THE IMPORTANCE OF ENVIRONMENTAL DUE DILIGENCE IN LINEAR CONSTRUCTION

KLAR, Richard V., MCCOY, Zaneta L., and LAFFERE, Clint, Raba Kistner Environmental, Inc., 12821 West Golden Lane, San Antonio, TX 28249, rklar@rkci.com

INTRODUCTION

Environmental due diligence efforts are usually performed during real-estate transactions to assess the environmental liability risk of a property prior to a change in ownership or in advance of construction projects to better inform the design or project planning effort. When encountered, environmental contamination issues may involve a long remediation process or, at a minimum, additional risk-based assessment through an appropriate regulatory agency to "close" the property from an environmental standpoint. The remediation process itself can be time consuming and costly, the least of which may include the cost of environmental consultants hired to assess the situation and laboratory testing to evaluate the presence and/or absence of significant impacts. Depending on the type of construction project, comprehensive environmental due diligence efforts are not usually performed prior to commencement. Although contractors are not usually liable for the cost of remediation efforts when contaminated media is encountered, they are often held accountable for assuring that it is handled in an appropriate manner; especially when environmental contamination issues are encountered after construction start. In such a case, the contractor will exhaust time and money with work stoppages and other associated costs on top of the cost of remediation efforts paid by the property owner. Conducting appropriate environmental due diligence efforts prior to project commencement will save time and money if environmental contamination issues are likely or suspected.

The purpose of this paper is to underscore the need for conducting an appropriate level of environmental due diligence with particular regard to linear construction projects. Although real-estate transactions typically involve assessments for fixed-sites, linear construction projects often traverse multiple properties along the project footprint, each of which may present individual environmental concerns of their own. Case studies are presented to further emphasize the benefits of performing appropriate due diligence efforts as part of the construction planning process.

BACKGROUND

In response to the enactment of the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) and the Superfund Reauthorization and Amendments Act of 1986 (SARA), the environmental consulting industry emerged to aid in the complexities of real-estate transaction environmental liabilities (ASCE, 1996). With the passage of CERCLA, past and present property owners can be held liable for contamination on their property under any circumstances, including contamination that pre-dated the acquisition of the property. Under the provisions of SARA, a landowner is able to establish innocence regarding knowledge that onsite contamination had occurred. However, the property owner must be able to demonstrate that prior to property acquisition, he/she did not know or have reason to suspect that hazardous substances were released or disposed of on the property (ASCE, 1996). To maintain that defense, the property owner (or project owner in case of a construction project) must demonstrate that "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial and customary practice was performed in an effort to minimize liability" (CERCLA, §101(35)(b)). With that said, the concept of environmental due diligence came about to help potential landowners and project owners navigate the complexities of environmental contamination liability.

Phase I Environmental Site Assessments

The environmental due diligence process is usually carried out via a Phase I Environmental Site Assessment (ESA-I). ESA-Is are sometimes referred to as a preliminary site assessment or an environmental site investigation (ESI). In any case, an ESA-I is performed pursuant to the *American Society of Testing and Materials* (ASTM) standards outlined in *ASTM E1527-13*.

During this initial phase, intrusive testing (i.e., soil or groundwater sampling) is not conducted. It is merely intended to identify environmental concerns (i.e., recognized environmental conditions) associated with past and/or current land use activities (Hinerman, 2014). An investigation into the history of the property is conducted and usually involves the review of historical aerial photographs, maps, real estate atlases, title documents, city street directories, building permits, textual records, historical records, and oral interviews of the current site owner (ASCE, 1996). Since contamination, where present, is not limited by property boundaries, a thorough investigation should also include adjacent properties and/or properties within a certain radius of the subject property. The *ASTM E1527-13* standard is currently applicable and outlines the specific minimum search radius for certain Federal, State, and Tribal environmental record sources.

Phase II Environmental Site Assessments

Following the discovery of recognized environmental conditions on the subject property or an adjacent property as part of the ESA-I process, a Phase II – Environmental Site Assessment (ESA-II) may be undertaken to confirm the presence or absence of onsite contamination (ASTM E1903-11). To confirm or further evaluate the presence of environmental impacts, an exploratory subsurface investigation is typically conducted that includes the collection of soil, groundwater, surface water, and/or air samples (ASCE manual) from onsite areas that are most likely to have been affected based on ESA-I results. Subsequently, collected samples undergo chemical analyses relevant to the type of environmental conditions or land use activities recognized in association with the site.

An ESA-II is integrally linked to the information uncovered during the ESA-I process. As stated earlier, records review is a central aspect of the environmental due diligence process. Therefore, an ESA-I report is only as thorough as the records kept for past land use activities. Since an ESA-II relies heavily on ESA-I activities to uncover possible sources of contamination, the exploratory subsurface investigation may completely miss affected areas if records are poorly kept, absent, or otherwise unavailable. Conversely, an ESA-I can also unearth an abundance of potential environmental liability issues. In this case, the ESA-II can aid in clarifying the extent of the issue.as it pertains to the property in question, if one exists at all.

LINEAR CONSTRUCTION ACTIVITIES

Linear construction projects frequently involve the clearing, grading, and excavation of land associated with utility installations (i.e., underground electric lines, communication lines, gas pipelines, storm water pipes, cable/internet, etc.) in addition to roadway and drainage improvement projects. Because this type of construction involves earthwork, there is potential to encounter environmentally affected media (e.g., soil and/or groundwater) during such activities associated with historical or current facilities of concern or land use activities within the project right-of-way (ROW) itself or on adjacent properties. As such, appropriate environmental due diligence efforts should be conducted prior to the commencement of construction activities to avoid unnecessary and costly delays, especially when the subject area is in a historical environmentally impacted area. An appropriate level of environmental due diligence is particularly important with respect to linear construction projects as opposed to fixed sites as linear projects traverse multiple properties hosting a variety of past operations, for which environmental recordkeeping or knowledge of past land use of facility operations may be lacking. This often necessitates research into multiple sites or facilities of concern along the ROW and makes ESA-I process more difficult and time-consuming.

The upfront cost of conducting an environmental site assessment prior to construction can cost upwards of $10 K, depending on the nature of the findings and the possible need to conduct multiple phases (i.e., ESA-I and ESA-II studies). The cost of halting a construction project because environmentally affected media has been encountered can be substantially greater. Performance of an environmental site assessment prior to construction activities can help to identify any environmental issues relating to past and/or current land use activities. In cases where it is likely that affected media will be encountered based on due diligence findings, careful planning prior to the commencement of construction activities and development of an appropriate affected soils or groundwater management strategy can effectively mitigate the costs associated with work stoppages and/or delays.

AFFECTED MEDIA MANAGEMENT PLANS AND CONSTRUCTION PLANS AND SPECIFICATIONS

Affected Media Management Plans are developed based upon the results of collective ESA-I and ESA-II study findings, which are individual and unique to each site. These management plans define areas of concern within project limits and set forth specific field procedures to be followed by the contractor to ensure that the affected media is managed in accordance with applicable environmental and waste handling protocols to minimize project delays. Generally, affected media management plans outline detailed procedures to be implemented when affected media is encountered including temporary staging areas and media sampling procedures to be followed. Typically, affected media is to remain in temporary staging areas for re-use or offsite disposal pending analytical testing results.

Construction Plans and Specifications can be developed with estimated quantities and corresponding unit costs before a construction project begins. In this scenario, the cost (time and money) of affected media management can be accounted for prior to breaking ground.

CASE STUDIES INVOLVING LINEAR CONSTRUCTION PROJECTS

Case studies are presented herein to emphasize the benefit of performing appropriate environmental due diligence efforts prior to the commencement of construction activities, particularly linear construction projects, which traverse multiple properties over the project footprint. Our firm, Raba Kistner Environmental, Inc. (RKEI) has dealt with historically impacted areas undergoing earthwork activities associated with linear construction projects. In two of the case studies presented below, ESA-Is had previously been prepared by RKEI or another environmental consulting firm prior to construction activities. Affected Media Management Plans were subsequently developed for the beneficial use of the contracting party to efficiently and effectively complete work objectives with minimal complications.

<u>*CASE STUDY # 1: ROLAND ROAD BRIDGE (NOVEMBER 2012)*</u>

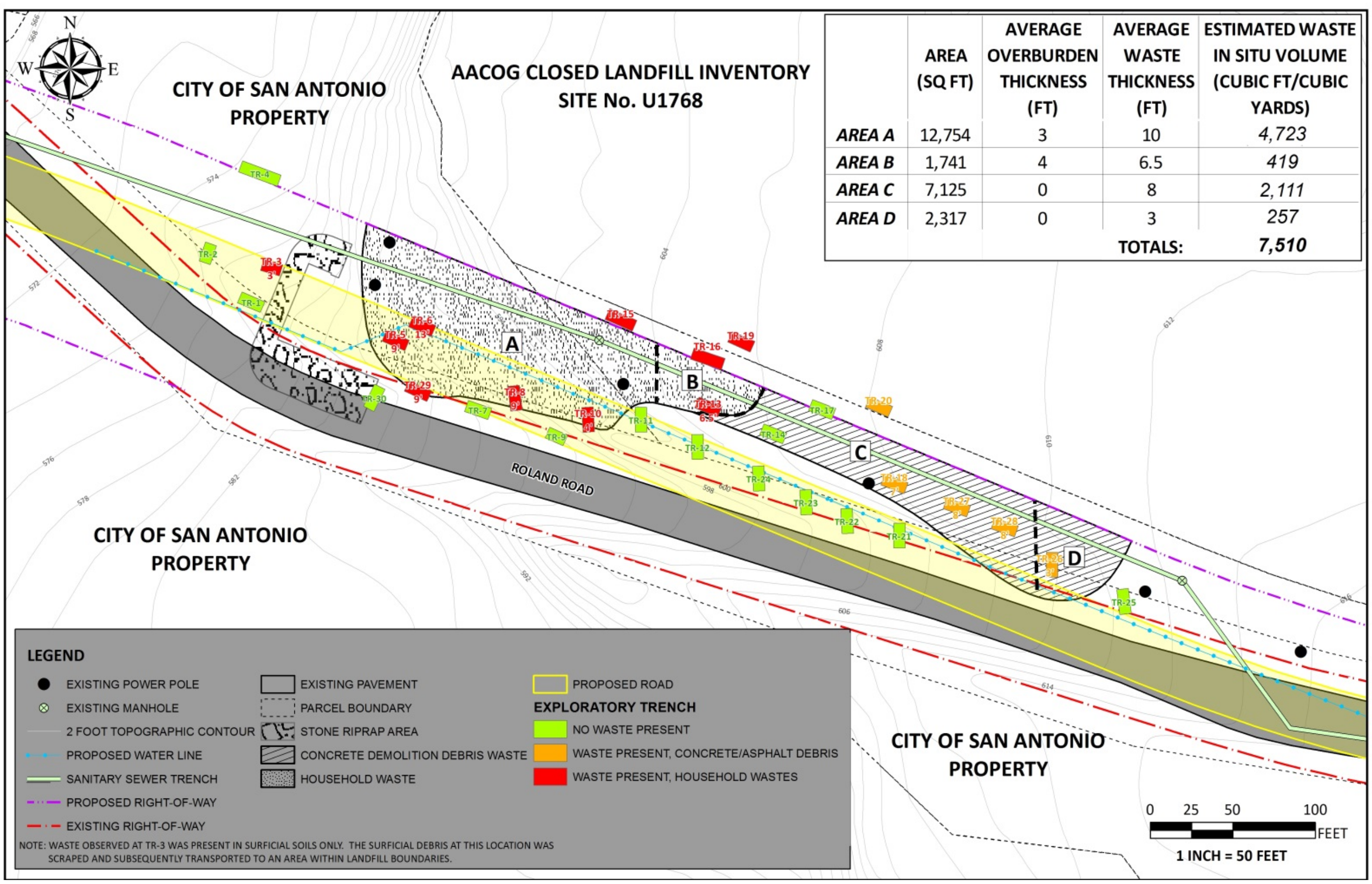
Figure 1 – Site Location Map

As part of the Bexar County Flood Control Program in November 2012, a new elevated bridge structure along Roland Road at the east and west crossings of Salado Creek located on the east side of San Antonio, Texas (***Figure 1 – Site Location Map***) was being constructed to adjust the alignment of an existing roadway to "smooth" curves and to improve drainage by reconstructing a bridge structure over the 100-year floodplain. As such, existing underground utilities had to be re-routed within the newly-defined right-of-way (ROW).

During site preparation for construction of the new roadway, bridge, and sanitary sewer line, an unpermitted dumping area was encountered within the utility excavation area. As depicted in ***Figure 2 – Exploratory Trench and Waste Location Map***, the excavation area is approximately parallel to the roadway project within the ROW. The waste materials encountered consisted of typical household refuse and commercial/construction debris of an unknown origin. After encountering the buried waste, Bexar County representatives were notified and a stop work directive was issued to the contractor.

Following the discovery of the dumping area, RKEI was tasked with conducting a buried waste assessment. Upon review of the Bexar County Inventory of Closed and Abandoned Landfills maintained by the Alamo Area Council of Governments (AACOG), it was determined that the buried waste location correlated with an unauthorized waste disposal site. The disposal site was first discovered by the City of San Antonio Public Works Department in 1980 and lists wet household garbage and brush as the waste description.

The unpermitted/unauthorized municipal solid waste (MSW) disposal at the site is recognized by the Texas Commission on Environmental Quality (TCEQ) as a Closed Municipal Solid Waste Landfill (CMSWL) pursuant to applicable MSW rules (i.e., *Title 30 Texas Administrative Code (TAC), Chapter 330, Subchapter T*). As a result, construction or intrusive environmental assessment activities that disturb or penetrate the existing ground surface (i.e., final landfill cover) are regulated pursuant to Subchapter T rules. In accordance with regulatory guidelines, and as the first step in evaluating the extent of buried wastes present within the Roland Road construction project area, a work plan to investigate the unpermitted dumping area encountered during site preparation activities had to be submitted to the TCEQ MSW Permits Section and approved, an expedited process that took approximately two weeks.



	AREA (SQ FT)	AVERAGE OVERBURDEN THICKNESS (FT)	AVERAGE WASTE THICKNESS (FT)	ESTIMATED WASTE IN SITU VOLUME (CUBIC FT/CUBIC YARDS)
AREA A	12,754	3	10	*4,723*
AREA B	1,741	4	6.5	*419*
AREA C	7,125	0	8	*2,111*
AREA D	2,317	0	3	*257*
			TOTALS:	***7,510***

Figure 2 – Exploratory Trench and Waste Location Map

Exploratory Trench Installation and Sampling

In conducting the buried waste assessment, RKEI's primary objective was to determine the lateral extent and type of waste material buried in the ROW as necessary to support a request for authorization to remove wastes and/or continue construction efforts within the portion of the project area containing buried MSW as required pursuant to *Title 30 TAC Chapter 330 Subchapter T*. In an effort to achieve this goal, RKEI installed a total of 30 exploratory test trenches in accordance with standard environmental protocols. Soils in direct contact with MSW were subjected to environmental testing to evaluate waste classification in accordance with standard profiling requirements for local landfills. Additionally, a visual estimate of intermixed MSW within the ROW to support construction project planning was conducted.

Further delaying construction activities, trenches were installed along approximately 600 linear feet on Roland Road on a grid pattern with an approximate 20 to 30-foot linear spacing and designated as TR-1 through TR-30, respectively as shown in ***Figure 2***. Test trenches were distributed throughout the project area and immediately north of the existing sanitary sewer to facilitate a complete assessment of the buried waste extent within the ROW. Soil samples were field screened for the presence of volatile organic compounds (VOCs). The open trenches and breathing zones surrounding field personnel were also screened for the presence of landfill gases (i.e., methane and hydrogen sulfide). An RKEI professional continuously logged the soils for composition, color, any visual/olfactory indications of contamination and evidence of any buried MSW.

In accordance with the objectives of the buried waste assessment and the approved TCEQ work plan, one composite sample per trench site where MSW was encountered was submitted for a broad range of environmental contaminants associated with MSW, including indicator petroleum hydrocarbons (i.e., total pertroleum hydrocarbons, or TPH, and volatile organic compounds, or VOCs), metals, and Semi-VOCs constituents. Further analyses were conducted for waste profiling purposes for planned disposal of the MSW at a permitted landfill facility.

Findings and Recommendations

Preliminary estimates of waste volume within the ROW were developed by RKEI for planning purposes. The calculated waste volumes took into account the total subsurface depth interval containing MSW. Therefore, a significant percentage of the waste total was actually comprised of intermixed clay soils. Calculations indicated a total in-situ waste volume on the order of 7,510 cubic yards as indicated on ***Figure 2***. As part of the buried waste assessment conducted after encountering MSW during construction activities, RKEI recommended that during future phases of site development and associated earthwork activities, all MSW should be removed from the project extent within the ROW to the extent possible to facilitate the construction project.

Discussion

The above case study presented a situation wherein environmental due diligence efforts were not properly undertaken prior to construction activities. It was only after encountering MSW affected media that appropriate environmental diligence efforts were conducted. By that time, construction activities had been halted to allow for proper protocols pursuant to applicable regulations to be followed. This led to costly delays that could easily have been prevented by conducting an appropriate ESA-I study prior to construction activities. As determined in the buried waste assessment, a simple review of the local closed landfill database quickly identified the potentiality of encountering MSW in the project area ROW. Subsequently, an appropriate ESA-II would most likely have been recommended to accomplish the same objectives as did the buried waste assessment in much more cost- and time-efficient manner.

<u>CASE STUDY #2: SH 365 HIDALGO COUNTY (APRIL 2016)</u>

State Highway (SH) 365, currently in the construction phase of development, will be operational as the first toll road in Hidalgo County and will essentially connect the Pharr International Bridge with the Anzalduas Port of Entry. The toll road will be open to the public but was designed to facilitate transportation supporting the produce and maquiladora industry. The project is located south of US 83 (Interstate 2) primarily between US 281 and FM 1016 in southwest Hidalgo County, Texas.

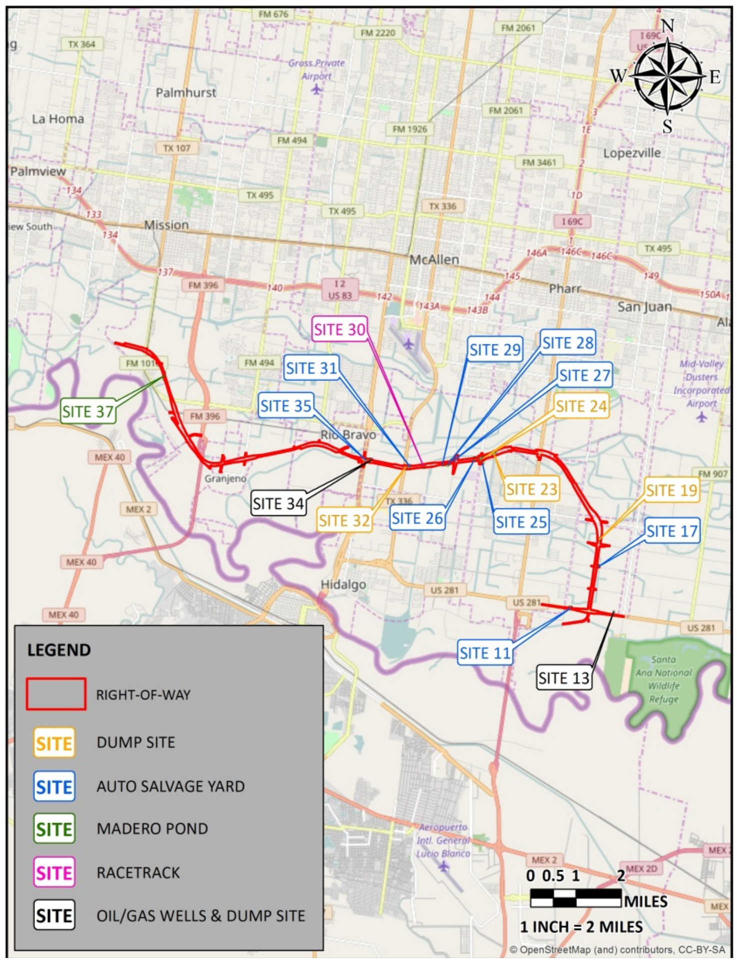


Figure 3 – Site Location Map

RKEI was originally tasked with conducting an ESA-II in 2015 following a Hazardous Materials Initial Site Assessment (ISA) conducted in December 2014. The original ISA Report prepared for the Texas Department of Transportation (TXDOT) was completed to satisfy the Federal Highway Administration's (FHWA) guidelines regarding hazardous materials to identify and assess potentially contaminated sites to minimize construction delays for the worksite and avoid involvement with substantially contaminated properties.

A total of 27 facilities were identified as a result of ISA site reconnaissance activities for the length of the planned construction. These facilities hosted a wide variety of land uses including: auto salvage yards, dump sites, a racetrack, equipment yards, a mobile storage tank trailer, a lift station, oil/gas wells, an oil booster station, and cemeteries. A total of 16 out of the original 27 properties, as shown in ***Figure 3 –***

Site Location Map were identified within the ROW or adjacent to the ROW as having a medium or high risk and were chosen for ESA-II activities to develop baseline environmental data prior to planned construction activities. As depicted in ***Figure 3***, properties have been labeled according to their environmental concern. ESA-II activities included intrusive assessment within portions of properties of concern within the SH 365 ROW or immediately adjacent to the ROW.

Based on ESA-II findings, Site 26, an auto salvage yard, was identified with a designation of medium risk and further targeted for additional intrusive assessment prior to construction of SH 365 to devise an appropriate soils management strategy. As a result, five soil borings were installed within Site 26 (***Figure 4 – Site 26 Boring Location Map***), from which 10 samples were collected to evaluate potential environmental impact to near-surface soils (i.e., the anticipated depth of construction) associated with past/present land use activities. Soil samples were analyzed for a wide range of constituents of concern (COCs) typically associated with automobile salvage yards and petroleum product storage including indicator petroleum hydrocarbons (i.e., TPH and VOCs) and metals.

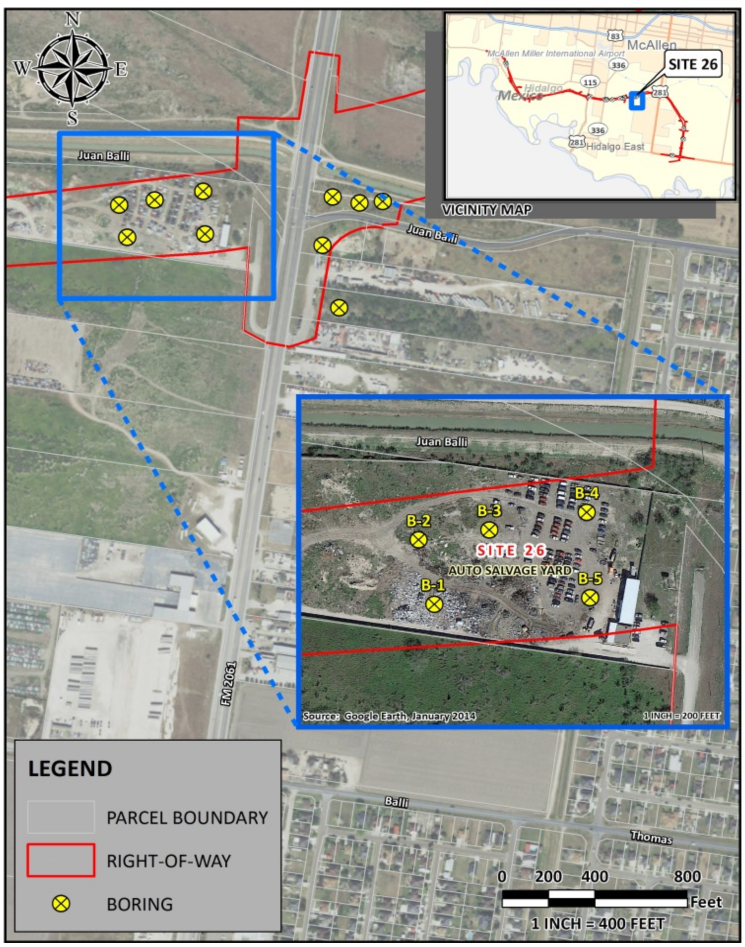


Figure 4 – Site 26 Boring Location Map

Findings and Recommendations

Analytical testing results from Site 26 did not indicate the presence of targeted COCs in excess of concentrations that are considered protective of human health in a residential land use setting. Organic constituents (i.e., VOCs, TPH, and SVOCs) were reported below laboratory detection limits. Elevated arsenic concentrations (i.e., above the Texas Specific Background value) were reported for Site 26, possibly owing to non-point source impacts from auto salvage yard or past agricultural operations.

Based upon ESA-II analytical data, an affected media management plan was developed for Site 26 with the assumption that affected soils and groundwater would be encountered during planned construction activities. Excavated soils generated within the portion of Site 26 exhibiting elevated arsenic concentrations would be initially treated as "affected" by the SH 365 construction project earthwork contractor and placed in a pre-designated onsite staging area pending additional analytical testing to evaluate the suitability for offsite reuse or waste classification for disposal at a permitted landfill facility. As part of the soil management strategy for the project, RKEI recommended that all excavated soils could be reused as part of the project without restriction unless obvious visible or olfactory indications of contamination (i.e., soil staining or hydrocarbon, chemical, or other unusual odors) are observed. Additionally, any soils or shallow groundwater with apparent impacts, or excess soils that cannot be reused onsite, should be separately segregated and managed in a manner consistent with the this plan. If residual environmental impacts are present in excess of regulatory action levels, the excavated soil should be disposed of at a permitted landfill facility.

Discussion

The above case study involved a situation where a Hazardous Materials Initial Site Assessment was performed prior to planned highway construction activities that spanned across multiple properties. Following the initial assessment, ESA-IIs were conducted on 16 properties that were deemed as environment liability risks. To deal with potentially encountering environmentally affected media, an affected media management plan was developed for a specific property of concern, Site 26, an auto salvage yard. This case followed an environmental due diligent-conscious path that allowed for an affected media plan to be developed in support of construction activities to accommodate encountered affected media prior to construction earthwork activities. As a result of appropriate due diligence efforts conducted prior to construction commencement, construction work proceeded smoothly with no delays.

CASE STUDY #3: FORMER PEARL BREWERY AFFECTED SOILS MANAGEMENT (JANUARY 2006)

In the late 1800s, a brewery that would later become known as the Pearl (so named for one of their beers) was founded and quickly became the largest brewery in the State of Texas. Brewery operations included the production of shipping of beer across Texas and the United States through the use of trucks and railroad trains. By the late 1990s and early 2000s, the brewery operations were winding down, and the site was targeted for upscale re-development. Re-development of the site in the master development plan included hosting of a variety of retail shopping tenants and a hotel in addition to various other venues.

The former Pearl Brewery site has been affected by the historical releases of petroleum hydrocarbons, particularly in the vicinity of a vehicle maintenance garage associated with former brewery operations. As a result, the facility was assigned a Leaking Petroleum Storage Tank (LPST) status. RKEI performed a broad range of environmental consulting services to address specific environmental concerns and achieve regulatory closure in accordance with established corrective action guidelines pursuant to applicable Petroleum Storage Tank (PST) Program Rules (*30 TAC Chapter 334*). The corrective action process included site assessment, groundwater monitoring, remedial action plan preparation, groundwater remediation (i.e., product recovery), and environmental risk assessment activities in accordance with regulatory directives pursuant to PST Program Rules. Site closure status was granted in 1997 by the Texas Natural Resource Conservation Commission (TNRCC), the predecessor to the TCEQ.

Some years after site closure status in conjunction with the early stages of re-development for the site, construction plans were prepared for earthwork activities for a box culvert system, part of which (approximately 820 feet) crosses the area known to exhibit hydrocarbon impacts based on previous assessments (***Figure 5 – Site Plan***). In preparation for this construction project, RKEI conducted environmental drilling and sampling activities to further evaluate residual hydrocarbon impacts to soils within the construction interval, as well as shallow groundwater levels (i.e., depth at which groundwater may be encountered during construction). m hydrocarbons (i.e., VOCs and TPH) in addition to total lead due to the nature of the contamination from past onsite hazardous.

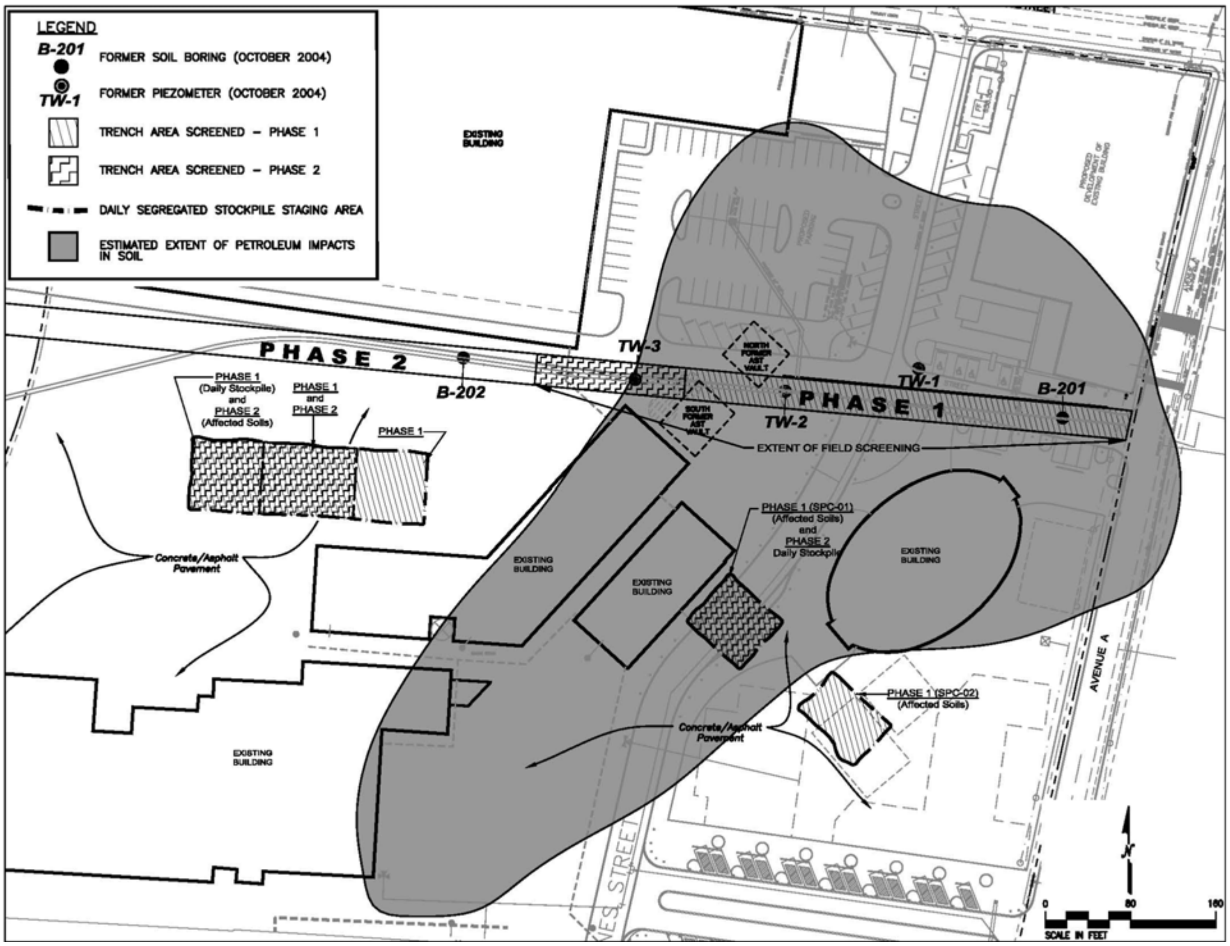


Figure 5 – Former Pearl Brewery Site Plan

Findings and Recommendations

Collective sampling results confirmed that maximum residual soil concentrations of petroleum hydrocarbons are located along the east segment of the proposed box culvert. As a result, it was recommended that the contractor be prepared to address potentially affected soils and groundwater within the excavation footprint. In support of planned construction activities, RKEI developed a procedure for the management of affected soils to assist the construction contractor during earthwork activities. As part of the affected media plan, an environmental professional would monitor excavation activities and field-screen soils using a photoionization detector (PID) on a continuous basis.

Additionally, designated onsite temporary staging areas would be chosen for the placement of stockpiled soils into either daily excavated soils or obviously (i.e., visibly or field-screened) affected soils (***Figure 5***).

Discussion

The former Pearl Brewery site presented herein was a historical environmentally impacted site that was considered “closed” prior to planned earthwork activities in conjunction with the installation of a box culvert system that transected affected media. As part of the corrective action process previously conducted for the site, assessment activities were already on file and taken into account prior to construction. New environmental sampling borings were installed along the alignment of the proposed box culvert system to confirm previous assessments and support a more detailed affected media management plan.

During earthwork activities for the proposed box culvert alignment, two former aboveground storage tank (AST) vaults were discovered, one of which (i.e., the northern former AST vault) was previously unknown and believed to pre-date known brewery operations (***Figure 5***). Soils excavated in the area around the northern former AST vault exhibited elevated PID readings and were immediately directed to the obviously affected designated stockpile area, also depicted in ***Figure 5***, pending analytical testing to determine if it was suitable for re-use or disposal at a permitted landfill facility. Having an affected media management plan in place prior to excavation activities allowed for the continuance of the construction project without significant delay when an environmentally impacted area was encountered. In this case, both time and money were saved because an appropriate level of environmental due diligence was conducted prior to construction commencement.

CONCLUSIONS

The concept of environmental due diligence originated to aide potential landowners in navigating environmental contamination liability issues introduced by the enactment of CERCLA of 1980 and SARA of 1986. Though mainly employed in real estate transactions to assist in risk analysis for a potential acquisition property (i.e., fixed-site), environmental due diligence in the form of ESA-I/ESA-II studies also can have very important application to linear construction projects. Because linear construction projects involve earthwork activities traversing multiple properties through potentially environmentally impacted areas, due diligence efforts should be conducted prior to construction in order to fully understand the risks involved in such activities. However, an appropriate level of intrusive investigation as part of the process can better inform construction plans and effectively mitigate risks.

ESA-IIs for real-estate transactions for fixed-sites are much different than construction projects. For construction projects, it is not enough to simply know the presence or absence of any affected media; more must be determined to be able to develop appropriate affected media management strategies. As demonstrated in the Roland Road Bridge case study, a failure to conduct an ESA-I or a similar effort can have immense financial impacts mostly due to work stoppage associated with encountering affected media and the regulatory process and approval that follows such a discovery. As demonstrated in the other two case studies, appropriate due diligence efforts can help to identify troubling environmental issues prior to construction to allow for proper management of said issues when and if they are encountered. Additionally, if construction activities are still in the planning phase, the results of an ESA-I may be used to better inform the design process as necessary to accommodate known issues and/or reduce the likelihood of encountering unknown environmental conditions.

All environmental due diligence investigations (i.e., ESA-I/ESA-II studies) are not created equal. As potential users of information, contractors and designers (i.e., project team) must have the ability to recognize limited information developed on behalf of landowners, so that they can better manage their risk. Doing this will allow them the opportunity to request more information where necessary to adequately bid work, or at a minimum, include unit costs for environmental issues not fully defined as a result of limited ESA-IIs.

WORKS CITED

ASCE (1996). *Environmental Site Investigation Guidance Manual*. ASCE Manuals and Reports on Engineering Practice No. 83. American Society of Civil Engineers, New York.

ASTM E1527-13 (2013). Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. ASTM Annual Book of ASTM Standards, Volume 11.05. West Conshohocken, PA.

ASTM E1903-11 (2011). Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process. ASTM Annual Book of ASTM Standards, Volume 11.05. West Conshohocken, PA.

Hinerman, Philip L. (2014). *Attorney's Guide to Using Environmental Consultants as Experts*. Accessed on October 24, 2016 at http://www.foxrothschild.com/content/uploads/2015/05/eBook_AttorneysGuideUsingEnvirExperts.pdf.