Drill-Rig

Samples can be collected from samplers advanced by a hollow stem auger drill rig. The sampler (split spoon) will be advanced at selected sampling depths. The split spoon will be removed from the ground and disconnected from drill rig flight. The split spoon will

be opened and the soil placed in a sterile laboratory supplied container. The containers can include 4 or 8 ounce glass jars or plastic containers. Glass container must be used for soil samples that will be analyzed for organic compounds. As an alternative, the split spoon can be lined with a metal liner and the liner can be removed from the device and plastic caps placed on the ends.

A portion of each sample to be analyzed VOCs will be collected in accordance with the Environmental Protection Agency (EPA) method EPA Method 5035 using single-use EnCore sample containers. Care should be taken to disturb the sample as little as possible during collection. Sub-samples will be collected from the primary sample containers by pushing the EnCore samplers into the primary sample. Please note these samples only have a 24 hour hold time.

4) SAMPLE HANDLING

All laboratory samples will be labeled in the field with a Sharpie® or equivalent water-proof labeler with the following information:

- Sample Location
- Date Sample Collected
- Time Sample Collected
- Technicians Initials

After the jars are labeled, a custody seal should be placed on sample container or on the cooler at the completion of sample collection for the project (see example of custody seals attached to SOP). Samples must be placed in coolers with ice. Ice should be placed in zip lock bags or other water tight containers and the samples containers should be placed in the cooler in such a way as to avoid melted ice water getting into the containers.

Samples should be delivered to the laboratory as soon as reasonably possible after the sampling event. If the samples are to be shipped to the laboratory, the cooler can be used as a shipping container and blue ice can be substituted for the ice used during field collection.

5) FIELD SUPPLIES

Before each sampling event the technician should collect the field supply check list (a copy of the check list is attached to this SOP).

6) ATTACHMENTS

EXAMPLE OF SHIPPING LABELS AND CUSTODY SEALS

(Name of Sampling Organization)	
Sample Description: _____ Sample Location: _____ Date: _____ Time: _____ Matrix: _____ Sample Type: _____ Preservative: _____ Sampled By: _____ Sample ID #: _____	Remarks: _____
Signature Date CUSTODY SEAL	CUSTODY SEAL Date Signature

Project: _____ Project #: _____ Weather: _____

Date of Field Work : _____ Site Manager: _____

Field Supply Check List

Item	Need for Project	Date Cleaned and Checked	Date Loaded	Date Returned
Maps/Plot Plan		NA		NA
GIS				
Tape Measure				
Measuring Wheel				
Survey Stakes and Flags		NA		NA
Camera				
PID				
Zip Lock Bags		NA		
4 oz Glass Soil Jars*		NA		NA
8 oz Glass Soil Jars*		NA		NA
VOAs*		NA		NA
Amber Bottles*		NA		NA
Water Bottles for Metal*		NA		NA
Sample Labels		NA		NA
Chain-of-Custody		NA		NA
Custody Seals		NA		NA
Cooler				
Ice		NA		NA
3 or More Clean Plastic Buckets**				
Scrub Brush**				
Sponge**				
Alconox**				
Paper Towels**				
Plastic Sheets**				
Hand Spade				
Hand Auger				
Disposable Bailers				
Hard Hat***		NA		NA
Tyvek Suite***		NA		NA
Respirator***				NA
Disposal Latex Gloves***		NA		NA
XRF				

*Supplied by Laboratory

**Decontamination Supplies

***PPE

1) INTRODUCTION

The purpose of this Standard Operating Procedure (SOP) is to provide a description of the methods used for preventing, minimizing, or limiting cross-contamination of samples due to inappropriate or inadequate equipment decontamination. It also provides general guidelines for developing decontamination procedures for sampling equipment to be used during hazardous waste operations as per 29 Code of Federal Regulations (CFR) 1910.120. This SOP does not address personnel decontamination.

These are standard (i.e. typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

To help control cross-contamination, when possible, disposal and one time use items will be used for sample collection.

2) DECONTAMINATION SETUP FOR HAND COLLECTION INSTRUMENTS

During each sampling event where it is necessary to decontaminate hand collection instruments, a decontamination area will be set up. A plastic sheet will be placed on the ground. Three clean plastic buckets will be placed on the plastic sheet. The first bucket will be filled with tap water and Alconox® soap, a scrub brush, and sponge. The second bucket will contain clean tap water, and the third bucket will be used to collect distilled/de-ionized water.

3) DECONTAMINATION STEPS FOR HAND COLLECTION INSTRUMENTS

- Step 1: Place item to be decontaminated into first bucket. Use brush and sponge to wash item.
- Step 2: Rinse the item in the second bucket.
- Step 3: Hold item over third bucket and pour distilled/de-ionized water over item (if required, some of this last rinse water can be collect for laboratory sampling to verify effectiveness of the decontamination process) .
- Step 4: Place item on clean towel to air dry.

4) DECONTAMINATION OF POWER SAMPLING EQUIPMENT (I.E. DRILL RIGS)

The drilling subcontractor must steam clean the auger flights before mobilizing to the site. When possible, all soil samples will be collected in a single use plastic sleeve. If a reusable split spoon sampler is used, it will be decontaminated before each use by the same procedure used to decontaminate hand tools.

If auger flights or Geoprobe rods need to be reused during a single day of sampling, it will be the sub-contractors responsibility to set up a station to decontaminate this equipment either by scrubbing as described above or using a low-pressure water wash to remove all visible contaminants. The low-pressure water wash method consists of a container which is filled with water and then is pumped full of air to create pressure. A slender nozzle and hose allow the user to spray in hard-to-reach places. For a highly contaminated site, additional on-site decontamination may be required. This will be discussed with the sub-contractor on a site by site basis.

Laboratory Information

Appendix D

Veritas Laboratories

6/30/2025

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Blank Spike / LCS %R	RPD
Arsenic, Total 6010B in Solid (EPA 6010B)							
Preservation:None							
Container:Clear Glass Jar, 2oz,							
unpreserved							
Amount Required:2 oz							
Hold Time:180 days							
Arsenic, Total	1.2	3.0 mg/Kg			75 - 125	20	85 - 115 20
Barium, Total 6010B in Solid (EPA 6010B)							
Preservation:None							
Container:Clear Glass Jar, 2oz,							
unpreserved							
Amount Required:2 oz							
Hold Time:180 days							
Barium, Total	0.010	0.30 mg/Kg			75 - 125	20	85 - 115 20
Cadmium, Total 6010B in Solid (EPA 6010B)							
Preservation:*** DEFAULT PRESERVATION ***							
Container:*** DEFAULT CONTAINER							

Amount Required:							
Hold Time:180 days							
Cadmium, Total	0.030	0.30 mg/Kg			70 - 130	20	85 - 115 20
Chromium, Total 6010B in Solid (EPA 6010B)							
Preservation:None							
Container:Clear Glass Jar, 2oz,							
unpreserved							
Amount Required:2 oz.							
Hold Time:180 days							
Chromium, Total	0.030	0.50 mg/Kg			75 - 125	20	85 - 115 20
Lead, Total 6010B in Solid (EPA 6010B)							
Preservation:None							
Container:Clear Glass Jar, 2oz,							
unpreserved							
Amount Required:2 oz							
Hold Time:180 days							
Lead, Total	0.37	1.5 mg/Kg			75 - 125	20	85 - 115 20
Selenium, Total 6010B in Solid (EPA 6010B)							
Preservation:None							
Container:Clear Glass Jar, 2oz,							
unpreserved							
Amount Required:2 oz							
Hold Time:180 days							
Selenium, Total	0.52	5.0 mg/Kg			75 - 125	20	85 - 115 20
Silver, Total 6010B in Solid (EPA 6010B)							
Preservation:None							
Container:Clear Glass Jar, 2oz,							
unpreserved							
Amount Required:2 oz							
Hold Time:180 days							
Silver, Total	0.050	1.0 mg/Kg			75 - 125	20	85 - 115 20

Veritas Laboratories

6/30/2025

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	LCS RPD
TPH Ranges, TNRCC 1005 in Solid (TNRCC 1005)								
Preservation:4°C ±2°C								
Container:Clear Glass Jar, 2oz,		Amount Required:2oz.			Hold Time:14 days			
unpreserved								
TPH (=C6-C12), GRO	2.6	10 mg/Kg		20	75 - 125	20	75 - 125	20
TPH (>C12-C28), DRO	3.8	20 mg/Kg		20	75 - 125	20	75 - 125	20
TPH (>C28-C35), ORO	8.2	20 mg/Kg		20		20	75 - 125	20
surr: Bromofluorobenzene			70 - 130					
surr: Pentacosane			70 - 130					

Veritas Laboratories

6/30/2025

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
8260B VOCs Full List (mg/Kg-Soil) in Solid (EPA 8260B)								
Preservation: 4°C ±2°C								
Container: Clear Glass Jar, 2oz,								
Amount Required: 2oz								
Hold Time: 14 days								
unpreserved								
Benzene	0.00085	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Bromobenzene	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Bromodichloromethane	0.00081	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Bromoform	0.00076	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Bromomethane	0.00098	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
2-Butanone (MEK)	0.0023	0.010 mg/Kg		20	80 - 120	20	80 - 120	20
sec-Butylbenzene	0.0013	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
tert-Butylbenzene	0.0012	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
n-Butylbenzene	0.0015	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Carbon disulfide	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Carbon Tetrachloride	0.0013	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Chlorobenzene	0.00086	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Chloroethane	0.0011	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Chloroform	0.00091	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Chloromethane	0.00082	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
~~2-Chloroethyl vinyl ether~~	~~0.0016~~	~~1.0050 mg/Kg~~						
2-Chlorotoluene	0.00093	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
4-Chlorotoluene	0.00087	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,2-Dibromo-3-chloropropane	0.0017	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Dibromochloromethane	0.00092	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,2-Dibromoethane	0.0011	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Dibromomethane	0.00096	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,2-Dichlorobenzene	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,3-Dichlorobenzene	0.00010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,4-Dichlorobenzene	0.0011	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Dichlorodifluoromethane	0.00069	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,1-Dichloroethane	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,2-Dichloroethane	0.00096	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,1-Dichloroethene	0.00096	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
cis-1,2-Dichloroethene	0.0011	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
trans-1,2-Dichloroethene	0.0012	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,2-Dichloropropane	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,3-Dichloropropane	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
2,2-Dichloropropane	0.0014	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,1-Dichloropropene	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
cis-1,3-Dichloropropene	0.00084	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
trans-1,3-Dichloropropene	0.00094	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Ethylbenzene	0.00088	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Hexachlorobutadiene	0.0021	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Isopropylbenzene	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
p-Isopropyltoluene	0.0018	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Methyl-tert-butyl-ether (MTBE)	0.0013	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Methylene Chloride	0.0012	0.010 mg/Kg		20	80 - 120	20	80 - 120	20
Naphthalene	0.0015	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
n-Propylbenzene	0.0011	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Styrene	0.00096	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
1,1,1,2-Tetrachloroethane	0.00093	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,1,2,2-Tetrachloroethane	0.00089	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Tetrachloroethene (PCE)	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Toluene	0.0015	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,2,3-Trichlorobenzene	0.0015	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,2,4-Trichlorobenzene	0.0015	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,1,1-Trichloroethane	0.0011	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,1,2-Trichloroethane	0.00086	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Trichloroethene (TCE)	0.00069	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Trichlorofluoromethane	0.00094	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,2,3-Trichloropropane	0.00074	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,2,4-Trimethylbenzene	0.0011	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
1,3,5-Trimethylbenzene	0.0012	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
Vinyl chloride	0.00088	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
m,p-Xylene	0.0018	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
o-Xylene	0.0010	1.0050 mg/Kg		20	80 - 120	20	80 - 120	20
surr: Dibromofluoromethane			70 - 130					
surr: 1,2-Dichloroethane-d4			70 - 130					
surr: Toluene-d8			70 - 130					
surr: 4-Bromofluorobenzene			70 - 130					
Chlorobenzene-d5								
1,4-Dichlorobenzene-d4								
Fluorobenzene								



STANDARD OPERATING PROCEDURE

Description: Sample Receipt, Control and Log In

Method: General Laboratory Procedures

Approval Signatures:

03/12/2026

Jannette Joy Soria, QA Officer

Date

03/12/2026

Puri Romualdo, Laboratory Director

Date

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1 SCOPE AND APPLICATION

This SOP describes a procedure for sample receipt, sample log in and sample storage of samples from clients.

2 SUMMARY

Samples are received from clients through ASSET Laboratories' Sample Control Department. The samples are checked upon receipt according to sample acceptance policy and consistency of information with the Chain of Custody (COC) forms. Any discrepancies are noted in a Sample Receipt Checklist form. Samples are assigned with laboratory identification and stored under appropriate refrigeration until analysis. Samples are tracked within the laboratory by use of an internal chain of custody form either manually (if LIMS is down) or electronically through LIMS.

3 DEFINITIONS

3.1 Chain of Custody (COC) Form

A record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; collector; time of collection; preservation; and requested analyses. (NELAC)

3.2 TAT – Turnaround Time

4 SAFETY

4.1 Protective clothing and protective eye wear shall be worn at all times.

4.2 Avoid spilling samples or standards on clothing and hands.

4.3 All safety procedures specified in OSHA safety guidelines shall be followed.

4.4 All applicable Material Safety Data Sheets (MSDSs) shall be read prior to performing this procedure.

4.5 Make sure that all coolers are opened under the hood. Be careful when opening the cooler. Samples may have broken during shipment.

5 EQUIPMENT AND SUPPLIES

5.1 Balance

5.2 Thermometer/IR Gun

5.3 Computer

5.4 Refrigerator/Freezers

5.5 Barcode Printer

5.6 Barcode Scanner

5.7 pH paper

5.8 Pasteur pipettes

5.9 LIMS, version 11

6 REAGENTS AND STANDARDS

For sample preservation:

6.1 Hydrochloric Acid (HCl), 1:1

6.2 Sulfuric Acid (H₂SO₄), 1:1

6.3 Sodium Hydroxide (NaOH), 6N

6.4 Aluminum Chloride (AlCl₃), 6N

6.5 Zinc Acetate (Zn(CH₃COO)₂), 2 N

6.6 Sodium Bisulfate (NaHSO₄)

6.7 Methanol

6.8 Ammonium Buffer

6.9 Nitric Acid (HNO₃), 1:1

7 SAMPLE COLLECTION, PRESERVATION, SHIPMENT AND STORAGE

7.1 Sample integrity must be preserved during login process. Samples must be kept in proper storage during delays in the login process.

7.2 With the exception of samples for volatile analysis, sample preservation must be checked upon sample receipt. Samples without proper preservation must be preserved during this time. Properly trained personnel shall add the preservative to samples under a hood.

7.3 Store samples at required temperatures (Refrigeration: 0-6°C) until analysis.

- 7.4 Volatile samples must be segregated from all other samples. Volatile samples that contain high levels of volatile organics should be segregated from all other volatile samples.
- 7.5 Refer to Attachment 1 for sample preservation and holding times.
- 7.6 Refer to Attachment 2 for $\text{Na}_2\text{S}_2\text{O}_3$ Treatment for Volatile and Semi volatile Water Samples.

8 QUALITY CONTROL

8.1 REFRIGERATOR/FREEZER TEMPERATURES

- 8.1.1 Refrigerator temperatures must be taken on a daily basis using a properly calibrated NIST traceable thermometer. Refrigerator temperatures must be $\leq 6^\circ\text{C}$ but not frozen and freezers $< -7^\circ\text{C}$ but not below -20°C .
- 8.1.2 A calibrated thermometer is located inside the refrigerators/freezers. Refrigerator temperatures are recorded on logbook.
- 8.1.3 If the temperature of the refrigerator/freezers is higher than the acceptance criteria, then turn off the refrigerator and defrost the coils for several hours. Turn the refrigerator back on and monitor the temperature. Record the temperature and write in the comments section that the coils were defrosted.
- 8.1.4 If the temperature of the refrigerator/freezer is lower than the acceptance criteria, then adjust the thermostat and monitor the temperature. Record the temperature and write in the comments section that the thermostat was adjusted up or down.
- 8.1.5 If the refrigerator/freezer continues to be outside the acceptance criteria for more than 24 hours, then have the refrigerator checked by a service technician. A non-conformance form properly filled out and signed by the department supervisor must be turned to the QA Office within 24 hours of the event.
- 8.1.6 If the refrigerator/freezer is out of service, then all current samples must be moved into extra stand-alone refrigerators or into another walk-in refrigerator. This alternative plan is used until the main refrigerators are fixed. Temperatures of the alternate refrigerators must be documented while the main refrigerators are being fixed.

8.2 REFRIGERATOR BLANK

- 8.2.1 A holding blank is made by placing a preserved filled VOA with DI water or a VOA with blank sand inside the refrigerator to monitor storage contaminants.

8.2.2 The VOA is kept inside the refrigerator for seven days. Every time a VOA is taken it should be replaced by a new one.

8.2.3 On the seventh day, the VOA is logged in to be analyzed for 8260. The Client is ASSET Laboratories, Project Name "Water or Soil BLANK" and Sample ID as "Ref. Holding Blank". The report Attention to the QA Manager.

8.2.4 Once the results are done and checked by the QA Manager, the report is saved per normal electronic reporting procedure.

8.2.5 Refer to SOP for Volatile Holding Blanks for more details on procedure

8.3 BOTTLE TESTING

8.3.1 All bottles purchased are certified clean. If in case, bottles purchased are not certified clean those are lot tested in-house. Each batch or sets of bottles purchased are given a lot number based on the date received. The bottles are tested accordingly: 32 OZ amber for 8270 and 8015 TPHD, 32 OZ clear for 1664 (Oil & Grease), and the 16 OZ plastics for metals by EPA Method 200.8. For bottles that are certified clean, the Sample Control Officer compiles all the certification and lot numbers.

8.3.2 VOA vials are purchased with lot numbers. If purchased without certification, each set of lot is also tested in-house for VOC contaminants. VOA vials with sodium bisulfate and methanol preservatives are purchased with preservatives. Purchased pre-cleaned and pre-preserved containers are accompanied with certificate of analysis.

8.3.3 Reports for all Lot Testing and Certificate of Analysis are checked by QA Manager and kept in file at Sample Control Department.

9 PROCEDURE

9.1 SAMPLE ACCEPTANCE POLICY

ASSET Laboratories has established a sample acceptance policy procedure to better serve its clients.

9.1.1 Proper, full and complete documentation of the chain-of-custody form that includes sample identification and location, date and time of collection (time is required especially for samples with holding time of less than 48 hrs), collector's name, sample matrix, preservation and test required on samples.

9.1.2 Sample labels that are intact and Sample IDs legibly written to identify sample. Use of indelible or water resistant ink is advised.

- 9.1.3 Samples have unique identification or sample IDs.
- 9.1.4 Samples have proper container and preservative as required by the method. See Attachment 1 for container type and preservative for each test.
- 9.1.5 Samples received in the laboratory within method holding time. For a list of holding time for each test, see Attachment 1. When samples are received for field tests with short holding time like pH and residual chlorine, the laboratory will analyze the samples as soon as possible or within 24 hrs. Data from samples that are analyzed out of holding time are flagged with H qualifier.
- 9.1.6 Adequate sample volume provided for test requested. For a list of required sample volume, see Attachment 1.
- 9.1.7 Sample received at required temperature of 0-6 °C or there is evidence of chilling like received on cooler with ice for samples collected and received on the same day.
- 9.1.8 Sample does not show sign of contamination or damage like loosely cap lid.

Client must be informed for any sample that does not meet the above requirements. The communication can be either by e-mail or telephone and must be documented on the client correspondence log. Any instruction from client should be noted in the correspondence log. If the laboratory does not receive response from client and there is holding time issue, the laboratory will proceed with analysis.

Any internal communication pertaining to the Project/Work order should also be documented on the client correspondence log.

Document all discrepancy in the sample receipt checklist. Analytical results from samples that do not satisfy the laboratory sample acceptance policy will be noted on the case narrative.

The laboratory has the right to reject samples if there is any evidence upon sample receipt that will compromise the quality of the sample that will result in indefensible analytical data. This is especially true for samples that are subject to or have to be reported to Federal and/or State regulating agencies or are deemed to pose an unacceptable level of health risk or nuisance to employees and/or the public. The laboratory may also reject samples wherein exposure to the sample poses evident health and safety risk to its employees. Following are examples of sample conditions but not limited to, that may result to sample rejection by the laboratory:

- Sample requested for volatiles analysis where the sample is contained in a plastic bottle (inappropriate container), unacceptable headspace, etc.

- Samples with very strong offensive odor that the current standard laboratory safety equipment such as laboratory hoods and respiratory masks are insufficient to contain the exposure to safe levels.
- Hard samples that requires special equipment to grind/crash prior to analysis.

9.2 SAMPLE INSPECTION

A Sample Control Officer receives a sample shipment or delivery. An alternate person is designated to receive samples if the Sample Control Officer is not available.

The following items are inspected and documented in the Sample Receipt Checklist in LIMS:

9.2.1 Temperature:

Read the cooler temperature using the Infrared thermometer. If the IR thermometer is not available place a thermometer inside the cooler. Close the lid of the cooler (if possible) and allow the temperature to stabilize for about 10 – 15 minutes.

Record the temperature on the "Sample Receipt Checklist" form on the LIMS. The cooler temperature should be between 0 – 6 °C. Some projects / clients may require notification if the samples are received outside the acceptance criteria. All communications with the client must be documented on the "Client Correspondence Log".

9.2.2 Custody Seal:

Check for the presence or absence of custody seals or tape on the shipping containers and the condition of the seals (i.e., intact, broken, etc.). A notation is made if sample custody seals are present but removable.

9.2.3 Chain of Custody:

Check for the presence or absence of Chain of Custody (COC) form.

9.2.3.1 If the sample(s) is/are delivered by the client without a COC, the Sample Control Officer will assist in completing the form.

9.2.3.2 If the sample(s) is/are delivered by a courier without a COC, the Sample Control Officer will contact the client and initiate a COC document containing all appropriate information. If the client is present, a signed copy of the COC is given for their records.

9.2.3.3 If a client uses a single page Chain-of-Custody to relinquish the samples, the Sample Control Officer must sign/date the "Received" section and make a copy for the client. The copy of the COC goes to the client and the "original" stays with the lab.

9.2.3.4 Sample Control Officer must sign/date the Chain-of-Custody under the "Received by" portion. If an ASSET Laboratories' COC was used the sample conditions upon receipt must be filled out by the Sample Control Officer (in the upper right section of the COC). If laboratory courier arrives late night and there is no sample control personnel to receive the samples, the courier will sign the relinquished and received portion of the COC and place the samples inside walk-in refrigerator.

9.2.4 The agreement between samples, tags, chain of custody, and analytical request forms must be verified.

9.2.5 *Containers:*

Inspect the condition of sample containers at time of receipt (i. e., intact, broken, or leaking, headspace present in VOA vials, incorrect containers, etc.)

9.2.6 *Visual assessment of Headspace* (refer to SW 5030B Sec. 6.1)

If bubble size exceeds 5-6 mm, document observation in the sample receipt checklist and immediately notify client and secure authorization to proceed and/or further instruction.

9.2.7 *Shipping Documents:*

Sample shipments shall be inspected for air-bills or shipping documents. Shipping materials must be present together with the samples. Documents are scanned and saved in the project folder.

9.2.8 *Packaging Material:*

Document the packaging material used in the Sample Receipt Checklist form.

9.3 SAMPLE LOG IN

9.3.1 Chain-of-Custody (COC)

9.3.1.1 Arrange the page(s) of Chain-of-Custody (if necessary). Scan COC and send to Sample Control- Remote team for login.

9.3.1.2 Login begins with assigning a Laboratory Work Order number from ELIMS (Environmental Laboratory Information Management System). This number is a seven digit sequential numbers that identifies the samples by batch.

9.3.1.3 Turnaround time (TAT) for samples received after 3:00 PM starts at 8:00 AM the following day.

9.3.1.4 Within each Work Order, the samples are then assigned an individual numbers starting at 001. A workorder with 10 samples will be labeled as N00XXXX-001A /010A.

9.3.1.5 Those samples that have same sample ID but have different bottle preservation must have individual fraction assigned to each bottle. A sample with 3 fractions will be labeled as N00XXXX-001A / 001C.

NOTE: See LIMS-LOGIN-01 for exact details on how to log in samples and fractions into ELIMS.

9.3.1.6 If the client submits only one bottle with multiple tests, the Sample Control Officer must log in one (1) fraction with multiple tests associated to the sample. "LIMITED SAMPLE VOLUME" must be typed into the special instructions for the sample.

9.3.1.7 If the client submits a large container (such as a 5 gallon bucket) for sample analysis, the Sample Control Officer must take sub-samples for requested analysis and add proper preservative. The sample must be log as one (1) sample but multiple fractions.

9.3.2 Labels

After all the samples have been logged into the ELIMS, a sample label is printed containing the client ID, laboratory number, sampling date and time, date received and the barcode. See LIMS-LOGIN-01 for details on printing labels. Labels are color coded based on the received date. Below are the color codes:

MONTH	COLOR
January & July	White
February & August	Orange
March & September	Blue
April & October	Yellow
May and November	Pink
June and December	Green

When affixing label to the container, Sample Control Officer must compare client sample ID written on the laboratory's label versus client's sample label. If the labels do not match, sample login and chain of custody must be reviewed for errors. If error occurs during login, the Sample Control Officer will review, correct the error, print new label and attach label to sample containers.

9.4 SAMPLE PRESERVATION CHECK

The preservation of all aqueous samples for Metals, Sulfide, and Cyanide must be verified in Sample Control. A small aliquot is transferred to a plastic container and the pH tested using a pH strip. For each workorder that will require preservation check, an excel spreadsheet is generated and printed. Results of pH check are recorded in the printed spreadsheet and scanned for storage in the project folder.

For samples received that are not preserved or inadequately preserved, Sample Control personnel will preserve the sample to meet the test requirement.

All samples preserved upon receipt should be indicated in the Sample Receipt Checklist.

9.4.1 Sulfide - add zinc acetate and NaOH to adjust the pH to >9.

9.4.2 Cyanide - oxidizing agents such as chlorine decompose most of the cyanides. Test a drop of the sample with potassium iodide-starch test paper; a blue color indicates the need for treatment. Add Ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the indicator paper. Then add 0.06 grams of ascorbic acid for each liter of sample. Adjust pH to >12 with 10N NaOH.

9.4.3 Metals (Total Recoverable) - adjust the pH with HNO₃ to pH <2. Following acidification, the sample should be mixed, held for 16 hours, and then verified to be pH <2 by sample control personnel. If the sample is found to have pH of <2, the cap is marked by a green marker. If for some reason such as high alkalinity the sample pH is verified to be > 2, more acid must be added and the sample held for 16 hours until verified to be pH < 2.

9.4.4 For samples received for EPA 1664, samples are no longer checked for preservation. All samples are added with about 0.5 mL HCl (1:1). Before analysis, analyst will check for preservation according to in-house SOP.

9.5 CANISTER CHECK

9.5.1 The canisters are requested from the Subcontract Laboratory and given to the client for sampling. When the client returns the canisters, the overall condition of each sample canister is observed. Any signs of canister damage, missing brass cap or missing tags/labels are immediately reported to the client. Any discrepancy between information recorded on the sample Chain-of-Custody and Canister tag is reported to the client.

9.5.2 The canisters are sent to the Subcontract Laboratory with the proper documentation for analysis. For details refer to Section 9.10 SUBCONTRACTING SAMPLES.

9.6 DOCUMENTATION, REVIEW AND CLIENT NOTIFICATION

All documents mentioned in this SOP must have an electronic copy. A pdf printer should always be selected when generating or printing forms/reports in ELIMS.

9.6.1 Sample Receipt Checklist

Sample Control Officer must create a Sample Receipt Checklist by using ELIMS. The checklist documents the carrier name, cooler temperature, shipment/sample condition questions and Sample Control Officer initials. For the exact details on creating the checklist, refer to the LIMS-LOGIN-01.

Observations of inappropriate documentation, temperatures, containers and sample conditions during sample inspection are also noted in the Sample Receipt Checklist.

The Sample Receipt Checklist is printed and the Sample Control Officer must electronically sign and date the document. The checklist is then placed into the electronic project folder along with all-important documentation.

9.6.2 Project Folder

Electronic Folders are created for each Work Order. The Sample Control Officer will create the folder with the Work Order number as folder name (i.e. **N009195**)

The Sample Control Officer generates the Work Order COC (WO COC) and Sample Receipt Checklist (SRC) from LIMS and saved them inside the project folder.

All pertinent documents regarding the sample received are saved in this folder including the scanned COCs and client correspondence for review of the Project Manager.

9.6.3 Review and Client Notification

The Project Manager will check the completeness and correctness of Sample Login. Approval is designated by the Reviewed by signature in the

Sample Receipt Checklist and change status of samples in LIMS to "Login Reviewed". The Project Manager must notify the client of all sample discrepancies noted within 24 hours of sample receipt. All correspondences with the client must be documented on the "Client Correspondence Log".

9.7 SAMPLE STORAGE

Sample Control Department is responsible for the proper sample storage. Samples received by the laboratory are placed into refrigeration units, which are restricted to authorized laboratory personnel. Samples for volatile analysis are kept in a separate refrigerator

Temperature of the sample storage refrigerators is monitored daily for acceptable working temperature range using an NIST traceable thermometer. The thermometer is calibrated against an NIST reference thermometer year. Walk-in refrigerators are also equipped with automatic temperature chart recorder for reference.

9.7.1 Refrigerator Locations

After all the samples have been properly labeled, the sample bottles are then placed into the appropriate refrigerators. Samples in the refrigerator are placed on the shelves per received date for easy control and disposal scheduling.

During login, samples were assigned locations for storage. Below are the codes used in login and the description per location:

Storage Area Code	Description
AIR	Air
D	Disposed
SUB	SubcontractedS
FRZ	Freezer
WWWSVS	WaterSoilVolatile Soil
VW	Volatile Water
WS	Soil
WW	Water
In-Transit	If sample is en route to different Lab Location

9.7.2 Refrigeration

Samples must be kept at less than 6°C in order to prevent volatilization and biodegradation between sampling and analysis.

Samples must be stored away from all standards, chemicals, and food and other potentially contaminating sources. If samples (for volatile analysis) contain high concentrations of hydrocarbons, then place the samples in a plastic Ziploc bag before placing these samples in the volatile refrigerator.

9.7.3 Duration

The samples are kept in cold storage for 2 to 3 weeks. The samples are disposed after 45 days after receipt.

Due to client contracts or requests, samples can be stored for a longer duration. The client must stipulate the duration and terms under which the samples must be held.

For those samples that are requested back by the client, a print out of the "Return to client" on sample tracker (on LIMS) is made and relinquished by Sample Control Officer. The signed original is given to the client along with the sample(s) and a copy is made for file at Sample Control Department.

9.7.4 Samples for Litigation

If a client submits samples to the laboratory, which could or will go to litigation, the laboratory can make provisions to store the samples into a separate refrigerator. The refrigerator can be locked and secured until a written notice is received from the client. The client must approve transferring or disposal of samples. A written authorization must be faxed to the laboratory confirming status of samples. All documentation must be placed into the project folder.

9.7.5 Sample Storage Contingency

If one of the refrigerators experiences a malfunction, samples have to be transferred to another refrigerator or cooler and temperature of refrigerator or cooler must be maintained to less than 6°C. Once the malfunctioning refrigerator is repaired and within the acceptance criteria, the samples can be transferred.

9.8 INTERNAL CHAIN OF CUSTODY

CUSTODY: a sample is in your custody if the following criteria are met:

- It is in your possession.
- It is in your view, after being in your possession.
- It was in your possession and then locked up to prevent tampering.
- It was in your possession and then transferred to a designated secure area.

If analysts need sample for analysis, they will get their sample from the refrigerator and sign in on LIMS Sample Tracking. The analysts then take the samples to their work areas. After analysis, the analyst returns the samples to the designated refrigerator then logout the sample on LIMS Sample Tracking. The analyst will have to mark the sample as consumed or disposed on when logging it out.

Empty containers/bottles from analysis that requires the use of one-liter volume (i.e. 8270, 8081, 1664 etc.) will be given to sample disposal after completion of analysis, which will be properly disposed by Sample Disposal personnel.

After 2 to 3 weeks, the samples are removed from the refrigerator for sample disposal. The Sample Control personnel remove the samples from the refrigerator and log the individual's samples into Dry Storage for sample disposal.

9.9 CHANGE ORDER

Change orders are changes specified by the client (i.e. change or additional parameters). Most change orders occur after the analyses have been completed, but some change orders can occur when the client decides to add analyses to an existing work order.

9.9.1 Change orders require written authorization from the client.

9.9.2 Change orders must be login within the same day of the written authorization. The analyst(s) must be notified of any **RUSH** change orders in order to process the samples in a timely manner.

9.9.3 Change orders are added on the same laboratory number or on a different Work Order. Composite sample are added as another sample.

9.9.4 For sample that do not need to be composite, the additional test and due date are log on the day of written authorization.

9.9.5 For samples where holding time has expired, the client must be notified of which tests will be affected.

9.10 SUBCONTRACTING SAMPLES

Samples can be subcontracted to another laboratory, if ASSET Laboratories is not approved to perform a particular test or if the lab is not capable to complete analysis for required tests. These samples must be subcontracted to a certified laboratory. If the laboratory subcontracts any part of the testing covered under NELAP, this work will be placed with a laboratory accredited under NELAP for the tests to be performed or with a laboratory that meets applicable statutory and regulatory requirements for performing the tests. The client will be advised in writing by the Project Managers of its intention to sub-contract any portion of the testing to another party.

- 9.10.1 The samples must be logged in and labeled. The Sample Control Personnel must fill-out or print out from ELIMS a Chain-of-Custody, then sign and date the COC to relinquish the samples to the subcontract laboratory. If the sample needs to be shipped via commercial courier, tracking number is written at the lower portion of the sub-COC.
- 9.10.2 All subcontracted samples must be charged to a Purchase Order. A copy of the PO should be included in the project folder together with the sub-COC.
- 9.10.3 If the subcontract laboratory has a courier, then the courier must sign and date the COC to receive the samples. The courier is given a copy of the COC and the samples.
- 9.10.4 If the samples need to be shipped out to the subcontract laboratory, then the samples must be properly packed in a cooler. NOTE: Packing materials must be used to prevent bottle breakage. If the samples need to be chilled during shipment ($\leq 6^{\circ}\text{C}$ but not frozen), place ice packs into the cooler along with the samples.

The method of shipment and the tracking number must be written on the relinquish portion of the Sub-COC. A copy of the Sub-COC is placed inside the cooler or outside the cooler (in an envelope). The lab work order number must also be written in the commercial shipping manifest and a copy must be attached to the COC/PO file copy of sample control.

- 9.10.5 If samples are to be delivered by an ASSET Laboratories' courier to the subcontract laboratory (including other ASSET Laboratories locations), the delivery must be arranged and written into the field schedule log. The samples to be subcontracted must be relinquished to the ASSET Laboratories courier. The courier will then relinquish the samples to the subcontract lab and the copy given to Sample Control Officer.
- 9.10.6 Whether the subcontract samples have been received by a carrier or delivered by ASSET Laboratories courier or shipped/mailed (commercial shipping), all documentation indicating that the samples have been sent/received by the subcontract lab is saved in the project folder of the corresponding Work Order.
- 9.10.7 If the samples need to be received by the subcontract laboratory on Saturday, the Sample Control Officer and/or Project Manager must verify with the subcontract laboratory that someone there will be available to receive the samples.
- 9.10.8 All subcontract samples without proper documentation will be assumed as not completed. Project Managers must follow-up Sample Control Officer until subcontract is carried out with correct COC.

9.11 SUB-SAMPLING/COMPOSITING OF SAMPLES

9.11.1 If the clients submit a large container (such as a 5 gallon bucket) for analysis, the Sample Control Officer must take sub-samples for requested analysis and add proper preservative. The sample must be logged as one (1) sample but multiple fractions. It should be noted on the sample checklist comments that fractions have been done. Then, the client must be notified if the rest of the samples are still needed, otherwise it will then be disposed once the project folder has been reviewed.

9.11.2 For composite sample set-up by ASSET Laboratories field services personnel, Sample Control Officer must take sub-samples for requested analysis and add proper preservative. The rest of the samples can then be disposed once the project folder has been reviewed.

9.11.3 When doing composite samples, equal amount of each sample are taken by weighing sufficient quantity in a jar. Mix well for uniformity. The composite sample is given a new distinct ID. Record the amount of each sample taken in the composite logbook.

9.12 SAMPLES RECEIVED BY FIELD SERVICES

9.12.1 Samples received by ASSET Laboratories field services personnel are considered received by the laboratory.

9.12.2 If the ASSET Laboratories Field Services personnel arrive at the laboratory after regular business hours, he/she is then responsible to secure the sample inside the refrigerator at sample control, until it can be relinquish to the in-house Sample Control Officer.

9.13 SAMPLE CONTAINERS/PRESERVATION (supplied to clients)

Use chemical preservatives only when they are shown not to interfere with the analysis being made. When they are used, add them to the sample bottle so that all sample portions are preserved as soon as collected. Because a preservation method for one determination may interfere with another one, samples for multiple determinations may need to be split and preserved separately.

See Attachment 1 for a table of preservatives.

9.13.1 Sample containers request is filled out on the Bottle Order/Tracking form with the corresponding test (if available) and the appropriate preservative. These forms are archived by the Project Manager/Sample Control Officer.

Warning: All bottles that are preserved with base or acid must be labeled with a "CORROSIVE" sticker. The preservative used must be written on the preservative section of the sticker.

9.13.2 VOA vials requested for volatile compounds should be preserved with HCl. To each vial add 5 drops of 1:1 HCl. VOA vials are purchased with preservatives and accompanied by certificate of analysis.

9.13.3 If the bottles are being shipped to the client, care in packaging the bottles must be taken. If the bottles do not contain preservatives, they can be packed in packing boxes.

9.13.4 If the bottle does contain preservatives, they must be placed in a secondary container such as a cooler prior to shipment.

9.1.2.5 Ammonium buffer preservative for hexavalent chromium sample bottles is prepared by analyst and analyze first for contamination prior to use by sample control personnel. The bottle labels for hexavalent chromium samples for EPA 218.6/218.7 analyses are marked with the following information:

- Preservative name
- Reagent code
- Date prepared
- Expiration date

9.13.5 Encore Preservation

9.13.5.1 *VOA vials for clients needing Encore preserved VOA vials are purchased with preservatives and accompanied by certificate of analysis.*

NOTE: For every sample requested by the client there MUST be two VOA preserved with Sodium Bisulfate and one VOA preserved with Methanol. If the client requested results to be reported in dry weight basis, then an additional VOA vial without preservative is required for moisture test.

10 CALCULATIONS

Not Applicable

11 METHOD PERFORMANCE

Not Applicable

12 PREVENTIVE MAINTENANCE

12.1 Materials

A sufficient supply of login supplies (labels, COCs, log-in books, etc) will be available at all times.

12.2 Logbooks

Complete the ASSET Laboratories' Sample Control Logbook with all relevant information. All columns must be completed.

12.3 Refrigerators (see Section 8.1)

13 POLLUTION CONTROL

- 13.1 The solvent and chemicals used in this method should be recycled and/or managed properly to ensure minimal threat to the environment.
- 13.2 Standards should be prepared in volumes consistent with laboratory use to minimize the volume of expired standards to be disposed.

14 WASTE MANAGEMENT

- 14.1 It is the laboratory's responsibility to comply with all federal, state, and local regulations governing waste management, particularly the hazardous waste identification rules and land disposal restrictions. Compliance with all sewage permits and regulations is also required.
- 14.2 Proper disposal of samples must be observed. See GE-DISPOSAL-01.

15 REFERENCES

- 15.1 Test Methods for Evaluating Solid Waste, Volume 1A, USEPA, Update III, December 1996
- 15.2 ASSET Laboratories' Quality Assurance Manual
- 15.3 The NELAC Institute Standard 2016

16 ATTACHMENTS

- 16.1 Attachment 1: Holding Time and Preservation Table
- 16.2 Attachment 2: $\text{Na}_2\text{S}_2\text{O}_3$ Treatment for Volatile and Semi volatile Water Samples.
- 16.3 Attachment 3: Example of ASSET Laboratories' Sample Receipt Checklist

17 DOCUMENT REVISION HISTORY

Date	Description
October 2012	• Interchanged Section 11.0 (Attachment) & 12.0 (References) • Added Section 13.0 Revision History • Changed format added footer. • Changed revision number.

September 2013	- Revised to denote that project folders are made electronically - Added additional Sections (3.0 Definition, 13.0 Waste Management, 14.0 References) - Removed Section 5.2.1 & incorporate in Section 4.0 Safety - Added Section 9.5 for Documentation, Review & Client Notification. - Calculation of Sodium Bisulfate added in Section 10.0 - Added Attachment 3. Example of ASSET Laboratories Sample Receipt Checklist
February 2014	- Revised format - Updated to ASSET Laboratories - Added holding Time & preservation Table of Microbiology
February 2015	- Changed signatories - Updated Company Logo - Changed positions QA Officer to QA Manager & Project Coordinator to Project Manager - Updated freezer temp criteria - Added storage area code and description - Updated TCLP holding time table - Updated preservation procedure for hexavalent - Updated procedure for late night samples brought by courier
April 2016	- Added changes to sample labels - Added canister check - Added Air holding time on the holding time table
June 2017	Updated signatories
June 2018	Updated signatories
August 2019	Updated signatories
January 2020	Clarify temperature requirement of $\leq 6^{\circ}\text{C}$ but not frozen
June 2021	Updated signatories, References
April 2022	- Updated VOA containers in the lab are pre-cleaned and pre-preserved - Update Holding time table to include OPP (8141A)
January 2024	Updated Attachment 1

March 2026	• Updated Section 6.9. Revised reagent for sample preservation to HNO₃ 1:1 • Updated Section 8.2.1. Revised holding blank media to DI water or blank sand. • Updated Sections 9.3.1.4 and 9.3.1.5 for numbering samples and fractions. • Updated Sections 9.5.1 and 9.5.2. Revised to denote that that canisters are requested from and analyzed by the Subcontract Laboratory. • Removed Section 9.5.3, Canister pressure check • Updated Section 9.9.3 to include that Change orders can be added on a different Work Order. • Updated Section 9.13.5 Encore preservation vials are purchased pre preserved and no longer prepared in the laboratory.
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Attachment 1: Holding Time and Preservation Table

Volatile Organics in Water					
Parameter	Method	Holding Time	Min. Vol. (mL)	Container Type	Preservation
GRO	8015B/8260B	14 days*	40	3 x 40 mL vials with Teflon lined septum caps	HCL, pH < 2, add 1000 mg ascorbic acid/L or 10% Na ₂ S ₂ O ₃ if residual chlorine present, ≤6°C
VOCs (Volatile Organic Compounds)	8260B/624	14 days*	40	3 x 40 mL vials with Teflon lined septum caps	HCL, pH < 2, add 1000 mg ascorbic acid/L or 10% Na ₂ S ₂ O ₃ if residual chlorine present, ≤6°C
2-Chlorovinyl ether	8260B/624	7 days	40	3 x 40 mL vials with Teflon lined septum caps	Add 1000 mg ascorbic acid/L or 10% Na ₂ S ₂ O ₃ if residual chlorine present, ≤6°C
Acrolein & acrylonitrile	8260B/624	14 days	40	3 x 40 mL vials with Teflon lined septum caps	pH < 4-5, add 1000 mg ascorbic acid/L or 10% Na ₂ S ₂ O ₃ if residual chlorine present, ≤6 °C
Acrolein & acrylonitrile	8260B/624	3 days	40	3 x 40 mL vials with Teflon lined septum caps	Add 1000 mg ascorbic acid/L or 10% Na ₂ S ₂ O ₃ if residual chlorine present, ≤6 °C

Note: * 7 days without HCl

Volatile Organics in Soil					
Parameter	Method	Holding Time	Min. Wt. (g)	Container Type	Preservation
GRO	8015B	14 days	5	4 oz glass jar w/Teflon lid	≤6°C
GRO(EnCore)	5035/8015B	48 hours	(3) 5g/sample	(3) 5g EnCORE sampler	≤6°C
GRO (NaHSO ₄ preserved)	5035/8015B	14 days	(3) 5g/sample	2 pre-weighed NaHSO ₄ preserved VOA + 1 pre-weighed MeOH preserved VOA	4°C, NaHSO ₄ , MeOH
Purgeable Halocarbons/Aromatics	8260(8021B list)	14 days	5	4 oz glass jar w/Teflon lid	≤6°C
GRO/BTEX/MTBE	8015B/8021B	14 days	5	4 oz glass jar w/Teflon lid	≤6°C
TPH(g) (EnCORE)	5035/8015B (M)	48 hours	(3) 5g/sample	(3) 5g EnCORE sampler	≤6°C
TPH(g) (NaHSO ₄ & MeOH preserved)	5035/8015B (M)	14 days	(3) 5g/sample	2 pre-weighed NaHSO ₄ preserved VOA + 1 pre-weighed MeOH preserved VOA	4°C, NaHSO ₄ , MeOH
VOCs	8260B	14 days	5	4 oz glass jar w/Teflon lid	≤6°C
VOCs (EnCORE)	5035/8260B	48 hours	(3) 5g/sample	(3) 5g EnCORE sampler	≤6°C

VOCs (NaHSO ₄ & MeOH preserved)	5035/8260B	14 days	(3) 5g/sample	2 pre-weighed NaHSO ₄ preserved VOA + 1 pre-weighed MeOH preserved VOA	≤6°C, NaHSO ₄ , MeOH
Semivolatile Organics in Water					
<i>Parameter</i>	<i>Method</i>	<i>Holding Time</i>	<i>Min. Vol. (mL)</i>	<i>Container Type</i>	<i>Preservation</i>
DRO	8015B	7*	1000	1 L amber glass	≤6 °C**
Pesticides, Organochlorine	8081A/608	7*	1000	1 L amber glass	≤6 °C**
Pesticides, Organophosphorous	8141B	7*	1000	1 L amber glass	≤6 °C**
PCBs	8082/608	7*	1000	1 L amber glass	≤6 °C**
SVOCs (BNAs)	625/8270C	7*	1000	1 L amber glass	≤6 °C**
1,4-Dioxane	8270C Isotope Dilution	7*	1000	1 L amber glass	≤6 °C**
TPH (d)	8015B (M)	7*	1000	1 L amber glass	≤6 °C**
TPH-CC (C8-C40)	8015B (M)	7*	1000	1 L amber glass	≤6 °C**

Note: * 7 days for extraction, 40 days after extraction for analysis. ** If sampling from location where residual chlorine is present, samples have to be treated with sodium thiosulfate (Na₂S₂O₃)

Semivolatile Organics in Soil					
<i>Parameter</i>	<i>Method</i>	<i>Holding Time</i>	<i>Min. Vol. (g)</i>	<i>Container Type</i>	<i>Preservation</i>
DRO	EPA 8015B	14*	30	4 oz glass jar w/Teflon lid	≤6°C
PCBs	EPA 8082	14*	30	4 oz glass jar w/Teflon lid	≤6°C
Pesticides, Organochlorine	EPA 8081A	14*	30	4 oz glass jar w/Teflon lid	≤6°C
Pesticides, Organophosphorous	EPA 8141B	7*	15	4 oz glass jar w/Teflon lid	≤6°C
SVOCs (BNAs)	EPA 8270C	14*	30	4 oz glass jar w/Teflon lid	≤6°C
TPH(d)	EPA 8015B(M)	14*	15	4 oz glass jar w/Teflon lid	≤6°C
TPH-CC (C8-C40)	EPA 8015B(M)	14*	15	4 oz glass jar w/Teflon lid	≤6°C

Note: * days for extraction, 40 days for analysis

General Chemistry Water					
Parameter	Method	Holding Time	Minimum Volume (mL)	Sample Volume & Container Type	Preservation
Acidity	SM 2310B	14 days	100	125 mL, 4oz plastic or glass	Cool, ≤ 6 °C
Alkalinity	SM 2320B	14 days	100	125 mL, 4oz plastic or glass	Cool, ≤ 6 °C
Ammonia	SM 4500-NH3C	28 days	100	500 mL, plastic or glass	Cool, ≤ 6 °C, H2SO4 to pH < 2
Biochemical Oxygen Demand	SM5210B	48 hours	300	1 L, plastic or glass	Cool, ≤ 6 °C
Bromide	300.0, SM 4110B	28 days	50	125 mL, 4oz plastic	Cool, ≤ 6 °C
cBOD	SM5210B	48 hours	300	1 L, 32oz plastic	Cool, ≤ 6 °C
Chemical Oxygen Demand	410.4	28 days	50	125 mL, 4oz plastic	Cool, ≤ 6 °C, H2SO4 to pH < 2
Chloride	SM 4500-Cl- C, 300.0, SM 4110B	28 days	50	125 mL, 4oz plastic	Cool, ≤ 6 °C
Chlorine, Free	SM4500CLG	15 mins	100	500 mL, plastic or glass	Cool, ≤ 6 °C
Chlorine, Total Residual	SM4500CLG	15 mins	100	500 mL, plastic or glass	Cool, ≤ 6 °C
Color	SM2120B	48 hours	100	250 mL, 8oz plastic or glass	Cool, ≤ 6 °C
Cyanide, Amenable	SM 4500-CN G	14 days	250	250 mL, 8oz plastic	Cool, ≤ 6 °C; if oxidizing agents present add 0.6 g of ascorbic acid per L; adjust pH > 12 with 10N NaOH.
Cyanide, Total	SM 4500-CN G 9014	14 days	250	250 mL, 8oz plastic	Cool, ≤ 6 °C; if oxidizing agents present add 0.6 g of ascorbic acid per L; adjust pH > 12 with 10N NaOH.
Flashpoint	1010	14 days	100	250 mL, 8oz plastic	None
Fluoride	SM 4500-F C, 300.0, SM 4110B	28 days	50	250 mL, 8oz plastic	None
Hardness	SM2340 C SM2340B	6 months	100	125 mL, 4oz plastic or glass	HNO ₃ , pH < 2
Nitrate	300.0, SM 4500 NO3 E. SM 4110	48 Hours	50	125 mL, 4oz plastic or glass	Cool, ≤ 6 °C

Nitrate-Nitrite	SM 4500-NO3 E	28 days	50	125 mL, 4oz plastic or glass	Cool, ≤6 °C, H2SO4 to pH < 2
Nitrite	300.0; SM 4500-NO2 B. SM 4110B	48 hours	50	125 mL, 4oz plastic or glass	Cool, ≤6 °C
Oil and Grease - HEM	1664	28 days	1000	32oz, glass	Cool, ≤6 °C, H2SO4 to pH < 2
General Chemistry Water (continued)					
Parameter	Method	Holding Time	Minimum Volume (mL)	Sample Volume & Container Type	Preservation
Oxygen, Dissolved	360.1, SM4500-O G	15 mins	50	250 mL, glass or BOD bottle	None
Perchlorate	314.0	28	50	125 ml HDPE	≤6 °C
pH	SM 4500-H+ B, EPA 150.1	15 mins	50	125 mL, 4oz plastic or glass	None required
Phenolics	420.1	28 days	100	500 mL amber	Cool, ≤6 °C, H2SO4 to pH < 2
Phosphate, Ortho	300.0; 365.3; SM 4500-P E, SM 4110B	48 hours	50	125 mL, 4oz plastic	Cool, ≤6 °C
Phosphorus, Total	365.3; SM4500-PE	28 days	100	125 mL, 4oz plastic	Cool, ≤6 °C, H2SO4 to pH < 2
Solids, Total (TS)	SM 2540 B	7 days	200	250 mL, 8oz plastic	Cool, ≤6 °C
Solids, Total Dissolved (TDS)	SM 2540 C	7 days	200	250 mL, 8oz plastic	Cool, ≤6 °C
Solids, Total Suspended (TSS)	SM 2540 D	7 days	200	250 mL, 8oz plastic	Cool, ≤6 °C
Solids, Settleable (SS)	SM 2540 F	48 hours	1000	1 L , 32oz plastic	Cool, ≤6 °C
Solids, Volatile (VS)	160.4	7 days	200	250 mL, 8oz plastic	Cool, ≤6 °C
Specific Conductance	120.1	24 hours	50	125 mL, 4oz plastic or glass	Cool, ≤6 °C
Specific Conductance	SM 2510C	28 days	50	125 mL, 4oz plastic or glass	Cool, ≤6 °C
Sulfate	300.0, SM 4110B	28 days	50	125 mL, 4oz plastic or glass	Cool, ≤6 °C
Sulfide, Dissolved	SM 4500-S-2 D	7 days	100	125 mL, Plastic	NaOH + AlCl3, flocculate + settle. Transfer liquid, preserve w/ zinc acetate, pH > 9. Cool, ≤6 °C
Sulfide, Total	SM 4500-S-2 D	7 days	100	500 mL, Plastic or Glass	Cool, ≤6 °C, add zinc acetate, pH > 9
Surfactants (MBAS)	SM 5540 C	48 hours	200	250 mL, 8oz plastic	Cool, ≤6 °C
Total Organic Carbon (TOC)	SM 5310B, SM 5310C	28 days	40	40 mL VOA	Cool, ≤6 °C, H2SO4 to pH < 2

Total Organic Halides (TOX)	9020	28 days	200	500 mL, amber glass	Cool, ≤6 °C, H2SO4 to pH < 2
Turbidity	180.1	48 Hours	50	125 mL, plastic or glass	Cool, ≤6 °C

General Chemistry Soil					
Parameter	Method	Holding Time	Minimum Weight(g)	Sample Volume & Container Type	Preservation
Alkalinity	310.1(M)	14 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Bromide	300.0(M)	28 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Chemical Oxygen Demand (COD)	410.4(M)	28 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Chloride	300.0(M)	28 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Chromium IV (Hexavalent Chromium)	7196A/7199	30 days to extraction, 7 days to analysis	10	4 oz glass jar w/Teflon lid	≤6 °C
Cyanide, Amenable	9010B/9014	14 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Cyanide, Reactive	SW 846 Ch.7	14 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Cyanide, Total	9010B/9014	14 days	10	4 oz glass jar w/Teflon lid	≤6 °C
Ignitability (Flashpoint)	1010	14 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Moisture Content	ASTM D2216	ASAP	10	4 oz glass jar w/Teflon lid	≤6 °C
Nitrogen, Nitrate	300.0(M)	48 hours	10	4 oz glass jar w/Teflon lid	≤6 °C
Nitrogen, Nitrite	300.0(M)	48 hours	10	4 oz glass jar w/Teflon lid	≤6 °C
Oil and Grease (HEM)	1664(M)	28 days	30	4 oz glass jar w/Teflon lid	≤6 °C
Perchlorate	314.0 (M)	28	50	125 ml HDPE	≤6 °C
pH	9045C / 9040B	ASAP	10	4 oz glass jar w/Teflon lid	≤6 °C
Phenolics, Total	420.1 (M)	28 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Phosphate, Ortho	300.0(M)	48 hours	10	4 oz glass jar w/Teflon lid	≤6 °C
Phosphate, Total	365.3(M)	28 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Phosphorus, Total	365.3(M)	28 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Sulfate	300.0(M)	28 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Sulfide, Reactive	SW 846 Ch.7	7 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Sulfide, Total	9030B/EPA 376.2(M)	7 days	20	4 oz glass jar w/Teflon lid	≤6 °C
Total Organic Carbon (TOC)	9060	28 days	2	4 oz glass jar w/Teflon lid	≤6 °C
TRPH	1664SGT/ HEM (M)	28 days	30	4 oz glass jar w/Teflon lid	≤6 °C

Note: (M) indicates modification of the method

Metals in Water					
Parameter	Method	Holding Time	Minimum Volume (mL)	Sample Volume & Container Type	Preservation
Mercury	7470A/245.1/245.7	28 days	50	Minimum 250mL or 16oz plastic	HNO ₃ , pH < 2
ICP Metals, except Chromium VI & Mercury	6010B,200.7	6 months	50	250 mL, 16oz plastic	HNO ₃ , pH < 2
ICPMS Metals	6020/200.8	6 months	50	250 mL, 16oz plastic	HNO ₃ , pH < 2
Hexavalent Chromium	7196A , 218.6/ 7199	24 hours	50	250 mL, 8oz plastic	Cool, ≤6 °C
Hexavalent Chromium	218.6	28 days	50	250 mL, 8oz plastic	Cool to ≤6 °C, field filtered and adjusted to pH 9.3-9.7 with ammonium buffer solution

Note: Dissolved Metals must be filtered prior to preservation.

Metals in Soil					
Parameter	Method	Holding Time	Minimum Weight (g)	Sample Volume & Container Type	Preservation
Mercury	EPA 7471A	28 days	5	4 oz glass jar w/Teflon lid	≤6 °C
ICP Metals	EPA 6010B	6 months	5	4 oz glass jar w/Teflon lid	≤6 °C
ICP/MS Metals	EPA 6020	6 months	5	4 oz glass jar w/Teflon lid	≤6 °C

TCLP						
Parameter	From: Field Collection To: TCLP Extraction	From: TCLP Extraction To: Preparative Extraction	From: Preparative Extraction To: Determinative Analysis	Sample Volume & Container Type	Total Elapsed Time	Preservation
Volatiles	14 days	NA	14 days	40mL VOA	28 days	≤6°C
Semivolatiles	14 days	7 days	40 days	32oz amber	61 days	≤6°C

Mercury	28 days	NA	28 days	16oz plastic	56 days	After extraction, HNO ₃ , pH < 2
Metals, except Mercury	180 days	NA	180 days	16oz plastic	360 days	After extraction, HNO ₃ , pH < 2

Microbiology						
Parameter	Matrix	Method	Holding Time	Minimum Volume (mL)	Sample Volume & Container Type	Preservation
Coliform: Total, Fecal, <i>E.coli</i>	Drinking Water	9223B	30 hrs	100	120 mL pre-sterilized plastic bottle	Cool, <10°C; 10% Na ₂ S ₂ O ₃
	Water/Wastewater		8 hrs			

Air					
Parameter	Method	Holding Time	Minimum Volume (mL)	Sample Volume & Container Type	Preservation
Volatiles	TO3 / TO15 / 8260	3 Days	1000	1L Tedlar Bag	None
Volatiles	TO3 / TO15 / 8260	30 Days	1000 / 6000	1L/6L Canister	None

Volatile Organics in Drinking Water					
Parameter	Method	Holding Time	Min. Vol. (mL)	Container Type	Preservation
Volatiles	524.2	14 days	40	3 x 40 mL vials with Teflon lined septum caps	HCL, pH < 2, add ascorbic acid or 10% Na ₂ S ₂ O ₃ if residual chlorine present, ≤6°C
Volatiles	524.2	24 hours	40	3 x 40 mL vials with Teflon lined septum caps	add ascorbic acid or 10% Na ₂ S ₂ O ₃ if residual chlorine present, ≤6°C
THMs	524.2	14 days	40	3 x 40 mL vials with Teflon lined septum caps	add Na ₂ S ₂ O ₃ if residual chlorine present, ≤6°C

Attachment 2: $\text{Na}_2\text{S}_2\text{O}_3$ Treatment for Volatile and Semivolatile Water Samples.

Sodium Thiosulfate Treatment for Volatile and Semi-volatile Organics Water Samples

If sampling from location where residual chlorine is present, samples have to be treated with sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3$). As specified from SW-846 Chapter 4 Table 4-1, 10% sodium thiosulfate is used to remove residual chlorine from liquid samples prior to preservation.

Procedure

Volatile Organic Analyses

Collect sample in a 125-mL container which has been pre-preserved with 4 drops of 10 % sodium thiosulfate solution. Gently swirl to mix sample and transfer to 40 mL VOA vial preserved with HCl. Cool to $\leq 6^\circ\text{C}$.

Semi-volatile Analyses

Treat the samples by collecting sample in a pre-preserved container with 0.8 mL sodium thiosulfate solution per 1-liter sample. Cool to $\leq 6^\circ\text{C}$. If the sample containing residual chlorine was collected in un-preserved container, notify the laboratory by indication on the chain of custody and treatment will be performed in the laboratory.

Attachment 3: Example of ASSET Laboratories Sample Receipt Checklist

ASSET Laboratories

Please review the checklist below. Any NO signifies non-compliance. Any non-compliance will be noted and must be understood as having an impact on the quality of the data. All tests will be performed as requested regardless of any compliance issues.

If you have any questions or further instruction, please contact our Project Coordinator at (702) 307-2659.

Cooler Received/Opened On: _____ Workorder: N014346

Rep sample Temp (Deg C): _____ IR Gun ID: _____

Temp Blank: ☐ Yes ☐ No

Carrier name: _____

Last 4 digits of Tracking No: _____ Packing Material Used:

Cooling process: ☐ Ice ☐ Ice Pack ☐ Dry Ice ☐ Other ☒ None

Sample Receipt Checklist

- | | | | |
|--|------------------------------|--|--|
| 1. Shipping container/cooler in good condition? | Yes ☐ | No ☐ | Not Present ☐ |
| 2. Custody seals intact, signed, dated on shipping container/cooler? | Yes ☐ | No ☐ | Not Present ☐ |
| 3. Custody seals intact on sample bottles? | Yes ☐ | No ☐ | Not Present ☐ |
| 4. Chain of custody present? | Yes ☐ | No ☒ | |
| 5. Sampler's name present in COC? | Yes ☐ | No ☒ | |
| 6. Chain of custody signed when relinquished and received? | Yes ☐ | No ☒ | |
| 7. Chain of custody agrees with sample labels? | Yes ☐ | No ☒ | |
| 8. Samples in proper container/bottle? | Yes ☐ | No ☒ | |
| 9. Sample containers intact? | Yes ☐ | No ☒ | |
| 10. Sufficient sample volume for indicated test? | Yes ☐ | No ☒ | |
| 11. All samples received within holding time? | Yes ☐ | No ☒ | |
| 12. Temperature of rep sample or Temp Blank within acceptable limit? | Yes ☐ | No ☒ | NA ☐ |
| 13. Water - VOA vials have zero headspace? | Yes ☐ | No ☐ | NA ☐ |
| 14. Water - pH acceptable upon receipt?
Example: pH > 12 for (CN, S); pH < 2 for Metals | Yes ☐ | No ☐ | NA ☒ |
| 15. Did the bottle labels indicate correct preservatives used? | Yes ☐ | No ☐ | NA ☐ |
| 16. Were there Non-Conformance issues at login? | Yes ☐ | No ☐ | NA ☐ |
| Was Client notified? | Yes ☐ | No ☐ | NA ☐ |

Comments:

Checklist Completed By: _____

Reviewed By: _____

8270C _ SVOC

Matrix:

SOIL (EPA 3546)

LCS/LCSD

Analyte	Lower	Upper	RPD
1,2,4-Trichlorobenzene	46	120	20
1,2-Dichlorobenzene	46	120	20
1,2-Diphenylhydrazine	49	120	20
1,3-Dichlorobenzene	45	120	20
1,4-Dichlorobenzene	45	120	20
2,4,5-Trichlorophenol	47	120	20
2,4,6-Trichlorophenol	47	120	20
2,4-Dichlorophenol	44	120	20
2,4-Dimethylphenol	40	120	20
2,4-Dinitrophenol	18	120	20
2,4-Dinitrotoluene	51	120	20
2,6-Dinitrotoluene	55	121	20
2-Chloronaphthalene	50	120	20
2-Chlorophenol	43	120	20
2-Methylnaphthalene	46	120	20
2-Methylphenol	44	120	20
2-Nitroaniline	49	120	20
2-Nitrophenol	45	120	20
3,3'-Dichlorobenzidine	23	141	20
3/4-Methylphenol	45	120	20
3-Nitroaniline	50	120	20
4,6-Dinitro-2-methylphenol	33	128	20
4-Bromophenyl-phenylether	51	120	20
4-Chloro-3-methylphenol	48	120	20
4-Chloroaniline	35	120	20
4-Chlorophenyl-phenylether	50	120	20
4-Methylphenol	45	120	20
4-Nitroaniline	45	120	20
4-Nitrophenol	39	120	20
Acenaphthene	48	120	20
Acenaphthylene	50	120	20
Aniline	35	120	20
Anthracene	51	120	20
Benzidine (M)	20	124	20
Benzo(a)anthracene	51	120	20
Benzo(a)pyrene	49	120	20
Benzo(b)fluoranthene	53	120	20
Benzo(g,h,i)perylene	47	120	20
Benzo(k)fluoranthene	53	120	20
Benzoic acid	20	120	20
Benzyl alcohol	47	120	20
Bis(2-chloroethoxy)methane	48	120	20
Bis(2-chloroethyl)ether	45	120	20
Bis(2-chloroisopropyl)ether	32	120	20
Bis(2-ethylhexyl)phthalate	50	140	20
Butylbenzylphthalate	53	140	20
Carbazole	49	110	20
Chrysene	38	136	20

LCS/LCSD

Analyte	Lower	Upper	RPD
Dibenz(a,h)anthracene	40	137	20
Dibenzofuran	50	120	20
Diethylphthalate	50	120	20
Dimethylphthalate	51	120	20
Di-n-butylphthalate	51	121	20
Di-n-octylphthalate	48	142	20
Fluoranthene	49	120	20
Fluorene	50	120	20
Hexachlorobenzene	51	120	20
Hexachlorobutadiene	44	120	20
Hexachlorocyclopentadiene	28	120	20
Hexachloroethane	45	120	20
Indeno(1,2,3-cd)pyrene	47	120	20
Isophorone	49	134	20
Naphthalene	45	120	20
Nitrobenzene	48	120	20
N-Nitrosodimethylamine	33	120	20
N-Nitrosodi-n-propylamine	48	120	20
N-Nitrosodiphenylamine	52	120	20
Pentachlorophenol	41	120	20
Phenanthrene	51	120	20
Phenol	43	120	20
Pyrene	49	120	20
Pyridine	24	120	20

Surrogate

Analyte	Lower Limit	Upper Limit
1,2-Dichlorobenzene-d4	26	120
2,4,6-Tribromophenol	31	120
2-Chlorophenol-d4	24	120
2-Fluorobiphenyl	28	120
2-Fluorophenol	21	120
4-Terphenyl-d14	28	128
Nitrobenzene-d5	22	120
Phenol-d5	22	120

Effective Date:

July 17, 2024



ASSET LABORATORIES

ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

“Serving Clients with Passion and Professionalism”

8270C _ SVOC

Matrix:

SOIL (EPA 3546)

MS/MSD

Analyte	Lower	Upper	RPD
1,2,4-Trichlorobenzene	37	120	20
1,2-Dichlorobenzene	36	120	20
1,2-Diphenylhydrazine	36	120	20
1,3-Dichlorobenzene	35	120	20
1,4-Dichlorobenzene	35	120	20
2,4,5-Trichlorophenol	22	120	20
2,4,6-Trichlorophenol	18	120	20
2,4-Dichlorophenol	23	120	20
2,4-Dimethylphenol	26	120	20
2,4-Dinitrophenol	0	120	20
2,4-Dinitrotoluene	36	120	20
2,6-Dinitrotoluene	36	120	20
2-Chloronaphthalene	40	120	20
2-Chlorophenol	29	120	20
2-Methylnaphthalene	39	120	20
2-Methylphenol	33	120	20
2-Nitroaniline	30	120	20
2-Nitrophenol	24	120	20
3,3'-Dichlorobenzidine	11	128	20
3/4-Methylphenol	33	120	20
3-Nitroaniline	39	120	20
4,6-Dinitro-2-methylphenol	14	120	20
4-Bromophenyl-phenylether	36	120	20
4-Chloro-3-methylphenol	34	120	20
4-Chloroaniline	27	120	20
4-Chlorophenyl-phenylether	41	120	20
4-Methylphenol	33	120	20
4-Nitroaniline	32	120	20
4-Nitrophenol	24	120	20
Acenaphthene	35	120	20
Acenaphthylene	37	120	20
Aniline	18	120	20
Anthracene	32	120	20
Benzidine (M)	0	205	20
Benzo(a)anthracene	38	120	20
Benzo(a)pyrene	35	120	20
Benzo(b)fluoranthene	36	120	20
Benzo(g,h,i)perylene	26	120	20
Benzo(k)fluoranthene	39	120	20
Benzoic acid	0	120	20
Benzyl alcohol	34	120	20
Bis(2-chloroethoxy)methane	33	120	20
Bis(2-chloroethyl)ether	32	120	20
Bis(2-chloroisopropyl)ether	20	120	20
Bis(2-ethylhexyl)phthalate	29	141	20
Butylbenzylphthalate	37	132	20
Carbazole	39	120	20
Chrysene	23	132	20

MS/MSD

Analyte	Lower	Upper	RPD
Dibenz(a,h)anthracene	23	128	20
Dibenzofuran	41	120	20
Diethylphthalate	42	120	20
Dimethylphthalate	40	120	20
Di-n-butylphthalate	39	120	20
Di-n-octylphthalate	31	135	20
Fluoranthene	21	122	20
Fluorene	38	120	20
Hexachlorobenzene	38	120	20
Hexachlorobutadiene	38	120	20
Hexachlorocyclopentadiene	23	120	20
Hexachloroethane	34	120	20
Indeno(1,2,3-cd)pyrene	27	120	20
Isophorone	17	144	20
Naphthalene	36	120	20
Nitrobenzene	37	120	20
N-Nitrosodimethylamine	23	120	20
N-Nitrosodi-n-propylamine	36	120	20
N-Nitrosodiphenylamine	39	120	20
Pentachlorophenol	8	120	20
Phenanthrene	23	127	20
Phenol	30	120	20
Pyrene	18	122	20
Pyridine	7	120	20

Effective Date:

July 17, 2024



ASSET LABORATORIES

ANALYTICAL SUPPORT SERVICES FOR ENVIRONMENTAL TECHNOLOGIES

“Serving Clients with Passion and Professionalism”

8270C _ SVOC Marginal Exceedance

Matrix:

LCS/MS/MSD

Analyte	Lower	Upper
1,2,4-Trichlorobenzene	36	120
1,2-Dichlorobenzene	38	120
1,2-Diphenylhydrazine	39	120
1,3-Dichlorobenzene	37	120
1,4-Dichlorobenzene	37	120
2,4,5-Trichlorophenol	35	125
2,4,6-Trichlorophenol	35	128
2,4-Dichlorophenol	32	124
2,4-Dimethylphenol	28	122
2,4-Dinitrophenol	2	120
2,4-Dinitrotoluene	40	129
2,6-Dinitrotoluene	44	132
2-Chloronaphthalene	40	120
2-Chlorophenol	33	120
2-Methylnaphthalene	36	120
2-Methylphenol	34	120
2-Nitroaniline	38	128
2-Nitrophenol	33	128
3,3'-Dichlorobenzidine	4	161
3/4-Methylphenol	34	120
3-Nitroaniline	39	127
4,6-Dinitro-2-methylphenol	17	144
4-Bromophenyl-phenylether	40	129
4-Chloro-3-methylphenol	37	122
4-Chloroaniline	25	120
4-Chlorophenyl-phenylether	40	120
4-Methylphenol	34	120
4-Nitroaniline	34	120
4-Nitrophenol	26	131
Acenaphthene	38	120
Acenaphthylene	41	120
Aniline	26	120
Anthracene	40	124
Benzidine (M)	0	150
Benzo(a)anthracene	40	127
Benzo(a)pyrene	38	124
Benzo(b)fluoranthene	43	125
Benzo(g,h,i)perylene	35	132
Benzo(k)fluoranthene	42	126
Benzoic acid	5	120
Benzyl alcohol	37	120
Bis(2-chloroethoxy)methane	38	120
Bis(2-chloroethyl)ether	36	120
Bis(2-chloroisopropyl)ether	17	134
Bis(2-ethylhexyl)phthalate	35	155
Butylbenzylphthalate	38	155
Carbazole	38	121
Chrysene	21	152

LCS/MS/MSD

Analyte	Lower	Upper
Dibenz(a,h)anthracene	24	153
Dibenzofuran	41	120
Diethylphthalate	40	122
Dimethylphthalate	41	123
Di-n-butylphthalate	39	133
Di-n-octylphthalate	32	158
Fluoranthene	39	120
Fluorene	40	120
Hexachlorobenzene	40	126
Hexachlorobutadiene	33	120
Hexachlorocyclopentadiene	15	124
Hexachloroethane	36	120
Indeno(1,2,3-cd)pyrene	35	131
Isophorone	28	155
Naphthalene	36	120
Nitrobenzene	38	120
N-Nitrosodimethylamine	21	120
N-Nitrosodi-n-propylamine	39	120
N-Nitrosodiphenylamine	40	131
Pentachlorophenol	27	120
Phenanthrene	40	124
Phenol	33	120
Pyrene	39	120
Pyridine	15	120



Unanticipated Discovery Plan

Appendix E

Unanticipated Discovery Plan

City of Las Vegas-Symphony Park

This Unanticipated Discovery Plan (UDP) presents plans and procedures for the inadvertent discovery of cultural resources or human skeletal remains and is to be used as a supplemental attachment to all work plans proposing ground disturbing (surface/subsurface) environmental sampling field activities associated with site assessment/remediation funded through the United States Environmental Protection Agency (USEPA) Brownfields Assessment Grant awarded to the City of Las Vegas (CLV). Cultural resources and human remains are protected under federal and state laws and regulations and their disturbance, excavation, removal, or damage can result in criminal penalties

RECOGNIZING CULTURAL RESOURCES

A cultural resource discovery could be prehistoric or historic. Examples include:

- An accumulation of shell, burned rocks, or other food related materials
- Bones or small pieces of bone
- An area of charcoal or very dark stained soil with artifacts
- Stone tools or waste flakes (i.e., an arrowhead, or stone chips)
- Clusters of tin cans or bottles, logging or agricultural equipment that appears to be older than 50 years
- Buried railroad tracks, decking, or other industrial materials

When in doubt, assume the material is a cultural resource.

GENERAL UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES

If any unanticipated cultural resources or suspected cultural resources are encountered during the assessment, the EPA contractor, will follow the general steps outlined below.

STEP 1: STOP WORK within a 100-foot (ft) radius of the observed cultural material and NOTIFY Team Project Management. Ensure all cultural items are left in place and that no further disturbance is allowed to occur. All vehicles, equipment and unauthorized personnel will not be permitted to traverse the discovery site. If the find occurs at the end of the workday, the area must be secured in a manner to prevent vandalism or biological disturbance (i.e., flooding, animal interference etc.). The discovery location should not be left unsecured at any time.

STEP 2. NOTIFY MONITOR. If there is an archaeological monitor for the project, notify that person. If there is a monitoring plan in place, the monitor will follow its provisions.

STEP 3: NOTIFY THE USEPA PROJECT OFFICER

The consultant (Converse) project lead will notify CLV who will notify the USEPA Project Officer (PO) in order to evaluate the cultural resources and potential impacts. The USEPA PO will notify the State Historic Preservation Office (SHPO).

PROCEDURE WHEN HUMAN REMAINS AND/OR POTENTIAL HUMAN SKELETAL MATERIALS ARE OBSERVED

Human remains are physical remains of a human body or bodies including, but not limited to, bones, teeth, hair, and preserved soft tissues (mummified or otherwise preserved) of an individual. Remains may be articulated or disarticulated bones or teeth. If personnel identify human remains, funerary objects, sacred objects, or objects of cultural patrimony during subsurface investigations, the procedures in the following sections will apply. All human skeletal remains will be treated with dignity and respect at all times.

STEP 1: Immediately STOP WORK within a 100-ft radius of the observed potential human remain discovery. Invasive work will not proceed within the 100-ft radius around the discovery until the appropriate written authorization is obtained.

STEP 2: Immediately NOTIFY USEPA PO and the City of Las Vegas Department of Public Safety of the nature and location of the discovery.

STEP 3: PROTECT the discovery with a tarp or other non-invasive material (as appropriate). If necessary, post a monitor to ensure the discovery is protected. No skeletal remains or associated materials will be moved from the location of their discovery and no photographs will be taken unless required as part of the identification process.

The USEPA PO and/or the Sheriff's Office will make all other calls and notifications. If desiccated human remains are encountered, treat them with dignity and respect at all times. Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection in place and to shield them from being photographed. Do not call 911 unless it is apparent that they are recently deceased. Do not speak with the media.

FIELD SAFETY SUPERVISOR'S RESPONSIBILITIES

- **Protect Find:** The FSS is responsible for taking appropriate steps to protect the discovery site. All work will stop in an area adequate to provide for the total security, protection, and integrity of the possible resource. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Work in the immediate area will not resume until treatment of the discovery has been completed following provisions for treating archaeological/cultural material as set forth in this document or as directed by the SHPO.
- **Direct Work Elsewhere On-site:** The FSS may direct construction away from cultural resources to work in other areas prior to contacting the concerned parties.
- **Contact USEPA PO.**

PROCEEDING WITH WORK

Project field activities outside the discovery location may continue while documentation and assessment of the cultural resources proceed.

In the case of cultural resources, the Nevada SHPO must determine the boundaries of the discovery location. In consultation with the federal agency(s) and affected tribes, the Project Manager and the Nevada SHPO will determine the appropriate level of documentation and treatment of the resource. The federal agency(s) will make the final determinations about treatment and documentation if there is a federal nexus with the project.

Field activities may continue at the discovery location only after the process outlined in this plan is followed and the Nevada SHPO (and, if applicable, the federal agency[s]) determines that compliance with state and federal laws is complete. Should any recently deceased human remains be discovered at the site, field activities would be outlined by the Sheriff's/Coroner's offices.

CONTACTS

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Robin K. Reed, Deputy State Historic
Preservation Officer
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Proposed Sample Matrix

Appendix F

Sample I.D.	Analysis				MS/MSD	Duplicate	Notes
	TPH	VOC	SVOC	Metals			
1-3	X					X	
1-6	X	X	X	X			
1-9	X						
1-12	X	X	X	X	X		
1-15	X						
1-18	X	X	X	X			
2-3	X						
2-6	X	X	X	X			
2-9	X						
2-12	X	X	X	X			
2-15	X					X	
2-18	X	X	X	X			
3-3	X						
3-6	X	X	X	X			
3-9	X						
3-12	X	X	X	X			
3-15	X						
3-18	X	X	X	X		X	
4-3	X						
4-6	X	X	X	X			
4-9	X						
4-12	X	X	X	X			
4-15	X						
4-18	X	X	X	X			
5-3	X						
5-6	X	X	X	X			
5-9	X				X		
5-12	X	X	X	X			
5-15	X						
5-18	X	X	X	X		X	
6-3	X						
6-6	X	X	X	X			
6-9	X						
6-12	X	X	X	X			
6-15	X						
6-18	X	X	X	X			
7-3	X						
7-6	X	X	X	X			
7-9	X						
7-12	X	X	X	X			
7-15	X						
7-18	X	X	X	X		X	
8-3	X						
8-6	X	X	X	X			
8-9	X						
8-12	X	X	X	X			
8-15	X						
8-18	X	X	X	X	X		
9-3	X						
9-6	X	X	X	X			
9-9	X					X	
9-12	X	X	X	X			
9-15	X						
9-18	X	X	X	X			
10-3	X						
10-6	X	X	X	X			

Sample I.D.	Analysis				MS/MSD	Duplicate	Notes
	TPH	VOC	SVOC	Metals			
10-9	X					X	
10-12	X	X	X	X			
10-15	X						
10-18	X	X	X	X	X		
11-3	X						
11-6	X	X	X	X			
11-9	X						
11-12	X	X	X	X			
11-15	X						
11-18	X	X	X	X		X	
12-3	X						
12-6	X	X	X	X			
12-9	X						
12-12	X	X	X	X			
12-15	X						
12-18	X	X	X	X			
13-3	X						
13-6	X	X	X	X			
13-9	X						
13-12	X	X	X	X			
13-15	X						
13-18	X	X	X	X		X	
14-3	X						
14-6	X	X	X	X			
14-9	X						
14-12	X	X	X	X			
14-15	X				X		
14-18	X	X	X	X			
15-3	X						
15-6	X	X	X	X			
15-9	X						
15-12	X	X	X	X			
15-15	X						
15-18	X	X	X	X		X	
16-3	X						
16-6	X	X	X	X			
16-9	X						
16-12	X	X	X	X			
16-15	X						
16-18	X	X	X	X			
17-3	X						
17-6	X	X	X	X			
17-9	X					X	
17-12	X	X	X	X			
17-15	X						
17-18	X	X	X	X	X		
18-3	X						
18-6	X	X	X	X			
18-9	X						
18-12	X	X	X	X			
18-15	X						
18-18	X	X	X	X			
19-3	X						
19-6	X	X	X	X			
19-9	X					X	
19-12	X	X	X	X			
19-15	X						

Sample I.D.	Analysis				MS/MSD	Duplicate	Notes
	TPH	VOC	SVOC	Metals			
19-18	X	X	X	X	X		
20-3	X						
20-6	X	X	X	X			
20-9	X						
20-12	X	X	X	X			
20-15	X						
20-18	X	X	X	X		X	
21-3	X						
21-6	X	X	X	X			
21-9	X						
21-12	X	X	X	X			
21-15	X						
21-18	X	X	X	X			
22-3	X						
22-6	X	X	X	X			
22-9	X					X	
22-12	X	X	X	X			
22-15	X						
22-18	X	X	X	X			
23-3	X						
23-6	X	X	X	X			
23-9	X						
23-12	X	X	X	X			
23-15	X						
23-18	X	X	X	X		X	
24-3	X						
24-6	X	X	X	X			
24-9	X				X		
24-12	X	X	X	X			
24-15	X						
24-18	X	X	X	X			
25-3	X						
25-6	X	X	X	X			
25-9	X						
25-12	X	X	X	X			
25-15	X						
25-18	X	X	X	X		X	
26-3	X						
26-6	X	X	X	X			
26-9	X						
26-12	X	X	X	X			
26-15	X						
26-18	X	X	X	X			
27-3	X						
27-6	X	X	X	X			
27-9	X						
27-12	X	X	X	X			
27-15	X						
27-18	X	X	X	X	X		
28-3	X					X	
28-6	X	X	X	X			
28-9	X						
28-12	X	X	X	X			
28-15	X						
28-18	X	X	X	X			
29-3	X						
29-6	X	X	X	X			

Sample I.D.	Analysis				MS/MSD	Duplicate	Notes
	TPH	VOC	SVOC	Metals			
29-9	X						
29-12	X	X	X	X			
29-15	X						
29-18	X	X	X	X		X	
30-3	X						
30-6	X	X	X	X			
30-9	X						
30-12	X	X	X	X			
30-15	X						
30-18	X	X	X	X	X		
31-3	X						
31-6	X	X	X	X			
31-9	X					X	
31-12	X	X	X	X			
31-15	X						
31-18	X	X	X	X			
32-3	X						
32-6	X	X	X	X			
32-9	X						
32-12	X	X	X	X			
32-15	X						
32-18	X	X	X	X			
33-3	X						
33-6	X	X	X	X			
33-9	X					X	
33-12	X	X	X	X			
33-15	X				X		
33-18	X	X	X	X			
34-3	X						
34-6	X	X	X	X			
34-9	X						
34-12	X	X	X	X			
34-15	X						
34-18	X	X	X	X			
35-3	X						
35-6	X	X	X	X			
35-9	X					X	
35-12	X	X	X	X			
35-15	X						
35-18	X	X	X	X			
36-3	X						
36-6	X	X	X	X			
36-9	X				X		
36-12	X	X	X	X			
36-15	X						
36-18	X	X	X	X		X	
37-3	X						
37-6	X	X	X	X			
37-9	X						
37-12	X	X	X	X			
37-15	X						
37-18	X	X	X	X			
38-3	X						
38-6	X	X	X	X			
38-9	X						
38-12	X	X	X	X			
38-15	X						

Sample I.D.	Analysis				MS/MSD	Duplicate	Notes
	TPH	VOC	SVOC	Metals			
38-18	X	X	X	X		X	
39-3	X						
39-6	X	X	X	X			
39-9	X						
39-12	X	X	X	X			
39-15	X						
39-18	X	X	X	X			
40-3	X						
40-6	X	X	X	X			
40-9	X						
40-12	X	X	X	X			
40-15	X						
40-18	X	X	X	X		X	
41-3	X						
41-6	X	X	X	X			
41-9	X						
41-12	X	X	X	X			
41-15	X						
41-18	X	X	X	X	X		
42-3	X						
42-6	X	X	X	X			
42-9	X						
42-12	X	X	X	X			
42-15	X						
42-18	X	X	X	X		X	
43-3	X						
43-6	X	X	X	X			
43-9	X				X		
43-12	X	X	X	X			
43-15	X						
43-18	X	X	X	X			
44-3	X						
44-6	X	X	X	X			
44-9	X					X	
44-12	X	X	X	X			
44-15	X						
44-18	X	X	X	X			
45-3	X						
45-6	X	X	X	X			
45-9	X						
45-12	X	X	X	X			
45-15	X						
45-18	X	X	X	X			
46-3	X						
46-6	X	X	X	X			
46-9	X					X	
46-12	X	X	X	X			
46-15	X				X		
46-18	X	X	X	X			
47-3	X						
47-6	X	X	X	X			
47-9	X						
47-12	X	X	X	X			
47-15	X						
47-18	X	X	X	X			
48-3	X					X	
48-6	X	X	X	X			

Sample I.D.	Analysis				MS/MSD	Duplicate	Notes
	TPH	VOC	SVOC	Metals			
48-9	X						
48-12	X	X	X	X			
48-15	X						
48-18	X	X	X	X		X	
49-3	X						
49-6	X	X	X	X			
49-9	X					X	
49-12	X	X	X	X			
49-15	X						
49-18	X	X	X	X			

Note: Any sample not designated to be analyzed for VOC/SVOC/Metals (i.e., only designated for TPH analysis) that exhibits field evidence of impacts (PID readings over 6 ppm) will be noted and then also analyzed for VOC/SVOC/metals.

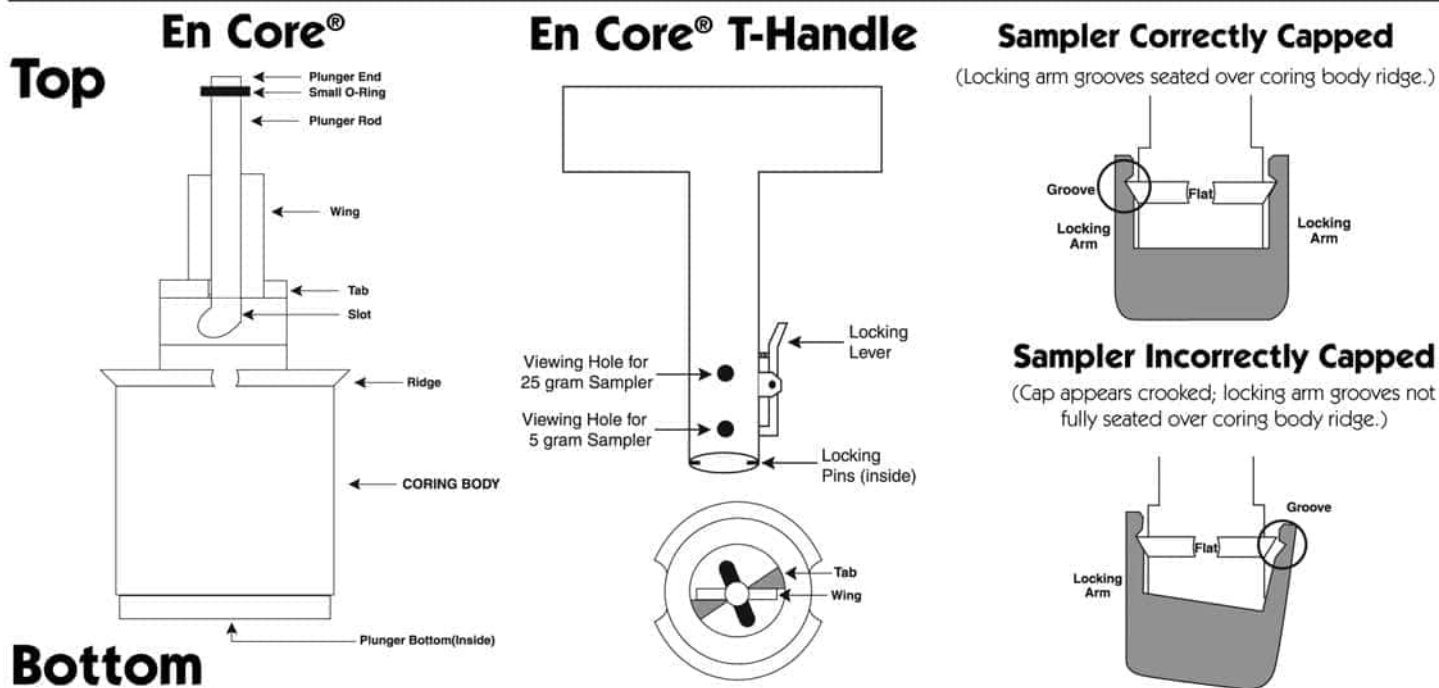
Appendix G

Disposable En Core® Sampler Sampling Procedures

Using The En Core® T-Handle

NOTE:

1. En Core® Sampler is a SINGLE USE device. It cannot be cleaned and/or reused.
2. En Core® Sampler is designed to store soil. Do not use En Core Sampler to store solvent or free product!
3. En Core® Sampler must be used with En Core® T-Handle and/or En Core® Extrusion Tool exclusively. (These items are sold separately.)



BEFORE TAKING SAMPLE:

1. Hold **coring body** and push **plunger rod** down until **small o-ring** rests against **tabs**. This will assure that plunger moves freely.
2. Depress **locking lever** on En Core T-Handle. Place coring body, **plunger end first**, into open end of T-Handle, *aligning the (2) slots on the coring body with the (2) locking pins in the T-Handle*. Twist coring body clockwise to lock pins in slots. Check to ensure Sampler is locked in place. Sampler is ready for use.

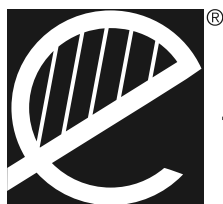
TAKING SAMPLE:

3. Turn T-Handle with T-up and coring body down. This positions plunger bottom flush with bottom of coring body (ensure that plunger bottom is in position). Using T-Handle, push Sampler into soil until coring body is completely full. When full, small o-ring will be centered in T-Handle **viewing hole**. Remove Sampler from soil. Wipe excess soil from coring body exterior.

4. Cap coring body while it is still on T-handle. **Push cap over flat area of ridge and twist** to lock cap in place. **CAP MUST BE SEATED TO SEAL SAMPLER (see diagram).**

PREPARING SAMPLER FOR SHIPMENT:

5. Remove the capped Sampler by depressing locking lever on T-Handle while twisting and pulling Sampler from T-Handle.
6. Lock plunger by rotating extended plunger rod fully counter-clockwise until **wings** rest firmly against tabs (see plunger diagram).
7. Fill in sample description on the back of the En Core Sampler bag.
8. Return full En Core Sampler to zipper bag. Seal bag and put on ice.



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Disposable En Core® Sampler

EXTRUSION PROCEDURES

USING THE En Core® EXTRUSION TOOL

CAUTION! Always use the Extrusion Tool to extrude soil from the En Core Sampler. If the Extrusion Tool is not used, the Sampler may fragment, causing injury.

1. To attach En Core Sampler to En Core Extrusion Tool: Depress locking lever on Extrusion Tool and place Sampler, plunger end first, into open end of Extrusion Tool, aligning slots on coring body with pins in Extrusion Tool. Turn coring body clockwise until it locks into place. Release locking lever.
 2. Rotate and gently push Extrusion Tool plunger knob clockwise until plunger slides over wings of coring body. (When properly positioned plunger will not rotate further.)
 3. Hold Extrusion Tool with capped Sampler pointed upward so soil does not fall out when cap is removed. Remove cap from Sampler by rotating cap until locking arms are aligned with the flat area of ridge and pull cap off. To release soil core push down on plunger knob of En Core Extrusion Tool. Remove and properly dispose of En Core Sampler.
-

Warranty and Disclaimers

IMPORTANT: FAILURE TO USE THE EN CORE® SAMPLER IN COMPLIANCE WITH THE WRITTEN INSTRUCTIONS PROVIDED HEREIN VOIDS ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

PRINCIPLE OF USE. The En Core Sampler Cartridge System is a volumetric sampling system designed to collect, store and deliver a soil sample. The En Core Sampler comes in two sizes for sample volumes of approximately 25 or 5 grams. There are four components: the cartridge with a movable plunger; a cap with two locking arms; a T-handle (purchased separately); and an extrusion handle (purchased separately). NOTE: The En Core Sampler is designed to store soil. It is not designed to store solvent or free product.

The soil is stored in a sealed headspace-free state. The seals are achieved by three special Viton® * o-rings, two located on the plunger and one on the cap of the Sampler. At no time and under no condition should these o-rings be removed or disturbed.

QUALITY CONTROL. The cartridge is sealed in an airtight package to prevent contamination prior to use. Due to the stringent quality control requirements associated with the use of this system, the disposable cartridge is designed to be used only once.

WARRANTY. En Novative Technologies warrants that the En Core Sampler shall perform consistent with the research conducted under En Novative Technologies' approval, within thirty (30) days from the date of delivery, provided that the Customer gives En Novative Technologies prompt notice of any defect or failure to perform and satisfactory proof thereof. THIS WARRANTY DOES NOT APPLY TO THE FOLLOWING, ASSOLELY DETERMINED BY EN NOVATIVE TECHNOLOGIES: (a) Damage caused by accident, abuse, mishandling or dropping; (b) Samplers that have been opened, taken apart or mishandled; (c) Samplers not used in accordance with the directions; and (d) Damages exceeding the cost of the sampler. Seller warrants that all En Core Samplers

shall be free from defects in title. THE FORE-GOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING ANY INFORMATION PROVIDED BY SALES REPRESENTATIVES OR IN MARKETING LITERATURE. IMPLIED WARRANTIES OF FITNESS AND MERCHANTABILITY SHALL NOT APPLY. En Novative Technologies' warranty obligations and Customer's remedies, except as to title, are solely and exclusively as stated herein.

LIMITATION OF LIABILITY. IN NO EVENT SHALL EN NOVATIVE TECHNOLOGIES BE LIABLE FOR ANTICIPATED PROFITS, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF REVENUE, DOWN TIME, REMEDIATION ACTIVITIES, REMOBILIZATION OR RESAMPLING, COST OF CAPITAL, SERVICE INTERRUPTION OR FAILURE OF SUPPLY, LIABILITY OF CUSTOMER TO A THIRD PARTY, OR FOR LABOR, OVERHEAD, TRANSPORTATION, SUBSTITUTE SUPPLY SOURCES OR ANY OTHER EXPENSE, DAMAGE OR LOSS, INCLUDING PERSONAL INJURY OR PROPERTY DAMAGE. En Novative Technologies' liability on any claim of any kind shall be replacement of the En Core Sampler or refund of the purchase price. En Novative Technologies shall not be liable for penalties of any description whatsoever. In the event the En Core Sampler will be utilized by Customer on behalf of a third party, such third party shall not occupy the position of a third-party beneficiary of the obligation or warranty provided by En Novative Technologies, and no such third party shall have the right to enforce same. All claims must be brought within one (1) year of shipment, regardless of their nature.

The En Core™ Sampler is covered by One or More of the Following U.S. Patents: 5,343,771; 5,505,098; 5,517,868; 5,522,271. Other U.S. and Foreign Patents Pending.

* Viton® is a registered trademark of DuPont Dow Elastomers.



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En Core Sampler Frequently Asked Questions (FAQ)

- **Does the En Core® Sampler work in tight clay?**

The En Core excels in sampling tight soils. A cutting edge was designed into the front of the body. Push and twist the sampler into the clay to take a core sample.

- **Does the En Core® Sampler work in sand?**

The En Core cannot be used to sample sand in the normal way since dry sand will not form a cohesive plug. Pull the plunger back to form an o-ring seal on the back end of the body and scoop or push sand into the sampler. When the cap is attached, the sand will be kept in a headspace-free state.

- **Does the En Core® Sampler work in rocks?**

The En Core sampler does not work with rocks. Rocks are a difficult matrix to sample no matter what approach is used. We would recommend that you have some methanol available if you need to sample rocks. You may need to break up the rocks to get a sufficiently small sample.

- **Does the En Core® Sampler work with down-hole sampling methods?**

At the present time, the En Core does not work with down hole sampling. You must bring the soil core or split spoon to the surface and quickly take a sample.

- **How do I know if the En Core® Sampler is full?**

There is a viewing hole in the handle. The o-ring on the plunger will show in the viewing hole when soil has pushed the plunger fully to the back. However, there is another check you should make on every sample. The plunger can only be rotated when it is fully pushed to the back of the body. If you can twist the plunger, you have guaranteed that the soil has filled the sampler and the back o-rings have sealed.

- **How do I know if the cap is on properly?**

When you put the cap on, it is important that you twist the cap as you push it on. The cap is properly sealed when the two locking arms are completely and symmetrically over the body ridge. This means the cap is sealed.

- **What is the status with hold times?**

Currently, the hold time is 48 hours. This means that the soil must be placed in a preservative before the end of the 48 hour period. Some regulatory agencies have approved extended hold times. Check with your regulatory agency.



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