Analysis of Brownfield Cleanup Alternatives

Former St. Johnsbury Armory
1249 Main Street
St. Johnsbury, Vermont 05819

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ABBREVIATIONS

AACE	American Association of Cost Estimating
ABCA	Analysis of Brownfield Cleanup Alternatives
ACM	Asbestos Containing Material
ASTM	ASTM International
CAA	Clean Air Act
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
HEPA	High Efficiency Particulate Air
HUD	United States Department of Housing and Urban Development
IAQ	Indoor Air Quality
LBP	Lead-based paint
NESHAP	National Emission Standard for Hazardous Air Pollutants
NVDA	Northeastern Vermont Development Association
OPC	Opinion of Probably Cost
PCB	Polychlorinated biphenyl
PPE	Personal Protective Equipment
ppm	Parts per million
RBM	Regulated Building Materials
REC	Recognized Environmental Conditions.
SMS	Sites Management Section
SSV	Vermont Soil Screening Values

Stantec	Stantec Consulting Services Inc.
TCLP	Toxicity Characteristic Leaching Procedure
Town	Town of St. Johnsbury Vermont
TPH	Total Petroleum Hydrocarbons
TSCA	Toxics Substance Control Act
UST	Underground Storage Tank
VTDEC	Vermont Department of Environmental Conservation
VOC	Volatile Organic Compounds
VOSHA	Vermont Occupations Safety and Health administration
VRAC	Vermont Regulations for Asbestos Control

1.0 INTRODUCTION

This Analysis of Brownfield Cleanup Alternatives (ABCA) was prepared by Stantec Consulting Services Inc. (Stantec) on behalf of the Town of St. Johnsbury, Vermont (Town, or St. Johnsbury) for the Former St. Johnsbury Armory Building located at 1249 Main St., St. Johnsbury, Vermont 05819 (the "Site"). The Site is currently owned by the Town of St. Johnsbury. This ABCA is to be included with a Threshold Criteria Report in the United States Environmental Protection Agency (EPA) Brownfield Cleanup Grant Application for the Site. The purpose of the ABCA is to present options and costs for the abatement of regulated building materials (RBMs) (e.g. asbestos-containing materials [ACM], polychlorinated biphenyls [PCBs], lead-based paint [LBP], and other hazardous materials) identified during the completion of an RBM Survey by others on behalf of the Northeastern Vermont Development Association (NVDA) in March 2013. The report titled, *Environmental Survey, Former Saint Johnsbury Armory, 1249 Main Street, Saint Johnsbury, Vermont,* dated March 28, 2013 by Cardno ATC also heavily relied on a previous asbestos survey summarized in a technical memo titled *St. Johnsbury Community Center – St. Johnsbury, Vermont, Interior Asbestos Inspection, Limited* dated November 1, 2008 by Crothers Environmental Group LLC.

Stantec currently understands that the Town is considering two potential approaches for the Site with the final goal of relocating their existing police station/community safety building to the former Armory building. The two approaches include:

1. The Town will undertake the remediation of the Site and redevelop the building for use as a public safety building; or
2. The Town will undertake the remediation of the Site, sell the Site to a developer, and lease the Site from the developer and become a tenant.

The Town is currently considering both options from multiple perspectives to see which is most feasible for them to pursue.

1.1 PROPERTY LOCATION AND DESCRIPTION

The approximately 0.44-acre Site is located on the west side of Main Street, bound on the north by the Saint Andrews Episcopal Church and to the west by the Grace United Methodist Church. To the south of the Site exists a local dental practice and to the east, Main Street. Across Main Street exists multiple small businesses. Generally, the surrounding area in the Town of St. Johnsbury is zoned for commercial use. The Site itself is relatively flat but the topography of the surrounding area generally slopes from Main Street to the east, towards the Passumpsic River. The Passumpsic River is located approximately 2,100 feet east of the Site.

The Site is currently vacant. There exists one, two-story structure on the Site (with basement) which was previously used as an armory. Exterior portions of the Site are primarily paved and utilized for parking with the exception of a small area along the northwest corner of the building which is gravel-covered, and a small lawn immediately east of the building between the building and Main Street.

As previously mentioned, the focus of this ABCA is RBMs as no other environmental concerns were identified as part of the 2013 Environmental Survey Report by Cardno ATC. As such, geologic and hydrogeologic information for the Site has not been included within this report for brevity.

1.2 PROPERTY HISTORY

Based on the Phase I Environmental Site Assessment (ESA) for the Site summarized in the report titled *Phase I Environmental Site Assessment, Former Saint Johnsbury Armory, VT DEC Site #2010-4075, (SMAC September 7, 2010), 1249 Main Street, Saint Johnsbury, Vermont* dated May 2012 by The Johnson Company for the Vermont Department of Environmental Conservation (VTDEC), the Site has been primarily used as an armory since approximately 1916. No property transactions were recorded prior to 1861 which suggests that this was the earliest known development of the Site. Research of the Sites use following this date suggest that the Site was primarily residential as Sanborn maps show four smaller structures from 1882 to 1912 maps. Manning's Street Directories available from the Vermont Law Library indicate continued use as an armory in some capacity from 1931 to 1984 after which the Town utilized the Site for their police and municipal departments until 2006 when the building was vacated.

2.0 SUMMARY OF PREVIOUS ENVIRONMENTAL INVESTIGATIONS AT THE SITE

The following provides a summary of previous environmental investigations performed at the Site. Also note, multiple structural and redevelopment plans have been generated for the Site in preparation for the proposed re-development, however these are not considered pertinent to this report.

2.1 2008 ASBESTOS SURVEY

As previously mentioned, a limited building asbestos survey was performed by Crothers Environmental Group, LLC for the Town in November 2008 and summarized in the technical memo titled, *St. Johnsbury Community Center – St. Johnsbury, Vermont, Interior Asbestos Inspection, Limited*. The memo detailed both presumed and confirmed ACM throughout the building. The following materials were mentioned exceeding the 1% asbestos threshold:

- Plaster in walls and ceilings, throughout the building;
- Pipe and fitting insulation (not fiberglass) in the basement and partially on the first floor; and
- Internal boiler gaskets, refractory, and packing materials.

Many materials were sampled as part of this survey and were determined to not contain asbestos which is beneficial information as Site redevelopment plans are developed. No remedial recommendation or further sampling was recommended as a part of this memo.

2.2 2012 PHASE 1 ENVIRONMENTAL SITE ASSESSMENT

A Phase I Environmental Site Assessment was also generated for the Site by The Johnson Company for the VTDEC Site Management Section in May 2012. The report titled, *Phase I Environmental Site Assessment, Former Saint Johnsbury Armory, VT DEC Site #2010-4075, (SMAC September 7, 2010), 1249 Main Street, Saint Johnsbury, Vermont* was certified to be in compliance with the American International (ASTM) Standard Practice for Environmental Site Assessment (ASTM E 1527-05). The following recognized environmental conditions (RECs) and recommendations were identified as part of the report:

- Two underground storage tanks (USTs) previously containing gasoline (1,000 gallon) and fuel oil (6,000 gallon) were removed from the Site along with 22 tons of petroleum-impacted soils. VTDEC issued a Sites Management Activity Complete (SMAC) designation and the Site was removed from the Site Management Section (SMS) hazardous waste site list. No further actions were recommended as part of this REC.
- Three pits/floor drains were observed during the Site inspection. One of these drains exhibited staining and previous use of the building suggests that vehicles were stored in the basement of the structure and may have leaked petroleum or other contaminants to the pits. The report recommended further investigation of the floor drains including dye testing to determine their

outlet and sediment sampling for total petroleum hydrocarbons (TPH) and volatile organic compounds (VOCs).

- Multiple partially empty and empty one- to five-gallon containers of paint were encountered under the roof access ramp. No evidence of spills or leaks were noted during the inspection, but the report recommended disposal of this potentially hazardous waste stream at a permitted facility.
- The potential PCB contents of a transformer at the northwest corner of the site was unable to be confirmed. No evidence of spills or leaks were noted during the inspection, but the report recommended contacting the local utility to either replace the oil within the transformer with Non-PCB oil or replace the transformer all together.
- Older electrical components were noted in multiple areas of the building during the inspection. The age of these components suggests that they may contain PCBs, such as in light ballasts. Also, due to the age of the building, there exists a potential for PCB-containing construction materials such as caulks, paints, and sealants. The report recommended a full survey of potential PCB-containing material at the Site.
- There exists a potential for heavy metal contamination (particularly lead) based on the buildings past use as an armory which also generally contained an indoor firing range. The report recommended a full survey of potential lead-containing material at the Site including LBP.
- Due to the age of the building, ACM is likely present. The report references the 2008 Asbestos Survey Memo by Crothers Environmental Group, LLC, however it recommends further investigation to close data gaps and in preparation for solicitation of formal ACM abetment quotes from qualified contractors.
- Based on the responses to the environmental questionnaire provided as part of the Phase I report, a detail mold assessment was recommended to determine the full extent of mold damage present in the building.

2.3 2013 ENVIRONMENTAL SURVEY

The *Environmental Survey, Former Saint Johnsbury Armory, 1249 Main Street, Saint Johnsbury, Vermont,* dated March 28, 2013 by Cardno ATC prepared for the NVDA was a follow up investigation presumably utilizing the Phase I ESA and 2008 Asbestos Survey results to guide their investigation. The investigation focused on an additional asbestos survey, PCBs in building materials, lead-based paint, lead-in-dust, indoor air quality investigation (mold), and sediment sampling and dye testing. The limited report concluded the following:

2.3.1 Asbestos

Materials that were identified to contain above 1% asbestos included; air cell pipe insulation, mudded joint packings, and plaster walls and ceilings (mentioned in the 2008 Asbestos Survey).

Materials that were assumed to contain greater than 1% asbestos but were able to be sampled included; door insulation, fire brick, vibration cloth, boiler door insulation, and boiler internal materials.

Materials that were identified to contain trace amounts of asbestos (less than 1%) included; exterior window caulking and exterior tar brick caulking.

The following recommendations were made as part of this report:

- Abate any ACM prior to the start of any renovation or demolition in accordance with applicable regulations. Work shall be performed by a Vermont-Certified Abatement Contractor.
- Certain materials were unable to be accessed during the survey. If further suspected ACMs are encountered during renovation or demolition, they should be tested and managed accordingly.
- Confirm plan for trace ACM.

2.3.2 PCBs in Building Materials

PCBs in building materials were encountered in the following materials at varying concentrations:

- Exterior Door Caulking – Gray
- Exterior Window Caulking - White
- Floor Paint – Gray
- Wall Paint – White
- Floor Paint – Blue

Concentrations ranged from 1.5 parts per million (ppm) in the white exterior window caulking to 5,700 ppm in the gray basement floor paint. Other building materials tested were non detect and therefore did not contain PCBs.

The report recommended further sampling of the basement concrete floor underlaying the PCB-containing paint to further delineate the extent, if any, the PCBs have leached into the concrete.

2.3.3 Lead-Based Paint

An X-Ray Fluorescence (XRF) survey was completed as part of this report. The survey noted multiple lead-based paints coating the building in various areas. Multiple interior rooms were entirely coated with LBP while others only had one wall coated. Doors, window wells, stairs, porches, and floors were also noted to exhibit varying concentrations of LBP.

The report recommended the following in regards to LBP:

- Should renovation or demolition plans disturb the LBP-impacted areas, appropriate LBP work practices should be implemented including air monitoring.

- Copies of the report should be supplied to all contractors responsible for demolition or renovation to aid in compliance with Vermont Occupational Safety and Health Administration (VOSHA) Lead in Construction Standard.
- Utilize a Vermont-Licensed Lead Abatement Contractor.
- Conduct a lead-specific final cleaning and lead-in-dust survey prior to final building occupancy.

2.3.4 Lead-In-Dust

The report noted that lead-in-dust results above target/clearance levels were identified in all levels of the building. Samples collected from the presumed indoor firing range area did not exhibit elevated concentrations from that of other areas of the building. In fact, windowsills exhibited concentrations an order of magnitude higher for lead-in-dust in other areas of the building.

The report recommended the following in regards to lead-in-dust; 1) Copies of the report should be supplied to all contractors responsible for demolition or renovation to aid in compliance with VOSHA Lead in Construction Standard, and 2) Conduct a lead-specific final cleaning and lead-in-dust survey prior to final building occupancy.

2.3.5 Indoor Air Quality

An indoor air quality (IAQ) assessment was performed as part of the report. The results indicate varying levels of mold growth on a microbial level, however, during their investigation, Cardno ATC did not identify any areas of visible mold growth. The report recommended that if significant fungal growth is identified during renovation/demolition activities, removal of the growth should be conducted pursuant to the EPA document titled *Mold Remediation in Schools and Commercial Buildings (EPA 402-K-01-001).* The report also recommended a final high efficiency particulate air (HEPA) filter cleaning should be conducted in the basement area prior to building occupancy. Finally, any areas of water seepage or infiltration should be repaired to reduce the potential for further mold formation.

2.3.6 Sediment and Dry Testing

Further investigation beyond what was recommended in the Phase I ESA in regards to the basement floor drains was undertaken as part of the 2013 Survey. Dye testing was completed and it was concluded that the basement drains connect to the sanitary sewer on Main Street and the potential for contamination beneath these drains was minimal. Sediment from the drains was also collected and determined to contain elevated of arsenic and bromomethane in excess of Vermont's Soil Screening Values (SSVs) for industrial and commercial properties. The report recommended the removal of this sediment (a quantity less than a 55-gallon drum) with disposal at a permitted facility.

2.4 2020 REMEDIATION PLANNING COST ESTIMATE

ATC (which as a company separated from Cardno ATC in 2015) prepared a cost estimate for the Town transmitted via email titled *2020 Remediation Planning Cost Estimate, St. Johnsbury Armory Building, St. Johnsbury, Vermont, ATC Project # 280BS01932* dated June 4, 2020. In the estimate, ATC provided costs for the remediation and management of the materials presented in Section 2.3 of this report. Within the estimate, ATC provided costs for two remediation alternatives:

1. Full removal of PCB bulk product and PCB remediation waste; or
2. Full removal of PCB bulk product waste and the in-place management of PCB remediation via an EPA-approved work plan.

Under both of these proposed options, asbestos impacted portions of the building identified in the 2013 Environmental Survey would also be fully removed by a Vermont-Licensed Abatement Contractor or qualified remediation contractor.

ATC did not anticipate any lead-based paint abatement (to the extent that it was not already removed due to PCB impacts) to be required during the remedial effort at the Site. Their rational was that State of Vermont considers the abatement of LBP to be the permanent removal of a lead hazard from a facility. If LBP surfaces are impacted with the purpose of removing a lead hazard, then that is considered abatement. If those same surfaces are impacted as a function of another activity (e.g. renovation), then the work is considered renovation and subject to the VOSHA lead in construction regulations. Based on this, ATC did not include LBP abatement costs within their estimate but rather said that the abatement would be part of the selected general contractors VOSHA compliance requirements. ATC did, however, recommend the inclusion of a $10,000 contingency for VOSHA compliance for budgeting purposes.

The following assumptions were made in the generation of ATCs cost estimate and a later response to a Stantec inquiry via email:

- Costs include a 25% contingency.
- Option 2 does not include the costs associated with deed restrictions and annual monitoring likely required by EPA.
- Contractor performing work has full access to building during work.
- Costs associated with historical preservation have not been included.
- Ancillary costs associated with COVID-19 have not been included.

Stantec understands that the Town anticipates the costs presented in this ABCA (Section 4.3.3) to generally align with costs provided by ATC in their 2020 estimate. As such, Stantec requested from ATC their calculations relating to the provided costs to verify their accuracy and build in any additional anticipated costs that may not have been included within their estimate. Stantec incorporated ATC's provided costs and did not conduct a separate RBM survey to confirm ATCs findings and estimated abatement fees when generating the costing section of this report.

2.5 BROWNFIELD ASSESSMENT REPORT

In March of 2021 KGSNE, Inc. of Marlborough, MA prepared a draft brownfields assessment report for the US EPA titled Draft Targeted Brownfields Assessment Report, Former St. Johnsbury Armory, St.

Johnsbury, Vermont TDD NO. BR-01-20-06-0001 dated March 9, 2021. The report focused on identifying hazardous building materials, mold, and regulated materials/universal waste within the building.

The following summarizes the findings of this report:

- Asbestos Containing Materials (ACM): 45 bulk samples were collected for laboratory analysis via polarized light microscopy and/or NOB TEM analysis.
- Lead Based Paint: Testing via X-ray Florescence (XRF) was conducted as a screening of materials likely to be demolished.
- PCB's: Five samples were collected for laboratory analysis
- Hazardous/Regulated materials: KGSNE surveyed the building for regulated materials, universal waste, and miscellaneous hazardous materials. Hazardous/regulated materials encountered during the survey include fluorescent light tubes, fluorescent light ballasts, standalone lead acid batteries and in emergency lights and exit signs, fire extinguishers, refrigerator/freezer, and microwave.
- Mold: Numerous airborne and surface microbial samples were collected at the site.

Recommendations:

- Asbestos: ACM removed via applicable state and federal regulations.
- LBP: Follow applicable OSHA and EPA regulations during demolition and disturbance. Disposal must be conducted in accordance with TSCA disposal requirements.
- PCB: Determine if products containing greater than 1 ppm and less than 50 ppm of PCBs meet the definition of excluded product or require handling as regulated materials. All regulated PCB containing materials must be handled in accordance with applicable federal regulations.
- Hazardous materials: Materials that require special handling and disposal must be removed from the building prior to demolition or renovation. Materials must be handled in accordance with applicable state and federal regulations. Contractor must conduct an item by item review of the light ballast in the facility for hazardous material content.
- Mold: Reuse of mold contaminated building materials is not recommended. Correction of building conditions facilitating mold growth such as roof leaks and flooding.

3.0 APPLICABLE REGULATIONS AND CLEANUP STANDARDS

3.1 APPLICABLE LAWS & REGULATIONS

The following are applicable laws and regulations for ACMs, lead, PCBs, IAQ, sediment, and materials containing miscellaneous hazardous substances.

3.1.1 Asbestos Laws and Regulations

Asbestos is regulated by the EPA National Emission Standard for Hazardous Air Pollutants (NESHAP), the Toxic Substances Control Act (TSCA), and the Clean Air Act (CAA).

To protect construction workers, all asbestos abatement work must be performed in accordance with US OSHA asbestos regulations as promulgated in Title 29 of the Code of Federal Regulations (CFR), Section 1926.1101 and with VOSHA regulations.

Furthermore, Vermont Department of Health also regulates ACMs. Vermont regulations for asbestos control (VRAC) V.S.A Title 18, Chapter 26, requires that all friable ACM that will be disturbed during renovation or demolition activities be properly removed prior to disturbance. VRAC requires the use of a Vermont-Certified Asbestos Contractor for the removal of these materials. Work must be performed in accordance with VRAC Section 2.4.2. Vermont Department of Health also requires a permit for this work and notification 10-days prior to the start of work.

3.1.2 Lead Laws and Regulations

The United States Department of Housing and Urban Development (HUD), promulgates the rules for evaluating and controlling lead-based paint hazards commonly referred to as Title X (ten). Although HUD Title X specifically focuses on residential housing and child-occupied facilities, the evaluation framework promulgated by HUD for lead paint evaluation is the generally accepted guideline for performing paint surveys/inspections.

Further, to protect construction workers, lead-related work must be performed in accordance with US OSHA asbestos regulations as promulgated in Title 29 of the CFR Sections 1910.1025 and 1926.62 and VOSHA regulations.

The State of Vermont does not have specific lead-in-dust regulatory requirements prior to renovation activities, however, the “clearance levels” contained in the Vermont Regulations for Lead Control (V.S.A. Title 18, Chapter 38) were utilized as de facto target levels for comparison. Work must be performed by a Vermont-certified lead abatement contractor. For lead-abatement projects in Vermont, work areas must also be cleaned until dust samples indicate levels of lead-in dust are below the clearance levels. The clearance levels are commonly utilized outside of lead-abatement projects as standards to determine if a response action is needed related to lead-in-dust contamination.

3.1.3 Hazardous Materials

EPA regulations specify requirements for managing the following hazardous materials: PCBs, batteries, pesticides, mercury-containing equipment, lamps, household hazardous waste, and conditionally exempt small quantity generator waste. In addition to the EPA universal waste regulations, the following federal regulations may also include, but not be limited to the following:

- Applicable Federal OSHA regulations;
- Title 40, Code of Federal Regulations, Part 61 Subpart M – National Emission Standards for Hazardous Pollutants;
- Title 40, Code of Federal Regulations, Part 260 – Hazardous Waste Management System;
- Title 40, Code of Federal Regulations, Part 261 - Identification and Listing of Hazardous Waste;
- Title 40, Code of Federal Regulations, Part 262 - Standards Applicable to Generators of Hazardous Waste;
- Title 40, Code of Federal Regulations, Part 264 - Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities;
- Title 40, Code of Federal Regulations, Part 265 - Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities;
- Title 40, Code of Federal Regulations, Part 273 -Standards for Universal Waste Management;
- Title 40, Code of Federal Regulations, Part 268 - Land Disposal Restrictions;
- Title 40, Code of Federal Regulations, Part 761 - Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions;
- Title 40, Code of Federal Regulations, Part 763 - Asbestos; and
- Title 49, Code of Federal Regulations, Parts 100-199 - Transportation of Hazardous Materials.

An understanding of the EPA definitions of Excluded PCB Products, PCB Bulk Product Waste, and PCB Remediation Waste are also beneficial when discussing remedial alternatives later in the report. The definitions below are excerpted from 40 CFR Part 761.3 Definitions.

Excluded PCB Products: PCB materials which appear at concentrations less than 50 ppm, including but not limited to:

(1) Non-Aroclor inadvertently generated PCBs as a byproduct or impurity resulting from a chemical manufacturing process.

(2) Products contaminated with Aroclor or other PCB materials from historic PCB uses (investment casting waxes are one example).

(3) Recycled fluids and/or equipment contaminated during use involving the products described in paragraphs (1) and (2) of this definition (heat transfer and hydraulic fluids and equipment and other electrical equipment components and fluids are examples).

(4) Used oils, provided that in the cases of paragraphs (1) through (4) of this definition:

(i) The products or source of the products containing <50 ppm concentration PCBs were legally manufactured, processed, distributed in commerce, or used before October 1, 1984.

(ii) The products or source of the products containing <50 ppm concentrations PCBs were legally manufactured, processed, distributed in commerce, or used, i.e., pursuant to authority granted by EPA regulation, by exemption petition, by settlement agreement, or pursuant to other Agency-approved programs;

(iii) The resulting PCB concentration (i.e. below 50 ppm) is not a result of dilution, or leaks and spills of PCBs in concentrations over 50 ppm.

PCB Bulk Product Waste: Waste derived from manufactured products containing PCBs in a non-liquid state, at any concentration where the concentration at the time of designation for disposal was ≥50 ppm PCBs. PCB bulk product waste does not include PCBs or PCB Items regulated for disposal under §761.60(a) through (c), §761.61, §761.63, or §761.64. PCB bulk product waste includes, but is not limited to:

(1) Non-liquid bulk wastes or debris from the demolition of buildings and other man-made structures manufactured, coated, or serviced with PCBs. PCB bulk product waste does not include debris from the demolition of buildings or other man-made structures that is contaminated by spills from regulated PCBs which have not been disposed of, decontaminated, or otherwise cleaned up in accordance with subpart D of this part.

(2) PCB-containing wastes from the shredding of automobiles, household appliances, or industrial appliances.

(3) Plastics (such as plastic insulation from wire or cable; radio, television and computer casings; vehicle parts; or furniture laminates); preformed or molded rubber parts and components; applied dried paints, varnishes, waxes or other similar coatings or sealants; caulking; adhesives; paper; Galbestos; sound deadening or other types of insulation; and felt or fabric products such as gaskets.

(4) Fluorescent light ballasts containing PCBs in the potting material.

PCB Remediation Waste: Waste containing PCBs as a result of a spill, release, or other unauthorized disposal, at the following concentrations: Materials disposed of prior to April 18, 1978, that are currently at concentrations ≥50 ppm PCBs, regardless of the concentration of the original spill; materials which are currently at any volume or concentration where the original source was ≥500 ppm PCBs beginning on April 18, 1978, or ≥50 ppm PCBs beginning on July 2, 1979; and materials which are currently at any concentration if the PCBs are spilled or released from a source not authorized for use under this part. PCB remediation waste means soil, rags, and other debris generated as a result of any PCB spill cleanup, including, but not limited to:

(1) Environmental media containing PCBs, such as soil and gravel; dredged materials, such as sediments, settled sediment fines, and aqueous decantate from sediment.

(2) Sewage sludge containing <50 ppm PCBs and not in use according to §761.20(a)(4); PCB sewage sludge; commercial or industrial sludge contaminated as the result of a spill of PCBs including sludges located in or removed from any pollution control device; aqueous decantate from an industrial sludge.

(3) Buildings and other man-made structures (such as concrete floors, wood floors, or walls contaminated from a leaking PCB or PCB-Contaminated Transformer), porous surfaces, and non-porous surfaces.

3.1.4 Indoor Air Quality

Although IAQ was not noted to be of significant concern at the Site, should mold growth be encountered during renovation/demolition activities, removal of the growth, and correction of the water intrusion cause the mold growth should be conducted pursuant to the EPA document *Mold Remediation in Schools and Commercial Buildings* (EPA 402-K-01-001), dated September 2008.

3.1.5 Sediment

Sediment samples collected as part of the 2013 Environmental Survey by ATC were compared to the Vermont VSS for industrial and commercial properties as listed in the VTDEC's *IRULE – Investigation and Remediation of Contaminated Properties Rule*. Disposal of this soil following removal will be compared to *EPA Listed Wastes, Table 1: Maximum Concentration of Contaminants for the "Toxicity" Characteristic, as Determined by the Toxicity Characteristic Leaching Procedure (TCLP).* Additional characteristics may be compared depending on the chosen disposal facilities acceptance requirements.

4.0 EVALUATION OF CLEANUP ALTERNATIVES

4.1 REMEDIAL ACTION OBJECTIVE

The remedial action objective for the armory's ACMs, PCBs, LBP, and other hazardous materials is to prevent these materials from causing unacceptable risk to human health. The following formula is commonly used to represent risk:

RISK = EXPOSURE X CONCENTRATION

As indicated by this common formula, risk can be reduced by limiting exposure or by reducing the magnitude of contaminant concentration. The human exposure pathway of concern for ACMs, lead-in-dust, and mold is inhalation. As a result, contaminant exposure can be limited by isolating these contaminants from human contact. This generally consists of limiting disturbance where possible and utilizing personal protective equipment (PPE) when this is not a viable option. The process of renovation and demolition is intrusive by nature which leaves PPE as the primary method for risk reduction during these activities. In some instances, maintaining ACMs in good condition so that asbestos fibers would not be released into indoor air is also a viable option for reduced risk, however, this is infeasible in this particular circumstance.

The only way to reduce ACM concentration is to perform asbestos abatement, which would reduce concentration to zero. If concentration is zero, then risk also would reduce to zero.

The human exposure pathway of concern for PCBs and LBP is dermal contact and ingestion. As a result, contaminant exposure can be limited by isolating these contaminants from human contact. Utilizing PPE reduces the possibility of a completed exposure pathway during renovation activities at the Site. Full removal of these RBMs is the most effective way to reduce future risk for building inhabitants.

4.2 CLEANUP ALTERNATIVES

The optimal cleanup alternative for ACM, PCBs, LBP, and other hazardous materials will depend on future plans for the armory. Stantec understands the anticipated future development to be a police station/community safety building. This building type is anticipated to be occupied 24-hours a day and will therefore need to be designed for continual human occupancy. Three remedial alternatives are presented below. These options cover the full spectrum of possible remedial alternatives for the Site and match the anticipated future use of the building to the extent practicable.

4.2.1 Base Scope of Services

The following scope will be included in each of the presented remedial alternatives. These items are deemed essential for the remediation of the building to properly prepare it for renovation/demolition activities.

- Full removal, management, and disposal of ACM as noted in the 2013 Environmental Survey. This work shall be complete by a Vermont-Licensed Asbestos Abatement Contractor and will include removal of each of the materials included in Section 2.3.1 of this report and disposal at a Vermont-permitted disposal facility. An abatement work plan and independent air monitoring will also be required as part of this task during asbestos abatement activities to ensure the work being performed is not adversely impacting nearby properties.

- The gray basement floor paint has been identified as PCB Bulk Product Waste (>50 ppm) and will be required to be removed from the Site in all of the remedial alternatives. Removal of this waste will include scarification of the basement floor using specialized equipment capable of capturing the scarified paint and portions of the underlying concrete. Scarification will occur to a depth of approximately 0.25-inches.

  This waste stream will likely be the most difficult to dispose of due to its toxicity. Limited disposal facilities for this type of waste exist, and therefore are expensive due to their scarcity. It has been assumed that this gray paint does not contain lead at concentrations exceeding the hazardous waste threshold and will therefore be acceptable for disposal at a RCRA Subtitle C facility in Michigan. The Contractor will be required to manage PCB waste and decontaminate equipment in compliance with TSCA and other federal and state regulations.

  This work will likely take place under an EPA-approved Self-Implementing Cleanup and Disposal Plan in accordance with 40 CFR part 761.61(a).

- As previously mentioned in Section 2.4, LBP abatement (with the exception of the basement floor paint impacted by PCBs) is assumed to be part of the selected general renovation/demolition contractors VOSHA compliance requirements. A $10,000 contingency for VOSHA compliance has been included for budgeting purposes.

- Removal of sediment from basement drain pits, management, transportation, and off-site disposal at a RCRA Subtitle D Facility as non-hazardous waste.

Lead-in-dust and mold remediation have not been included in the base scope of services but will require management during renovation/demolition activities should they be encountered above applicable thresholds.

4.2.2 Alternative 1: Full Removal of PCB Bulk Product, Excluded PCB Product, and PCB Remediation Waste

In addition to the base scope of services presented in the previous section, this remedial alternative includes the full removal of PCB waste at the Site. Excluded PCB products identified at the site include exterior white window caulking, exterior gray door caulking, and interior paints. Based on a review of conceptual renovation plans these products will likely be disturbed during renovation/demolition activities and will require management. PCB containing materials will be removed using approved methods by a Vermont-Certified Environmental Contractor.

PCB Remediation Waste will also be disposed of as part of in this remedial alternative. PCB Remediation Waste shall include the concrete underlying the gray floor paint present in the basement of the building. Limited sampling of this concrete has been completed to date, however, remediations completed at other sites by Stantec suggest that the concrete underlying the paint is likely to contain PCBs at elevated concentrations due to continued leaching of PCBs from the paint over time. This is especially relevant in the armory as past interviews of staff have indicate the damp nature of the basement. Stantec submitted an inquiry with ATC regarding the scope of work anticipated for this Alternative. Stantec has included the anticipated scope of work from ATC which includes removal of approximately 5,160 square feet of the basement gray floor paint and complete removal of the underlying concrete, full removal of 127 windows, and removal of approximately 3,000 square feet of PCB-impacted wall paint. This material will be disposed of as bulk product waste in accordance with applicable regulations.

4.2.3 Alternative 2: Full Removal of PCB Bulk Product Waste and Excluded PCB Products with In-Place Management of PCB Remediation Waste

This remedial alternative will include the base scope of services as presented previously and will be the same as Alternative 1 with the exception of PCB remediation waste. Full removal of 127 windows and removal of approximately 3,000 square feet of PCB-impacted wall paint and disposal as bulk product waste in accordance with applicable regulations remains consistent with Alternative 1. Under this alternative, the concrete underlying the basement floor paint will be managed in-place and not disposed of off-site. This alternative relies on the assumption that the concentrations of PCBs in the underlying concrete (beneath the paint) are at levels suitable for in-place management (<1 ppm). One option for in-place management of PCBs <1 ppm include abandoning this portion of the building and not using it for human occupancy. The possibility of encapsulation may also be considered by re-coating the floor.

EPA under TSCA offers three options for this in-place management, however these options are generally heavy in reporting and can be costly. A detailed plan outlining the full design to prevent a completed exposure pathway of PCBs to building occupants would be required to implement this remedial alternative.

4.2.4 Alternative 3: Full Removal of PCB Bulk Product Waste with In-Place Management of Excluded PCB Products and PCB Remediation Waste

Alternative 3 is the same as Alternative 2 but Excluded PCB Products would also be left in place and managed. This method is viable as Excluded PCB Products are able to be left in place assuming they are not disturbed, are delineated, and are defined as Excluded PCB Products. Refer to the definition of Excluded PCB products for further information.

4.3 CLEANUP ALTERNATIVE EVALUATION

To satisfy EPA requirements, the effectiveness, ability to implement, and cost of each alternative must be considered prior to selecting a recommended cleanup alternative. See Section 4.4 and Table 1 for description of ranking for each Alternative.

4.3.1 Effectiveness

Effectiveness is evaluated by 1) the ability to achieve the desired level of protection as quickly as possible, and 2) whether the alternative can maintain the desired level of protection over the long-term.

4.3.1.1 Alternative 1

The full removal of asbestos, PCBs, LBP, and other hazardous building materials with no remaining contamination in place is generally considered to be the most effective method of remediation. Risk to human health associated with exposure to RBMs would be reduced significantly if not completely eliminated with regards to these contaminants. The overall effectiveness of Alternative 1 is considered good as no long-term management via engineering or institutional controls would be required to prevent a completed exposure pathway in the future.

4.3.1.2 Alternative 2

The in-place PCB management alternative would use a combination of remediation and engineering and institutional controls to mitigate risks associated with PCB-containing materials. ACMs, LBP, and other hazardous materials will be managed in the base scope of services and will therefore not be a concern for future exposure in this alternative. Various engineering and institutional controls (generally described above in Section 4.2.3), if properly implemented, would be effective in mitigating the risk associated with PCB-impacted concrete left in place by minimizing or eliminating human exposure to this material. The effectiveness of this alternative requires PCB Bulk Product removal, initial measures to isolate remaining hazards from the impacted underlying concrete, and continued management to maintain hazard isolation. The overall effectiveness of Alternative 2 is considered moderate. This rating is based upon the fact that the quantity of PCBs would be reduced through partial removal, and also the fact that the long-term reliability of on-going management of remaining PCBs is considered challenging. A deed restriction would also be required on the Site and would severely limit future uses of the building.

4.3.1.3 Alternative 3

The effectiveness of this alternative is considered similar to that of Alternative 2. Additional PCB-containing material would be left in place via this alternative (Excluded PCB Product) which has the potential to introduce additional exposure pathways should these materials be disturbed. The overall effectiveness of Alternative 3 is also considered moderate. This rating is based upon the fact that the quantity of PCBs would be reduced through partial removal, and also the fact that the long-term reliability of on-going management of remaining PCBs is considered challenging. A deed restriction would also be required on the Site and would severely limit future uses of the building.

4.3.2 Ability to Implement

The assessment of implementability is intended to evaluate whether, or with how much difficulty, the cleanup alternative can be implemented and whether the alternative’s continued effectiveness can be assessed and verified.

The ability to implement scores presented below are relative to the Site itself and surrounding area (i.e. these scores may have different values if the site was located in a different location). For example, it should be noted that there are is currently only one permitted landfills operating in the State of Vermont. Neither of these facilities is permitted to accept large quantities of asbestos containing waste as is anticipated to be generated as part of this remediation. Nor are these landfills permitted to accept any form of PCB waste. Therefore, the implementability of each of the remedial alternatives will include large transportation distances for many of the waste streams.

The base scope of services included for each of the alternatives will likely include a medium-large scale remedial effort by multiple contractors. There are many certified asbestos and LBP abatement contractors within the State of Vermont. This helps to increase the ease in which the project is implemented. Contractors certified to handle PCB containing waste are limited not only in Vermont but across the country, however, this will be factored into each of the proposed remedial alternatives.

4.3.2.1 Alternative 1

Seeing as a certified PCB contractor will already be on-site to remove the PCB Bulk Product Waste from the basement as part of the base scope of services, having them also remove the PCB Remediation Waste and Excluded PCB Products from the building will not introduce significant issues to the overall implementability of the remedial alternative. The fact that long-term monitoring will not be required to evaluate the alternatives effectiveness significantly increases the implementability score. Based on these factors, the ability to implement rating for Alternative 1 is good.

4.3.2.2 Alternative 2

The implementability of this alternative is generally lower than that of Alternative 1. Additional work will be required to monitor the long-term effectiveness of the remedial approach as PCB contamination will remain in place in the building’s basement. Engineering and institutional controls will limit the future use of the building as well.

This alternative does however reduce the quantity of waste generated as part of the remediation. This reduces transportation generally making the project easier to implement. This reduced transportation is likely not outweighed by the limited future use of the building. Based on these factors, the ability to implement rating for Alternative 2 is moderate-poor.

4.3.2.3 Alternative 3

The implementability of this alternative is generally similar to that of Alternative 2. Excluded PCB Products will be left in place in the basement and first floor that will require additional work to monitor the long-term effectiveness of the remedial approach. Engineering and institutional controls will limit the future use of the building as well. Based on these factors, the ability to implement rating for Alternative 3 is also moderate-poor.

4.3.3 Cost

Stantec included ATC's provided costs and did not conduct a separate RBM survey to confirm ATCs findings and estimated abatement fees when generating the costing section of this report.

The base scope of services listed below shall be implemented in addition to one of the three proposed remedial alternatives as presented in Section 4.2. The opinion of probable cost (OPC) to implement the base scope of services is as follows:

ACM Abatement including consulting and oversight fees:	$326,000
PCB Bulk Product Waste Remediation:	$268,000
Lead Based Paint Abatement Contingency:	$10,000
Floor Drain Sediment Remediation:	$7,500
Total:	**$611,500**

Note: PCB bulk product waste remediation assumes paint is not hazardous for lead in conjunction with PCBs.

4.3.3.1 Alternative 1

The OPC for Alternative 1 is approximately $219,000 in addition to the base scope of services. The total remedial cost for the implementation of the base scope of services and Alternative 1 is $830,500. These costs are associated with the added removal, management, and disposal of excluded PCB wastes. Based on this relatively low implementation cost, Alternative 1 receives a cost rating of good-moderate.

4.3.3.2 Alternative 2

The OPC for Alternative 2 is approximately $577,000 in addition to the base scope of services. The total remedial cost for the implementation of the base scope of services and Alternative 2 is $1,188,500. These costs are associated with 1) added isolation measures for PCBs in the basement concrete floor and 2) increased reporting and oversight related to the remaining contamination. This cost does not include likely costs associated with deed restrictions and annual monitoring. This implementation cost results in a cost rating of moderate-poor.

4.3.3.3 Alternative 3

The OPC for Alternative 3 is approximately $358,000 in addition to the base scope of services. The total remedial cost for the implementation of the base scope of services and Alternative 3 is $969,500. These costs are associated with 1) added isolation measures for PCBs in the basement concrete floor and 2) increased reporting and oversight related to the remaining contamination. Removal, management, and disposal of Excluded PCB Products have been removed from this cost. This cost does not include likely costs associated with deed restrictions and annual monitoring. This implementation cost results in a cost rating of moderate.

4.3.4 Green Remediation Considerations

The carbon footprint associated with asbestos, PCB, LBP, and other hazardous abatement is relatively small as compared to other remedial efforts such as soil excavation or groundwater treatment. Electrical service in the building is active and will provide power for hand power tools and fans associated with abatement containment systems. Each waste stream requires disposal at a properly permitted facility. As mentioned previously, transportation associate with this disposal will likely increase greenhouse gas emissions. The removed material also has no possibility of being reused on-site. Finally, partial demolition and renovation of the armory would have a much smaller carbon footprint than demolition of the building, and construction a new building of similar function and size.

4.4 RECOMMENDED CLEANUP ALTERNATIVE

In order to quantitatively evaluate the three cleanup alternatives, the following point system is utilized:

- Good – 5 points
- Good-Moderate – 4 points
- Moderate – 3 points
- Moderate-Poor – 2 points
- Poor – 1 point

The application of this scoring system for each of the three scoring criteria listed above results in Table 1, below.

Table 1: Summary of Remedial Alternative Rankings

	Alternative 1	Alternative 2	Alternative 3
Effectiveness	5	3	3
Ability to Implement	5	2	2
Cost	4	2	3
Total	14	7	8

Based upon this quantitative scoring system, the recommended cleanup alternative is Alternative 1: Full Removal of PCB bulk product, excluded PCB product, and PCB remediation waste. This recommendation is based on the Town's planning goal to renovate the building for use as a police station/community safety building. Other remedial alternatives may become more viable if future development plans are modified.

5.0 COSTING ASSUMPTIONS

The OPCs presented represent an estimate of the proposed scope of services for each alternative.

OPCs presented herein represents a Class 5 estimate as defined by the American Association of Cost Estimating (AACE) International. The AACE defines a Class 5 estimate as follows:

Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. They are often prepared for strategic planning purposes, market studies, assessment of viability, project location studies, and long-range capital planning. Virtually all Class 5 estimates use stochastic estimating methods such as cost curves, capacity factors, and other parametric techniques. Expected accuracy ranges are from –20% to –50% on the low side and +30% to 100% on the high side, depending on technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.

For the purposes of this report, Stantec included ATC's provided costs and did not conduct a separate RBM survey to confirm ATCs findings and estimated abatement fees when generating the costs provided above.

Stantec has used its professional judgement given the available information and our experience with similar remedial techniques on other sites. Accordingly, the Client agrees that Stantec cannot and does not make any warranty, promise, guarantee, or representation, either expressed or implied, that proposals, bids, project construction costs, or cost of operation or maintenance will not vary substantially from this good-faith cost estimate.

The following assumptions were made in the generation of this ABCA:

- A bird and bat guano survey has not been performed at the Site based on the information provided to Stantec. This potentially hazardous waste stream has not been considered as part of this ABCA.
- Costs provided by ATC and utilized by Stantec include a 25% contingency.
- Costs associated with base scope of services assumes PCB migration has not impacted soil beneath the building envelope and below the concrete slab.
- Alternative 2 and 3 do not include the costs associated with deed restrictions and annual monitoring likely required by EPA.
- Alternatives 2 and 3 assume that EPA approves the submitted plan regarding the in-place PCBs to remain at the Site.
- Alternatives 2 and 3 assume that renovation and demolition activities can progress without significant disturbance of the PCB contaminated materials remaining in place within the building.

COSTING ASSUMPTIONS

- Alternative 2 and 3 assume PCB concentration in concrete underlying the gray basement floor paint are below 1 ppm and able to remain in place.
- The base scope of services as well as Alternative 2 and 3 assume that the PCB-impacted material will be non-hazardous for lead. Additional costs will be incurred if materials are hazardous for lead and PCBs.
- No historical preservation costs have been included.
- Contractor(s) will have full, unfettered access to the building during remedial work.
- Unforeseen project implications associated with COVID-19 have not been anticipated or included.
- Exterior soil PCB and other contaminates of concern to be delineated under separate work plan and cover.

6.0 REFERENCES

1. ATC, 2020. 2020 Remediation Planning Cost Estimate, St. Johnsbury Armory Building, St. Johnsbury, Vermont, ATC Project # 280BS01932. Prepared for The Town of St. Johnsbury. June 4, 2020.
2. Cardno ATC, 2013. Environmental Survey, Former Saint Johnsbury Armory, 1249 Main Street, Saint Johnsbury, Vermont. Prepared for Northeastern Vermont Development Association. March 28, 2013.
3. Crothers Environmental Group, LLC, 2008. St. Johnsbury Community Center – St. Johnsbury, Vermont, Interior Asbestos Inspection, Limited. Prepared for The Town of St. Johnsbury. November 1, 2008.
4. The Johnson Company, 2012. Phase I Environmental Site Assessment, Former Saint Johnsbury Armory, VT DEC Site #2010-4075, (SMAC September 7, 2010), 1249 Main Street, Saint Johnsbury, Vermont Prepared for the Vermont Department of Environmental Conservation Sites Management Section. May, 2012
5. Town of St. Johnsbury, 2020. St. Johnsbury Brownfield Planning Grant – Final Report. Prepared for Public Distribution. August 28, 2020.