PROPOSED REMEDIAL ACTION PLAN

OR - Suffern MGP
Suffern, Rockland County
Site No. 344045
February 2014

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 hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

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 repositories 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 repositories:

Suffern Free Library
210 Lafayette Ave
Suffern, NY 10901
Phone: (845) 357-1237

NYSDEC
21 South Putt Corners Road
New Paltz, NY 12561
Phone: (845) 256-3154

A public comment period has been set from:

February 26, 2014 through March 27, 2014

A public meeting is scheduled for the following date:

March 13, 2014

Public meeting location:

Suffern Village Hall
61 Washington Avenue
Suffern, NY

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) 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 March 27, 2014 to:

John Spellman
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
jtspellm@gw.dec.state.ny.us

The Department may modify the proposed remedy or select another of the alternatives 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 Orange and Rockland Suffern MGP Site is located on Pat Malone Drive in the Village of Suffern, approximately 0.2 miles north of the Suffern Rail Station. The site is located in an urban area.

Site Features:
The Suffern Manufactured Gas Plant (MGP) Site is an approximate 1 acre trapezoidal area encompassing the former MGP. The site is flat and vacant except for an active gas regulator station occupying a small area in the southwest corner. The remains of an approximate 100-foot square foundation slab from a former building are visible at the surface.

A railroad spur was constructed adjacent to the western boundary of the site after MGP operations ceased. Construction of the railroad included an approximate 20-foot high embankment; the spur is not active, however the embankment is still present.

Current Zoning/Use:
The site and adjacent properties are zoned for manufacturing land use. The site is currently used as a natural gas gate station. The Village of Suffern water supply wells are located approximately 400 feet to the west of the site. The nearest residential area is within 800 feet to the east and 1,200 feet to the south. The State of New Jersey owns property to the north and east of the site, as well as the abandoned railroad berm. A firing range is present to the north, and an active commuter railroad is present to the east. Property to the south of the site is owned by the Village of Suffern and includes active recreation fields.

Past Use of the Site:
A manufactured gas plant (MGP) operated at the site from 1902 to 1935. During the 1940s and early 1950s an electroplating facility was in operation at this location. The site was also used to manufacture buses until 2008.

Geology and Hydrogeology:
The unconsolidated alluvial deposits form a thick geologic unit to a depth of approximately 75 feet which is highly permeable and forms an unconfined aquifer. Approximately five feet of fill overlies the deposits. The depth to groundwater is generally from 12 to 15 feet below ground surface. Groundwater flow direction is generally from the east to the southwest, towards the Ramapo River. The Ramapo River is located approximately 600 feet west of the site. Groundwater flow is towards the public water supply wellfield.

A site location map is attached as Figure 1.

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, alternatives that restrict the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) are 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.

The PRPs for the site, documented to date, include:

Orange and Rockland Utilities Inc.

This MGP site is part of the Orange and Rockland Utilities multi-site Consent Order. The Department and Orange and Rockland Utilities, Inc. entered into Consent Orders on September 29, 1998 and March 11, 1999. The Orders obligate Orange and Rockland Utilities, Inc. to implement a full remedial program.

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

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 hazardous waste 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 contaminants of concern identified at this site are:

Coal Tar
Total Polycyclic Aromatic Hydrocarbons (PAHs)
Cyanides (soluble cyanide salts)
benzene, toluene, ethylbenzene and xylenes
(BTEX)

As illustrated in Exhibit A, the contaminants of concern exceed the applicable SCGs for:

- groundwater
- soil

6.2: Interim Remedial Measures

An interim remedial measure (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 IRM has been completed at this site based on conditions observed during the RI.

Septic Tank Removal

Water samples collected from a septic tank (location shown in Figure 2) in 2008 revealed the presence of certain chlorinated volatile organic compounds. In 2010, a septic tank and associated seepage pit were removed from the site. In addition, approximately 95 cubic yards of soil were removed from the area and disposed of at a permitted facility.

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.

The Fish and Wildlife Resources Impact Analysis (FWRIA) for OU 01, which is included in the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors.

Nature and Extent of Contamination:

Groundwater: The BTEX compounds benzene, toluene, ethylbenzene, xylene; and certain PAH compounds exceed the Class GA groundwater standards or guidance values in the unconsolidated aquifer at the site. Total BTEX concentrations ranged from not detected to 180 ppb. Groundwater contamination also extends approximately 100 feet beyond the site to the north and southwest. In addition to monitoring wells placed to determine the extent of contamination, a row of sentinel monitoring wells located beyond the MGP-impacted groundwater, about 100 feet from the municipal supply wells, provide a means of detecting migration of the groundwater plume towards the supply wells. The sentinel wells have been sampled on a quarterly basis since 1999. Contaminants of concern have not been found in the sentinel wells exceeding one-half their respective maximum contaminant level with the exception of four samples. The four samples contained benzo(a)pyrene up to a concentration of 4.7 ppb (March 2011 sampling event). The maximum contaminant level for benzo(a)pyrene is 0.2 ppb. No trends are apparent from the exceedances.

Soil: Coal tar is present in the remnants of the eastern gas holder foundation and the gas oil house foundation. Total PAH concentrations from these structures ranged up to 65,000 ppm. Coal tar impacted soil containing certain PAHs and BTEX compounds exceeding the Part 375 soil cleanup objectives for commercial use was observed predominantly from the ground surface to 35 feet below grade, although less impacted soil was found at depths up to 101 feet. The area of visual tar impact is approximately two acres, generally to the north of the former MGP building and at certain MGP structures. Soil contaminated with greater than 500 ppm total PAHs coincided with the area of visual soil impact.

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*.

The site is completely fenced, which restricts public access; however, persons who enter the site could contact contaminants in the soil by walking on the site, digging or otherwise disturbing the soil. People will not come into contact with site related contaminants in off-site soil unless they dig below the ground surface. People are not drinking the contaminated groundwater. Measures are in place to control the potential for public water supply wells to be affected by the groundwater contamination. Volatile organic compounds in groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Because there is no on-site building, inhalation of site contaminants in indoor air due to soil vapor intrusion does not represent a concern for the site in its current condition. However, the potential exists for the inhalation of site contaminants due to soil vapor intrusion for any future on-site redevelopment.

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.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in 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 THE PROPOSED REMEDY

To be selected, the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the FS report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's proposed remedy is set forth at Exhibit D.

The proposed remedy is referred to as the Excavation and In-situ Solidification remedy.

The estimated present worth cost to implement the remedy is $12,200,000. The cost to construct the remedy is estimated to be $10,600,000 and the estimated average annual cost is $220,000.

The elements of the proposed remedy are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the

design, implementation, and 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 gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Excavation and off-site disposal of on-site and off-site contaminant source areas to an approximate depth of 10 feet, including:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- soil containing visual coal tar or non-aqueous phase liquid; and
- soil containing total PAHs exceeding 500 ppm.

Approximately 7,700 cubic yards of soil will be removed. The remains of the former gas house and eastern gas holder foundation will be removed as part of this remedial element.

On-site soil which does not exceed SCOs for commercial use and the protection of groundwater may be used to backfill the on-site excavation to the extent that a sufficient volume of on-site soil is available. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for commercial use and protection of groundwater will be brought in to complete the backfilling of the on-site excavation and establish the designed grades at the site.

For the off-site area owned by the State of New Jersey, backfill over the ISS treatment area will consist of a minimum of four feet of soil. The upper two feet of soil, and all imported backfill, will meet the SCOs for unrestricted use as set forth in 6 NYCRR Part 375. Existing soil on the State of New Jersey-owned property that does not exceed the SCOs for commercial use and groundwater protection may be used to backfill below the upper two feet.

3. Approximately 2,500 cubic yards of coal tar impacted soil located on the Orange & Rockland Utilities, Inc. property west of the site will be removed to a depth of approximately five feet below grade. Coal tar embedded within the embankment of the abandoned railroad berm on the State of New Jersey property will not require removal due to its greater depth and apparent immobility, as well as embankment stability concerns. The area will be backfilled as described in remedial element 2 for the on-site excavations.

4. In-situ solidification (ISS) will be applied in deeper areas which are not excavated and which contain:
• grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
• soil with visual coal tar or non-aqueous phase liquid; and
• soil with total PAHs exceeding 500 ppm.

Vertically, the treatment zone will extend from the limits of the removal conducted in remedial element 2 (approximately 10 feet below the existing grade), down to 35 feet below grade to solidify approximately 18,500 cubic yards of soil. ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically portland cement) or other binding agents using an excavator or augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The resulting solid matrix reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination. The solidified mass will then be covered with a cover system described in element 5 to prevent direct exposure to the solidified mass and protect the monolith from damage due to freeze/thaw cycles.

5a. For the on-site areas, a site cover will be required to allow for commercial use. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development, or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required, it will consist of a minimum of one foot of soil meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Where the soil cover is required over the on-site ISS treatment area, it will consist of a minimum of four feet of soil meeting the SCOs for commercial use.

5b. For the off-site area owned by the State of New Jersey, backfill over the ISS treatment area will consist of a minimum of four feet of soil. The upper two feet will meet the SCOs for unrestricted use as set forth in 6 NYCRR Part 375. Below this layer, existing soil on the State of New Jersey-owned property that meets the SCOs for commercial and groundwater protection may be used for backfill. Implementation of this backfill requirement will be subject to a site management plan and an agreement with the State of New Jersey. For off-site area owned by Orange & Rockland Utilities, Inc., the soil cover will consist of a minimum of one foot of soil meeting the SCOs for commercial use and protection of groundwater. No on-site soil will be placed on the off-site areas.

6. A Public Water Supply Protection and Mitigation Plan will be developed and implemented. The program will:
a) evaluate the existing long-term groundwater monitoring program and determine whether additional sentinel monitoring points and/or increased sampling frequency are necessary to ensure adequate detection and warning of potential MGP-contamination into the public water supply;

b) as necessary, install wellhead treatment systems or comparable alternative measures, or upgrade existing systems, for public water supply wells that are threatened or impacted by MGP-related contamination in the future;
c) provide immediate notification to the NYSDEC, NYSDOH, County Health Department and the Village of Suffern if MGP-contaminant concentrations in a sentinel well(s) exceed a specified action level and implement appropriate response actions; and,
d) provide up-to-date groundwater model predictions of contaminant plume location and migration.

7. Imposition of an institutional control in the form of an environmental easement for the site and the off-site affected area owned by Orange & Rockland Utilities and a site management plan (subject to agreement) for the State of New Jersey owned affected property, that:

- requires 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);
- allows the use and development of the controlled properties for 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
- requires compliance with the Department approved Site Management Plan.

8. 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 affected area and details the steps and media-specific requirements necessary to ensure the following institutional and engineering controls remain in place and effective:
i. Institutional Controls:
• the environmental easement discussed in remedial element 7 above applicable only to the on-site area and off-site area owned by Orange & Rockland Utilities, Inc.;
• an agreement with the State of New Jersey to implement the remedy and any necessary future site management plan on the off-site property owned by the State of New Jersey.

ii. Engineering Controls: the solidified soil described in remedial element 4 and the cover and backfill system described in remedial element 5.
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;
• a provision for evaluation of the potential for soil vapor intrusion as defined in the site management plan for any buildings developed on all the affected properties , including provisions 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 groundwater to assess the performance and effectiveness of the remedy;

• a schedule of monitoring and frequency for submittals to the Department;

• monitoring for vapor intrusion for any buildings developed on or off the site, as may be required by the Institutional and Engineering Control Plan discussed above.

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.

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. 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.

Waste/Source Areas

As described in the RI report, waste/source materials were identified at the site and are impacting groundwater and soil.

Wastes are defined in 6 NYCRR Part 375-1.2(aw) and include solid, industrial and/or hazardous wastes. Source areas are defined in 6 NYCRR Part 375(au). Source areas are areas of concern at a site where substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium, such as groundwater.

The production of manufactured gas created waste products which are resistant to natural decay and often results in potential effects on public health and the environment. The primary waste was an oily liquid known as coal tar which condensed out of the gas at various stages of its production, purification and distribution. The coal tar contains certain hazardous substances of concern in the volatile organic compound (VOC) and semivolatile organic compound (SVOC) chemical classes. Specific VOCs of concern are benzene, toluene, ethylbenzene and xylenes (BTEX). Specific SVOCs of concern are the polycyclic aromatic hydrocarbons (PAHs):

acenaphthene	pyrene	acenaphthylene
chrysene	anthracene	fluoranthene
benzo(a)anthracene	*benzo(a)pyrene*	fluorene
indeno(1,2,3-cd)pyrene	*benzo(b)fluoranthene*	2-methylnaphthalene
benzo(g,h,i)perylene	*benzo(k)fluoranthene*	naphthalene
phenanthrene	dibenzo(a,h)anthracene	

Total PAH concentrations as referred to in this plan are the sum of the individual PAHs listed above. The italicized PAHs are probable human carcinogens.

Cyanide compounds are also formed during gas production. No cyanide waste disposal areas were found. However, occasional exceedances (9 samples out of 176) of the SCO for the protection of public health – commercial use were found in the subsurface.

Coal tar and its constituents were found in the subsurface at the Suffern Former MGP Site. The RI report uses the term non-aqueous phase liquid (NAPL) to describe fluid coal tar. Two source areas were identified at the site that are associated with former MGP structures. NAPL was observed inside the foundation of the former eastern gas holder, as well as in soil underneath the holder, to a depth of 101 feet, suggesting a leak in the foundation bottom. NAPL was also found within the former gas oil house foundation at depths up to 13 feet. In addition to structures, coal tar areas have been found at the western end of the former MGP building, and at the eastern portion of the State of New Jersey property. At the eastern portion of the O&R Gate Station a layer of hard, non-flowable tar approximately one-foot thick was observed within the top five feet which extended laterally into the abandoned railroad berm. These areas are identified on Figures 3a and 3b. The approximate combined areal extent of source areas is two acres. The bulk of the coal tar (an estimated 85% of the coal-tar impacted soil) was observed within 35 feet of the surface. Coal tar appears to have migrated vertically, and was not observed to spread laterally with increasing depth.

Despite the presence of NAPL in subsurface soils, no measureable thicknesses were observed at 35 monitoring wells gauged to assess the presence of NAPL. A small amount of NAPL was observed to coat the tools used to gauge the wells in one well approximately 40 feet north of the site.

The waste/source areas identified will be addressed in the remedy selection process.

Groundwater

Groundwater samples were collected to assess groundwater conditions on and off-site.

Due to the proximity and downgradient location of the municipal supply wells for the Village of Suffern, quarterly or biannual groundwater sampling has been performed since 1999. The municipal supply wells are screened from approximately 45 feet to 130 feet below ground surface. A monitoring well network designed to sample groundwater at various depths from the water table to the top of bedrock was established to rule out the existence of preferential pathways of contaminant flow towards the supply wells.

Sampling results indicate that benzene, toluene, ethylbenzene, xylene (BTEX) and the lower molecular weight PAH compounds, specifically naphthalene and acenaphthalene, are the prevalent contaminants within the former MGP Area. Groundwater exceeded standards or guidance values for these compounds at the site and off-site onto the State of New Jersey owned property. Cyanide was detected above the groundwater standard at one monitoring well, MW-9, located on the State of New Jersey property. Groundwater from the water table to a 45 foot depth has slightly higher contaminant concentrations (generally within one order of magnitude) than groundwater deeper than 45 feet.

Groundwater throughout the vertical profile of the aquifer did not exceed standards for the contaminants of concern on the Orange & Rockland Utilities, Inc. property located in the off-site affected area, (see Figure 2), downgradient of the abandoned railroad berm.

Trichloroethene, a solvent not associated with MGP operations, was found on-site in one well, immediately downgradient of the former septic tank described in Section 6.2, at a concentration of 24 ppb, which exceeded the standard of 5 ppb. Monitoring in the four years following the RI has shown no spread or increase in concentration of this compound.

Nickel, an inorganic compound not associated with MGP operations, exceeded the groundwater standard in a limited area in the eastern portion of the site.

Table 1 - Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG[c]
VOCs			
Benzene	ND – 100	1	7 of 109
Toluene	ND – 6.1	5	1 of 109
Ethylbenzene	ND – 51	5	1 of 109
Xylene (total isomers)	ND – 49	5	5 of 109
SVOCs			
Naphthalene	ND – 2500	10	6 of 89
Acenaphthene	ND – 140	20	8 of 89
Inorganics			
Cyanide (total)	ND – 251	200	1 of 90
Nickel	ND - 303	100	3 of 90

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).
c - 2009 data was used for this table
ND = not detected

Based on the findings of the RI, the presence of manufactured gas plant wastes have resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are benzene, toluene, ethylbenzene and xylene.

Soil

Surface and subsurface soil samples were collected and analyzed for volatile, semi-volatile, cyanide and metals during the remedial investigation to determine the nature and extent of impacts to soil as a result of the former MGP operations.

Shallow and surface soil samples were collected from the site and at background locations within the Village of Suffern. The surface soil samples were collected from the top six inches with the exception of background samples, which were collected from the top two inches to assess direct human exposure. Subsurface soil samples were collected below a two-foot depth.

No VOCs or BTEX compounds were detected in surface soil samples at concentrations exceeding unrestricted use.

Certain metals, specifically copper, lead and zinc, were present in site surface soil samples in concentrations that exceeded the unrestricted SCOs. The same metals were present in background samples at similar concentrations and are not associated with the coal tar constituents. Therefore, metals in soil are not a contaminant of concern.

In general, PAH concentrations in surface soil were similar to background PAH concentrations, suggesting that MGP contamination is not prevalent at the site surface soil. Certain individual PAHs did however, exceed unrestricted SCOs. Benzo(b) fluoranthene was found in the highest concentration among PAHs in surface soil.

Total cyanide in surface soil exceeded the unrestricted SCO at one location (sample SS-4, near the former western gas holder) in the Orange & Rockland Utilities, Inc. property located in the off-site affected area.

In subsurface soil, individual BTEX compounds exceeded unrestricted SCOs at areas which generally coincided with soil visually impacted with coal tar. These areas lie to the east of the abandoned railroad berm, with the exception of the hard-tar area at the west end of the berm. A few subsurface soil samples exceeded the commercial use SCOs in the former MGP area. Soil containing greater than 500 ppm PAHs was consistently associated with a visual characterization as containing coal tar in the form of a sheen, bleb or saturation.

Nine subsurface soil samples exceeded the unrestricted SCO for cyanide, with the greatest concentration at monitoring well MW-9. Seven of the locations coincide with soils within the upper 20 feet containing source material. The remaining two sample locations are at depths greater than twenty feet.

Table #2 – Site Shallow Soil (0-6")

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)pyrene benzo(b) fluoranthene naphthalene	0.3 – 10 0.4 - 12 0.12 – 3.6	1 1 12	1 of 2 1 of 2 0 of 2	1 5.6 500	1 of 2 1 of 2 0
Inorganics					
cyanide (total)	0.31 – 1.1	27	0 of 2	27	0 of 2

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 Commercial Use
ND – not detected

Table 3 - Subsurface 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
VOCs					
benzene	ND - 11000	0.06	17 of 187	44	4 of 187
toluene	ND - 11000	0.7	6 of 187	500	2 of 187
ethylbenzene	ND - 1000	1	8 of 187	390	2 of 187
xylene (mixed)	ND - 18000	0.26	24 of 187	500	3 of 187
SVOCs					
benzo(a)pyrene	ND - 2100	1	50 of 173	1	50 of 173
chrysene	ND - 2000	1	51 of 173	56	28 of 173
naphthalene	ND – 17000	12	16 of 136	500	11 of 136
total PAHs	ND - 65000	NA	NA	500	22 of 173
Inorganics					
cyanide (total)	ND - 2540	27	9 of 176	27	9 of 176

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 Commercial Use
ND – not detected
NA – not applicable

Based on the findings of the Remedial Investigation, the presence of MGP-related contaminants has resulted in the contamination of soil. The site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are, PAHs (polycyclic aromatic hydrocarbons), cyanide, and BTEX (benzene, toluene, ethylbenzene and xylene).

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Alternative 2: Removal of Contaminant Source Areas to the Groundwater Table

This Alternative will include the following components:

- Removal of the gas oil house structure and coal tar associated with the structure.
- Removal of the eastern gas holder foundation remnants and coal tar associated with the structure.
- Removal of the shallow hardened tar west of the abandoned railroad berm (approximately 2,600 cubic yards).
- Removal of contaminant source areas, including visually impacted soil and soil containing total PAHs greater than 500 ppm to the top of the water table (approximately 13,900 cy). The water table is approximately 12 to15 feet below ground surface. Excavated source material will be treated off-site prior to disposal.
- Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to complete the backfilling of the excavation and establish the designed grades.
- Installation of a cover system at the on-site area and Orange & Rockland Utility-owned parcel area west of the site to allow for commercial use. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable SCOs. Where the soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Backfill at the State of New Jersey-owned off-site area will meet the requirements of 6 NYCRR Part 375-6.7(d) for unrestricted use.
- A public water supply protection and mitigation plan. The plan will evaluate the existing long term groundwater monitoring program, and provide appropriate notification and treatment measures when necessary to protect the water supply.
- Placement of an institutional control in the form of an environmental easement to restrict the use of the on-site property and off-site affected area owned by Orange and Rockland to commercial or industrial uses, restrict the use of groundwater and evaluate the potential for soil vapor intrusion for any buildings developed at these properties.
- Development of a Site Management Plan to include institutional controls to address residual soil, soil vapor and groundwater contamination remaining following the remedy. An agreement with the State of New Jersey will be necessary to implement the remedy and any necessary site management on the off-site property owned by the State of New Jersey.

The cost to implement Alternative 2 has been estimated as follows, not including the groundwater treatment contingency:

Present Worth: ..... $11.8 million
Capital Cost:..... $10.2 million
Annual Costs:.....$220,000

Alternative 3: Excavation and In-Situ Solidification

This Alternative will include the following components:

- Removal of the gas oil house structure and coal tar associated with the structure.
- Removal of the eastern gas holder foundation remnants and coal tar associated with the structure.
- Removal of the shallow hardened tar west of the abandoned railroad berm (approximately 2,600 cubic yards).
- Removal of impacted soil to pre-clear areas for solidification. Soil visually impacted with coal tar and soil containing total PAHs greater than 500 ppm will be removed to an approximate depth of 10 feet. (approximately 7,700 cy).
- In-situ solidification will be applied to contaminant source areas, including soils visually impacted with coal tar and non-aqueous phase liquid that have not been removed through the above-identified components. Soil containing greater than 500 ppm will also be treated via ISS. ISS will extend to a depth of 35 feet below the existing grade to solidify approximately 18,500 cubic yards of soil. Areas to receive ISS are shown on Figure 4.
- Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to complete the backfilling of the excavation and establish the designed grades.
- Installation of a cover system at the on-site area and Orange & Rockland Utility-owned parcel area west of the site to allow for commercial use. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable SCOs. Where the soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use, except in areas to receive ISS. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Areas receiving ISS will require a cover system at least four feet thick to protect the solidified mass from freeze/thaw cycles.
- For the off-site area owned by the State of New Jersey, backfill over the ISS treatment area will consist of a minimum of four feet of soil. The upper two feet will meet the SCOs for unrestricted use as set forth in 6 NYCRR Part 375. Below this layer, existing soil on the State of New Jersey-owned property that meets the SCOs for commercial and groundwater protection may be used for backfill.
- A public water supply protection mitigation plan. The plan will evaluate the existing long term groundwater monitoring program, and provide appropriate notification and treatment measures when necessary to protect the water supply.
- Placement of an institutional control in the form of an environmental easement to restrict the use of the on-site property and off-site affected area owned by Orange and Rockland to commercial or industrial uses, restrict the use of groundwater and evaluate the potential for soil vapor intrusion for any buildings developed at these properties.

- Development of a Site Management Plan to include institutional controls to address residual soil, soil vapor and groundwater contamination remaining following the remedy. An agreement with the State of New Jersey will be necessary to implement the remedy and any necessary site management on the off-site property owned by the State of New Jersey.

The cost to implement Alternative 3 has been estimated as follows, not including the groundwater treatment contingency:

Present Worth: ..... $12.2 million
Capital Cost:..... $10.6 million
Annual Costs:..... $220,000

Alternative 4: Restoration to Unrestricted Conditions

This alternative achieves all of the SCGs discussed in Section 6.1.1 and Exhibit A and soil meets the unrestricted soil clean objectives listed in Part 375-6.8(a). This alternative would include the removal of all source areas and the excavation of all contaminants of concern greater than the Part 375 unrestricted use SCOs. Approximately 63,000 cubic yards of soil will be removed for off-site treatment or disposal followed by the backfill of soil meeting unrestricted use SCOs. Removal would extend to a depth of 101 feet. Construction time is an estimated two years. Remedial goals are expected to be satisfied immediately upon completion of the construction.

This alternative would also include a public water supply protection and mitigation plan, a groundwater use restriction and a provision for evaluating the potential for soil vapor intrusion for any buildings developed at the site, until demonstrated that the remedial action objectives for all media have been achieved.

Present Worth: ..... $57 million

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
1: No Action	0	0	0
2: Removal to the Water Table	10.2 million	220,000	11.8 million
3: Excavation and Solidification	10.6 million	220,000	12.2 million
4: Restoration to Unrestricted	57 million	140,000[1]	57 million

These costs do not include the cost to implement the public water supply protection treatment contingency
[1]Annual cost for two years of groundwater monitoring

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 3, excavation and in-situ solidification as the remedy for this site. Alternative 3 will achieve the remediation goals for the site by reducing the volume and mobility of the contaminant mass and providing suitable soil backfill in areas of potential exposure. The proposed remedy will greatly reduce the source of contamination to groundwater. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 4.

Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the Feasibility Study.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

Alternative 1 (No Action) does not include active remedial actions and thus will not provide any additional protection to human health and the environment compared to what currently exists. Additionally, this alternative will not comply with SCGs; since source material will remain in place and continue to pose a threat to both human health and the environment. Therefore, Alternative 1 is eliminated from further evaluation.

Alternatives 2, 3 and 4 will all provide comparable levels of protection to public health and the environment and were retained for further evaluation. Common elements of these alternatives that provide protection of human health are the public water supply protection program, clean soil cover and/or backfill, provisions for evaluation and mitigation of soil vapor intrusion and the groundwater use restriction.

Alternative 2, Removal of Contaminant Source Areas to the Groundwater Table, will provide protection of human health by preventing direct exposure to contaminants in shallow impacted materials located above the groundwater table. However, grossly impacted material will remain in place and continue to impact groundwater. Alternative 3, Excavation and In-Situ Solidification, will provide protection to human health and the environment by removing source material above the water table and solidifying the remaining source material to a depth of 35 feet, thereby reducing the potential for direct contact with the contaminants of concern. This alternative would further protect the environment through the contingency for an active groundwater remediation based on ongoing monitoring results. Alternative 4, which provides for the total removal and off-site treatment and/or disposal of MGP impacted material will provide the highest level of protection compared to the other alternatives.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternatives 2, 3 and 4will all comply with SCGs. By addressing source areas of contamination above the water table and restricting land and groundwater use, Alternative 2 will comply with SCGs. Alternative 3 conforms to the applicable soil SCGs through the implementation of soil excavation and ISS including a contingency plan for public water supply protection program. Alternative 4 will achieve soil SCGs through the removal of soils exceeding the SCOs for unrestricted use.

Because Alternatives 2, 3, and 4 satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the site.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 4, restoration to unrestricted conditions, provides the best long-term effectiveness and permanence because it permanently removes all soil contributing to groundwater and soil vapor contamination and, since there is no remaining contamination, does not rely upon institutional controls. Alternative 2, removal of source structures and certain soil above the water table (approximately 12 to 15 feet below ground), is effective and permanent for the shallow soils but does not address the coal tar in the deeper saturated zone that is contributing to groundwater contamination. Alternative 3, excavation and ISS, provides a higher level of effectiveness and permanence than Alternative 2 since the deeper, saturated zone source areas are addressed long-term to a depth ranging up to 35 feet through solidification. Since both Alternatives 2 and 3 do not completely remove contaminant source areas, an institutional control in the form of an environmental easement and a site management plan will be required as a remedy component, to control the use of groundwater and the development of the site.

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Comparing Alternatives 2, 3 and 4, Alternative 4 provides the greatest reduction in toxicity, mobility and volume while Alternative 2 provides the least reduction. The excavation components of the alternatives reduce the volume of contamination by treating the excavated materials prior to disposal. Alternative 4 removes approximately 63,000 cubic yards (cy) of contaminated soil. Alternative 2 removes approximately 16,500 cy of contaminant source soil, while Alternative 3 removes approximately 10,300 cy of soil and immobilizes 18,500 cy of soil through solidification, which reduces the mobility of the contamination.

The site and off-site areas contain an estimated 26,000 cy of MGP source material. Alternative 2 addresses approximately 11,000 cy, of soil meeting this criteria while Alternative 3 addresses approximately 22,000 cy of soil meeting this criteria. Alternative 4 addresses all source material and contaminated soil exceeding the unrestricted use SCOs.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other

alternatives.

Alternatives 2 through 4 all have short-term impacts due to the construction activity, but will be controlled through Department-approved plans. Alternative 4 has the greatest short-term adverse impact to the community. The extensive excavation to be performed under Alternative 4 for approximately two years will result in a large amount of excavated material in need of transport through the community for off-site treatment or disposal (approximately 3,000 truck loads) as well as roughly the same amount of soil to backfill the excavation. Alternatives 2 and 3 have comparable truck loads (approximately 1,000) and comparable construction times (8 months). By reducing truck movements and the volume of contaminated soil destined for commercial disposal facilities, the solidification of contaminated soil in Alternative 3 is consistent with Department policies that promote overall long-term sustainability and green remediation.

The most difficult remedial goal to achieve will be attainment of the groundwater standards at the site. Therefore, alternatives that more rigorously address source areas will achieve the remedial objectives sooner. Thus, Alternative 4 is expected to achieve the remedial goals in the shortest amount of time, followed by Alternatives 3 and 2 respectively.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Alternative 4 will be very difficult to implement, and may not be technically feasible. Contaminated soil deeper than 40 feet is expected to be removed by auger, a less reliable method than excavation bucket. In addition, Alternative 4 relies on extensive dewatering in a highly transmissive aquifer; a treatment system for the groundwater will be required to maintain the dewatering rate in order for the removal to be effective. Alternative 2 is readily implementable; remedial contractors are generally readily available for this conventional excavation alternative. Alternative 3 is also implementable although specialized equipment and potentially bench studies are needed for the solidification component of this alternative. Alternatives 2 and 3 will leave residual contamination on the State of New Jersey property following the completion of remediation. This will require the State of New Jersey to agree to the implementation of a Site Management Plan for future management of the remaining contamination.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

Alternative 4 is not cost effective. Compared to Alternative 3, Alternative 4 will remove 4,000 additional cubic yards of source material, at five times the cost. The cost of Alternatives 2 and 3 are approximately the same, but Alternative 3 addresses 11,000 more cubic yards of source material than Alternative 2 while other remedial components remain comparable. As a result, Alternative 3 is more cost effective than Alternative 2.

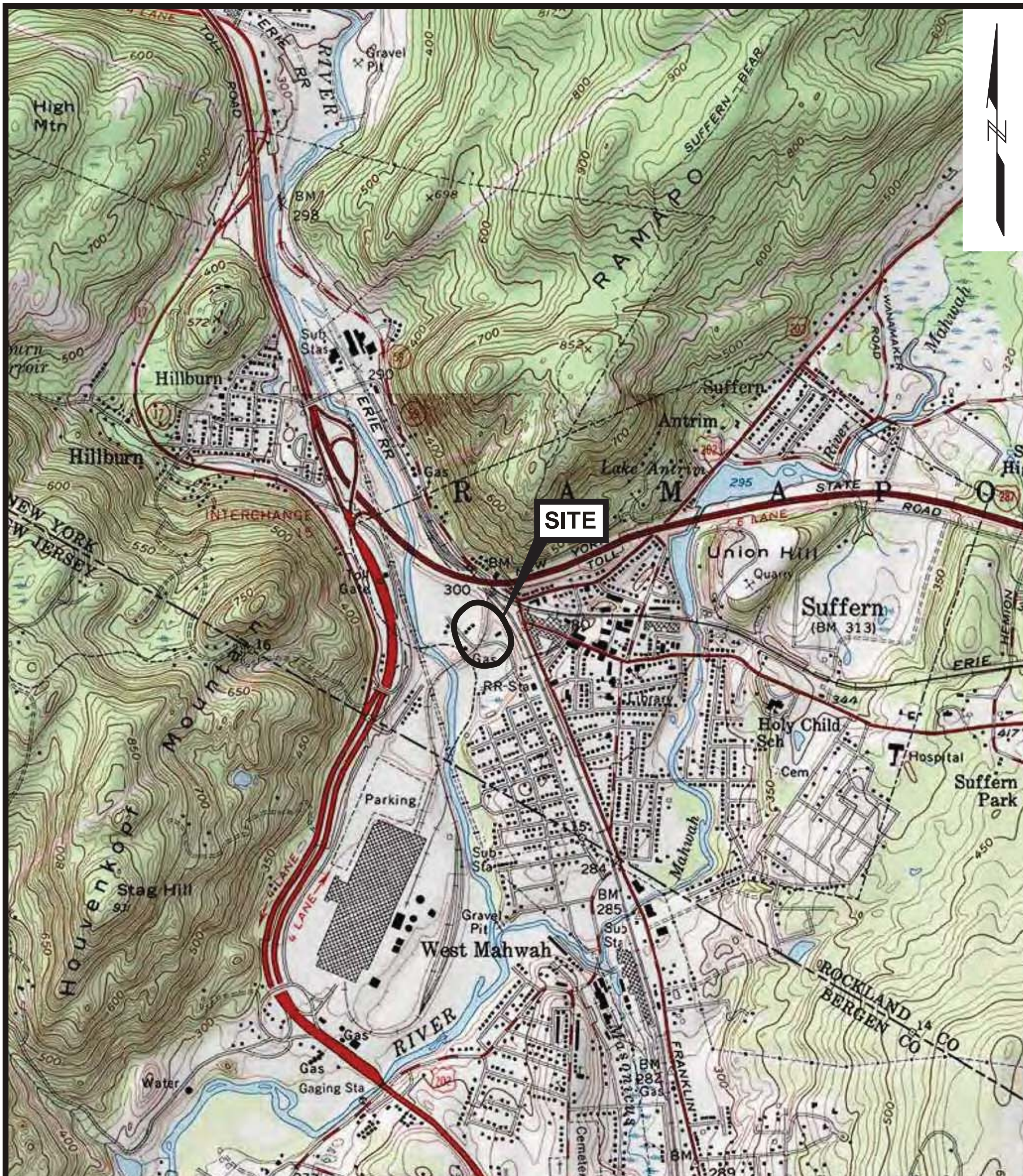
8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Due primarily to the presence of coal tar at depths of 35 to 101 feet, a cleanup to unrestricted use (Alternative 4) may not be feasible. Because the site is zoned for manufacturing, Alternatives 2 and 3, which are protective for commercial use of the site, would equally comply with this criterion. In addition, the off-site area owned by Orange and Rockland Utilities, which is currently used for industrial purposes, will be backfilled with soil meeting the SCOs for commercial use under Alternatives 2 and 3 and be subject to an environmental easement consistent with commercial or industrial use. The off-site area owned by the State of New Jersey and currently used as a firing range will receive a soil cover compatible with unrestricted use subject to a site management plan and an agreement with the State of New Jersey.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Alternative 3 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.



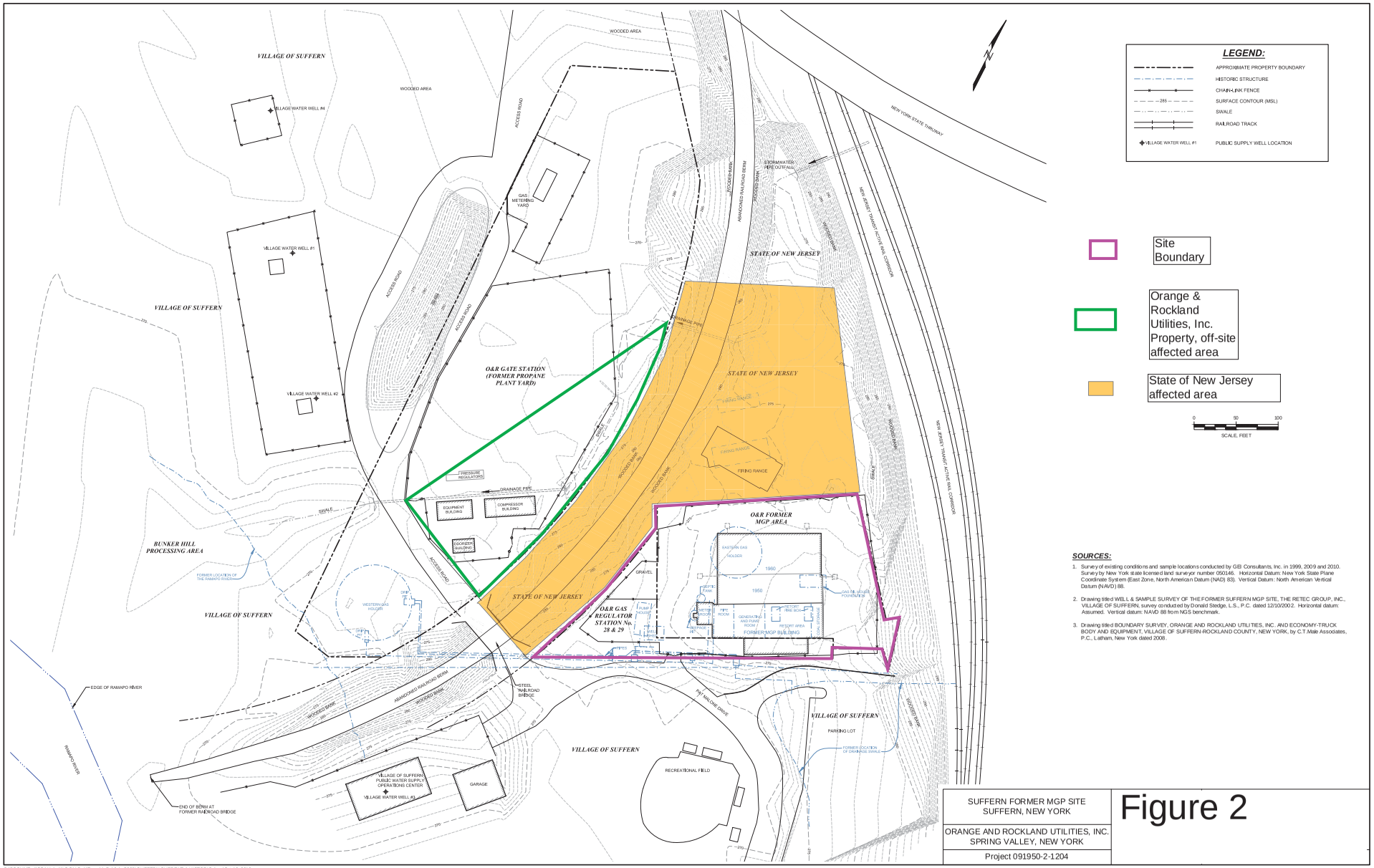
SOURCE: Map created with TOPO! ® ©2001 National Geographic (www.nationalgeographic.com/topo)

0 2000 4000

SCALE, FEET

SUFFERN FORMER MGP SITE SUFFERN, NEW YORK	GEI Consultants	**SITE LOCATION MAP**
ORANGE AND ROCKLAND UTILITIES, INC. SPRING VALLEY, NEW YORK	Project 091950-2-1204	October 2010 Figure 1

ORANGE & ROCKLAND\SUFFERN\RI REPORT\FIGURES\SUFFERN-LOCATION MAP.CDR



SOURCES:

1. Survey of existing conditions and sample locations conducted by GEI Consultants, Inc. in 1999, 2009 and 2010. Survey by New York state licensed land surveyor number 050146. Horizontal Datum: New York State Plane Coordinate System (East Zone, North American Datum (NAD) 83). Vertical Datum: North American Vertical Datum (NAVD) 88.
2. Drawing titled WELL & SAMPLE SURVEY OF THE FORMER SUFFERN MGP SITE, THE RETEC GROUP, INC., VILLAGE OF SUFFERN, survey conducted by Donald Stedge, L.S., P.C. dated 12/10/2002. Horizontal datum: Assumed. Vertical datum: NAVD 88 from NGS benchmark.
3. Drawing titled BOUNDARY SURVEY, ORANGE AND ROCKLAND UTILITIES, INC. AND ECONOMY-TRUCK BODY AND EQUIPMENT, VILLAGE OF SUFFERN-ROCKLAND COUNTY, NEW YORK, by C.T.Male Assodates, P.C., Latham, New York dated 2008.

SUFFERN FORMER MGP SITE SUFFERN, NEW YORK	Figure 2
ORANGE AND ROCKLAND UTILITIES, INC. SPRING VALLEY, NEW YORK	
Project 091950-2-1204	

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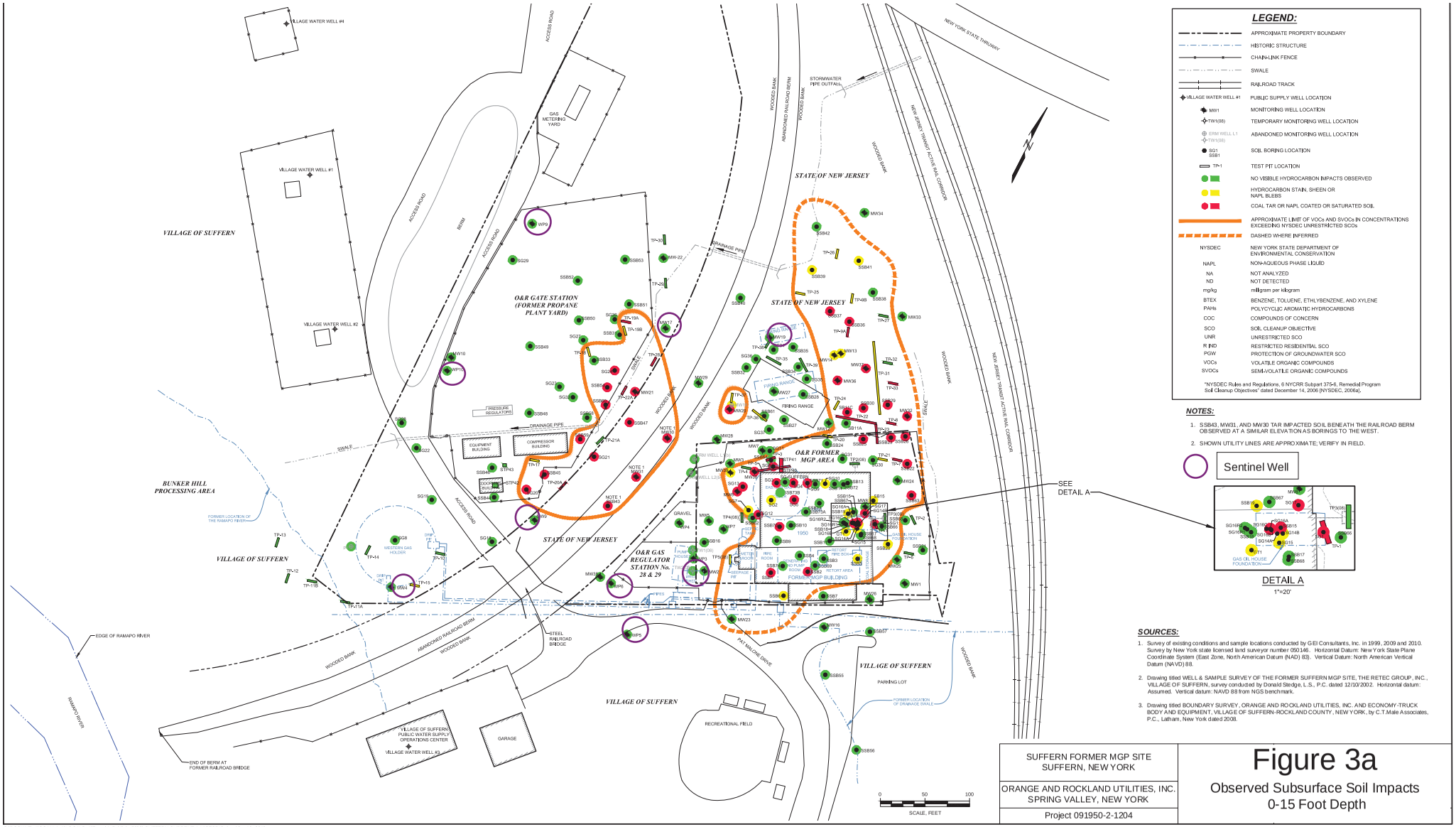

LEGEND:

- APPROXIMATE PROPERTY BOUNDARY
- HISTORIC STRUCTURE
- CHAIN-LINK FENCE
- SWALE
- RAILROAD TRACK
- VILLAGE WATER WELL #1 — PUBLIC SUPPLY WELL LOCATION
- MW1 — MONITORING WELL LOCATION
- TW1(08) — TEMPORARY MONITORING WELL LOCATION
- ERM WELL L1 / TW1(08) — ABANDONED MONITORING WELL LOCATION
- SG1 / SSB1 — SOIL BORING LOCATION
- TP-1 — TEST PIT LOCATION
- NO VISIBLE HYDROCARBON IMPACTS OBSERVED
- HYDROCARBON STAIN, SHEEN OR NAPL BLEBS
- COAL TAR OR NAPL COATED OR SATURATED SOIL
- APPROXIMATE LIMIT OF VOCs AND SVOCs IN CONCENTRATIONS EXCEEDING NYSDEC UNRESTRICTED SCOs
- DASHED WHERE INFERRED

NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NAPL	NON-AQUEOUS PHASE LIQUID
NA	NOT ANALYZED
ND	NOT DETECTED
mg/kg	milligram per kilogram
BTEX	BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENE
PAHs	POLYCYCLIC AROMATIC HYDROCARBONS
COC	COMPOUNDS OF CONCERN
SCO	SOIL CLEANUP OBJECTIVE
UNR	UNRESTRICTED SCO
R IND	RESTRICTED RESIDENTIAL SCO
PGW	PROTECTION OF GROUNDWATER SCO
VOCs	VOLATILE ORGANIC COMPOUNDS
SVOCs	SEMI-VOLATILE ORGANIC COMPOUNDS

*NYSDEC Rules and Regulations, 6 NYCRR Subpart 375-6, Remedial Program Soil Cleanup Objectives" dated December 14, 2006 [NYSDEC, 2006a].

NOTES:

1. SSB43, MW31, AND MW30 TAR IMPACTED SOIL BENEATH THE RAILROAD BERM OBSERVED AT A SIMILAR ELEVATION AS BORINGS TO THE WEST.
2. SHOWN UTILITY LINES ARE APPROXIMATE; VERIFY IN FIELD.

Sentinel Well

DETAIL A
1"=20'

SOURCES:

1. Survey of existing conditions and sample locations conducted by GEI Consultants, Inc. in 1999, 2009 and 2010. Survey by New York state licensed land surveyor number 050146. Horizontal Datum: New York State Plane Coordinate System (East Zone, North American Datum (NAD) 83). Vertical Datum: North American Vertical Datum (NAVD) 88.
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SUFFERN FORMER MGP SITE
SUFFERN, NEW YORK

ORANGE AND ROCKLAND UTILITIES, INC.
SPRING VALLEY, NEW YORK

Project 091950-2-1204

Figure 3a

Observed Subsurface Soil Impacts 0-15 Foot Depth

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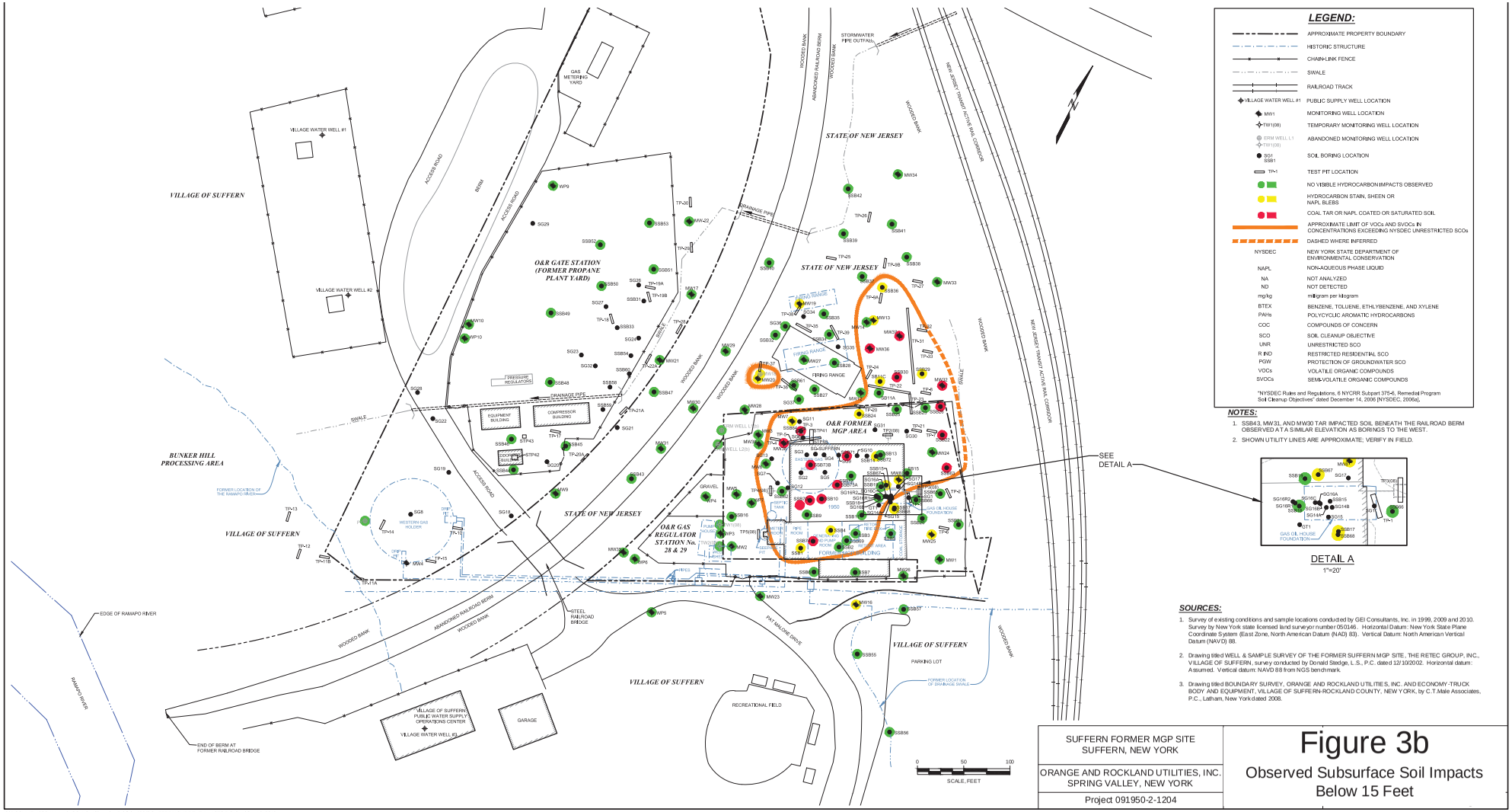

LEGEND:

- APPROXIMATE PROPERTY BOUNDARY
- HISTORIC STRUCTURE
- CHAIN-LINK FENCE
- SWALE
- RAILROAD TRACK
- VILLAGE WATER WELL #1 — PUBLIC SUPPLY WELL LOCATION
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- TP-1 — TEST PIT LOCATION
- NO VISIBLE HYDROCARBON IMPACTS OBSERVED
- HYDROCARBON STAIN, SHEEN OR NAPL BLEBS
- COAL TAR OR NAPL COATED OR SATURATED SOIL
- APPROXIMATE LIMIT OF VOCs AND SVOCs IN CONCENTRATIONS EXCEEDING NYSDEC UNRESTRICTED SCOs
- DASHED WHERE INFERRED

NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NAPL	NON-AQUEOUS PHASE LIQUID
NA	NOT ANALYZED
ND	NOT DETECTED
mg/kg	milligram per kilogram
BTEX	BENZENE, TOLUENE, ETHLYBENZENE, AND XYLENE
PAHs	POLYCYCLIC AROMATIC HYDROCARBONS
COC	COMPOUNDS OF CONCERN
SCO	SOIL CLEANUP OBJECTIVE
UNR	UNRESTRICTED SCO
R IND	RESTRICTED RESIDENTIAL SCO
PGW	PROTECTION OF GROUNDWATER SCO
VOCs	VOLATILE ORGANIC COMPOUNDS
SVOCs	SEMI-VOLATILE ORGANIC COMPOUNDS

"NYSDEC Rules and Regulations, 6 NYCRR Subpart 375-6, Remedial Program Soil Cleanup Objectives" dated December 14, 2006 [NYSDEC, 2006a].

NOTES:

1. SSB43, MW31, AND MW30 TAR IMPACTED SOIL BENEATH THE RAILROAD BERM OBSERVED AT A SIMILAR ELEVATION AS BORINGS TO THE WEST.
2. SHOWN UTILITY LINES ARE APPROXIMATE; VERIFY IN FIELD.

DETAIL A
1"=20'

SOURCES:

1. Survey of existing conditions and sample locations conducted by GEI Consultants, Inc. in 1999, 2009 and 2010. Survey by New York state licensed land surveyor number 050146. Horizontal Datum: New York State Plane Coordinate System (East Zone, North American Datum (NAD) 83). Vertical Datum: North American Vertical Datum (NAVD) 88.
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SUFFERN FORMER MGP SITE
SUFFERN, NEW YORK

ORANGE AND ROCKLAND UTILITIES, INC.
SPRING VALLEY, NEW YORK

Project 091950-2-1204

Figure 3b

Observed Subsurface Soil Impacts Below 15 Feet

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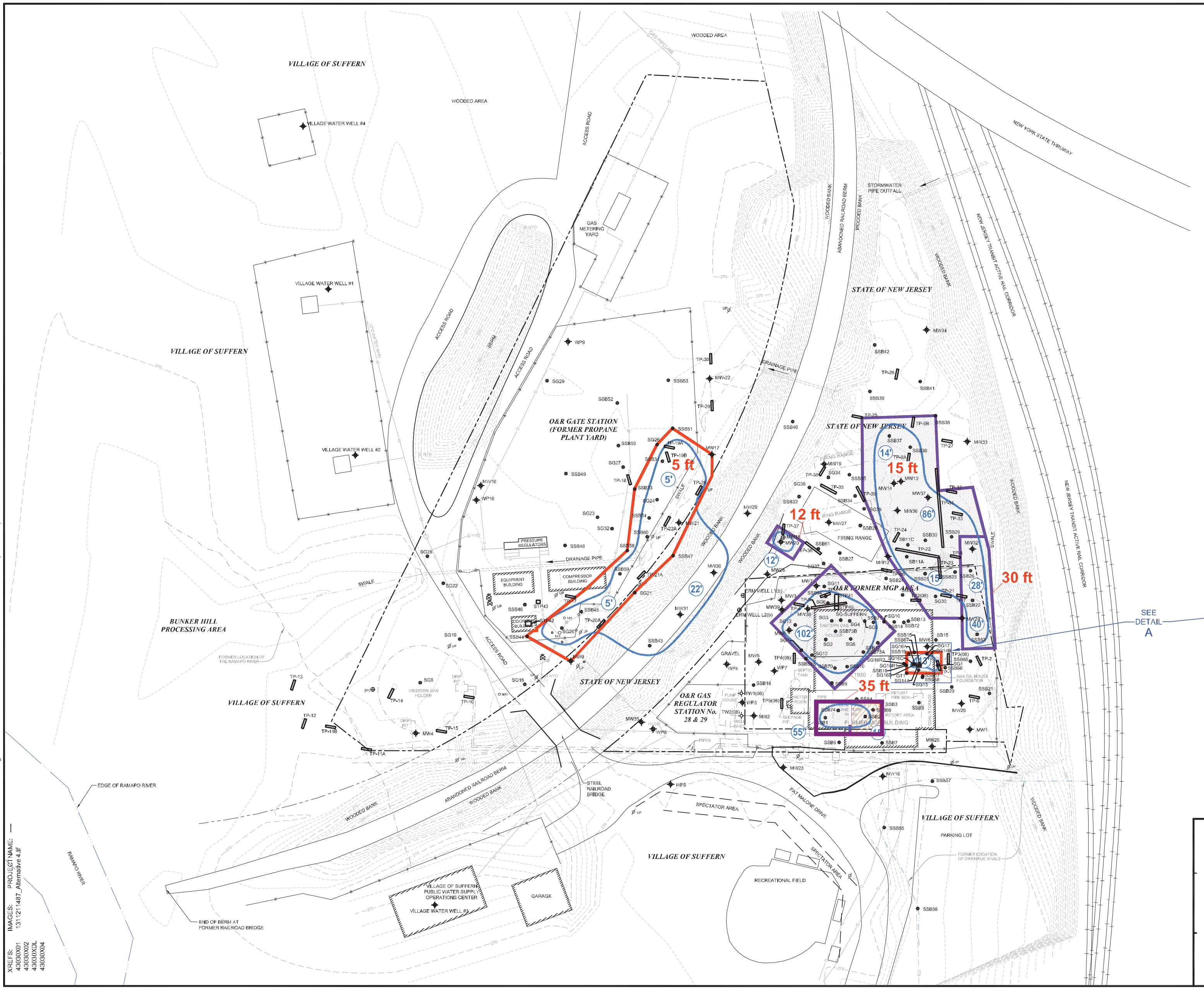
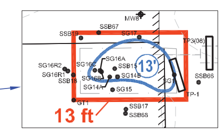


LEGEND:

- APPROXIMATE PROPERTY BOUNDARY
- HISTORIC STRUCTURE
- CHAIN-LINK FENCE
- SWALE
- RAILROAD TRACK
- VILLAGE WATER WELL #1 — PUBLIC SUPPLY WELL LOCATION
- WATER LINE
- NATURAL GAS LINE
- STORM SEWER
- TOPOGRAPHIC CONTOUR
- MW1 — MONITORING WELL LOCATION
- TW1(08) — TEMPORARY MONITORING WELL LOCATION
- ERM WELL L1 / TW1(08) — ABANDONED MONITORING WELL LOCATION
- SG1 / SSB1 — SOIL BORING LOCATION
- TP-1 — TEST PIT LOCATION
- APPROXIMATE HORIZONTAL EXTENT OF VISUALLY IMPACTED MATERIAL (GREATER THAN SHEENS OR BLEBS)
- 13' — MAXIMUM DEPTH OF VISUALLY IMPACTED MATERIAL
- 12 ft — LIMITS AND DEPTH OF EXCAVATION
- 30 ft — LIMITS AND DEPTH OF SOLIDIFICATION



DETAIL A
SCALE: 1" = 20'

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. FIGURE DEVELOPED BASED ON FIGURES 3 AND 4 OF THE REMEDIAL INVESTIGATION REPORT PREPARED BY GEI (GEI, 2010) AND ELECTRONIC FILES PROVIDED BY GEI ON JULY 9, 2012.
3. PRE-ISS EXCAVATION TO BE CONDUCTED TO DEPTHS OF 5 TO 10 FEET BELOW GRADE AT STABILIZATION AREAS.
4. O & R PLANS TO DEMOLISH COMPRESSOR BUILDING ON THE GATE STATION PROPERTY PRIOR TO IMPLEMENTATION OF REMEDIAL CONSTRUCTION.

0 50' 100'
GRAPHIC SCALE

ORANGE & ROCKLAND UTILITIES, INC.
SUFFERN FORMER MGP SITE
SUFFERN, NEW YORK

Proposed Remedial Action Plan
Alternative 3

Figure 4

CITY: SYRACUSE NY DIV/GROUP: ENV/IM-DV DB:W.JONES, E.KRAHMER LD:(Opt) PIC:M. CARRILLO-SHERIDAN PM:TM: J.BRIEN TR:D. ALCOCER LYR:(Opt)ON=*;OFF=*REF*
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