



ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

(ABCA)

5800 Alameda Avenue, Lakewood, Colorado

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February 6, 2017

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FIGURE 1 5800 Alameda Development Boundaries

1.0 ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

The Analysis of Brownfield Cleanup Alternatives (ABCA) was written to help inform Metro West Housing Solutions (MWHS) U.S. Environmental Protection Agency (EPA) Brownfield Grant Application. It includes the results of Site investigations and proposes a reasonable cleanup strategy that meets the standards of the Colorado Department of Public Health and the Environment (CDPHE), the EPA, City of Lakewood, and other potential funders.

2.0 SITE DESCRIPTION

The Site is a 3.68-acre property developed with two large, connected buildings with approximately 165,475 square feet of combined floor space. The buildings were constructed in 1981 and include a 7-story Tower Building with a basement and a single story building with a subgrade-parking garage. The majority of the remaining property was improved with asphalt parking lot during the same year. At the time of construction, the buildings were intended for use as office and retail space. The Site was operated by Martischang Properties, LLLP (though the property comprises two distinct parcels that were owned by separate LLC's) from the time of building construction through 2014. MWHS purchased the property in 2014 with the intent on redeveloping the Site for future residential/commercial (mixed) use.

Due to previous Site operations that included an on-site drycleaner, and the previous existence of a car wash and retail gas station on the adjacent properties, a Phase I investigation was completed at the behest of the EPA as part of a targeted brownfield assessment (TBA) while MWHS was under contract to purchase the property. Additional details regarding the site history and any recognized environmental conditions are provided in the October 2014 *Phase I Environmental Site Assessment For Martischang Complex* report prepared by Weston Solutions, Inc. (Weston). Weston also identified some mold and Asbestos in the commercial tower and lead-based paint (LBP), properly encapsulated, in the ground floor retail area now occupied by a charter school. Due to tight time constraints, lack of available equipment, and concerns from the property owner, some data gaps were left unanswered until MWHS took ownership of the property.

Due to the findings of the Phase I ESA, Weston recommended that a Phase II ESA be completed to determine whether any of the previous Site operations, or operations at adjacent properties, had caused environmental impacts to the Site soil, groundwater, and/or soil gas. The initial Phase II assessment activities were completed by Weston in November 2014 and the results are reported in Weston's December 2014 *Phase II Environmental Site Assessment For Martischang Complex* report. Due to the findings of Weston's initial Phase II ESA, MWHS' environmental consultant LT Environmental, Inc. (LTE) was tasked with addressing the deficiencies (or data gaps) that arose from the difficulties encountered during drilling and to better characterize the site soil, groundwater, and soil vapor beneath the existing buildings.

Soil analytical results are summarized in LTE's Supplemental Phase II report. VOCs were not detected in 13 out of the 14 soil samples collected. Methylene chloride (MC) was detected at a concentration of 0.012 milligrams per kilogram (mg/kg) in the soil sample collected from one soil boring. The EPA Regional Screening Levels (RSL) for residential land use for MC is 57 mg/kg; thus, the detected concentration of MC in the sample collected from SB12 is well below the RSL. No other VOCs were detected in soils at concentrations above the laboratory reporting limits, and the laboratory reporting limits were sufficiently below the RSLs for all compounds reported.

Groundwater analytical results are summarized in LTE's Supplemental Phase II report. VOCs were not detected in 13 out of the 14 groundwater samples collected. Tetrachloroethene (PCE) was detected at a concentration of 1.9 micrograms per liter ($\mu\text{g/L}$) in the groundwater sample collected from monitoring well MW-10. The CDPHE, Regulation 41 Groundwater Quality Standard (CGWQS) for PCE is 17 $\mu\text{g/L}$; thus, the detected concentration of PCE in the groundwater sample collected from monitoring well MW-10 is below the CGWQS. No other VOCs were detected in groundwater at concentrations above the laboratory reporting limits.

Sub-slab vapor analytical results are summarized in LTE's Supplemental Phase II report. Only those compounds that were detected at concentrations that exceed the EPA Residential Air Regional Screening Level (RSL) are summarized below. The following compounds were present at concentrations that exceed the EPA Residential Air RSL and are considered as the chemicals of potential concern (COPCs) for indoor air:

- 1,2,4-Trichlorobenzene
- Benzene
- Benzyl Chloride
- Bromodichloromethane
- Carbon Tetrachloride
- Chloroform
- Ethylbenzene
- Hexachlorobutadiene
- m,p-Xylene
- Methylene Chloride
- Naphthalene
- Tetrachloroethene
- Trans-1,3-Dichloropropene
- Trichloroethene

3.0 FUTURE USE OF SITE

MWHS will partially repurpose and redevelop the Site into an apartment community. The existing office tower will be adaptively reused as an apartment building with ground level leasing and amenity space. The existing unused basement level of the tower will contain residential apartments and storage. The existing subgrade-parking will remain as such and serve the entire apartment complex. The commercial space above the subgrade-parking will remain as is. A new multi-family building will be constructed to the west of the tower on what is currently a surface parking lot.

4.0 CLEANUP STANDARDS USED

As directed by the Voluntary Cleanup and Redevelopment Act (Colorado Revised Statutes [CRS] 25-16-301, 1994), inclusion of the Site into the Voluntary Cleanup Program (VCUP) is appropriate because the following criteria have been satisfied:

- The applicant owns all of the property that comprises the Site.
- No portion of the Site is listed or is proposed for listing on the National Priorities List (NPL) of Superfund sites established under the Comprehensive Environmental Response Compensation and Liabilities Act (CERCLA).
- No portion of the Site is subject to corrective action under orders or agreements issued pursuant to the provisions of Part 3 of Article 15 of the CRS 25-16-301 or the federal Resource Conservation and Recovery Act (RCRA) of 1976, as amended.
- The Site is not subject to an order issued by or an agreement (including permits) with the CDPHE Water Quality Control Division.
- The Site is not a facility that has or should have a permit or interim status pursuant to Part 3 of Article 15 of the RCRA Subtitle C for treatment, storage, or disposal of hazardous waste.
- The Site is not subject to underground storage tank (UST) provisions.

5.0 APPLICABLE LAWS AND GUIDELINES

MWHS will adhere to all applicable local, State and Federal laws, regulations and guidance pertaining to Brownfields and environmental remediation, to include but not limited to the following:

- 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response).
- 29 CFR 1910.1200 Hazard Communication Standard.
- OSHA 3096 Asbestos Standard for the Construction Industry.
- Asbestos-Contaminated Soil Guidance Document, April 2007 Revision, Colorado Department of Public Health and the Environment, Hazardous Materials and Waste Management Division.
- 6 CCR 1007-2 Section 5.5 of the Regulations Pertaining to Solid Waste Disposal Sites and Facilities.
- 6 CCR 1007-3 Colorado Solid and Hazardous Waste Commission Regulations.
- Voluntary Cleanup Roadmap, A How-To Guide, May 2008, Colorado Department of Public Health and the Environment, Hazardous Materials and Waste Management Division.
- CDPHE Regulation 41 Groundwater Quality Standard (GWQS).
- EPA Residential Air Regional Screening Level.

6.0 CLEANUP ALTERNATIVES

6.1 No Action Alternative

The No Action Alternative would leave Site conditions as they currently are, with elevated soil vapors within the subsurface presenting a potential inhalation risk to future building occupants. Existing mold, LBP, and Asbestos would be left in-place, presenting a potential inhalation or consumption risk to future building occupants. There are no financial costs to this alternative.

This alternative is not protective of human health or the environment, does not meet the cleanup standards for state or federal regulatory agencies, and is not compatible with unrestricted residential development of the Site. For these reasons, this alternative has been eliminated.

6.2 On-site Soil Vapor Mitigation and Disposal of Mold, LBP, and Asbestos

On-site soil vapor mitigation would protect long-term occupants from any potentially harmful vapors. Remediation of existing Asbestos and mold will remove the risk of human occupant contact. The alternative would cost \$300,000 to \$500,000. Implementation options include the following:

- Garage-oriented active vapor mitigation system – To meet modern building code, an active vapor system must be installed to allow for the subgrade-parking of vehicles, focused primarily on CO₂. This same system can be utilized to also removed collected

soil gas vapor from within the space and prevent exposure to human occupants within the space.

- Tower-oriented sub-slab depressurization system – Install a sub-slab depressurization system in relation to the tower to create a negative pressure across the tower basement slab. By doing so the system will prevent the collection of soil vapors within the basement and prevent exposure to human occupants within the space. The system will also collect and prevent Radon from entering the occupied basement. The system will utilize vapor piping bedded within a clean aggregate layer. A sealed vapor barrier will be placed beneath the slab and above the piping and bedding material. The vapor barrier piping will be connected to a blower which will collect air from the permeable layer and create a measurable pressure difference across the slab. Collected vapors will be expelled to the exterior of the building above the roof line. The corridors will be pressurized with a make-up air unit that will provide fresh air directly inside the corridors. The corridors’ fresh air will not be exhausted but rather allowed to “bleed” into and beneath apartments’ doorways, also providing additional fresh air ventilation. Indoor air quality sampling will be completed on the basement level to verify the inhalation exposure pathway has is incomplete.
- Newly constructed building passive vapor mitigation system – Install a sub-slab passive vapor mitigation system that is prepared to become an active system in the event of elevated readings of radon or any other harmful vapor. A series of clean aggregate layers and bedding materials will be applied with vapor mitigation piping between the soil and concrete slab. A sealed vapor barrier will be placed beneath the slab and above piping. The building will also run the bathroom exhaust fan continuously inside the apartments which will also help mitigate any indoor air quality issues. The corridors will be pressurized with a make-up air unit that will provide fresh air directly inside the corridors. The corridors’ fresh air will not be exhausted but rather allowed to “bleed” into and beneath apartments’ doorways, also providing additional fresh air ventilation.
- Materials Management Plan – In the event that any unanticipated contamination is discovered in soil or existing infrastructure or buildings, the Material Management Plan (MMP) can provide training and directions for how to address suspected contamination in a manner that protects workers and the eventual long-term occupants. The MMP will also instruct workers on how to properly remediate mold and Asbestos.

This alternative is cost-effective and protective of human health, though it requires consistent operation and maintenance to ensure successful operations. Climatically, it leverages energy already going to construction to treat contamination concurrently, though it will not directly treat the soil vapor contamination. However, the vapor will be exhausted above the buildings, ensuring that humans are directly in contact with contaminated soil vapors. Mold and Asbestos

would be completely removed from the commercial tower, transported from the Site, and properly disposed of.

6.3 Excavation and Disposal of All Contaminated Materials

This alternative includes excavating potentially contaminated soils that are contributing to the vapor wherever necessary to remove the exposure potential to future site residents. Soil confirmed as contaminated would be transported to an acceptable disposal facility. Confirmation sampling and/or indoor air quality sampling would be utilized to ensure complete cleanup. This alternative is anticipated to cost \$500,000 to \$750,000.

This alternative would protect workers and occupants from contamination and allow redevelopment to take place, but is not the most time- or cost-effective alternative. The soil vapor contamination was identified in various locations at the Site. The presences of soil vapor contaminants within the subsurface are believed to be related to unsaturated soils at vary depths across the Site and present beneath the current subgrade-parking garage and Tower. Thus, it could take extensive excavation and concrete removal to find the source(s), and it's possible no clear source would ever be found. The excavation itself would be costly, time-consuming and limited in extent by the current buildings on-site thus making budgeting at the onset of the project challenging. Climatically, this alternative would likely remove any potentially contaminated material and on-site vapor and transport it to a designated facility to slowly dilute over time. The immediate climatic impact of this alternative would most likely high due to the amount of energy required to excavate, remove, and transport materials.

6.4 Recommended Environmental Cleanup Alternative

On-site soil vapor mitigation and disposal of mold and Asbestos is the most time-effective and economical approach to protecting human health while offering climatic benefits.

7.0 COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

In addition to the applicable and relevant or appropriate requirements identified above in Section 5.0, if MWHs wins an EPA Brownfield Cleanup Grant, it will comply with other requirements including but not limited to the following:

- MBE/WBE requirements found at 40 CFR 40 CRF 31.36(e) or 40 CFR 30.44(b).
- Uniform Relocation Act.
- Historic Preservation Act.

- Endangered Species Act.
- Permits required by Section 404 of the Clean Water Act.
- Executive Order 11246, Equal Employment Opportunity, and implementing regulations at 41 CFR 60-4.
- Contract Work Hours and Safety Standards Act, as amended (40 USC 327-333).
- Anti-Kickback Act (40 USC 276c).
- Section 504 of the Rehabilitation Act of 1973 as implemented by Executive Orders 11914 and 11250.

8.0 CLEANUP STRATEGY

The cleanup strategy will employ the following active measures to close the indoor air exposure pathway and be conducted prior to or in coordination with the proposed redevelopment:

- Design and implement a pilot test to evaluate the conditions beneath the tower building slab and determine the most efficient means to evacuate accumulated vapors, so that a full-scale sub-slab depressurization system can be designed.
- Evaluate and design vapor mitigation for the garage and proposed new multi-family apartment building.
- Incorporate the designs of the vapor mitigation systems into the redevelopment and construction plans.
- Oversee the installation of the vapor mitigation systems, complete indoor air sampling of basement units associated with the tower building, and inspect the systems periodically after construction is complete to ensure proper operation.
- Since the Site is planned for renovation, it is important that all materials are sampled properly to protect future workers conducting demolition activities.
- LTE also observed several building materials which had been damaged by water intrusion or water leaks from plumbing. The observed water damage had resulted in visible mold growth on various building materials. The observed building materials impacted by mold should be removed properly and in a manner that will not release mold spores throughout the building.

In addition, although no impacts to soil or groundwater were detected and encountering or active remediation of contaminated materials during redevelopment is not expected, a MMP should be created and implemented in the event that contamination may be present in discrete, previously uninvestigated areas. Contaminated materials can be addressed as they are encountered. The use of an MMP will eliminate the potential dermal contact and ingestion exposure pathway for future construction workers. The following items will be addressed in the MMP:

- Those materials encountered during redevelopment must be adequately inspected and characterized by properly trained and/or certified professionals.
- Materials that have been impacted or have potentially been impacted at concentrations greater than those previously observed, if any, will be segregated.
- Impacted materials or potentially impacted materials will be properly staged, contained, and disposed of in accordance with local, state, and federal environmental regulations.
- Exposure to impacted materials, if any, during construction activities will be limited.
- Potentially impacted materials which may be generated during construction will be prevented from affecting human health and the environment.

9.0 EPA REPORTING REQUIREMENTS/DELIVERABLES

After EPA acceptance of the ABCA, the following deliverables are required under the EPA Brownfields Cleanup Grant:

- Community Relations Plan;
- Responses to public comment;
- Quarterly reports;
- Project completion report with a narrative of cleanup operations, sequentially numbered waste manifests, and confirmation of removal sampling results; and
- No Action Determination from CDPHE.

10.0 HEALTH AND SAFETY PLANS

A Health and Safety Plan complying with OSHA 29 CFR 1910.120 entitled “Hazardous Waste Operations and Emergency Response” will be created.

11.0 MILESTONE

Completion of the remedial action and receipt of the No Action Determination is anticipated no later than December 31, 2018.

Figure 1

5800 Alameda Development Boundaries

