Final
Analysis of Brownfields Cleanup Alternatives
Geneva Car Barn and Powerhouse
Targeted Brownfields Assessment

2301 San Jose Avenue
San Francisco, California

Prepared for:
U.S. Environmental Protection Agency
Region 9

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EXECUTIVE SUMMARY

This Analysis of Brownfields Cleanup Alternatives (ABCA) compares different cleanup scenarios for the Geneva Car Barn and Powerhouse site. It was requested by the San Francisco Recreation and Parks Department and performed by the United States Environmental Protection Agency contractors. This ABCA is to be used with a Phase II Brownfields Assessment conducted by Ecology & Environment, Inc. (E&E) in 2013. The Site consists of a two-story former office building which occupies 6,200 square feet (ft^2), and an attached one-story powerhouse that occupies 3,700 ft^2. The San Francisco Recreation and Parks Department is looking to redevelop the buildings as a community center.

The following environmental concerns were noted during the Phase II Assessment (Figure ES-1):

- Asbestos Containing Material (ACM) was found in the former office building and powerhouse. ACM will need to be abated.
- Lead-based paint (LBP) was found in the former office building and powerhouse. Lead-based material (LBM) was also found in the former office building.
- Oil-stained concrete on the first floor and basement of the powerhouse contain polychlorinated biphenyls (PCBs). Oil-stained concrete will need to be remediated for PCBs.

Three options were evaluated for the site buildings based on effectiveness, implementability, and cost in the table on the following page:

- No Action,
- Institutional Controls (ICs), and
- Rehabilitation of buildings.

ICs are administrative and legal tools that do not involve construction or physically changing the site. Effectiveness is the satisfaction of cleanup goals and the protection to human and environmental health/safety. Implementability addresses the technical and administrative feasibility of the option.

If no corrective action is taken, the Site will continue to pose a risk to public safety; the Site will not be protective of human health if occupied. If ICs are implemented then the project goals of redeveloping the buildings into a community center will not be met. The third option is divided into a and b to give the choice of cleaning up one or both of the buildings. If both buildings are rehabilitated, they will meet the project goals as a community center.

Table ES

Summary and Comparison of Cleanup Alternatives

Alternative	Actions	Effectiveness	Implementability	Approximate Cost	Considerations
1: No Action	None	Low	Easy	None	High potential for future liability.
2: Institutional Controls	Implement institutional controls where impacted media would remain in place. Site redevelopment would be restricted to commercial or industrial uses. **The institutional controls (zoning restrictions) will not meet the project goals of redeveloping the building into a community center.**	Moderate	Easy	Permit Fees	Potential for future liability.
3: Rehabilitation of Structures	Alternative 3a and 3b: Abate asbestos, Lead Based Paint (LBP), and lead-based material (LBM) and remove PCB contaminated concrete from the former office building and powerhouse.	High	Easy	$107,764	None
	Alternative 3a Former Office Building: Abate asbestos and LBP.	High	Easy	$43,580	None
	Alternative 3b Powerhouse: Abate asbestos and LBP and remove PCB contaminated concrete floors.	High	Easy	$64,184	None

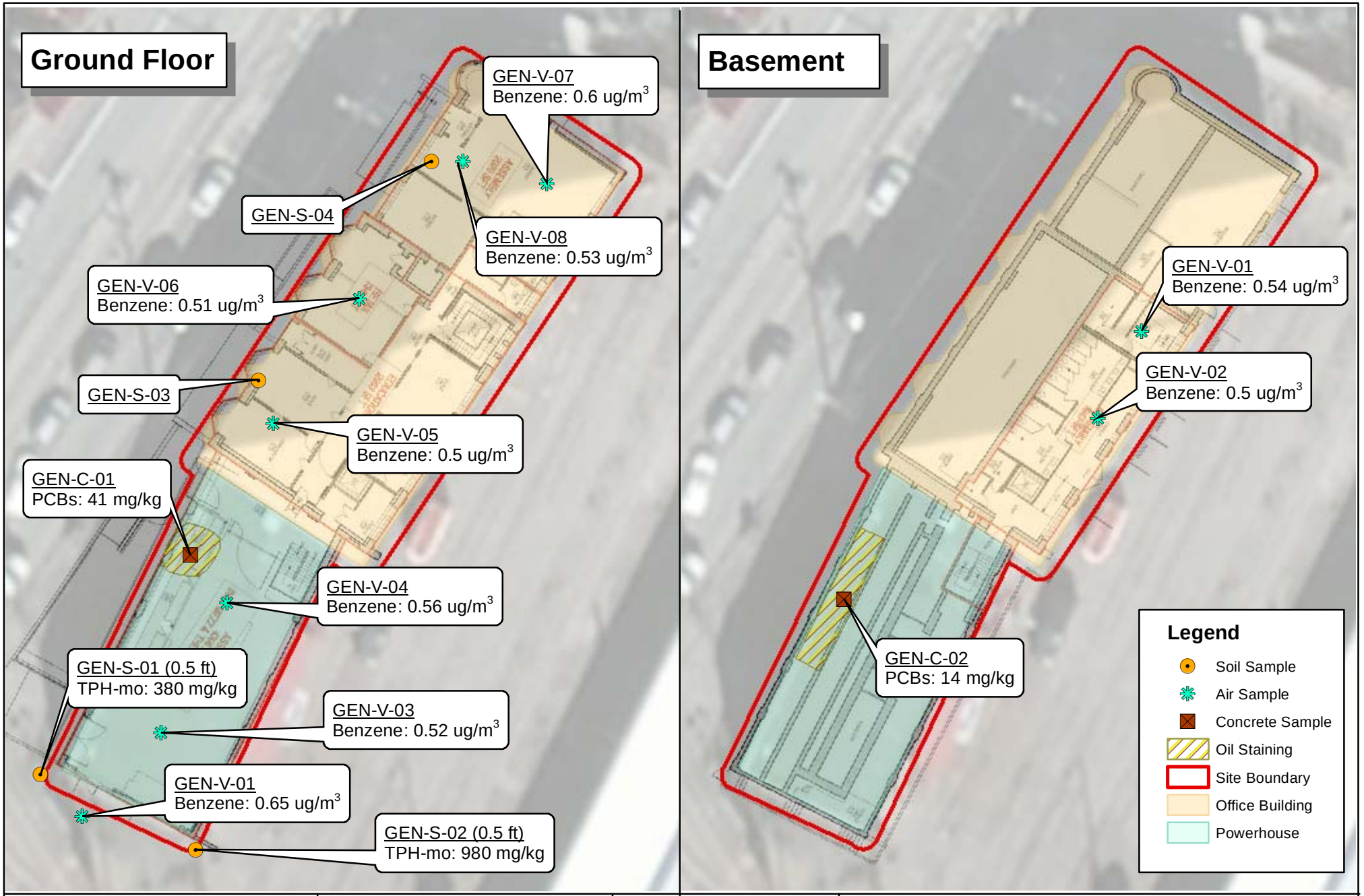

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FIGURE ES-1
SAMPLE RESULT EXCEEDANCES
Geneva Car Barn and Powerhouse
San Francisco, CA

1. Introduction and Background

The U.S. Environmental Protection Agency (EPA), Region 9, in coordination with the U.S. Army Corps of Engineers (USACE), tasked Weston Solutions, Inc. (WESTON®) to conduct an Analysis of Brownfields Cleanup Alternatives (ABCA) for the Geneva Car Barn and Powerhouse site (Site), which consists of one building and surrounding powerhouse structures at 2301 San Jose Avenue, San Francisco, CA. This ABCA is intended to be used in conjunction with a Phase II Brownfields Assessment conducted by Ecology & Environment, Inc. (E&E) in 2013. A community organization, the Friends of the Geneva Office Building and Powerhouse has been the recipient of an EPA Region 9 Targeted Brownfields Assessment (TBA) assistance award. The San Francisco Recreation and Parks Department, in conjunction with local community group (Friends of the Geneva Office Building and Powerhouse) are looking to redevelop and rehabilitate the Site buildings to be used as a community meeting and youth activity center. The work was performed for EPA under USACE Contract W91238-11-D-0001.

The purpose of the ABCA is to evaluate possible remedial alternatives, based on Site conditions and the anticipated reuse of the site. This evaluation will be expanded, modified if necessary, and incorporated into the final Site Cleanup Plan for review by the community, project partners, and the regulatory oversight agency.

1.1 Site Location

The Site occupies a 0.3 acre portion of APN 6972-036, which is 2.7 acres in total, in San Francisco, CA (Figure 1). The Site consists of a two-story former office building which occupies 6,200 square feet (ft^2), and an attached one-story powerhouse that occupies 3,700 ft^2. The San Francisco Municipal Transportation Agency (SFMTA) owns APN 6972-036, but the Site is owned, but not operated, by the San Francisco Department of Parks and Recreation.

The Site extends 5 feet away from the former building and powerhouse structures (Figure 2). The building was damaged during the 1989 Loma Prieta earthquake and is currently vacant. The Site is located approximately 200 feet above sea level.

1.2 Ownership and Previous Use

Ownership and previous use information was obtained during Phase I ESA applicant interviews. The two-story building was temporarily used by the SFMTA as office-space and transit agency worker housing during the 1917 Carman Strike. The attached single-story powerhouse structure contained power structures used to power electric street cars from the 1900s until the 1970s. The two present buildings are the only known structures to have ever existed at the Site. Prior to the 1900s, the Site was previously used for agriculture. The two buildings were condemned after the 1989 Loma Prieta Earthquake, and planned for demolition by SFMTA.

1.3 Previous Investigations

Based on SFTMA's demolition plans, a Phase I Environmental Site Assessment (ESA) was conducted in 1998 by Environmental Science Associates, Inc. The Phase 1 was performed to identify potential impacts to construction workers during the demolition process. E&E conducted a Phase I ESA in 2012 and a Phase II ESA in 2013 that evaluated the Site based on the current use proposed by the Friends of the Geneva Office Building and Powerhouse Site Assessment Findings. Recognized environmental conditions were identified during the Phase I ESA:

- "The possible presence of oil or heating oil in soil at the southwest end of the powerhouse near a former oil storage area, including potential for vapor intrusion of VOCs into the powerhouse structure;
- The possible presence of chlorinated VOCs in breathing air inside the office building and powerhouse resulting from off-site use and potential releases of chlorinated solvents at for former Turko Persian Rug cleaning facility to the southwest, the former light rail car maintenance facilities to the northwest and southeast, and the current light rail maintenance facility to the north;
- The possible presence of PCBs in oil staining on the concrete floors of the powerhouse structure and in the basement of the powerhouse;
- The possible presence of PCBs in fluorescent light ballasts throughout the office building, and in various electrical components observed in the office building and in the basement of the powerhouse;
- The presence of mercury in thermostats throughout the office building;
- The possible presence of asbestos and lead in construction materials."

The sample results and findings of the Phase II ESA were used to prepare this ABCA.

1.3.1 Phase II Site Assessment Findings

Soil, concrete chip, and ambient air samples were collected from February 19 to 22, 2013 for total petroleum hydrocarbons, metals, and polychlorinated-biphenyls (PCBs). Two concrete chip samples were collected from oil-stained concrete areas in the powerhouse 1st floor and basement and analyzed for PCBs. Air samples were collected inside both buildings onsite and upwind of the Site and analyzed for selected volatile organic compounds (VOCs). Mercury vapor concentrations were analyzed inside buildings onsite. An asbestos containing material (ACM) and lead based paint (LBP) survey was conducted from February 28, 2013 to February 29, 2013 and March 12, 2013 to March 13, 2013, respectively. ACM is defined as material containing greater than (>) 1 % asbestos. LBP and lead containing material (LCM) is defined as material containing greater than or equal to 1 milligram per cubic centimeter (mg/cm^3). The findings from the Phase II ESA investigation identified the following hazardous materials associated with the buildings:

- The ACM survey determined the presence of ACM in both the powerhouse and the two-story former office building. ACM was determined to be present in the powerhouse in an area of 74 square feet in cement panel, insulation, insulator, and mastic at asbestos concentrations >1%. Some materials with an area of 6,050 square

feet within the powerhouse that were inaccessible during the ACM survey are assumed to contain ACM: galbestos panels, putty, and roofing materials at assumed asbestos concentration of >1%. ACM was determined to be present within the former office building in 5,387 square feet within insulation, mastic, vinyl floor tile, insulator, cement panel, tape, and heat shield. Material containing asbestos at a percentage greater than 0.1 % but less than 1 % (less than the percentage required to designate material as ACM) was found in the former office building in an area of 1,500 square feet throughout wallboard/joint compound.

- The LBP survey determined the presence of LBP in both the powerhouse and the two-story former office building. LBP is present within the powerhouse at 16,000 square feet throughout the exterior at lead concentrations greater than or equal to (≥) 1.0 milligram per centimeter squared (mg/cm^2) and/or ≥0.5 percent weight. LBP is present throughout the former office building in an area of 37,500 square feet at lead concentrations ≥1.0 mg/cm^2 and/or ≥0.5 percent weight. Lead-based material (LBM), vinyl sheet flooring, is present in the former office building in an area of 250 square feet at lead concentrations ≥1.0 mg/cm^2 and/or ≥0.5 percent weight. All remaining tested materials within the former office building had lead concentrations below 1 mg/cm^2, and therefore, are not LBP or LBM. However, the remaining testing materials in the former office building contained lead in excess of the level for compliance with trigger activities as defined in Title 8 CCR Section 1532.1.
- Soil samples were collected at four boring locations near the building foundations (two borings were located on the south end of the powerhouse and two borings were located on the west end of the former office buildings) and analyzed for petroleum hydrocarbons, metals and PCBs. Total petroleum hydrocarbons as gasoline (TPH-g), total petroleum hydrocarbons as diesel (TPH-d) and metal concentrations were not detected above their respective screening levels. Benzene, toluene, ethylbenzene, and xylenes (BTEX) and PCB constituents were not detected in any of the soil samples. Total petroleum hydrocarbons as motor oil (TPH-mo) was detected in two soil samples collected at 0.5 feet bgs at concentrations exceeding the project screening level. However, considering the absence of obvious indications of contamination and the locations of the detections of TPH-mo directly below asphalt pavement, the reported TPH-mo concentrations are most likely associated with the asphalt and not with contamination.
- Oil-stained concrete within the powerhouse first floor and basement was tested for PCBs. The powerhouse 1st floor oil-stained area of 16 feet by 16 feet contained Aroclor 1260 at a concentration of 41 mg/kg. The powerhouse basement oil-stained area: of 6 feet by 40 feet contained Aroclor 1260 at a concentration of 14 mg/kg. These areas need to be demolished until all PCBs are below 1 mg/kg based on the planned building reuse.
- Indoor air samples were collected in the former office building and powerhouse. The indoor air samples were analyzed for chlorinated VOCs (perchloroethylene, trichloroethylene, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, and vinyl chloride) using EPA Method TO-15 with selective ion monitoring. Chlorinated VOCs were not detected in any of the samples.

A survey of potentially hazardous materials and universal waste was not conducted during the Phase II ESA. All the surveyed buildings were assumed to have light fixtures with ballasts that could contain polychlorinated biphenyls (PCBs) and fluorescent lights

that could contain mercury based on the Phase I ESA. Mercury was identified in thermostats throughout the former office building during Phase I ESA activities.

1.4 Project Goal

The San Francisco Recreation and Parks Department, in conjunction with local community group, Friends of the Geneva Office Building and Powerhouse, plan to redevelop the Site to provide recreational, educational and cultural programming for youth and adults in the surrounding neighborhood, the city of San Francisco, and the region, including arts-related job training for underserved youth. The San Francisco Recreation and Parks Department plans to remodel the existing former office building and powerhouse.

2. Applicable Regulations and Cleanup Standards

2.1 Cleanup Oversight Responsibility

The Bay Area Air Quality Management District (AQMD) regulates the demolition and renovation of buildings and structures that may contain asbestos, or milling and manufacturing of specific materials which are known to contain asbestos. The provisions that cover these operations are found in AQMD Regulation 11, Rule 2. Because asbestos has been used extensively in residential, commercial, and industrial construction, AQMD Regulation 11-2-401.3 requires that for every renovation involving the removal of 100 square feet/linear feet or greater of Regulated Asbestos Containing Material (RACM), and for every demolition (even when no asbestos is present), a notification must be made to the AQMD a minimum of 10 working days (except in special circumstances) prior to commencement of demolition/renovation.

The Regional Water Quality Control (RWQCB) and the Department of Toxic Substances Control (DTSC) have the authority to regulate cleanup of polluted/contaminated sites in California. In order to improve the coordination between agencies on oversight of Brownfields cleanups, a Memorandum of Agreement (MOA) was signed on March 1, 2005. The MOA describes the process and considerations used to determine the appropriate lead agency for a particular Brownfields site.

The Site has not been entered into the DTSC Site Mitigation and Brownfields Reuse Program database of properties that may be contaminated (EnviroStor). The EnviroStor database provides access to detailed information on hazardous waste permitted and corrective action facilities, as well as existing site cleanup information. EnviroStor allows users to search for information on investigation, cleanup, permitting, and/or corrective actions that are planned, being conducted, or have been completed under DTSC's oversight.

If additional soil samples need to be collected, then the Maher Ordinance will be applicable during soil sampling activities. The Maher Ordinance, developed in 1986 and administered by San Francisco Department of Public Health and the San Francisco Department of Building Inspection, requires applicants for building permits to develop site histories and, if necessary, to test soils for hazardous substances and perform

appropriate handling, clean-up or capping of contaminated sites. The Maher Ordinance will be only be applicable if additional soil samples are collected, otherwise, it will not be applicable to the site because soil concentrations for contaminants of concern were not detected, with the exception of TPH-mo, in any of the soil samples collected during the Phase II Assessment (E&E, 2013). TPH-mo contamination was determined to be associated with the asphalt pavement and not contamination.

2.2 Cleanup Standards for Major Contaminants

Asbestos Containing Materials

A material shall be considered non-asbestos containing only if all samples collected of that material indicate that no asbestos is detected. Materials containing greater than 1% asbestos as determined by Polarized Light Microscopy (PLM) methodology are considered to be an ACM, according to EPA. These materials are subject to regulatory provisions under 40 CFR 61. Materials containing greater than one tenth of one percent (>0.1%) asbestos as determined by PLM methodology are considered to be an asbestos-containing construction materials (ACCM) according to California Occupational Safety and Health Administration (Cal-OSHA). These materials are subject to regulatory provisions under California Code of Regulations (CCR) Title 8, Section 1529.

Lead-Based Paint

The State of California, U.S. Department of Housing and Urban Development (HUD), and EPA define LBP as a painted or other surface coating material containing greater than or equal to 5,000 parts per million of lead (40 CFR Part 745). However, Cal-OSHA requires initial employee exposure monitoring be conducted to evaluate work exposure during work that disturbs lead-containing material, where lead is present in any detectable level (CCR Title 8, Section 1532.1).

PCBs in concrete

PCB results in concrete were compared to cleanup levels required by the Toxic Substances Control Act (TSCA) regulations within 40 CFR Part 761 for the cleanup and disposal of PCBs. The regulations prescribe cleanup thresholds for varied reuse goals. The oil-stained concrete containing PCBs onsite is considered to be a PCB remediation waste, specifically a "porous surface." Based on the reuse goals determined by the San Francisco Recreation and Parks Department, the oil-stained concrete is within a planned high occupancy area and should be removed until PCBs concentrations are present at a concentration of less than or equal to 1 part per million (ppm).

2.3 Laws and Regulations Applicable to the Cleanup

Site cleanup and redevelopment should be conducted in compliance with applicable laws and regulations that govern the disturbance of hazardous building materials. The asbestos remediation activities at the site will be subject to the Bay Area AQMD Regulation 11, Rule 2 and 11-2-401.3; EPA 40 Code of Federal Regulations (CFR) Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP); and Occupational Safety and Health Administration (OSHA) Asbestos Construction Standard 29 CFR 1926.1101.

The lead-based paint abatement will be subject to OSHA Lead Construction Standard 29 CFR 1926.62; California OSHA Lead in Construction Standard Title 8 CCR Section 1532.1; and HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing as a guideline for the development of clearance criteria.

Laws and regulations that are applicable to this cleanup include the Federal Small Business Liability Relief and Brownfields Revitalization Act, the Federal Davis-Bacon Act (for federally funded or assisted public works projects), and local laws. Federal, state, and local laws regarding procurement of contractors to conduct the cleanup will be followed.

The Maher Ordinance requires San Francisco Department of Public Health oversight for the characterization and mitigation of hazardous substances in soil and groundwater in designated areas zoned for industrial use or underground storage tanks, sites with historic bay fill, sites in close proximity to freeways or underground storage tanks. If additional soil samples need to be collected, then the Maher Ordinance will be applicable during soil sampling activities, otherwise, it will not be applicable to this cleanup because soil concentrations for contaminants of concern were not detected, with the exception of TPH-mo, in any of the soil samples collected during the Phase II Assessment (E&E, 2013). TPH-mo contamination was determined to be associated with the asphalt pavement and not contamination.

3. Evaluation of Brownfields Cleanup Alternatives

3.1 Cleanup Action Objectives

The results of the TBA have confirmed the presence of LBP and ACM in the former office building and powerhouse onsite. Additionally, oil-stained concrete in the powerhouse contains PCBs above acceptable cleanup concentrations for the intended reuse of the Site. The objective of the cleanup at the buildings is to reduce or prevent potential risk to human health and/or the environment from hazardous building materials before restoration activities begin. Abatement construction workers would endure a short-term exposure to hazardous building materials, including LBP, ACM, and mercury- and PCB-containing building materials.

3.2 Identification and Evaluation of Cleanup Alternatives

Based on the historical status of the buildings onsite and planned reuse, three options were evaluated – No Action, Institutional Controls, and Rehabilitation of Structures.

Evaluation criteria include effectiveness, implementability, and cost. The evaluation for effectiveness considers the appropriateness of the alternative with respect to long- and short-term satisfaction of cleanup goals and comprehensiveness in terms of protection to human and environmental health/safety. Implementability addresses the technical and administrative feasibility of the remedial alternative. Cost evaluates the short- and long-term costs associated with remedy implementation.

Alternative 1 – No Action

The No Action Alternative is included as a baseline for comparison to the other proposed alternatives. The No-Action Alternative assumes that the buildings will continue to exist as is; none of the proposed actions listed in the other alternatives would be initiated.

Effectiveness: This alternative would not provide for mitigation of the actual or potential risks posed by the hazardous building materials. The current state of the buildings onsite does not allow for the intended reuse goals to be met. If no corrective action is taken, the site will continue to pose a risk to public safety and is not protective of human health is occupied.

Implementability: This alternative is easily implemented.

Cost: No costs would be incurred during the implementation of this alternative, other than potential maintenance.

Alternative 2 – Institutional Controls

Institutional Controls are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. The Institutional Controls alternative includes the implementation of institutional controls, where impacted media would remain in place,

but site redevelopment would be restricted to commercial or industrial uses. **The institutional controls (zoning restrictions) will not meet the project goals of a community center.** The restrictions are based primarily on reduced exposure times associated with workers in commercial and industrial settings. The plan should document that only employees trained per 40 CFR 1910.120 for Hazardous Waste Operations (Hazwoper) will be allowed to work at the Site until the hazards are mitigated.

Effectiveness: Contaminated media would remain in place, but would not be considered a significant threat or hazard if the institutional controls and restrictions were implemented.

Implementability: This alternative requires little action, and is easily implemented.

Cost: No costs would be incurred during the implementation of this alternative, other than potential permitting and maintenance fees.

Alternative 3 – Rehabilitation of Structures

This action would entail the abatement of hazardous building materials.

Effectiveness: During ACM and LBP abatement and follow-on cleanup activities, workers may be exposed to hazardous building materials on a short-term basis. However, personnel conducting these activities would be required to have appropriate training and personnel protective equipment to mitigate health risks during cleanup activities. Following the ACM and LBP abatement and PCB-contaminated concrete removal, the Site would no longer pose a continued risk to site users.

Implementability: The abatement of hazardous building materials from the interior of the former office building and powerhouse is considered feasible. The demolition debris would need to be disposed off-site at an appropriate landfill.

Cost: The cost for the removal of hazardous building materials are itemized for each building on Table 1. The cost includes LBP abatement and ACM abatement for the former office building and the powerhouse as well as removal of PCB-contaminated concrete within the 1st floor and basement of the powerhouse. The costs do not include restoration of the building after abatement activities are conducted.

Table 1

Cost Estimate for Cleanup Alternative 3

Building	ACM Abatement/ Monitoring	LBP Abatement/ Universal Waste	PCB contaminated concrete removal	Total
Former Office Building	$31,940	$11,640	N/A	$43,580
Powerhouse	$34,686	$11,640	$17,858	$64,184
Total	**$66,626**	**$23,280**	**$17,858**	**$107,764**

3.3 Comparison of Alternatives

Alternative 1: *No Action* would meet none of the protective criteria for this project and is therefore dismissed without additional evaluation.

Alternative 2: *Institutional Controls* would meet the same short-term protective criteria as Alternative 1, but the restriction of potential redevelopment land uses would better meet long-term protective criteria, and is therefore considered a more preferable option than Alternative 1. Little if any costs or efforts are associated with this option.

Alternative 3: *Rehabilitation of Structures* is protective in the short term and long term. It would remove the hazardous building materials from the Site during abatement activities. The existing structure activities discussed in alternative 2 in order to be converted to a residential style (community center) building. After renovations, the building would no longer to pose a physical hazard to trespassers.

3.4 Remediation Technologies

EPA provides guidance for specific technologies which may be used for the remediation of hazardous wastes and other contaminates. Detailed links for EPA's remediation technology guidance, as well as case studies and demonstrations can be found online at http://www.epa.gov/superfund/remedytech/remed.htm#tech.

3.5 Consideration of Climate Change Impacts

Scientific evidence demonstrates that the climate is changing at an increasingly rapid rate, outside the range to which society has adapted in the past. These changes can pose significant challenges to EPA's ability to fulfill its mission. EPA must adapt to climate change if it is to continue fulfilling its statutory, regulatory, and programmatic requirements. EPA is therefore anticipating and planning for future climate changes to ensure it continues to fulfill its mission of protecting human health and the environment even as the climate changes.

In February 2013, EPA released its draft Climate Change Adaptation Plan to the public for review and comment. The plan relies on peer-reviewed scientific information and expert judgment to identify vulnerabilities to EPA's mission and goals from climate change. The Region 9 Plan identifies vulnerabilities in Region 9, including lack of rainfall and the prospect of future droughts, reduction in groundwater supply, sea level rise, projected temperature increase and its impact on urban areas, wildfire prevalence, agricultural and ocean productivity, and habitat loss and ecosystem shift. Priority is being placed on mainstreaming climate adaptation within EPA and to encourage adaptation planning across the entire federal government.

The nine-county San Francisco Bay Area has recognized the potential of climate change to impact the economy, environment, and quality of life in the Bay Area. According to a shoreline vulnerability assessment released by the San Francisco Bay Conservation and Development Commission (BCDC) in October 2011, a 16-inch rise in sea level (relative to sea level observed in 2000) would potentially expose 281 square miles of Bay

shoreline to flooding, and a 55-inch rise in sea level would potentially expose 333 square miles of Bay shoreline to flooding.[1]

The subject buildings are at an elevation of approximately 200 feet above mean sea level in San Francisco, CA. The San Francisco Parks and Recreation Department has plans to remove the hazardous building materials within the buildings and restore the historical buildings for public use as a community center or other use. Based upon current BCDC shoreline vulnerability assessment, the subject buildings are not vulnerable to sea level rise. Figure 4 illustrates three potential inundation scenarios at the Site: 46-cm (18-inch) sea level rise predicted by 2050; 100-cm (39-inch) sea level rise predicted by 2081; and 139-cm (55-inch) sea level rise predicted by 2099.

3.6 Green and Sustainable Remediation Guidance

When implemented effectively, green and sustainable remediation practices enhance the environmental benefits offered by federal cleanup and redevelopment programs such as the EPA Brownfields Program. The principles governing green and sustainable remediation for EPA cleanup programs have been outlined in greater detail[2], but generally seek to "optimize environmental performance and implement protective cleanups that are *greener* by increasing our understanding of the environmental footprint and, when appropriate, and taking steps to minimize that footprint."

The following benefits can be reached through preferential use of green remediation approaches:

- Waste production and use of materials can be minimized
- Impacts to water quality and water resources can be avoided
- Air emissions and greenhouse gas production can be reduced
- Natural resources and energy can greater be conserved.

3.6.1 Administrative Suggestions

Emphasis should be placed on selecting contractors, including laboratory subcontractors, that follow green remediation best management practices. EPA' s Lead Renovation, Repair and Painting Rule requires that firms performing renovation, repair, and painting projects that disturb lead-based paint in homes, child care facilities and pre-schools built before 1978 have their firm certified by the EPA, use certified renovators who are trained by EPA-approved training providers and follow lead-safe work practices. Additionally, abating asbestos building materials (e.g. insulation, roofing materials, etc.) and replacing them with more sustainable and eco-friendly options will make the buildings green and

[1] San Francisco BCDC. October 2011. Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline. http://www.bcdc.ca.gov/BPA/LivingWithRisingBay.pdf.

[2] US Environmental Protection Agency, Office of Solid Waste and Emergency Response. August 27, 2009. Principles for Greener Cleanups. (http://www.epa.gov/oswer/greenercleanups/principles.html)

safer. Use of contractors that place priority on clean fuel and emission technologies should be encouraged. Redevelopment plans and future use of the Site should guide the type of sampling and remediation, ensuring efficient and sustainable methods. Reporting efforts, both draft and final documents, should be submitted in digital format, rather than as hard copies. Outreach to local communities should optimize the use of electronic and centralized communication.

3.6.2 Operations Suggestions

The following suggestions should be considered to help achieve green and sustainable remediation at the site:

- Sustainable practices, such as utilizing existing structures, native vegetation, and natural attributes on-site, should be encouraged.
- Environmentally preferable products, as outlined in EPA's Environmentally Preferable Purchasing (EPP) guidance (http://www.epa.gov/epp), should be utilized, including environmentally friendly electronics, recycled products, and energy-efficient lighting.
- Mobilization during field efforts should use fuel-efficient and/or alternative fuel vehicles, encourage carpooling, and should avoid environmentally sensitive areas when placing operations centers and command posts.
- Waste should be minimized, through conservation efforts, recycling, and reuse of items. The following procedures can be followed to minimize waste:
    - Field screens should use non-invasive technologies where feasible, such as ground penetrating radar, seismic refraction/reflection, electromagnetic survey, electrical resistivity tomography, and borehole radar tomography.
    - Quantity of field samples should be minimized, and mobile laboratories should be prioritized.
    - Drilling and excavation activities should incorporate clean fuel and emissions controls, including idle reduction devices, use of ultra-low sulfur diesel and/or fuel-grade biodiesel, advanced emission controls, EPA or California Air Resources Board (ARB) verified emission control technology, and the performance of routine engine maintenance.
    - Demolition should be minimized; instead, value should be placed on utilizing existing structures. Efficiency during transport and disposal operations should be maximized, and practices such as back-loading should be used whenever possible.

3.6.3 Bioremediation Considerations

Bioremediation is a natural process which relies on bacteria, fungi, and plants to degrade, break down, transform, or essentially remove contaminants from soil and water. Bioremediation options potentially provide a low cost, non-intrusive, natural method of addressing soil contamination at a site. More information about bioremediation alternatives can be found at http://www.epa.gov/tio/download/citizens/a_citizens_guide_to_bioremediation.pdf.

Bioremediation potential of the site should not be examined or considered because site soils are not contaminated.

4. Limitations and Additional Assessment Needs

The TBA investigation provides a valuable characterization of current and historical conditions of the subject buildings, including a summary of historical site use, previous investigations and regulatory involvement, site reconnaissance and photo documentation, and an evaluation of hazardous building materials.

LBP and ACM were determined within the powerhouse and two-story former office building. Some materials onsite, galbestos panels, putty, and roofing materials, were inaccessible and were assumed to be ACM. Due to the inaccessibility of the materials, the square footage is estimated. Additionally, oil-stained concrete was sampled and found to contain PCBs at a concentration above the site action levels. The depth the PCB contamination extends within the concrete is not determined, but was estimated in order to determine the cost estimate for Cleanup Alternative 3. The limited sampling scope of a TBA is generally insufficient to determine the exact extent of hazardous waste volume or hazardous waste classification for a site. Hazardous waste characterization for disposal is often best determined during the stockpiling and removal of excavated materials. The TBA, and associated ABCA, can provide mitigation guidance but are not removal characterizations; information therein represents only the site-specific recognized environmental conditions and opinions of the environmental professional.

If additional soil samples need to be collected, then the Maher Ordinance will be applicable during soil sampling activities. The Maher Ordinance will be only be applicable if additional soil samples are collected, otherwise, it will not be applicable to the site because soil concentrations for contaminants of concern were not detected.

FIGURES

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FIGURE 1
SITE LOCATION
Geneva Car Barn and Powerhouse
San Francisco, CA

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FIGURE 2
SITE LAYOUT
Geneva Car Barn and Powerhouse
San Francisco, CA

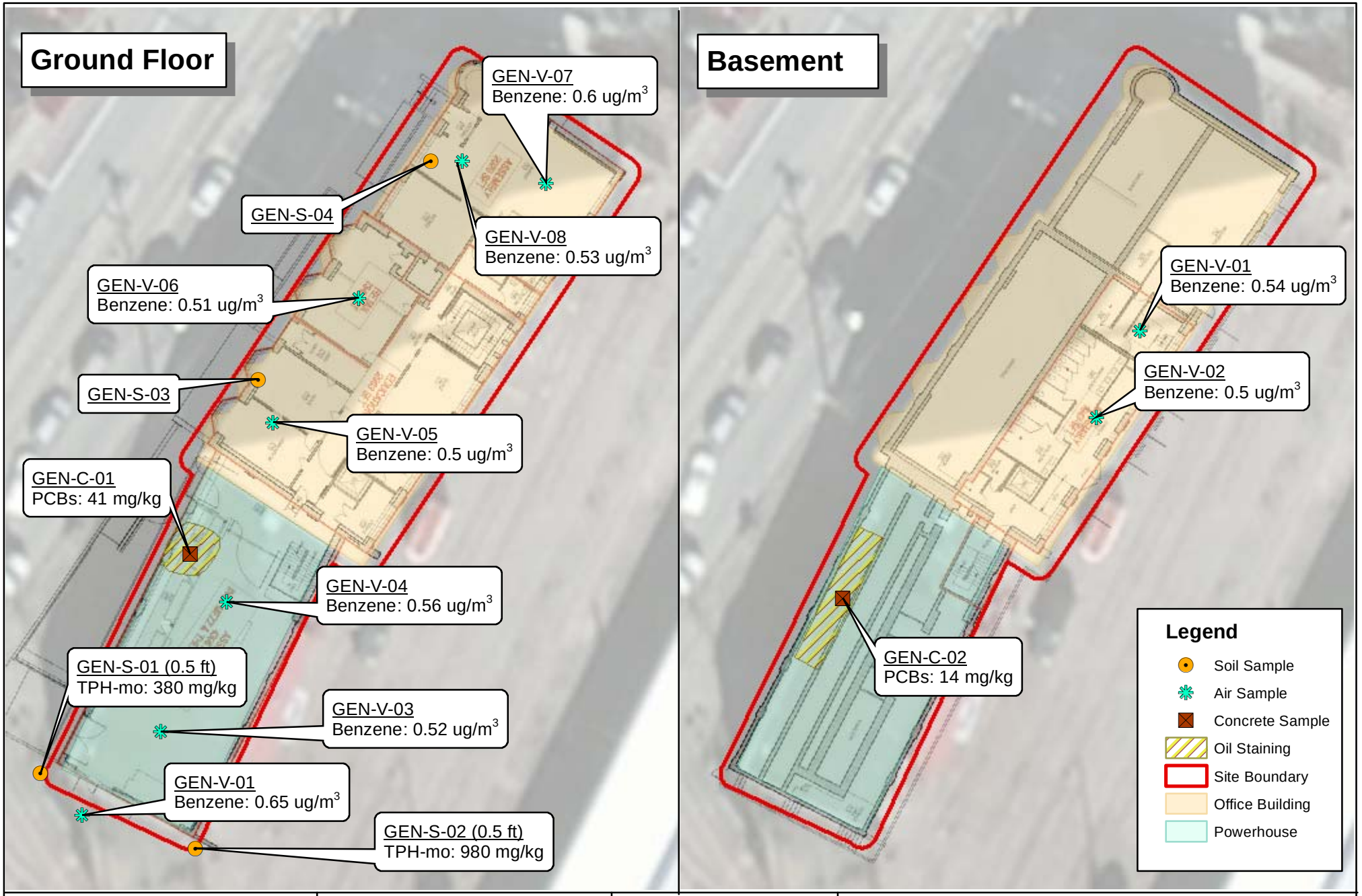

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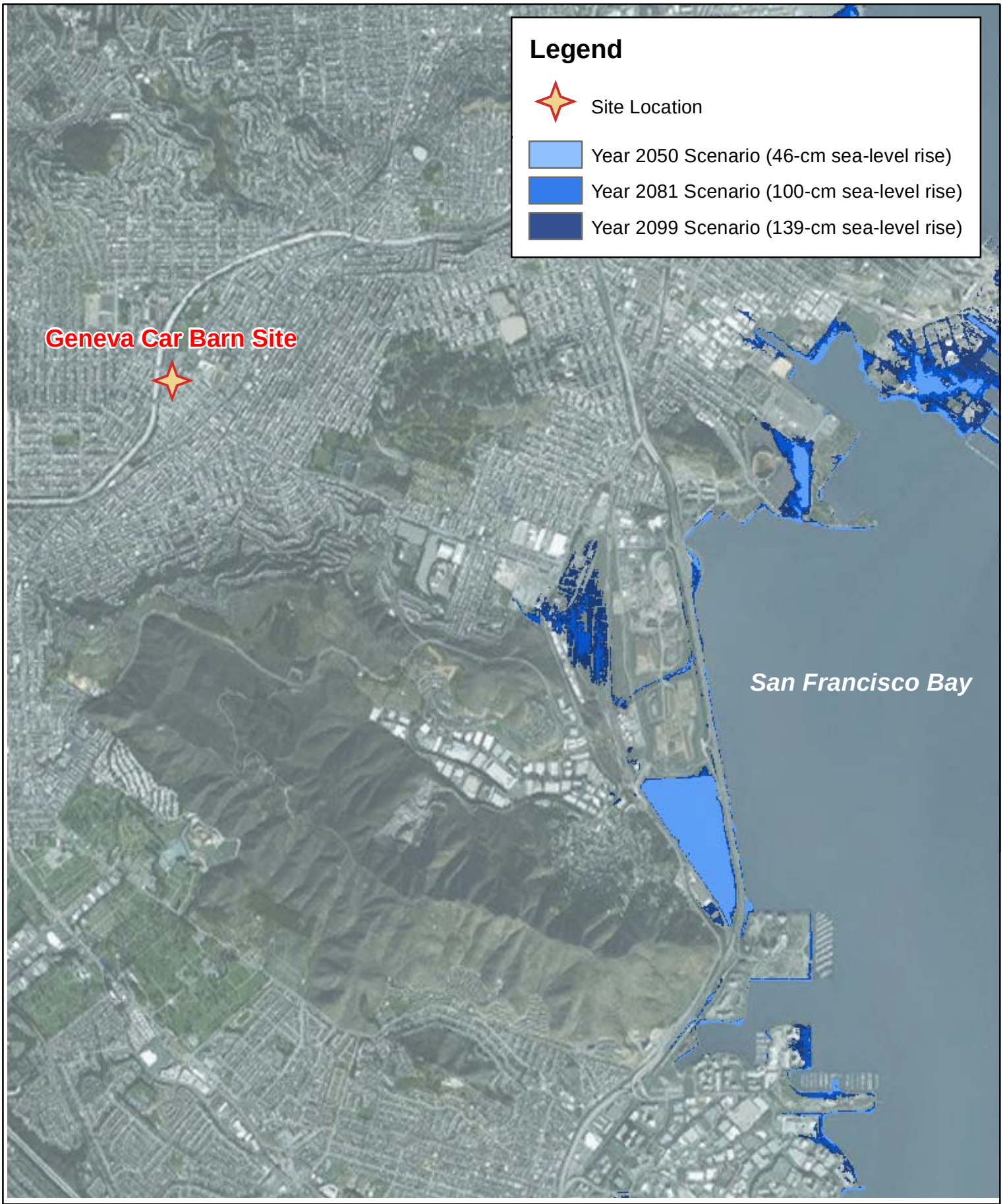
FIGURE 3
SAMPLE RESULT EXCEEDANCES
Geneva Car Barn and Powerhouse
San Francisco, CA



N

0 Miles 1

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FIGURE 4
POTENTIAL SEA LEVEL RISE
Geneva Car Barn and Powerhouse
San Francisco, CA