GARLAND
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1. Applicant Identification
   City of Garland
   200 N 5th Street
   Garland, Texas 75040-6314

2. Website URL: www.garlandtx.gov

3. Funding Requested
   a. Grant Type: Single Site Cleanup
   b. Federal Funds Requested: $1,375,000

4. Location
   a) City of Garland, b) Dallas County, c) Texas

5. Property Information:
   VARO Manufacturing Company - 530 Clara Barton Boulevard, Garland, TX 75042

6. Contacts
   a. Project Director:
      Ayako Schuster – Director, Economic Development
      972-205-3818
      ASchuster@garlandTX.gov
      200 N 5th Street
      Garland, Texas 75040-6314

   b. Chief Executive/Highest Ranking Elected Official:
      Scott LeMay – Mayor
      214-794-8904
      Mayor@GarlandTX.gov
      200 N 5th Street
      Garland, Texas 75040-6314

7. Population:
   City of Garland, TX: 244,026 (US Census: 2018–2022 American Community Survey)

8. Other Factors

Other Factors	**Page #**
Community population is 15,000 or less.	N/A
The applicant is, or will assist, a federally recognized Indian Tribe or United States Territory.	N/A
The proposed brownfield site(s) is impacted by mine-scarred land.	N/A
Secured firm leveraging commitment ties directly to the project and will facilitate completion of the remediation/reuse; secured resource is identified in the Narrative and substantiated in the attached documentation.	
The proposed site(s) is adjacent to a body of water (i.e., the border of the proposed site(s) is contiguous or partially contiguous to the body of water, or would be contiguous or partially contiguous with a body of water but for a street, road, or other public thoroughfare separating them).	N/A
The proposed site(s) is in a federally designated flood plain.	N/A
The reuse of the proposed cleanup site(s) will facilitate renewable energy from wind, solar, or geothermal energy.	
The reuse of the proposed cleanup site(s) will incorporate energy efficiency measures.	
The proposed project will improve local climate adaptation/mitigation capacity and resilience to protect residents and community investments.	
The target area(s) is impacted by a coal-fired power plant that has recently closed (2014 or later) or is closing.	

9. Releasing Copies of Applications:
Not Applicable.

Threshold Criteria

1. **Applicant Eligibility**
   a. The City of Garland, TX is eligible to apply for the EPA Brownfields Cleanup Grant as a general-purpose unit of local government as defined under 2 CFR §200.64.
   b. The City is not exempt from Federal taxation under section 501(c)(4) of the Internal Revenue Code.

2. **Previously Awarded Cleanup Grants**
   The former VARO Manufacturing Company site located at 530 Clara Barton Boulevard has not received funding from a previously awarded EPA Brownfields Cleanup Grant.

3. **Expenditure of Existing Multipurpose Grant Funds**
   The City does not have an open EPA Brownfields Multipurpose Grant.

4. **Site Ownership**
   The City of Garland is the current property owner, having acquired the property on November X, 2024.

5. **Basic Site Information**
   a) Site Name: VARO Manufacturing Company
   b) Site Address: 530 Clara Barton Boulevard, Garland, TX 75042

6. **Status and History of Contamination at the Site**
   a) The site is contaminated with hazardous substances.
   b) The site consisted of primarily vacant land with a homestead located on the central portion of the site from at least 1942 until between 1953 and 1961, when the former homestead was removed. By 1961, a 150,000-square foot manufacturing facility was constructed on the northwest portion of the site and was expanded by 1968 until the structure was demolished in 2004. According to the city directories, the facility was occupied by VARO Manufacturing, Biometrics Instrument, Litton Laser System, and Litton Optical from 1961 through 2003. The site has been vacant since 2004.
   c) The former facility was a large quantity generator (LQG) of corrosive waste, tetrachloroethene (PCE), methylene chloride, 1,1,1-trichloride, chlorinated fluorocarbons, toluene, methyl isobutyl ketone, carbon disulfide, isobutyl, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane, 2-propanone, acetone, ethylene, formic acid, hydrofluoric acid, hydrogen fluoride, methanol, methyl alcohol, and benzene. The facility was listed as a LQG from 1980 through 2006.
   d) Contamination at the site is due to historical releases (over many decades) from past operations. Investigations were conducted at the site from 1992 through 2002. Based on a review of the state regulatory files, three source areas were identified as concerns associated with former manufacturing operations: a former hazardous material storage area (abutting the former building to the northeast), an abandoned wastewater neutralization pit area (abutting the former building to the southeast), and an approximately 4,000 linear feet of wastewater pipping/distribution system (traversing east-west, through the southern portion of the building) beneath the former building floor slab. The overall vertical and lateral extents of contamination

have been identified and remedial activities were performed through the TCEQ VCP Program which resulted in an August 2004 letter indicating that vapor intrusion potential into indoor spaces on the site may be of concern for future redevelopments.

7. Brownfields Site Definition

The City affirms the site is:

a) NOT listed (or proposed for listing) on the National Priorities List (NPL);

b) NOT subject to unilateral administrative orders, court orders, administrative orders on consent, or judicial consent decrees issued to or entered into by parties under CERCLA; and

c) NOT subject to the jurisdiction, custody, or control of the US government.

8. Environmental Assessment Required for Cleanup Grant Applications

Many reports have been prepared for the site. The following are the primary reports containing the complete history and data for the site:

- Phase I Environmental Site Assessment (ESA) – December 18, 2023;
- Limited Site Investigation Report – February 1, 2024

9. Site Characterization

a. Not Applicable.

b. The VARO Manufacturing Company site located at 530 Clara Barton Boulevard was previously enrolled in a state voluntary response program (TCEQ Voluntary Cleanup Program (VCP)). A letter from the TCEQ is included in this application that:

i. affirms that the site is eligible to be enrolled in the VCP;

ii. indicates that the site can remain enrolled in the VCP for brownfield regulatory oversight purposes; and

iii. indicates that there is a sufficient level of site characterization from the environmental site assessment performed to date for the remediation work to begin.

c. Not Applicable.

10. Enforcement or Other Actions

The City affirms there are not any ongoing or anticipated environmental enforcement actions relating to the property at 530 Clara Barton Boulevard.

11. Sites Requiring a Property-Specific Determination

The City affirms that the site located at 530 Clara Barton Boulevard does not require property-specific determination to be eligible for EPA Brownfields Grant funding.

12. Threshold Criteria Related to CERCLA/Petroleum Liability

a. Property Ownership Eligibility – Hazardous Substance Sites

i. EXEMPTIONS TO CERCLA LIABILITY

(1) Indian Tribes

Not applicable.

(2) Alaska Native Village Corporations and Alaska Native Regional Corporations
Not applicable.

(3) Property Acquired Under Certain Circumstances by Units of State and Local Government
Provide the following to demonstrate that the State or local government is exempt from CERCLA liability:

(a) The City of Garland, TX commissioned pre-purchase inquiry as detailed below in 12.iii. (1). Upon completion, the City acquired the site and placed the site in its local government corporation, the Garland Foundation for Development. Upon making the decision to apply for an EPA Cleanup Grant, the City transferred the site back into City ownership.
(b) November X, 2024
(c) No disposal of hazardous substances has occurred at the site.
(d) The hazardous substances at the site are associated with original owner and operations. Therefore, the City has not contributed to the release of hazardous materials.
(e) The City has not arranged for the disposal of hazardous substances at the site or transported hazardous substances to the site.

ii. EXCEPTIONS TO MEETING THE REQUIREMENTS FOR ASSERTING AN AFFIRMATIVE DEFENSE TO CERCLA LIABILITY

1. **Publicly Owned Brownfield Sites Acquired Prior to January 11, 2002**
Not applicable.

iii. LANDOWNER PROTECTIONS FROM CERCLA LIABILITY

(1) **Bona Fide Prospective Purchaser Liability Protection**

(a) Information on the Property Acquisition
(i) Negotiated purchase.
(ii) The City of Garland, through its local government corporation, the Garland Foundation for Development, acquired the property in April, 2024.
(iii) Fee simple
(iv) NAME OF PRIOR OWNER
ADDRESS OF PRIOR OWNER
(v) The City does NOT have familial, contractual, corporate, or financial relationships or affiliations with any prior owners or operators of the site.

(b) Pre-Purchase Inquiry
(i) An ASTM E1527-21 Phase I ESA was completed on December 18, 2023 for the City of Garland, TX. A Limited Site Investigation was completed on February 1, 2024 for the City of Garland, TX.
(ii) The ASTM E1527-21 Phase I ESA was performed by Theron Epp, an Environmental Professional at Terracon Consultants, who meets the definition of Environmental

Professional as defined in Section 312.10 of 40 CFR. The required declaration by the environmental professional is included in the written report.

(iii) Not Applicable.

(c) Timing and/or Contribution Toward Hazardous Substances Disposal

All disposal of hazardous substances at the site occurred before the City acquired the property. The City has not caused or contributed to the release of any hazardous substances on the property. The City has not, at any time, arranged for the disposal of hazardous substances at the property or transported hazard substances to the property.

(d) Post-Acquisition Uses

The property has not been used by the City since taking ownership. The grass-covered site currently sits vacant with no use.

(e) Continuing Obligations

(i) There are no known continuing releases at this time. All state and local requirements were met during active sampling.

(ii) The site is limited from any activities in an effort to limit disturbance of hazardous materials. No chemicals are currently stored at the property, and the property is vacant and without structures. Terminating business operations and removing former structures from the site has stopped the potential for any continuing releases, prevents any threatened future releases, and prevents exposure to the previously released hazardous substances below the surface.

(iii) Prior remedial efforts limit exposure pathways to the soil and groundwater. As no structures have been constructed on the site, exposure to remaining soil contaminants is prevented and indoor vapor intrusion pathway is not a concern. The City will not begin construction of new site buildings until such time the previously released hazardous substance and exposure pathways have been addressed. The City intends to use Cleanup Grant funds to properly manage impacted soils and install required vapor mitigation systems for any future buildings constructed on the site.

Non-Publicly Owned Sites Acquired Prior to January 11, 2002

Not applicable

iv. SITES WITH HAZARDOUS BUILDING MATERIAL THAT IS NOT RELEASED INTO THE ENVIRONMENT

Not Applicable.

13. Cleanup Authority and Oversight Structure

a. The site was previously enrolled in the state voluntary response program, the TCEQ VCP. During this time, the site received a Final Certificate of Completion (COC) in August 2004; however, the COC included the language regarding the potential for vapor intrusion into indoor spaces should construction occur at the site. Based on the site having obtained a Final COC, the City does not intend to re-enroll the site into the program and plans to consult with EPA to ensure the cleanup activities are protective of human health and the environment. Further, the City plans to procure a contractor for additional technical expertise. The City is well versed in

conducting construction cleanups through contractor procurement, as well as, the management and oversight of all parties involved.

b. It is not anticipated that neighboring or adjacent properties will need to be accessed based on the localization of the contamination to the site boundaries.

14. Community Notification

a. Draft Analysis of Brownfield Cleanup Alternatives

The City announced their intent for cleanup funding for the site and the proposed redevelopment on **October 29, 2024**. A draft ABCA for the site and this application was made available at that time for public review and comment. These documents summarize information about:

- the site and contamination issues, cleanup standards, and applicable laws;
- the cleanup alternatives considered; and
- the proposed cleanup.

b. Community Notification Ad

A request for public input was published on **October 29, 2024**, in the *Garland Texan*. A copy of this grant application and a draft ABCA was made available for public review and comment.

c. Public Meeting

The draft application and ABCA was discussed during an in-person public hearing on **November 4, 2024, at 4:30 p.m. Central Time**. The City documented participant attendance at the meeting.

d. Submission of Community Notification Documents

The following community notification documents are included as an attachment to this proposal:

- a copy of the draft ABCA;
- a copy of the ad that demonstrates notification to the public and solicitation for comments on the application and that the notification to the public occurred at least **14 days** before the application was submitted to the EPA.
- a copy of the meeting attendance sheet and meeting agenda.
- The City received did not received any comments during the public meeting. See attached meeting notes.

15. Contractors and Named Subrecipients

Not Applicable.

1. PROJECT AREA DESCRIPTION AND PLANS FOR REVITALIZATION

a. Target Area and Brownfields i. Overview of Brownfield Challenges and Description of Target Area: The City of Garland (City) was founded in 1887 with churches, multiple gristmills, steam cotton gins, a roller flour mill, hotels, and other local businesses. But in 1899, a fire destroyed twenty-eight of the thirty established businesses. Garland was quick to rebuild and modeled their new layout around a town square. By the mid-1900s, the population of Garland had skyrocketed to over 72,000 residents and 1,000 businesses. With two railroads, Garland was a major shipping point. Several manufacturers, aircraft plants, and Kraft Foods were a part of the Garland industrial boom. As with most small towns, Garland's industrial boom came at the expense of the City's future, as lots were made smaller. With small lots, there developed a need to create parcels large enough for productive modern uses, and by the early 2000s, industries needed larger footprints to operate. This led to businesses and manufacturers abandoning their existing locations and relocating to a larger parcel. The shifting of industry to larger lots left lingering **brownfield challenges** as abandoned and blighted areas throughout the City began to grow. This practice left Garland in disrepair with rundown, dilapidated buildings and small overgrown lots scattered throughout its heart. .

The **target area** is the **South Shiloh Industrial Corridor (SSIC)**. The SSIC is comprised of **CEJST Justice40 disadvantaged census tracts 48113018501, 48113018600, 48113018900, 48113019013, 48113019046, and 48113019047.** The **SSIC** target area is along the border of Garland's primary industrial district with a mixture of low-income residential neighborhoods. The SSIC is consumed with abandoned industrial, automotive dealerships and repair shops, big box retail, printing facilities and more that are dilapidated and in disrepair, housing potential contaminants like **PHCs, VOCs, metals, underground storage tanks (USTs), asbestos-containing materials (ACM), and lead-based paint (LBP)**. The City intends to use this grant to clean-up a historically contaminated parcel of land located in a key location of the target area where connectivity of the high density residential disadvantaged community to the commercial and healthcare services is a major priority to the City. The cleanup grant will address the financial challenges to site redevelopment and ultimately spark revitalization of the other abandoned and derelict properties within the target area for better **connectivity, affordable housing, and increased job opportunities and to reestablish these underserved communities**.

ii. Description of the Proposed Brownfield Site(s): The VARO Manufacturing Company (VARO) site (5.98 acres) is a grassy vacant and unfenced lot with remnants of concrete in the northwest portion of the site. It historically operated as the VARO Manufacturing Company from 1961 until 2003, specializing in night vision viewing systems, frequency control devices, and high voltage rectifiers. The former facility was a large quantity generator (LQG) of corrosive waste, tetrachloroethene (PCE), methylene chloride, 1,1,1-trichloride, chlorinated fluorocarbons, toluene, methyl isobutyl ketone, carbon disulfide, isobutyl, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane, 2-propanone, acetone, ethylene, formic acid, hydrofluoric acid, hydrogen fluoride, methanol, methyl alcohol, and benzene. The materials handled onsite resulted in soil, groundwater, and soil gas impacts to the site. Soils and groundwater at the site were remediated under the oversight of the State's Voluntary Cleanup Program (VCP), who issued a final certificate of completion in 2003; however, soils remaining at the site, as well as soil gas, resulting in indoor vapor intrusion concerns for future redevelopment remained at the site. The property was purchased by Baylor Health Care System in 2004, but has sat vacant due to concerns over the existing remaining contamination. The cost to remediate these environmental concerns inhibited the site redevelopment. The City acquired the site in April 2024 as part of implementing its Garland

Medical District Plan adopted in 2021 to promote development in the much-needed expansion of the adjoining medical campus to meet the healthcare needs of the diverse disadvantaged community in the target area. Without the proper management of impacted soil and soil gas the proposed expansion of the medical campus poses risks to the residents who live in the developments adjoining the site to the south and east. Patients of the nearby VA Medical Center to the north and the medical office buildings to the west as well as the congregations of the various churches to the south and north. The construction plans includes the redevelopment of a critically needed community hospital.

b. Revitalization of the Target Area i. Reuse Strategy and Alignment with Revitalization Plans: In 2018, the only full-service hospital in Garland closed its doors, leaving a desperate need in the area for a new hospital. Garland, a City of a quarter-million people, has **no General Acute Care beds – no Community Hospital – and no hospital-based Emergency Services.** The **redevelopment of the VARO site with a community hospital aligns with both the needs of the local community as well as the goals outlined in the Garland Medical District Plan** adopted in 2021 to provide the desperately needed healthcare services to its target area residents. The Plan outlined the City resolution to identify potential redevelopment projects and implementation strategies based on a market assessment and an analysis of physical and economic conditions within the planning area. An outcome of the Plan indicated that "Preserving the ability of the medial district to maintain clinical activity" as a priority. Due to the importance of these healthcare needs, the City developed a further plan in 2023 - the **Valoris Health Park Master Plan Design**, which includes a major expansion to the Veteran's hospital, mixed-use development including retail, hotels, and medical office buildings. These plans birthed the vision to "Create quality of place through targeted physical improvements to the commercial properties and trail development along Duck Creek." The redevelopment of this nearly 6-acre vacant contaminated parcel of land situated along Duck Creek directly aligns with the plans many years in the making.

ii. Outcomes and Benefits of Reuse Strategy: The cleanup site will provide both economic and noneconomic **benefits to the disadvantaged community**. The site's redevelopment strategies focus on maintaining sustainable communities within the City. Economic benefits will be seen through the cleanup process and in the form of new construction jobs (estimated 300 over the course of the project and 500 resulting from the new hospital). A new hospital will provide much needed healthcare services for the community creating long lasting non-economic benefit. Additional noneconomic benefits include the removal of blight on unused properties and using the land to generate a stronger sense of community belonging. City leadership will work with the local community in the design of the hospital ensuring energy efficient measures and renewable energy processes are utilized at the site, such as solar panels, LED lighting, and water conservation methods. The City will consider LEED (Leadership in Energy and Environmental Design) in all building designs. By remediating and redeveloping the VARO Manufacturing Company site, the health risks posed by the contaminants will be removed, jobs will be created, and quality healthcare will become accessible again for the residents of Garland.

c. Strategy for Leveraging Resources i. Resources Needed for Site Characterization: The previous investigations conducted at the site sufficiently characterized the overall extent and degree of contamination to develop a draft Analysis of Brownfields Cleanup Alternatives (ABCA) with a preferred cleanup approach. The City does not anticipate needing more funding for further characterization of the site and is ready to proceed to cleanup; however, should additional assessment funding be deemed necessary, the City will work with the state programs to conduct the additional assessments.

ii. Resources Needed for Site Remediation: The EPA grant funding requested in this application will be sufficient to allow the City to complete the remediation. The City will spearhead the cleanup process and hire an environmental contractor to manage and implement remediation efforts. The cost of the required cleanup does not fit into the City's limited available funding for site redevelopment. The partnership with the EPA will fulfill the City's goal of remediation and allow it to move on to the reuse phase of development.

iii. Resources Needed for Site Reuse: The remediation of the site into a new hospital in the heart of the disadvantaged community will be funded by this Cleanup Grant. Utilizing funds from the 2019 Bond Program, the City will also bring significant streetscape improvements to the area as well as new trails along Duck Creek behind the VA medical center. These new trails will connect to a planned Healing Garden also behind the medical center. The trails will then connect to the larger Garland trail system, bringing greater pedestrian access to the area. Current street improvements projects along the southern portion of Shiloh Road will help increase vehicular access to the medical district from I-635. Funding sources for the hospital construction are anticipated as follows:

Name of Resources	Is the Resource for Assessment (1.c.i.), Remediation (1.c.ii.), or Reuse (1.c.iii.) Activities?	Is the Resource Secured or Unsecured?	Additional Details or Information About the Resource
2019 Bond Program	**Reuse Activities**	**Secured**	**Streetscape and walking trail improvements**
TIF District	**Reuse Activities**	**Secured**	
May 2024 Bond	**Reuse Activities**	**Unsecured**	**Funds will be earmarked to support the Valoris Health Pari**

iv. Use of Existing Infrastructure: With the recent implementation of the 2019 Streetscape Plan, the existing infrastructure (streets, sewer, water) in the target area is sufficient for redevelopment. If additional infrastructure is needed to further its revitalization effort, the City will look to state and federal funding sources.

2. COMMUNITY NEED AND COMMUNITY ENGAGEMENT

a. Community Need i. The Community's Need for Funding: The CEJST Justice40 disadvantaged communities of the SSIC target area went from thriving and prosperous areas to communities saturated by vacant and blighted structures. The target area suffers from low incomes with a low median family household income of $69,486 and a low per-capita income of $25,713, much lower than the national averages (US $92,646/$41,261).[1] To add to the daily stress of these underserved residents, the target areas are in the 72nd percentile for low income (US) and 60th percentile for unemployment (US).[2]

The City's budget is allocated for salaries and services such as solid waste, police, and fire. Unfortunately, the combined **high unemployment rates, extreme low-income status of the target-area** residents, and the low City budget results in a City lacking the funds for assessments that would allow for redevelopment. With no additional funding for assessments, these impoverished residents will continue to endure the negative health and blight overtaking this area.

[1] US Census 2018–2022 American Community Survey
[2] EJ Screen Report

Brownfield funds will allow the City to provide resources, identify environmental hazards, and create opportunities for a prosperous future for these **underserved** communities.

i. Threats to Sensitive Populations (1) Health or Welfare of Sensitive Populations: The target area's sensitive populations are **minorities, youth, and those living in poverty**. The target area has a sensitive population of **56% Hispanic** (US 19%), **30% youth** (US 22%), and 10% of families living in poverty (US 9%).[1]

Welfare issues such as lack of affordable housing need to be addressed for this community to thrive. In Census Tract (CT) 48113019013, the average housing cost is in the **97th percentile for households spending more than 30% of their income on housing**.[3] In addition, the target area's average **monthly rent is $1,379 (US $1,268)**.[1] Residents suffer as a significant portion of their annual income goes to cover housing, making other essentials unattainable. **Seventy-four percent (74%) of the housing throughout the target areas were built prior to 1979** (US 51%), before the EPA lead and asbestos ban.[1] The aging housing stock can cause health issues for the **youth sensitive population** related to building materials such as lead paint. The Environmental Justice (EJ) Screen Report **Lead Paint Indicator shows the target areas average in the 82nd percentile in the state**. Another welfare issue sensitive populations face is a need for work compatible with education levels. The target area is in the **92nd percentile for less than a high school education,** which greatly limits the residents' ability to attain higher salaries.[2] The end goal of a new hospital will bring **new employment opportunities in addition to local quality healthcare** to these underserved communities will help them transition out of the cycle of poverty.

(2) Greater Than Normal Incidence of Disease and Adverse Health Conditions: Sensitive populations face a greater cancer and asthma risk due to historical disinvestment and industrial use of the target areas. Worsened health conditions can be attributed to exposure to environmental concerns located at brownfield sites throughout the target area, such as PHCs, VOCs, ACM, and LBP. The target area is in the **69th percentile for diesel particulate matter** and **80th percentile for traffic proximity**.[2] With the poor air quality, it is no surprise that the target area is in the **75th percentile for asthma** (CT data not available). The **county's asthma rate is 8.4%** compared to the US's 7.7%. The target area ranks in the **97th percentile** (US) for areas with a **lack of health insurance**; therefore, the true extent of disease in the target area may not be captured in the county or state data, as many of the local residents cannot afford medical care (CT data not available).[2]

The National Cancer Institute shows a cancer rate for the City of 430/100K (US 424/100K) with an average annual count of over 10,480 cancer diagnoses. This is elevated, with a **low life expectancy** for the target area in the **64th percentile**.[2] The infant **mortality rate due to birth defects** for the county in 2021 (CT data not available) was 146.3 per 100K, which accounted for 23% of all infant deaths in that year, higher than the US averages (108.8 per 100K/20%). The risk for disease and health conditions within the target area will continue to increase with proximity to **risk management plan (RMP) facilities in the 95th percentile** and proximity to **hazardous waste facilities in the 97th percentile**.[2] Without EPA Brownfield Grant funding, the City will have to consider other alternatives, possibly reduction in the size of the hospital, thereby not meeting the needs of the underserved and disadvantaged communities. Redevelopment using grant funding will reduce the number of those exposed to cancer- and asthma-causing contaminants within the target areas and spur new, healthy growth for the future.

(3) Environmental Justice: (a) Identification of Environmental Justice Issues: The priority site is in a **CEJST Justice40 disadvantaged community.** The underserved residents of the target areas are burdened with **high poverty rates**, **lack of medical care**, and **extremely low-income levels**.

[3] Climate and Economic Justice Screening Tool

The target area suffers from EJ issues that have plagued the area since the industry shift caused blight and contamination throughout the community. Environmental indicators that are considerably high, affecting the sensitive populations, include these: **72nd percentile particulate matter, 73rd percentile for ozone**, **86th percentile for nitrogen dioxide**, **61st percentile for diesel particulate matter, 97th percentile for RMP facility proximity** in the US and the **97th percentile for hazardous waste proximity**, **80th percentile for traffic proximity**, and **82nd percentile for drinking water noncompliance** in the state.[2] High socioeconomic indicators include these: **72nd percentile for low income**, **92nd percentile limited-English speaking households**, and **92nd percentile for less than a high school education**.[2] These sensitive populations who are impoverished, minority, and young are not experiencing economic growth and resilience due to a lack of investment to improve their future.

(b) Advancing Environmental Justice: The Brownfield Grant funds will allow the City to address the environmental justice issues plaguing the target areas and their residents. With the flight toward larger lot sizes, varying industry changes, and economic shifts, the abandoned and dilapidated properties have taken over the target area and left residents exposed to poverty and blight. The proposed reuse of the priority site into a community hospital will enhance the health and well-being of residents and remedy many environmental and socioeconomic justice issues affecting the sensitive populations. By creating **new employment opportunities with better wages and providing economic stability**, the City will address the **Justice40 Initiatives** that have overwhelmed the **underserved residents** of this area, generating hope for a brighter future for generations to come.

The redevelopment at the priority site will not displace any residents or businesses as the site is currently vacant. With the building of new hospital created by assessment and cleanup, the target area will see an increase in property valuations that help prevent any potential future resident displacement. In the future, if any planned reuse causes potential displacement, the City will work with the property owners and developers to find new suitable sites by focusing on vacant lots and infill development.

b. Community Engagement i. Project Involvement & ii. Project Roles

Name of Organization	**Entity's Mission**	**Point of Contact**	**Specific involvement in the project or assistance provided**
Garland Chamber of Commerce (GCC)	The GCC's mission is to promote economic development and networking.	Paul Mayer, CEO Paul.mayer@garlandchamber.com	The GCC will help with reuse planning strategies and educating local businesses.
Garland Downtown Business Association (GDBA)	The GDBA's mission is to work with downtown businesses and Bankhead Cultural Arts District to focus on economic development and improving the downtown.	Cary Hodson Need contact info	The GDBA would help with business outreach and site identification.

iii. Incorporating Community Input: The City Council Meeting held on October 7th, 2024 informed the public of their intent to pursue an EPA Brownfield Cleanup Grant for the former VARO Manufacturing Company site. A public meeting to fulfill the community notification requirements of the EPA Brownfield Cleanup Grant was publicized on October 30th, 2024 and public meeting held on November 4th, 2024, to solicit community feedback on the draft grant application and draft ABCA. Garland continuously works with community members on redevelopment projects and will implement a successful Brownfield Program. The City will hold community educational events and encourage collaboration interactions between target-area residents and community organizations. The City has and will continue to seek valuable input from residents and community organizations to help identify potential brownfield sites, as they are the most aware of where its most important needs lie. After a grant is awarded, the City will create a Community Involvement Plan (CIP) which will provide an event schedule, an outline of planned community engagement activities, a project background, and a list of key players. The CIP will be made available for review at City Hall and on the City's website and will ensure engagement with the target areas underserved community.

All community member suggestions and information will be recorded in the minutes and posted on the City's Brownfield Program webpage. Resident questions and comments will be responded to within two weeks of receipt with responses also posted on the brownfield project webpage. The City will incorporate several forms of media to disseminate information. Brownfield Program updates will be posted to the City's Facebook and LinkedIn Pages and the Brownfield Program webpage. The City will provide resident interaction via website and social media as an alternative to in-person community engagement. The City will distribute Brownfield Project information through signage in government buildings, press releases, and local newspapers and will update organizations and community members through City Council meetings, community education meetings held throughout the target areas, and charrettes/visioning sessions. These in person interactions will be most helpful for those residents without access to the internet. All promotional materials and the names and contact information of the City's Brownfield Program Team will be posted on the City's brownfield webpage, facilitating community-members contact with all relevant staff on the project.

3. TASK DESCRIPTIONS, COST ESTIMATES, AND MEASURING PROGRESS

a. Proposed Cleanup Plan: The findings of the ABCA indicate a cleanup plan including a vapor mitigation system (VIMS) of accumulating sub-slab vapors in soil gas originating from impacted groundwater and a Soil Management Plan (SMP) would serve as a guideline for the handling and management of on-site soils and/or accumulated surface water during construction activities. The purpose of the VIMS is to protect building occupants from potentially harmful accumulating vapor. Consideration should be given to a design that would include sub-slab soil gas collection piping and a sub-slab vapor intrusion barrier. This type of system would offer a robust engineered approach, integrating the VIMS with building materials and components, installation by a certified installer, and construction oversight by a certified inspector providing an entire building solution. The concentration of chlorinated solvent vapors in soil gas at the site currently exceeds State risk thresholds. If on-site soils will not be re-used on the site and therefore exported from the site, said soils shall undergo proper characterization prior to export. If soil is disposed of at an approved landfill, proper waste characterization, profiling, and manifesting shall be conducted as outlined in this plan.

On-site soil re-use is recommended to reduce risk and costs. If affected soils require export from the site the soils may be disposed at an approved landfill following proper waste characterization, profiling, and manifesting.

b. Description of Tasks/Activities and Outputs

Task 1: Outreach	
i.	*Project Implementation:* CIP, outreach materials, brownfield (BF) project webpage, and social media posts developed by City's BF Project Manager with assistance of the Qualified Environmental Professional (QEP). City staff will lead the community meetings discussing project plans and updates. Supplies: printing of outreach materials (brochures/handouts), office supplies, and software to manage the grant.
ii.	*Anticipated Project Schedule:* CIP created in Q1. Community/edu. meetings held Q1 Y1-4. Webpage and outreach materials created in Q1 and posted throughout the grant project.
iii.	*Task/Activity Lead:* City: Jacob Acton, Econ. Development Manager, BF Project Manager
iv.	*Outputs:* CIP, BF webpage, 4 community/edu. meetings, brochures/handouts, social media posts, summary of community meetings in EPA-required quarterly reports.
Task 2: Program Management	
i.	*Project Implementation:* The City will procure an QEP to assist with the BF Grant Project. The City's BF Project Director will oversee grant implementation and administration to ensure compliance with the EPA Cooperative Agreement work plan, schedule and terms and conditions. The QEP will assist in completing ACRES database reporting, yearly financial reporting, quarterly reporting, MBE/WBE forms, and additional programmatic support for the four-year term of the grant. The City's travel budget allows for 2 staff to attend 2 BF training conferences/workshops.
ii.	*Anticipated Project Schedule:* Procure QEP Q1. ACRES & quarterly reporting begins Q1 & and continues throughout the grant. Annual reporting and forms created in Q5, 9, 13, and final close out.
iii.	*Task/Activity Lead:* City: Ayako Schuster, Director of Econ. Develop., BF Project Director
iv.	*Outputs:* ACRES database reporting, 4 annual financial reports, 16 quarterly reports, 4 MBE/WBE forms, programmatic support for the four-year grant period. 2 staff to attend 2 events.
Task 3: Cleanup Planning	
i.	*Project Implementation:* The City's BF Project Manager will oversee the EC as they finalize the ABCAs and Abatement Designs, prepare QAPPs and Health and Safety Plans (HASPs), and prepare O&M plans.
ii.	*Anticipated Project Schedule:* The finalized ABCA, QAPPS and HASP, and Soil Management Plan documents will be created within six months of the award. The site reuse vision and VIMs design plans will be generated in Q1 of Y2 after community input is received and full set of construction drawings are available. A cleanup report will be generated following the cleanup activities
iii.	*Task/Activity Lead:* The QEP will handle the technical aspects of the project with oversight from City: Jacob Acton, Economic Development Manager, BF Project Manager
iv.	*Outputs:* 1ABCAs, 1 VIMS Design, 1 Site Specific-QAPPs & HASPs, 1 Site Reuse Vision, 1 Cleanup Plan.
Task 4: Cleanup	
i.	*Project Implementation:* The City's BF Project Manager will oversee the EC as they manage the proposed site cleanup activities including contractor mobilization, abatement

	and/or encapsulation of ACM and LBP, Asbestos Air Monitoring, clearance sample analysis, contractor oversight, and cleanup reporting.
ii.	*Anticipated Project Schedule:* Cleanup and VIMS installation activities will begin within 18-36 months of award and will be completed within 12 months after initial activities.
iii.	*Task/Activity Lead:* The QEP will handle the technical aspects of the project with oversight from City: Jacob Acton, Economic Development Manager, BF Project Manager
iv.	*Outputs:* 1 site ready for reuse, 20 remediation jobs created (annualized), 1 cleanup report
Task 5: Cleanup Oversight	
i.	*Project Implementation:*.
ii.	*Anticipated Project Schedule:*.
iii.	*Task/Activity Lead:*
iv.	*Outputs:*

c. Cost Estimates: Below are the anticipated cost estimates for this project *based on past brownfield projects as determined by local market standards with contractual hourly rates based on the skills needed for the specific tasks*. The budget for this project includes travel, supplies and contractual costs only. Personnel pay rates average $36 per hour and fringe rate 20%.

Task 1 Outreach: Personnel ($36/hr): CIP $1,440 (40hrs); BF webpage, outreach brochure/handouts, social media posts $720 (20hrs); 4 community/educational meetings $2,880 (20hrs/meeting x 4 meetings to include preparation and execution). Contractual: CIP $2,960 (16hrs x $185); BF webpage, outreach brochure/handouts, social media posts $2,220 (12hrs x $185); 4 community/educational meetings $8,000 (10hrs x $200) ($2,000/meeting). Supplies: $993 (500 printouts at $1 each, 3 display boards at $100 each, $133 office supplies)

Task 2 Program Management: Personnel ($36/hr): 3,600 (100hrs) Contractual: ACRES database reporting, yearly financial reporting, quarterly reporting, MBE/WBE forms $18,500 (100hrs x $185). Travel: 2 staff to attend 2 conferences $8,800 (flights at $800, 3 nights in hotel at $300, incidentals and per diem at $100 x 3 days x 2 attendees).

Task 3 Cleanup Planning: Contractual: 1 ABCA for $6,000 (30 hrs x $200), 1 VMS Design for $30,000 (Senior Engineer: 150hrs x $200), 1 QAPP for $7,600 (Senior Engineer: 38hrs x $200), 1 Site Reuse Vision for $43,500 (Principal Planner: 60 hrs x $200, Senior Planner: 120 hrs x $175, Environmental Planner: 60 hrs x $175).

Task 4 Cleanup: Construction: VIMS Installation: $510,000 (120,00 square feet (sf) x $4.25/sf), Soil Management/Hauling/Disposal: $1,100,000 (20,000 cubic yards (cy) x $55/cy).

Task 5 Cleanup Oversight: Contractual VIMS installation oversight and testing: $40,000 (200 hrs x $200/hr), Soil Management/Oversight: $200,000 ($1,250 hrs x $160/hr).

Category	**Tasks**					**Totals**
	Outreach	***Program Management***	***Cleanup Planning***	***Cleanup***	***Cleanup Oversight***	
Personnel	$5,040	$3,600	$576	$8,640		$17,856
Fringe Benefits	$1,008	$720	$115	$1,728		$3,571
Travel		$8,800				$8,800
Supplies	$993					$993
Contractual	$13,180	$18,500	$87,100		$240,000	$358,780
Construction				$1,610,000		$1,610,000

Total Budget	**$20,221**	**$31,620**	**$87,791**	**$1,620,368**	**$240,000**	**$2,000,000**

d. Plan to Measure and Evaluate Environmental Progress and Results: To ensure this EPA Brownfield Grant is on schedule, the Brownfields Team, which will include the QEP, will meet quarterly to track all **outputs identified in 3.b** using an Excel spreadsheet. The Project Director will report progress to the EPA via quarterly reports, and project expenditures and activities will be compared to the project schedule to ensure the project will be completed within the four-year time frame. Site information will be entered and tracked in the ACRES database. Outputs to be tracked include QAPP, ABCA, and cleanup plan development, contractor procurement, quarterly, annual, and closeout reports, and the number of community meetings. The outcomes to be tracked include community participation, acres ready for reuse, redevelopment dollars leveraged, and jobs created. In the event the project is not progressing efficiently, countermeasures are in place to address the problem which include making monthly calls to their EPA Project Officer and, if needed, revising the existing Work Plan to get back on schedule.

4. PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE

a. Programmatic Capability i. Organizational Structure & ii. Description of Key Staff: The City operates under a mayor-council form of municipal government. The City has the organizational capacity to handle a project through the office of the City Administrator with the support from the City's government officials (City Council) led by the mayor. The experienced staff of the Economic Development Department will handle all matters of this grant project, as they have ample experience in managing grants and their implementation for the City. The Director of Economic Development, **Ms. Ayako Schuster**, will be the **Brownfield Project Director**. Ms. Schuster has been with the City for three years and worked for the Garland Chamber of Commerce in Economic Development for over twenty years. Her current responsibilities include focusing on reimagining, repurposing, and redeveloping the City as well as managing all the economic development projects for the City. **Mr. Jacob Acton**, Economic Development Manager, will be the **Brownfield Project Manager**. Mr. Acton has been with the City for five years and has been the Economic Development Manager for almost two years. Mr. Acton is responsible for research and management of all economic development projects, project recruitment, and expansion of projects. He will assist Ms. Ayako with the daily management of the Brownfield Project. **Mr. Matt Watson**, the City's Finance Director, will be the **Brownfield Finance Director**. Mr. Watson has been with the City in the Budget and Finance office for over a decade and has served as Finance Director since 2016. Mr. Watson's roles include oversight of finance and budget issues for the City, accounting, payroll, accounts payable, reporting, and staff management. He will be responsible for grant draw downs using the ASAP.gov system. All three will serve to guide brownfields decisions and monitor risk management, direct project management, and oversee all portions of the project. The City will acquire a qualified environmental contractor to ensure technical and reporting aspects of the grant implementation are completed accurately.

iii. Acquiring Additional Resources: Using local contracting requirements and procurement process, the City will procure a qualified environmental professional to assist with technical and reporting portions of the Brownfield Cleanup, in addition to any other contractors needed to complete the project. The City will ensure compliance with the EPA's "Professional Service" procurement process. Redevelopment will emphasize the growth in the target areas, creating local jobs for residents. During redevelopment activities, temporary construction jobs will be created and available to residents who work in that field. The City recognizes the importance of ensuring that the benefits of this grant extend beyond environmental improvement to meaningful economic

and social impacts. The City is committed to fostering strong labor practices, supporting local hiring and procurement by partnering with local hiring organizations, and creating educational and workforce opportunities for all..

b. Past Performance and Accomplishments i. Currently Has or Previously Received an EPA Brownfields Grant (1) Accomplishments: The City was awarded a 2003 Assessment Grant ($200,0000). A total of three Phase I Environmental Assessment (ESAs) and five Phase II ESAs with Site-Specific Quality Assurance Project Plans (QAPPs) were conducted between October 2003 and September 2006. In addition, a CIP, brochures/outreach materials, and a generic QAPP were produced. One key accomplishment was the redevelopment of the Former DDI Facility, which was assessed with the 2003 grant. The City leveraged over $17 million for cleanup and redevelopment of the site as a Fire Department's Training and Administrative Facility, creating 48 jobs in the process. The staff who previously worked on this grant have retired; however, the overall structure of the City and capabilities with grant management has continued to grow and improve. Ms. Schuster was involved tangentially with the grant during her time at Garland Chamber of Commerce in Economic Development and assisted in its overall successful implementation. All outcomes and outputs have been recorded/reported to the EPA.

(2) Compliance with Grant Requirements: For the 2003 grant, the City outlined its objectives, budget, tasks, and overall quality assurance plan. The staff managed the grant in a way that facilitated a strict conformance with the Work Plan and complied with required schedules implemented by the US EPA for on-time submittal of quarterly reports, reporting, and deliverable submittals. This grant successfully drew down to a zero-dollar balance with on-time closeout documents in September 2006.

Analysis of Brownfield Cleanup Alternatives (ABCA)

Proposed Community Hospital
530 Clara Barton Boulevard
Garland, Dallas County, Texas

October 29, 2024 | Terracon Project No. 94247964

Prepared for:

City of Garland
Garland, Texas

8901 John Carpenter Freeway
Dallas, Texas 75247
P (214) 630-1010
Terracon.com

October 29, 2024

City of Garland
203 N 5th Street, Suite 100
Garland, Texas 75040

Attn: Mr. Jacob Acton
Economic Development Manager
P: (972) 205-3814
E: JActon@garlandtx.gov

Re: Analysis of Brownfield Cleanup Alternatives (ABCA)
Proposed Community Hospital
530 Clara Barton Boulevard
Garland, Dallas County, Texas
Terracon Project No. 94247964

Dear Mr. Acton:

Terracon Consultants, Inc. (Terracon) presents to the City of Garland this Analysis of Brownfield Cleanup Alternatives (ABCA) as part of cleanup design for the above-referenced Site. This cleanup design activity was performed consistent with our proposal (Terracon Proposal No. P94247964), dated September 19, 2024.

In the event a Brownfields Cleanup Grant is sought to assist with cleanup of the Site, funding guidance requires the applicant to provide the community with notice of its intent to apply for a United States Environmental Protection Agency (EPA) brownfields cleanup grant and allow the community an opportunity to comment on the draft proposal. In addition, the EPA Brownfield Cleanup funding proposal must include, as an attachment, a draft ABCA that summarizes information about the Site and contamination issues, cleanup standards, applicable laws, cleanup alternatives considered, and the proposed cleanup.

The ABCA must include information on the effectiveness of each alternative, the ability of the grantee to implement each alternative, the cost of each proposed cleanup alternative, and an analysis of the reasonableness of the various cleanup alternatives considered, including the one chosen. The ABCA is intended as a brief preliminary document summarizing the larger and more detailed technical and financial evaluations performed in addressing each of these areas. The ABCA may be modified technically and financially or in more depth relative to each of these areas upon award of funding and in response to community interaction.

Cleanup alternatives were evaluated in accordance with EPA protocols and general guidance required prior to implementation of a cleanup design using EPA Brownfields Grant funding. More specifically, this ABCA summarizes viable cleanup alternatives based on Site-specific conditions, technical feasibility, and preliminary cost/benefit analyses. Specific cleanup alternatives and associated recommendations are presented in the applicable sections of this report.

Terracon appreciates this opportunity to continue to provide environmental consulting services for the City of Garland in support of Brownfields redevelopment. Should you have any questions or require additional information, please do not hesitate to contact our office at (214) 630-1010.

Sincerely,

Terracon Consultants, Inc.

Lance Crabtree, PG
Senior Associate/Department Manager

Theron Epp, CESCO
Authorized Project Reviewer

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Appendices

1.0 Introduction and Background

Terracon Consultants, Inc. (Terracon) has prepared this Analysis of Brownfield Cleanup Alternatives (ABCA) on behalf of the City of Garland for the Proposed Community Hospital site, which consists of an approximate 5.9816-acre parcel of land addressed at 530 Clara Barton Boulevard in Garland, Dallas County, Texas (hereinafter, the "site"). The site comprises one parcel consisting of the address, Dallas Central Appraisal District (DCAD), and land uses listed below:

Address	DCAD	Acres	Use
530 Clara Barton Boulevard	26619700010020000	5.9816	Vacant Land

The site consisted of primarily vacant land with a homestead located on the central portion of the site from at least 1942 until between 1953 and 1961, when the former homestead was removed. By 1961, a manufacturing facility was constructed on the northwest portion of the site and was expanded by 1968 until the structure was demolished by 2004. According to the city directories, the facility was occupied by Varo Manufacturing, Biometrics Instrument, Litton Laser System, and Litton Optical from 1961 through 2003. The former facility was identified in the regulatory database as "Former Imco Vargo Inc / Imo Varo / Litton Electro Optical Systems Garland". The site has consisted of vacant land since 2005.

Based on a review of historical information, the surrounding properties consisted of vacant, wooded land with an unimproved road to the west since at least 1942. By the early 1960s, Marie Curie Boulevard was constructed to the north and was extended by the late 1960s. By the early 1960s through late 1980s, the existing medical hospital with a parking lot were constructed to the north, beyond Marie Curie Boulevard. Additionally, by the early 1970s, a former railroad track (associated with the former on-site operations) was constructed to the north. By 2004, a former maintenance building (associated with the former on-site operations) was constructed to the north and is currently vacant. The northern adjacent property has remained relatively unchanged since 2004.

To the east of the site, Peggy Lane was constructed by 1953. From the early through late 1980s, medical buildings were constructed beyond Peggy Lane. The eastern adjacent property has remained relatively unchanged since the late 1980s. To the south of the site, by the early 1960s a residential neighborhood was constructed, beyond West Walnut Street. The southern adjacent property has remained relatively unchanged since the early 1960s.

To the west of the site, the unimproved road extending from the site was removed by 1953. By the early 1960s, a parking lot (associated with the former on-site operations) was constructed and was removed by 2005. In 1966, Betty Jo Lion Service Station was present to the west of the site until 1981 when the station was reconfigured into the existing

commercial building. By 1972, the existing medical building was constructed to the west of the site.

The former Betty Jo Lion Service Station property was located approximately 250 feet west of the site, with the facility building approximately 290 feet west of the site in a topographic up to cross-gradient position relative to the site. The facility was not identified in the regulatory database report. Based on its distance and topographic position relative to the site and duration of time since operations ceased (42 years), the Betty Jo Lion Service does not constitute a REC to the site.

By 2008, the existing medical building and associated parking lot were constructed to the west of the site. The western adjacent property has remained relatively unchanged since 2008.

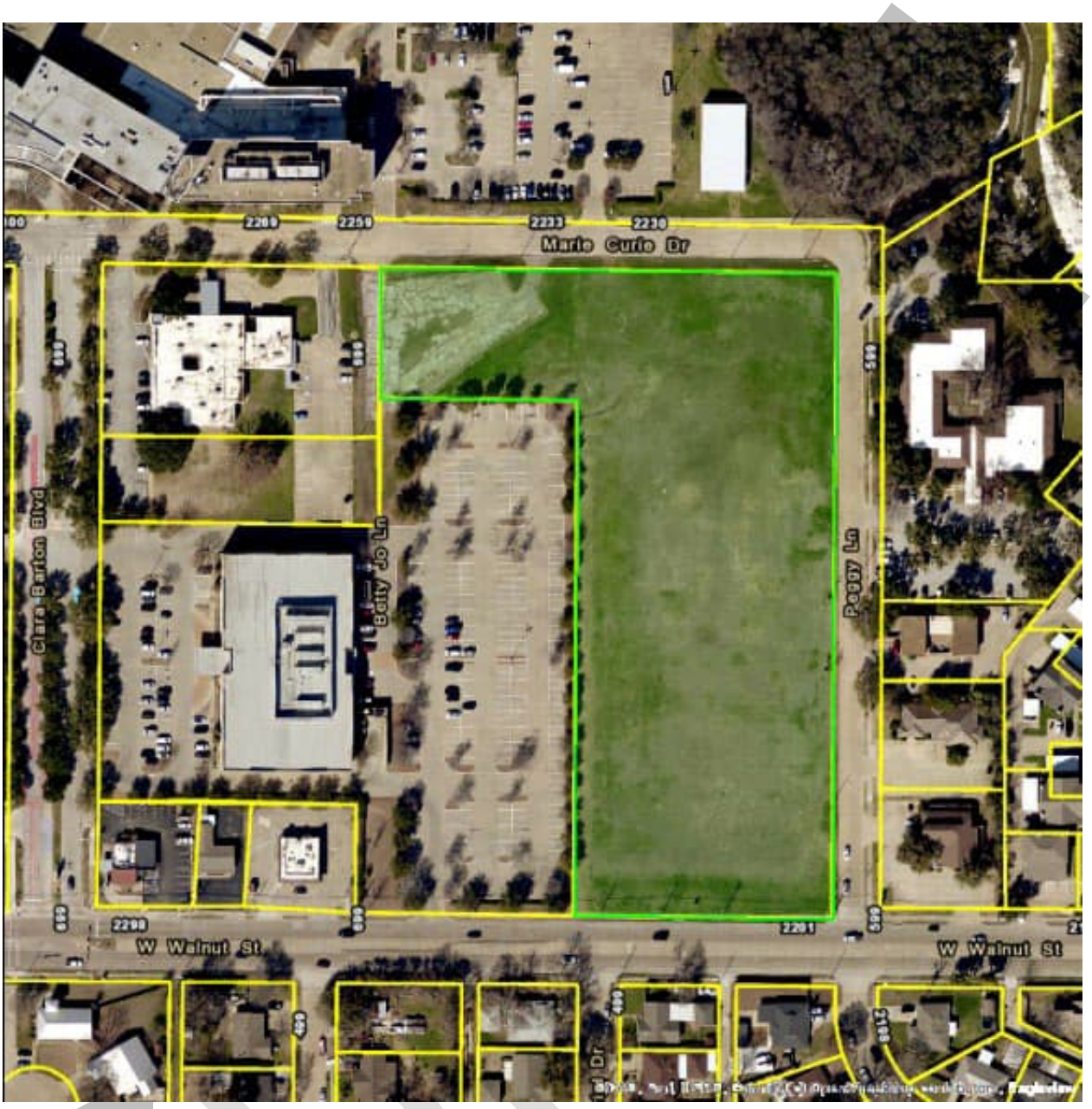

FIGURE 1: SITE MAP (DALLAS CENTRAL APPRAISAL DISTRICT WEBSITE: HTTPS://MAPS.DCAD.ORG/PRD/DPM/)

The site is adjoined by the following:

Direction	Adjoining Properties
North	Marie Curie Boulevard, followed by a parking lot associated with Garland Veterans Hospital and a building utilized by the Veterans Hospital for the storage of lawn care equipment and supplies.
East	Peggy Lane, followed by Walnut Medical, Rainbow Pediatrics, a building with no signage, and Brident Dental & Orthodontics.
South	West Walnut Street, followed by a residential neighborhood.
West	Room for Change and a parking lot associated with the Medical Plaza to the west.

This ABCA has been prepared to support redevelopment of the site by the City of Garland by providing preliminary cleanup planning information. It is Terracon's understanding that the City of Garland intends to redevelop the site as a community hospital.

1.1 Phase I Environmental Site Assessment: December 18, 2023

In December 2023, Terracon performed a Phase I Environmental Site Assessment (ESA; Reference 2023 in Section 4.0) on the site for the City of Garland. The Phase I ESA identified the following Recognized Environmental Condition (REC) associated with the Site.

- Based on the response actions and Voluntary Cleanup Program (VCP) Certificate of Completion (COC) issued for the site, the impacts to site soil and groundwater as a result of the former IMO Varo Optical System Division/Walnut Facility operations constitute a historical REC (HREC). Based on the absence of information regarding specific analytical results, the VCP letter indicating the potential need for further future investigation relative to indoor air exposure pathways, and the planned development of the site, the reported presence of volatile organic compounds (VOCs) in site soil vapor constitutes a REC to the site.

Further discussions of the identified HREC and REC are detailed below.

Former Imco Vargo Inc / Imo Varo / Litton Electro Optical Systems Garland, on-site, was identified in the Environmental Protection Agency (EPA) Groundwater Contamination Case (GWCC), Industrial Hazardous Waste Generator (IHW), IHW Transporter (IHWT), RCRA large-quantity generator (LQG), Toxic Release Inventory System (TRIS), Facility Registry

Service (FINDS), and Texas Commission on Environmental Quality (TCEQ) Affected Property Assessment Report (APAR), VCP, and IHW Corrective Action (IHWCA) databases.

The site was formerly improved with an approximate 150,000-SF manufacturing facility occupied by "IMO Varo Optical System Division/Walnut Facility" and operations consisted of manufacturing laser range finders and night vision systems from 1956 to 1998; however, operations may have ceased as early as 1992.

According to the database, the former facility was a LQG of corrosive waste, tetrachloroethene (PCE), methylene chloride, 1,1,1-trichloride, chlorinated fluorocarbons, toluene, methyl isobutyl ketone, carbon disulfide, isobutyl, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane, 2-propanone, acetone, ethylene, formic acid, hydrofluoric acid, hydrogen fluoride, methanol, methyl alcohol, and benzene. The facility was listed as a LQG from 1980 through 2006.

Generated waste for the IHW consisted of paint filters from spray paint operations (contains chromium / steel and plastic); empty plastic or fiber containers generated from various manufacturing activities; grinding slurry from liquid polishing and grinding of optical components; spent tetrachloroethylene solvent used to remove parrafin waxes from glass optic; GU-305 spent activated carbon/generated during treatment of raw river water and 1,1,1 trichloroethane from vapor degreasing of optical and electronic components.

Investigations were conducted at the site from 1992 through 2002. Based on a review of the TCEQ files, three source areas were identified as concerns associated with former manufacturing operations: a former hazardous material storage area (located abutting the former building to the northeast), an abandoned wastewater neutralization pit area (located abutting the former building to the southeast), and an approximately 4,000 linear feet of wastewater pipping/distribution system (located traversing east-west, through the southern portion of the building) beneath the former building floor slab. Soil and groundwater sampling was conducted and analyzed for VOCs, total petroleum hydrocarbons (TPH) and metals.

Based on the analytical results, from 1992 through 2002, remediation activities consisted of:

- In 1992, soil and groundwater samples collected along the concrete wastewater trench and beneath the floor of the building exhibited low concentrations of several VOCs and metals; with exception to cadmium, which was detected at elevated concentrations. Soil impacted with elevated concentrations of cadmium was excavated. The maximum concentration was detected at 142 mg/kg from soil boring T-3 and was in the vicinity of the wastewater piping/distribution system. Three groundwater monitoring wells were installed (MW-1 through MW-3). Groundwater was not encountered at two of the well locations (MW-1 and MW-3) and data obtained was inconclusive.
- In 1994, the former wastewater neutralization pit was cleaned and backfilled. Confirmation soil samples were collected, and results were below the critical soil PCLs for trichloroethene (TCE).

- In 1994, lead-containing soil was removed from an area beneath the former manufacturing facility floor.
- In 1994, approximately 650-cubic yards of petroleum-impacted soil and debris were excavated from the hazardous material storage area and disposed of at CSC Landfill. Confirmation soil samples did not indicate the presence of affected soils above the applicable Residential Assessment Levels (RALs).
- In 1995, a perched groundwater collection trench and granular carbon treatment system were installed in the vicinity of the abandoned wastewater neutralization pit. The City of Garland issued a permit to discharge the treated groundwater into the sanitary sewer.
- In 1995, subsurface investigation activities were conducted the vicinity of the abandoned wastewater neutralization pit and affected soils were not encountered. VOCs, metals and petroleum hydrocarbon-impacted soils in the vicinity of the former hazardous material storage area were removed in July and August 1995. Confirmation sampling of soils in the vicinity of the former hazardous material storage area did not indicate the presence of affected soils which exceeded the applicable RALs.
- Soil concentration maps including samples collected prior to 2001 were submitted with the VCP application in January 2001. The facility was accepted into the VCP in February 2001 and was assigned VCP No. 1315.

In 2002, approximately 1,950 tons of soil and limestone were excavated from the abandoned wastewater neutralization pit area. In addition, excavation activities included removal of the perched groundwater zone (defined by TCEQ as Class 3 groundwater), the wastewater neutralization pits and associated piping, the corroded segment of the sanitary pipe that crossed the excavation, an unknown concrete structure, miscellaneous abandoned utility conduits and the groundwater collection trench. The excavated area was backfilled and compacted. The excavation activities were conducted to remediate a Class 3 groundwater preliminary cleanup level exceedance (PCLE) zone. All concentrations of VOCs in soil confirmation samples from these zones were well below Texas Risk Reduction Program (TRRP) protective cleanup levels (PCLs) for soil ($^{GW}Soil_{Class\ 3}$).

In order to achieve a Final COC for the VCP, a final investigation was conducted in 2003 of the abandoned wastewater neutralization pit area. Five monitoring wells (MW-6 through MW-10) were installed were analyzed for VOCs. The wells were installed within the interior and exterior of the eastern portion of the former building. Based on a review of the analytical results for trichloroethylene (TCE), the results were as followed:

- MW-6: TCE (0.140-0.160 mg/L)
    - Remaining VOCs were non-detect (ND), with the exception of cis-1,2-dichloroethene (cis-1,2-DCE) (0.100-0.150 mg/L).
- MW-7: TCE (<0.005-0.015 mg/L)
    - Remaining VOCs were ND, with the exception of cis-1,2-DCE (0.010-0.020 mg/L).

- MW-8: TCE (< 0.005-0.0098 mg/L)
    - Remaining VOCs were ND, with the exception of 1,1-dichloroethane (1,1-DCA) (<0.005-0.018mg/L)
- MW-9: TCE (0.240-0.300 mg/L)
    - Remaining VOCs were ND, with the exception of 1,1-DCA: (0.0070-0.010 mg/L) and cis-1,2-DCE (0.071-0.110 mg/L)
- MW-10: TCE (0.370-0.730 mg/L)
    - Remaining VOCs: ND, with the exception of 1,2-dichloroethane (1,2-DCA) (0.033-0.130 mg/L); 1,1-DCA (0.078-0.250 mg/L); cis-1,2-DCE (0.610-2.200 mg/L); trans-1,2-dichloroethene (trans-1,2-DCE) (<0.005-0.0089 mg/L); PCE (<0.005-0.015 mg/L); toluene (<0.005-0.031 mg/L); 1,1,1-trichloroethane (1,1,1-TCA) (<0.005-0.014 mg/L); and vinyl chloride (0.0078-0.030 mg/L).

Impacted groundwater was removed from the abandoned wastewater neutralization pit area as documented by groundwater analyses for samples from monitoring wells (MW-6, MW-7, MW-8, and MW-9) that did not exhibit TCE above Class 3 groundwater PCL. TCE was detected above the PCL for Class 3 groundwater in groundwater samples collected from MW-10 (located within the building / west of the excavation area). Soil vapor data was collected from below the building slab in the vicinity of MW-10. Although the specific soil vapor sampling results were not provided in the VCP file; according to correspondence records reviewed, "the distribution and composition of chemicals detected in sub-slab soil vapor suggested that an additional PCLE zone associated with a previously unidentified release(s) of VOCs, separate from the releases that occurred in the courtyard, may exist below the building."

In 2003, the TCEQ identified two Partial Response Action Areas (PRAAs). PRAA "A" was for the former wastewater neutralization pit and the former hazardous storage area (located to the adjoining east of the southern and northern portions of the building, respectively) and PRAA "B" consisted of the footprint of the former facility building. Based on the completed response actions, PRAAs "A" and "B" for VCP No. 1315 received a COC on February 7, 2004 and August 10, 2004, respectively.

It should be noted that with the TCEQ VCP closure documents, TCEQ included the following statement(s) in an August 2004 letter:

"*Please be aware that the VCP may at a later date compel an investigation of the vapor intrusion potential into indoor spaces on this site. Should the VCP compel additional investigation of indoor air exposure pathway at this site, additional sampling of soil-gas vapor and/or indoor air may be necessary. The TCEQ strongly recommends that the applicant provide a copy of this letter to any future property owner*".

1.2 Limited Site Investigation: February 1, 2024

In January 2024, Terracon performed a Limited Site Investigation (LSI; Reference 2024a in Section 4.0) on the site for the City of Garland. The LSI consisted of the advancement/installation of eleven (11) soil borings (TB-1 through TB-11) which were concerted to soil gas points (SGP-1 through SGP-11) to evaluate potential releases associated with the former on-site Imco Vargo Inc / Imo Varo / Litton Electro Optical Systems Garland facility, which was identified as a REC in Terracon's Phase I ESA, discussed above.

Composite soil samples were collected throughout the site for pre-characterization purposes to aid the City of Garland in waste profiling for landfill disposal, should landfill disposal be necessary during site development (i.e., soil export vs. soil import site). Soil characterization was completed by analyzing composite soil samples for TPH, VOCs and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, selenium, silver and mercury) using the Toxicity Characteristic Leaching Procedure (TCLP) analyses. Based on review of the analytical results, TPH and TCLP VOCs were not detected above laboratory sample detection limits (SDLs). With the exception of minimal barium concentration detections ranging from 0.331 mg/L to 1.18 mg/L, RCRA metals were not detected above laboratory SDLs.

Concentrations of TCE and cis-1,2-DCE were detected in the soil gas sample from SGP-4 (northeast portion of the site and proximate to the former hazardous materials storage area) at concentrations of 5,570 ug/m^3 and 4,800 ug/m^3, respectively, which exceed the Residential Soil Gas Target Concentrations of 70 ug/m^3 and 2,100 ug/m^3 for TCE and cis-1,2-DCE, respectively. The SGP-4 TCE and cis-1,2-DCE concentrations also exceeded the Commercial/Industrial (C/I) Soil Gas Target Concentrations of 97 ug/m^3 and 2,900 ug/m^3, respectively. Various other VOCs were also detected in each of the soil gas samples collected; however, the detections did not exceed their respective Residential or C/I Soil Gas Target Concentrations.

Based on the soil analytical results, the soils present at the site meet Class 2 non-hazardous equivalent waste criteria, and the soils may be disposed of at a regulated landfill accepting Class 2 non-hazardous equivalent waste.

The soil gas in the vicinity of SGP-4 appears to be affected by a historic release of chlorinated VOCs (TCE and cis-1,2-DCE) from the former on-site facility, which received regulatory closure in 2004. Concentrations of TCE and cis-1,2-DCE in the SGP-4 soil gas sample exceeded the calculated TRRP Soil Gas Target Concentrations for both residential and C/I use.

1.3 Summary of Investigations Conducted to Date

Identified soil and groundwater impacts include petroleum hydrocarbons, VOCs, and metals at concentrations below the TCEQ RALs and/or Critical PCLs. Identified soil gas impacts

include VOCs, more specifically, TCE and cis-1,2-DCE exceeding the calculated TRRP Soil Gas Target Concentrations for both residential and C/I use.

Based on cancer and non-cancer risk data provided by EPA's VISL Calculator, TCE (in soil gas) represents the greatest risk to human health and would likely be the driver for corrective action at the site, though PCE, DCE, and VC are also concerns. The Contaminants of Concern (COC) are listed below

Analyte	Matrix	Exposure Scenario	Screening tool
Tetrachloroethene (PCE)	Soil Gas	Residential/Commercial	TRRP Soil Gas Target
Trichloroethene (TCE)	Soil Gas	Residential/Commercial	TRRP Soil Gas Target
cis-1,2-dichloroethene (DCE)	Soil Gas	Residential/Commercial	TRRP Soil Gas Target
trans-1,2-dichloroethene (DCE)	Soil Gas	Residential/Commercial	TRRP Soil Gas Target
Vinyl Chloride (VC)	Soil Gas	Residential/Commercial	TRRP Soil Gas Target

1.4 Project Goal

The Garland Foundation for Development has purchased the site for future use by a private or public partner to utilize for the development of a community hospital. The masterplan details that this site is the most logical location for a community-facing hospital, and a feasibility study shows that there would be demand. The masterplan indicates that the proposed community hospital will be a 4-story, 100-bed hospital. Cleanup and reuse of this Site is a vital component of the overall approach of the masterplan. Management of soils with respect to construction-related activities and remediation of documented impacts to soil gas will be required to support this redevelopment strategy. Site soils are suitable for on-site re-use but may not be suitable for export to other properties depending on the characteristics of the receiving property. In addition, residual concentrations of PCE and daughter products may be present in soils within the limits of the documented groundwater plume.

2.0 Applicable Regulations and Cleanup Standards

2.1 Cleanup Oversight Responsibility

The site is not currently enrolled in a TCEQ correct action program for regulatory oversight purposes. The site was previously enrolled in the VCP and received a Final COC in 2004. There are various mechanisms by which sites may be closed in the TCEQ regulatory programs. Site closure is typically achieved through one of the TCEQ's recognized regulatory programs, including the Corrective Action (CA) Program or VCP. Regulatory closure for the CA and VCP programs is achieved utilizing the TRRP rules, which provides risk-based PCLs for numerous contaminants.

2.1.1 VCP

The Texas VCP provides administrative, technical, and legal incentives for the cleanup of contaminated sites in Texas. The Texas VCP was created by House Bill 2296 of the 74th Texas Legislature. The VCP facilitates real estate transactions on impacted property by providing a monitored closure resulting in a COC which is deed recorded, runs with the land and releases future owners and lenders from liability to the State of Texas for corrective action associated with the release. It should be noted that this release of liability does not apply to third parties, or to new releases that may occur at a site. In order to be eligible for the TCEQ VCP, the applicant must not be regulated by the Railroad Commission of Texas, be under an order or permit from the TCEQ, or have enforcement pending. A responsible party cannot have initiated remediation (after September 1, 1995) prior to entering the program and must file an Application along with a $1,000.00 fee payable to the TCEQ. The VCP is a fee-based program where the TCEQ coordinator charges the responsible party for time spent reviewing the project and providing regulatory guidance. In addition, historical information pertaining to the site typically in the form of a Phase I Environmental Site Assessment is necessary at the time of Application. Once the application is filed, the TCEQ has 45 days to respond with a letter of acceptance or denial, and a coordinator will be assigned to the project if the site is accepted. In addition, a TCEQ VCP Agreement must be signed and submitted which outlines the terms and conditions and establishes the schedule for submittals and corrective action activities. The VCP Application and Agreement requires the signature of all applicants.

The TCEQ VCP will review submittals on an expedited schedule, particularly if a transaction is pending. Potential purchasers of a property can either wait for the response actions to be completed in accordance with TCEQ requirements and issuance of the COC prior to purchasing the property, or they can become an additional Applicant on the TCEQ application prior to purchasing the property and still receive the release of liability once the COC is issued. Becoming an additional applicant on the VCP application prior to purchasing the property is necessary if the potential purchaser wishes to buy the property prior to the completion of the response action.

During the VCP process several reports are required to document proper assessment of the property (Affected Property Assessment Report – APAR), planned remediation activities (Response Action Plan – RAP) and documentation of remediation activities (Response Action Completion Report – RACR). Sites may be closed under two remedy scenarios: Remedy Standard A and Remedy Standard B. Remedy Standard A is achieved without the use of institutional or engineering controls (i.e. without the use of a groundwater restriction or an engineered cap to prevent contact with the contaminants). Remedy Standard B is achieved through use of either an institutional control or engineering control.

2.1.2 Corrective Action Program

The mission of the TCEQ CA Program is to oversee the cleanup of sites contaminated from industrial and municipal hazardous and industrial non-hazardous wastes. The goals of the CA Program are to:

- Ensure that sites are assessed and remediated to levels that protect human health and the environment;
- Verify that waste management units or facilities are taken out of service and closed properly; and
- Facilitate revitalization of contaminated properties.

Remediation of sites not entered into the VCP are managed under the CA Program. Although the CA Program provides oversight of the remediation process, there is far less oversight than what is provided for sites entered into the VCP. Assessment and cleanup of sites entered into the CA Program are conducted under the Texas Risk Reduction Program (30 TAC §350). Response actions under the CA Program can be self-implemented (i.e. conducted without direct TCEQ oversight guidance) and both assessment reports (APARs) and response action reports (RACRs) may be submitted to TCEQ for approval once the response actions have been completed. Following approval, TCEQ issues a "No Further Action" (NFA) letter, which does not relieve the applicant of future liability with the TCEQ.

The CA Program also allows the reuse of a property prior to completion of all response actions through the Ready for Reuse designation. The Ready for Reuse (RfR) designation encourages environmental cleanups that promote economic growth by enhancing redevelopment opportunities. This voluntary regulatory determination recognizes when a property has been characterized and remediated to the extent that it is protective for redevelopment based on current or planned land use. The CA Program began implementing this measure of remedial achievement in May 2003.

The RfR determination is intended to supplement and be consistent with other state actions. For many facilities or parcels thereof, the RfR determination may occur when sites have achieved final cleanup. However, RfR can also occur when the remedy standard is not yet achieved but the property has been addressed such that the conditions are protective based on the reuse scenario.

The RfR determination is available to all parties that notify the IHW CA Program and meet the eligibility criteria. Many types of facilities may be eligible for RfR, including facilities with petroleum storage tanks and those subject to a hazardous waste permit, compliance plan, order, or other formal or informal enforcement mechanism. In conjunction with the RfR determination, an RfR Certificate is issued.

All work plans, including sampling and analysis plans and quality assurance project plans, and reports related to environmental investigations and remediation activities conducted at the Site will be submitted to the selected agency for review and approval.

2.2 Cleanup Standards

Terracon understands that the City of Garland intends to develop the property for use as a community hospital by a private or public partner. With this anticipated exposure scenario, Terracon anticipates the following screening levels will be used as the Cleanup Standards for the Site.

- **Soil:** If on-site soils will not be re-used on the Site and will be exported from the Site, said soils shall undergo proper characterization prior to export. If soils will be disposed at an approved landfill, proper waste characterization, profiling, and manifesting shall be conducted. Based on current information, Site soils appear to meet the criteria of a Class 2 non-hazardous waste equivalent. Prior to or during construction, soils shall be characterized for comparison to the EPA hazardous waste and the Texas Class 1 and 2 non-hazardous waste thresholds.
- **Groundwater:** Groundwater remediation is not anticipated; however, if groundwater is encountered during construction it shall be compared to the TCEQ TRRP ingestion of Class 3 groundwater PCL ($^{GW}GW_{Class\ 3}$).
- **Soil Gas:** The TCEQ has not established soil gas PCLs but has published Risk Based Exposure Limits (RBELs) for air inhalation at the point of exposure. The TCEQ has not published formal guidance or regulations specific to the vapor intrusion pathway; however, the air-inhalation RBELs represent current TRRP inhalation values protective of human health. Therefore, soil gas VOC concentrations shall compared to Soil Gas Target Concentrations calculated using TRRP residential and C/I RBELs and the current EPA generic attenuation factor of 0.03 for soil gas to indoor air.

2.3 Laws & Regulations Applicable to the Cleanup

Laws and regulations that are applicable to this cleanup include:

- Occupational Safety and Health Act, Hazardous Waste Operations and Emergency Response Standard (40CFR1910.120) and applicable Safety and Health Regulations for Construction (29CFR1926).
- National Emissions Standards for Hazardous Air Pollutants (NESHAP) (40CFR61 – Subpart M: National Emission Standard for Asbestos).

- Department of Transportation, Hazardous Materials Regulations (49CFR Subtitle B, Chapter 1, Subchapter C).
- Resource Conservation and Recovery Act (42 U.S.C. § 6901, et. seq.).
- National Historic Preservation Act of 1966, Section 106.
- Texas Health and Safety Code (THSC), Chapter 361, Section 361.602-613 (Voluntary Cleanup Program).
- THSC, Chapter 361, Section 751-754 (Innocent Owner/Operator Program).
- Texas Administrative Code (TAC) Title 30, Chapter 333, Subchapter A (Brownfields Initiative, Voluntary Cleanup Program Section).
- TAC Title 30, Chapter 333, Subchapter B (Brownfields Initiative, Innocent Owner/Operator Certification).
- TAC Title 30, Chapter 334 (Underground and Aboveground Storage Tanks)
- TAC Title 30, Chapter 335 (Industrial Solid Waste and Municipal Hazardous Waste)
- TAC Title 30, Chapter 350 (Texas Risk Reduction Program)
- Federal Small Business Liability Relief and Brownfields Revitalization Act, if Brownfields or other Federal funding is used.
- Federal Davis-Bacon Act, if Brownfields or other Federal funding is used.

In addition, all appropriate permits and notifications (e.g., Texas 811, soil disposal acceptance notification, soil transport/disposal manifests, etc.) will be obtained prior to the cleanup activities commencing.

2.4 Climate Change Considerations

Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, establishes an integrated strategy for sustainability within the Federal Government. Under the Executive Order, each agency is required to evaluate their climate change risks and vulnerabilities to manage the effects of climate change on the agency's mission and operations in both the short and long-term as part of the formal Strategic Sustainability Performance Planning process.

Effective with Fiscal Year 2013, EPA's Brownfields Program initiated a change to cooperative agreements for Cleanup and Revolving Loan Fund awards. It requires cooperative agreement recipients to evaluate the resilience of remedial options funded by the award in light of reasonably foreseeable changing climate conditions. As directed under EPA's Climate Change Adaptation Plan, the ABCA must include a discussion of observed and forecasted climate change conditions for the area of the project and the associated site-specific risk factors. Specifically, this is to be presented as part of the ABCA. As the possibility exists that Cleanup grant funds or Revolving Loan Fund grant funds may be utilized for cleanup actions at the Site, climate change has been considered in this ABCA.

2.4.1 General Considerations

In considering remedy resiliency Terracon consulted the following resources as authoritative sources:

- EPA Climate Change on EPA.gov

2.4.2 Site-Specific Considerations

The Site and Texas climate is characterized by hot summers and mild to cool winters (Reference 2024b in Section 4.0). Three geographical features largely influence the state's varied climate: the Rocky Mountains block intrusions of moist Pacific air from the west and tend to channel arctic air masses southward during the winter; the relatively flat central North American continent allows easy north and south movement of air masses; and the Gulf of Mexico serves as the primary source of moisture, which is most readily available to the eastern part of the state. As a result of these factors, the state exhibits large east-west variations in precipitation and is subject to frequent and varied extreme events, including hurricanes, tornadoes, droughts, heat waves, cold waves, and extreme precipitation. Due to rapid population growth, especially in urban areas, increased demand for limited water supplies may increase Texas's vulnerability to naturally occurring droughts.

Temperatures in Texas have risen almost 1.5°F since the beginning of the 20th century. While there is no overall trend in extremely hot days, the number of very warm nights was particularly high during the 2010s. The urban heat island effect increased these occurrences in city centers. The summer of 2011 was the warmest summer on record (since 1895) and broke the state record for highest average number of days with temperatures of 100°F or more. The Dallas-Fort Worth area endured 40 consecutive days with temperatures higher than 100°F, which was the second-longest streak on record (1899–2020). The record dry conditions contributed to the higher temperatures. Daily minimum temperatures in January typically range from about 20°F in the northern Panhandle to about 50°F near the mouth of the Rio Grande River. The annual number of entire days below freezing was well above average in the 1970s and 1980s but has since been near the long-term average (Figure 4a).

Precipitation is widely variable across Texas, with normal amounts ranging from less than 10 inches in the far west to more than 60 inches in the extreme southeast. Historically significant droughts occurred in the late 1910s, the early 1950s, and the early 2010s; the driest calendar years were 1917, 1956, and 2011. The driest consecutive 5 years was the 1952–1956 interval and the wettest was the 2015–2019 period. In the 1990s and early 2000s, the number of 3-inch extreme precipitation events was above average, and after the dry period of 2005–2014, they were well above average during the 2015–2020 period. The five wettest months on record have all occurred since the year 2000, led by 9.1 inches in May 2015. Hurricane Harvey (2017) was the most destructive event in Texas history, mostly due to the unprecedented rainfall, which contributed to the second wettest month on record despite affecting only part of the state. After making landfall on August 25, Harvey slowed and was nearly stationary for several days near Houston. Rainfall exceeded 30

inches in many locations, and a few locations had more than 50 inches (Figure 5). Catastrophic flooding occurred across much of southeast Texas.

Texas is consistently ranked in the top 10 states affected by extreme events. In 2020, the state was hit by eleven of the nation's billion-dollar disasters. The three most impactful events were drought, extreme heat, and wildfires. The warmest and the driest summer in the historical record helped fuel the worst wildfire season since statewide records began (approximately 1990), with nearly 4 million acres burned and almost $750 million in damages. Since the creation of the United States Drought Monitor Map in 2000, Texas has been completely drought-free for approximately 8% of the time (2000–2014), and at least half of the state has been under drought conditions for approximately 42% of the same period. Paleoclimatic records indicate that droughts as severe as the one in 2011 have occurred occasionally in the past 1000 years. Higher temperatures and drought conditions are likely to increase the severity, frequency, and extent of wildfires in the future, threatening significant harm to property, human health, and the livelihood of residents.

Over the period of 1900 to 2020, Texas endured more than 85 tropical storms and hurricanes (about 3 storms every 4 years); approximately half of them (46) were hurricanes (Figure 4d). Since 2000, Texas has experienced 19 named storms, including 8 destructive hurricanes, with Hurricane Harvey (Category 4), Hurricane Rita (Category 3), and Hurricane Ike (Category 2) causing the most significant damage. While Hurricane Rita caused the largest U.S. evacuation in history, Hurricane Harvey is the costliest hurricane in Texas history, with an estimated $136 billion in damages. Storm surges between 11 and 13 feet along the Texas coast typically have return periods of 25 years. Over the past 30 years (1991–2020), Texas has averaged 149 tornadoes and 4 tornado fatalities per year. Events can occur all year, though activity typically peaks between April and June.

Under both higher and lower emissions pathways, historically unprecedented warming is projected by the end of this century. However, a large range of temperature increases is projected under both pathways, and under the lower pathway, a few projections are only slightly warmer than historical records. Increases in the number of extremely hot days and decreases in the number of extremely cold days are projected to accompany the overall warming. By 2055, an estimated increase of 20–30 days with temperatures higher than 95°F is projected under one pathway, with the greatest increase in southwestern Texas.

Future changes in annual average precipitation are generally projected to be small, but an increase in extreme precipitation is likely. Furthermore, even if average precipitation does not change, higher temperatures will increase the rate of soil moisture loss, likely leading to more intense naturally occurring droughts. Longer dry spells are also projected.

Increased drought severity and increased human demand for surface water will cause changes in streamflow, with extended reductions of freshwater inflow to Texas bays and estuaries. These changes in streamflow will cause temporary or permanent changes to bay salinity and oxygen content, which will have potentially major impacts on bay and estuary ecosystems, such as negatively affecting organism growth, reproduction, and survival.

Future changes in the frequency and severity of tornadoes, hail, and severe thunderstorms are uncertain. However, hurricane intensity and rainfall are projected to increase for Texas as the climate warms.

Since 1900, global average sea level has risen by about 7–8 inches. It is projected to rise another 1–8 feet, with a likely range of 1–4 feet, by 2100 as a result of both past and future emissions from human activities. Sea level rise has caused an increase in tidal floods associated with nuisance-level impacts. Nuisance floods are events in which water levels exceed the local threshold (set by NOAA's National Weather Service) for minor impacts. These events can damage infrastructure, cause road closures, and overwhelm storm drains. As sea level has risen along the Texas coastline, the number of tidal flood days has also increased, with the greatest number occurring in 2020. Future sea level rise will increase the frequency of nuisance flooding and the potential for greater damage from storm surge.

3.0 Analysis of Brownfield Cleanup Alternatives

A discussion of the cleanup objectives and an evaluation of remedial alternatives for the Site are provided below.

3.1 Cleanup Objectives

Chlorinated solvents in soil and soil gas, particularly PCE and daughter products, will be managed to reduce environmental viability to reduce vapor intrusion potential to acceptable risk levels.

3.2 Cleanup Alternatives Considered

Terracon has discussed proposed redevelopment scenarios with the City of Garland and has incorporated information from those conversations into this ABCA. The assumptions behind the cleanup alternative discussions include the following.

- The Site will be redeveloped for commercial use.
- Chlorinated solvents (PCE and daughter products) have been detected in soil and groundwater but below the TCEQ RALs and/or critical PCLs.
- Export of soils related to construction activities will be managed through waste characterization sampling, waste profiling, off-site landfill approval, and waste manifesting.
- Chlorinated solvents (PCE and daughter products) have been detected in soil gas above TRRP Soil Gas Target Concentrations for both residential and C/I use. The chlorinated solvent-impacted soil gas appears to be limited to the property boundaries.
- On-site soil gas impacts will be addressed through remediation of the dissolved-phase source material in groundwater.

Table 1 presents cleanup alternatives with respect to effectiveness, long-term reliability, implementability, and cost. Also presented are advantages and disadvantages of the proposed technology. The final solution may involve multiple technologies to achieve remedial goals. More detailed comparison of potential costs to implement is provided in Table 2. The tables can be found attached to this report in Appendix A.

3.2.1 Alternative 1: No Action

The No Action alternative is included as a baseline comparison to other remedial alternatives and assumes no action is taken.

3.2.2 Alternative 2: Vapor Intrusion Mitigation System (VIMS) and Soil Management

Alternative 2 would provide vapor mitigation from accumulating sub-slab vapors in soil gas originating from impacted groundwater and a Soil Management Plan (SMP) would serve as a guideline for the handling and management of on-site soils and/or accumulated surface water during construction activities. The purpose of the VIMS is to protect building occupants from potentially harmful accumulating vapors. Consideration should be given to a design that would include sub-slab soil gas collection piping and a sub-slab vapor intrusion barrier. This type of system would offer a robust engineered approach, integrating the VIMS with building materials and components, installation by a certified installer, and construction oversight by a certified inspector providing an entire building solution. The alternative does not address the chlorinated solvents in groundwater. The concentration of chlorinated solvent vapors in soil gas at the site currently exceed TCEQ risk thresholds.

If on-site soils will not be re-used on the site and will be exported from the site, said soils shall undergo proper characterization prior to export. If soils will be disposed at an approved landfill, proper waste characterization, profiling, and manifesting shall be conducted as outlined in this plan.

On-site soil re-use is recommended to reduce risk and costs. If affected soils require export from the site the soils may be disposed at an approved landfill following proper waste characterization, profiling, and manifesting. Soils should not be transported to a third-party soil yard or pit where the Generator (City of Garland) does not have control over their re-use and/or distribution.

Field oversight during portions of excavation activities on the site shall be conducted and the environmental consultant on the Site shall sign waste manifests on behalf of the Generator as soils are transported off of the Site for disposal at the selected and approved receiving facilities. Specific oversight activities by environmental consultant may include the following.

- Screening of soils for the presence of VOCs or objectionable characteristics during excavation and grading activities in the footprints of known former potential source

areas. Screening would be conducted using sensory methods and a photoionization detector (PID).

- Directing segregation, stockpiling, and management of impacted soils if identified during construction.
- Collecting samples for analysis and characterizing/profiling if impacted soils are identified during construction.
- Coordinating with selected landfill to obtain profile approvals as needed.
- Overseeing that waste manifests and associated documentation are appropriately completed prior to transport of Managed Soils to the approved landfill.

This SMP should be provided by the City of Garland to applicable contractors regarding the work described above and any subsequent subsurface work with the potential to generate soils that will require management.

3.2.3 Alternative 3: Soil Vapor Extraction (SVE and Soil Management)

Alternative 3 is Soil Vapor Extraction (SVE), a remediation technology with an objective to reduce the concentration of volatile contaminants in the source media (e.g., subsurface soil and/or groundwater) to levels that will reduce soil gas concentrations to levels below the TRRP Soil Gas Target Concentrations. SVE is not an appropriate technology for direct remediation of groundwater (though groundwater is treated indirectly through increased volatilization). The technology uses a blower coupled to vapor extraction wells installed in the source area. The blower induces a vacuum for removing soil gas and accelerating volatilization of contaminants from soil and groundwater. The difference between SVE and VIMS is that SVE removes source materials and VIMS removes or prevents soil gas accumulating below the floor slab. Both SVE and VIMS methods may require a Notice of Intent and reporting to the TCEQ. Extracted vapors may require treatment prior to discharge to the atmosphere to reduce Hazardous Air Pollutants (HAPs). Similar to VIMS, the concentration of chlorinated solvent vapors in soil gas at the site currently exceed TRRP Soil Gas Target Concentrations.

The SVE system's vapor extraction wells will be placed in areas where soil vapor concentrations exceeding TRRP Soil Gas Target Concentrations have been identified. Pilot testing would be required to determine the feasibility of using SVE and to determine site parameters for design. SVE systems can take months to years to achieve cleanup and require ongoing operations and maintenance (O&M) and sampling to determine system effectiveness. Given the concentrations of chlorinated solvents present in groundwater and soil gas at the Site, it is considered likely that a combination of SVE and VIMS may be required.

If on-site soils will not be re-used on the site and will be exported from the site, said soils shall undergo proper characterization prior to export. If soils will be disposed at an approved landfill, proper waste characterization, profiling, and manifesting shall be conducted as outlined in this plan.

On-site soil re-use is recommended to reduce risk and costs. If affected soils require export from the site the soils may be disposed at an approved landfill following proper waste characterization, profiling, and manifesting. Soils should not be transported to a third-party soil yard or pit where the Generator (City of Garland) does not have control over their re-use and/or distribution.

Field oversight during portions of excavation activities on the site shall be conducted and the environmental consultant on the Site shall sign waste manifests on behalf of the Generator as soils are transported off of the Site for disposal at the selected and approved receiving facilities. Specific oversight activities by environmental consultant may include the following.

- Screening of soils for the presence of VOCs or objectionable characteristics during excavation and grading activities in the footprints of known former potential source areas. Screening would be conducted using sensory methods and a photoionization detector (PID).
- Directing segregation, stockpiling, and management of impacted soils if identified during construction.
- Collecting samples for analysis and characterizing/profiling if impacted soils are identified during construction.
- Coordinating with selected landfill to obtain profile approvals as needed.
- Overseeing that waste manifests and associated documentation are appropriately completed prior to transport of Managed Soils to the approved landfill.

This SMP should be provided by the City of Garland to applicable contractors regarding the work described above and any subsequent subsurface work with the potential to generate soils that will require management.

3.2.4 Alternative 4: In-Situ Biological Enhanced Reductive Dechlorination and Abiotic In-Situ Chemical Reduction and Soil Management

Alternative 4 directly targets chlorinated solvent contamination in groundwater and indirectly targets chlorinated solvent contamination in soil gas. This alternative proposes to use a combination of biological enhanced reductive dechlorination (ERD) and abiotic in-situ chemical reduction (ISCR) degradation pathways for rapid reduction of chlorinated solvents. Chlorinated solvents dissolved in groundwater will be treated by in-situ biological ERD and abiotic ISCR using a combination of an oleic acid and lactate/polylactate electron donor microemulsion (or equivalent), micro-scale zero valent iron (ZVI), and a microbial inoculum containing species of *Dehalococcoides sp.* which are known to stimulate the rapid and complete dechlorination of chlorinated solvents. This multi-component reductive dechlorination approach will rapidly degrade the PCE, TCE, DCE, and VC to concentrations that are below the cleanup standards specified in Section 2.2, while reducing the potential for daughter product formation compared to more common in-situ remediation methods (e.g., chemical oxidation). A multi-component reductive dechlorination approach is more expensive than other potential in-situ treatment methods (e.g., chemical oxidation).

The treatment solutions will be injected in a grid pattern throughout the groundwater chlorinated solvent plume via direct-push methods by a specialized remediation contractor. Several companies manufacture products that could be used. Further research and vendor coordination would be required to determine suitable products, volumes and dosages to be applied, method of delivery, and concentration needed to achieve remedial goals. The technology can also be appropriate for destruction of other volatile organics that may be present in groundwater and in soils. Implementation would be prior to construction of a new building.

Many factors play a role in the success of the proposed in-situ treatment. Some of these factors are listed below:

- demand for electron donors and reductants from target compounds and nontarget compounds
- remedial goals
- soil properties (e.g., grain size, porosity)
- contact times
- groundwater velocity
- contaminant mass flux

Additional subsurface information may be required to properly design treatment specifications and provide an appropriate delivery system to distribute the treatment solutions in the target zones. The biggest challenge for in-situ treatment at the Site is the fine-grained soils overtop shallow limestone bedrock (Austin Chalk). Use of passive flux meters (PFMs) would be a relatively inexpensive and high-accuracy method to identify depth intervals with high contaminant mass flux that could be specifically targeted by the injection design. Use of micro-scale electron-donor and ZVI products will be critical for achieving good dispersion of the treatment solutions through fine-grained soils.

If on-site soils will not be re-used on the site and will be exported from the site, said soils shall undergo proper characterization prior to export. If soils will be disposed at an approved landfill, proper waste characterization, profiling, and manifesting shall be conducted as outlined in this plan.

On-site soil re-use is recommended to reduce risk and costs. If affected soils require export from the site the soils may be disposed at an approved landfill following proper waste characterization, profiling, and manifesting. Soils should not be transported to a third-party soil yard or pit where the Generator (City of Garland) does not have control over their re-use and/or distribution.

Field oversight during portions of excavation activities on the site shall be conducted and the environmental consultant on the Site shall sign waste manifests on behalf of the Generator as soils are transported off of the Site for disposal at the selected and approved

receiving facilities. Specific oversight activities by environmental consultant may include the following.

- Screening of soils for the presence of VOCs or objectionable characteristics during excavation and grading activities in the footprints of known former potential source areas. Screening would be conducted using sensory methods and a photoionization detector (PID).
- Directing segregation, stockpiling, and management of impacted soils if identified during construction.
- Collecting samples for analysis and characterizing/profiling if impacted soils are identified during construction.
- Coordinating with selected landfill to obtain profile approvals as needed.
- Overseeing that waste manifests and associated documentation are appropriately completed prior to transport of Managed Soils to the approved landfill.

This SMP should be provided by the City of Garland to applicable contractors regarding the work described above and any subsequent subsurface work with the potential to generate soils that will require management.

3.2.5 Recommended Cleanup Alternative

The applicable remedial alternatives for the analytes exceeding screening levels are summarized below.

Analyte	Remedial Alternative	Screening tool	Exposure Scenario	Matrix
Tetrachloroethene (PCE)	2, 3, 4	TRRP Soil Gas Target Concentrations, EPA Hazardous Waste and Texas Waste Classification Criteria	Residential	Soil Gas and Soil
Trichloroethene (TCE)	2, 3, 4	TRRP Soil Gas Target Concentrations, EPA Hazardous Waste and Texas Waste Classification Criteria	Residential	Soil Gas and Soil

cis-1,2-dichloroethene (DCE)	2, 3, 4	TRRP Soil Gas Target Concentrations, EPA Hazardous Waste and Texas Waste Classification Criteria	Residential	Soil Gas and Soil
trans-1,2-dichloroethene (DCE)	2, 3, 4	TRRP Soil Gas Target Concentrations, EPA Hazardous Waste and Texas Waste Classification Criteria	Residential	Soil Gas and Soil
Vinyl Chloride	2, 3, 4	TRRP Soil Gas Target Concentrations, EPA Hazardous Waste and Texas Waste Classification Criteria	Residential	Soil Gas and Soil

To achieve the Cleanup Objectives listed in Section 3.1, the Recommended Cleanup Alternative is Alternative 2 for the following reasons

- Alternative 2 (VIMS and Soil Management)
  - conventional remediation options are not viable due to the site geology (clay soils overtop shallow limestone bedrock)
  - most cost-effective alternative
  - does not require long-term O&M monitoring assuming a passive VIMS system
  - a preemptive VIMS is installed during construction and does not significantly impact development schedule

Other alternatives were rejected for the following reasons.

- Alternative 1 (No Action) is not considered a viable option since it does not meet the redevelopment objectives or protect from future exposure to site contaminants.
- Alternative 3 (SVE and Soil Management):
  - poses significant engineering challenges
  - requires large amounts of mechanical equipment that is vulnerable to breakdown and will require periodic maintenance, repair, and replacement
  - requires long-term O&M and monitoring
  - likely would need to be implemented in combination with a VIMS
- Alternative 4 (In-Situ Remediation and Soil Management):

- Not viable due to low permeability soils overtop shallow limestone bedrock (Austin Chalk)
- poses significant engineering challenges
- injection points cannot be advanced through bedrock
- chemicals cannot be injected into bedrock formation
- likely would need to be implemented in combination with a VIMS

Following implementation of a remedial strategy, a cleanup completion report would be generated to document that the cleanup activities were completed, along with the final condition of the Site based on cleanup confirmation sampling. Depending on which TCEQ regulatory program provides oversight, a post-remediation risk assessment may also be required to calculate the level of residual human health risk, along with an SMP specifying controls to manage the residual risks and the possibility of a Restrictive Covenant to manage future Site use with remaining environmental impacts.

4.0 References

2023 Terracon Consultants, Inc., 2023. *Phase I Environmental Site Assessment, Proposed Community Hospital, 530 Clara Barton Boulevard, Garland, Dallas County, Texas.* Terracon Project No. 94237444. December 18, 2023.

2024a Terracon Consultants, Inc., *2024. Limited Site Investigation, Proposed Community Hospital, 530 Clara Barton Boulevard, Garland, Texas.* Terracon Project No. 95237621. February 1, 2024.

2024b Climate Change Impacts, State and Regional Climate Impacts, State Climate Summaries, NOAA National Centers for Environment Information, State Climate Summaries 2002, Texas Narrative (Web search: October 2024). https://statesummaries.ncics.org/chapter/tx/

Appendix A

Tables

Table 1 Brownfield Cleanup Alternatives Balancing Factor Evaluation

Remedial Alternative	Effectiveness	Long-term reliability	Implementability	Cost Implications
1. No Action	Does not address potential risks.	Does not address potential risks.	Not applicable for No Action.	No cost to implement. Potential cost implications on property value and future liabilities associated with contaminant exposure.
2. Vapor Intrusion Mitigation System (VIMS) and Soil Management	Addresses vapor intrusion from VOCs in groundwater. Does not address impacts to groundwater. Manages potential environmental risks associated with handling and disposal of soil waste.	Passive system with no long-term O&M needs. Not applicable for soil management	Can be incorporated into the design of any future development. Properly maintained, the system would operate for the expected life of the building. Minor implementation risks associated with excavation and transportation to appropriate disposal facility. Minor risk to community due to transportation.	VIMS: Moderate costs associated with vapor mitigation. Soil Management: Moderate costs depending on volume of soil export
3. Soil Vapor Extraction (SVE) and Soil Management	Reduces soil gas VOC contaminant levels but may not eliminate the need for a VIMS. Does not	Targets the unsaturated zone with minimal benefits to the saturated zone.	Design of a SVE system is based on building design, subsurface lithology and expected performance. Costs will be higher than a VIMS due to need for wells and	SVE: High implementation cost to include engineering costs, pilot testing, capital equipment, installation/construction, permitting, and O&M.

	address impacts to groundwater.	Requires pilot testing to determine feasibility of technology, equipment design and placement.	mechanical equipment that will need to be operated for long periods of time, potentially in perpetuity since it is unlikely that VOC concentrations in groundwater will be substantially reduced.	Soil Management: Moderate costs depending on volume of soil export
4. In-Situ Biological Enhanced Reductive Dechlorination and Abiotic In-Situ Chemical Reduction and Soil Management	Reduces source zone contaminant levels of VOCs in groundwater. Remediates low-level contamination in soils and accelerates attenuation of soil gas impacts after groundwater remediation.	Reduces the concentration of chlorinated compounds through reductive dechlorination. Reduces vapor intrusion potential and reduces off-site migration of chlorinated compounds.	Chemical injection in source area for degradation of chlorinated compounds in the saturated zone. Difficult to implement given site geology.	In-situ Reductive Dechlorination: High short-term costs for injection chemicals, methods for application, and labor. Unlikely to require multiple treatments or long-term O&M. High costs to inject over a large area with a diminished radius of influence, if possible. Soil Management: Moderate costs depending on volume of soil export

Table 2 Estimated Comparative Costs for Cleanup Alternatives

Cleanup Alternative	Estimated Costs	Notes	
1. No Action	$0	Not a viable option.	
2. Vapor Intrusion Mitigation System (VIMS) and Soil Management	$1,570,00	**VIMS:**	
		$30,000	Engineering Design.
		$500,000	Installation of system (labor and materials). Assumes an approximate building envelope of ~120,000 ft^2
		$40,000	Consultant oversight during installation,
		Soil Management:	
		$800,000	Remove, transport, and disposal of excess soils (20,000 cubic yards). Contractor rough estimate based on similar projects. Includes all labor and equipment necessary. Assumes Class 2 non-hazardous waste disposal at a permitted landfill.
		Oversight and Reporting:	
		$200,000	Cleanup planning document preparation, public notification of proposed cleanup, soil oversight, waste manifesting, and completion report.

Cleanup Alternative	Estimated Costs	Notes	
3. Soil Vapor Extraction (SVE)) and Soil Management	$3,170,000	**SVE:**	
		$100,000	Pilot testing.
		$50,000	System design.
		$1,250,000	Capital costs and installation.
		$80,000	Consultant installation oversight.
		$800,000	Operations and maintenance for 10 years.
		Soil Management:	
		$800,000	Remove, transport, and disposal of excess soils (20,000 cubic yards). Contractor rough estimate based on similar projects. Includes all labor and equipment necessary. Assumes Class 2 non-hazardous waste disposal at a permitted landfill.
		Oversight and Reporting:	
		$90,000	Cleanup planning document preparation; air emissions permitting and reporting; meetings with the selected regulatory agency; public notification of proposed cleanup; and cleanup completion report.

Cleanup Alternative	Estimated Costs	Notes
4. In-Situ Biological Enhanced Reductive Dechlorination and Abiotic In-Situ Chemical Reduction and Soil Management	$3,150,000	**In-Situ Reductive Dechlorination:** $80,000 — In-situ remediation design validation study $900,000 — Remediation contractor (design and injection field implementation) $1,200,000 — Cost for chemicals (including delivery and sales tax). $70,000 — Consultant field oversight of in-situ injections. **Soil Management**: $800,000 — Remove, transport, and disposal of excess soils (20,000 cubic yards). Contractor rough estimate based on similar projects. Includes all labor and equipment necessary. Assumes Class 2 non-hazardous waste disposal at a permitted landfill. **Oversight and Reporting**: $100,000 — Cleanup planning document preparation; meetings with the selected regulatory agency; public notification of proposed cleanup; and cleanup completion report.