ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES
The Yellow Barn Site
281 VT Route 15 West
Hardwick, VT 05836

EPA Cooperative Agreement Number: BF-00A00480

VT DEC SMS Site #2019-4834

Prepared for:

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THE YELLOW BARN SITE, 281 VT ROUTE 15 WEST, HARDWICK, VT 05836

Revision	Description	Author		Quality Check		Independent Review	
1	Draft	Nina Bellus, EIT	2/27/20	Kevin Ignaszak, PE	2/27/20	David Allwine, PG	2/28/20

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Prepared by _____

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EXECUTIVE SUMMARY

This report presents an Analysis of Brownfield Cleanup Alternatives (ABCA) for the remediation of potential impacts related to petroleum discharges in a former oil and hazardous material (OHM) storage area and metal-containing septic effluent discharges at the property referred to as the Yellow Barn Site at 281 VT Route 15 West in Hardwick, Vermont (Site). The site location is shown on Figure 1. The Vermont Department of Environmental Conservation has assigned SMS Site #2019-4834 to the Site. Remediation of the Site is expected to be conducted under the Vermont Brownfields Revitalization Fund (BRF). Submittal of this ABCA is a required part of the application for funding from the BRF.

Three remediation alternatives were retained following a preliminary screen of applicable remedial methods and technologies. **Alternative A** is the no action alternative. **Alternative B** includes sampling for polynuclear aromatic hydrocarbon (PAHs) and select heavy metals on-site and, if required based on the analytical results, off-site disposal of impacted soil. **Alternative C** includes sampling for PAHs and select heavy metals on-site and, if required based on the analytical results, reuse of and capping of impacted soil on-site and the implementation of land use restrictions.

Based on the extent of the impacted areas, the contaminants of concern, and the affected media, the recommended remedial approach is **Alternative B**.

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ABBREVIATIONS

ABCA	Analysis of Brownfield Cleanup Alternatives
ARARs	Applicable or Relevant and Appropriate Requirements
BRF	Brownfields Revitalization Fund
HASP	Health and Safety Plan
IC	Institutional Controls
NVDA	Northeastern Vermont Development Association
OPC	Opinion of Probable Cost
PAH	Polynuclear Aromatic Hydrocarbon
RSCO	Remedial Site Cleanup Objective
SCGs	Site Standards, Criteria and Guidelines
SCL	Soil Cleanup Level
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SVOC	Semi-Volatile Organic Compound
TOGS	Technical & Operational Guidance Series
UST	Underground Storage Tank
VOC	Volatile Organic Compound

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1.0 INTRODUCTION AND BACKGROUND

1.1 SITE DESCRIPTION AND HISTORY

The Yellow Barn Site is located at 281 Vermont (VT) Route 15 West (Site) in Hardwick, Vermont. A Site Location Map is included as **Figure 1**. The Site includes one parcel of land (Hardwick Tax Map Parcel 09001-0000) that encompasses approximately 4.7 acres. There are three buildings on-site; the main building referred to as the Yellow Barn, an open storage shed, and a wooden breezeway structure that connects the barn and shed. The most recent Site use was the Greensboro Garage, an auto repair shop that operated for approximately 30 years. Prior use to the auto repair shop appears to have been agricultural.

1.2 PROPOSED FUTURE USE OF SITE

The current Site owner, the Town of Hardwick, Vermont, in cooperation with the Northeastern Vermont Development Association (NVDA) and the Vermont Center for an Agricultural Economy, plans to redevelop the Site as the Yellow Barn Business Accelerator Project that includes renovation of the existing Yellow Barn (or barn) with one first-floor commercial tenant space and the construction of a new Accelerator Building on the Site, located west of the barn. The Accelerator Building will include additional tenant spaces anchored by The Cellars at Jasper Hill, a cheese aging and distribution operation.

1.3 PURPOSE AND CONTENT OF REPORT

This report presents an evaluation of alternatives for the remediation of the Yellow Barn Site, as shown on Figure 1. The Vermont Department of Environmental Conservation (VTDEC) assigned SMS Site #2019-4834 to the Site. The project objective is to remediate the Site to the degree required to obtain a Site Management Activities Complete (SMAC) designation from the VTDEC Brownfields Program once all work has been performed.

Stantec developed three remedial alternatives for consideration: 1) **Alternative A** is the no action alternative; 2) **Alternative B** includes sampling for polynuclear aromatic hydrocarbon (PAHs) and select heavy metals on-site and, if required based on the analytical results, off-site disposal of impacted soil; and 3) **Alternative C** includes sampling for PAHs and select heavy metals on-site and, if required based on the analytical results, reuse and capping of impacted soil on-site and the implementation of land use restrictions. Based on the extent of the impacted areas, the contaminants of concerns, and the affected media, the recommended remedial approach is **Alternative B**.

The proposed remedial action includes the following:

- Shallow soil samples will be collected from the former OHM storage area and analyzed for PAHs using EPA Method 8270 SIM to obtain laboratory reporting limits below Vermont standards;
- As part of the removal of the site septic system during the initial phases of site redevelopment, septic soil samples will be collected from effluent discharge points for analysis of arsenic, cadmium, and lead to evaluate soil quality in the vicinity of the septic system;

- If samples indicate exceedances for PAHs and/or metals, impacted soil will be excavated, stockpiled on-site, and characterized for disposal at an off-site facility licensed to accept the soil; and

- Preparation of Corrective Action Construction Completion Report.

The analysis of remedial alternatives includes a summary of previous environmental investigations at the Site, an examination of potential exposure scenarios, applicable relevant and appropriate regulations (ARARs) that will be used as remedial site cleanup objectives (RSCOs), a discussion of the evaluated remedial alternatives and a recommended remedial alternative.

2.0 ENVIRONMENTAL BACKGROUND

Environmental studies that have been completed for the Yellow Barn Site and/or the surrounding area and reviewed for preparation of this ABCA include:

- Phase I Environmental Site Assessment (ESA), Ross Environmental Associates (REA), September 2017;
- Septic Tank and Soil Sampling & Analysis Report, REA, January 2018;
- Phase I ESA, LE Environmental (LEE), September 2018; and
- Limited Phase II ESA, Stantec, 2019.

2.1 ROSS ENVIRONMENTAL ASSOCIATES AND LE ENVIRONMENTAL PHASE I AND PHASE II REPORTS, 2017 AND 2018

Potential environmental concerns at the Site were evaluated as part of several site investigations conducted in 2017 and 2018. REA conducted a Phase I ESA in 2017 and documented their results in a Phase I ESA report dated September 22, 2017 (REA, 2017). Based on their Phase I ESA findings, REA identified several potential possibilities of a release of OHM based on the historical use of the Site as an automotive garage, for auto body and heavy equipment maintenance and repair, and due to the presence of a floor drain and slop sink in the barn building, which were identified as recognized environmental conditions (RECs). REA recommended the collection and laboratory analysis of samples from the outfall of the floor drain, soil samples from exploratory test pits, and an effluent sample from the former septic tank to further evaluate these issues. The recommended work was subsequently conducted and documented in REA's letter report titled Septic Tank and Soil Sampling & Analysis dated January 9, 2018 (REA, 2018).

Based on their follow-up sampling, REA concluded that no Vermont action levels or standards were exceeded for the septic tank effluent or soil samples collected during their assessment. The concentrations of arsenic, cadmium and lead detected in the septic tank sample did exceed the Vermont Groundwater Enforcement Standards (VGES) for these three metals; however, the standards don't apply specifically to septic tank effluent. The absence of volatile organic compounds (VOCs) and polychlorinated biphenyls (PCBs) in the septic tank sample suggested the former septic system was not a significant threat to the subsurface environment. Based on these sample results and field observations, REA recommended no further work be completed. It should be noted that the Vermont Department of Environmental Conservation (VTDEC) did not have an opportunity to review the Phase I ESA recommendations or proposed subsurface

work as presented by REA prior to its implementation. Based on their post-completion review of the work, significant portions of the work as described in their report did not satisfy the VTDEC regulatory requirements in place at the time it was conducted.

Both REA reports were evaluated during LEE's 2018 Phase I ESA of the Property and were appended and discussed in LEE's Phase I ESA Report and Tier 1 Vapor Encroachment Screening Report dated September 28, 2018 (LEE, 2018). RECs identified by LEE, are discussed below.

- Possible subsurface contamination in the leach field area due to discharges from the septic tank that accepted, in addition to sanitary wastes, effluent from a former shop sink in the Yellow Barn;
- Possible subsurface contamination from petroleum, solvents, and polycyclic aromatic hydrocarbons (PAHs) due to historical Property use (auto repair/maintenance) and nearby off-site uses (south-abutting former rail bed); and
- Potential soil gas contamination on the Property due to historic Property use for auto repairs/maintenance and from the northeasterly-adjoining Lamoille Valley Ford property.

LEE's Phase I ESA recommended the completion of a supplemental Phase II ESA and a Tier II Vapor Encroachment Study (VES) to determine if contamination is present due to the identified RECs and the vapor encroachment concern, and to obtain additional data that can be considered as part of the proposed Property redevelopment process.

2.2 STANTEC LIMITED PHASE II ESA, 2019

Following review of the available REA and LEE information, Stantec identified a number of data gaps in connection with the Site. Identified data gaps included the following:

- whether the identified discharges to the Site septic tank resulted in soil or groundwater impacts in the Site's leach field area from VOCs, petroleum, or metals;
- whether the surficial releases of OHM identified in the former Yellow Barn auto repair area and in the OHM storage area in the shed building resulted in soil or groundwater impacts at the Site from VOCs, petroleum, or metals;
- whether the presence of the south-abutting railroad right-of-way resulted in impacts to soil or groundwater quality at the Site from VOCs, petroleum, metals, pesticides, or herbicides; and
- whether the former use of the Site for auto repair/maintenance and the proximity of the northeasterly adjoining Lamoille Valley Ford property resulted in soil vapor intrusion into the Yellow Barn building.

Resolutions to the identified data gaps were presented in Stantec's Limited Phase II Report. Findings showed soil and groundwater testing in the area of the leach field (SB-1/TW-1 to SB-4/TW-4), and soil and groundwater testing at SB-5/TW-5 to SB-8/TW-8 did not indicate exceedances for VOCs, petroleum-derived contaminants, or metals. Soil and groundwater testing at the SB-1/TW-1, SB-2/TW-2, and SB-8/TW-8 locations did not indicate exceedances for VOCs, metals, pesticides, and herbicides. Although arsenic was detected in soil samples in these areas, the concentrations did not exceed Vermont background levels for the metal and so this contaminant was not considered to be a Site-related contaminant of concern. Soil

vapor testing at the SG-1 and SG-2 locations did not indicate exceedances for VOCs at these locations, suggesting a lack of the potential for vapor intrusion into the Yellow Barn building.

Although the detected PAH concentrations in the SS-1 and SS-2 shallow soil samples collected in the former oil and hazardous material (OHM) storage area during Stantec's Phase II investigation did not exceed Vermont Screening Levels (VSLs), the elevated laboratory reporting limits for these samples were above associated VSLs. Also, although Stantec's Phase II subsurface investigation of the perimeter of the leach field area did not indicate impacts to soil or groundwater above VGES from this potential contaminant source, previous REA sampling data indicated the presence of elevated levels of arsenic, cadmium, and lead in a septic effluent sample from the septic tank located in the western portion of the Site. This suggests that heavy metal contamination may be present in soil adjacent to the septic tank. Therefore, as a result of the elevated laboratory reporting limits for PAH analysis of the SS-1/SS-2 samples in the OHM storage area, and the potential for the presence of heavy metal impacts in the septic tank/leach field area, additional investigation, and possible remediation, is warranted, which is described in more detail below.

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3.0 APPLICABLE REGULATIONS AND CLEANUP STANDARDS

3.1 EXPOSURE PATHWAYS

Considering that remedial excavation and residential redevelopment activities are anticipated at the Site, the construction worker/trespasser and local resident have been identified as the most appropriate potential human receptors.

Exposures to the construction worker may occur during remediation, construction and other activities that involve excavation at the Site or at its periphery.

Exposure to construction workers could potentially occur during excavation work at the Site through dispersion of particulates. Potential routes of exposure include:

- Inhalation, ingestion and dermal contact of substances in subsurface soils (potential future occupational worker and construction worker/trespasser)

Potential exposure during the remedial work will be managed with a Health and Safety Plan (HASP) prepared in accordance with Occupational Safety and Health Administration (OSHA) Code of Federal Regulations (CFR) 1910.120, which is designed to protect Site workers and the public. A perimeter fence will be in place during remedial work to prevent the public from accessing the Site to mitigate that potential exposure pathway.

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4.0 BROWNFIELD CLEANUP ALTERNATIVES FOR THE SITE

Three brownfield cleanup alternatives were chosen and evaluated for this analysis. The selected alternatives include:

- **Alternative A:** No Action.
- **Alternative B:** Soil sampling for PAHs and select heavy metals with off-site disposal of impacted soil, if required based on the sampling results.
- **Alternative C:** Soil sampling for PAHs and select heavy metals with reuse and capping of impacted soil on-site and the implementation of land use restrictions, if required based on the sampling results.

4.1 ALTERNATIVE A: NO ACTION

The no action alternative does not involve proactive remedial measures. Potentially impacted soils will remain on-Site and will not be remediated.

4.2 ALTERNATIVE B: SOIL SAMPLING FOR PAHS AND SELECT HEAVY METALS WITH OFF-SITE DISPOSAL OF IMPACTED SOIL

This alternative includes sampling shallow soils in the former OHM storage area in the shed for PAHs using EPA Method 8270 SIM. If the soils demonstrate impacts above Vermont Soil Standards (VSS), they will be excavated and stockpiled on-site for subsequent disposal characterization.

As part of the removal of the site septic system during the initial phases of site redevelopment, soil samples will also be collected from septic effluent discharge points for analysis of arsenic, cadmium, and lead to evaluate soil quality in the vicinity of the septic system. If samples indicate VSS exceedances for metals, impacted soil will be excavated, and stockpiled on-site for subsequent disposal characterization. Additional characterization samples will be collected from the stockpiled soil and analyzed per the requirements of the chosen disposal facility. The facility will be certified to accept non-hazardous soils. It is estimated that approximately 75 cubic yards (CY) of soil will require off-site disposal.

For soils that are non-impacted (“clean”), the soil will still need to be removed due to poor geotechnical properties or to achieve desired grades. Clean fill will be imported into these areas for backfill, as required. Non-impacted excavated soils will be sampled in accordance with the Town’s chosen disposal location: either a Town-owned sand and gravel pit property or a VTDEC-permitted disposal facility such as Coventry Landfill. If the soil is disposed of at a Town-owned gravel pit property, sampling of the soil will be completed to confirm that the soil contains no contaminants at elevated levels that could potentially impact the disposal site. Sampling of the disposal site itself (soil, groundwater) may also be completed to confirm that the soil storage location is not contaminated prior to the soil’s placement there. If the soil is disposed of at a local non-hazardous landfill, the soil will be characterized per the requirements of the landfill. The sampling

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results will be used to create a soil profile for submittal to the landfill for their review and acceptance. No long-term environmental monitoring will be required for the Site.

4.3 ALTERNATIVE C: SOIL SAMPLING FOR PAHS AND SELECT HEAVY METALSWITH REUSE AND CAPPING OF IMPACTED SOIL ON-SITE AND IMPLEMENTATION OF LAND USE RESTRICTIONS

This alternative addresses the VTDEC's concerns regarding possible soil impacts in the former OHM storage area and septic/leach field area by implementing a soil sampling program and managing any contaminated soil on-site with an institutional controls (IC) that includes capping and implementation of land use restrictions. Pending the analytical results of the soil sampling program described in Alternative B, any impacted material will be excavated and stockpiled on-site, separately from any clean material It is estimated that approximated 75 CY of material will be identified as contaminated and require excavation and managing.

For this option, the excavated, non-hazardous soil will be used as additional fill material on-Site. Once placed, the contaminated material shall be overlain with a demarcation barrier and capped with either 6 inches of impermeable surface or covered with at least 18 inches of clean fill, per § 35-803(a)(4) of the VTDEC Investigation and Remediation of Contaminated Properties Rule (IRULE).The impacted soil stockpile location is proposed to be on the eastern part of the Site in the asphalt-paved area next to the existing Yellow Barn building. The permanent soil placement location would be under the asphalt-paved driveway proposed for installation in this area of the Site.

Following the completion of site redevelopment, a VTDEC-approved institutional control plan and soil management plan will be employed to evaluate and maintain the integrity of the cap and provide a guideline for managing impacted soils that are encountered during future site operations. Land use restrictions will also be developed and recorded as required by the IRule.

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5.0 EVALUATION OF CLEANUP ALTERNATIVES

Potential cleanup alternatives were evaluated based on the following criteria: effectiveness, implementation feasibility, preliminary opinions of probable cost, general reasonableness, and the potential for extreme weather events to adversely impact proposed cleanup remedies.

5.1 ALTERNATIVE A: NO ACTION

Effectiveness - The No Action Alternative is not effective because it does nothing to address possible subsurface contamination in the former OHM storage area or leach field area or due to historical site use.

Implementation Feasibility - This alternative is easily implemented.

Preliminary Opinion of Probable Cost – There is no preliminary opinion of probable cost for this alternative (Refer to Table 1).

General Reasonableness – This alternative provides no management of the Site's impacted soil and effectively prohibits Site development. As a result, this is not a reasonable cleanup option.

Potential Adverse Impacts Caused by Extreme Weather Events – Portions of the Site are in areas identified as a wetland and/or are within the flood limit. The May 2013 Vermont Agency of Natural Resource's Climate Change Adaptation Framework identified increases in temperatures and precipitation as potential climate change impacts to Vermont. It is believed that none of these factors will affect this alternative.

5.2 ALTERNATIVE B: SOIL SAMPLING FOR PAHS AND SELECT HEAVY METALS WITH OFF-SITE DISPOSAL OF IMPACTED SOIL, IF NECESSARY

Effectiveness – Excavation and off-Site disposal is highly effective as it removes the contaminated material and utilizes an approved off-Site disposal facility for final disposition.

Implementation Feasibility – Implementation of this alternative is feasible. Based on the soil sample analytical results, it may be necessary to find suitable off-Site disposal facilities, but potential disposal facilities are located in Vermont (for example Coventry Landfill).

Preliminary Opinion of Probable Cost – The preliminary opinion of probable cost for this alternative has been estimated to be $18,840 if no contaminated soil is identified and $45,648 if contaminated soil is identified and off-site soil disposal is required (Refer to B1 and B2 in Table 1).

General Reasonableness – This alternative provides an immediate and permanent solution to potential soil contamination in the former OHM storage area and septic/leach field area. Since the contaminated soil will be excavated and disposed off-Site, there is no need for any long-term commitments to maintain any engineering barriers or ICs. Since the proposed use of the Site is, in part, for food-related businesses, removal of impacted soils may be viewed as the preferred option than managing the soil on-site.

Potential Adverse Impacts Caused by Extreme Weather Events – Portions of the Site are in areas identified as a wetland and/or are within the flood limit. The May 2013 Vermont Agency of Natural Resource's Climate Change Adaptation Framework identified increases in temperatures and precipitation as potential climate change impacts to Vermont. It is believed that none of these factors will affect this alternative.

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5.3 ALTERNATIVE C: SOIL SAMPLING FOR PAHS AND SELECT HEAVY METALS WITH REUSE AND CAPPING OF IMPACTED SOIL ON-SITE AND IMPLEMENTATION OF LAND USE RESTRICTIONS

Effectiveness – This alternative is an effective way to limit exposure and manage any potentially contaminated soil after the completion of Site redevelopment. A permanent IC (land restrictions) would need to be recorded in order to maintain the integrity of the engineered barriers and eliminate any direct contact of the contaminated material with the public. As the asphalt pavement cap degrades over time, it will need to be maintained and may eventually need to be replaced in order to maintain the requirements of the IC.

Implementation Feasibility – This alternative will be moderately difficult to implement due to the additional planning and coordination with redevelopment activities to limit the exposure of contaminated material to other non-contaminated material. In addition, the reused contaminated soil will require capping with either a 6" impermeable cap or covered with 18" of clean soil material. At this time, capping under the proposed asphalt driveway is proposed.

Preliminary Opinion of Probable Cost – The preliminary opinion of probable cost for this alternative has been estimated to be $18,840 if no contaminated soil is identified and $42,960 if contaminated soil is identified and ICs are implemented (Refer to C1 and C2 in Table 1).

General Reasonableness – This alternative provides good short-term management of the Site's potential contamination and Site redevelopment. However, it requires additional coordination during the Site redevelopment and long-term commitment to maintain the engineered barriers.

Potential Adverse Impacts Caused by Extreme Weather Events – Portions of the Site are in areas identified as a wetland and/or are within the flood limit. The May 2013 Vermont Agency of Natural Resource's Climate Change Adaptation Framework identified increases in temperatures and precipitation as potential climate change impacts to Vermont. Depending on where the contaminated soil is placed on-Site, these conditions may cause the cap to degrade more readily over time.

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6.0 RECOMMENDED CLEANUP ALTERNATIVE

The recommended cleanup alternative for the Site is Alternative B – Soil Sampling for PAHs and Select Heavy Metals with Off-Site Disposal of Impacted Soil, if Necessary. The disposal of impacted soil off-site provides a permanent solution that does not require any long-term environmental monitoring or secondary remediation. Also, since the proposed use of the Site is, in part, for food-related businesses, removal of impacted soils may be viewed as the preferred option than managing the soil on-site.

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7.0 REFERENCES

LE Environmental, 2018. Phase I Environmental Site Assessment Report/Tier 1 Vapor Encroachment Screening Report, Yellow Barn Business Accelerator Project, 281 Vermont Route 15 West, Hardwick, Vermont. September 28.

Ross Environmental Associates, Inc., 2017. Phase I Environmental Site Assessment Report, 281 VT Route 15, Hardwick, Vermont 05843. September 22.

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VTDEC. 2019. Investigation and Remediation of Contaminated Properties Rule. Amended July 6, 2019.

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APPENDIX A: TABLES

TABLE 1 – OPINION OF PROBABLE COSTS FOR REMEDIATION

Alternative	Associated Tasks	Est. Cost/Task	Total Cost
A	None	$0	$0
B1*	Meeting/Coordination with Contractor	$300	$18,840
	Site-specific Health and Safety Plan	$1,000	
	Project Management	$1,000	
	Soil Sampling	$3,000	
	Equipment and Field/Travel Related Expenses	$400	
	Sample Analysis	$2,000	
	Corrective Action Construction Completion Report Preparation	$5,000	
	QA/QC Review	$1,000	
	Report Revisions	$2,000	
	20% Contingency	$3,140	
B2	B1 Costs	$18,840	$45,648
	Contractor Mob/Demob	$1,500	
	Contractor Soil Excavation and Stockpiling	$3,800	
	Contractor Soil Loading, Transportation and Disposal at VT-permitted Facility	$9,040	
	Consultant Oversight of Soil Excavation, Stockpiling, Characterization, and Loading	$3,000	
	Stockpiled Soil Characterization Laboratory Analysis per Disposal Facility	$1,000	
	Confirmatory Soil Sample Analysis following Impacted Soil Excavation	$1,000	
	Project Management including interaction with Disposal Facility, Regulators, Client	$1,000	
	Reporting	$2,000	
	20% Contingency	$4,468	
C1*	Meeting/Coordination with Contractor	$300	$18,840
	Site-specific Health and Safety Plan	$1,000	
	Project Management	$1,000	
	Soil Sampling	$3,000	
	Equipment and Field/Travel Related Expenses	$400	
	Sample Analysis	$2,000	
	Corrective Action Construction Completion Report Preparation	$5,000	
	QA/QC Review	$1,000	
	Report Revisions	$2,000	
	20% Contingency	$3,140	
C2	C1 Costs	$18,840	$42,960
	Contractor Mob/Demob	$1,500	
	Contractor Soil Excavation, Stockpiling, and Placement of Soil Cap	$7,600	
	Consultant Oversight of Soil Excavation, Stockpiling, Placement	$3,000	
	Project Management including interaction with Disposal Facility, Regulators, Client	$1,000	
	O&M related costs	$5,000	
	Reporting	$2,000	
	20% Contingency	$4,020	

*Assumptions for B1 and C1: Includes project kickoff meeting, 10 hours field time on-site, 1 hour project management, and 120 miles roundtrip mileage per day. Septic system sampling will include 10 locations for analysis of arsenic, cadmium, and lead, plus 1 duplicate QA/QC sample. SS-1/SS-2 sampling will include two locations for PAHs by EPA Method 8270 SIM, plus 1 duplicate QA/QC sample on 5-day turnaround from laboratory. Contractor costs for septic system excavation and removal not included in OPC as this is a task included in the site redevelopment plan and is not solely required for soil sample collection as part of the OPC.

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APPENDIX B: FIGURES

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FIGURE 1 – SITE LOCATION MAP

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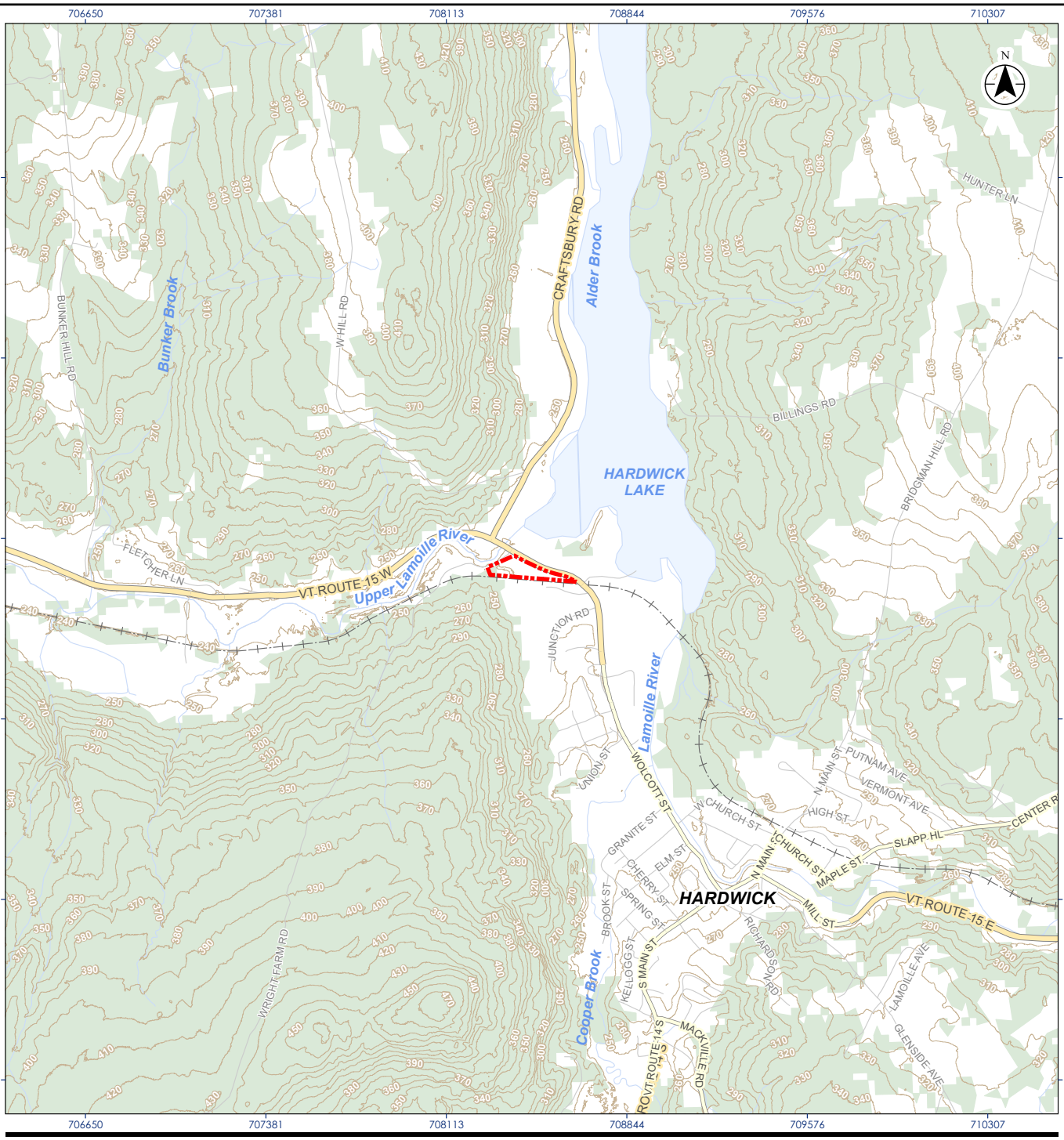

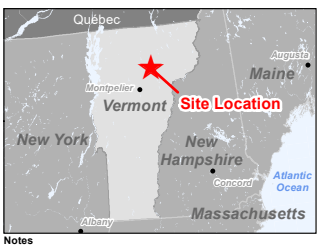

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced by Vermont Open Geodata Portal, http://geodata.vermont.gov/pages/imagery. Accessed April 21, 2019.
3. This figure is to be viewed in the context of the accompanying report and is subject to the limitations specified in that report.

Legend

- Approximate Site Boundary
- Expressway / Highway
- Major Road
- Minor Road
- Former Railway
- Topographic Contour (ft)
- Watercourse
- Waterbody
- Wooded Area

0 1,000 2,000 Feet

1:24,000 (at original document size of 8.5x11)

Stantec

Project Location
281 VT Route 15 West
Hardwick, Vermont

1857501001 REVA
Prepared by NKB on 2/27/2020

Client/Project
Northeastern Vermont Development Association
Analysis of Brownfield Cleanup Alternatives (ABCA)
Yellow Barn Site, Hardwick, Vermont

Figure No.
1

Title
Site Location Map

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FIGURE 2 – VICINITY MAP

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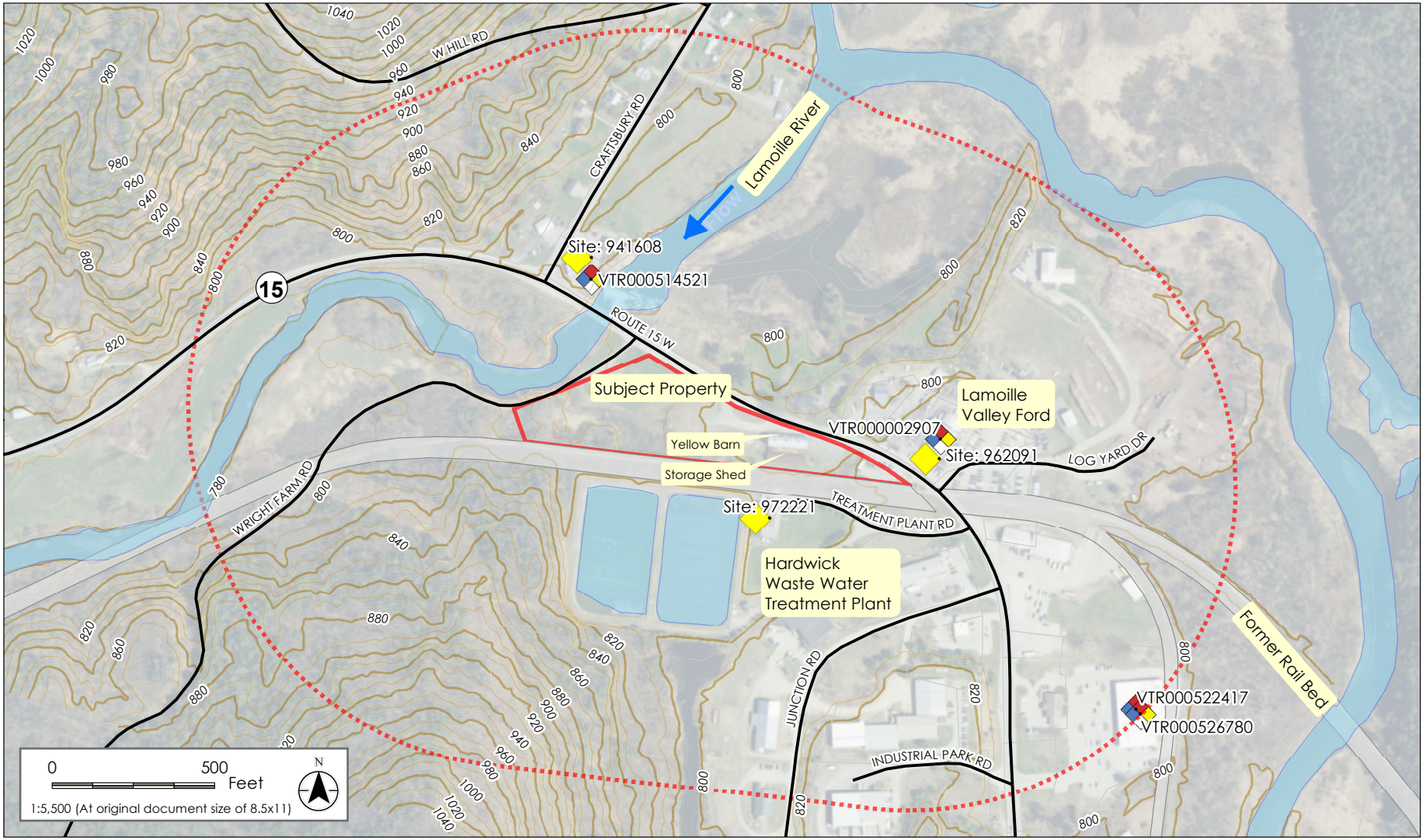
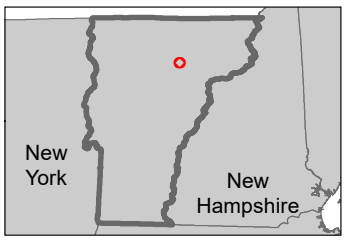




Hazardous Waste Site

Hazardous Waste Generators

Former Rail Bed

Subject Parcel

1000' Buffer

Parcel Boundary Contour
Interval = 2ft.

Service Layer Credits: Vermont Agency of Natural Resources online Natural Resource Atlas, Waste Management Theme. Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
VTANRGIS

Stantec

Project Location
281 VT Route 15 West
Hardwick, Vermont

1857501001 REVA
Prepared by NKB on 2/27/2020

Client/Project
Northeastern Vermont Development Association
Analysis of Brownfield Cleanup Alternatives (ABCA)
Yellow Barn Site, Hardwick, Vermont

Figure No.
2

Title
Vicinity Map

V:\1857\Active\1857501001_Vermont\gis_cad\gis\mxds\Remediation\PhiEA\Yellow&amtlle_Hardwick_Vermont\1857501001_Rem_PhiEA_Fig02_VicinityMap.mxd Revised: 2019-04-22 By: svandomme

FIGURE 3 – SUMMARY OF SOIL ANALYTICAL RESULTS

DRAFT

708448 708479 708509 708539 708570

4932527 4932497

SB-5	
	15.0 - 17.0 ft 03/25/2019
Arsenic	11.8

N

SB-4	
	10.0 - 15.0 ft 03/26/2019
Arsenic	2.66 / 2.81

SB-4/TW-4

VT ROUTE 15 W

SB-5/TW-5

SB-3/TW-3

Reported Area of Leach Field

SG-1

Yellow Barn

SG-2

SB-6	
	5.0 - 9.0 ft 03/26/2019
Arsenic	12.4

Trailer

SB-3	
	8.0 - 11.0 ft 03/26/2019
Arsenic	12.4

SB-2/TW-2

SB-6

SB-1/TW-1

SS-2

Septic Tank

Storage Shed

SS-1

SB-7

SB-7A

SB-7A	
	5.0 - 7.0 ft 03/26/2019
Arsenic	12.4

SB-8/TW-8

SB-2		
	0.5 - 1.5 ft 03/26/2019	10 - 14.0 ft 03/26/2019
Arsenic	10.1	6.60

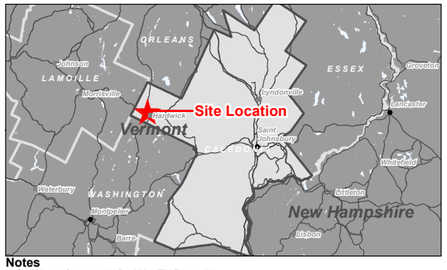
SB-1		
	0.5 - 1.5 ft 03/25/2019	8.0 - 11.0 ft 03/25/2019
Arsenic	12.6	12.7

Former Rail Bed

SS-1		
	0.5 - 1.5 ft 03/29/2019	3.0 - 3.5 ft 03/29/2019
Arsenic	6.61	8.28

SS-2		
	0.5 - 1.5 ft 03/29/2019	3.0 - 3.6 ft 03/29/2019
Arsenic	5.58	5.77

SB-8		
	0.5 - 1.5 ft 03/25/2019	10.0 - 14.0 ft 03/25/2019
Arsenic	7.64	11.1



Legend

- Soil Boring
- Soil Boring/Temporary Well
- Soil Boring/Temporary Well with Shallow Soil Sample
- Soil Gas Point
- Surfical Soil Sample
- Septic Tank
- Detected Soil Concentrations Exceed EPA Regional Screening Levels - Industrial
- Approximate Site Boundary
- Reported Area of Leach Field
- Waste Oil AST
- Parcel Boundary
- Concentration Exceeds EPA RSL Industrial Soil

Location ID | Sample Depth (feet)/ Sample Date

SB-4	
	10.0 - 15.0 ft 03/26/2019
Arsenic	2.66 / 2.81

Parameter | Concentration Exceeds Guidelines | Original/Field Duplicate

0 20 40 Feet

1:400 (At original document size of 11x17)

		USEPA RSL	
Parameter	Units	Residential	Industrial
Arsenic	mg/kg	0.68	3.0

Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced by Vermont Open Geodata Portal, http://geodata.vermont.gov/pages/imagery. Accessed April 21, 2019.
3. This figure is to be viewed in the context of the accompanying report and is subject to the limitations specified in that report.
4. Orthoimagery © Vermont Open Geodata Portal, 2019. Imagery Date, 2018.
5. USEPA RSL - United States Environmental Protection Agency Regional Screening Levels (RSLs).
6. VSL - Vermont Screening Levels, Investigation and Remediation of Contaminated Properties Rule, July 27, 2018 (Appendix A - Soil Screening Levels).

Stantec

Project Location
281 VT Route 15 West
Hardwick, Vermont

1857501001 REVA
Prepared by NKB on 2/27/2020

Client/Project
Northeastern Vermont Development Association Analysis of Brownfield Cleanup Alternatives (ABCA)
Yellow Barn Site, Hardwick, Vermont

Figure No.
3

Title
Summary of Soil Analytical Results

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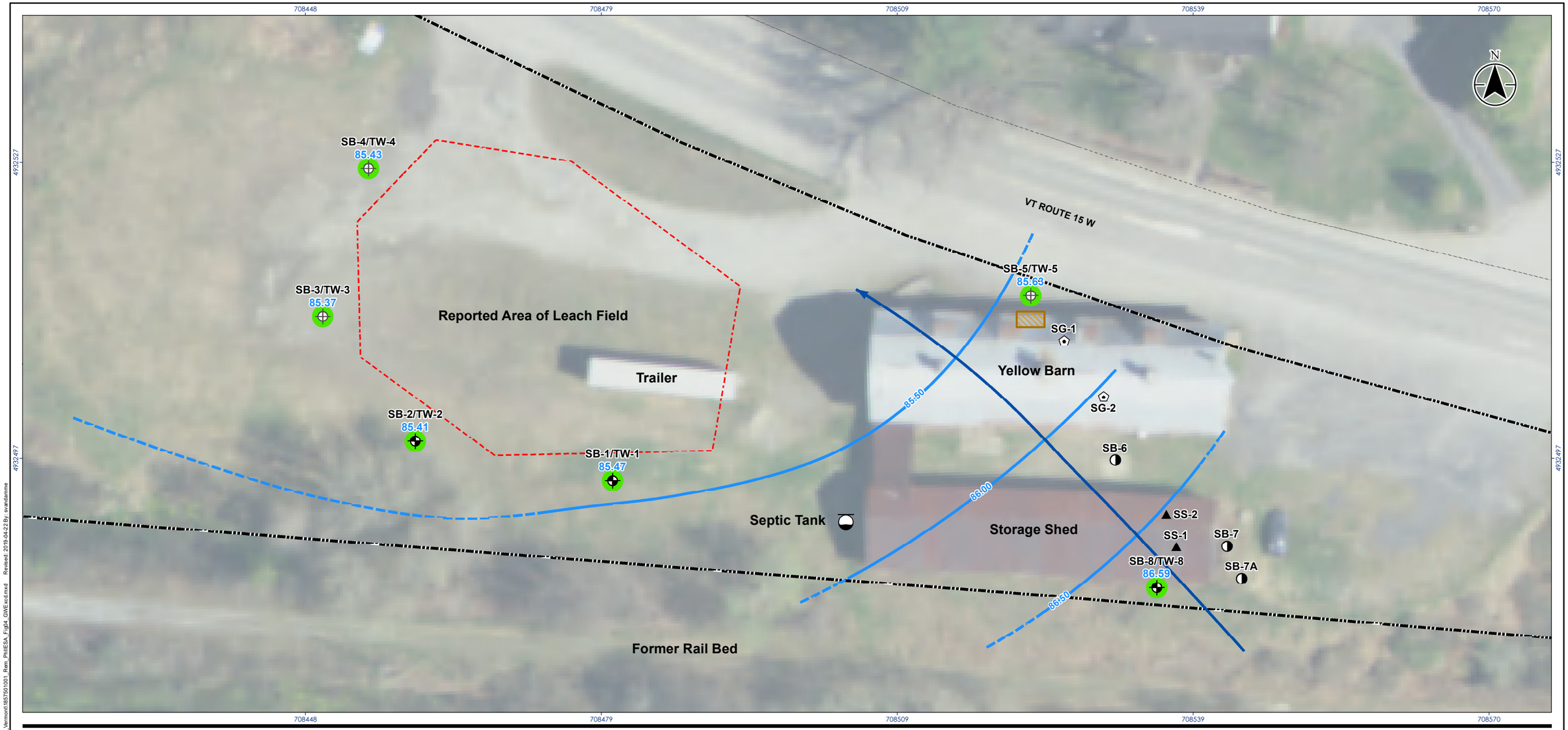
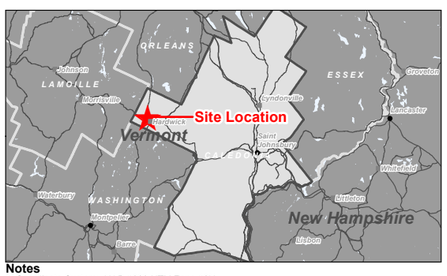
FIGURE 4 – SUMMARY OF GROUNDWATER RESULTS

DRAFT





Legend

- Soil Boring
- Soil Boring/Temporary Well
- Soil Boring/Temporary Well with Shallow Soil Sample
- Soil Gas Point
- Surfical Soil Sample
- Septic Tank
- Detected Groundwater Concentrations below Vermont Groundwater Quality Standards
- 87.54 Groundwater Elevation (ft) on 4/18/2019
- Groundwater Contour
- Inferred Groundwater Contour
- Inferred Direction of Groundwater Flow
- Approximate Site Boundary
- Reported Area of Leach Field
- Waste Oil AST
- Parcel Boundary

0 20 40 Feet

1:400 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced by Vermont Open Geodata Portal, http://geodata.vermont.gov/pages/imagery. Accessed April 21, 2019.
3. This figure is to be viewed in the context of the accompanying report and is subject to the limitations specified in that report.
4. Orthoimagery © Vermont Open Geodata Portal, 2019. Imagery Date, 2018.
5. VSL - Vermont Groundwater Quality Standards, Chapter 12 of the Environmental Protection Rules: Groundwater Protection Rule, dated July 11, 2018, Appendix One, Table 1 (Primary Groundwater Quality Standards).

Stantec

Project Location
281 VT Route 15 West
Hardwick, Vermont

1857501001 REVA
Prepared by NKB on 2/27/2020

Client/Project
Northeastern Vermont Development Association
Analysis of Brownfield Cleanup Alternatives (ABCA)
Yellow Barn Site, Hardwick, Vermont

Figure No.
4

Title
Summary of Groundwater Analytical Results and Inferred Direction of Groundwater Flow

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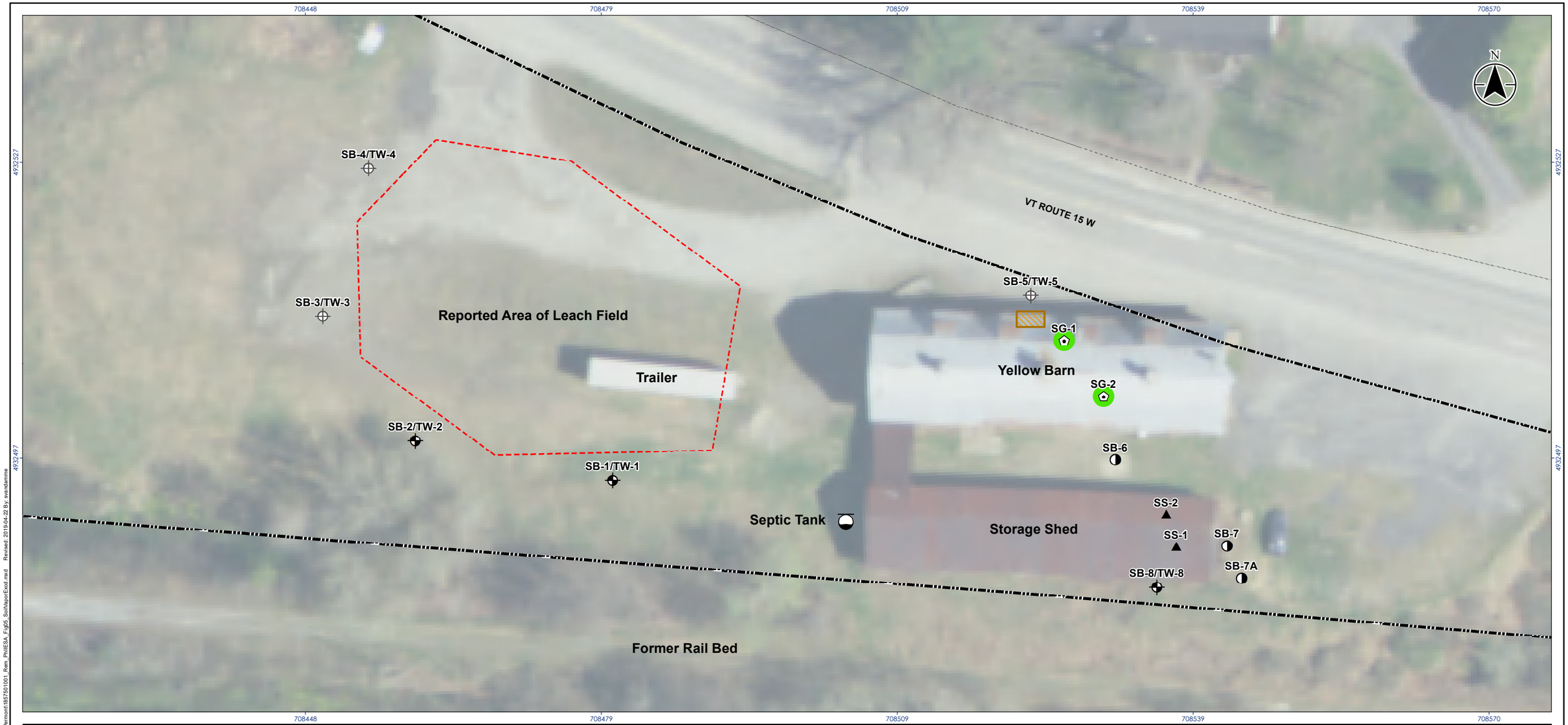
FIGURE 5 – SUMMARY OF SOIL VAPOR ANALYTICAL RESULTS

DRAFT



Legend

- Soil Boring
- Soil Boring/Temporary Well
- Soil Boring/Temporary Well with Shallow Soil Sample
- Soil Gas Point
- Surfical Soil Sample
- Septic Tank
- Sub-slab Soil Vapor Concentrations did not exceed Vapor Intrusion Screening Values
- Approximate Site Boundary
- Reported Area of Leach Field
- Waste Oil AST
- Parcel Boundary

0 20 40 Feet

1:400 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced by Vermont Open Geodata Portal, http://geodata.vermont.gov/pages/imagery. Accessed April 21, 2019.
3. This figure is to be viewed in the context of the accompanying report and is subject to the limitations specified in that report.
4. Orthoimagery © Vermont Open Geodata Portal, 2019. Imagery Date, 2018.
5. VSL - Vapor Intrusion Screen Values - Sub-Slab Soil Gas - Residential, Invetigation and Remediation of Contaminated Properties Rule, July 27, 2017 (Appendix A - Vapor Intrusion Values).

Stantec

Project Location
281 VT Route 15 West
Hardwick, Vermont

1857501001 REVA
Prepared by NKB on 2/27/2020

Client/Project
Northeastern Vermont Development Association
Analysis of Brownfield Cleanup Alternatives (ABCA)
Yellow Barn Site, Hardwick, Vermont

Figure No.
5

Title
Summary of Soil Vapor Analytical Results

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