

DRAFT

Analysis of Brownfield Cleanup Alternatives (ABCA)

Light Rail Property of the Twin Rivers Triangle Site

Sproule Avenue and North 12th Street

Sacramento, California

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Prepared for:

Sacramento Housing Redevelopment Agency



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1.0 INTRODUCTION AND BACKGROUND

The Sacramento Housing and Redevelopment Agency (SRHA) and Tetra Tech, Inc. (Tetra Tech) have prepared this Analysis of Brownfield Cleanup Alternatives (ABCA) for remediation of the Light Rail Property for the Twin Rivers Dos Rios Transit Oriented Development in Sacramento, California. The SHRA and California Department of Toxic Substances Control (DTSC) have entered into a cleanup agreement under the California Land Reuse and Revitalization Act (CLRRA) to remediate and redevelop the Twin Rivers Triangle Site (Triangle Site). This ABCA is for a portion of the Triangle Site to be transferred to the Sacramento Regional Transit District (RTD) for construction of a light rail station along North 12th Street providing public transportation to this part of Sacramento.

1.1 Introduction

This ABCA, necessary to obtain a U.S. Environmental Protection Agency (US EPA) brownfields cleanup grant, overviews site conditions and site cleanup objectives, and reviews remedial alternatives. SHRA purchased the Triangle Site in July 2011 with intents to (1) transfer a portion to the RTD for construction of the light rail station, and (2) redevelop the balance of the Triangle Site with residential units and possibly some ground floor retail space. Alternative cleanup and environmental management activities considered for the Light Rail Property are as follows:

1. No Action
2. Soil Excavation and Temporary Stockpile On Site (on the balance of the Triangle Site)
3. Soil Excavation and Disposal Off Site
4. Soil Excavation, Stabilization, and Asphalt Cap On Site (on the balance of the Triangle Site).

The cleanup alternatives were evaluated based on the following criteria: effectiveness, feasibility of implementation, remedial costs, and general reasonableness. Based on this analysis, the recommended cleanup alternative for the Light Rail Property is Excavation and Temporary Stockpile On Site (on the balance of the Triangle Site). This alternative would provide long-term effectiveness, is easily implemented, supports sustainability, and would be significantly less expensive than excavation/off-site disposal and excavation/capping on site. To be effective, the remediation would require coordination among the SHRA, the Triangle Site's developer, and DTSC to ensure proper management of the impacted soil on the balance of the Triangle Site.

1.2 Background

The currently undeveloped but fenced Triangle Site, covering 3.14 acres and encompassing six parcels, is approximately 1 mile north of downtown Sacramento, California, and 1,000 feet southwest of the American River. It is bordered by North 12th Street, Sproule Avenue, and North 16th Street (Figures 1 and 2). The Triangle Site will be part of a larger commercial and residential development referred to as the Sacramento Twin Rivers Development, extending approximately 900 feet southwest of the Triangle Site.

This ABCA addresses the cleanup for the 0.6-acre Light Rail Property along North 12th street shown on Figure 2.

Commercial and industrial activities occurred on the Triangle Site from the 1930s through 2005, when the structures were demolished. Historical uses included automotive and truck service and repair, and auto wrecking. The Triangle Site also reportedly received from 3 to 8 feet of import fill material at the time of development from nearby industrial properties.

1.3 Summary of Previous Studies

Several studies at the Triangle Site have occurred since 2013:

- Phase I Environmental Site Assessment (ESA) report prepared by NCE (December 3, 2013)
- Draft Phase II ESA report prepared by NCE (May 9, 2014)
- Phase I ESA report prepared by NCE (September 22, 2016)
- Phase II ESA report prepared by NCE (September 22, 2016).

The 2013 Phase I ESA report covered most of the Triangle Site, omitting two small parcels at the southwest corner (parcel numbers 001-0103-010 and -008). The report concluded that past on-site and nearby off-site industrial uses could have impacted the Triangle Site. The Phase I ESA reported possible presence of one or more underground storage tanks (UST) within the northern portion of the Triangle Site.

The 2014 Phase II ESA report summarized a “limited soil investigation” across the same property assessed during the 2013 Phase I ESA. The site investigation included a geophysical survey to assess possible presence of a UST within the northern portion of the Triangle Property, excavation of test pits by use of a backhoe, and collection of soil samples for laboratory analyses for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCB), metals (total and dissolved), and asbestos. The geophysical survey did not confirm likely presence of a UST, but did detect small metallic objects. Artificial fill was identified across the Triangle Site, ranging in depth from 3 to 8 feet below ground surface (bgs). Near surface soil was found impacted by elevated concentrations of lead, arsenic and thallium.

The September 2016 Phase I ESA report conveyed the following findings: (1) fill material formerly placed on the Triangle Site also had been placed on other nearby properties, and (2) that fill material contained elevated lead concentrations. The Phase I ESA also identified possible presence of a UST at the southwest corner of the Triangle Site based on past use as an auto repair facility.

The September 2016 Phase II ESA involved geophysical surveys at the southwest and north corners of the Triangle Site to assess for presence of USTs, completion of 33 test pits to assess soil conditions and investigate subsurface anomalies identified by the geophysical surveys, collection

of shallow soil samples for laboratory analysis, advancements of eight soil borings to depths between 20 and 28 feet bgs for collection of soil and groundwater samples for laboratory analysis, and collection of nine soil vapor samples at 5 feet bgs across the Triangle Site for VOC analysis. The geophysical surveys identified no USTs. The test pits led to identification of buried debris, including demolition debris, in some areas. Debris included three 55-gallon drums at one location within the southwest portion of the Triangle Site, east of the southern portion of the Light Rail Property. Shallow soil sampling revealed impacts on surface soil of arsenic and lead, and, of less concern, thallium. Several soil samples analyzed for soluble lead were found to exceed State of California Title 22 criteria for off-site disposal as a hazardous waste. Groundwater sample results did not indicate impacts of VOCs, SVOCs, TPH, or metals. Some reporting limits for metals exceeded regulatory screening levels. Soil vapor sample results indicated detection of a lone and non-target compound at concentration well below its regulatory screening level; no other analytes were detected.

1.4 Project Goals

The following project goals for the Light Rail Property will incorporate regulatory standards along with development guidelines and best practices for the proposed use of the Light Rail Property:

- Clean up soil from the Light Rail Property to be protective of construction workers, future light rail users, and future residents.
- Conduct the easiest and most effective transfer of property to the RTD.
- Redevelop the Light Rail Property with a light rail station.

1.5 Human Health and Ecological Risk Assessment

Possible human exposure via direct contact with soil, groundwater, and indoor air at the Triangle Site could threaten human health. Exposure routes include dermal contact, inhalation, and ingestion. Potential future receptors include residents, light rail commuters, light rail workers, and construction/utility workers.

1.5.1 Screening Level Human Health Risk Assessment

Tetra Tech conducted a Screening Level Human Health Risk Assessment (HHRA) of the Triangle Site, including the Light Rail Property. The HHRA included a background evaluation, comparisons of detected analyte concentrations that exceeded background concentrations to risk-based screening values for those analytes, calculations of chemical-specific and cumulative risks and hazards, and formulation of recommendations. Chemicals of concern in surface soil were lead, arsenic, and, thallium. The HHRA report recommended remediation of soil exceeding the cleanup goals listed in Table 1 in order to address elevated soil concentrations of arsenic, lead, and thallium. The HHRA report also concluded the following:

- Detected concentrations of analytes in groundwater do not present significant cancer risks or noncancer hazards related to potential potable groundwater use. Drinking water

provided to the community comes from the American River. Moreover, installation and use of a private groundwater drinking well for a resident of an apartment or townhouse is highly unlikely.

- If required, additional groundwater investigation and remediation would occur as part of remedial actions at the Triangle Site.

1.5.2 Screening Level Ecological Risk Assessment

Tetra Tech performed a Screening Level Ecological Risk Assessment (SLERA) of the Triangle Site, including the Light Rail Property, that evaluated ecological impacts and characterized risks from chemicals in soil to invertebrates, birds, and mammals. The SLERA found limited potential at the Triangle Site for exposure to chemicals in soil at concentrations that would cause adverse effects, and little to no risk posed to ecological receptors. Additionally, the Triangle Site has little habitat value and does not support sensitive species. Therefore, the SLERA report recommended no further assessment of risk to ecological receptors, or development of any ecological risk-based remedial action objectives.

1.6 Cleanup Goals and Objectives

The cleanup objective for the Triangle Site is to remediate it so as to be appropriate for sale and redevelopment (residential and retail). Meeting the cleanup objective will require elimination of exposure pathways by implementation economically of DTSC-approved remedial actions protective of human health and the environment.

Remedial cleanup goals were developed via comparisons of soil analytical results to risk screening levels for residential use. Table 1 lists remedial cleanup goals for the contaminants of concern at the Light Rail Property.

Table 1 – Remedial Cleanup Goals

Arsenic	Lead	Thallium
8.5 milligrams per kilogram (mg/kg)	80 mg/kg	0.78 mg/kg

2.0 APPLICABLE CLEANUP REGULATIONS AND STANDARDS

Section 3.0 discusses oversight and responsibilities for cleanup at the Light Rail Property, conveys cleanup standards, and summarizes applicable laws and regulations. The section also addresses potential impacts on the cleanup associated with climate change.

2.1 Responsibility for Cleanup Oversight

SHRA and DTSC have entered into a CLRRRA agreement for cleanup and redevelopment of the Triangle Site, including the Light Rail Property. The CLRRRA provides certain liability protections to SHRA to encourage cleanup and redevelopment of blighted contaminated properties. The law establishes a process for eligible property owners to obtain immunities, conduct site assessments, and implement response actions as necessary to ensure eligibility of the property for reuse or redevelopment. DTSC is the lead regulatory agency to oversee the CLRRRA process and cleanup of the Triangle Site, including the RTD Property. SHRA has also engaged the services of a qualified environmental contractor (Tetra Tech) to develop and implement an appropriate remediation work plan to address metal-impacted soils. Tetra Tech employs licensed professional geologists (PG), a licensed professional engineer (PE), a Certified Hazardous Materials Manager (CHMM), and qualified All-Appropriate Inquiry (AAI) Environmental Professionals.

2.2 Cleanup Standards

The cleanup standards listed in Table 1 meet residential land use standards or background concentrations. Lead, arsenic, and thallium concentrations exceeding cleanup standards are present in surface and near-surface soil.

2.3 Laws and Regulations Applicable to the Cleanup

The cleanup will comply with the CLRRRA and U.S. EPA Brownfields Program requirements (e.g., for information repository, public comment, ABCA, cleanup oversight, etc.). Cleanup activities at the Triangle Site will generally follow the guidelines outlined in CLRRRA Health and Safety Code Chapter 6.82 and 6.83, and other applicable federal, state, and local laws, rules, and regulations.

2.4 Climate Change Considerations

Topography and climate in Northern California vary dramatically. The Sacramento area has a Mediterranean climate, characterized by wet winters and hot, dry summers. Temperatures typically vary from 39 to 94 degrees Fahrenheit (°F), with occasional extremes to below 31°F or above 102°F. Since the beginning of the 20th century, temperatures have risen approximately 2°F in Northern California. Potential effects of climate change on Northern California include flooding from extreme precipitation and drought associated with reduction in the snowpack. Increasing temperatures raise concerns about sea level rise in coastal areas.

The Triangle Site and Light Rail Property are not directly or significantly susceptible to impacts of climate change. The Triangle Site is not near the coast and would not be impacted by drought conditions. According to Federal Emergency Management Agency Flood Maps, the Triangle Site is within an area of reduced flood risk due to protection by a levee system. The flood insurance rate zone of the Triangle Site corresponds to areas outside the 100-year floodplain or areas protected from the 100-year flood by levees.

3.0 IDENTIFICATION OF POTENTIAL CLEANUP ALTERNATIVES

Based on findings of the Phase II ESAs across the Triangle Site, including the Light Rail Property, surface soil impacted by lead, arsenic, and thallium requires cleanup. Four potential cleanup alternatives were evaluated for the Light Rail Property:

1. No Action
2. Soil Excavation and Temporary Stockpile On Site (on the balance of the Triangle Site)
3. Soil Excavation and Disposal Off Site
4. Soil Excavation, Stabilization, and Asphalt Cap On Site (on the balance of the Triangle Site).

3.1 Alternative 1 – No Action

This alternative would involve no remedial activities at the Light Rail Property, leaving it in its current condition. No Action would entail no further response actions of any type, including administrative controls or monitoring. The No Action alternative is retained as a basis for comparison with other remedial alternatives.

3.2 Alternative 2 – Soil Excavation and Temporary Stockpile On Site

This alternative includes excavating the contaminated soil within the Light Rail Property and temporarily stockpiling the soil on the balance of the Triangle Site for future remediation. The soil stockpiles would be remediated at a future date as part of the overall Triangle Site response action under the CLRRRA agreement. Assumedly, the temporary stockpiles would be in place until completion of remediation of the Triangle Site within a maximum of 2 years.

Soil excavation within the Light Rail Property would remove soils exceeding remedial goals to allow development and construction of the light rail station (Figure 2). Approximately 500 cubic yards of soil would be excavated to depth of 1 foot, and approximately 600 cubic yards of soil would be excavated to depth of 2.5 feet. The exposed excavation surface would be stabilized via application of surface roughening, temporary seeding and mulching, and erosion control blankets. The excavated soils would be placed in approximately 300-cubic-yard stockpiles that would be underlain by a lined cover to prevent vertical migration of soils and contamination. The stockpiles would be covered with plastic sheeting or treated with a soil binder, stabilizing the soil to eliminate potential for air and stormwater impacts. Sediment control best management practices would occur around the perimeter of the stockpile (e.g., silt fence, waddles, and sand bags). The stockpiles would be periodically maintained by inspections of perimeter controls, implementation of inlet protection in accordance with best management practices, and reapplication of plastic sheeting or soil binder as necessary.

3.3 Alternative 3 – Soil Excavation and Disposal Off Site

This alternative includes excavation of contaminated soil within the Light Rail Property and transport of the soil off site to a landfill for disposal. Soil excavation within the Light Rail Property

would remove soils exceeding remedial goals to allow development and construction of the light rail station. Approximately 500 cubic yards of soil would be excavated to depth of 1 foot, and approximately 600 cubic yards of soil would be excavated to depth of 2.5 feet. The impacted soil would be excavated, temporarily stockpiled if necessary, characterized (profiled) for proper disposal, loaded into trucks, and transported to an appropriate permitted landfill. Based on soil sample results from the Phase II ESAs, much of the soil expectedly would require disposal as a California hazardous waste because of presence therein of leachable lead. Potential landfills include the Clean Harbors Buttonwillow Landfill in California, the Waste Management Kettleman Hills Facility in California, and the US Ecology Landfill in Beatty, Nevada. The excavated area would not be backfilled because part of the construction of the Light Rail Station will occur within that area. The exposed excavation surface would be stabilized via application of surface roughening, temporary seeding and mulching, and erosion control blankets. Alternative 3 would require no long-term monitoring or imposition of land use controls at the Light Rail Property following removal of the soil.

3.4 Alternative 4 – Soil Excavation, Stabilization, and Asphalt Cap On Site

This alternative includes excavation of contaminated soil within the Light Rail Property, stabilization of the soil, and placement of the stabilized soil on the balance of the Triangle Site beneath an asphalt cap. Soil excavation within the Light Rail Property would remove soils exceeding remedial goals to allow construction of the Light Rail Station. Approximately 500 cubic yards of soil would be excavated to depth of 1 foot, and approximately 600 cubic yards of soil would be excavated to depth of 2.5 feet. The exposed excavation surface would be stabilized via application of surface roughening, temporary seeding and mulching, and erosion control blankets. Anticipation is that the soils would be stabilized on the balance of the Triangle Site to reduce leaching potential of lead and arsenic to below regulatory guidelines for federal TCLP concentrations and California Soluble Threshold Limit Concentrations (STLC). The stabilized soil would be used as fill material beneath an asphalt cap within the Triangle Site.

Long-term management of the cap would occur to ensure maintenance of the cap in good condition and thus continuing protectiveness of public health and the environment. Operation and maintenance (O&M) of the cap would include periodic visual inspections of the cap for asphalt cracking, settlement, and subsidence to ensure continuation of its function as intended. Periodic sealing of the cap surface would occur as necessary.

Institutional controls (IC) such as Land Use Covenants (LUC) would be required because of continuing presence of hazardous substances on site at concentrations precluding unrestricted use of the property. Five-Year Reviews would occur as necessary to evaluate ongoing remedy effectiveness. Purposes of the reviews are to help ensure that the remedy:

- Remains protective of human health and the environment
- Remains functional as designed

- Undergoes appropriate maintenance via O&M activities.

3.5 Evaluation of Cleanup Alternatives

Potential cleanup alternatives were evaluated according to the following criteria: effectiveness, feasibility of implementation, remedial costs, and general reasonableness. Capital and O&M cost estimates are order-of-magnitude-level estimates for comparison purposes, and expected accuracy of those estimates ranges from minus 30 to plus 50 percent.

3.5.1 Alternative 1 – No Action

- *Effectiveness* – The No Action Alternative would not be effective because it would do nothing to address toxicity, mobility, or volume of contamination on site. It also would constrain and potentially eliminate any practical redevelopment.
- *Implementation Feasibility* – This alternative would be easily implemented.
- *Remedial Costs* – No cost would be necessary for this alternative.
- *General Reasonableness* – This alternative would provide no long-term management of the Triangle Site's contamination and would effectively prohibit site development. As a result, this is not a reasonable cleanup option.

3.5.2 Alternative 2 – Soil Excavation and Temporary Stockpile On Site

- *Effectiveness* – Complete excavation of the impacted soil would provide long-term effectiveness by permanently removing all contamination from the Light Rail Property. This alternative would ensure that future redevelopment of the Light Rail Property would not encounter residual contamination, thereby eliminating future exposure pathways. The excavated soils to be temporarily stockpiled on the balance of the Triangle Site would be remediated along with the remediation of the Triangle Site. The maximum estimated time period over which the soil would be stockpiled is 2 years.
- *Implementation Feasibility* – This alternative would be easily implemented by application of standard construction methods. It would require construction of a stockpile pad and temporary maintenance of the stockpiles until completion of remediation of the Triangle Site. Alternative 2 would necessitate no off-site transport of waste on public roadways or disposal of waste to landfills, reducing associated impacts. Excavation and stockpiling of the soil would likely require up to 6 to 8 weeks in the field.
- *Remedial Costs* – Estimates of capital cost, annual O&M cost for 2 years, and total present worth cost for Alternative 2 are as follows:
 - Capital Cost: \$176,000
 - Annual O&M Cost \$47,000
 - Total Present Worth Cost: \$260,000

- *General Reasonableness* – Both economic and environmental factors render this option very reasonable. This alternative would have the lowest cost, allow for site development for the Light Rail Station, and eliminate exposure pathways and threats to the environment and human health. The soils would ultimately be remediated as part of the Triangle Site remedial action. The alternative would minimize environmental impacts of hauling and landfilling 1,800 tons of contaminated soil and would support the sustainability goal to reduce solid waste entering area landfills.

3.5.3 Alternative 3 – Soil Excavation and Disposal Off Site

- *Effectiveness* – Complete excavation and off-site disposal of all impacted soil would provide the most long-term effectiveness by permanently removing all contamination. This alternative would ensure that future redevelopment of the Light Rail Property would not encounter residual contamination, thereby eliminating future exposure pathways.
- *Implementation Feasibility* – This alternative would be easily implemented by application of standard construction methods. It would require transport and disposal of approximately 1,800 tons of material to a landfill approximately 225 miles from the Light Rail Property. An excavation of this size would likely necessitate 5 to 7 weeks in the field and approximately 110 truckloads to the landfill.
- *Remedial Costs* – This alternative would have no annual O&M costs because the Triangle Site would be closed, with no further action or ICs required. Estimates of capital cost, annual O&M cost, and total present worth cost for Alternative 3 are as follows:
 - Capital Cost: \$588,000
 - Annual O&M Cost \$0
 - Total Present Worth Cost: \$588,000.
- *General Reasonableness* – This alternative ranks low for reasonableness. It would remove the impacted soil, eliminating the risk and threat to the environment and human health, and would allow redevelopment of the site; however, it would have a very high capital cost. Additionally, environmental impacts would be associated with transportation and disposal of 1,800 tons of waste at the landfills, and the California landfills are currently affected by debris removal efforts associated with the area's wildfires.

3.5.4 Alternative 4 – Soil Excavation, Stabilization, and Asphalt Cap On Site

- *Effectiveness* – Soil excavation, stabilization, and on-site asphalt cap would provide long-term protection to human health and the environment by eliminating future exposure pathways as long as the cap is competent and maintained. This alternative would remove impacted soil, allowing future redevelopment and construction of the light rail station. Asphalt caps have proven to be effective barriers for buried contaminated soil.
- *Implementation Feasibility* – Standard construction practices would be implemented, but

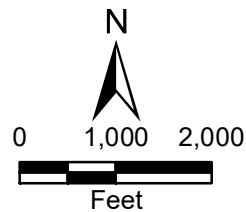
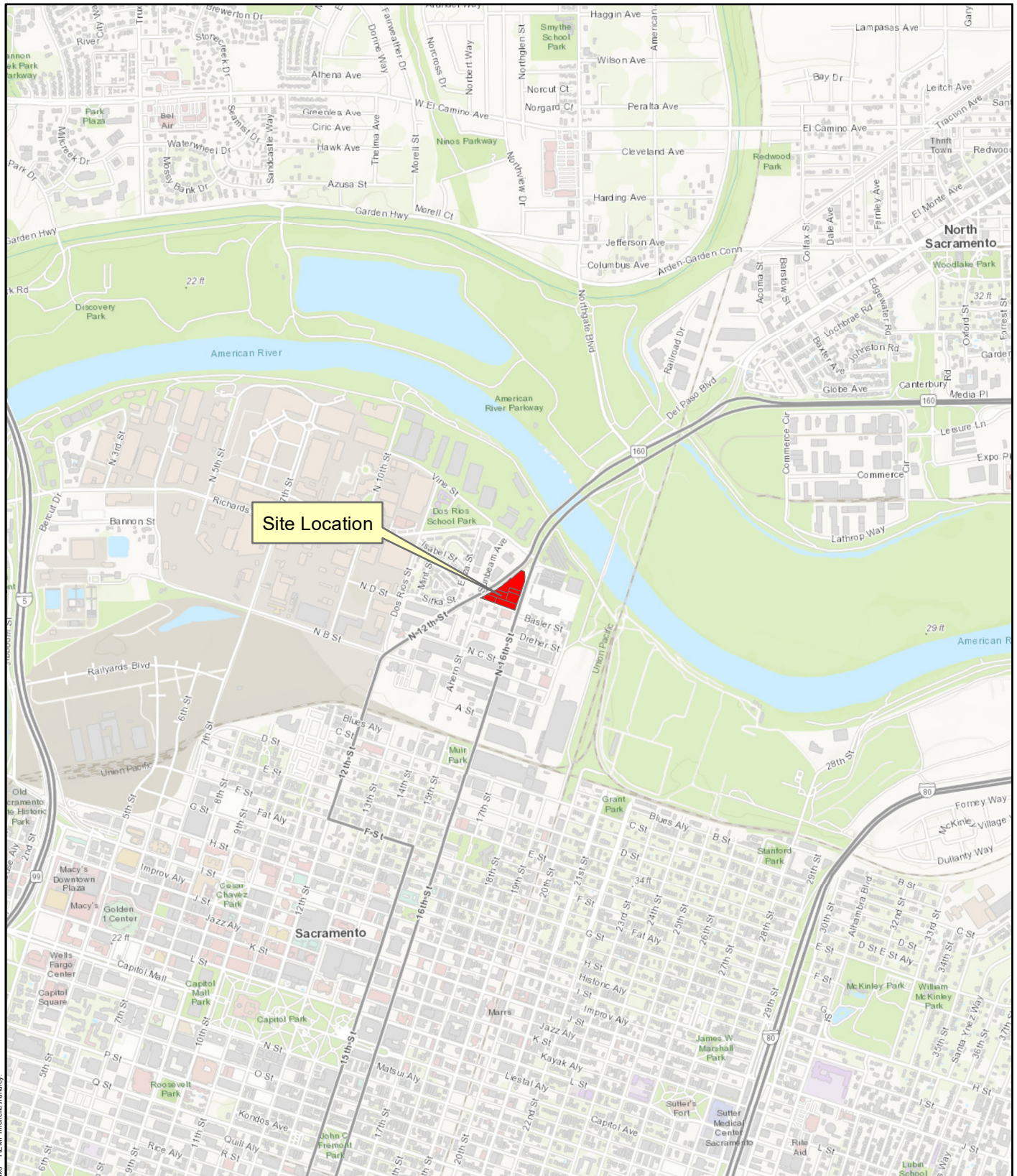
would be more complex than the other alternatives because of additional excavation and construction of an asphalt cap. This alternative would require coordination with the site developer regarding construction and placement of the cap, and would necessitate long-term maintenance of the cap and ICs. An excavation of this size and construction of an asphalt cap would likely require up to 8 to 10 weeks in the field.

- *Remedial Costs* – Estimates of capital cost, 30 years of annual O&M costs, and total present worth cost for Alternative 2 are as follows:
 - Capital Cost: \$272,000
 - Annual O&M Cost \$28,000
 - Total Present Worth Cost: \$624,000
- *General Reasonableness* – This alternative would relocate impacted soil beneath a protective on-site cap, allowing redevelopment and installation of the light rail station. Placement of soils under the cap would eliminate exposure pathways and threats to the environment and human health. Implementation of this alternative would have the highest total present worth cost but a moderate capital cost. The alternative would minimize the environmental impact of haul and disposal of 1,800 tons of contaminated soil, and would support the sustainability goal to reduce solid waste entering California landfills.

3.6 Recommended Cleanup Alternative

The recommended cleanup alternative for the Light Rail Property of the Triangle Site is Alternative 2, Soil Excavation and Temporary Stockpile On Site (on the balance of the Triangle Site). This Alternative would eliminate exposure pathways and threats to the environment and human health on the Light Rail Property, allowing construction of the light rail station economically. It would provide long-term effectiveness because the soil would be remediated as part of the Triangle Site remediation. SHRA is working with DTSC under a CLRRRA agreement to remediate the Triangle Site. Alternative 2 would be easily implemented and would support the sustainability goal of reducing the amount of waste transported to and undergoing disposal at landfills.

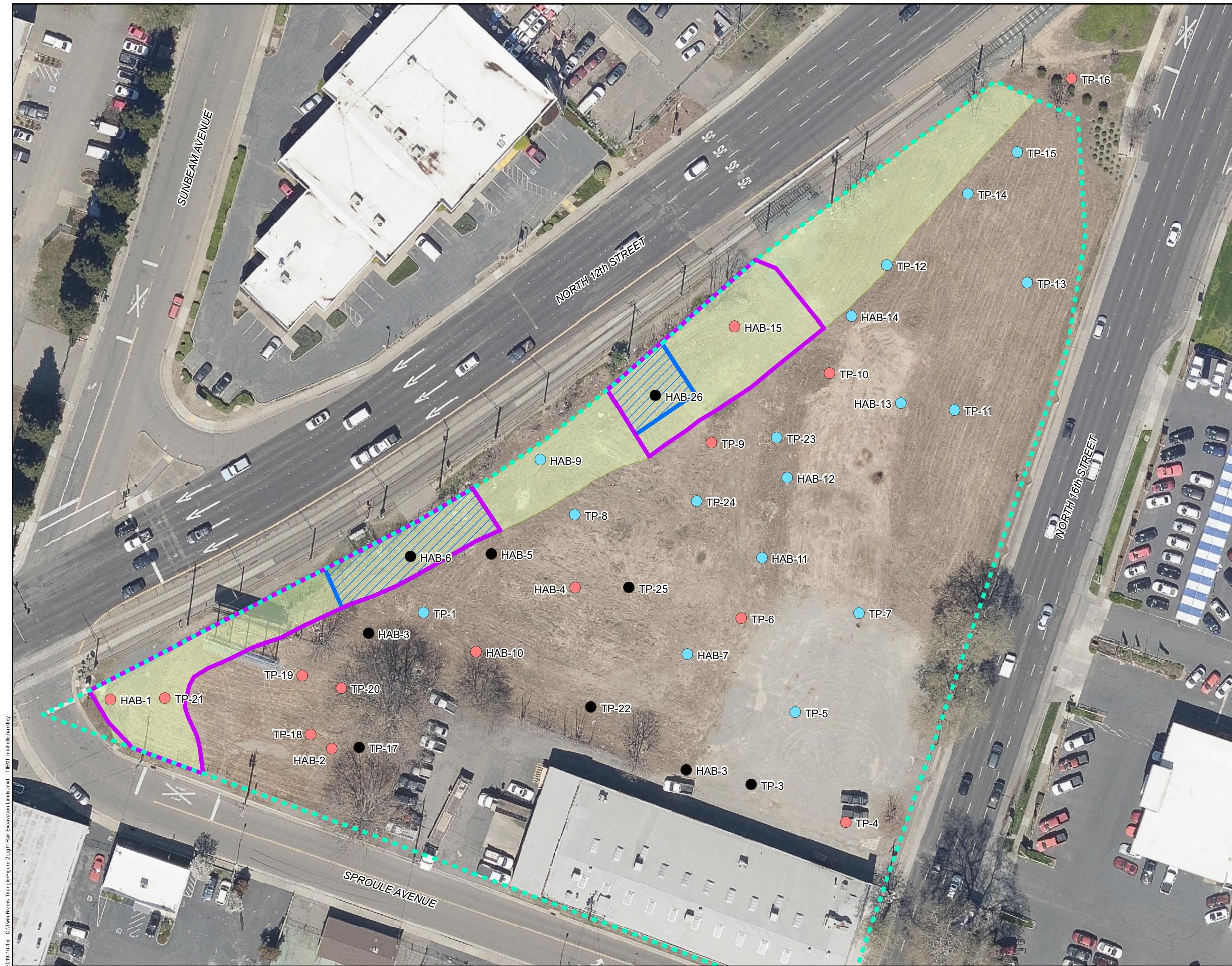
FIGURES



Twin Rivers Triangle
 Sproule Avenue and North 12th Street
 Sacramento, Sacramento County, California

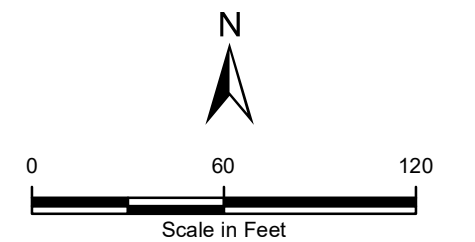
Figure 1
 Site Location Map





Sample Location

- Below Cleanup Remediation Goal
- Exceeds Cleanup Remediation Goal to 1 foot
- Exceeds Cleanup Remediation Goal to 1.5 foot
- Twin Rivers Triangle Site
- Excavation to 1 foot bgs
- Excavation to 2.5 feet bgs
- Light Rail Property



Twin Rivers Triangle
Sproule Avenue and North 12th Street
Sacramento, Sacramento County, California

Figure 2
Excavation Limits
for Light Rail Property

