PROPOSED REMEDIAL ACTION PLAN

Ithaca Falls Overlook
Environmental Restoration Project
Ithaca, Tompkins County
Site No. E755018
May 2017

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of contaminants at the site resulted in threats to public health and the environment that were addressed by actions known as interim remedial measures (IRMs), which were undertaken at the site. An IRM is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the remedial investigation (RI) or feasibility study (FS). The IRMs undertaken at this site are discussed in Section 6.2. Contaminants include hazardous wastes and/or petroleum.

Based on the implementation of the IRM(s), the findings of the investigation of this site indicate that the site no longer poses a threat to human health or the environment. The IRM(s) conducted at the site attained the remediation objectives identified for this site, which are presented in Section 6.5, for the protection of public health and the environment. No Further Action is the remedy proposed by this Proposed Remedial Action Plan (PRAP). A No Further Action remedy may include continued operation of any remedial system installed during the IRM and the implementation of any prescribed institutional controls/engineering controls (ICs/ECs) that have been identified as being part of the proposed remedy for the site. This PRAP identifies the IRM(s) conducted and discusses the basis for No Further Action.

The 1996 Clean Water/ Clean Air Bond Act provides funding to municipalities for the investigation and cleanup of brownfields. Brownfields are abandoned, idled, or under-used properties where redevelopment is complicated by real or perceived environmental contamination. They typically are former industrial or commercial properties where operations may have resulted in environmental contamination. Brownfields often pose not only environmental, but legal and financial burdens on communities. Under the Environmental Restoration Program, the state provides grants to municipalities to reimburse up to 90 percent of eligible costs for site investigation and remediation activities. Once remediated, the property can then be reused.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repository identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repository:

Tompkins County Public Library
101 East Green Street
Ithaca, NY 14850
Phone: 607-272-4557

A public comment period has been set from:

6/1/2017 to 7/17/2017

A public meeting is scheduled for the following date:

6/20/2017 at 6:30 PM

Public meeting location:

Ithaca City Hall, Common Council Chambers

At the meeting, the findings of the remedial investigation (RI) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent through 7/17/2017 to:

Gary Priscott
NYS Department of Environmental Conservation
Division of Environmental Remediation
1679 Route 11
Kirkwood, NY 13795
gary.priscott@dec.ny.gov

The Department may modify the proposed remedy presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The Ithaca Falls Overlook site is an approximately 0.95-acre parcel in an urban area within the City of Ithaca, Tompkins County. The site has a narrow access from Lake Street on the south and extends north to the Fall Creek gorge. Portions of the site share a property boundary with the Former Ithaca Gun Factory, Brownfield Cleanup Program (BCP) site (Site No. C755019). The off-site area of the BCP site, identified as Former Ithaca Gun Factory - Off-site (Site No. C755019A), is located to the west.

Site Features: The site is composed of four different areas described separately as the: Western Accessway; Former Walkway; Raceway; and Island. The Western Accessway is a narrow north-south trending land corridor providing access from Lake Street, most of this area is steeply sloping to the west. The Former Walkway is an area that extends from the Western Accessway to the former bridge over the Raceway. The Raceway is a narrow water channel constructed in bedrock which was part of the water power canal for the former Ithaca Gun Company. The Island area is an elevated area located between the Raceway and the Fall Creek gorge. There are no existing buildings on the site.

Current Zoning and Land Use: The site is currently inactive, and zoned for industrial use. The surrounding parcels are currently used for a combination of public, residential, and commercial uses. The nearest residential area is across Lake Street to the south.

Past Use of the Site: The site was part of the former Ithaca Gun Company property. The Ithaca Gun Company manufactured firearms at this property from 1885 to 1986. Site contamination appears to be associated with this prior manufacturing activity and the disposal of related waste (e.g., lead shot). In 2002, removal actions were conducted in isolated areas of the site by the United States Environmental Protection Agency (USEPA). During the removal actions, buildings on the Island area were removed and areas of soil on the site were excavated for off-site disposal. In some excavation areas, where necessary, clean backfill and topsoil was placed and native vegetation was re-established. In addition, temporary erosion control measures were placed on the western slope of the Island area. In 2015, the USEPA performed a removal action to excavate contaminated soil along the base of the south Fall Creek gorge wall. All USEPA removal actions were completed meeting cleanup criteria for restricted-residential use (includes active recreational uses).

Site Geology and Hydrogeology: The predominantly shale bedrock underlying the site is at or near the surface. Therefore, soil, where it exists, may range from only a few inches to less than a few feet thick. Greater thickness of soil appears to exist in portions of the Western Accessway and in isolated portions of the Island area. Depth to groundwater within the bedrock is typically greater than 20 feet below ground surface. Groundwater flow direction is generally to the west-northwest.

A site location map is attached as Figure 1. The different areas of the site, referred to above and described within this document, are shown on the site map included as Figure 2.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, an alternative that restricts the use of the site to restricted-residential use (which allows for commercial use and industrial use) as described in Part 375-1.8(g) is being evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

No PRPs have been documented to date.

Since no viable PRPs have been identified, there are currently no ongoing enforcement actions. However, legal action may be initiated at a future date by the state to recover state response costs should PRPs be identified. The City of Ithaca will assist the state in its efforts by providing all information to the state which identifies PRPs. The City of Ithaca will also not enter into any agreement regarding response costs without the approval of the Department.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a contaminant that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site is/are:

benzo(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
indeno(1,2,3-CD)pyrene
cis-1,2-dichloroethene
tetrachloroethene (PCE)
trichloroethene (TCE)
vinyl chloride
arsenic
lead

Based on the investigation results, comparison to the SCGs, and the potential public health and environmental exposure routes, certain media and areas of the site required remediation. These media were addressed by the IRMs described in Section 6.2. More complete information can be found in the RI Report and the IRM Construction Completion Report.

6.2: Interim Remedial Measures

An IRM is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

The following IRMs have been completed at this site based on conditions observed during the RI. Public meetings, review, and comment were incorporated as citizen participation activities by the City of Ithaca prior to implementing the IRMs.

IRM Soil Excavation and Cover - Western Accessway Area

Excavation and off-site disposal of the lead contaminated soil in areas of the Western Accessway portion of the site began in August 2013 and was completed in January 2014. Soil with lead concentrations exceeding the restricted-residential use soil cleanup objective (SCO) of 400 parts per million (ppm), as defined by 6 NYCRR Part 375-6.8, were excavated from two separate areas to a depth of two feet below grade and removed from the site. The excavation area in the northern portion of the Western Accessway covered an area of approximately 5,400 square feet, and the excavation area in the southern portion, near Lake Street, covered an area of approximately 600 square feet. In the southern excavation area, bedrock was encountered within two feet of the ground surface, in these areas the bedrock surface was vacuumed to remove any loose soil/debris. A total of 785 tons of lead contaminated soil was removed from the Western Accessway area.

Following excavation in the northern area, a demarcation layer (i.e., orange snow fence) was placed above the remaining soil with lead at concentrations exceeding the restricted-residential use SCOs. Above the demarcation layer, a soil cover with a minimum thickness of two feet was constructed using imported fill material and topsoil meeting the requirements of 6 NYCRR Part 375-6.7(d) for restricted-residential use. The soil cover also included the use of erosion control mats and was revegetated with a steep slope vegetation mix.

IRM Soil Excavation and Cover - Island, Raceway, and Former Walkway Areas

Excavation and off-site disposal of lead contaminated soil from the Island, Raceway, and Former Walkway areas was conducted from November 2014 through June 2015. An additional small area of soil with exposed lead shot was removed from the Island Area and the Raceway sidewall in April 2017.

Prior to excavation of soil on the Island area, concrete and asphalt slabs were removed and disposed of off-site. Excavation on the Island area mainly consisted of removing non-native lead contaminated industrial soil. The excavation area extended off-site to include the steep western slope of the Island area. Thickness of the lead contaminated soils ranged from approximately

two to seven feet. Greatest thicknesses were found along edges of the Island where bedrock dropped off to the west and south. Clearance sampling was conducted through grid based sampling over the entire excavation area. Excavation was continued until analytical results for soil in each grid met the restricted residential use SCOs. In areas that encountered competent bedrock, the surface of the bedrock was vacuumed to remove any loose soil/debris. The bridge to the Island area was removed during excavation activities in order to access contaminated soil around the bridge foundation. A total of 1,750 tons of lead contaminated soil and 327 tons of concrete were removed from the Island area.

Removal of lead contaminated soil in the Raceway included areas along the base of the Raceway and the sidewalls. Throughout most of the Raceway, soil was removed using a combination of hand tools and vacuuming; however, in the plunge pool area of the Raceway, a mini-excavator was used along with hand tools to remove soil. Soil was transported out of the plunge pool to the soil staging area by a crane and two-yard skip boxes. The excavation of the plunge pool area extended off-site beyond the western property boundary. Soils were fully removed to bedrock in the Raceway with the exception of sidewall areas along the northern side of the Raceway where post-excavation sampling confirmed that the soil met the restricted-residential use SCOs. The IRM area was extended beyond the eastern property boundary to include the eastern limits of the raceway. A total of 42 tons of lead contaminated soil was removed from the Raceway area.

Lead contaminated soil was removed from the Former Walkway area. Soil in the approximately 3,200 square foot area was removed to a depth of up to two feet. A total of 76 tons of lead contaminated soil was removed from the Former Walkway area. Following excavation, a demarcation layer was placed above the remaining soil with lead at concentrations exceeding the restricted-residential use SCOs. Above the demarcation layer, a soil cover with a minimum thickness of two feet was constructed using imported fill material and topsoil meeting the requirements of 6 NYCRR Part 375-6.7(d) for restricted-residential use. The soil cover also included use of erosion control mats and was revegetated.

Post-IRM soil screening conducted in October 2016 identified an approximate 600 square foot area of contaminated surficial soil in a steeply sloped area of the site. The contaminated soils overlapped the general boundary between the Island and Raceway areas. The surficial soils were removed in April 2017 using hand tools and vacuuming.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU 01.

Nature and Extent of Contamination: Soil and groundwater were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), inorganics, polychlorinated

biphenyls (PCBs), and pesticides. Based upon investigations conducted to date, the primary contaminants of concern that are site related appear to be SVOCs and inorganics (metals) in soil associated with the past operational history of the former Ithaca Gun factory. The VOC groundwater contamination present in an isolated portion of the site appears to be the results of disposals that occurred on the adjacent Former Ithaca Gun Factory site.

Soil – Remedial actions conducted as interim remedial measures (IRMs) have successfully achieved soil cleanup objectives (SCOs) for restricted-residential use. Remaining subsurface soil contamination exists beneath the cover systems constructed in portions of the Western Accessway and Former Walkway areas. Primary soil contaminants below the cover system include polycyclic aromatic hydrocarbons (PAHs), which are a subset of SVOCs, and metals including arsenic and lead. Lead is the most prevalent contaminant in soil at the site, based on frequency of occurrence and concentrations detected. Soil contamination with similar characteristics has been found off-site and has been addressed through USEPA removal actions and will continue to be addressed through the Former Ithaca Gun Factory remedial program.

Groundwater – The primary contamination of concern in site groundwater consist of the following VOCs: cis-1,2,-dichloroethene (cis12DCE), tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride. However, the distribution of these contaminants appears to indicate that the source for the impacts to groundwater is hydraulically upgradient on the adjacent Former Ithaca Gun Factory site. The groundwater contamination passes beneath the Western Accessway portion of this site and continues to migrate off-site. The off-site area of groundwater contamination has been and continues to be investigated as part of the Former Ithaca Gun Factory – Off-site remedial program. Where contamination exists in off-site groundwater it consists mostly of detections of TCE only and at concentrations below the groundwater standard.

Soil Vapor – VOCs present at elevated concentrations in soil vapor samples included 1,1,1-tricholoethane, cis12DCE, PCE, and TCE with maximum concentrations of 213, 75, 61, and 3,154 µg/m3, respectively. VOCs present in the soil vapor mostly correspond to VOCs detected in groundwater and occur in the same general area. An off-site vapor intrusion evaluation continues to be conducted by the Department as part of the Former Ithaca Gun Factory – Off-site remedial program. Based on sampling results for TCE, mitigation has been conducted at eight off-site structures.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

Access to the site is unrestricted. However, contact with the contaminated soil is unlikely unless they dig below the two feet of clean cover. People are not drinking contaminated groundwater associated with the site because the area is served by a public water supply that obtains its water from a different source not affected by this contamination. Volatile organic compounds in the groundwater can move into the soil vapor (air between soil particles), which in turn may move into overlying buildings and affect indoor air quality. This process, similar to the movement of

radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Since there are no buildings on-site, soil vapor intrusion does not represent a concern for the site in its current condition. However, the potential exists for inhalation of site contaminants due to soil vapor intrusion for any future on-site development. Sub-slab depressurization systems (systems that ventilates/remove the air beneath a building) have been installed in several off-site structures as part of the remedial program for the Former Ithaca Gun Factory - Off-Site site (Site #C755019A) to prevent the indoor air quality from being affected by the contamination in soil vapor beneath the buildings. Sampling is ongoing to identify whether soil vapor intrusion is a concern for other off-site buildings.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

SECTION 7: SUMMARY OF PROPOSED REMEDY

No Further Action

Based on the results of the investigations at the site, the IRMs that have been performed, and the evaluation presented here, the Department is proposing No Further Action as the remedy for the site. This No Further Action remedy includes the implementation of an institutional control in

the form of an environmental easement and site management plan, as well as the ~~an~~ engineering control consisting of a cover system, installed for portions of the site by the IRMs, as the proposed remedy for the site. The Department believes that this remedy is protective of human health and the environment and satisfies the remediation objectives described in Section 6.5.

The elements of the IRMs already completed are discussed in Section 6.2 and the institutional and engineering controls are as follows:

1. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

• require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
• allow the use and development of the controlled property for restricted residential, commercial, and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
• restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
• require compliance with the Department approved Site Management Plan.

2. Site Management Plan

A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 1 above.

Engineering Controls: The Cover System discussed in Section 6.2 above.

This plan includes, but may not be limited to:
• an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
• descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
• a provision for evaluation of the potential for soil vapor intrusion for any new buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
• provisions for the management and inspection of the identified engineering controls;
• maintaining site access controls and Department notification; and
• the steps necessary for the periodic reviews and certification of the institutional and engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to monitoring of soil vapor intrusion for any new building developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

c. an Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection and reporting of any mechanical or physical components of the remedy.

3. Green Remediation

Green remediation principles and techniques will be implemented to the extent feasible in the site management of the remedy as per DER-31. The major green remediation components are as follows:

• considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
• reducing direct and indirect greenhouse gas and other emissions;
• increasing energy efficiency and minimizing use of non-renewable energy;
• conserving and efficiently managing resources; and
• reducing waste, increasing recycling, and increasing reuse of materials which would otherwise be considered a waste.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination. Soil and groundwater samples were analyzed for VOCs, SVOCs, inorganics (metals), PCBs, and pesticides.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into categories depending on what constituents were detected in each medium sampled. For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

Groundwater

Groundwater samples were collected from bedrock monitoring wells. Prior to conducting the soil removal IRMs described in Section 6.2, samples were collected during two groundwater sampling events and were used to assess groundwater conditions on and off-site. The results indicate that contamination in the groundwater at the site exceeds the SCGs for certain VOCs, one SVOC, and certain inorganics. Table 1 summarizes all contaminants that exceed the groundwater SCGs

Table 1 - Groundwater

Detected Constituents	Concentration Range (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
1,1-Dichloroethane	ND – 19	5	2 of 10
1,1-Dichloroethene	ND – 18	5	2 of 10
Benzene	ND – 2.1	1	2 of 10
Cis-1,2-Dichoroethene	ND – 1,800	5	6 of 10
Tetrachloroethene	ND - 230	5	3 of 10
Trans-1,2-Dichloroethene	ND – 11	5	2 of 10
Trichloroethene	ND – 1,700	5	7 of 10
Vinyl chloride	ND – 91	2	2 of 10
SVOCs			
Bis(2-Ethylhexyl)phthalate	ND – 7	5	1 of 10
Inorganics			
Antimony	5.42 JN – 18.9 N	3	10 of 10

Detected Constituents	Concentration Range (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
Chromium	ND – 86.5	50	1 of 10
Iron	80.6 – 1,100	300	5 of 10
Manganese	20.4 – 3,140	300	2 of 10
Sodium	13,200 – 271,000	20,000	9 of 10

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).
ND – compound was not detected.
J – reported value was obtained from a reading that was less than the quantification limit, but greater than the method detection limit.
N – matrix spike recovery was outside control limits.

The distribution of VOC contaminants appears to indicate that groundwater has been impacted by disposals that occurred hydraulically upgradient on the adjacent Brownfield Cleanup Program (BCP) site referred to as the Former Ithaca Gun Factory. Based on the magnitude of SCG exceedances and the frequency of detection, primary contamination of concern in groundwater consist of cis12DCE, PCE, TCE, and vinyl chloride. Figure 3 shows the distribution of total VOCs from the groundwater sampling events performed during the RI. As depicted, the contaminated groundwater passes beneath the Western Accessway portion of this site and migrates off-site generally to the west. The off-site area of groundwater contamination has been and continues to be investigated as part of the Former Ithaca Gun Factory – Off-site remedial program. Where site-related contamination exists in off-site groundwater, it contains TCE only and at concentrations below the groundwater standard.

Antimony, an inorganic constituent, has been detected in all on and off-site wells at concentrations greater than the groundwater SCG. However, laboratory data qualifiers indicate that antimony at these levels may be difficult to quantify. Presence of antimony is likely due to natural occurrence and not related to industrial contamination. Investigation boring logs show that the monitoring wells have been completed within rock types that make up the Ithaca and Renwick bedrock formations. These formations include pyritic silty shales and black shales that may contain higher levels of antimony. Additionally, it is unlikely that antimony would be detected in groundwater without presence of other inorganic constituents associated with contamination from munitions and present at higher concentration in soil at this site (i.e., lead, copper, and zinc).

The SVOC, bis(2-Ethylhexyl)phthalate and the inorganic constituent, chromium, each had only one exceedance of the groundwater SCG at one off-site well and for only one groundwater sampling event. The inorganic constituents, iron, manganese, and sodium, are all likely to be naturally occurring and in this setting are unrelated to industrial activities.

The primary contaminants of concern in groundwater as identified during the RI does not appear to be site-related, and therefore, no remedial alternatives need to be evaluated for groundwater as part of this remedial program. However, based on the findings of the RI, past disposal of hazardous waste and prior industrial activities that occurred at the adjacent Former Ithaca Gun Factory BCP site have resulted in the contamination of groundwater with VOCs. Further investigation and evaluation of remedial alternatives for VOC contaminants in groundwater will be addressed as part of the Former Ithaca Gun Factory remedial program. Further investigation of VOCs that have migrated off-site in groundwater will continue to be performed as part of the Former Ithaca Gun Factory – Off-site remedial program.

Soil

Surface and subsurface soil samples were collected at the site during the RI. Surface soil samples were collected from a depth of 0-2 inches to assess direct human exposure. Subsurface soil samples were collected from a depth of 2 inches to 16 feet to determine vertical distribution of contamination and assess the soil contamination impact to groundwater. Results indicate that soils at the site exceeded the unrestricted use SCOs and restricted-residential use SCOs for the protection of public health for specific SVOCs and inorganics. Table 2 shows the contaminant constituents detected, the concentration ranges, and frequency in which they exceeded SCGs before the IRMs were implemented.

Table 2 - Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted SCG
SVOCs					
Benzo(a)anthrecene	ND - 10	1	10 of 14	1	10 of 14
Benzo(a)pyrene	ND – 8.3	1	10 of 14	1	10 of 14
Benzo(b)fluoranthene	ND – 9.9	1	10 of 14	1	10 of 14
Benzo(b)fluoranthene	ND - 4	0.8	6 of 14	3.9	1 of 14
Chrysene	ND – 9.8	1	6 of 14	3.9	4 of 14
Dibenzo(a,h)anthracene	ND – 1.3	0.33	3 of 14	0.33	3 of 14
Indo(1,2,3-cd)pyrene	ND – 5.3	0.33	10 of 14	0.5	10 of 14
Inorganics					
Arsenic	7.15 - 939	13	11 of 15	16	9 of 15
Cadmium	ND – 13.6	2.5	2 of 14	4.3	2 of 14
Copper	20.5 – 7,440	50	7 of 14	270	3 of 14
Lead	15.5 – 131,000	63	107 of 111	400	88 of 111
Manganese	ND - 9,790	1,600	2 of 14	2,000	2 of 14
Mercury	0.098 – 2.91	0.18	10 of 14	0.81	3 of 14
Zinc	64.5 – 13,700	109	12 of 14	10,000	2 of 14

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted-Residential Use, unless otherwise noted.
ND – compound was not detected.

The primary soil contaminants, benzo(a)anthrecene, benzo(a)pyrene, benzo(b)fluoranthene, indo(1,2,3-cd)pyrene, arsenic, and lead, are associated with manufacturing activities and disposals of waste by the former

Ithaca Gun Company. Based on the RI and previous investigations associated with the former Ithaca Gun Company property, lead is the most prevalent contaminant in both frequency of occurrence and in the magnitude at which the SCOs are exceeded. Analysis for lead has often been used to determine the distribution and limits of contamination in soil at this site and on adjacent properties where soil removal actions have been conducted by the USEPA.

Based on the investigation results, comparison to SCGs, and the potential public health and environmental exposure routes, contaminated surface soil at this site was remediated through completion of IRMs described in Section 6.2 and summarized below according to the area of the site for which they occurred:

- Western Accessway (southern area) – full removal of contaminated soil to restricted residential SCOs.
- Western Accessway (northern area) – removal of contaminated soil to a depth of two feet or greater and construction of a clean soil cover with a minimum thickness of two feet for restricted-residential use.
- Island – full removal of contaminated soil to restricted residential SCOs.
- Raceway – full removal of contaminated soil to restricted residential SCOs.
- Former Walkway – removal of contaminated soil to a depth up to two feet and construction of a clean soil cover with a minimum thickness of two feet for restricted residential use.

Figure 4 shows areas where IRMs were performed and where contaminated subsurface soil remains beneath clean soil cover. The SVOC and inorganic contaminants present in soil at this site have not been found to be impacting groundwater.

Soil contamination with similar characteristics has been found off-site and has either already been addressed through USEPA removal actions or will be addressed at the adjacent property through the Former Ithaca Gun Factory remedial program.

Soil Vapor

The evaluation of the potential for soil vapor intrusion resulting from the presence of groundwater contamination was evaluated by the sampling of soil vapor. At this site no buildings were present in impacted areas, so only soil vapor was evaluated.

Soil vapor samples were collected from four soil vapor points installed on-site within the Western Accessway area. VOCs present at elevated concentrations in soil vapor samples included 1,1,1-trichloroethane, cis-1,2-dichloroethene, tetrachloroethene, and trichloroethene with maximum concentrations of 213, 75, 61, and 3,154 $\mu g/m^3$, respectively. VOCs present in soil vapor correspond to VOCs detected at higher concentrations in groundwater and exist in the same general area.

Based on the findings of the RI, past disposal of hazardous waste and the prior industrial activities that occurred at the adjacent Former Ithaca Gun Factory BCP site have resulted in the contamination of soil vapor. Further investigation and evaluation of remedial alternatives for VOCs in soil vapor will be conducted as part of remedial program for the Former Ithaca Gun Factory site.

Off-site evaluation of the potential for soil vapor intrusion continue to be conducted as part site characterization for the Former Ithaca Gun Factory – Off-site area.

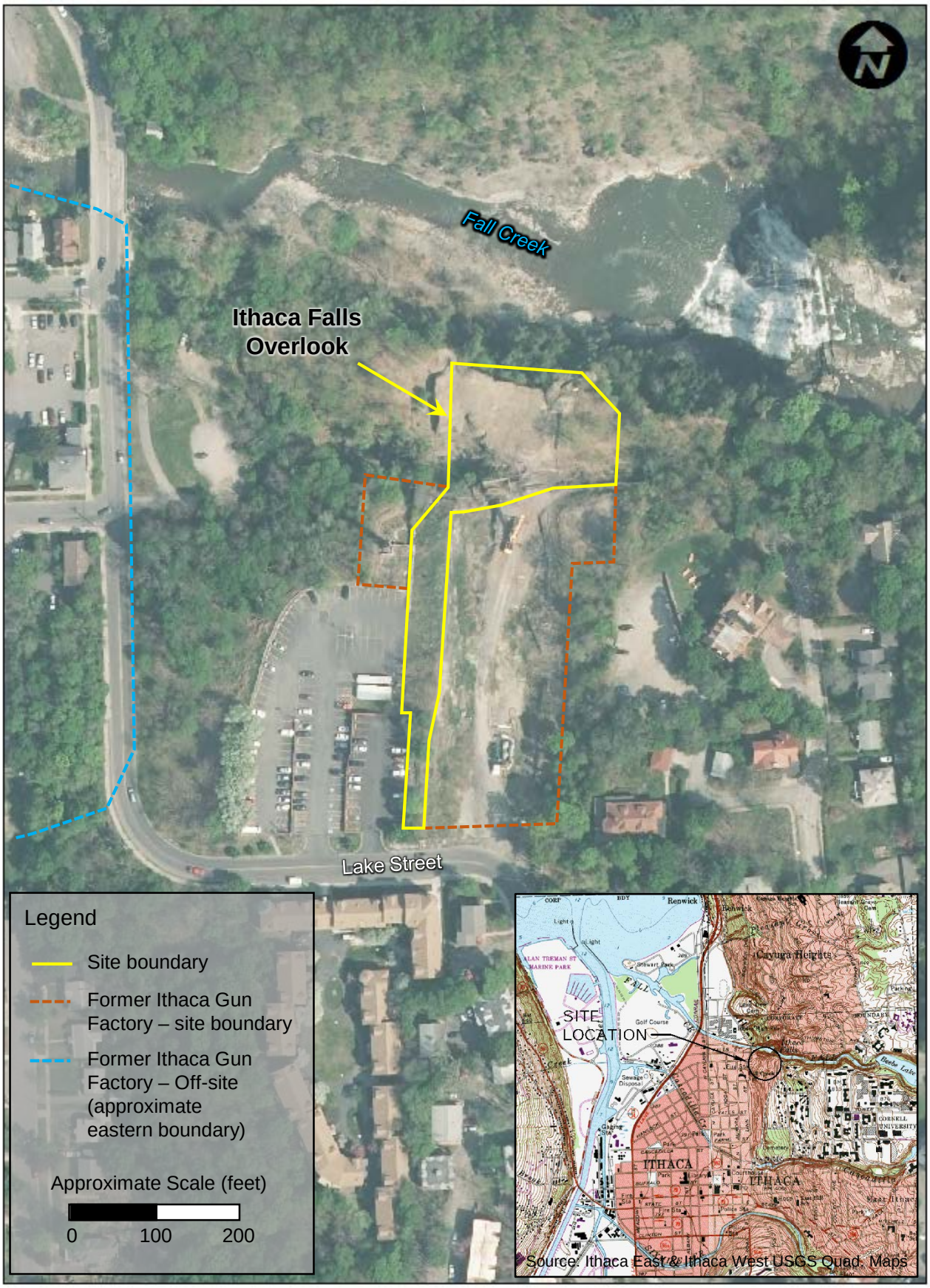

FIGURE 1 – SITE LOCATION MAP

Ithaca Falls Overlook, E755018

City of Ithaca, Tompkins County

0 37.5 75 150 Feet

Scale

FIGURE 2 – SITE AREAS

Ithaca Falls Overlook, E755018

City of Ithaca, Tompkins County

FIGURE 3 – GROUNDWATER VOC DISTRIBUTION

Ithaca Falls Overlook, E755018

City of Ithaca, Tompkins County

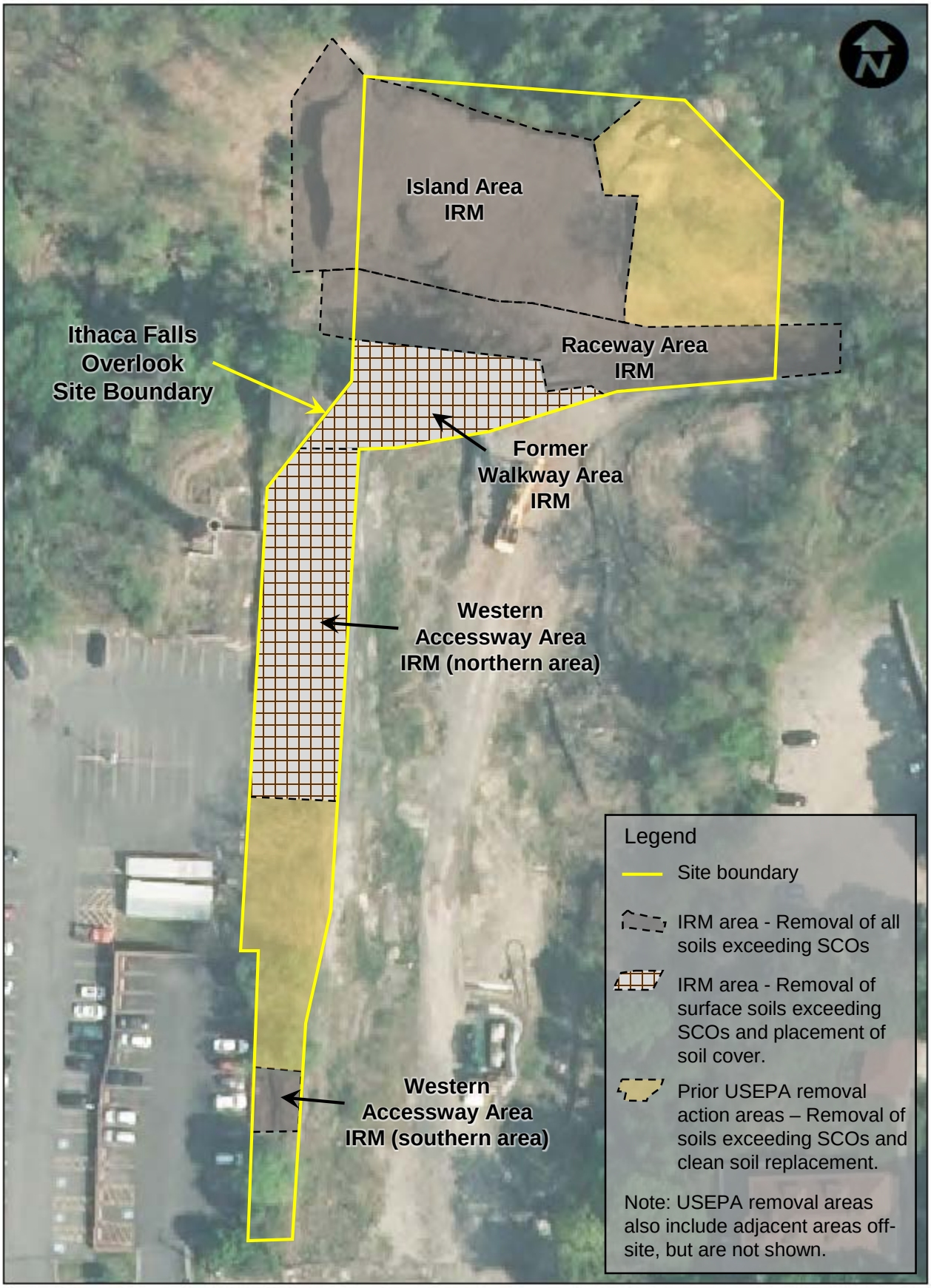

FIGURE 4 – IRM AREAS
Ithaca Falls Overlook, E755018
City of Ithaca, Tompkins County