ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES

Neighborworks: Baatz Building

400 2nd Avenue South | Great Falls, Montana

Prepared For:

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Approval Page

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1.0 INTRODUCTION

This Analysis of Brownfields Cleanup Alternatives (ABCA) has been completed for the site redevelopment for the Baatz Building located at 400 2nd Street South in Great Falls, Montana (collectively, the site). This includes redevelopment in a single structure at the site to allow a mixed-use space of commercial along the main level and residential along the 2nd and 3rd levels. Great Falls Development Authority (GFDA) has received a revolving loan fund (RLF) cleanup grant through the Environmental Protection Agency (EPA). Hygienix, LLC (Hygienix) has performed a Limited Phase II Environmental Site Assessment (ESA) at the site and determined that asbestos, lead, polychlorinated bisphenols (PCBs), mercury, microbial contamination, and low levels of hydrocarbons via vapor intrusion are present in and beneath the current structure at the site. The goal of the project is to abate hazardous building materials prior to renovation to preclude these materials from becoming airborne and creating an environmental risk to construction workers during renovation construction or to future occupants.

This ABCA report includes information regarding:

- The characteristics of the site, including documentation of contaminants, potential exposure pathways, sources of contamination, applicable or relevant and appropriate laws, regulations and standards.
- Analysis of potential cleanup alternatives, including "No Action".
- A discussion of the proposed cleanup activities and factors considered in evaluating and recommending the planned cleanup. And,
- A determination of what controls will be required to implement the cleanup.

2.0 SITE LOCATION

The subject property's consist of the parcel 400 2nd Avenue South, Great Falls, Montana. A location diagram is provided in Appendix A: Figure 1. The legal description of the site is Great Falls Original Townsite, S12, T20 N, R03 E, Block 414. Lot 001.

The site is located in downtown Great Falls and is zoned as Commercial Urban (CU) and is surrounded by CU. The 2nd Avenue South and the Cascade County Health Department borders the site to the north, The Cameron Center to the east, 4th Street South and the Great Falls Rescue Mission borders the west, and an alley with the Restore building borders the site to the south.

The 3-story brick building contains commercial spaces along the main level and apartments along the 2nd and 3rd levels. In its existing state, the building has been abandoned. Within the basement, several water intrusions have occurred. This building was constructed in 1913 and is wood frame interior construction with partial steel. A boiler is present to heat the building in the basement. Interior features include plaster and gypsum wallboard finishes, carpeting, ceiling tile, floor tile, and wood floors are present.

3.0 SITE INVESTIGATIONS

The Limited Phase II ESA was completed in accordance with Hygienix's *Work Order 18-006.12*, dated September 2, 2021. The scope of the Hygienix Work Order consisted of the following tasks:

- Project Management
- Initial Planning and Coordination
- Sampling and Analysis Plan Preparation – both Draft and Final Documentation with reviews from Montana Department of Environmental Quality (DEQ) and EPA
- Health and Safety Plan
- Site Work to consist of the following efforts:
    - o Site Diagram
    - o Hazardous Materials Investigation
        - Asbestos
        - Lead
        - Mercury
        - PCBs
        - Visual Microbial Assessment

    - o Hydrocarbon and Dry-Cleaning Solvent Investigation from previously identified Recognized Environmental Conditions (RECs) near the site
        - Two (2) sub-slab samples from the northwest and southwest corners of the building;
        - Two (2) interior air samples within the basement;
        - One (1) interior air sample from the main level; and,
        - One (1) exterior air sample upwind of the site (background).

- Draft and Final Reports with findings with Data Validation

For the purpose of this assessment, the limited portion was in conjunction with performing vapor intrusion points within the building and air only, not providing documentation of the soil/water conditions within the property as noted may be present with the Phase I ESA.

The hazardous materials assessment within the two Functional Areas (FA) of the Baatz building identified the following asbestos-containing materials (ACM):

- FA #1 – Beige with Tan Mottles 12-inch by 12-inch Floor Tile, Room 237 (0.5% Chrysotile);
- FA #2 – Gypsum Wallboard (GWB) System, Rooms 101-103, 106-109, 116, 118-121, (2.0% Chrysotile in Mud);
- FA #2 – Beige 9-inch by 9-inch Floor Tile and Black Mastic, Room 110 (4%/5% Chrysotile, Respectively);
- FA #2 – 4-inch to 8-inch AirCell Pipe Insulation, Throughout Basement, (60% Chrysotile);
- FA #2 – Rope Gasket Material Around Old Boiler, Room 012, (70% Chrysotile);
- FA #2 – Water Tank Insulation, Room 012, (80% Chrysotile) ;
- FA #2 – Mudded Joint Fittings, Throughout Basement, (60% Chrysotile); and,
- FA #2 – Contaminated Debris, Throughout Basement, Assumed ACM.

TD&H performed a subsequent data gap inspection on January 24, 2023, for areas within the building and determined the following additional asbestos components were found to contain asbestos:

- Silver Paint/Black Tar Over Mesh/Red Brick along the Roof Parapet. (4% Chrysotile);
- Tan Textured Surfacing along the First Floor, Room 101. (3% Chrysotile); and,
- Tan Textured Surfacing along the Basement, Room 008, East Wall. (3% Chrysotile).

The following lead-based paint (LBP) (greater than 0.5% lead by weight) and lead-containing materials – (greater than 0.009% lead by weight and less than 0.5% lead by weight) were identified within each FA:

• FA #1 – Red Paint along Wood Stairs/Door Exterior and Room #122, (10.8%);
• FA #1 – White Paint along Wood Trim/Doors/Windows, Room #'s 122,213,216 (0.0153%);
• FA #1 – Brown/Beige/Green/Pink/Blue Paint along Plaster, All Walls/Ceilings (0.153%);
• FA #1 - Green Paint along Wood Window Trim, Room #213 (0.0403 %);
• FA #1 – Beige Paint along Plaster Walls/Wood Trim, Room #'s 214, 215 (0.137%);
• FA #1 – Beige Paint along Wood Trim, Throughout, (0.234%) ;
• FA #1 – Green Paint along Wood Floors, Room #232 (0.0648%) ;
• FA #1 – Green/Beige/Pink/Brown Paint along Plaster, Room #345, 346 (0.285%);
• FA #1 – Beige Paint along Brick, Exterior (9.71%);
• FA #2 – Green/Beige Paint along Plaster, Throughout (0.075%);
• FA #2 – White Paint along Wood Trim/Doors/Windows, Room #101,102 (11.9%);
• FA #2 – Beige Paint along Tin Ceiling Tile, Room #101, 102, (6.42%);
• FA #2 – Silver Paint along Radiators, Room #101, 102 (0.203%);
• FA #2 – Pink Paint along Plaster, Room 102 (0.101%); and
• FA #2 – Brown Paint along Wood Trim, Room #'s 107-109 (0.444); and
• FA #2 – Brown/Beige Paint along Plaster Walls/Ceilings, Room #110, 112 (0.175%),
• FA #2 – Yellow Paint along Wood Door/Trim, Room #003 (0.0662%).

Two (2) mercury thermostats were recorded in FA #1. One mercury thermostat was recorded in FA #2.

The following mercury fluorescent-filled tubes and light switches were identified at the site:

• Twenty-one (21) mercury light switches were identified within Functional Area #1.
• Five (5) mercury light switches were identified within FA #2.

The following mercury fluorescent-filled light bulbs were identified at the site:

• Thirty-five (35) compact fluorescent lightbulbs (CFLs) within FA #1;
• Two (2) 4-foot T8 (one-inch diameter) within FA #1;
• Eighteen (18) CFLs within FA #2;
• Twenty-five (25) T8's in FA #2; and,
• Six (6) T8's in FA #2.

The following PCB-containing ballasts were identified:

• Six (6) PCB ballasts within FA #2.

Microbial growth was identified in FA No. 1 along GWB ceiling and walls. And FA No. 2 throughout the basement.

Methamphetamine was found above the DEQ standards (1.5 micrograms per square centimeter (ug/cm2)) within FA No. 1 within two (2) adjoining rooms.

No exceedances were identified within the indoor air samples. Ambient air samples were utilized for reference to normal background levels. For ambient air samples, an exceedance was encountered for benzene in residential air at 10-6 risk (0.36 micrograms per cubic meters (ug/m3)). Please note the concentration of benzene upwind during normal activities in downtown Great Falls, Montana, is 0.68 ug/m3. Adjusting and/or standardizing the results for normal exterior conditions does not indicate exposure within the building when the sample results are reduced by the exterior upwind result.

Within the basement, low levels of vapor-phase hydrocarbon constituents were identified that are slightly above the DEQ established limits for Aliphatic (C9-C12) hydrocarbons in a single sub-slab sample within the basement for indoor air; however, when adjusted for attenuation factors for sub-slab samples, the results were not above DEQ standards at 10-5 risk. EPA has not established thresholds for risk of Aliphatic and Aromatic hydrocarbon ranges; however, with residential developments, it has established risk thresholds based on 10-6 limits. Due to the limited analysis conducted, one sampling event, coupled with a sub-slab air result within the parameters defined, Hygienix opines that a risk level may be present such that a residential occupancy should establish control measures during renovation efforts within the building to mitigate the risk of hydrocarbons. Hygienix acknowledges that the levels discovered are beneath the established thresholds within Montana; however, recommends that a sub-slab ventilation is installed with the building renovation. In addition, to control water intrusion within the building, which has lead to microbial growth within the basement, a perimeter French drain tile system should be included.

4.0 REGULATORY CONSIDERATIONS

Hygienix presents the following regulatory considerations as part of this assessment to allow understanding and acknowledgement of what risk is present and how it must be addressed.

4.1 Asbestos

The Montana Department of Environmental Quality (DEQ) defines Asbestos-Containing Materials (ACM) as material containing more than 1% asbestos based on laboratory analysis of the material using the EPA Method 600/R-93/116 (“Method for the Determination of Asbestos in Bulk Building Materials”) by Polarized Light Microscopy (PLM). Three (3) categories of ACM have been defined in the National Emissions Standards for Hazardous Air Pollutants (NESHAP) standard, which is established in Title 40, Part 61, of the Code of Federal Regulations (40 CFR 61.141) and adopted by the DEQ in Title 17, Chapter 74, Subchapter 3, of the Administrative Rules of Montana (ARM 17.74.351). The NESHAP category definitions are as follows:

1. Category I Non-friable ACM mean asbestos-containing packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than one (1) percent (%) asbestos as determined using the method specified in appendix E, subpart E, 40 CFR 763, section 1 (PLM).
2. Category II Non-friable ACM means any material, excluding Category I Non-friable ACM, containing more than 1% asbestos as determined using the method specified in appendix E, subpart E, 40 CFR 763, section 1, PLM that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.
3. Regulated ACM (RACM) means a) friable asbestos material; b) Category I Non-friable ACM that has become friable; c) Category I Non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or d) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by the subpart.

The definition of RACM includes all ACM associated with a structure or space which will be impacted by renovation and/or demolition activities. In other words, even non-friable Category I and Category II ACM may become RACM if disturbed during demolition or renovation activities.

An “asbestos project,” as defined by Montana Code Annotated (MCA) 75-2-502, means the encapsulation, enclosure, removal, repair, renovation, placement in new construction, demolition of asbestos in a building or other structure, or the transportation or disposal of asbestos-containing waste. The term does not include a project that involves less than 10 square feet in surface area or 3 linear feet of pipe. Based on DEQ correspondence and Hygienix’s understanding of DEQ’s interpretation of the MCA, the removal, transport, and/or disposal of RACM (or ACM which may become friable) in amounts exceeding this threshold value constitutes an “asbestos project.”

Per Federal NESHAP Regulations, in a facility being renovated, all suspect asbestos-containing components must be inspected by the owner/operator prior to any renovation and/or demolition activity. If RACM is to be removed, above the following threshold criteria, than the EPA Regional Administrator must be notified 10 days prior to any asbestos removal:

- 260 linear feet on pipes;
- 160 square feet on other facility components; and/or
- 35 cubic feet off any other components where length or area could not be measured.

The DEQ has adopted the NESHAP by reference and requires the building owner/operator to apply for an Asbestos Abatement Permit at least five (5) working days prior to commencing asbestos abatement project involving greater than (>) 10 square feet but less than (<) 160 square feet in surface area and/or greater than (>) three (3) linear feet but less than (<) 260 linear feet of RACM. The permit must be submitted 10 days for any quantities greater than shown as stipulated by the NESHAP.

Prior to undertaking a renovation or demolition project, DEQ requires an asbestos inspection to be performed for the structure or portion of the structure to be included in the renovation or demolition project, in accordance with ARM 17.74.354. The inspection must be completed by a Montana-accredited Asbestos Inspector. Following completion of the inspection, DEQ's notification requirements should be considered, as follows:

- Project Permit Application – This application should be used for a renovation project where quantities of RACM exceeding the "asbestos project" threshold will be or are likely to be dislodged, disturbed, or impacted (or where any non-friable ACM may be made friable). The application must be submitted to the DEQ at least 10 working days prior to initiation of any activities which will dislodge, disturb, or impact RACM (and/or make friable any ACM), including all transport and disposal activities as stated above.
- Demolition Notification – This notification must be submitted to the DEQ prior to demolition of a structure in which no ACM was identified by the inspection.
- Project Permit Application & Demolition Notification – This application & notification should be used where an asbestos project and subsequent demolition will be completed, as described above. The application & notification must be submitted to the DEQ at least 10 working days prior to initiation of any activities which will dislodge, disturb, or impact RACM (and/or make friable any ACM), including <u>all transport and disposal activities</u>.

In Montana, the DEQ requires that personnel conducting an asbestos abatement design are prepared by a State of Montana accreted asbestos project designer.

Asbestos projects must be performed by individuals holding current accreditation as Montana Asbestos Contractor/Supervisors and/or Asbestos Workers, as stipulated under ARM 17.74.362. Asbestos projects are not considered complete until they have been "cleared" in accordance with the requirements set forth in ARM 17.74.357. It is important to note that clearance monitoring must be completed by a party not contractually associated with the asbestos project contractor, and there may not be any common ownership or

employment relationship between the person or entity carrying out the asbestos project and the person or entity conducting the final clearance monitoring or sample analyses.

Demolition projects which will include in-place demolition of non-friable ACM (i.e. non-friable ACM which will not be rendered friable during demolition activities) require the full-time, on-site oversight of an individual holding a current Montana Asbestos Contractor/Supervisor accreditation to ensure any ACM remaining in the structure is not rendered friable during demolition activities. Friable ACM waste (RACM) must be disposed at a Montana-licensed, Class II landfill. Non-friable ACM waste (Category I or Category II ACM) may be disposed at a Montana-licensed, Class IV landfill. It is important to note, however, that some landfills will not accept asbestos waste, even if it is non-friable. Arrangements should be made with the landfill prior to initiation of abatement and/or demolition activities as the State of Montana may treat the entire project as asbestos "Special Waste" if not removed and/or segregated during abatement/demolition.

The DEQ residential exclusion for four (4) or less dwelling units in a "facility" is only allowed if in residential settings. If a company owns the "Facility" and it intends to perform asbestos activities on regulated components it must abide by DEQ legislation and complete the permitting process.

Handling of RACM, ACM, and non-ACM materials which contain only detectable amounts of asbestos is regulated by the Occupational Safety and Health Administration (OSHA), as stipulated in 29 CFR 1926.1101. At all times, such materials must be handled in generally the same fashion as RACM unless a negative exposure assessment is completed to document workers will not be exposed to airborne fiber concentrations in exceedance of the OSHA permissible exposure limit (PEL) of 0.1 fibers per cubic centimeter (f/cc) as an eight-hour time-weighted average (8-hour TWA) and the 30-minute, short term excursion limit (STEL) of 1.0 f/cc.

4.2 Lead-Based Paint

The purpose of a lead assessment is to identify lead-containing surface coatings and to characterize the overall concentration of leachable lead in an anticipated renovation or demolition waste stream. Identification of lead-containing coatings and/or LBP is necessary to determine whether renovation/demolition workers may potentially be exposed to airborne lead concentrations exceeding permissible exposure limits established by the OSHA. Characterization of leachable lead in the overall potential waste stream is necessary to determine proper handling and disposal of renovation waste materials as required by the RCRA.

HUD defines LBP as a surface coating containing lead in a concentration greater than 1.0 mg/cm2. The presence of LBP on surfaces scheduled to be impacted during renovation activities increases the potential for workers to be exposed to airborne lead in concentrations greater than the OSHA PEL of 50 micrograms per cubic meter (µg/m3), which is established in 29 CFR 1926.62. However, it is important to note that the presence of lead-containing surface coatings (i.e. coatings which contain lead at concentrations less than the HUD criterion

of 1.0 mg/cm2) may also present a potential exposure hazard for renovation workers. The Consumer Product Safety Commission (CPSC) has identified the standard and allowable use of lead in goods for up to 90 parts per million (ppm) of lead within the product. This equates to 0.009% lead. Hygienix values lead-containing paints (LCPs) as those that are above the CPSC safe threshold of greater than (>) 0.009% to less than (<) the HUD-defined LBP (1.0%).

Beneath the EPA's Toxic Substance Control Act (TSCA), 40 CFR 1945.61, the standard identifies lead-based paint hazards – including roles and responsibilities associated with control and action of these hazards. As identified herein, the standard applies to all target housing and child-occupied facilities. For this, target housing is defined as any housing constructed prior to 1978 except housing for the elderly or persons with disabilities or any 0-dwelling (unless any child who is less than six (6) year of age resides or is expected to reside in such housing). The applicability of this standard references that the owner of properties subject to these standards does not have to evaluate any property for the presence of lead-based hazards or take any action to control the hazards if identified. Currently it is understood that these spaces are not and have not been used for occupancy.

Per the Subpart F of 40 CFR 1945.61 disclosure must accompany lead or sale of residential property and/or dwellings.

If lead paint is found to be present in occupied dwelling units during renovation events, EPA's Lead-Based Paint Renovation, Repair and Painting (RRP) Rule (40 CFR 745, Subpart E) would be employed, including properly trained workers, pre-testing, and post testing.

When disturbing lead-containing coatings or LBP, an employer must assume workers will be exposed to lead concentrations above the PEL, and worker protection must be provided in accordance with 29 CFR 1926.62, including training of employees. Alternatively, a negative exposure assessment may be completed to document the potential for exposure to airborne lead during renovation/demolition activities, on a per-task basis for all LCP and LBP surfaces.

Relating to disposal of lead-containing waste, RCRA regulatory criteria for "total" lead in a waste stream is established in 40 CFR 261, Subpart C. The regulatory criteria are listed in milligrams per liter (mg/l) of dissolved lead in a solution ("wet basis"), as determined using the Toxicity Characteristic Leaching Procedure (TCLP) by EPA Method 1311.

Rule-of-thumb RCRA criteria are listed in mg/kg of solid metal in the material sample ("dry basis") and assume the entire mass of the analyte will enter solution. They are therefore conservative values; however, when the analyte concentration approaches or exceeds the rule-of-thumb value for a metal, the TCLP method should be used to determine the actual leachable concentration of the analyte in the sample.

The RCRA rule-of-thumb criteria for total lead is 100 mg/kg (0.1% by weight), and the TCLP regulatory criteria for leachable lead is 5.0 mg/l, as established in 40 CFR 261.24. A waste stream with a leachable lead concentration determined to be greater than 5.0 mg/l using the

TCLP analytical method is defined as a "hazardous waste" and must be transported by a hazardous waste transporter and disposed at a hazardous waste disposal facility.

For the purpose of a renovation or demolition project, a composite sample representative of the overall anticipated waste stream for the project may be collected and analyzed for leachable lead concentration. RCRA solid waste regulations set forth in 40 CFR 260.10 define a representative sample as "a sample of a universe or whole (e.g. waste pile, lagoon, ground water) which can be expected to exhibit the average properties of the universe or whole." If analytical data indicate the leachable lead concentration for the representative sample is less than the regulatory criteria of 5.0 mg/l, then the entire waste stream may be disposed as non-hazardous waste with regards to lead.

Materials containing 5.0 mg/l of lead or more as defined by a TCLP analysis are regulated by RCRA as hazardous waste. Material determined to be hazardous waste must be transported in accordance with Department of Transportation (DOT) regulations, as stipulated in 49 CFR 171.3. Hazardous waste must be handled and disposed in accordance with 40 CFR 260 – 265.

4.3 Mercury

Mercury-containing equipment is defined in 40 CFR 273.9 as "a device or part of a device (including thermostats, but excluding batteries and lamps) that contains elemental mercury integral to its function." Although lamps (i.e. fluorescent light bulbs) are excluded from the definition of mercury-containing equipment, their disposal is still regulated under 40 CFR 273 if they are determined to be "hazardous waste" as defined in 40 CFR 261 (i.e. if the overall concentration of mercury in the entire lamp is more than 0.2 mg/L as determined by TCLP). Without laboratory analytical data or documentation from the lamp manufacturer regarding the concentration of mercury in the lamp, one must assume the TCLP mercury concentration in the lamp is greater than the regulatory criteria of 0.2 mg/l. These materials are "universal waste" materials, as defined in 40 CFR 273.

A "Small Quantity Handler of Universal Waste" must not accumulate 5,000 kilograms (kg) or more of universal waste (e.g. mercury) at any time. Personnel handling universal wastes must be trained regarding the proper handling and emergency response actions for the universal waste. The universal waste must be containerized to protect it from damage and/or leakage, and the containers must be properly labeled to identify the contents (e.g. "Universal Waste – Mercury Thermostats" or "Universal Waste – Lamps"). The transport of universal waste must be completed by a Universal Waste Transporter in accordance with EPA and DOT regulations. Universal wastes may only be transported to other universal waste handlers, destination facilities (e.g. disposal or recycling facilities), or foreign destinations. Handling and transport of small quantities of universal waste do not need to be reported the EPA; however, it is prudent to collect and document any and all receipts generated by the destination facility(ies).

4.4 PCBs

As established in the Toxic Substance Control Act (TSCA) of EPA (40 CFR 761.2), any person must assume that a capacitor (i.e. a fluorescent light ballast) manufactured prior to July 2,

1979, whose PCB concentration is not established, is "PCB-Contaminated" (i.e. contains at least 500 parts per million (ppm) PCBs). Further, any person may assume that a capacitor manufactured after July 2, 1979, is non-PCB (i.e. contains less than 50 ppm PCBs); if the date of manufacture is unknown, any person must assume the capacitor is PCB-contaminated. Additionally, any person may assume that a capacitor marked at the time of manufacture with the statement "No PCBs" in accordance with 40 CFR 761.40 is non-PCB. In addition to the means described above, manufacturer's literature (including documented communications with the manufacturer) or chemical analysis may be used to determine whether a capacitor contains PCBs.

As defined in 40 CFR 761.3, fluorescent light ballasts which contain at least 50 ppm PCBs (as determined by one of the methods described above) must be considered to be "PCB Bulk Product Waste". In general, these waste materials may be disposed in an incinerator, a chemical waste landfill, or a hazardous waste landfill, if the respective disposal facility meets the requirements of the CFR and the EPA. It is important to note that each load of PCB waste must be transported using the waste manifest protocol stipulated in 40 CFR 761.207. EPA does not require notification for removal or disposal of PCB Bulk Product Waste unless the waste generator owns or operates a PCB storage facility.

4.5 Methamphetamine

The State of Montana and Montana DEQ regulate meth investigations under Montana Code Annotated (MCA) Title 75, Chapter 10, Parts 1301-1306 and ARM 17.74 Subchapter 5. MCA 75-10-1303 states that the decontamination standard for methamphetamine (meth) cleanup is 1.5 μg/100 cm2. If a building material contains a larger amount of meth than the decontamination standard, then it is considered to pose an unacceptable health risk to building occupants as well as workers performing demolition and renovation activities.

4.6 Microbial-Containing Building Materials

Molds are part of the natural environment. Molds are fungi that can be found anywhere - inside or outside - throughout the year. About 1,000 species of mold can be found in the United States, with more than 100,000 known species worldwide.

Indoors, mold growth should be avoided. Problems may arise when mold starts eating away at materials, affecting the look, smell, and possibly, with the respect to wood-framed buildings, affecting the structural integrity of the buildings.

Molds can grow on virtually any substance, as long as moisture or water, oxygen, and an organic source are present. Molds reproduce by creating tiny spores (viable seeds) that usually cannot be seen without magnification. Mold spores continually float through the indoor and outdoor air.

Molds are usually not a problem unless mold spores land on a damp spot and begin growing. They digest whatever they land on in order to survive. There are molds that grow on wood, paper, carpet, foods and insulation, while other molds feast on the everyday dust and dirt that gather in the moist regions of a building.

When excessive moisture or water accumulates indoors, mold growth often will occur, particularly if the moisture problem remains uncorrected. While it is impossible to eliminate all molds and mold spores, controlling moisture can control indoor mold growth.

Molds gradually damage building materials and furnishings. If left unchecked, mold can eventually cause structural damage to a wood framed building, weakening floors and walls as it feeds on moist wooden structural members. If you suspect that mold has damaged building integrity, consult a structural engineer or other professional with the appropriate expertise.

Since mold requires water to grow, it is important to prevent excessive moisture in buildings. Some moisture problems in buildings have been linked to changes in building construction practices since the 1970s, which resulted in tightly sealed buildings with diminished ventilation, contributing to moisture vapor buildup. Other moisture problems may result from roof leaks, landscaping or gutters that direct water into or under a building, or unvented combustion appliance. Delayed or insufficient maintenance may contribute to moisture problems in buildings. Improper maintenance and design of building heating/ventilating/air-conditioning (HVAC) systems, such as insufficient cooling capacity for an air conditioning system, can result in elevated humidity levels in a building.

Currently, there are no federal standards or recommendations, (e.g., OSHA, NIOSH, EPA) for airborne concentrations of mold or mold spores. Scientific research on the relationship between mold exposures and health effects is ongoing. This section provides a brief overview, but does not describe all potential health effects related to mold exposure. For more detailed information, consult a health professional or your state or local health department.

There are many types of mold. Most typical indoor air exposures to mold do not present a risk of adverse health effects. Molds can cause adverse effects by producing allergens (substances that can cause allergic reactions). Potential health concerns are important reasons to prevent mold growth and to remediate existing problem areas.

The onset of allergic reactions to mold can be either immediate or delayed. Allergic responses include hay fever-type symptoms such as runny nose and red eyes.

Molds may cause localized skin or mucosal infections but, in general, do not cause systemic infections in humans, except for persons with impaired immunity, AIDS, uncontrolled diabetes, or those taking immune suppressive drugs. An important reference with guidelines for immuno-compromised individuals can be found at the Centers for Disease Control and Prevention (CDC) website.

Molds can also cause asthma attacks in some individuals who are allergic to mold. In addition, exposure to mold can irritate the eyes, skin, nose and throat in certain individuals. Symptoms other than allergic and irritant types are not commonly reported as a result of inhaling mold in the indoor environment.

Some specific species of mold produce mycotoxins under certain environmental conditions. Potential health effects from mycotoxins are the subject of ongoing scientific research and are beyond the scope of this document.

4.7 Vapor Intrusion

The phrase "vapor intrusion" (VI) refers to the process by which volatile chemicals migrate from subsurface contaminant sources to the soil vapor phase and into the indoor air. Potential sources for VI are any volatile chemicals that can generate vapors beneath the ground surface or within structures including, but are not limited to the following:

- Groundwater or soil that contains volatile chemicals;
- Nonaqueous phase liquid (NAPL);
- Buried wastes;
- Underground storage tanks or drums;
- Contaminated utility lines and corridors; and,
- Other sources of subsurface contamination.

Soil vapor is the air found in the pore spaces between soil particles. Soil vapor can become contaminated when chemical s volatilizes from contaminated sources and migrates into the pore spaces. Although VI is commonly associated with high vapor pressure chemicals, other chemicals such as poly nuclear aromatic hydrocarbons (PAHs), Semi-volatile organic compounds (SVOCs), fluorinated compounds, inorganic substances like radon or mercury pose a VI risk.

Contaminated soil vapors may enter structures through cracks in slabs or basement floors and walls, through the junction between the slab footing and the basement floor, through dirt floors, and through openings around sump pumps or where pipes and electrical wires go through the foundations. Preferential pathways are created via buried utility lines (gas, electric, sewer, communication lines) may pose a greater risk than undisturbed ground because the utility trench may allow vapors to migrate easily to a structure at locations where the utility penetrates the foundation. Heating, ventilation, and air-conditioning (HVAC) systems and cold temperatures increase the risk of drawing contaminated soil vapor into structures by reducing the air pressure inside structures.

For initial screening of soil gas/vapor, ambient air, sub-slab soil gas and indoor air data, DEQ compares concentrations to the most recent EPA Regional Screening Levels (RSLs) for residential and/or industrial air. The results of this screening step will generate a list of contaminants of potential concern (COPCs) for each data set, based on the residential receptor and the industrial/commercial worker receptor. Since the residential indoor air RSLs are the most protective of the exposure scenarios, if all gaseous contaminants at a site fall below those levels then additional screening may not be necessary.

EPA calculates cancer risk using a 1 x 10-6 (or one in one million) excess lifetime cancer risk which allows for as many as 10 cancer-causing compounds to be present at their screening levels before the Montana-allowable 1 x 10-5, (or one in one hundred thousand) excess

lifetime cancer risk, is exceeded. All cancer risk is considered to be additive regardless of the type of cancer that may result from exposure.

DEQ has developed generic screening levels for the petroleum fractions reported by the Massachusetts Air-Phase Petroleum Hydrocarbons (APH) method which are not found in EPA's RSL table. DEQ calculated these screening levels using the same assumptions as those used by EPA to calculate the indoor air.

Generic DEQ APH Fraction Screening Levels for Residential Screening Level (µg/m3) are the following:

- Aliphatic (C5-C8) – 94;
- Aliphatic (C9-C12) – 44; and,
- Aromatic (C9-C10) – 10.

Generic DEQ APH Fraction Screening Levels for Industrial Screening Level (µg/m3) are the following:

- Aliphatic (C5-C8) – 260;
- Aliphatic (C9-C12) – 44; and,
- Aromatic (C9-C10) – 44.

In 2021, the DEQ accepts application of generic attenuation factors set forth by the EPA. The EPA's attenuation factors were established with specific goals in mind in conjunction with sampling parameters and were calculated to protect human health while recognizing that, under specified conditions, a minimum level of attenuation occurs between the subsurface and indoor air. In instances where site conditions are not consistent with EPA's generic model that underlies the VI screening levels and attenuation factors, empirical evidence should be used for VI decision-making rather than attempting to apply generic attenuation factors.

The following medium-specific attenuation factors for residential buildings exist regarding VI:

- Sub-Slab Soil Gas, generic value – 0.03;
- Near-Source Exterior Soil Gas, generic value except for sources in the vadose zone (less than five feet below foundation) or presence of routes for preferential vapor migration in vadose zone soils – 0.03; and,
- Crawl Space Air, generic value – 1.0.

5.0 ALTERNATIVES CONSIDERED

Hygienix identified potential remediation alternatives and prepared preliminary budgetary cost estimates.

The four (4) identified remediation alternatives are:

- **Alternative 1**: In place management of the confirmed asbestos-containing materials, lead-based/containing paint, removal of all mercury/PCB-containing equipment, in-place management of methamphetamine-containing materials, and, in-place management of microbial-containing items/water intrusion for the site. In-place management of vapors into the basement;
- **Alternative 2**: Encapsulation of the confirmed asbestos-containing materials and lead-based/containing paint, microbial growth, water intrusion, removal of all mercury/PCB-containing equipment, and encapsulation of methamphetamine-containing materials at the site. Encapsulate/prevent vapor migration into the basement with filling cracked concrete, concrete joints, sump pits with sealed systems and provide rubber coating throughout the existing concrete floor;
- **Alternative 3**: Complete renovation/selective demolition of the site building of the project areas throughout the site to include the removal of all asbestos, removal and/or historic restoration of lead-based/containing paint, microbial-contaminated building components/materials with remediation of existing structural, non-compromised members, removal of all mercury/PCB-containing equipment, remediation/removal of all methamphetamine contaminated building components/materials prior to redevelopment of site structures. Implementation of interior perimeter French Drain to mitigate water intrusion related to microbial growth to a sump pit. In addition, use of this French Drain for sub-slab vapor mitigation. Encapsulate/prevent vapor migration into the basement with filling cracked concrete, concrete joints, sump pits with sealed systems and provide rubber coating throughout the existing concrete floor;
- **Alternative 4**: No action.

Each of the four (4) alternatives is discussed in greater detail below.

Alternative 1: In place management of the confirmed asbestos-containing materials, lead-based/containing paint, removal of all mercury/PCB-containing equipment, in-place management of methamphetamine-containing materials, and, in-place management of microbial-containing items/water intrusion for the site. In-place management of vapors into the basement;. In this alternative, the identified hazardous substances (asbestos, lead paint, microbial growth, methamphetamine, water intrusion, vapors would be managed in place; mercury and PCBs would be removed. This alternative does not include removal of the defined hazardous substances.

> **Feasibility**: This alternative is **not** feasible considering the future plans to redevelop the site building into residential and commercial mixed-use site. Removal of the hazardous substances would be required to facilitate the planned redevelopment activities. Leaving microbial growth is a violation of OSHA Act and creates a known health risk. Leaving contaminated methamphetamine building materials is a violation

of the OSHA Act as well as State of Montana ARM. The removal of the mercury and PCB-containing equipment is effective. By not correcting the water intrusion, microbial growth will continue to occur. Vapor migration will occur.

Effectiveness: This alternative is effective for continued use of the buildings (currently vacant), but is **not** feasible, since the property is scheduled for redevelopment. During redevelopment exposures to the hazardous substances will occur.

Cost: The capital cost for in-place management of the hazardous substances within the site is estimated to be $20,000. The estimate does not include costs associated with on-going periodic re-inspection of the identified asbestos-containing materials, future abatement of hazardous building materials during routine building maintenance activities or in the event of damage to the materials.

Alternative 2: Encapsulation of the confirmed asbestos-containing materials and lead-based/containing paint, microbial growth, water intrusion, removal of all mercury/PCB-containing equipment, and encapsulation of methamphetamine-containing materials at the site. Encapsulate/prevent vapor migration into the basement with filling cracked concrete, concrete joints, sump pits with sealed systems and provide rubber coating throughout the existing concrete floor.

Feasibility: This alternative is technologically effective and meets all State requirements for most of the hazardous substances in their existing conditions (the asbestos that is present throughout the basement floor does not meet this category); however due to the planned site redevelopment is **not** feasible. The locations where new flooring and mechanical systems as well as locations throughout the basement must be removed. The vapor and water intrusion concerns will not be controlled effectively with encapsulation.

Effectiveness: This alternative is **not** entirely effective in the prevention of exposure to the hazardous building materials; however, the alternative is **not** feasible, as the alternative requires the materials to remain in place and will **not** allow removal of the materials to facilitate the planned demolition of the site buildings. Risk is present with the damaged hazardous substances to become aerosolized as there composition is degrading. The elevated water table must be addressed to prevent future microbial growth and vapors must be controlled entering the basement.

Cost: The capital cost for encapsulation for this alternative is estimated to be $50,000.

Alternative 3: Complete renovation/selective demolition of the site building of the project areas throughout the site to include the removal of all asbestos, removal and/or historic restoration of lead-based/containing paint, microbial-contaminated building components/materials with remediation of existing structural, non-compromised members, removal of all mercury/PCB-containing equipment, remediation/removal of all methamphetamine contaminated building components/materials prior to redevelopment of site structures. Implementation of interior perimeter French Drain to mitigate water intrusion related to microbial growth to a sump pit. In addition, use of this French Drain for sub-slab

vapor mitigation. Encapsulate/prevent vapor migration into the basement with filling cracked concrete, concrete joints, sump pits with sealed systems and provide rubber coating throughout the existing concrete floor.

Note that some of the removal may be in the form of component removal as part of the forthcoming architectural demolition and redevelopment plans for the building or for historic purposes hazardous material components may have to be cleaned off from existing surfaces.

Feasibility: This alternative **is** technologically effective and meets all Federal and State requirements for waste management.

Effectiveness: This alternative **is** effective in cleaning up the site and makes the site ready for renovation and redevelopment. Additionally, it prevents future microbial growth as well as prevention of vapor from entering the building.

Cost: The capital cost for site remediation for this alternative is estimated to be $636,715 with 20% contingency included. Cost only includes costs associated with abating the identified hazardous substances at the site. Additionally, this includes installation of a French Drain within the basement perimeter tied back to a common sump pit with installation of sub-slab vapor intrusion system with crack seals and encapsulation of porous concrete floor. Estimates do not include costs associated with materials not previously identified.

Alternative 4: No Action
In this alternative no cleanup or development would occur and the site would remain as an unused, vacant building.

Feasibility: This alternative is deemed **infeasible** due to Neighborwork's intentions to redevelop/renovate/expand services at the site into an updated facility to meet the needs of current clients.

Effectiveness: This alternative is effective in controlling the potential exposure of citizens to the hazardous building materials; however, it does not contribute to the GFDA's redevelopment and quality of life goals for the City of Great Falls. If individuals will enter the space and generate dust, this Alternative is not effective as health risks are present with asbestos and microbial spores.

Cost: $2,000 to $3,000 per year for required Asbestos Hazard and Emergency Response Act (AHERA) re-inspections to ensure adequate operations and maintenance plan is in place to preclude asbestos from becoming aerosolized to impact the community in accordance with OSHA and NESHAP recommendations.

Cost Comparison of Alternatives
The table below presents a summary of the estimated costs for all alternatives under consideration. There would be no cost if the site were to remain as an unused, vacant building.

ALTERNATIVE	CAPITAL COST*	ANNUAL COST
1	$20,000	$2,000-$3,000**
2	$50,000	N/A
3	$636,715	N/A
4	$0	$2,000-$3,000**

* Estimates do not include costs associated with renovation and construction, only the tasks identified for each alternative.
** Costs for re-inspection of painted surfaces and updates to the Operations and Maintenance Plan, as necessary.

6.0 RECOMMENDED CLEANUP ALTERNATIVE

Alternatives one and two both include leaving the hazardous building materials in place, and do not allow for the planned redevelopment of the site. Alternative 4 is the "No Action" alternative.

Based on the anticipated project goal for the property, Hygienix presents the following rejected alternatives:

- **Alternative 1** - In place management of the confirmed hazardous substances with removal of mercury and PCBs. This alternative does not include removal of the materials. This alternative was removed from consideration since it will not allow the overall project to be completed and it allows the risk potential of hazardous substances to impact environmental health of staff, clients, and patrons.
- **Alternative 2** - Encapsulation of hazardous substances. In this alternative, the identified hazardous materials would be encapsulated to prevent exposure to and deterioration of the identified hazardous building materials. The extensive contamination of asbestos and microbial growth throughout the basement would not allow effective encapsulation. This alternative requires the materials to remain in place and would allow removal of the materials to facilitate the planned renovation of the site building. This alternative was removed from consideration since it will not allow the overall project to be completed and continued deterioration would commence from the flooring in the basement, causing spalling, chipping, cracking and potential exposure. Water would continue to enter the space and vapor migration would most likely occur.
- **Alternative 4** - No Action: This alternative was removed from consideration since it will not allow the overall project to be completed and it allows the risk potential of asbestos fibers and microbial spores to impact environmental health of staff, clients, and patrons.

Hygienix has selected the following alternative based on the proposed project and redevelopment:

- **Alternative 3** – Complete renovation/selective demolition of the site building of the project areas throughout the site to include the removal of all asbestos, removal and/or historic restoration of lead-based/containing paint, microbial-contaminated building components/materials with remediation of existing structural, non-compromised members, removal of all mercury/PCB-containing equipment, remediation/removal of all methamphetamine contaminated building components/materials prior to redevelopment of site structures. Implementation of interior perimeter French Drain to mitigate water intrusion related to microbial growth to a sump pit. In addition, use of this French Drain for sub-slab vapor mitigation. Encapsulate/prevent vapor migration into the basement with filling cracked concrete, concrete joints, sump pits with sealed systems and provide rubber coating throughout the existing concrete floor.

  This alternative was selected, because it allows the planned renovation and redevelopment of the site into new commercial and residential mixed use without

long-term continuing obligations, meets the current EPA, DEQ laws, and provides the most cost-effective, risk-based solution to protect health of the future building occupants and construction staff during redevelopment activities.

7.0 CONCLUSIONS

Through analysis of alternatives as presented herein, Hygienix has selected the site selective demolition alternative with hazardous substance abatement, vapor mitigation, French Drain installation (Alternative 3) to complement the redevelopment of the site and includes the hazardous substance abatement at the site.

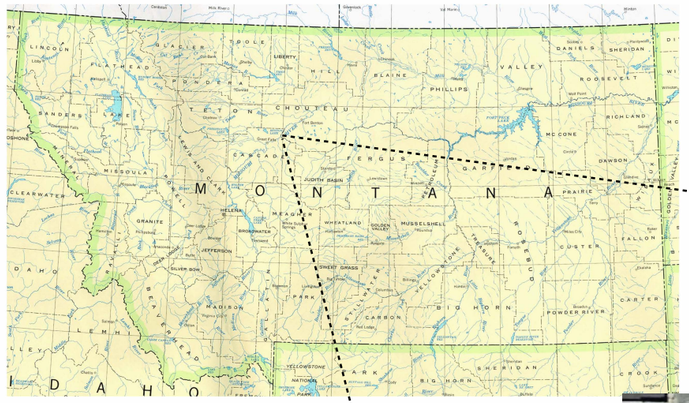
This report was prepared specifically for use by Neighborworks and GFDA. Use by any other entity is at the sole risk of the user(s). Hygienix analysis was completed with a standard of care meeting or exceeding that of other consultants performing similar work in this area. Our findings and recommendations are based on observations and data collected during our site visits and our professional interpretation of laboratory analytical data for samples collected during the project, as described above. The findings and conclusions of this report may not apply to future conditions at the site which we have not had the opportunity to evaluate.

We appreciate the opportunity to provide these environmental consulting services to Neighborworks and the GFDA. If you have any questions regarding this project, or if we can be of service in another environmental consulting capacity, please contact our office (406.750.1204).

HYGIENIX

APPENDIX A

Figure



SITE LOCATION

HYGIENIX
ANTICIPATE AND SOLVE EXPOSURE SOLUTIONS

SITE LOCATION
Great Falls Development Authority: Neighborworks
400 2nd Avenue South, Great Falls, Montana
Analysis for Brownfields Cleanup Alternatives (ABCA)

DRAWN BY:	KC
CHECKED BY:	KC
DATE:	5.31.23
JOB #	18-006.19
FILE:	18-006.19
SCALE	NTS
ATTACHMENT#	A
FIGURE	1

ANTICIPATE RISK. PROVIDE SOLUTIONS.