Former Johnson Village Powerhouse
415 VT 100C
Johnson, Vermont 05656

VTDEC# 2017-4738
KAS Job #508170455

BROWNFIELDS PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT

September 18, 2018, Revised November 12, 2018

Prepared for:

Lamoille County Planning Commission
PO Box 1637
52 Portland Street, 2nd Floor
Morrisville, VT 05661

kas
environmental science & engineering

589 Avenue D, Suite 10
PO Box 787
Williston, VT 05495

www.kas-consulting.com

802 383.0486 p
802 383.0490 f

Table of Contents

Appendices

Certification

This report, which summarizes the Brownfields Phase II Environmental Site Assessment efforts completed at the Former Johnson Village Powerhouse property located in Johnson, Vermont, has been prepared and reviewed by the following personnel in accordance with the American Society of Testing and Materials (ASTM) Practice E 1903-11, the approved Site-Specific Quality Assurance Project Plan (QAPP) Addendum and current Vermont Department of Environmental Conservation (VTDEC) requirements as presented in the *Investigation and Remediation of Contaminated Properties Rule* (I-Rule) document dated July 27, 2017.

We certify under penalty of perjury that we are environmental professionals, that all content contained within this deliverable is to the best of our knowledge true and accurate and that this report accurately reflects the condition of the property as of July 2018.

Prepared By:

Rebecca Treat, P.G.
Project Manager, EP

Reviewed By:

Jeremy Roberts, P.G.
Environmental Program Manager, EP

Executive Summary

This report presents the results of a Brownfields Phase II Environmental Site Assessment (ESA) conducted at the Former Johnson Village Powerhouse property located at 415 VT 100C in Johnson, Vermont (Site Location Map, Appendix A). Investigative work was conducted by KAS, Inc. (KAS) for the Lamoille County Planning Commission (LCPC) of Morrisville, Vermont who is the sponsor of the work. This work was conducted for the LCPC on behalf of the property owner (Village of Johnson) and has been funded by the LCPC through EPA Brownfields Assessment Cooperative Agreement #BF00A00109. All work was conducted in accordance with KAS' Work Plan dated December 1, 2017 revised January 31, 2018, the American Society of Testing and Materials (ASTM) Practice E 1903-11, KAS' Generic Quality Assurance Project Plan (QAPP) (RFA 12098), KAS' Site-Specific QAPP Addendum dated February 20, 2018 revised March 29, 2018 and current Vermont Department of Environmental Conservation (VTDEC) requirements as presented in the *Investigation and Remediation of Contaminated Properties Rule* (I-Rule) document dated July 27, 2017.

The current property owner, Village of Johnson, has not finalized a redevelopment plan for the property; however, preliminary plans are to convert the property into a public space. It is intended for the building to remain as a historical site, if possible. The existing building is in poor condition and would likely need to be structurally repaired prior to continued use.

The investigative work was proposed to address various Recognized Environmental Conditions (RECs) identified at the property by KAS in August 2017 during a Brownfields Phase I Environmental Site Assessment.[1] KAS' Brownfields Phase II ESA work scope included the following:

[1] KAS, Inc., Phase I Environmental Site Assessment, Former Johnson Village Powerhouse, Johnson, Vermont, August 18, 2017.

- Work Plan, Site specific QAPP addendum to KAS' approved Generic QAPP (RFA12098), and submittal, notifications, approvals, project coordination, and health and safety plan preparation;
- Visual Inspection of building wastewater plumbing;
- Environmental Assessment: soils;
- Environmental Assessment: groundwater;
- Environmental Assessment: building materials and concrete;
- Laboratory data verification; and,
- Preparation of a summary report.

Visual Inspection of Building Wastewater Plumbing
The building's wastewater plumbing is suspected to discharge directly to the Gihon River. A drain pipe was found to be protruding from the west side of the building. The drain pipe is in close proximity to a bathroom located on the main level of the building.

Environmental Assessment – Soils
KAS advanced seventeen soil borings at the property. Subsurface soils encountered consisted primarily of sands and silts overlying bedrock. Select polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) were reported in shallow soil above VTDEC residential screening levels. The PCB impacts identified in shallow soils across the property are believed to be related to the historical use of the property as a power-generating facility. Elevated PAH levels are likely related to the historical industrial use of the property and the presence of urban fill. While urban fill was not identified during soil sampling, the site is located in close proximity to a "urban soil background area" indicating fill soils are likely present. Analysis of shallow soils near a utility pole did not identify the presence of pentachlorophenol impacts. Low level metals were reported in shallow soils but all concentrations were below applicable screening levels.

Environmental Assessment – Groundwater
Bedrock refusal was encountered across the property at depths ranging from 3 to 10.5 feet below grade (fbg). Because of the shallow bedrock and an absence of saturated soil conditions, only one monitoring well was installed. KAS installed one monitoring well adjacent to the southeast corner of the building in a presumed downgradient direction of all potential source areas. Groundwater was encountered at a depth of 5 fbg at this location. Select metals were reported in the groundwater; however, all concentrations were below Vermont Ground Enforcement Standards (VGES). No volatile organic compounds (VOCs) or PCBs were reported in groundwater above laboratory method detection limits.

Environmental Assessment – Building Materials and Concrete
Asbestos containing materials and lead-based paint were identified on interior and exterior portions of the former powerhouse structure. Total PCBs were reported in select wood, paint and concrete samples above the Toxic Substances Control Act (TSCA) cleanup level of 1 milligrams per kilogram (mg/kg). The asbestos, lead and PCBs levels identified in building materials and concrete are consistent with what would be expected given the historical age/use of the building and property.

Recommendations

Based on the investigative work as well as the above-stated conclusions for the property, KAS recommends the following:

- An Evaluation of Corrective Action Alternatives (ECAA) and a Corrective Action Plan (CAP) should be prepared for this property to mitigate and address potential risks posed to human health as a result of the documented impacts;

- Due to the elevated PCB levels identified in soil, building materials and concrete, a Toxic Substances Control Act (TSCA) Self-Implementing Cleanup Plan should be prepared to manage PCB waste. Disposal of bulk product waste and PCB remediation waste can be accomplished at a non-hazardous waste landfill given the PCB remediation waste was reported at a level below 50 mg/kg;

- Due to asbestos containing materials reported on the interior and exterior of the former powerhouse structure, notification must be sent to Region 1 EPA in accordance with 40 CFR Part 61 subpart M and the State of Vermont in accordance with 18 VSA Chapter 26 at least 10 working days prior to the start of any demolition (defined as disturbance of a load bearing structure) or renovation. Per the EPA Region 1 NESHAPS (40 CFR Part 61, paragraph 61.145) a trained on site representative is required to be present during demolition activities to identify any unexpected materials that may be asbestos containing. This event is unlikely but the EPA requires it as a contingency. If found, the discovered material must be presumed asbestos containing materials (ACM) and treated accordingly, or tested by a licensed inspector; and,

- Due to lead-based paint reported on the interior and exterior of the former powerhouse structure, employer compliance to Vermont Occupational Safety & Health Administration (VOSHA) Lead in Construction standards will be required for any Village of Johnson or hired construction company's employees for any renovation or other demolition work.

1.0 Introduction

This report presents the results of a Brownfields Phase II Environmental Site Assessment (ESA) conducted at the Former Johnson Village Powerhouse property located at 415 VT 100C in Johnson, Vermont (Site Location Map, Appendix A). This work was performed by KAS, Inc. (KAS) for the Lamoille County Planning Commission (LCPC) of Morrisville, Vermont on behalf of the property owner (Village of Johnson) and has been funded by the LCPC through EPA Brownfields Assessment Cooperative Agreement #BF00A00109. All work was conducted in accordance with KAS' Work Plan dated December 1, 2017 revised January 31, 2018, the American Society of Testing and Materials (ASTM) Practice E 1903-11, KAS' Generic Quality Assurance Project Plan (QAPP) (RFA 12098), KAS' Site-Specific QAPP Addendum dated February 20, 2018 revised March 29, 2018 and current Vermont Department of Environmental Conservation (VTDEC) requirements as presented in the *Investigation and Remediation of Contaminated Properties Rule* (I-Rule) document dated July 27, 2017. The VTDEC I-Rule Site Investigation Report Checklist is included as Appendix L.

The owner contact information is outlined below.

Property Owner	Mailing Address	Phone	Email Address
Village of Johnson	PO Box 383, Johnson, VT 05656	802-635-2611 x 311	vojmanager@townofjohnson.com

2.0 Background

A Brownfields Phase I ESA was completed for the property by KAS in August 2017.[2] The Phase I ESA identified several Recognized Environmental Conditions (RECs) and recommended further environmental investigations for the subject property. The following RECs were noted in the Phase I ESA document:

- The historical use of the property as a power generating facility with the documented use and storage of polychlorinated biphenyl (PCB) containing equipment;
- The observed and reported presence of fill on the property; and;
- The potential presence of elevated concentrations of lead and/or iron in shallow soils due to the historical presence of the painted powerhouse structure and the former iron penstock pipe.

One de minimis condition was identified; the presence of utility poles on or near the property which could result in the potential presence of pentachlorophenol in subsurface soils. It was reported during the Phase I ESA the building wastewater and sewage most likely discharged to the Gihon River historically.

[2] KAS, Inc., Phase I Environmental Site Assessment, Former Johnson Village Powerhouse, Johnson, Vermont, August 18, 2017.

3.0 Scope of Work/SOPs/QAPP/Digsafe

3.1 Scope of Work and Work Plan Deviations

The Brownfields Phase II ESA was performed to address RECs identified during a Brownfields Phase I ESA conducted at the property by KAS in August 2017.[3] The current property owner, Village of Johnson, has not finalized a redevelopment plan for the property; however, preliminary plans are to convert the property into a public space. It is intended for the building to remain as a historical site, if possible. The existing building is in poor condition and would likely need to be structurally repaired prior to continued use.

The preliminary redevelopment plan steered the Phase II ESA work scope to characterize the property in a manner to best protect human health during and after redevelopment. The Phase II ESA focused on potential environmental routes of exposure which directly bear on the planned future use. The primary routes of exposure to potential contaminants of concern identified were direct contact with soils, groundwater and/or building materials. The primary goal of the Phase II ESA was to define whether contamination is present in shallow soils and groundwater beneath the property, and if so, its nature, magnitude and extent. This information is then used to evaluate whether a risk is posed to the potential reuse of the property and if so, what corrective action(s) may be employed to minimize risk to the environment and human health. Additional goals of this Phase II ESA were to document the discharge location of the buildings plumbing and to determine if asbestos, lead and/or PCBs are present in the building materials/concrete pad(s). The Brownfields Phase II ESA consisted of the following components:

- Visual inspection of building wastewater plumbing;
- Soils assessment;
- Groundwater assessment; and
- Building materials and concrete assessment.

All components of the Phase II ESA scope of work were accomplished; however, four slight deviations from the approved work plan/QAPP Addendum did occur and are discussed below.

- The lower level of the building was not accessible for inspection/sampling efforts due to safety concerns related to the building's deteriorated condition. KAS was able to perform a visual inspection of the lower level through a building window. Additionally, a limited lead inspection of building materials on this level was achieved through the window access. This data gap was relayed to EPA/VTDEC project managers via email correspondence on May 7, 2018.
- Only one of four groundwater monitoring well installations was completed due to shallow bedrock refusal and the absence of saturated soils conditions. This completed well, MW-1, was installed adjacent to the southeast corner of the building in a presumed downgradient direction of all potential source area(s).
- The sampling interval at a boring adjacent to the building (SB18-1) was from a depth of 0 to 1 foot below grade which is shallower than originally proposed. Dense soil conditions coupled with coarse gravel prevented the soil boring from being advanced to a depth of 2 feet below grade. All other soil borings were advanced as proposed.

[3] Ibid

- In email correspondence on April 4, 2018 between KAS and Ms. Nora Conlon, EPA Quality Assurance Officer, a contingency was set in place to collect a soil sample at the groundwater interface provided no other significant impacts were noted during the drilling efforts. No significant impacts were identified during the drilling efforts; however, saturated soil conditions were encountered in only one boring. This boring was located downgradient of any potential source area and coarse lithology/weathered bedrock was encountered at the groundwater interface. Given the lithology, downgradient location and that groundwater analytical would be obtained from this location, KAS did not collect a soil sample at the groundwater interface and opted instead to focus the soil sampling efforts on potential source areas.

3.2 Standard Operating Procedures (SOPs)

The following KAS standard operating procedures (SOPs) were used during the Brownfields Phase II ESA activities. A copy of the SOPs is available upon request.

Protocol	Title
KAS Protocol #001	Soil Screening Headspace Measurement, Version 2, December 2010, KAS
KAS Protocol #002	Monitoring Well Installation, Development and Maintenance, Version 3, December 2010, KAS
KAS Protocol #003	Use and Maintenance of Electronic Interface Probes and Water Level Indicators, Version 2, December 2010, KAS
KAS Protocol #004	Soil Borings, Version 2, December 2010, KAS
KAS Protocol #005	Shallow Soil Sampling, Version 2, December 2010, KAS
KAS Protocol #006	Sample Containerization, Preservation, Handling and Packaging, Version 2, December 2010, KAS
KAS Protocol #007	Surveying for Environmental Projects, Version 2, January 2011, KAS
KAS Protocol #012	Low Flow Groundwater Purging and Sampling, Version 2, January 2011, KAS
KAS Protocol #034	Use and Maintenance of MiniRAE Lite Photoionization Detector, Version 1, December 2010, KAS
KAS Protocol #036	Sampling Procedures for PCB Containing Building Materials, Version 1, February 2011, KAS
USEPA Region 1	Sampling Porous Surfaces for Polychlorinated Biphenyls (PCBs), Revision 4, May 2011, USEPA Region 1
Vermont Dept. of Health	Asbestos Sampling Procedures, Vermont Regulations for Asbestos Control, V.S.A. Title 18, Chapter 26, February 1987, Amended November 1995, VDH

3.3 Quality Assurance Project Plan (QAPP)

KAS prepared a Site-Specific QAPP Addendum to KAS' approved generic QAPP for Brownfields work in Vermont prior to the initiation of the field work. The Site-Specific QAPP Addendum dated February 20, 2018 revised March 29, 2018 was prepared in accordance with the EPA document, *Quality Assurance Guidance for Conducting Brownfields Site Assessments*[4]. The purpose of the QAPP and QAPP Addendum was to develop data quality objectives, a sampling design, analytical precision requirements, and quality assurance guidelines. All work was completed in accordance with the approved generic QAPP and QAPP Addendum unless otherwise stated in Section 3.1.

[4] EPA, Quality Assurance Guidance for Conducting Brownfields Site Assessment, 540-R-98-038, September 1998.

3.4 Digsafe Notification

The property was pre-marked for digsafe notification on May 10, 2018 (Digsafe Ticket # 20181916837). KAS also contacted the Town of Johnson to request a water/sewer markout on this day. Due to a scheduling delay for the drilling efforts and a change in the drilling subcontractor, KAS renewed the digsafe ticket on June 7, 2018 (Digsafe Ticket # 20182313729).

4.0 Site Description

4.1 Site and Vicinity

The property consists of one rectangular parcel of land that is approximately 0.9 acres in size and is located in a mixed residential and commercial area in the Village of Johnson (Site Location Map and Site Vicinity Map, Appendix A). One vacant building resides on the property which was reportedly most recently used by the Village as an electric hydro-generating facility and substation. A paved parking area resides along the southern most portion of the property near the corner of School Street. The remainder of the property is primarily covered by overgrown vegetation; however, several former structures remain on the property. These structures include: a concrete pad, a buried concrete pad/foundation, concrete pillars, and a former stone wall foundation. Additionally, a large diameter steel water intake pipe (penstock) extends approximately 25 feet from the building towards the north along the river and asphalt fill has been observed on the ground surface of the property.

4.2 Site and Area Features, Topography, Surface Water Bodies and Drainage

Based on a review of topographic maps, the property lies at an approximate elevation of 540 feet above mean sea level (AMSL). The coordinates near the center of the property are 44.63667°N latitude and 72.67016°W longitude. The property has a gradual slope from north to south and east to west; however, a steeper slope towards the west is present on the northern portion of the property and a steep embankment is present along the western property boundary along the Gihon River. The nearest surface water body is the Gihon River, which abuts the property to the west and flows to the south. Surficial flow follows the topographic features of the property; no catchbasins or other drainage features have been observed.

4.3 Abutters and Nearby Properties

Land uses adjacent to the property as of July 2018 were as follows:

- North: Overhead electrical utility corridor followed by a residence
- South: School Street followed by a residence
- East: VT 100C followed by land owned by Green Mountain Power which houses an electrical substation
- West: Gihon River

Historical land use in the vicinity of the property is believed to be similar to present day.

4.4 Utilities

No underground utility corridors are known to exist on the property. Overhead utility lines are present on the northern portion of the property.

4.5 Historical Site Use and Hazardous Materials Releases

The property is believed to have been first developed in the late 1880's and used as the Johnson Village Electric Light Company Powerhouse until it was decommissioned in the mid-1950's. A substation, which was reportedly located where an existing concrete pad is present today, reportedly operated into the 1990's when it was decommissioned. Since that time, the property has reportedly remained vacant. The former electrical equipment including all transformers, and capacitors that were once used were reportedly removed from the property in the 2000's. According to Village of Johnson personnel, there were transformers stored in the building and at the substation which contained PCBs. In November 2017, the property was entered into the state hazardous waste site database (VTDEC Site # 2017-4738) based on the findings of the Brownfields Phase I ESA conducted by KAS in August 2017.

No releases of hazardous materials at the property are known.

5.0 Visual Inspection of Building Wastewater Plumbing

On May 23, 2018, KAS performed a visual inspection of the building's lower level and exterior in an attempt to identify the building's wastewater discharge location. Due to safety concerns resulting from the building's deteriorated condition, KAS was not able to physically access the lower level for a thorough inspection. Instead, a visual inspection was performed through a window access on the building's lower level. A significant amount of debris was observed; however, no plumbing or wastewater pipes were observed on the lower level. Although not entirely visible due to the debris present, a dirt floor is presumed on this level. A visual inspection of the exterior of the building, as seen from across the Gihon River, identified a drain pipe protruding from the west side of the building. The location of this pipe is in close proximity to a bathroom on the main level of the building. The presence of this pipe suggests wastewater from the building's bathroom was directly discharged to the Gihon River. Photographic documentation showing the lower level and drain pipe on the west side of the building is included in Appendix B.

6.0 Environmental Assessment – Soils

KAS conducted an environmental assessment of subsurface soils at the property on May 23, 2018 and June 18, 2018. A total of seventeen (17) soil borings (SB18-1 through SB18-17) were advanced by KAS and Cascade Drilling of Montpelier, Vermont, under the direct supervision of a KAS geologist, using a dual hollow-stem auger (HSA)/geoprobe drill rig and a hand auger. The borings were advanced across the property to evaluate possible source areas identified in the Phase I ESA[5] (lead-based paint on building, iron penstock pipe, fill areas, and former electrical equipment) and to evaluate the potential presence of pentachlorophenol in soils near the utility pole located along the northern portion of the property. A Site Map showing the boring locations is included in Appendix A. Photographic documentation of these efforts is included in Appendix B. Soil boring logs are included as Appendix C. The coordinates for all soil boring locations were documented using a sub-meter GPS.

Soil borings were advanced to depths ranging from 1 to 10.5 feet below grade (fbg). Shallow bedrock refusal was encountered at five locations (SB18-3, SB18-5, SB18-10, SB18-11, SB18-12) at depths ranging from 3 to 4.5 fbg. Deeper bedrock refusal was encountered at SB18-2 and SB-18-4

[5] KAS, Inc., Phase I Environmental Site Assessment, Former Johnson Village Powerhouse, Johnson, Vermont, August 18, 2017.

at depths of 10 fbg and 10.5 fbg, respectively. Soil samples were screened in the field for the presence of VOCs using a MiniRae Lite photoionization detector (PID) equipped with a 10.6 eV bulb. The PID was calibrated using an isobutylene reference prior to its use on each day of soil sampling. No PID readings above background (>2.0 parts per million by volume (ppmv)) were noted in any of the soils screened. Additionally, no evidence of impacts or fill soils were observed. Subsurface soils encountered during the advancement of soil borings consisted primarily of sands and silts overlying shallow bedrock. Saturated soils were encountered at one location, SB18-2, at a depth of 5 fbg.

Discrete grab samples of shallow soil from fourteen locations (SB18-1, SB18-2, SB18-3, and SB18-7 through SB18-17) were submitted to Eastern Analytical Laboratories of Concord, New Hampshire (EAI) for analysis of volatile organic compounds (VOCs) via EPA Method 8260, PCBs via EPA Method 8082, and RCRA-8 metals via EPA Method 6020. Shallow soil from the boring advanced adjacent to the utility pole (SB18-7) was also submitted to EAI for analysis of pentachlorophenol via EPA Method 8270; all other samples were submitted to EAI for polycyclic aromatic hydrocarbons (PAHs) via EPA Method 8270. For QA/QC purposes, a duplicate sample from SB18-7 was submitted to EAI for analysis of VOCs, RCRA-8 metals, PAHs and pentachlorophenol. Additionally, one trip blank was handled during the sampling event and submitted to EAI for analysis of VOCs. Drill cuttings were placed back in the borings upon completion of sampling.

Soil Results

Select PAHs were reported in all fourteen samples. Eleven samples had a PAH exceedance above applicable standards: Benzo(a)pyrene (BaP) toxic equivalent quotient (TEQ) was reported in SB18-1, SB18-2, SB18-3, SB18-7, SB18-8, SB18-9, SB18-11, SB18-12, SB18-13, SB18-14 and SB18-17 at concentrations ranging from 0.14454 to 3.0926 milligrams per kilogram (mg/kg) which exceeds the VTDEC residential screening level of 0.076 mg/kg. Pentachlorophenol was not detected in SB18-7 above laboratory method detection limits.

Select PCBs were reported in four samples; however, only one sample had a PCB exceedance above applicable standards: PCB-1254 was reported in SB18-1 at a concentration of 0.13 mg/kg which exceeds the VTDEC residential screening level of 0.120 mg/kg.

Select RCRA-8 metals were reported in all fourteen samples; however, all concentrations were below applicable standards.

No VOCs were reported above method detection limits in any of the samples analyzed. The method detection limit for four VOC compounds (vinyl chloride, 1, 1, 2-dibromoethane, 1,2,3-trichloropropane and 1,2-dibromo-3-chloropropane) did exceed applicable standards; however, these compounds were not detected in subsequent groundwater sampling (see following Section).

A tabulated summary of the soil sampling results is included in Appendix D and the laboratory report is provided in Appendix H.

7.0 Environmental Assessment – Groundwater

One of the soil boring locations (SB18-2) advanced on June 18, 2018 was completed as a permanent monitoring well installation (MW-1). The well installation was performed by Cascade Drilling of Montpelier, Vermont, using a HSA drill rig under the direct supervision of a KAS geologist. MW-1 was installed in a presumed downgradient direction of the onsite building as proposed in the Site-Specific QAPP Addendum. As set forth in Section 3.1, three additional well

installations were proposed in the vicinity of SB18-3, SB18-4 and SB18-5; however, bedrock refusal and the absence of saturated soil conditions prevented well installations at these locations. A Site Map showing the well location is included in Appendix A. Photographic documentation of the drilling efforts is included in Appendix B. A well construction log is included as Appendix C.

MW-1 was installed at the depth of bedrock refusal which occurred at a depth of 10 fbg. Saturated soils were encountered at a depth of 5 fbg. The well was constructed of 2-inch PVC plastic with a 5-foot length of 0.010-inch factory slotted well screen placed at the bottom of the borehole. A coarse sand pack was placed around the screen and a bentonite seal was placed above the sand pack. The monitoring well was flush-finished with a compression fitting and steel road box. All drill cuttings were placed back at the point of origin or in close proximity to drilling location. MW-1 was developed with a bailer after installation; purge water was discharged directly to the ground surface. The coordinates for MW-1 were documented using a sub-meter GPS. Because no other wells were installed, a survey to determine relative elevations was not performed.

A depth-to-liquid measurement was collected from MW-1 on July 10, 2018 using a Geotech™ interface probe; no non-aqueous phase liquid (NAPL) was measured or observed in MW-1. The depth to groundwater recorded for MW-1 was 5.33 feet below top of casing (btoc). Due to an insufficient amount of water level data points, the groundwater flow direction and gradient at the property could not be calculated. Based on the location of nearby surface water and site topography, groundwater flow direction beneath the property likely flows toward the south/southwest. Liquid level monitoring data is presented in Appendix E. A Groundwater Elevation Map is included in Appendix A.

A groundwater sample was collected from monitoring well MW-1 immediately following well gauging on July 10, 2018. The sample was collected using low flow sampling techniques and the purge water was discharged directly to the ground surface. The groundwater sample was submitted to EAI for analysis of VOCs via EPA Method 8260, RCRA-8 metals via EPA Method 6020 and PCBs via EPA Method 8082. For QA/QC purposes, a duplicate sample was collected from MW-1 and submitted to EAI for analysis of VOCs, RCRA-8 metals and PCBs. Additionally, one trip blank was handled during the sampling event and submitted to EAI for analysis of VOCs.

Groundwater Results

Select RCRA-8 metals were reported in the groundwater sample collected from MW-1; however, all concentrations were below Vermont Groundwater Enforcement Standards (VGES). No VOCs were detected above method detection limits. The method detection limits for two compounds (1,2-dibromoethane and 1,2-dibromo-3-chloropropane) did exceed applicable standards; however, neither compound was detected in soil (see previous Section). No PCBs were detected above method detection limits.

A tabulated summary of the groundwater sampling results is included in Appendix F and the laboratory report is provided in Appendix H.

8.0 Environmental Assessment – Building Materials & Concrete

On May 23, 2018, KAS conducted an assessment of building materials for renovation purposes. Separate testing was performed for asbestos-containing building materials, lead-based paint on building surfaces and PCBs in building materials and concrete. Due to safety concerns resulting from the building's deteriorated condition, KAS was not able to physically access the lower level

for PCB or asbestos sampling. A limited lead inspection of this level was performed through a window. Although not all areas of the building were accessible, KAS believes that the sampling performed is adequate to characterize the PCB, asbestos and lead levels in the building materials. A discussion of these efforts and the subsequent results is provided below.

Asbestos-containing Building Materials Results

An asbestos-inspection was conducted by a certified asbestos inspector on May 23, 2018. The inspection consisted of looking for asbestos containing materials (ACM) on the interior and exterior of the structure. Three materials were determined to be suspect for asbestos content. One of these materials (tar roof coating) tested positive for asbestos content and is considered to be an ACM. One other material (silver chimney flashing) was identified and is assumed to be an ACM based on historical knowledge. A copy of the *Asbestos Inspection Report* is included in Appendix I.

Lead-based Paint Results

KAS contracted with Evergreen Environmental Health & Safety, Inc. of Barton, Vermont to conduct a lead paint inspection on May 23, 2018. The building was found to contain lead-based paint as defined by State and Federal Regulations on both exterior and interior surfaces. Over seventy components tested positive for lead; specific results and components tested can be found in the *Lead Paint Inspection Report* included in Appendix J.

PCB Results

KAS conducted an assessment of PCBs in building materials (paint and wood) and in the concrete at the former transformer pad areas on May 23, 2018. Samples of white and red exterior paint (P-1 and P-2) and grey and green interior paint (P-3 and P-4) were collected. Samples of wood from floorboards (W-1 and W-2), shelfing (W-3) and a wallboard (W-4) were collected. A Site Map showing the approximate concrete sampling locations (Conc-1 through Conc-4) is included in Appendix A. Photographic documentation of the PCB sampling efforts is included in Appendix B. The samples were submitted to EAI for analysis of PCBs via EPA Method 8082. For QA/QC purposes, a duplicate sample was collected and submitted to EAI for analysis of PCBs. Additionally, one equipment blank was prepared and submitted to EAI for analysis of PCBs.

Select PCBs were detected in three paint samples. Total PCB concentrations in paint ranged from 0.65 to 13.3 mg/kg. The total PCB concentration for two paint samples, P-3 and P-4, exceeded the Toxic Substances Control Act (TSCA) Cleanup Level of 1 mg/kg. The two PCB aroclors detected in the paint samples were PCB-1254 and PCB-1260. No PCBs were detected above laboratory method detection limits in the white exterior paint sample (P-1).

Select PCBs were detected in all four wood samples. Total PCB concentrations in wood ranged from 5.3 to 12.4 mg/kg. The total PCB concentration for all four wood samples exceeded the TSCA Cleanup Level of 1 mg/kg. Three PCB aroclors were detected in the wood samples: PCB-1254, PCB-1260, and PCB-1268.

One concrete sample tested positive for PCBs: a concentration of PCB-1260 was detected in Conc-1 at a concentration of 2.1 mg/kg. The PCB concentration at Conc-1 exceeded the TSCA Cleanup Level of 1 mg/kg.

The detected PCB levels are consistent with what would be expected given the historical use of the building and property. As previously stated, the lower level of the buliding was inaccessible for

PCB sampling. Despite this limitation, KAS believes the sampling performed is adequate to characterize the extent of PCBs in building materials. KAS focused the sampling on stained areas observed within the building and where previous PCB-containing equipment was stored. Given the PCB results for PCB remediation waste (concrete and wood) are below 50 mg/kg, the remediation can be disposed of at a non-hazardous waste landfill. PCB bulk product waste (paint) is also below the threshold of 50mg/kg; however, sampling of paint can often result in varied results between sampling locations. Regardless, the bulk waste can also be disposed of at a non-hazardous waste landfill. A tabulated summary of the PCB sampling results is included in Appendix G and the laboratory report is provided in Appendix H.

9.0 Updated Conceptual Site Model

9.1 Site Conditions and Property History

Site conditions and property history are detailed in Section 4.0.

9.2 Geology

The soils beneath the Site are mapped as lake sands according to the *Surficial Geologic Map of Vermont*[6]. Subsurface soils encountered during the advancement of soil borings consisted primarily of sands and silts overlying shallow bedrock. Bedrock beneath the Site is mapped as dark-gray to black, carbonaceous to highly graphitic, fine-grained sulfidic biotite-muscovite-quartz phyllite having silicic laminae according to the *Centennial Geologic Map of Vermont*.[7] Bedrock refusal was encountered during the advancement of soil borings at depths ranging from 3 to 10.5 fbg.

9.3 Hydrogeology

Groundwater on the southern portion of the property has been observed at a depth of approximately 5 fbg. Due to an insufficient amount of water level data points due to shallow bedrock refusal, the groundwater flow direction and gradient at the property could not be calculated. Based on the location of nearby surface water and site topography, groundwater flow direction beneath the property likely flows toward the south/southwest.

9.4 Apparent Source of Release

No releases of hazardous materials at the property are known. The property was historically used as a power generating facility from the 1880's to the 1990's with documented use and storage of PCB containing equipment. Elevated levels of PCBs reported in shallow soil, paint, wood and concrete samples at the property is believed to be directly related to the historical use of the Site. Shallow soil sampling across the property did not directly identify urban fill; however, elevated levels of PAHs were reported after laboratory analysis. The historical industrial use of the property and its close proximity to an "urban soil background area" indicates elevated PAHs observed are likely the result of urban fill soils at the property.

No other potential sources on or off site are known to exist or have been identified at this time.

[6] Doll, Charles G., ed., 1970, *Surficial Geologic Map of Vermont*, Vermont Geological Survey
[7] Doll, Charles G., ed., 1961, *Centennial Geologic Map of Vermont*, Vermont Geological Survey

9.5 Contaminant Fate and Transport

PAH and PCB impacts in excess of applicable standards were identified in shallow soils across the property to a depth of 4 fbg. Analytical testing of deeper soil has not been performed; however, overburden deposits are limited by shallow bedrock occurring at depths ranging from 3 to 10.5 fbg. No groundwater impacts have been identified on the southern portion of the Site. Saturated soil conditions were not identified in the borings advanced north of the building or in the close proximity to the former transformer storage areas.

9.6 Sensitive Receptor Risk Assessment

A sensitive receptor risk assessment of the area surrounding the Site is provided below, and a determination of the potential risk to identified receptors has been made based on proximity to the source area(s), groundwater flow direction, contaminant mobility and volatility, and contaminant concentration levels in subsurface soils and/or groundwater. To date, one sensitive receptor (soil beneath the Site) has been identified as being impacted from the subsurface impacts beneath the Site.

No water or sewer services are currently located at the property. According to the Vermont Agency of Natural Resources Atlas mapping tool (http://anrmaps.vermont.gov/websites/anra/), there are nineteen (19) private wells within a ½ mile of the Site with the closest located approximately 360 feet to the east (upgradient). Given the distance/direction to this well and the absence of identifiable groundwater impacts at the property, this well is not believed to be at risk to the subsurface impacts beneath the Site at this time.

The Site is occupied by one building which does contain a partial basement. Elevated levels of PAHs and PCBs have been identified in shallow soils at the Site. The vapor intrusion risk for the building is considered low given PAHs/PCBs are not readily volatile.

The nearest surface water body is the Gihon River, which abuts the property to the west and flows to the south. Given the absence of groundwater impacts identified, the risk to this surface water body is considered low.

There are no known underground utility corridors present at the property.

9.7 Potential Exposure Pathways

Potential exposure pathways to the subsurface impacts identified beneath the Site have been evaluated. Routes of potential exposure to current and future site users include absorption via dermal contact and/or ingestion of soil. Impacted soils have been identified at shallow depths. Potential access to these soils currently and by future site users would be limited in some areas by the existence of paved areas and overgrown thick vegetation making the exposure risk low in some areas. However, no barriers presently exist to prevent access/exposure. Once a final redevelopment/reuse plan is in place, the proposed property use and the identified potential exposure pathways will need to be evaluated to develop a corrective action plan to confirm adequate protection to human health is being accomplished.

10.0 Data Validation

Upon receipt of all laboratory analytical data collected during this Brownfields Phase II ESA, KAS' quality assurance officer (QAO) performed data validation as described in the QAPP. The validation evaluated the usability of the data generated throughout the investigation. The Data Validation Report is included in Appendix M.

All work was completed in accordance with the approved generic QAPP and QAPP Addendum unless as otherwise stated in Section 3.1 and the Data Validation Report included in Appendix M.

QAPP Modifications

Representative samples were collected in an appropriate manner. The scope of work and sampling procedures detailed in the QAPP were not modified based upon field conditions unless as otherwise stated in Section 3.1 and the Data Validation Report included in Appendix M.

Verification of Sampling Procedures & Chain of Custody

As indicated in the data validation report, KAS' QAO determined that sampling appears to have been performed appropriately and is representative of the field conditions encountered. Data should be accepted based on field sampling procedures documented.

Lab QA/QC Findings

It was documented that representative samples were collected in an appropriate manner. The data collected for this investigation were accepted by the QAO with the condition that if definitive results for PCBs in select building material paint and concrete locations is required, additional samples may need to be collected to determine if the compounds are present or not. The Data Validation Report is included in Appendix M.

11.0 Conclusions

KAS has completed a Brownfields Phase II ESA in accordance with KAS' Work Plan dated December 1, 2017 revised January 31, 2018, KAS' Generic QAPP (RFA 12098), KAS' QAPP Addendum dated February 20, 2018 revised March 29, 2018 and followed the guidelines set forth in ASTM Practice E 1903-11 and VTDEC I-Rule. Based on the results of investigative work conducted during this Brownfields Phase II ESA, KAS presents the following conclusions:

1. The building's wastewater plumbing is suspected to discharge directly to the Gihon River. A drain pipe was found to be protruding from the west side of the building. The drain pipe is in close proximity to a bathroom located on the main level of the building;

2. KAS advanced seventeen soil borings at the property. Subsurface soils encountered consisted primarily of sands and silts overlying bedrock. Select PAHs and PCBs were reported in shallow soil above VTDEC residential screening levels. The PCB impacts identified in shallow soils across the property are believed to be related to the historical use of the property as a power-generating facility. Elevated PAH levels are likely related to the historical industrial use of the property and the presence of urban fill. While urban fill was not identified during soil sampling, the site is located in close proximity to a "urban soil

background area" indicating fill soils are likely present. Analysis of shallow soils near a utility pole did not identify the presence of pentachlorophenol impacts. Low level metals were reported in shallow soils but all concentrations were below applicable screening levels;

3. Bedrock refusal was encountered across the property at depths ranging from 3 to 10.5 fbg. Because of the shallow bedrock and an absence of saturated soil conditions, only one monitoring well was installed. KAS installed one monitoring well adjacent to the southeast corner of the building in a presumed downgradient direction of all potential source areas. Groundwater was encountered at a depth of 5 fbg at this location. Select metals were reported in the groundwater; however, all concentrations were below VGES. No VOCs or PCBs were reported in groundwater above laboratory method detection limits; and,

4. Asbestos containing materials and lead-based paint were identified on interior and exterior portions of the former powerhouse structure. Elevated levels of PCBs were reported in paint and wood samples from the powerhouse structure and also from a concrete pad that formerly housed transformers. Total PCBs were reported in select wood, paint and concrete samples above the TSCA cleanup level of 1 mg/kg. The asbestos, lead and PCBs levels identified in building materials and concrete are consistent with what would be expected given the historical age/use of the building and property.

12.0 Recommendations

Based on the investigative work as well as the above-stated conclusions for the property, KAS recommends the following:

- An Evaluation of Corrective Action Alternatives (ECAA) and a Corrective Action Plan (CAP) should be prepared for this property to mitigate and address potential risks posed to human health as a result of the documented impacts;

- Due to the elevated PCB levels identified in soil, building materials and concrete, a Toxic Substances Control Act (TSCA) Self-Implementing Cleanup Plan should be prepared to manage PCB wast. Disposal of bulk product waste and PCB remediation waste can be accomplished at a non-hazardous waste landfill given the PCB remediation waste was reported at a level below 50 mg/kg;

- Due to asbestos containing materials reported on the interior and exterior of the former powerhouse structure, notification must be sent to Region 1 EPA in accordance with 40 CFR Part 61 subpart M and the State of Vermont in accordance with 18 VSA Chapter 26 at least 10 working days prior to the start of any demolition (defined as disturbance of a load bearing structure) or renovation. Per the EPA Region 1 NESHAPS (40 CFR Part 61, paragraph 61.145) a trained on site representative is required to be present during demolition activities to identify any unexpected materials that may be asbestos containing. This event is unlikely but the EPA requires it as a contingency. If found, the discovered material must be presumed ACM and treated accordingly, or tested by a licensed inspector; and,

- Due to lead-based paint reported on the interior and exterior of the former powerhouse structure, employer compliance to VOSHA Lead in Construction standards will be required

for any Village of Johnson or hired construction company's employees for any renovation or other demolition work.

Appendix A

Site Location Map
Site Vicinity Map
Site Vicinity Map (Stormwater Infrastructure)
Site Map
Soil Concentration Map – BaP TEQ
Soil Concentration Map – PCBs
Groundwater Elevation Map
Concrete Concentration Map - PCBs