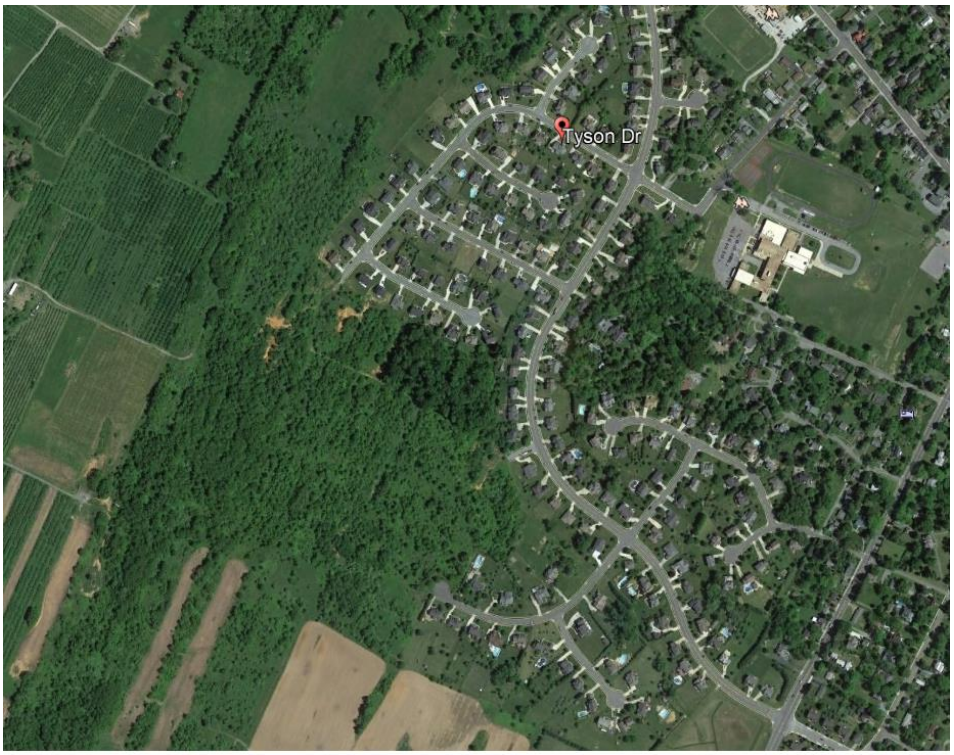
VOLUNTARY REMEDIATION PROGRAM #VRP00762

SITE CHARACTERIZATION, RISK ASSESSMENT SUMMARY & REMEDIAL ACTION PLAN

Hermitage Village Phase V
Tax Parcel 14-A-11A and 14A4-A-23
Tyson Drive
Berryville, Virginia 22611



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April 13, 2020

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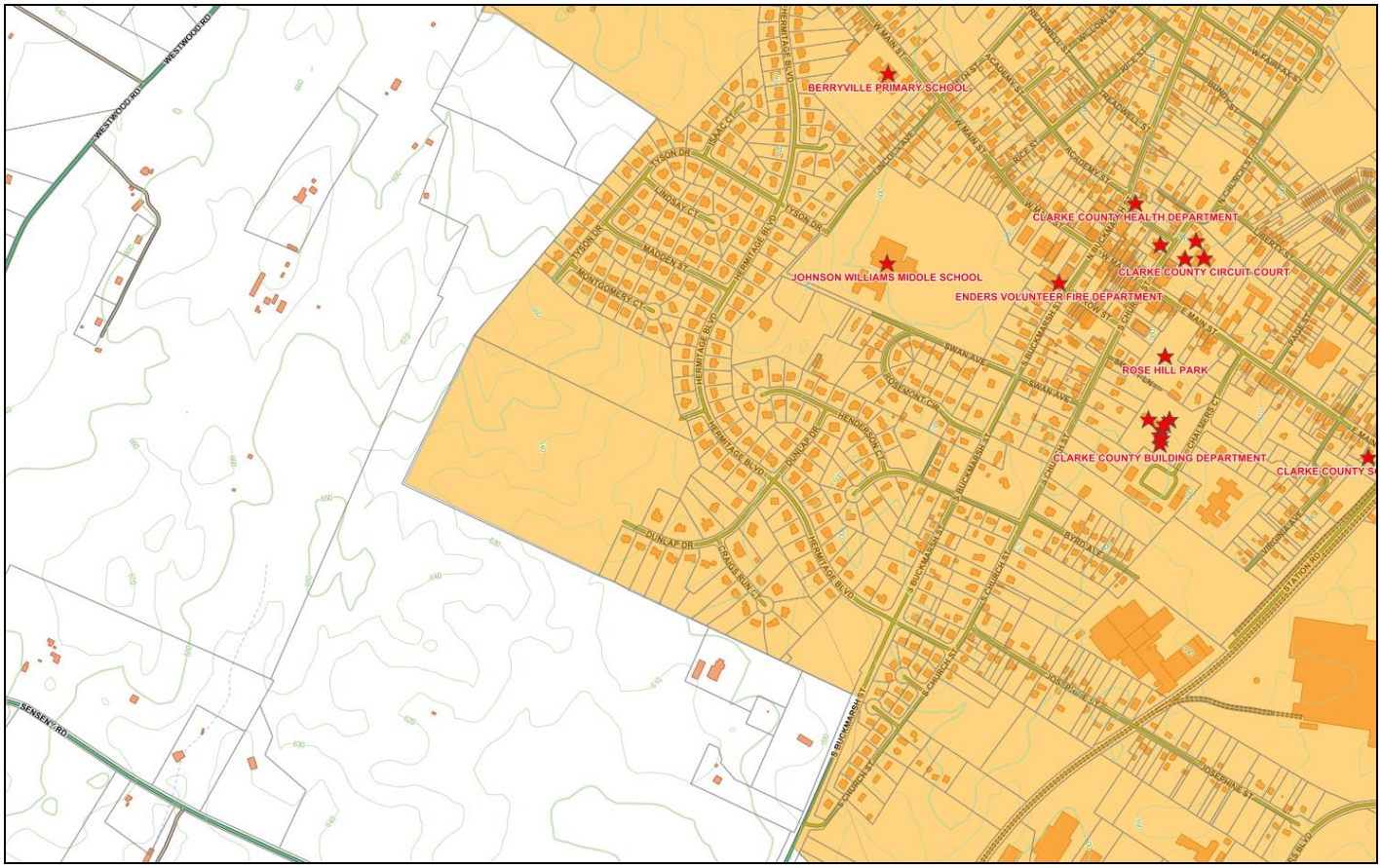
1.0 INTRODUCTION / BACKGROUND

Rezin Inc. (RI), on behalf of James Richard Wilkins III, Manager, (rwilkins@wilkinsco.com), 540-662-7215, Hermitage LLC, 13 S. Loudoun Street, Winchester, Virginia 22601, has prepared this Site Characterization and Risk Assessment Summary Report (Report) for the proposed Hermitage Phase V (Hermitage) residential community development located at Hermitage Village Phase V, Tax Parcel 14-A-11A and 14A4-A-23, Tyson Drive, Berryville, Virginia 22611, herein referred to as the "Site". Past site use included activity as an orchard. No active use at this time and for the past approximately 15 years.

Figure 1. Hermitage Phase V Tax Map Sites



Mr. Wilkins electronically submitted an application for the Site to enter the Virginia Department of Environmental Quality (VADEQ) Voluntary Remediation Program (VRP) in August, 2019. The VRP Application for the Site included site sampling data for arsenic, lead, pesticides and herbicides for 71 lot locations. The area under investigation is a 53.3-acre tract. The VRP deemed the Site eligible for participation per letter VRP correspondence dated October 4, 2019, and assigned the Site #VRP00762 (**Appendix A)**. VADEQ received the $2000 paid on September 10, 2019. The $7500 for program participation was paid by on October 15th, 2019.

This report provides the summary of subsurface investigations used to determine the extent of the COC concentrations. The investigation was conducted on the former orchard property and the information demonstrates through risk management tools that the historical application of heavy metals arsenic and lead along with pesticides poses acceptable risks when it can be placed into deed restricted area that would provide protections and precautions for future residents living in this community. The assumptions to support this assertion use sound scientific principles and accepted practices of elimination of risk through management, remedial principles and institutional controls. The proposed Remediation Management Plan includes institutionally controlled deed restrictions for the contained area.

A berm barrier burrow is intended to and will have use restrictions to prevent exposure potential to residents, construction workers and children. The plan for berm control includes covering, will have a geotextile fabric used for stabilization, erosion control, drainage and filtration applications placed on top of the impacted soil with clean cover above it. This will be included within Deed restrictions and include requirements for the area including that the cover needs to be maintained. The berm area will also be surveyed to identify its exact location. During the construction of the berm, relevant information for demonstration of completion will be documented by the construction company. Construction worker exposure and child exposure concerns from the risk exposure assessment are addressed in the management plan for this property.

Contaminants of Concern (COC), arsenic and lead are byproducts of the pesticide application and in certain locations exceed their respective VRP residential screening value using the maximum detection values. Upon relocation of impacted soils, the exposure scenario for lead reverts to a commercial situation using the EPA Adult Lead Methodology (ALM) exposure model. The ALM is based on exposure to a fetus in a pregnant woman in a commercial setting. Some of the concentrations of Arsenic and lead identified in the field investigation are subject to risk assessment. The site characterization eliminates groundwater and surface water and the COC's are nonvolatile, leaving dermal contact and ingestion of soil as the only exposure pathways. Arsenic does not easily migrate and therefore has little chance of migrating off-Site. No off-Site soil data were collected nor assumptions made about potential off site concentrations of arsenic. Onsite pathways for Soil would need to be considered based on the soil investigation. Based on review of that investigation data, removal to a confined and surveyed area with a two-foot cover would effectively isolate the soil.

The Site and adjacent properties are supplied drinking water by the Town of Berryville and there are no potable wells in the area, essentially eliminating groundwater as an exposure pathway. The data also demonstrates that the impacts are limited to the surficial soils. Institutional controls limiting the use of groundwater will be placed on the site.

There is no anticipated impact to groundwater. The site has no identified exposure pathway to groundwater through streams, ponds or other surface water collection. Public water would be supplied to each residential dwelling. No private wells exist here nor will any be planned within the development of the residences. There are no streams or ponds on the site. Because there is no surface water throughout the Phase V site, it can be

concluded that this also results in no surface water offsite pathways. Testing groundwater is therefore not necessary and has not been conducted at the site.

The VADEQ VRP representatives have communicated through conference calls that a Remediation Waste Management Unit would not be used on this project. The material used as pesticides were never classified as a waste and the product was used for its intended purpose.

This Remedial Action Plan (RAP) identifies the restrictions that will be utilized to assure the development will address the risk and uncertainty presented in the report. This RAP includes the proposed development plans and a soil management plan.

2.0 SITE CHARACTERIZATION

Greenway Engineering's Environmental Laboratory in Winchester, Virginia is an accredited laboratory pursuant to the provisions of 1VAC30-46 and the National Environmental Laboratory Accreditation Program (NELAP), with the Virginia Laboratory ID/VELAP ID 460028. Results reported conform to the 2003 NELAC Standard and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report. Analytical Method: EPA 6010; Preparation Method: EPA 3050 for arsenic and lead COC determination. ASTM D2974-87 was the analytical method used for Percent Moisture.

Soil samples were collected on April 4, 2019 at seventy-one locations based on planned residential lot numbers. Using a Geo-probe type sampling equipment, soil was obtained from each location to a depth of 4 feet or refusal. Samples were collected in individual 4-ounce amber glass jars with no preservative and identified by lot number, GPS location and depth of sample. Soil samples were collected for each of 71 lots at the surface, 1 foot, 2 feet, three feet, and 4 feet. If a sample exceeded 20 mg/kg for arsenic or 400 mg/kg for lead, the next deeper sample was tested. Table 1 provides boring logs with the GPS information.

Table 1. Arsenic and Lead Concentration from Lots 1 Through 71, 0 feet to 4 feet

Target Concentration	<20 mg/kg	<20 mg/kg	<20 mg/kg	<20 mg/kg	<20 mg/kg	<400 mg/kg	<400 mg/kg	<400 mg/kg
Sample/Lot	Arsenic-0'	Arsenic-1'	Arsenic-2'	Arsenic-3'	Arsenic-4'	Lead	Lead-1'	Lead-2'
1	64.2	8.3				330		
2	86.8	9.8				380		
3	62.9	7.5				178		
4	27.8	17.3				90.5		
5	115.0	7.4				106		
6	52.0	5.2				227		
7	28.9	15.7				41.2		
8	43.5	11.2				223		
9	156.0	3.2				543	16.3	
10	21.4	7.1				32.4		
11	22.0	5.2				76.9		
12	52.9	9.0				220		
13	65.5	12.0				361		
14	46.3	21.5	9.0			266		
15	18.0					29.2		
16	111.0	12.2				328		
17	16.3					22.8		
18	12.3					44.1		
19	13.2					123		
20	135.0	16.0				449	34.3	
21	131.0	18.0				674	25.2	
22	222.0	6.4				815	12.0	
23	115.0	5.9				414	25.2	
24	123.0	8.7				679	23.5	
25	10.1					14.8		
26	19.8					60.1		
27	21.1	4.1				59.4		
28	31.3	15.4				101		
29	8.0					25		
30	144.0	10.9				654	44.0	
31	17.4					83.1		
32	6.1					13		
33	6.0					15		
34	14.4					48.7		
35	271.0	13.1				860	17.5	
36	0.0					24.3		
37	21.2	16.0				57.5		
38	20.3	67.2	9.0			57.6		
39	15.7					69.7		
40	108.0	14.2				410	46.0	
41	28.3	20.1	8.5			95.5		
42	12.2					18		
43	19.4					88.6		
44	37.4	170.0	222.0	9.2	12.1	93		
45	12.3					25.6		
46	6.4					10.7		
47	68.2	29.0	14.2			283		
48	44.1	7.8				127		
49	75.6	6.3				425	11.5	
50	307.0	6.8				1010	12.1	
51	62.9	26.4	13.5			259		
52	44.0	32.7	17.1			188		
53	115.0	20.6	15.3			905	129	
54	193.0	126.0	9.5			1120	643	11
55	147.0	12.8				1050	22.4	
56	89.9	71.1	22.5	7.4		476	148	
57	43.8	20.3	9.7			229		
58	62.3	28.5	19.5			342		
59	18.5					30.3		
60	17.5					21.8		
61	33.0	91.0	5.4			92.5		
62	17.6					40.1		
63	454.0	29.0	8.0			989	54.4	
64	59.4	7.7				103		
65	72.4	25.1	17.2			103		
66	73.3	19.6				398		
67	53.3	6.8				212		
68	312.0	10.9				870	39.1	
69	19.1					76.2		
70	54.2	11.5				203		
71	76.8	16.2				422	29.3	

Table 2. Boring Logs with GPS Location

Lot #	Latitude	Longitude	Soil Description
1	39.146977	77.994159	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
2	39.147120	77.994457	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
3	39.147263	77.994760	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
4	39.147354	77.995100	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
5	39.147514	77.995414	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
6	39.147645	77.995535	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
7	39.147875	77.995852	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
8	39.148019	77.996161	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
9	39.148257	77.996208	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
10	39.148471	77.996432	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
11	39.148755	77.996591	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
12	39.149099	77.996500	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
13	39.149296	77.996392	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
14	39.149549	77.996398	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
15	39.149833	77.996309	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
16	39.148813	77.996393	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
17	39.148622	77.996294	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
18	39.148343	77.996300	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
19	39.148100	77.996113	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
20	39.147825	77.995949	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
21	39.147757	77.995644	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
22	39.147579	77.995373	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
23	39.147378	77.995188	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
24	39.147338	77.994855	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
25	39.147214	77.994543	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
26	39.147099	77.994199	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
27	39.146829	77.993779	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
28	39.147863	77.993479	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet

29	39.148075	77.993368	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
30	39.148316	77.993255	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
31	39.148058	77.993429	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
32	39.148168	77.993685	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
33	39.148216	77.993980	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
34	39.148449	77.994189	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
35	39.148495	77.994545	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
36	39.148635	77.994703	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
37	39.148813	77.994807	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
38	39.149091	77.994835	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
39	39.148737	77.994707	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
40	39.148582	77.994565	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
41	39.148285	77.994151	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
42	39.148616	77.993073	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
43	39.148859	77.993088	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
44	39.149058	77.993000	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
45	39.149347	77.993165	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
46	39.149566	77.993304	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
47	39.149779	77.993569	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
48	39.149962	77.993998	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
49	39.150084	77.994099	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
50	39.150125	77.994402	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
51	39.150248	77.994856	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
52	39.150446	77.994959	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
53	39.150563	77.995322	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
54	39.150826	77.995433	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
55	39.15111	77.995502	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
56	39.150088	77.995622	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
57	39.150661	77.995715	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
58	39.150460	77.995973	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet

59	39.150268	77.996155	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
60	39.150061	77.996304	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
61	39.149142	77.996443	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
62	39.149276	77.996401	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
63	39.149668	77.996421	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
64	39.149884	77.993790	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
65	39.149641	77.993531	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
66	39.149386	77.993281	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
67	39.149238	77.993181	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
68	39.149000	77.993041	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
69	39.148744	77.993248	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
70	39.148493	77.993164	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
71	39.148256	77.993206	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet

Pesticide and herbicide testing was conducted at five of the lot locations to obtain a representative site characterization of these COCs including Lots 20, 27, 40, 43, and 60. Results indicate that pesticide and herbicide do not meet COC concentrations across the site.

Table 3. Results for 8081 GCS Pesticides (ug/kg)

	RW#60	RW#20	RW#27	RW#40	RW#43
Aldrin	ND	ND	ND	ND	ND
alpha-BHC	ND	ND	ND	ND	ND
beta-BHC	ND	ND	ND	ND	ND
delta-BHC	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ND	ND	ND	ND	ND
Chlordane (Technical)	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND
4,4'-DDE	54.4	ND	74.0	ND	ND
4,4'-DDT	44.8	ND	44.4	189	505
Dieldrin	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND
Endrin	4.9	ND	10.2	29.0	144
Endrin aldehyde	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND
Heptachlor	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND
Hexachlorobenzene	ND	ND	ND	ND	ND
Methoxychlor	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND	ND

Table 4. Chlorinated Acid Herbicides (GC) by Method 8151 (mg/kg)

	RW#60	RW#20	RW#27	RW#40	RW#43
2,4-D	U	U	U	U	U
Dalapon	U	U	U	U	U
2,4-DB	U	U	U	U	U
Dicamba	U	U	U	U	U
Dichloroprop	U	U	U	U	U
Dinoseb	U (J3)	U (J3)	U (J3)	U (J3)	U (J3)
MCPA	U (J4)	U (J4)	U (J4)	U (J4)	U (J4)
MCPP	U	U	U	U	U
2,4,5-T	U	U	U	U	U
2,4,5-TP (Silvex)	U	U	U	U	U

U	Not detected at the Reporting Limit (or MDL where applicable)
J3	The associated batch QC was outside the established quality control range for precision
J4	The associated batch QC was outside the established quality control range for accuracy

Table 5. Detection Limits for Pesticides

Detection Limits

PASI Ormond Beach Laboratory

For Acode: 8081 SMW 8081 GCS Pesticides

Pace Analytical® www.pacelabs.com

ID	Limits Type	Matrix	Analytical Method	Preparation Method	Sample Type	Instr. Name	Effective Date	Stop Date	Other Criteria
307	MDL	Solid	EPA 8081	EPA 3546			7/24/2009		

#	Analyte	CAS Number	MDL	Units
1	4,4'-DDD	72-54-8	0.131	ug/kg
2	4,4'-DDE	72-55-9	0.061	ug/kg
3	4,4'-DDT	50-29-3	0.096	ug/kg
4	Aldrin	309-00-2	0.058	ug/kg
5	Chlordane (Technical)	57-74-9	15.874	ug/kg
6	Dieldrin	60-57-1	0.04	ug/kg
7	Endosulfan I	959-98-8	0.025	ug/kg
8	Endosulfan II	33213-65-9	0.057	ug/kg
9	Endosulfan sulfate	1031-07-8	0.043	ug/kg
10	Endrin	72-20-8	0.052	ug/kg
11	Endrin aldehyde	7421-93-4	0.066	ug/kg
12	Endrin ketone	53494-70-5	0.08	ug/kg
13	Heptachlor	76-44-8	0.039	ug/kg
14	Heptachlor epoxide	1024-57-3	0.111	ug/kg
15	Methoxychlor	72-43-5	1.05	ug/kg
16	Toxaphene	8001-35-2	7.346	ug/kg
17	alpha-BHC	319-84-6	0.069	ug/kg
18	alpha-Chlordane	5103-71-9	0.037	ug/kg
19	beta-BHC	319-85-7	0.077	ug/kg
20	delta-BHC	319-86-8	0.087	ug/kg
21	gamma-BHC (Lindane)	58-89-9	0.148	ug/kg
22	gamma-Chlordane	5103-74-2	0.068	ug/kg

Table 6. Detection Limits for Acid Herbicide Solids

Detection Limits

PASI Atlanta Laboratory

For Acode: 8151A S 8151A Cl Acid Herbicide Solids

ID	Limits Type	Matrix	Analytical Method	Preparation Method	Sample Type	Instr. Name	Effective Date	Stop Date	Other Criteria
7032	MDL	Solid	EPA 8151A	EPA 8151A			1/10/2019		

#	Analyte	CAS Number	MDL	Units
1	2,4,5-T	93-76-5	0.00907	mg/kg
2	2,4-D	94-75-7	0.0119	mg/kg
3	2,4-DB	94-82-6	0.01678	mg/kg
4	Dalapon	75-99-0	0.01027	mg/kg
5	Dicamba	1918-00-9	0.01184	mg/kg
6	Dinoseb	88-85-7	0.01547	mg/kg
7	Dichloroprop	120-36-5	0.01864	mg/kg
8	MCPA	94-74-6	11.138	mg/kg
9	MCPP	7085-19-0	11.319	mg/kg
10	2,4,5-TP (Silvex)	93-72-1	0.00934	mg/kg

Using VURAM for the risk assessment determination concentrations from the collected site data, Appendix 2 provides the reports for results obtained from the April 4th, 2019 sampling event. The topical application of pesticides and herbicides did not impact the surficial soils greater than four-feet below the ground surface, which significantly reduces the potential for the COCs to impact groundwater. The conclusion determined as best solution is to remove the soil impacted from orchard management practices to a segregated area in the site green space away from the residential dwellings and provide a reasonable cover to strictly limit access to the impacted soils. In addition, a restrictive covenant would be imposed. The restrictive covenant to the deed will read – "groundwater beneath the site shall not be used for any purpose other than environmental monitoring and testing". The site is supplied potable water by the Town of Berryville, which pumps water from the Shenandoah River. If further along in the project the groundwater is determined to be beneficial to use for irrigation purposes, a separate investigation will demonstrate the groundwater is not impacted.

3.0 RISK ASSESSMENT

According to the Virginia DEQ VRP website, "The regulatory basis for performing risk assessments under the Virginia Voluntary Remediation Program is found in the Voluntary Remediation Regulations Section 9 VAC 20-160-70(A)(1)(a). The risk assessment is included in the Site characterization report and should include an evaluation of the risks to human health and the environment posed by the release."

The risk assessment described in the following sections uses the new Virginia Unified Risk Assessment Model (VURAM) version 1.12 and the EPA Adult Lead Methodology (ALM) exposure model, in accordance with the methodology presented in the VRP Risk Assessment Guidance, and attempts to quantify potential human health risks posed by contaminants released into the environment. The basic steps in completing the risk assessment include identification of the contaminants present in the environmental media through a Site characterization and screening exercise, followed by assessing the population exposure and pathways, assessing the contaminant's exposure toxicity and summarizing the human health risks using VURAM, except in the case of lead.

The VRP/VURAM does not have an exposure model for lead. At EPA's site (https://www.epa.gov/superfund/lead-superfund-sites-frequent-questions-risk-assessors-adult-lead-methodology#screening%20value), the question "What is a reasonable screening value for soil lead at commercial/industrial sites, is answered. A screening goal is often more protective than a cleanup goal. A screening goal is intended to provide health protection without knowledge of the specific exposure conditions at a site. A cleanup goal can be derived using exposure assumptions based on site-specific data rather than default values (which are often more conservative). An updated screening level for soil lead at commercial/industrial (i.e., non-residential) sites of 800 part per million (ppm) is based on a recent analysis of the combined phases of the National Health and Nutrition Examination Survey (NHANES III) that choose a cleanup goal protective for all subpopulations. At this site, we have used 400 mg/kg as the screening factor to determine which soils would be impacted and require management.

3.1 Evaluation of Data

As discussed earlier, the collected soil samples are the basis to characterize and define the extent of possible historical impacts as related to the historical application of pesticide and herbicide to the 53.3-acre property. The screening tables, VURAM reports used to determine potential risks are included in Appendix D. Only those tables necessary to demonstrate the potential risks related to the historical releases are included in this assessment.

The characterization and institutional controls have eliminated groundwater and surface water as exposure pathways and the COC's are nonvolatile, eliminating the indoor air and soil gas pathways. Therefore, nonvolatile compounds in the soil are the only COC's and media that might present an exposure pathway and pose a risk to human health. The COC's are designed to persist in-place and do not easily migrate. There is little to no chance of the COC's migrating off-Site; therefore, no off-Site soil or groundwater data were collected and no assumptions are made about potential off-Site concentrations of COCs. On the following page, Table 2 shows the results obtained for each sample at each location at each specific depth. All results are reported in mg/kg for lead and arsenic. This table shows concentrations above the safe target concentration highlighted in yellow. Samples below the target concentration of the COC are shown as green cells. This provides a graphic representation of the COC concentrations at the site for each sample analyzed.

Use restrictions will limit the potential exposure populations to adult and child residential.

3.2 Exposure Assessment

The exposure evaluation shown in Table 7, Selection of Exposure Pathways - Onsite, identifies the potential exposure pathways and possible exposed populations and provides rationale as to why a certain pathway is incomplete or population not exposed. The rationale in Table 7 assumes "no groundwater usage" restrictions to the deed; thereby eliminating the groundwater pathway from the exposure assessment.

Table 7 indicates that potential exposure pathways exist for the onsite resident through dermal contact and ingestion with surficial soils impacted with arsenic. Other onsite exposure pathways are incomplete and exposed populations are eliminated by screening and restrictions to the deed.

The following rationale is provided regarding why groundwater sampling isn't needed:

1) There are no surface water ponds, streams, or rivers at any location on this site.
2) Groundwater flows through bedrock- and regolith-aquifer systems in Clarke County. The bedrock systems are characterized by karst and fractured-rock aquifers that have developed in the folded and faulted rocks. Well depths in Clarke County range from 23 to 1,020 feet below land surface. (USGS, Hydrogeology and Groundwater Availability in Clarke County by David L. Nelms and Roger M. Moberg, Jr Virginia Scientific Investigations Report 2010–5112)
3) The contaminants identified at the site were found within a few feet of the surface. Deeper samples showed background concentrations. Since there is no standing or running water at the surface, there is little opportunity for mixing or exposure potential from water sources.
4) Due to the projected depth to groundwater, there would be significant costs associated with a groundwater investigation with little gain in knowledge about the conditions at this site. The cost to benefit ratio would not warrant this investigation.
5) No water is used for drinking water at the site. All residences would be connected to city water supplies. There are no wells onsite. It is anticipated that water restrictions would be included in deed restrictions associated with properties at this Phase V site.
6) Contaminants dropped off steeply after two feet. Contact with groundwater would necessitate direct contact. The contaminants, arsenic and lead, tend to bind with soil rather than release into water. That is a reason that they are persistence in orchard sites.

Table 7. Selection of Exposure Pathways - Onsite

Medium	Exposure Medium	Receptor Population	Receptor Age	Exposure Route	Rational for Selection or Exclusion of Exposure Pathway
Groundwater	Groundwater	Resident	Adult	Dermal	Excluded-Public Water Usage- No Groundwater use
				Ingestion	Excluded-Public Water Usage- No Groundwater use
			Child	Dermal	Excluded-Public Water Usage- No Groundwater use
				Ingestion	Excluded-Public Water Usage- No Groundwater use
	Shower Air		Adult	Inhalation	No volatile VOCs
	Building Air		Adult	Inhalation	No volatile VOCs
			Child	Inhalation	No volatile VOCs
	Groundwater	Construction Worker	Adult	Dermal	No Groundwater Impacts
				Ingestion	No Groundwater Impacts
	Air			Inhalation	No Groundwater Impacts
	Groundwater	Commercial /	Adult	Dermal	Excluded-Public Water Usage- No Groundwater use
		Industrial		Ingestion	Excluded-Public Water Usage- No Groundwater use
	Building Air			Inhalation	Excluded-Public Water Usage- No Groundwater use
Surface Water	Surface Water	Recreational /	Adult	Dermal	No Surface Water Impacted
		Trespasser		Ingestion	No Surface Water Impacted
			Child	Dermal	No Surface Water Impacted
				Ingestion	No Surface Water Impacted
	Aquatic Organisms		Adult	Ingestion	No Surface Water Impacted
			Child	Ingestion	No Surface Water Impacted
Soil	Soil	Resident	Adult	Dermal	Potential exposure to arsenic/lead
				Ingestion	Potential exposure to arsenic/lead
			Child	Dermal	Potential exposure to arsenic/lead
				Ingestion	Potential exposure to arsenic/lead
	Air		Adult	Inhalation	No volatile COCs
			Child	Inhalation	No volatile COCs
	Soil	Trespasser/Visitor	Adult	Dermal	Potential exposure to arsenic/lead
				Ingestion	Potential exposure to arsenic/lead
			Child	Dermal	Potential exposure to arsenic/lead
				Ingestion	Potential exposure to arsenic/lead
	Air		Adult	Inhalation	No volatile COCs
			Child	Inhalation	No volatile COCs
	Soil	Construction Worker	Adult	Dermal	Residential
				Ingestion	Residential
	Air			Inhalation	Residential
	Soil	Commercial /	Adult	Dermal	Residential
		Industrial		Ingestion	Residential
	Air			Inhalation	No volatile COCs
Sediment	Sediment	Recreational /	Adult	Dermal	No sediment
		Trespasser		Ingestion	No sediment
			Child	Dermal	No sediment
				Ingestion	No sediment
	Aquatic Organisms		Adult	Ingestion	No sediment
			Child	Ingestion	No sediment

3.3 Summary of Risks

3.3.1 Onsite Dermal Contact/Ingestion of Soil Risk

In summary, the results of the onsite screening indicate that two exposure pathways: Potential exposure to arsenic and/or lead. Residential exposure via dermal contact and ingestion to soil impacted with arsenic or lead (Table 1 & Table 7). According to Table 7, arsenic and lead are the contaminants of potential concern to the onsite adult or child resident. The potential risks are as follows: Adult Resident - as shown in the VURAM printout for the Adult Resident Calculated Hazard /Risk Report for Soil, the individual non-cancer Hazard Quotient 01 Screening Threshold Criteria for arsenic individual cancer risk is 1.0 E-05.

Lot 1

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.42E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		3.30E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.42E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		3.30E+02	8.00E+02	

Lot 2

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		8.68E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		3.80E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		8.68E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		3.80E+02	8.00E+02	

Lot 3

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.29E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		1.78E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.29E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		1.78E+02	8.00E+02	

Lot 4

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.78E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		9.05E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.78E+01	3.00E+01	
Lead and Compounds	7439-92-1		9.05E+01	8.00E+02	

Lot 5

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.15E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		1.06E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.15E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		1.06E+02	8.00E+02	

Lot 6

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.20E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.27E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.20E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		2.27E+02	8.00E+02	

Lot 7

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.89E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		4.12E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.89E+01	3.00E+01	
Lead and Compounds	7439-92-1		4.12E+01	8.00E+02	

Lot 8

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.35E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.23E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.35E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		2.23E+02	8.00E+02	

Lot 9

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.56E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		5.43E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.56E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		5.43E+02	8.00E+02	

Lot 10

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.14E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		3.24E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.14E+01	3.00E+01	
Lead and Compounds	7439-92-1		3.24E+01	8.00E+02	

Lot 11

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.20E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		7.69E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.20E+01	3.00E+01	
Lead and Compounds	7439-92-1		7.69E+01	8.00E+02	

Lot 12

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.29E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.20E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.29E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		2.20E+02	8.00E+02	

Lot 13

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.55E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		3.61E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.55E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		3.61E+02	8.00E+02	

Lot 14

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.63E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.66E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.63E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		2.66E+02	8.00E+02	

Lot 15

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.80E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.92E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.80E+01	3.00E+01	
Lead and Compounds	7439-92-1		2.92E+01	8.00E+02	

Lot 16

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.11E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		3.28E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.11E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		3.28E+02	8.00E+02	

Lot 17

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.63E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.28E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.63E+01	3.00E+01	
Lead and Compounds	7439-92-1		2.28E+01	8.00E+02	

Lot 18

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.23E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		4.41E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.23E+01	3.00E+01	
Lead and Compounds	7439-92-1		4.41E+01	8.00E+02	

Lot 19

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.32E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		1.23E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.32E+01	3.00E+01	
Lead and Compounds	7439-92-1		1.23E+02	8.00E+02	

Lot 20

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.35E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		4.49E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.35E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		4.49E+02	8.00E+02	

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	2.46E-02	3.02E-02	
DDD, p,p`- (DDD)	72-54-8		2.46E-02	2.96E-02	
DDE, p,p'-	72-55-9	Y	2.46E-02	2.16E+00	
DDT	50-29-3		2.46E-02	3.70E+00	
delta-BHC	319-86-8		2.46E-02	8.37E-03	Y
Dieldrin	60-57-1		2.46E-02	1.45E-02	Y
Endosulfan I	959-98-8	Y	2.46E-02	2.74E+00	
Endosulfan II	33213-65-9	Y	2.46E-02	2.74E+00	
Endosulfan Sulfate	1031-07-8	Y	2.46E-02	2.74E+00	
Endrin	72-20-8		2.46E-02	1.62E+00	
Endrin Aldehyde	7421-93-4		2.46E-02	1.62E+00	
Endrin Ketone	53494-70-5		2.46E-02	1.62E+00	
Heptachlor	76-44-8	Y	2.46E-02	6.62E-01	
Heptachlor Epoxide	1024-57-3	Y	2.46E-02	8.17E-02	
Hexachlorobenzene	118-74-1	Y	2.46E-02	2.52E-01	
Hexachlorocyclohexane, Alpha-	319-84-6		2.46E-02	8.37E-03	Y
Hexachlorocyclohexane, Beta-	319-85-7		2.46E-02	2.91E-02	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		2.46E-02	2.33E-02	Y
Methoxychlor	72-43-5		6.15E-02	3.20E+01	
Mirex	2385-85-5	Y	6.15E-02	1.26E-01	
Toxaphene	8001-35-2		8.65E-02	4.90E+00	

Soil
mg/kg

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	2.46E-02	1.80E+00	
DDD, p,p`- (DDD)	72-54-8		2.46E-02	2.50E+00	
DDE, p,p'-	72-55-9	Y	2.46E-02	3.50E+01	
DDT	50-29-3		2.46E-02	5.20E+01	
delta-BHC	319-86-8		2.46E-02	3.60E+00	
Dieldrin	60-57-1		2.46E-02	1.40E+00	
Endosulfan I	959-98-8	Y	2.46E-02	7.00E+02	
Endosulfan II	33213-65-9	Y	2.46E-02	7.00E+02	
Endosulfan Sulfate	1031-07-8	Y	2.46E-02	7.00E+02	
Endrin	72-20-8		2.46E-02	2.50E+01	
Endrin Aldehyde	7421-93-4		2.46E-02	2.50E+01	
Endrin Ketone	53494-70-5		2.46E-02	2.50E+01	
Heptachlor	76-44-8	Y	2.46E-02	6.30E+00	
Heptachlor Epoxide	1024-57-3	Y	2.46E-02	1.50E+00	
Hexachlorobenzene	118-74-1	Y	2.46E-02	9.60E+00	
Hexachlorocyclohexane, Alpha-	319-84-6		2.46E-02	3.60E+00	
Hexachlorocyclohexane, Beta-	319-85-7		2.46E-02	1.30E+01	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		2.46E-02	2.50E+01	
Methoxychlor	72-43-5		6.15E-02	4.10E+02	
Mirex	2385-85-5	Y	6.15E-02	1.70E+00	
Toxaphene	8001-35-2		8.65E-02	2.10E+01	

Lot 21

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.31E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		6.74E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.31E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		6.74E+02	8.00E+02	

Lot 22

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.22E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		8.15E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.22E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		8.15E+02	8.00E+02	Y

Lot 23

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.15E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		4.14E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.15E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		4.14E+02	8.00E+02	

Lot 24

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.23E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		6.79E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.23E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		6.79E+02	8.00E+02	

Lot 25

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.01E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		1.48E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.01E+01	3.00E+01	
Lead and Compounds	7439-92-1		1.48E+01	8.00E+02	

Lot 26

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.98E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		6.01E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.98E+01	3.00E+01	
Lead and Compounds	7439-92-1		6.01E+01	8.00E+02	

Lot 27

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.11E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		5.94E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.11E+01	3.00E+01	
Lead and Compounds	7439-92-1		5.94E+01	8.00E+02	

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	4.65E-03	3.02E-02	
DDD, p,p`- (DDD)	72-54-8		4.65E-03	2.96E-02	
DDE, p,p'-	72-55-9	Y	7.40E-02	2.16E+00	
DDT	50-29-3		4.44E-02	3.70E+00	
delta-BHC	319-86-8		4.65E-03	8.37E-03	
Dieldrin	60-57-1		4.65E-03	1.45E-02	
Endosulfan I	959-98-8	Y	4.65E-03	2.74E+00	
Endosulfan II	33213-65-9	Y	4.65E-03	2.74E+00	
Endosulfan Sulfate	1031-07-8	Y	4.65E-03	2.74E+00	
Endrin	72-20-8		1.02E-02	1.62E+00	
Endrin Aldehyde	7421-93-4		4.65E-03	1.62E+00	
Endrin Ketone	53494-70-5		4.65E-03	1.62E+00	
Heptachlor	76-44-8	Y	4.65E-03	6.62E-01	
Heptachlor Epoxide	1024-57-3	Y	4.65E-03	8.17E-02	
Hexachlorobenzene	118-74-1	Y	4.65E-03	2.52E-01	
Hexachlorocyclohexane, Alpha-	319-84-6		4.65E-03	8.37E-03	
Hexachlorocyclohexane, Beta-	319-85-7		4.65E-03	2.91E-02	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		4.65E-03	2.33E-02	
Methoxychlor	72-43-5		1.15E-02	3.20E+01	
Mirex	2385-85-5	Y	1.15E-02	1.26E-01	
Toxaphene	8001-35-2		1.62E-02	4.90E+00	

Soil
mg/kg

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	4.65E-03	1.80E+00	
DDD, p,p`- (DDD)	72-54-8		4.65E-03	2.50E+00	
DDE, p,p'-	72-55-9	Y	7.40E-02	3.50E+01	
DDT	50-29-3		4.44E-02	5.20E+01	
delta-BHC	319-86-8		4.65E-03	3.60E+00	
Dieldrin	60-57-1		4.65E-03	1.40E+00	
Endosulfan I	959-98-8	Y	4.65E-03	7.00E+02	
Endosulfan II	33213-65-9	Y	4.65E-03	7.00E+02	
Endosulfan Sulfate	1031-07-8	Y	4.65E-03	7.00E+02	
Endrin	72-20-8		1.02E-02	2.50E+01	
Endrin Aldehyde	7421-93-4		4.65E-03	2.50E+01	
Endrin Ketone	53494-70-5		4.65E-03	2.50E+01	
Heptachlor	76-44-8	Y	4.65E-03	6.30E+00	
Heptachlor Epoxide	1024-57-3	Y	4.65E-03	1.50E+00	
Hexachlorobenzene	118-74-1	Y	4.65E-03	9.60E+00	
Hexachlorocyclohexane, Alpha-	319-84-6		4.65E-03	3.60E+00	
Hexachlorocyclohexane, Beta-	319-85-7		4.65E-03	1.30E+01	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		4.65E-03	2.50E+01	
Methoxychlor	72-43-5		1.15E-02	4.10E+02	
Mirex	2385-85-5	Y	1.15E-02	1.70E+00	
Toxaphene	8001-35-2		1.62E-02	2.10E+01	

Lot 28

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.13E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		1.01E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.13E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		1.01E+02	8.00E+02	

Lot 29

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		8.00E+00	3.50E+00	Y
Lead and Compounds	7439-92-1		2.50E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		8.00E+00	3.00E+01	
Lead and Compounds	7439-92-1		2.50E+01	8.00E+02	

Lot 30

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.44E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		6.54E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.44E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		6.54E+02	8.00E+02	

Lot 31

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.74E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		8.31E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.74E+01	3.00E+01	
Lead and Compounds	7439-92-1		8.31E+01	8.00E+02	

Lot 32

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.10E+00	3.50E+00	Y
Lead and Compounds	7439-92-1		1.30E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.10E+00	3.00E+01	
Lead and Compounds	7439-92-1		1.30E+01	8.00E+02	

Lot 33

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.00E+00	3.50E+00	Y
Lead and Compounds	7439-92-1		1.50E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.00E+00	3.00E+01	
Lead and Compounds	7439-92-1		1.50E+01	8.00E+02	

Lot 34

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.44E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		4.87E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.44E+01	3.00E+01	
Lead and Compounds	7439-92-1		4.87E+01	8.00E+02	

Lot 35

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.71E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		8.60E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.71E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		8.60E+02	8.00E+02	Y

Lot 36

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.20E-01	3.50E+00	
Lead and Compounds	7439-92-1		2.43E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.20E-01	3.00E+01	
Lead and Compounds	7439-92-1		2.43E+01	8.00E+02	

Lot 37

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.12E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		5.75E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.12E+01	3.00E+01	
Lead and Compounds	7439-92-1		5.75E+01	8.00E+02	

Lot 38

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.03E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		5.76E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.03E+01	3.00E+01	
Lead and Compounds	7439-92-1		5.76E+01	8.00E+02	

Lot 39

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.57E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		6.97E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.57E+01	3.00E+01	
Lead and Compounds	7439-92-1		6.97E+01	8.00E+02	

Lot 40

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.08E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		4.10E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.08E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		4.10E+02	8.00E+02	

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	9.75E-03	3.02E-02	
DDD, p,p`- (DDD)	72-54-8		9.75E-03	2.96E-02	
DDE, p,p'-	72-55-9	Y	9.75E-03	2.16E+00	
DDT	50-29-3		1.89E-01	3.70E+00	
delta-BHC	319-86-8		9.75E-03	8.37E-03	Y
Dieldrin	60-57-1		9.75E-03	1.45E-02	
Endosulfan I	959-98-8	Y	9.75E-03	2.74E+00	
Endosulfan II	33213-65-9	Y	9.75E-03	2.74E+00	
Endosulfan Sulfate	1031-07-8	Y	9.75E-03	2.74E+00	
Endrin	72-20-8		2.90E-02	1.62E+00	
Endrin Aldehyde	7421-93-4		9.75E-03	1.62E+00	
Endrin Ketone	53494-70-5		9.75E-03	1.62E+00	
Heptachlor	76-44-8	Y	9.75E-03	6.62E-01	
Heptachlor Epoxide	1024-57-3	Y	9.75E-03	8.17E-02	
Hexachlorobenzene	118-74-1	Y	9.75E-03	2.52E-01	
Hexachlorocyclohexane, Alpha-	319-84-6		9.75E-03	8.37E-03	Y
Hexachlorocyclohexane, Beta-	319-85-7		9.75E-03	2.91E-02	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		9.75E-03	2.33E-02	
Methoxychlor	72-43-5		2.43E-02	3.20E+01	
Mirex	2385-85-5	Y	2.43E-02	1.26E-01	
Toxaphene	8001-35-2		3.40E-02	4.90E+00	

Soil
mg/kg

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	9.75E-03	1.80E+00	
DDD, p,p`- (DDD)	72-54-8		9.75E-03	2.50E+00	
DDE, p,p'-	72-55-9	Y	9.75E-03	3.50E+01	
DDT	50-29-3		1.89E-01	5.20E+01	
delta-BHC	319-86-8		9.75E-03	3.60E+00	
Dieldrin	60-57-1		9.75E-03	1.40E+00	
Endosulfan I	959-98-8	Y	9.75E-03	7.00E+02	
Endosulfan II	33213-65-9	Y	9.75E-03	7.00E+02	
Endosulfan Sulfate	1031-07-8	Y	9.75E-03	7.00E+02	
Endrin	72-20-8		2.90E-02	2.50E+01	
Endrin Aldehyde	7421-93-4		9.75E-03	2.50E+01	
Endrin Ketone	53494-70-5		9.75E-03	2.50E+01	
Heptachlor	76-44-8	Y	9.75E-03	6.30E+00	
Heptachlor Epoxide	1024-57-3	Y	9.75E-03	1.50E+00	
Hexachlorobenzene	118-74-1	Y	9.75E-03	9.60E+00	
Hexachlorocyclohexane, Alpha-	319-84-6		9.75E-03	3.60E+00	
Hexachlorocyclohexane, Beta-	319-85-7		9.75E-03	1.30E+01	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		9.75E-03	2.50E+01	
Methoxychlor	72-43-5		2.43E-02	4.10E+02	
Mirex	2385-85-5	Y	2.43E-02	1.70E+00	
Toxaphene	8001-35-2		3.40E-02	2.10E+01	

Lot 41

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.83E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		9.55E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		2.83E+01	3.00E+01	
Lead and Compounds	7439-92-1		9.55E+01	8.00E+02	

Lot 42

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.22E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		1.80E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.22E+01	3.00E+01	
Lead and Compounds	7439-92-1		1.80E+01	8.00E+02	

Lot 43

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.94E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		8.86E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.94E+01	3.00E+01	
Lead and Compounds	7439-92-1		8.86E+01	8.00E+02	

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	5.20E-02	3.02E-02	Y
DDD, p,p`- (DDD)	72-54-8		5.20E-02	2.96E-02	Y
DDE, p,p'-	72-55-9	Y	5.20E-02	2.16E+00	
DDT	50-29-3		5.05E-01	3.70E+00	
delta-BHC	319-86-8		5.20E-02	8.37E-03	Y
Dieldrin	60-57-1		5.20E-02	1.45E-02	Y
Endosulfan I	959-98-8	Y	5.20E-02	2.74E+00	
Endosulfan II	33213-65-9	Y	5.20E-02	2.74E+00	
Endosulfan Sulfate	1031-07-8	Y	5.20E-02	2.74E+00	
Endrin	72-20-8		1.44E-01	1.62E+00	
Endrin Aldehyde	7421-93-4		5.20E-02	1.62E+00	
Endrin Ketone	53494-70-5		5.20E-02	1.62E+00	
Heptachlor	76-44-8	Y	5.20E-02	6.62E-01	
Heptachlor Epoxide	1024-57-3	Y	5.20E-02	8.17E-02	
Hexachlorobenzene	118-74-1	Y	5.20E-02	2.52E-01	
Hexachlorocyclohexane, Alpha-	319-84-6		5.20E-02	8.37E-03	Y
Hexachlorocyclohexane, Beta-	319-85-7		5.20E-02	2.91E-02	Y
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		5.20E-02	2.33E-02	Y
Methoxychlor	72-43-5		1.30E-01	3.20E+01	
Mirex	2385-85-5	Y	1.30E-01	1.26E-01	Y
Toxaphene	8001-35-2		1.82E-01	4.90E+00	

Soil
mg/kg

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	5.20E-02	1.80E+00	
DDD, p,p`- (DDD)	72-54-8		5.20E-02	2.50E+00	
DDE, p,p'-	72-55-9	Y	5.20E-02	3.50E+01	
DDT	50-29-3		5.05E-01	5.20E+01	
delta-BHC	319-86-8		5.20E-02	3.60E+00	
Dieldrin	60-57-1		5.20E-02	1.40E+00	
Endosulfan I	959-98-8	Y	5.20E-02	7.00E+02	
Endosulfan II	33213-65-9	Y	5.20E-02	7.00E+02	
Endosulfan Sulfate	1031-07-8	Y	5.20E-02	7.00E+02	
Endrin	72-20-8		1.44E-01	2.50E+01	
Endrin Aldehyde	7421-93-4		5.20E-02	2.50E+01	
Endrin Ketone	53494-70-5		5.20E-02	2.50E+01	
Heptachlor	76-44-8	Y	5.20E-02	6.30E+00	
Heptachlor Epoxide	1024-57-3	Y	5.20E-02	1.50E+00	
Hexachlorobenzene	118-74-1	Y	5.20E-02	9.60E+00	
Hexachlorocyclohexane, Alpha-	319-84-6		5.20E-02	3.60E+00	
Hexachlorocyclohexane, Beta-	319-85-7		5.20E-02	1.30E+01	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		5.20E-02	2.50E+01	
Methoxychlor	72-43-5		1.30E-01	4.10E+02	
Mirex	2385-85-5	Y	1.30E-01	1.70E+00	
Toxaphene	8001-35-2		1.82E-01	2.10E+01	

Lot 44

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.74E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		9.30E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.74E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		9.30E+01	8.00E+02	

Lot 45

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.23E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.56E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.23E+01	3.00E+01	
Lead and Compounds	7439-92-1		2.56E+01	8.00E+02	

Lot 46

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.40E+00	3.50E+00	Y
Lead and Compounds	7439-92-1		1.07E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.40E+00	3.00E+01	
Lead and Compounds	7439-92-1		1.07E+01	8.00E+02	

Lot 47

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.82E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.83E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.82E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		2.83E+02	8.00E+02	

Lot 48

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.41E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		1.27E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.41E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		1.27E+02	8.00E+02	

Lot 49

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.56E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		4.25E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.56E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		4.25E+02	8.00E+02	

Lot 50

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.07E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		1.01E+03	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.07E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		1.01E+03	8.00E+02	Y

Lot 51

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.29E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.59E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.29E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		2.59E+02	8.00E+02	

Lot 52

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.40E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		1.88E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.40E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		1.88E+02	8.00E+02	

Lot 53

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.15E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		9.05E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.15E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		9.05E+02	8.00E+02	Y

Lot 54

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.93E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		1.12E+03	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.93E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		1.12E+03	8.00E+02	Y

Lot 55

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.47E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		1.05E+03	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.47E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		1.05E+03	8.00E+02	Y

Lot 56

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		8.99E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		4.76E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		8.99E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		4.76E+02	8.00E+02	

Lot 57

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.38E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.29E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.38E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		2.29E+02	8.00E+02	

Lot 58

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.23E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		3.42E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		6.23E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		3.42E+02	8.00E+02	

Lot 59

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.85E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		3.03E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.85E+01	3.00E+01	
Lead and Compounds	7439-92-1		3.03E+01	8.00E+02	

Lot 60

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.75E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.18E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.75E+01	3.00E+01	
Lead and Compounds	7439-92-1		2.18E+01	8.00E+02	

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	2.35E-03	3.02E-02	
DDD, p,p`- (DDD)	72-54-8		2.35E-03	2.96E-02	
DDE, p,p'-	72-55-9	Y	5.44E-02	2.16E+00	
DDT	50-29-3		4.48E-02	3.70E+00	
delta-BHC	319-86-8		2.35E-03	8.37E-03	
Dieldrin	60-57-1		2.35E-03	1.45E-02	
Endosulfan I	959-98-8	Y	2.35E-03	2.74E+00	
Endosulfan II	33213-65-9	Y	2.35E-02	2.74E+00	
Endosulfan Sulfate	1031-07-8	Y	2.35E-03	2.74E+00	
Endrin	72-20-8		4.90E-03	1.62E+00	
Endrin Aldehyde	7421-93-4		2.35E-03	1.62E+00	
Endrin Ketone	53494-70-5		2.35E-03	1.62E+00	
Heptachlor	76-44-8	Y	2.35E-03	6.62E-01	
Heptachlor Epoxide	1024-57-3	Y	2.35E-03	8.17E-02	
Hexachlorobenzene	118-74-1	Y	2.35E-03	2.52E-01	
Hexachlorocyclohexane, Alpha-	319-84-6		2.35E-03	8.37E-03	
Hexachlorocyclohexane, Beta-	319-85-7		2.35E-03	2.91E-02	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		2.35E-03	2.33E-02	
Methoxychlor	72-43-5		5.85E-03	3.20E+01	
Mirex	2385-85-5	Y	5.85E-03	1.26E-01	
Toxaphene	8001-35-2		8.20E-03	4.90E+00	

Soil
mg/kg

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Aldrin	309-00-2	Y	2.35E-03	1.80E+00	
DDD, p,p`- (DDD)	72-54-8		2.35E-03	2.50E+00	
DDE, p,p'-	72-55-9	Y	5.44E-02	3.50E+01	
DDT	50-29-3		4.48E-02	5.20E+01	
delta-BHC	319-86-8		2.35E-03	3.60E+00	
Dieldrin	60-57-1		2.35E-03	1.40E+00	
Endosulfan I	959-98-8	Y	2.35E-03	7.00E+02	
Endosulfan II	33213-65-9	Y	2.35E-02	7.00E+02	
Endosulfan Sulfate	1031-07-8	Y	2.35E-03	7.00E+02	
Endrin	72-20-8		4.90E-03	2.50E+01	
Endrin Aldehyde	7421-93-4		2.35E-03	2.50E+01	
Endrin Ketone	53494-70-5		2.35E-03	2.50E+01	
Heptachlor	76-44-8	Y	2.35E-03	6.30E+00	
Heptachlor Epoxide	1024-57-3	Y	2.35E-03	1.50E+00	
Hexachlorobenzene	118-74-1	Y	2.35E-03	9.60E+00	
Hexachlorocyclohexane, Alpha-	319-84-6		2.35E-03	3.60E+00	
Hexachlorocyclohexane, Beta-	319-85-7		2.35E-03	1.30E+01	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9		2.35E-03	2.50E+01	
Methoxychlor	72-43-5		5.85E-03	4.10E+02	
Mirex	2385-85-5	Y	5.85E-03	1.70E+00	
Toxaphene	8001-35-2		8.20E-03	2.10E+01	

Lot 61

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.30E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		9.25E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.30E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		9.25E+01	8.00E+02	

Lot 62

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.76E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		4.01E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.76E+01	3.00E+01	
Lead and Compounds	7439-92-1		4.01E+01	8.00E+02	

Lot 63

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.54E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		9.89E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		4.54E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		9.89E+02	8.00E+02	Y

Lot 64

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.94E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		1.03E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.94E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		1.03E+02	8.00E+02	

Lot 65

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.24E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		1.03E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.24E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		1.03E+02	8.00E+02	

Lot 66

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.33E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		3.98E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.33E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		3.98E+02	8.00E+02	

Lot 67

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.33E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.12E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.33E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		2.12E+02	8.00E+02	

Lot 68

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.12E+02	3.50E+00	Y
Lead and Compounds	7439-92-1		8.70E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		3.12E+02	3.00E+01	Y
Lead and Compounds	7439-92-1		8.70E+02	8.00E+02	Y

Lot 69

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.91E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		7.62E+01	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		1.91E+01	3.00E+01	
Lead and Compounds	7439-92-1		7.62E+01	8.00E+02	

Lot 70

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.42E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		2.03E+02	2.70E+02	

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		5.42E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		2.03E+02	8.00E+02	

Lot 71

Soil
mg/kg

Screening Type: Residential Soil Tier II

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.68E+01	3.50E+00	Y
Lead and Compounds	7439-92-1		4.22E+02	2.70E+02	Y

Screening Type: Industrial Soil Tier III

Analyte	CAS	VOC	Concentration	Screening Level	COPC
Arsenic, Inorganic	7440-38-2		7.68E+01	3.00E+01	Y
Lead and Compounds	7439-92-1		4.22E+02	8.00E+02	

Table 8. Selection of Contaminants of Concern (95% UCL) Soil Unrestricted Residential

	CAS No.	SSL Soil to Groundwater (mg/kg)	RSL (mg/kg)	VRP Tier II Screening Concentration (mg/kg)	Soil Concentration Maximum (mg/kg)	Contaminant of Potential Concern (mg/kg)
TAL Inorganics						
Arsenic	7440-38-2	5.82	3.40 (a)	3.4	49.00	yes
Lead	7439-92-1	0.27	400.00 (b)	270.00	142.00	no
TCL Pesticides						
4, 4'-DDE	72-55-9	32.40	16.00	16.00	0.81	no
4, 4'-DDT	50-29-3	20.20	3.60	3.60	0.30	no
Endrin	72-20-8	4.86	1.80	1.80	0.05	no

Notes:
mg/kg = milligram per kilogram
CAS = chemical abstracts service
SSL = soil screening levels
RSL = regional screening level
VRP = voluntary remediation program
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
UCL = Upper Confidence Interval
(a) = see risk based screening level proxy values
(b) = the risk based screening level of arsenic is usually below the naturally occuring background concentration. VDEQ recommends that a site-specific background concentration be used as the screening concentration for arsenic.

3.4 Risk Management

Although the characterization and risk assessment demonstrate the exposure risk at Hermitage Phase V, development is acceptable with the employment of additional risk management and remedial tools to further eliminate exposure to COC impacts. The development will manage soils on-site and there is no off-site soil disposal proposed. Unsuitable soil management will consist of placing soil in a berm burrow area, greater than two feet below ground surface or in pre-dug on-site borrow pits. Essentially, suitable deeper soils are being mined for on-site use and the borrow pits filled with unsuitable soil.

3.5 Risk Assessment - Conclusions

The above risk evaluation demonstrates that there are no complete exposure pathways for residential zoning with deed restrictions. Therefore, no exposed populations are susceptible to unacceptable risks associated with the acceptable historical application of pesticides and herbicides at the proposed development. The results of this evaluation showed the total cumulative risk, after applying the 95% UCL is below the target hazard quotient of 1.0 and the target carcinogenic risk of 1.0 E-4.

4.0 REMEDIATION ASSESSMENT

No further remedial action appears warranted.

5.0 INSTITUTIONAL CONTROLS

Deed restrictions can demonstrate the proposed Hermitage Phase V development is suitable for residential occupation under the condition: 1. The VRP area would include deed restrictions limiting access to the collected impacted soils in the berm burrow area.

6.0 FUTURE ACTIONS REGARDING REMAINING VRP REQUIREMENTS

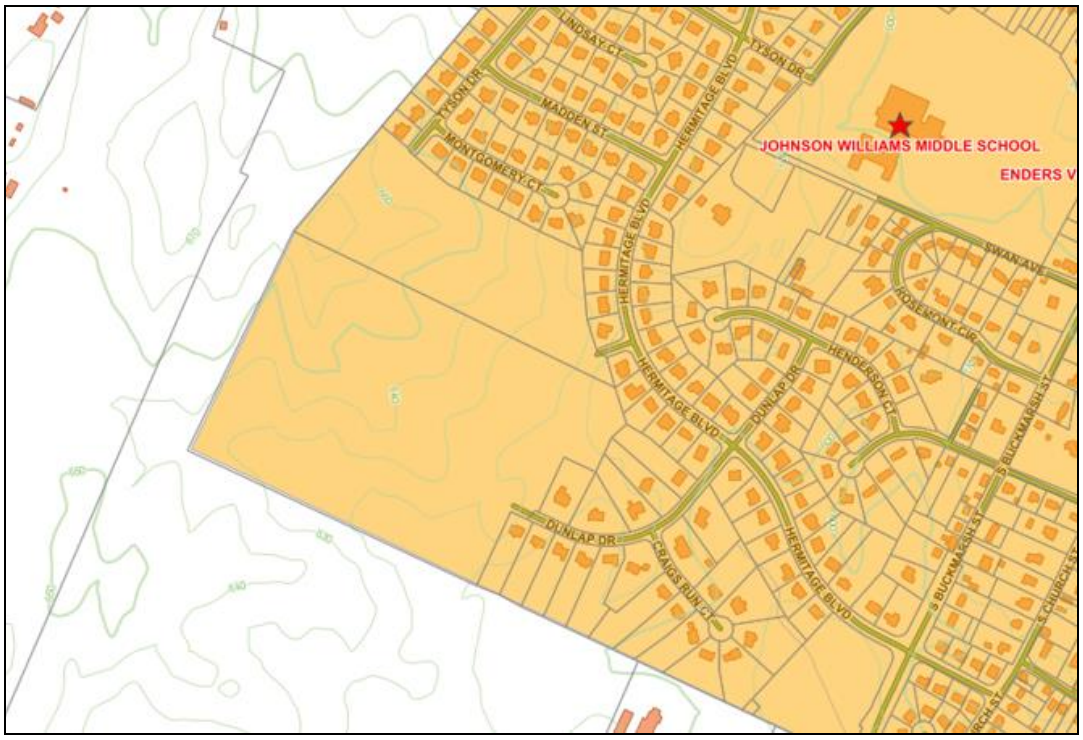
- Upon VRP review and acceptance of the information as summarized and proposed in this report, RI, on Hermitage, will proceed with the Public Notice, reporting and response requirement as stipulated in (9 VAC 20-160-120).
- Upon completion of the Public Notice requirements, RI will draft and issue, to the VRP for review, the Certificate of Satisfactory Completion of Remediation as stipulated in VAC 20-160110.
- Upon VRP signature of the certificate and public notice proceedings, with the exception there are substantive comments from the public, any additional information necessary will be provided.

7.0 REMEDIAL ACTION PLAN

7.1 Site Specifications - Project Description

This Remedial Action Plan is provided to the Virginia Department of Environmental Quality (DEQ) VRP program for the Hermitage Phase V #VRP00762 (Site). Through telephone communication, it was suggested that a narrative describing the remedial actions planned for the site be drafted for review. These details regarding remedial action are important to fully understand why these actions are acceptable practices to eliminate human health exposure. The development and VRP boundary are shown in Figure 2. The development Site includes 71 lots that would be prepared for residential single family dwellings. A green space is included in the proposed design of this residential community covered with grass. The grass areas will be sodded and the roads through the community would be paved with individual pavers or poured media.

Figure 2. VRP Location



There is a specific selected area within the green space that would be used as the location for removed soils. This area is identified outlined in red in Figure 4.

7.2 Site History

Historical records of the site's principle activity date back to use as an orchard. There was no use identified for underground storage tanks (UST), above ground storage tanks (AST), or mixing stations. The 53.3± acres VRP property contains no structures. The orchard has not operated since approximately 2002, since then the land is fallow.

7.3 Restrictive covenants

The property owner intends to complete additional actions to expedite the VRP process and to be a good steward of the land. Restrictive covenants that will run with the land are listed below: Although there is no reason to suspect the groundwater under the Site is impacted with Contaminants of Concern (COC), a restrictive groundwater covenant to the deed remedial action is planned in order to eliminate the potential exposure pathway. The restriction makes sense in addition because the residential houses will be on supplied community water. This also provides a cost saving regarding the expense of sampling the deep bedrock karst aquifer. The cost/benefit of this additional investigative analysis is questionable because a pathway can be eliminated worth a deed restriction regarding establishing wells where none will be needed.

Removing soil from impacted areas to a secure specifically identified location within the site is intended to insure it will effectively eliminate the ingestion pathway from the child exposure scenario.

The following were considered in the development of the Remedial Action Plan. In a residential setting, potential pathways of exposure to contaminants in soil are as follows:

- Direct ingestion
- Inhalation of volatiles and fugitive dusts
- Ingestion of contaminated ground water caused by migration of chemicals through soil to an underlying potable aquifer
- Dermal absorption
- Ingestion of homegrown produce that has been contaminated via plant uptake
- Migration of volatiles into basements.

The first three pathways -- direct ingestion, inhalation of volatiles and fugitive dusts, and ingestion of potable ground water -- are the most common routes of human exposure to contaminants in the residential setting. The additional pathways of exposure to soil contaminants, dermal absorption, plant uptake, and migration of volatiles into basements, may also contribute to the risk to human health from exposure to specific contaminants in a residential setting. The goal of this Remedial Action Plan is to limit to the greatest extent possible, these exposure pathways. The plan calls for removing the identified COCs and relocating to an area that can be appropriately managed in perpetuity.

8.0 SITE CHARACTERIZATION SUMMARY

8.1 Historical Investigations

There are no known investigations or Phase I Environmental Assessments for these properties.

8.2 Site History

The site was used as an orchard. There are no known mixing stations on this parcel.

8.3 Site Utilities and Local Water Supply

The Site and surrounding properties are serviced by public and private underground and above ground utilities, including gas, communication, drinking water, sanitary sewer, storm water, and electrical services. From a review of the Town of Berryville and Clarke County websites, the site receives water from the Berryville Department of Public Utilities, which sources surface waters from the Shenandoah River. Berryville requires residences and businesses within the town limits to use public water. We are not aware of any potable wells located onsite and offsite adjacent to the property.

8.4 Field Investigation

A field investigation was conducted on April 4th, 2019 to determine if pesticide applications during its orchard use phase had impacted soils within the area.

9.0 CONCEPTUAL SITE MODEL

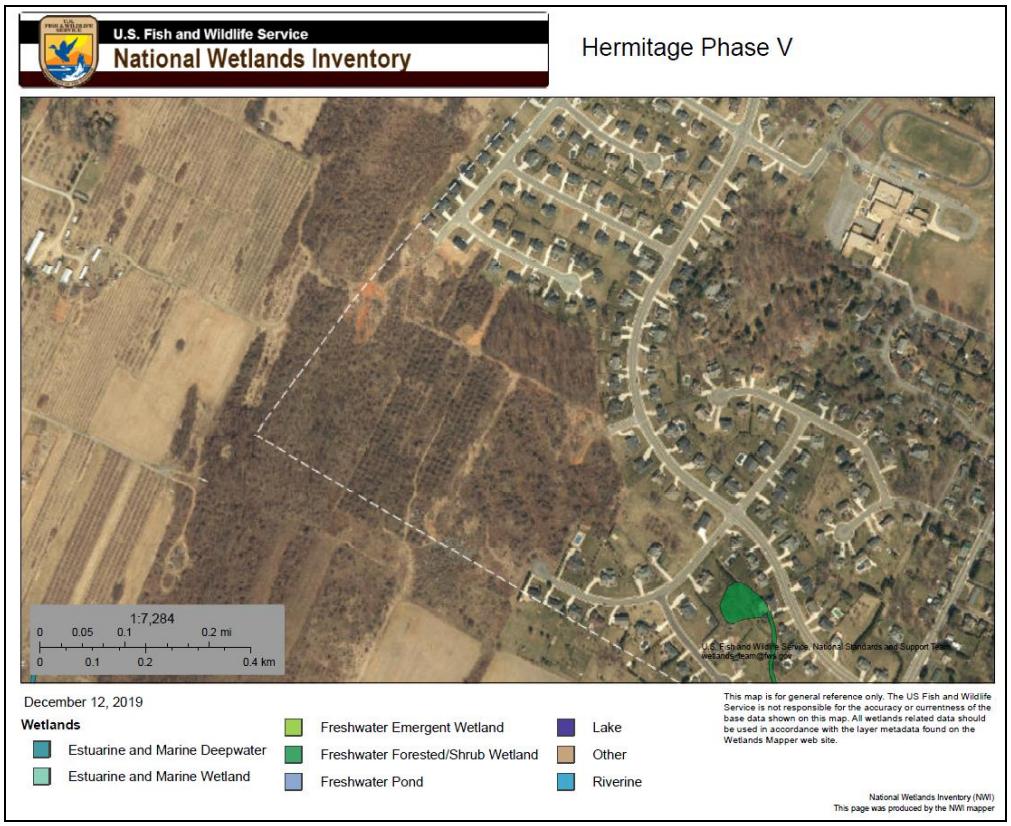
9.1 Ecology

9.1.1 Surface Water Bodies

The Site lies within the Berryville town limits. The area consists of mixed commercial, single family and multi-family residential development. Public water and sanitary and storm sewer are available to each developed property and this Site has available water and sewer.

National Wetlands Inventory Map for the Site did not identify wetlands. No significant surface water features are located on the Site. The National Wetlands Inventory Map indicates that no wetlands are located on or immediately adjacent to the Site. No wetlands are identified from the National Wetlands Inventory database for the VRP site.

Figure 3. National Wetlands Inventory for Hermitage Phase V



Due to the extended distances of down gradient surface water bodies from the site, and the relatively low level of constituent impact to soil and groundwater encountered at the site, there is little to no risk of COCs identified at the site migrating to identified offsite ecological receptors.

9.1.2 Site Water Service and Potable Groundwater Use

As noted previously, the site and immediate down gradient area of the Site are serviced by public water provided by the Town of Berryville. No potable wells currently exit onsite or on any property within a half mile search radius. There are no known potable wells in the immediate area.

9.2 Soils and Geology

According to the Natural Resource Conservation Service (NRCS) Online Soil Survey, Carbo-Opequon complex soils (5B) with rock outcrops make up the subject property. The Carbo-Opequon complex soils are in-place weathering of the underlying limestone bedrock and consist of silty loam and red clay subsoil found in the weathered materials of the limestone, shale and siltstone. The soils permeability is slow to moderate. The soils are well suited for agricultural purposes.

The Virginia Department of Mineral Resources Geologic Map of Virginia (1993) indicates that the subject property is located within the Valley and Ridge Physiographic Province, which consists of elongated parallel ridges and valleys underlain by folded sedimentary rock. The valleys and ridges formed when folding and differential weathering eroded faulted bands of sedimentary rocks. The sedimentary rocks of the Valley and Ridge Physiographic Province were folded and moved westward along thrust faults. The Conococheague Formation underlays the subject property and consists of limestone and dolostone.

Geotechnical borings in the unconsolidated soils of the site encountered a few inches of topsoil over reddish brown silty clay. Samples were collected up to 4 feet in depth at each lot location. Groundwater was not encountered in any of the borings during drilling.

9.3 Hydrogeological Setting

Locally, the geotechnical borings indicate there is little to no shallow groundwater in the unconsolidated soil. The fat clay has little storage capacity and significantly impedes shallow groundwater recharge during rain events, directing most of the rainfall as surface water runoff to surficial drainage or conduits directly into the bedrock. Regionally, both unconfined and confined aquifers of unconsolidated sediments underlay the Valley and Ridge Physiographic Province. The unconsolidated aquifer overlay consolidated bedrock, which dips to the southeast. Groundwater storage and movement are functions of the primary porosity of the sediments as well as secondary porosity (i.e., fractures, solution cavities) of the underlying bedrock. Storage is mostly by gravel and sand, with little to no storage provided by clay. Near surface, unconfined aquifers typically consist of sediments of higher permeability and recharge locally through precipitation that permeates through the unsaturated zone into the aquifers. The water table in unconfined aquifers is therefore highly variable, fluctuating with the seasons and with rates of precipitation. Variations in the groundwater surface and flow generally reflect the topography and relative locations of surface water features. Intermittent confining layers can locally alter the water table conditions. Artesian conditions exist where confining layers above and below bind the deeper confined aquifers. Confined aquifers are recharged in areas where the formation crops out, generally in more remote areas to the west.

9.3.1 Fate and Transport Considerations

The COC's were legally and correctly applied as a spray to prevent insect and noxious weed growth. For increased effectiveness, the compounds were designed to bond to organic and inorganic matter and not easily transported by water. Therefore, the COC's migration pattern is small and typically limited to the areas of application and areas of overspray.

This point becomes obvious when looking at the data in Table 2. In 50 of the 71 borings, concentrations of COC's arsenic and lead decrease significantly and eventually to background values as shallow as the 1 to 2 foot interval and certainly by the 3-4 foot interval. 4, 4 DDT and 4, 4-DDE, detected in 4 of the 5 borings and at concentrations several orders of magnitude below the VRP residential screening value. This clearly demonstrates the COC's did not move downward and in no way would influence groundwater.

9.4 Release Scenario

The COC compounds result from the legal and accepted practice of spray application of pesticides and insecticides on orchard and agricultural fields. Most of the chemicals used on the property categorize into organophosphates and organochlorines, both ranging from very too highly orally toxic.

Organochlorines are of most concern, as they have a tendency to accumulate residues in soil and are not readily degradable. Dichlorodiphenyltrichloroethane (DDT), a now banned organochlorine pesticide, was used historically on the property. DDT exhibits unusual sustainability and persistence. Studies have shown that the concentration of DDT and degradation metabolite compounds (dichlorodiphenyltrichloroethane (DDD) and dichlorodiphenyldichloroethylene (DDE)) have remained consistent with time in soils. Arsenic and lead based pesticide use ceased in the 1940's and 1950's with the invention of the chlorinated organic sprays. Studies have revealed that repeated application consequently have resulted in an increased surficial concentration of heavy metals above background level.

9.5 Area Use and Maintenance

The soil deposit areas will be maintained by the Home Owner's Association. As designed, it will have a layer of a textile layer over the deposited soil to act as a barrier to be used as a warning to protect accidental exposure. The area where the soil will be placed is included in the green space that people can walk in and in common use with homeowner association. The details of the maintenance will be included in the covenants of the property and restrictions in the deed of the property.

Figure 4. Soil Management Plan Area (SMP)

Figure 5. Soil Map – Clark Co., Virginia

Clarke County, Virginia (VA043)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
32B	Oaklet-Carbo complex, rocky, 3 to 8 percent slopes	4.1	13.5%
33B	Pagebrook silty clay loam, 0 to 7 percent slopes	0.0	0.1%
36B	Poplimento silt loam, rocky, 3 to 8 percent slopes	11.6	38.1%
36C	Poplimento silt loam, rocky, 8 to 15 percent slopes	8.9	29.1%
51B	Timberville silt loam, 0 to 7 percent slopes, frequently flooded	5.9	19.3%
Totals for Area of Interest		30.5	100.0%

The decision to use the Soil Screening guidance at the site was driven by the potential benefits of eliminating areas, exposure pathways, or contaminants from further investigation. By identifying areas where concentrations of contaminated soil are below levels of concern under CERCLA, this provides a means to focus resources on exposure areas, contaminants and exposure pathways of concern. Soil Screening Levels (SSLs) are risk-based concentrations derived from standardized equations combining exposure information assumptions with EPA toxicity data. The SSLs used for arsenic is 20 mg/kg, lead is 400 mg/kg. These concentrations were used to develop the remedial action plan. De minimus or trace amounts of pesticides or herbicides did not require their consideration in this planning in VURAM.

The property owner has developed a Soil Management Plan (SMP) that adopts a proactive attitude to reduce the concentration of COCs in the surficial soils; thereby reducing the exposure potential. The SMP is designed to further eliminate potential areas of elevated COCs during the initial grading cut/fill exercises. The object of the SMP is to create a scenario where the COC impacted soils are removed and placed in an on-site borrow pit and capped with clean fill. No soil will be taken offsite for the purposes of this Remediation Plan.

The property owner has identified 50 lot areas where soil will be removed based on the concentration of COC arsenic and 17 areas included within those same 50 areas that showed elevated levels of COC lead as shown on Table 1 and Figure 8. The soil will then be placed in an on-site borrow pit or fill storage area. The top one-foot to one and one half foot of these 50 areas will be removed based on the arsenic and/or lead concentration of the representative sample for that Lot location. For example, Lot 44 showed a higher concentration at 2 feet than the 20 mg/kg, so that area will have 2 to 2 ½ feet of soil removed and relocated to the burrow.

Arsenic

50 lot locations showed arsenic concentrations of between 20.3 to a maximum of 454 mg/kg. The average of the surface soil results was 71.62 mg/kg. The average of the 1-foot soil results was 20.07 mg/kg. The concentrations continued to drop at deeper levels. The average of the 2-foot soil results was 14.75 mg/kg.

Soil from 50 lots will have approximately 1 to 1 1/2-foot deep will be removed and managed in the borrow pit of fill storage area. One lot, lot 44, will have 2 to 21/2-feet deep removed and managed in the borrow pit of fill storage area.

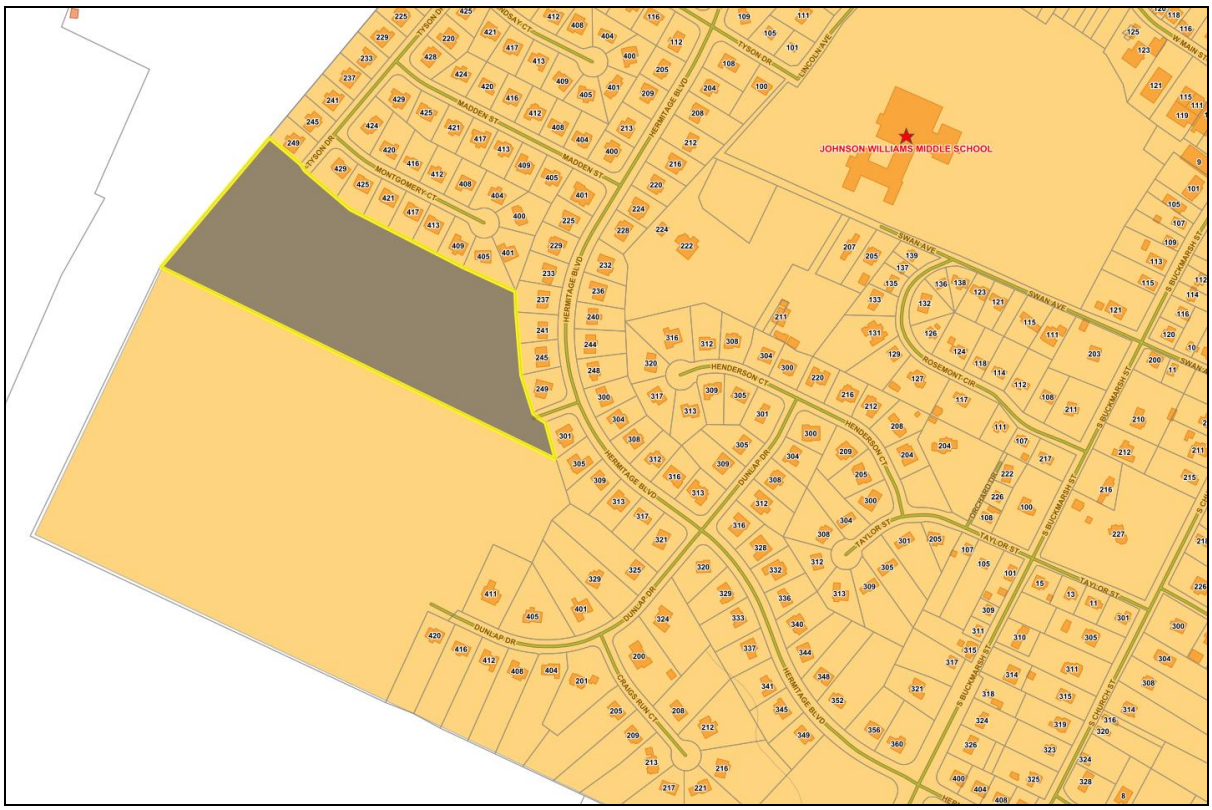
This exercise will significantly reduce the exposure to COC arsenic and lead to background values. The sampling points identified in the Table 1 and Figure 8will be surveyed and staked. A line tape will be used to measure the appropriate distance dependent on the concentration of arsenic and a field representative will observe and note the process of the removal. Topsoil or sod will be used to cover the areas where soil is removed for the residential dwellings.

The surficial soils at each site lot will be acceptable upon completion of this soil segregation effort. Any additional remedial effort would be above and beyond the requirements for this Site. Therefore, the Hermitage development requests that the Department of Environmental Quality proceed with the acceptance of this plan, so this Site can go to public notice and certification.

9.6 Site Specifications / Area Requested for Participation

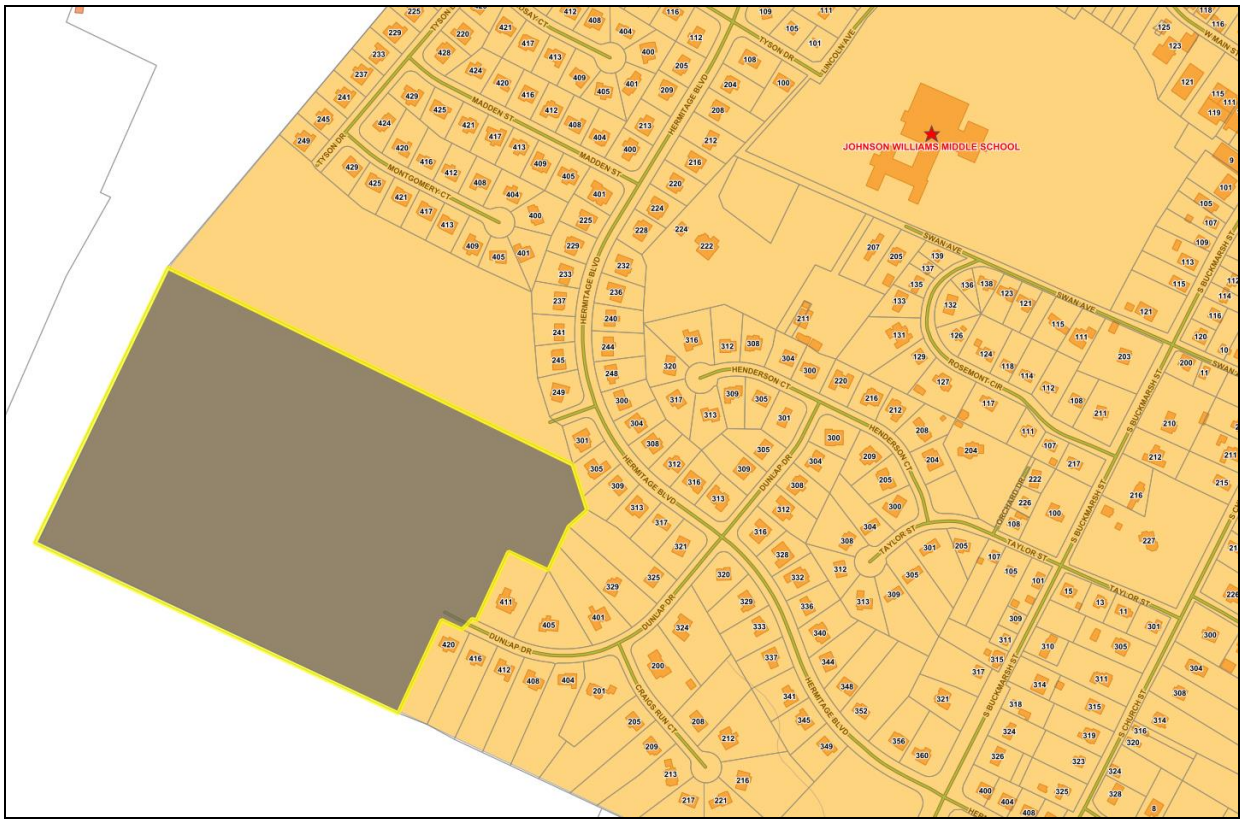
Currently, the Site is a rectangular shaped parcel and consists of 53.3-acres of undeveloped land and was formerly used an orchard by the Byrd family decades ago. This property is now identified as Hermitage Village Phase V, Tax Parcel 14-A-11A and 14A4-A-23, and is located at the end of Tyson Drive, Berryville, Virginia 22611 (**Figure 8a and 8b**). The property is zoned "Residential" and is being developed as residential development lots for single family dwellings. The site's individual parcels are shown in Figures 8a and 8b.

Figure 6a. Tax Parcel 14-A-11A



Detail Information	Zoom To
TAX_MAP	14A4 A 23
PROP_ADDR	-
ACCT	1960
BILL_NAME1	HERMITAGE LLC
BILL_NAME2	
BILL_ADDR1	13 S LOUDOUN STREET
BILL_ADDR2	
BILL_CITY	WINCHESTER
BILL_STATE	VA
BILL_ZIP	22601
VAL_IMPROV	0
VAL_LAND	1171300
DUR_ALLOC	0
DUR_REM	0
DEED_BK_PG	629/715
ACRES	23.426

Figure 6b. Tax Parcel 14A4-A-23



Detail Information	Zoom To
TAX_MAP	14 A 11A
PROP_ADDR	-
ACCT	7581
BILL_NAME1	HERMITAGE LLC
BILL_NAME2	
BILL_ADDR1	13 S LOUDOUN ST
BILL_ADDR2	
BILL_CITY	WINCHESTER
BILL_STATE	VA
BILL_ZIP	22601
VAL_IMPROV	0
VAL_LAND	1762500
DUR_ALLOC	0
DUR_REM	0
DEED_BK_PG	629/715
ACRES	35.25

Figure 7. Aerial View of Hermitage Phase V

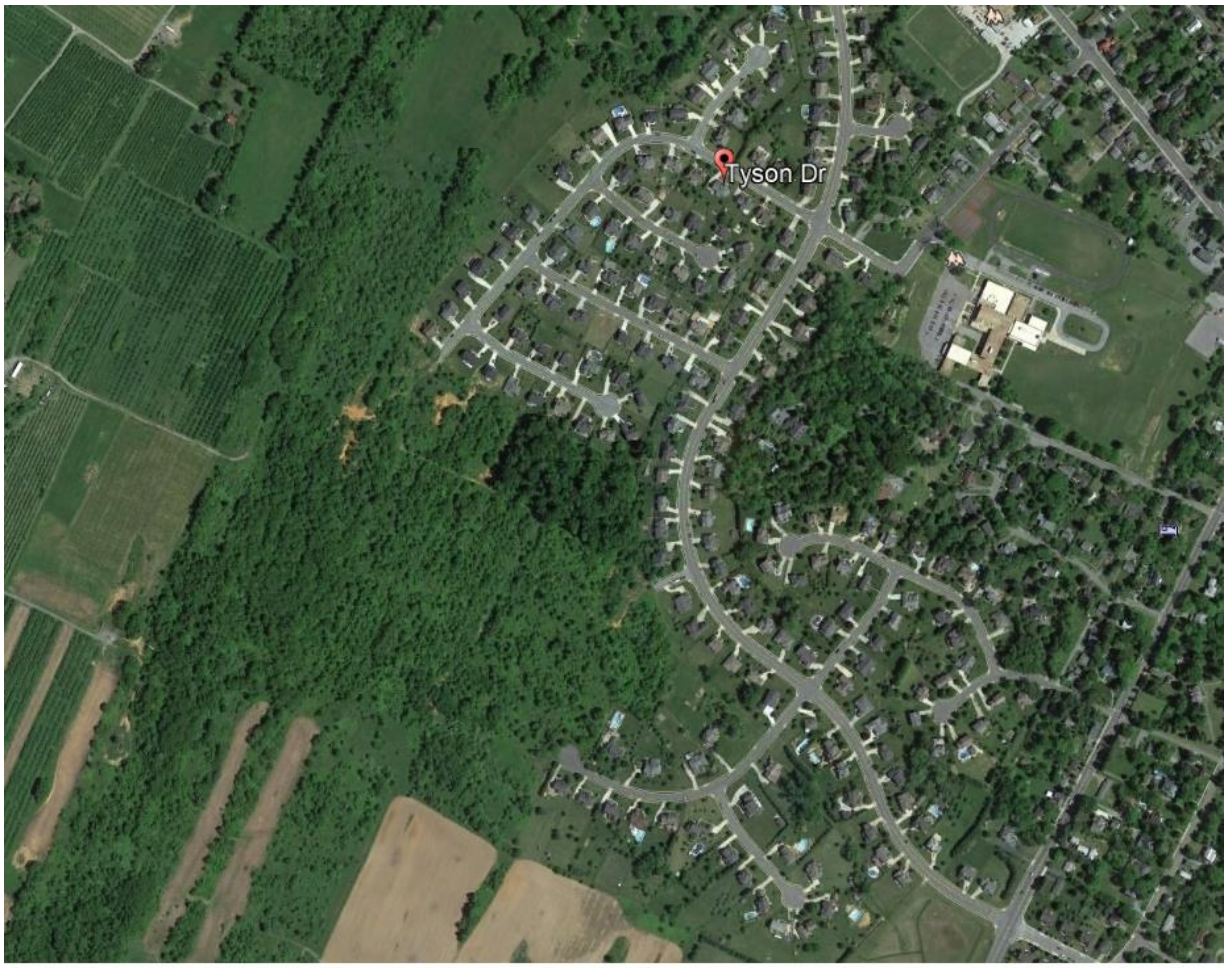


Figure 8. Site Remedial Action Plan Based on Site Analysis

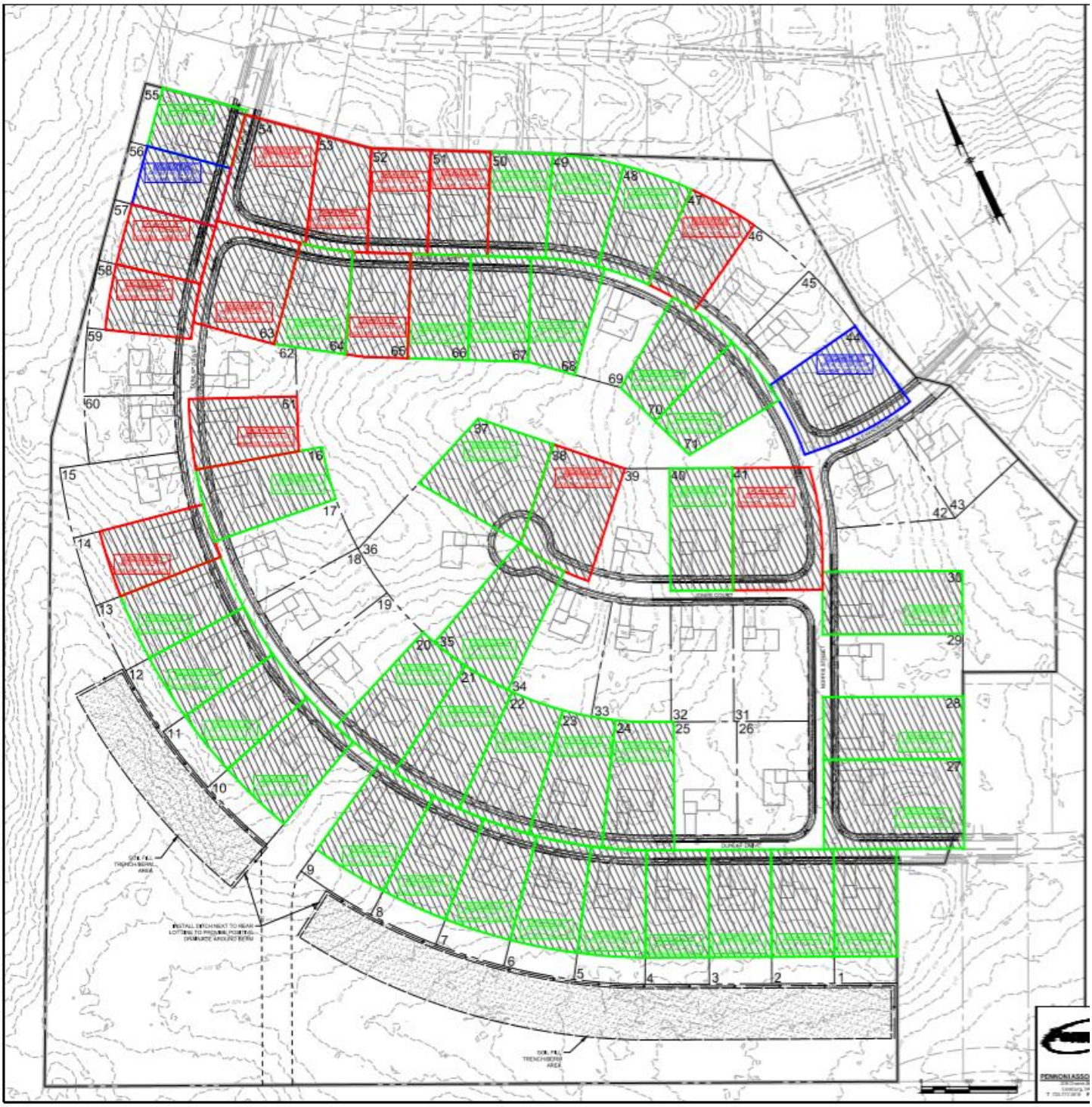


Figure 8 shows the boundaries of the Site and the proposed layout of the community. The buildings, its roadways and parking areas will cover approximately 80% of the proposed development area. The impacted

spoil will be relocated to an area the will be considered green space for the community residents. The relocated soil will have a two-foot cover creating a "cap" to eliminate potential exposures to the soil.

Figure 9. Site Remedial Action Plan Based on Site Analysis/more detailed

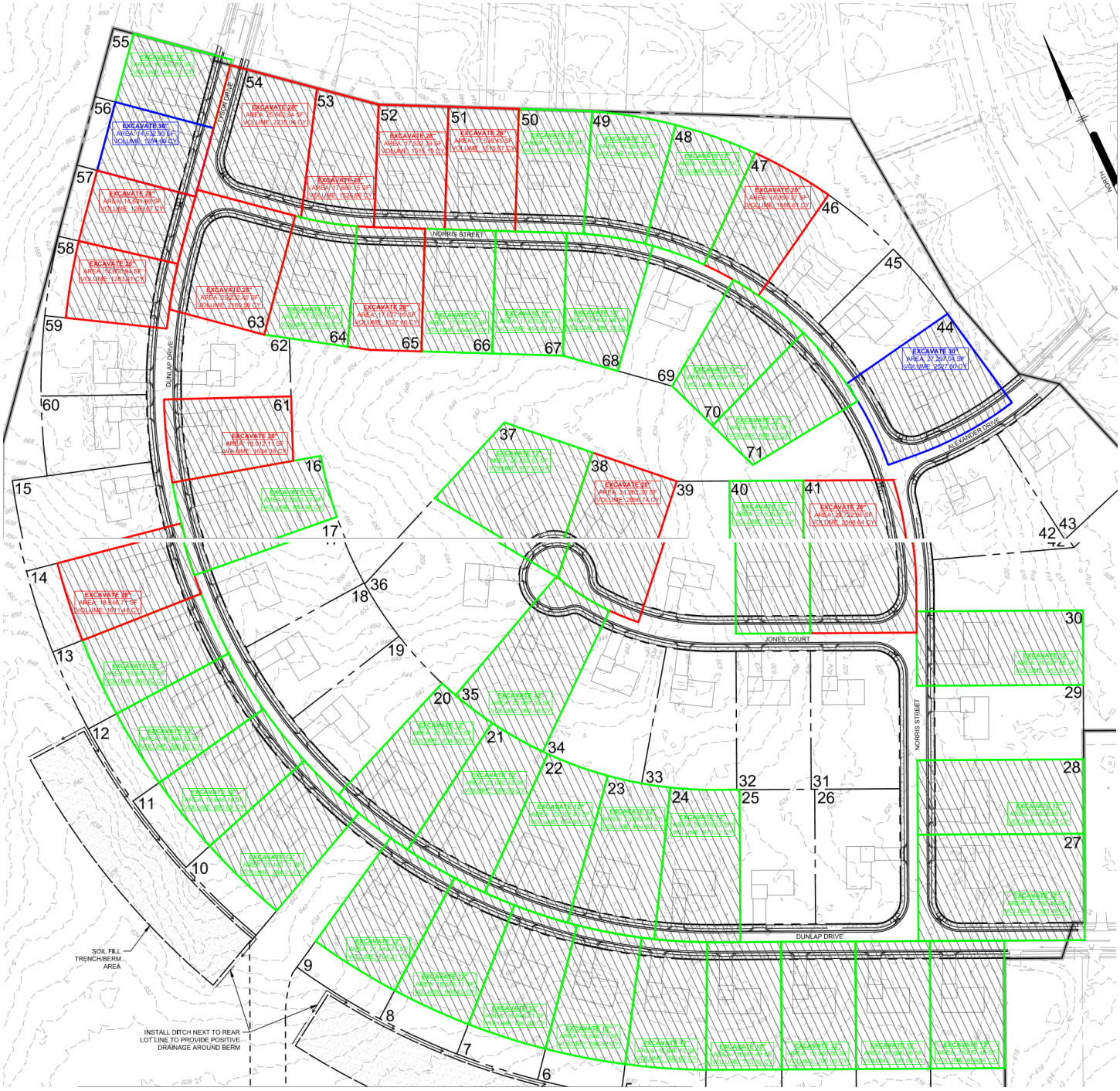
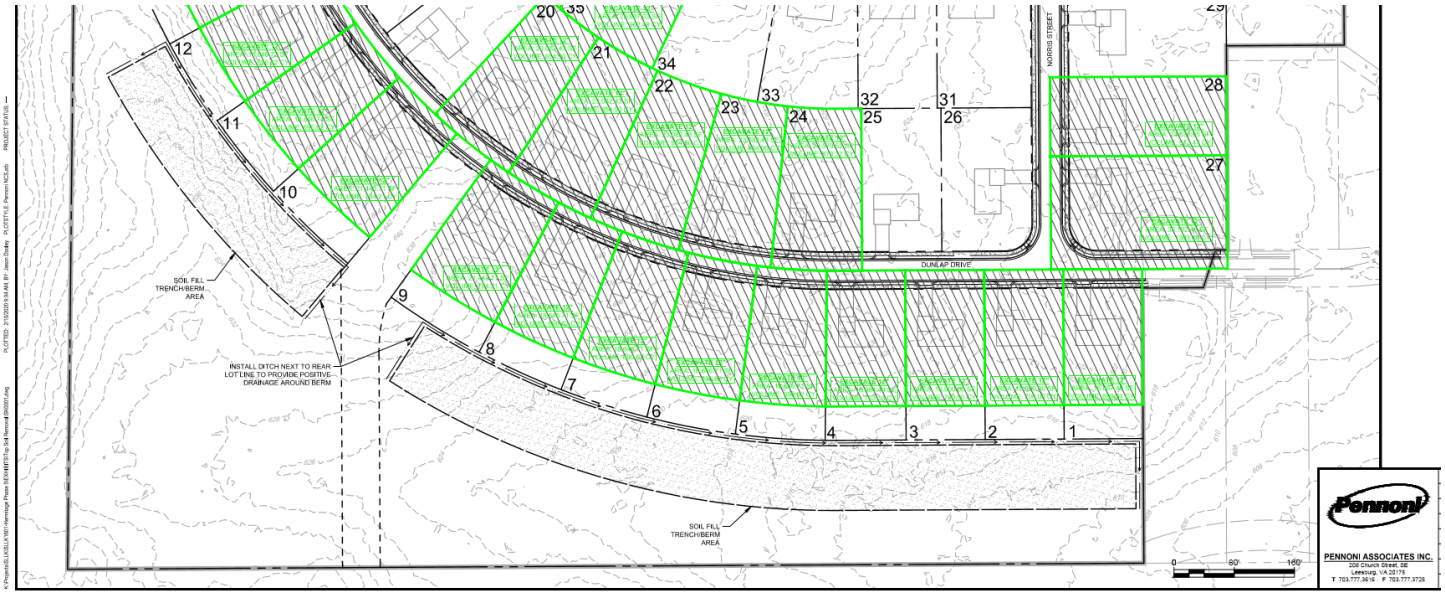


Figure 10. Controlled Management Area for Impacted Soil

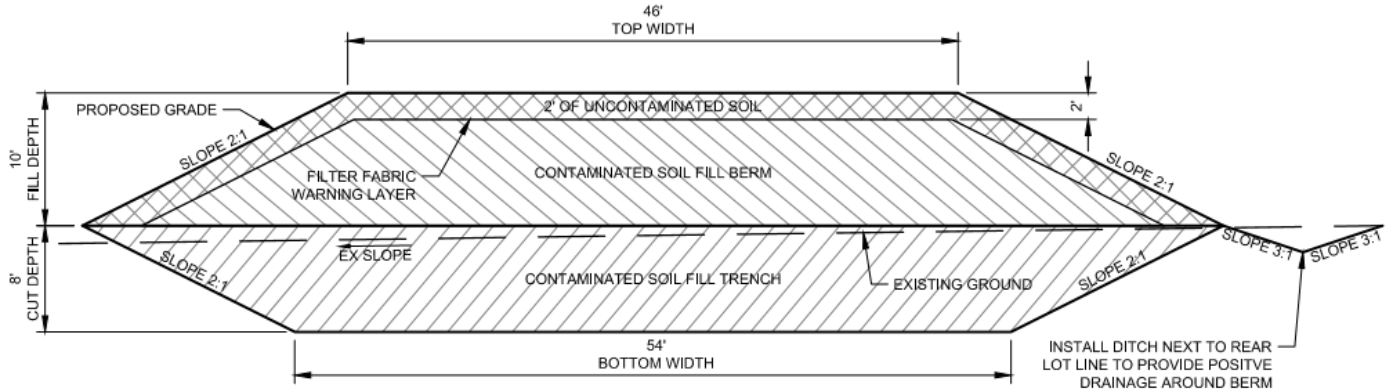


The remediation strategy consists of traditional cut and fill activities to remove the top 1 to 1 ½ feet of impacted soil and relocate it to the designated berm identified in red in Figure 7. This action is intended to mitigate the risk to human health or the environment. Testing of the 71 lots proposed show the majority of the impacted soil is within the top one foot layer due to past orchard management practices for pest control. The COCs include arsenic and lead. The details provided in this report delineate the extent of the contamination and the proposed remedial action plan eliminates both the arsenic and lead contaminants of concern to the residents.

Institutional controls in the form of deed restrictions incorporated in the Declaration of Restrictive Covenants that:

1. Groundwater beneath the site shall not be used for any purpose other than environmental monitoring and testing (if this is necessary at some point in the future);
2. The bermed area containing the impacted soil shall not be compromised by activities that could expose the impacted soils by digging into the burrow pit. The deliniation of the impacted soil will be identified by covering it with a geotextile fabric overwhich 2 feet of clean fill will be placed.

Figure 11. Controlled Management Berm for Impacted Soil



CORSS SECTION OF CONTAMINATED SOIL FILL TRENCH / BERM
(SCALE: 1"=10')

NOTES:

1. EXCAVATED MATERIAL WILL BE USED FOR SITE DEVELOPMENT AND INFRASTRUCTURE CONSTRUCTION.
2. THE DISPOSAL AREA IS WITHIN THE RUNOFF REDUCTION COMPLIANCE FOREST/OPEN SPACE AREA. SOIL AMENDMENTS MUST BE PERFORMED ON ANY DISTURBED SOILS WITHIN THIS AREA. REFER TO SOIL AMENDMENTS SPECIFICATIONS ON SHEET 74A OF THE HERMITAGE PHASE 5 SINGLE FAMILY DETACHED RESIDENTIAL PLANS.
3. ALL WORKERS SHALL WEAR DUST MASKS DURING TOPSOIL HANDLING.

SOIL DISPOSAL AREA MAINTENANCE NOTES:

1. THE MAINTENANCE OF THE DISPOSAL AREA SHALL BE IN ACCORDANCE WITH THE REGULATIONS SET FORTH IN THE FOREST/OPEN SPACE CONSERVATION AREA REGULATIONS, AS SHOWN ON SHEET 74A OF THE HERMITAGE PHASE 5 SINGLE FAMILY DETACHED RESIDENTIAL PLANS. NOTE THAT TREES ARE NOT PERMITTED WITHIN THE DISPOSAL AREA. ANY TREES WHICH MAY GROW WITHIN THE DISPOSAL AREA MUST BE REMOVED BEFORE REACHING 12" IN HEIGHT.
2. THE 2' BERM CAP MATERIAL SHALL BE FREE OF ROCKS LARGER THAN 6" IN DIAMETER.
3. THE DEPTH OF TOPSOIL EXCAVATION ON EACH LOT, PLACEMENT OF DISPOSED MATERIAL AND PLACEMENT OF THE FINISHED BERM CAP SHALL BE OBSERVED BY QUALIFIED PERSONS.
4. THE FINAL PERIMETER OF THE DISPOSAL BERM SHALL BE LOCATED ON THE DESIGN PLAN BY A FIELD SURVEY. A COPY OF THAT PLAN SHALL BE PROVIDED TO THE HOA AS A PART OF THEIR COVENANTS AND RESTRICTIONS.
5. THE FILTER FABRIC WARNING LAYER NOTED SHALL BE OF A NON-DEGRADABLE MATERIAL ABLE TO PROVIDE WARNING IF THE SITE IS EXCAVATED. THAT MATERIAL SELECTION SHALL BE APPROVED AND ITS PLACEMENT OBSERVED BY QUALIFIED PERSONS.

10.0 PUBLIC PARTICIPATION

To comply with the public participation requirements of the voluntary remediation regulations, the participant will complete the following:

- Provide a notice describing the proposed or completed remedy to the local government where the site is located.
- Provide the same notice to all adjacent property owners, other owners whose property has been affected by contaminants as determined through the site characterization report.
- Publish the notice once in a newspaper of general circulation in the area affected by the voluntary action.
- Provide a 30-day comment period once the notice is issued.
- Provide documentation to the department of the public notice and any comments received and evaluation of the comments impact on the project.

Current neighboring property uses:

Residential homes: North and East

Orchard: Bev Byrd property: west

Orchard: Dick Byrd property: south

It is the intent of this Report to demonstrate that all required environmental site characterization, risk assessment, and remedial measures satisfy the VRP's requirements for Site closure. Upon the VRP's review and approval of this Report, RI will advertise the 30-day public notice in the local newspaper and send notices to the adjacent property owners per VRP requirements. Upon completion of the 30-day public response period (and payment of any outstanding VRP-related fees), RI is confident that an expedited Certification of Satisfactory Completion of Remediation (Certificate) can be issued for the Site.

Contaminants: Arsenic and lead suspected as part of historical use of spray applications at the orchard area. Pesticides, herbicides, insecticides, etc. historical use of spray applications at the orchard area. No known mixing stations in the Phase V area.

CERCLA Investigation: Has an investigation(s) been conducted relative to the property under the auspices of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), also referred to as Superfund? NO

CERCLA / NPL Listing: Has the site or any portion of the property ever been listed or proposed for listing on the National Priorities List (NPL) established under CERCLA? NO

Petroleum or Oil Releases: Is/are the release(s) involved currently regulated, or been regulated, under the Code of Virginia State Water Control Law Article 9 §§ 62.1-44.34.8 et seq. or Article 11 §§ 62.1-44.34:14 et seq.? For releases involving petroleum compounds, it is advisable to inquire with the appropriate regional office about the potential applicability of these articles. Include any pollution complaint numbers (PC#) issued to the site. NO

RCRA: Is the site subject to the Virginia Hazardous Waste Management Regulations (VHWMR) per 9VAC20-60-10 et seq.? Provide all EPA ID numbers associated with the site. If the site is or was a hazardous waste (HW) generator, indicate if hazardous waste was treated, stored, and/or disposed of at the site. NO

Present or Past Permits: Has Virginia DEQ or USEPA issued any permits, past or present, to the site (air, water, waste, etc)? Please note, EPA ID Numbers for hazardous waste generators are not permits, identify these in the discussion of RCRA jurisdiction. NO

Enforcement Action: Is remediation of the release(s) currently subject to an enforcement action pursuant to city, county, state, or federal environmental laws? Enforcement actions are generally interpreted as orders or civil lawsuits issued by governmental entities to conduct regulated activities at a property or facility. They include environmental orders or agreements (e.g., Consent Order / Agreement, Interim Agreement, Letter Agreement, etc.) with a city, county, state, or federal agency. NO

Open Dump / Unpermitted Facility: Has solid waste, construction debris, demolition debris, industrial waste, ash, or any other waste been disposed or otherwise managed on the site? Has the site been determined, prior to application submittal, to be an open Dump / Unpermitted Facility under 9VAC20-81-45, and do such conditions still exist? NO

Waste Generator: Do any past or current activities conducted at the property require classification as an EPA or Virginia Hazardous Waste Generator? If a facility or operation on the property was or is classified as a hazardous waste generator, specify the applicable identification number in the discussion of RCRA jurisdiction.NO

Immediate Risk: To the best of your knowledge, does contamination at the property poses an immediate risk of harm to human health and the environment? NO

Impact to Drinking Water: Does contamination at the property have the potential to impact, or has already impacted, public or private drinking water wells or surface water supplies (i.e. supply intakes or streams or lakes)? The area will have public drinking water. No private wells are going to be used at the site.

11.0 REFERENCES

The following documents, maps, or other publications may have been used in the preparation of this report.

American Society for Testing and Materials (ASTM) 2005. Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM E 1527-05). Philadelphia, PA, USA.

Environmental Data Resources, Inc., Radius Map and Site Assessment Reports.

Federal Emergency Management Agency, National Flood Insurance Program, Flood Insurance Maps.

Clark County Tax Mapping

Google Earth

United States Department of Agriculture, Soil Conservation Service, Soil Surveys.

United States Geological Survey, Topographic Maps.

United States Department of the Interior, Fish and Wildlife Service, National Wetlands Inventory Map

Virginia Department of Environmental Quality, VRP Program

Site Characterization and Risk Assessment Summary Report Voluntary Remediation Program Site #VRP0072; Robert Regan Village, Tax Parcel #14-5-251B 418 Mosby Boulevard Berryville, Virginia 2261

Fetter, C.W., Applied Hydrogeology, Second Edition, Merrill Publishing Co., 1988

US Geological Survey (USGS) 7.5 Minute Series, Topographic Quadrangle - Clarke, VA, 1994, Contour Interval – 10’

Virginia Division of Mineral Resources, 1993, Geologic Map of Virginia: Virginia Division of Mineral Resources, scale 1:500,000

USEPA, EPA Adult Lead Methodology (ALM), https://www.epa.gov/superfund/lead-superfund-sites

Web links:

US Dept. of Agriculture – Natural Resource Conservation Service – Web Soil Survey
http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

US Fish & Wildlife Service National Wetlands Inventory
https://www.fws.gov/wetlands/Data/Mapper.html

US Geological Survey (USGS) Mineral Resources On-Line Spatial Data https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=VApsg

Table 3.1a, Selection of Exposure Pathways – Onsite, page 14 of "Site Characterization and Risk Assessment Summary Report Voluntary Remediation Program Site #VRP00720"; Robert Regan Village Tax Parcel #14-5-251B 418 Mosby Boulevard Berryville, Virginia 22611. Prepared by: Groundwater & Environmental Services, Inc. 571 Southlake Boulevard Richmond, Virginia, 23236. November 6, 2017

Appendix A: VRP Acceptance from VADEQ

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 1111 E. Main Street, Suite 1400, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
www.deq.virginia.gov

Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

October 4, 2019

James Richard Wilkins III
Hermitage LLC
13 S. Loudoun Street
Winchester, Virginia 22601

Re: Voluntary Remediation Program (VRP) Eligibility Determination
Site Name: Hermitage Phase V
Tyson Drive
Berryville, Virginia 22611
VRP00762

Dear Mr. Wilkins:

The Office of Remediation Programs (ORP) of the Department of Environmental Quality (DEQ) is tasked with oversight of remediation activities conducted under the Virginia Voluntary Remediation Program. The VRP application submitted for the referenced site has been reviewed by ORP, in consultation with DEQ's Valley Regional Office and with other DEQ programs.

Based on the information provided in the application, DEQ has determined the site is eligible to participate in the VRP and we strongly encourage the assessment and cleanup of environmental contamination at brownfield sites.

A Phase 1 Registration Fee payment in the amount of $2,000 was received on September 10, 2019. In order to proceed with voluntary remediation and to become fully enrolled in the VRP, please remit the required Phase 2 Registration Fee in the amount of $7,500 within 90 days of the date of this letter, pursuant to 9VAC20-160-65.C, *et seq*.

Please note that the $7,500 fee must be paid within 90 days of the date of this letter for the site to be considered enrolled in the VRP; otherwise, this determination will expire. Please include the assigned site number (**VRP00762**) on the check, make the check payable to the Treasurer of Virginia, and send it to Virginia DEQ, Receipts Control, P.O. Box 1104, Richmond, VA 23218.

Re: Voluntary Remediation Program (VRP) Eligibility Determination
Site Name: Hermitage Phase V
Tyson Drive
Berryville, Virginia 22611
VRP00762

If you have any questions or need additional information, please contact Meade Anderson, VRP & Brownfields Program Manager, at j.meade.anderson@deq.virginia.gov or 804-698-4179.

Sincerely,

Justin L. Williams, Director
Division of Land Protection & Revitalization

ec: Graham Simmerman – DEQ-VRO
Jed Pascarella – DEQ-VRO

APPENDIX B. Boring Logs with GPS Location

Lot #	Latitude	Longitude	Soil Description
1	39.146977	77.994159	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
2	39.147120	77.994457	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
3	39.147263	77.994760	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
4	39.147354	77.995100	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
5	39.147514	77.995414	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
6	39.147645	77.995535	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
7	39.147875	77.995852	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
8	39.148019	77.996161	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
9	39.148257	77.996208	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
10	39.148471	77.996432	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
11	39.148755	77.996591	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
12	39.149099	77.996500	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
13	39.149296	77.996392	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
14	39.149549	77.996398	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
15	39.149833	77.996309	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
16	39.148813	77.996393	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
17	39.148622	77.996294	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
18	39.148343	77.996300	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
19	39.148100	77.996113	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
20	39.147825	77.995949	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
21	39.147757	77.995644	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
22	39.147579	77.995373	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
23	39.147378	77.995188	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
24	39.147338	77.994855	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
25	39.147214	77.994543	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
26	39.147099	77.994199	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
27	39.146829	77.993779	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
28	39.147863	77.993479	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet

29	39.148075	77.993368	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
30	39.148316	77.993255	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
31	39.148058	77.993429	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
32	39.148168	77.993685	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
33	39.148216	77.993980	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
34	39.148449	77.994189	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
35	39.148495	77.994545	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
36	39.148635	77.994703	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
37	39.148813	77.994807	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
38	39.149091	77.994835	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
39	39.148737	77.994707	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
40	39.148582	77.994565	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
41	39.148285	77.994151	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
42	39.148616	77.993073	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
43	39.148859	77.993088	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
44	39.149058	77.993000	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
45	39.149347	77.993165	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
46	39.149566	77.993304	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
47	39.149779	77.993569	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
48	39.149962	77.993998	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
49	39.150084	77.994099	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
50	39.150125	77.994402	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
51	39.150248	77.994856	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
52	39.150446	77.994959	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
53	39.150563	77.995322	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
54	39.150826	77.995433	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
55	39.15111	77.995502	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
56	39.150088	77.995622	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
57	39.150661	77.995715	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
58	39.150460	77.995973	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet

59	39.150268	77.996155	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
60	39.150061	77.996304	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
61	39.149142	77.996443	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
62	39.149276	77.996401	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
63	39.149668	77.996421	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
64	39.149884	77.993790	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
65	39.149641	77.993531	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
66	39.149386	77.993281	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
67	39.149238	77.993181	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
68	39.149000	77.993041	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
69	39.148744	77.993248	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
70	39.148493	77.993164	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet
71	39.148256	77.993206	Topsoil – a few inches, reddish brown silty clay – 1 to 4 feet

Table 2. Arsenic and Lead Concentration from Lots 1 Through 71, 0 feet to 4 feet

Target Concentration	<20 mg/kg	<20 mg/kg	<20 mg/kg	<20 mg/kg	<20 mg/kg	<400 mg/kg	<400 mg/kg	<400 mg/kg
Sample/Lot	Arsenic-0'	Arsenic-1'	Arsenic-2'	Arsenic-3'	Arsenic-4'	Lead	Lead-1'	Lead-2'
1	64.2	8.3				330		
2	86.8	9.8				380		
3	62.9	7.5				178		
4	27.8	17.3				90.5		
5	115.0	7.4				106		
6	52.0	5.2				227		
7	28.9	15.7				41.2		
8	43.5	11.2				223		
9	156.0	3.2				543	16.3	
10	21.4	7.1				32.4		
11	22.0	5.2				76.9		
12	52.9	9.0				220		
13	65.5	12.0				361		
14	46.3	21.5	9.0			266		
15	18.0					29.2		
16	111.0	12.2				328		
17	16.3					22.8		
18	12.3					44.1		
19	13.2					123		
20	135.0	16.0				449	34.3	
21	131.0	18.0				674	25.2	
22	222.0	6.4				815	12.0	
23	115.0	5.9				414	25.2	
24	123.0	8.7				679	23.5	
25	10.1					14.8		
26	19.8					60.1		
27	21.1	4.1				59.4		
28	31.3	15.4				101		
29	8.0					25		
30	144.0	10.9				654	44.0	
31	17.4					83.1		
32	6.1					13		
33	6.0					15		
34	14.4					48.7		
35	271.0	13.1				860	17.5	
36	0.0					24.3		
37	21.2	16.0				57.5		
38	20.3	67.2	9.0			57.6		
39	15.7					69.7		
40	108.0	14.2				410	46.0	
41	28.3	20.1	8.5			95.5		
42	12.2					18		
43	19.4					88.6		
44	37.4	170.0	222.0	9.2	12.1	93		
45	12.3					25.6		
46	6.4					10.7		
47	68.2	29.0	14.2			283		
48	44.1	7.8				127		
49	75.6	6.3				425	11.5	
50	307.0	6.8				1010	12.1	
51	62.9	26.4	13.5			259		
52	44.0	32.7	17.1			188		
53	115.0	20.6	15.3			905	129	
54	193.0	126.0	9.5			1120	643	11
55	147.0	12.8				1050	22.4	
56	89.9	71.1	22.5	7.4		476	148	
57	43.8	20.3	9.7			229		
58	62.3	28.5	19.5			342		
59	18.5					30.3		
60	17.5					21.8		
61	33.0	91.0	5.4			92.5		
62	17.6					40.1		
63	454.0	29.0	8.0			989	54.4	
64	59.4	7.7				103		
65	72.4	25.1	17.2			103		
66	73.3	19.6				398		
67	53.3	6.8				212		
68	312.0	10.9				870	39.1	
69	19.1					76.2		
70	54.2	11.5				203		
71	76.8	16.2				422	29.3	

Respectfully submitted,

Jeffery L. Rezin
President

Environmental & Safety Consulting