PROPOSED REMEDIAL ACTION PLAN
Madison Avenue Former Manufactured Gas Plant (MGP) Site
City of Elmira, Chemung County, New York
Site No. 8-08-018

March 2008

Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

PROPOSED REMEDIAL ACTION PLAN

Madison Avenue Former Manufactured Gas Plant (MGP) Site

City of Elmira, Chemung County, New York
Site No. 8-08-018
March 2008

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 Madison Avenue Former Manufactured Gas Plant (MGP) Site. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, the operation of a manufactured gas plant at the former MGP site have resulted in the disposal of hazardous wastes, including coal tar containing benzene, toluene, ethylbenzene, xylene and polycyclic aromatic hydrocarbons (PAHs). Purifier waste was also identified at the site and was removed during a previous interim remedial measure. These wastes have contaminated the subsurface soil and groundwater at the site, and have resulted in:

- a significant threat to human health associated with potential exposure to contaminated soil and groundwater.
- a significant environmental threat associated with the impacts of contaminants to groundwater.

To eliminate or mitigate these threats, the Department proposes the following remedy:

The proposed action would include a combination of removal and in-situ treatment of contaminated soils that are heavily impacted with MGP coal tar. The remedy would also include passive recovery of mobile coal tar and treatment of residual impacted soil and groundwater through introduction of oxygen into the subsurface. An environmental easement and site management plan would also be required.

The proposed remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially 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.

This Proposed Remedial Action Plan (PRAP) identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for this preference. The Department will select a final remedy for the site only after careful consideration of all comments received during the public comment period.

The Department has issued this PRAP as a component of the Citizen Participation Plan developed pursuant to the 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 greater detail in the February 2007 Supplemental Remedial Investigation (SRI) Report" the January 2008 "Feasibility Study" (FS) Report, and other relevant documents. The public is encouraged to review the project documents, which are available at the following repositories:

Steele Memorial Library
101 East Church street
Elmira, NY 14901

NYSDEC
Division of Environmental Remediation
625 Broadway
Albany, NY 12233-7014
Hour: 8 am to 4 pm
Attention: Amen M. Omorogbe

The Department seeks input from the community on all PRAPs. A public comment period has been set from February 19, 2008 to March 20 to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for March 5, 2008 at the Steele Memorial Library, Elmira beginning at 6:30 PM.

At the meeting, the results of the RI/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 to: Amen M. Omorogbe, project manager at the above address through March 20, 2008.

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 all of the alternatives identified here.

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.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Madison Avenue Former MGP site is located in the City of Elmira, Chemung County, and is approximately 6 acres in size (see Figures 1 & 2). The former MGP site is bounded by East Fifth Street to the north and north east, East Clinton Street to the south and Madison Avenue to the west.

The New York State Electric and Gas Corporation (NYSEG) currently owns the property and maintains an electric substation in the northeastern portion of the site. The site is approximately 1,500 feet west of Newtown Creek and 3,000 feet north of the Chemung River.

There are five main geologic units beneath the site including (from the ground surface downward) fill, alluvial silt and clay, sand and gravel, lacustrine silt and clay, and a sandy/silty glacial till (see Figure 3). The water table is approximately seven to eight feet below the ground surface, and groundwater flows in a south to southeasterly direction.

The sand and gravel unit beneath the site is part of the Newtown Creek aquifer, which is an important local water resource; however, no drinking water wells are located in the vicinity of the site, and site contaminants (as described in Section 5.1.2 below) have not migrated extensively through the aquifer.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

A gas manufacturing facility was located on the site from the late 1860s until 1947. The manufacturing process involved heating coal and petroleum products to produce a combustible gas. The gas was cooled,

purified and then piped to homes and businesses in the surrounding area where it was used for heating and cooking in much the same way that natural gas is used today.

The former MGP facility consisted of, at different stages of operation, the gas house, coal house, liquid purifiers, purifier boxes, retorts, governor house, tar separators, oil tanks and generator house. Over the years, by-products, such as coal tar generated from the MGP operations, have leaked or been released from the former holders and other structures resulting in the contamination of soil and groundwater.

3.2: Remedial History

In 1986, the Department listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

NYSEG has conducted several remedial activities including four interim remedial measures, which are discussed in Section 5.2 below.

SECTION 4: 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. New York State Electric and Gas, the current owner and former operator of the site, is the only PRP identified for the site.

The Department and NYSEG entered into a multi-site Consent Order on March 30, 1994. The consent order (index number DO-0002-9309) obligates NYSEG to implement a full remedial program at 33 former MGP sites across the State, including the Madison Avenue Site. After the remedy is selected, NYSEG would be required to implement the selected remedy pursuant to the Consent Order.

SECTION 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between August 2003 and April 2006. The field activities and findings of the investigation are described in the RI report.

Three field programs consisting of soil, groundwater and soil vapor sampling were performed at the site to determine the nature and extent of impacts to these media of concern.

5.1.1: Standards, Criteria, and Guidance (SCGs)

To determine whether the soil, groundwater, and soil vapor contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on the Department's "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the Department's Cleanup Objectives ("Technical and Administrative Guidance Memorandum [TAGM] 4046; Determination of Soil Cleanup Objectives and Cleanup Levels and 6 NYCRR Subpart 375-6 - Remedial Program Soil Cleanup Objectives")

- Concentrations of sub slab Soil Vapor VOCs were evaluated in accordance with the NYSDOH guidance document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the RI report.

5.1.2: Nature and Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

As described in the RI report, many soil, groundwater and sub slab soil vapor samples were collected to characterize the nature and extent of contamination. As summarized in Table 1, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). For comparison purposes, where applicable, SCGs are provided for each medium.

Chemical concentrations are reported in parts per billion (ppb) for water and parts per million (ppm) for soil, Air samples are reported in micrograms per cubic meter ($\mu g/m^3$).

Figures 4 & 5 and Table 1 summarize the degree of contamination for the contaminants of concern in soil and groundwater and compare the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

The principal waste product produced at the former MGP site was coal tar, which is an oily, dark colored liquid with a strong, objectionable odor. Unlike most materials labeled as “tar”, this is not a viscous material. Rather, it has a physical consistency similar to motor oil, which enables it to move through the subsurface Coal tar is referred to as a dense non-aqueous phase liquid or DNAPL since it is heavier than water and will not readily dissolve in water. When released into the subsurface, it will sink through the groundwater until it reaches some impermeable material which it cannot penetrate. It can, under certain conditions, move laterally away from the point where it was initially released.

The tar contains high levels of volatile and semi-volatile organic compounds (VOCs and SVOCs). The principal coal tar VOCs are benzene, toluene, ethylbenzene, and xylenes. These compounds, collectively known as BTEX, are slightly soluble in water. Groundwater which comes into contact with tar or tar-contaminated soils will become contaminated with BTEX compounds. This contaminated groundwater can then move through the subsurface along with the ordinary groundwater flow.

The principal coal tar SVOCs are a group of compounds known as polycyclic aromatic hydrocarbons, commonly abbreviated as PAHs. PAH compounds are generally less soluble than BTEX, and are consequently less likely to dissolve in groundwater. This makes PAH compounds less mobile in the subsurface, so the highest levels of PAHs are normally found in proximity to the tar from which they are derived. The specific semivolatile organic compounds of concern in soil and groundwater are the following polycyclic aromatic hydrocarbons (PAHs):

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

In this document, PAH concentrations are referred to as either total PAHs (TPAHs) or carcinogenic PAHs (cPAHs). The TPAH concentration is the sum of the concentrations of each (italicized and non-italicized) PAH listed above. The cPAH concentration is the sum of the concentrations of each italicized PAH listed above.

All of the BTEX and PAH contaminants which dissolve in groundwater are subject to degradation by natural processes. Common soil bacteria are capable of using these chemical compounds as a food source, converting them to carbon dioxide and water. This degradation process takes place more rapidly when abundant oxygen is present in the groundwater, and can in many cases be expedited by the introduction of additional oxygen.

Surface Soil

Surface soil is defined as the soil located from zero to two inches in depth below the ground surface. While several VOCs and SVOCs were detected in the surface soil samples, none of the VOCs were detected above the NYSDEC's TAGM recommended cleanup objectives values. The SVOCs detected were generally comparable to the levels detected in the surrounding area background samples. Potential exposure to constituents in surface soil has also been reduced through a combination of the Interim Remedial Measures (IRM) conducted in the past and the existence of buildings and asphalt cover in the western portion of the site and gravel and clean fill cover in the eastern portion of the site.

On-site surface soils show TPAH concentrations ranging from 0.02 ppm to 72 ppm. BTEX concentrations range from non-detect to 0.01 ppm.

Surface soil contamination identified during the RI/FS was addressed during IRMs to remove soil associated with purifier waste and polychlorinated biphenyl (PCB) contamination described in Section 5.2. Additionally, institutional controls would ensure that the surface cover placed down during the IRMs is maintained and remains protective in the future.

Subsurface Soil

The remedial investigation revealed that high levels of coal tar contamination are generally found in subsurface soils in the immediate vicinity of former MGP structures that handled tar (see Figure 2). Two areas of coal tar impacted soil were identified. The first was in the vicinity of the two former MGP gas holders near the southern property line. The second was to the north and east of a former distribution holder. Other areas where coal tar was noted include the vicinity of the former oil and tar separators located about 100 feet north of the two former holders. A concrete pipe located in the southeastern portion of the site was encountered during the remedial investigation. A black sludge with a strong coal tar-like odor was observed inside the pipe. It should be noted that the two former holders and the foundations were removed during a 2004 IRM.

Coal tar beneath the area of the former MGP structures appears to have migrated into the subsurface to a depth of about 40 feet below ground surface (bgs). and has penetrated glacial till in some locations. Coal tar impacted soil in the eastern portion of the site has not penetrated as deeply, and is generally present from approximately 8 to 14 feet bgs. Coal tar impacted soil is primarily constrained to within the site boundary with the exception of a small area south of the former gas holders 1 and 2, where the tar appears to have migrated south beneath the adjacent property at a depth of about 20 to 25 feet bgs.

Chemical analyses of the subsurface soils show elevated PAH and BTEX concentrations in areas where visible tar contamination was noted. TPAH concentrations in subsurface soils range from non detect to a maximum of 2,458 ppm. BTEX concentrations range from non-detect to 102 ppm.

Subsurface soil contamination identified during the RI/FS will be addressed in the remedy selection process.

Groundwater

Groundwater contamination was detected in the areas near the grossly impacted soil and former MGP structures as shown on Figure 5. Some southward migration of contaminated groundwater would be expected, based on the mapped direction of groundwater flow in the area. However, this migration has been limited and has not carried site-related groundwater far beyond the tar-contaminated areas under current site conditions.

Total BTEX concentrations in groundwater range from 0.6 to a maximum of 13,400 ppb. TPAH concentrations range from 1.2 to 11,096 ppb. The lateral extent of dissolved-phase BTEX and PAH contamination appears to be limited to roughly 100 feet beyond the southern site boundary. The vertical extent of the contaminated groundwater appears to be limited to within 50 feet of the ground surface. The deep groundwater zone (deeper than 50 feet bgs) does not appear to be impacted by site related contaminants.

Four chlorinated VOCs (1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene and chlorothane) were detected above Class GA Groundwater Standards in groundwater at two shallow wells MW-3S and MW-4S located in the western portion of the site during the April 2004 sampling event. The presence of these chlorinated VOCs, ranging from 7.3 to 139 micrograms per liter, is not significant in comparison to the MGP-related BTEX concentrations. Even so, the proposed remedy would address this area by a combination of soil removal and injection of oxygen into the subsurface.

No significant amount of liquid coal tar has been observed in any of the monitoring wells.

Groundwater contamination identified during the RI/FS will be addressed in the remedy selection process.

Soil Vapor/Sub-Slab Vapor/Air

The investigation performed to determine the potential for soil vapor intrusion of VOCs in buildings on and near the site indicates that actions are not currently needed to address potential exposures related to soil vapor intrusion. The warehouse/storage building in the western portion of the site (and the center of the former MGP operation area) including the Trayer buildings along the southern edge of the site were evaluated. Additionally, institutional controls would ensure that the potential for exposures related to soil vapor intrusion would be evaluated for any new construction on-site.

5.2: 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 completion of the RI/FS. Four IRMs have been performed at this site as the investigation of site contamination proceeded (see Figure 6).

NYSEG performed an IRM from late 2003 to early 2004 to excavate the foundations of former gas holders 1 and 2, located in the southwestern portion of the site. The contents of the holder foundations were heavily contaminated with coal tar wastes and the IRM removed the contents, the foundations and contaminated soil in the immediately surrounding areas to depths of between 14 to 16 bgs. This material was transported off site for proper treatment and disposal.

In 2004, NYSEG also excavated and disposed of the top 3 feet of soil associated with the purifier waste disposal area along the southern boundary of the site.

In 1996, polychlorinated biphenyl (PCB) impacted soil was removed in the eastern portion of the site. The PCB contamination was related to former storage of transformers on the site and was not related to the historic use of the site as a gas plant.

The former gas house building was demolished and disposed of in 2003. For each of the completed IRMs, clean backfill and surface cover was used to replace any contaminated material that was removed.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 6.2 of the February 2007 Supplemental RI report, which can be found at the document repository. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

At this site the potential exposure pathways are:

- Dermal contact with contaminated soil, NAPL, or contaminated groundwater;
- Incidental ingestion of contaminated soils or groundwater; and
- Inhalation of contaminated soil vapors or dust.

The potential for exposure to contamination in surface soil has been reduced through a combination of the IRMs conducted in the past and the presence of buildings and asphalt cover in the western portion of the site and gravel and clean fill cover in the eastern portion of the site. Where site-related contamination was detected in surface soil it was generally comparable to background soil samples collected from off-site locations. The potential for exposure to NAPL-contaminated soil is unlikely since NAPL is only present in the subsurface, which is not easily accessible. However, redevelopment, subsurface utility work or building maintenance work in the future could bring workers into contact with contaminated material or bring contaminated soils to the surface. Exposure to contaminated groundwater is unlikely since the area is served by public water. However, the potential for exposure to contaminated groundwater in the future exists if a well were installed or construction was to occur below the shallow groundwater table.

The potential for exposures related to soil vapor intrusion was evaluated for buildings on and near the site. It was determined that actions are not needed to address this exposure pathway. However, the soil vapor intrusion pathway should be evaluated for any new buildings constructed on-site.

5.4: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

The Fish and Wildlife Impact Analysis, 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.

The following environmental exposure pathways and ecological risks have been identified:

- Analytical results from groundwater samples indicate that shallow groundwater (within the first 50 feet bgs) beneath the site is impacted by contaminants resulting from the operation of the former MGP. Although this groundwater impact has resulted in significant damage to the groundwater resource at the site, the contamination has not moved far beyond the site boundary. The groundwater is not currently used as a source of potable water, and there are no identified exposure routes for the contaminated groundwater. Although the extent of off-site groundwater contamination is relatively limited under current conditions, changes in local groundwater usage (such as an installation of a high capacity public supply or production well near the site) could change flow conditions in the future and lead to greater off-site migration.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- potential human exposure to subsurface soil containing contaminants of concern (COCs);
- potential human exposure to MGP tar;
- further off-site migration of MGP tar;
- future COC impacts to groundwater;
- potential human exposure to groundwater containing COCs;
- further off-site migration of groundwater containing COCs;
- maintaining the existing surface cover materials to provide continued protection against potential human exposure to soil containing COCs; and
- future exposures resulting from soil vapor intrusion.

Further, the remediation goals for the site include attaining to the extent practicable:

- ambient groundwater quality standards

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected 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. Potential remedial alternatives for the Madison Avenue Former MGP Site were identified, screened and evaluated in the FS report which is available at the document repositories established for this site.

A summary of the remedial alternatives that were considered for this site is discussed below. The present worth 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.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated subsurface soils and groundwater at the site.

Alternative 1: No Action with Institutional Controls

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment. Although this alternative would not require active remediation, it would include institutional controls to limit the use of groundwater containing COCs above the Department Class GA Groundwater Standards. These controls may be in the form of government, proprietary, enforcement or permit controls and/or informational devices. A periodic site review would be performed to assess any changes in the risk to human health and the environment posed by the site.

Capital costs associated with this alternative are the costs necessary to implement institutional controls to limit disturbance of cover materials, control subsurface activities, and restrict groundwater use within the project area. There would also be costs for continued annual monitoring and operation.

The cost to implement Alternative 1, based on an annual operation and maintenance (O&M), for a period of 30 years has been estimated as follows:

Present Worth: $300,000
Capital Cost: $140,000
Annual Costs (OM&M): $13,000

Alternative 2: Targeted Removal of Source Areas and Passive Recovery of MGP tar.

This Alternative would remove the most grossly impacted material from the subsurface (see Figure 7). The components of Alternative 2 would include the following:

- excavation and off-site disposal of approximately 4,800 cubic yards of targeted sources areas of MGP coal tar impacted subsurface soil to a depth of about 20 feet bgs;
- excavation and off-site disposal of the underground oil and tar separator;
- removal of the concrete pipe located along the southeastern boundary; and
- passive MGP coal tar collection using recovery wells. The wells would not be pumped; however, any tar which collects in the wells would be removed periodically for proper off site treatment and disposal.

This alternative would require an environmental easement which would restrict use of site to commercial and industrial use, restrict the use of groundwater, require implementation of a site management plan (to include monitoring of the site) and call for periodic reviews of effectiveness of the

remediation. This remedy would take approximately 12 months to design and 8 to 12 months to complete.

The cost to implement Alternative 3 has been estimated as follows:

Present Worth: $4,450,000
Capital Cost: $3,550,000
Annual Costs (OM&M): $73,000

Alternative 3: Removal of MGP Impacted Soil Containing PAHs Greater Than 500 mg/kg and BTEX Greater Than 10 mg/kg (to a depth of approximately 20 feet below grade) and Monitored Groundwater Natural Attenuation.

This alternative builds on Alternative 2, calling for removal of more soil, as shown in Figure 8. Any soils containing visible MGP tar, or TPAH values above 500 mg/kg, or BTEX concentrations above 10 mg/kg would be removed down to a defined depth of about 20 feet bgs.

The components of Alternative 3 would include the following:

- excavation and off-site disposal of soil containing coal tar, total PAHs and total BTEX concentrations greater than the TAGM 4046 criteria of 500 mg/kg and 10 mg/kg respectively to a depth of about 20 feet bgs. An estimated 36,000 cubic yards of contaminated material would be removed under this alternative;

- excavation and off-site disposal of the underground oil and tar separator;

- excavation and off-site disposal of concrete pipe located along the southeastern property boundary; and

- monitored groundwater natural attenuation.

This alternative would require an environmental easement which would restrict use of site to commercial and industrial use, restrict the use of groundwater, require implementation of a site management plan (to include monitoring of the site) and call for periodic reviews of effectiveness of the remediation. This remedy would take approximately 12 months to design and about 18 to 24 months to complete.

The cost to implement Alternative 3 has been estimated as follows:

Present Worth: $15,383,000
Capital Cost: $14,685,000
Annual Costs (OM&M): $56,000

Alternative 4: Excavation of Heavily Impacted Soil, In-situ Solidification/Stabilization (ISS) of Deeper Soils, Passive MGP Tar Recovery, and Oxygen Enhancement of Groundwater.

This Alternative would include a combination of removal and in-place treatment of impacted soils, together with collection and removal of mobile MGP tar and treatment of contaminated groundwater, as shown in Figure 9.

Shallow soils (from surface up to 8 ft bgs) would be removed and transported off site for proper treatment and disposal. Deeper soils would be stabilized using in-situ stabilization (ISS). The ISS process involves mixing the soil with pozzolanic agents (typically portland cement) to create a solid

monolith with greatly reduced permeability. Overlapping vertical columns of solidified soil would be created using large diameter augers, jet grouting, or other methods. Contaminants would not be destroyed, but they would be immobilized in place, and contact with groundwater would be greatly reduced. Any subsurface structures would interfere with the mixing process and would need to be removed prior to beginning the stabilization process.

The components of Alternative 4 would include the following:

- excavation and removal of about 4,500 cubic yards of shallow, heavily tar-impacted soil down to the water table, at a depth of approximately 8 feet bgs;
- excavation and removal of the oil and tar separator area located at about 100 feet north of the two former holders in the western portion of the site to a depth of about 18 feet bgs;
- excavation and removal of the concrete pipe located along the southeastern property boundary;
- ISS of approximately 22,400 cubic yards of heavily coal tar impacted soil to depths ranging from approximately 13 to 28 feet bgs. The actual treatment depth would be determined based on existing boring logs and subsequent pre-design investigation results;
- passive recovery of MGP coal tar;
- addition of oxygen to the groundwater along the southwestern property line to accelerate the natural degradation of dissolved contamination; and
- Development and implementation of a Site Management Plan which would include engineering and institutional controls designed to ensure that the implemented remedies remain protective of public health and the environment into the future.

This alternative would require an environmental easement which would restrict use of site to commercial and industrial use, restrict the use of groundwater, require implementation of a site management plan (to include monitoring of the site) and call for periodic reviews of effectiveness of the remediation. This remedy would take approximately 12 to 18 months to design and one to two years to complete.

The cost to implement Alternative 4 has been estimated as follows:

Present Worth: $10,440,000
Capital Cost: $9,320,000
Annual Costs (OM&M): $90,000

Alternative 5: Removal of Soil Exceeding TAGM 4046 Recommended Soil Cleanup Objectives (RSCOs) and Monitored Natural Attenuation of Groundwater.

This alternative would call for the maximum degree of soil removal as a means to restore the site to pre-release conditions to the maximum extent practicable. Soil containing individual constituents greater than their respective TAGM 4046 RSCOs (see Figure 10) would be excavated and transported off site for proper treatment and disposal. Because of the depth to which tar contamination has penetrated, the required excavation would be quite deep, and the volume of soil removed would be very large. The components of Alternative 5 would include the following:

- excavation of about 240,000 cubic yards of soil containing constituents of concern to a depth of approximately 40 feet bgs;

- excavation and removal of the oil and tar separator area to a depth of about 18 feet bgs;
- excavation and removal of the concrete pipe located along the southeastern property boundary; and
- groundwater monitoring to ascertain the effectiveness of natural attenuation in reducing MGP constituents dissolved in the groundwater.

This remedy would take approximately 12 to 18 months to design and about three to five years to complete.

The cost to implement Alternative 5 has been estimated as follows:

Present Worth: $80,783,000
Capital Cost: *$80,163,000*
Annual Costs (OM&M): $50,000

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

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.

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.

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

3. Short-term 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.

4. 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.

5. 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.

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.

7. Cost-Effectivness. 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. The costs for each alternative are presented in Table 2
This final criterion 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.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports 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.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 4, which would include excavation of shallow contaminated soils, in-situ Solidification/Stabilization (ISS) of deeper contaminated soils, mobile coal tar recovery through the use of passive extraction wells, oxygen enhancement of groundwater and the implementation of a site management plan as the remedy for this site. The number and exact locations of the recovery wells would be determined during the design phase of this project. The elements of this remedy are described at the end of this section.

The proposed remedy is based on the results of the RI and the evaluation of alternatives presented in the FS. The proposed remedy, when fully implemented, would mitigate all threats to public health and the environment presented by the contaminated materials present at the site. The proposed remedy would achieve the remedial action objectives (RAOs) and comply with applicable environmental laws, regulations and other standards and criteria.

Alternative 1 does not include active remedial actions and thus would not provide additional protection to human health and the environment over what currently exists. This alternative would not comply with SCGs, since source materials and other MGP-related structures would remain in place and continue to pose a threat to both human health and the environment. This alternative was therefore eliminated from further evaluation.

Alternatives 2, 3, 4 and 5 would all provide some level of protection to public health and the environment and were retained for consideration. Balancing criteria are used to evaluate the alternatives in relation to one another.

Alternative 2, which calls for removal of targeted sources of coal tar, passive coal tar recovery and the removal of the concrete pipe would limit potential for site construction workers to come into direct contact with impacted source material. However, this alternative would not comply with SCGs and Department groundwater standards, as significant amounts of source material would not be addressed, which would continue to act as a source of contamination to soil and groundwater. This alternative would not fully prevent further migration of site contamination to off-site locations.

Alternative 3 calls for more removal of contaminated material than Alternative 2. While this alternative would provide a higher level of protection of human health and the environment, source material would remain in place beyond the excavation limits at depth, and would continue to act as a source of contamination to soil and groundwater. In addition, this alternative would rely heavily on natural

attenuation mechanisms to bring groundwater into compliance with the SCGs. Such compliance would require significant length of time to achieve the desired results. Alternative 3 would be less desirable when compared to the proposed alternative.

Alternative 5, which includes near-total removal of contaminated materials to their full depth of approximately 40 feet bgs, would provide a slightly greater degree of protection to human health and the environment than Alternative 4. Only low levels of contaminated materials would remain following completion of this alternative, primarily in areas deep beneath existing buildings and infrastructure. However, this alternative would create several adverse short-term impacts during its implementation. The 40 foot excavation called for in this Alternative would require extensive dewatering in order to maintain safe working conditions. A massive groundwater treatment and disposal effort would be required. A significant increase in truck traffic would also result, because of the large volumes of soil to be transported off-site. The estimated 240,000 cubic yards of soil would require roughly 12,000 tandem truck trips through the community. While this alternative would result in a reduction of volume of contaminated source materials, it would create greater short-term adverse impacts on nearby residents and commercial establishments during construction (i.e. heavy traffic, noise, possible odors), while providing only minimal additional protection of human health and the environment over the proposed remedy. The incremental cost of over $70 million and the significantly increased community disruption associated with this alternative over the proposed alternative are not justified by the marginal increase in protection to human health and the environment.

Alternative 4 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site as it would either remove or treat in place most of the sources of site contamination. Alternative 4 would prevent off-site migration of the remaining source material through the installation of coal tar recovery wells and active treatment of dissolved phase contamination. Alternative 4 would be readily implementable and would permanently reduces the toxicity, mobility and volume of impacted material at the site.

Although all alternatives with the exception of Alternative 1 would achieve RAOs established for the site and meet SCGs through different means, they would not (with the exception of Alternative 5) provide comparable level of reductions in toxicity, mobility and volume of contaminated materials compared to the proposed Alternative 4.

The estimated present worth cost to implement the remedy is $10,440,000. The cost to construct the remedy is estimated to be $9,320,000 and the estimated average annual costs for O&M over a period of 30 years is $90,000.

The elements of the proposed remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. In addition, pre-design investigation would be required to further define the extent and/or volume of heavily impacted soil that would require excavation and ISS treatment. The target areas for the pre-design investigation would include but would not be limited to areas around and within the former distribution holder and areas immediately north of the holder. A few additional borings would also be required within the former locations of holders 1 and 2 to determine the nature of materials left behind after the previous IRM. A treatability study would also be required to determine the mix requirements and other parameters associated with the ISS;

2. Excavation and removal of about 4,500 cubic yards of MGP tar impacted soil to approximately 8 feet bgs, from the areas shown in Figure 9;

3. Excavation and removal of the contents of the oil and tar separator, their foundations, and contaminated soils surrounding them to an approximate depth of 18 feet bgs. Heavily impacted source materials around the structures would be removed to the extent practicable;

4. Excavation and removal of the concrete pipe located along the southern property boundary to the extent practicable;

5. Installation of a visible demarcation barrier at the bottom of the deep excavation areas to mark the extent of soil removal prior to backfilling the excavation;

6. In-situ solidification/stabilization (ISS) of heavily tar-impacted soil to depths ranging from approximately 13 to 28 feet bgs. The actual depth and lateral extent of treatment would be determined after the completion of the pre-design investigation;

7. Passive coal tar recovery through installation of extraction wells at locations pre-determined to contain potentially mobile coal tar. The specific number of recovery wells and locations would be determined during the design phase of this project. Tar which spontaneously enters the wells through subsurface migration would be removed and transported off site for proper treatment and disposal;

8. Introduction of oxygen into the subsurface along the southwestern property boundary, in the area identified on Figure 9, to enhance aerobic biodegradation of contaminants of concern in groundwater. The specific method for the delivering of oxygen to the subsurface would be determined during the design phase of this project. The injected oxygen would help to mitigate migration of constituents of concern beyond the site boundary;

9. Following the excavation and stabilization, remedial areas would be demarcated, backfilled and covered with at least 1 foot of clean materials from a Department approved off-site location.

10. Since the remedy results in contamination above unrestricted levels remaining at the site, an institutional control in the form of an environmental easement will be required for the site. The environmental easement would:
    (a) restrict the use of the site to commercial and industrial use;
    (b) restrict the use of groundwater at the site;
    (c) require the management of the site in accordance with the provisions of the site management plan, to be approved by the Department; and
    (d) require the property owner complete and submit to the Department a periodic certification.

11. A site management plan (SMP) would be developed and implemented. The SMP would identify the institutional controls and engineering controls (IC/ECs) required for the proposed remedy and detail their implementation. The SMP for the proposed remedy would include:
    (a) An IC/EC control plan to establish the controls and procedures necessary to; (i) manage remaining contaminated soils that may be excavated from the site during future activities, including procedures for soil characterization, handling, health and safety of workers and the community as well as, disposal/reuse in accordance with applicable Department regulations and procedures; (ii) evaluate the potential for vapor intrusion for any buildings developed on the site, including mitigation of any impacts identified; (iii) maintain use restrictions regarding site development or groundwater use identified in the environmental easement; and (iv) require the property owner to provide an institutional control/engineering control (IC/EC) certification on a periodic basis.
    (b) A monitoring plan to monitor the effectiveness of the oxygen injection in groundwater and to monitor the effectiveness of the proposed remedy and the trend of contaminant concentrations in the groundwater.
    (c) An operation and maintenance plan to provide the detailed procedures necessary to operate and maintain the remedy, including the oxygen injection and coal tar recovery

systems. The operation of the components of the remedy would continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

TABLE 1
Nature and Extent of Contamination

Subsurface Soil Analyte	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Benzene	0.0003 - 3.9	0.06	13/61
	Toluene	0.0008- 18	1.5	3/61
	Ethylbenzene	0.0002 - 44	5.5	7/61
	Xylenes (Total)	0.0009- 43	1.2	13/61
	Total BTEX	0.0008 - 101.9	10	10/61
Semi Volatile Organic Compounds (SVOCs) cPAHs	Benzo(a)anthracene	0.011- 76	0.224	36/78
	Benzo(a)pyrene	0.011 - 100	0.061	47/78
	Benzo(b)fluoranthene	0.0077 - 50	1.1	28/78
	Benzo(k)flouranthene	0.098 - 66	1.1	29/78
	Chrysene	0.012 - 96	0.4	32/78
	Dibenzo(a,h)anthracene	0.016 - 13	0.014	37/78
	indeno(1,2,3-cd)pyrene	0.012 - 54	3.2	21/78

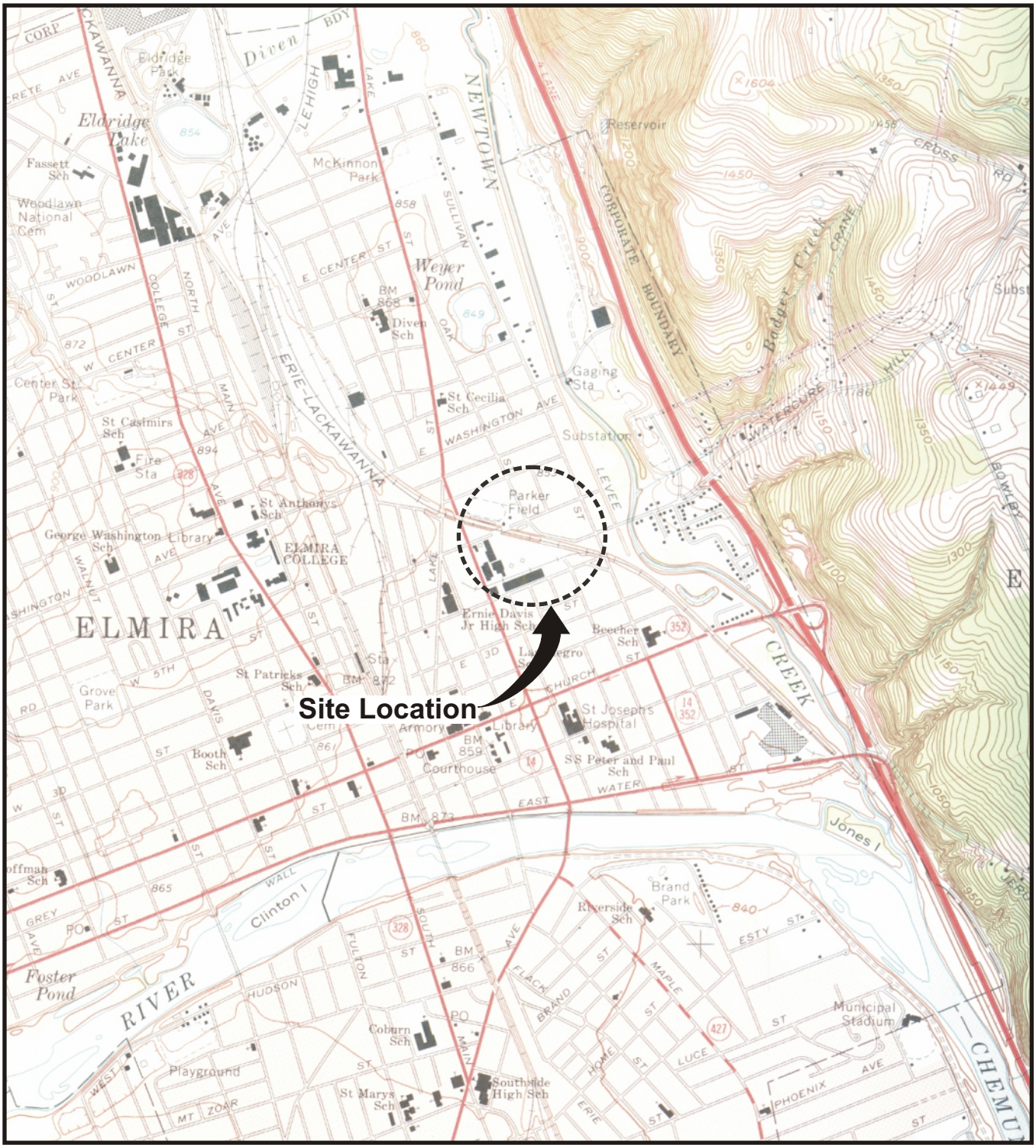
Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Benzene	0.5- 5,400	1	5/36
	Toluene	1.2 - 4,800	5	5/36
	Ethylbenzene	1.3 - 2,200	5	5/36
	Xylenes (Total)	6 - 2,100	5	6/36
	Total BTEX	0.6-13,400	N/A	N/A
Semivolatile Organic Compounds (SVOCs) cPAHs	Benzo(a)anthracene	17 - 17	0.002	0/36
	Benzo(a)pyrene	14 - 14	0.002	1/36
	Benzo(b)fluoranthene	ND - ND	ND	0/36
	Benzo(k)fluoranthene	10 - 10	0.002	1/36
	Indeno(1,2,3-cd)pyrene	ND - ND	0.002	0/36

Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
	Chrysene	13-13	0.002	1/36
	TPAHs	1.2 - 11,096	N/A	N/A

[a] ppb = parts per billion, which is equivalent to micrograms per liter, mcg/L, in water;
ND = Non Detect;
N/A = Not Applicable
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
mcg/m^3 = micrograms per cubic meter
[b] SCG = standards, criteria, and guidance values as presented in Department's TAGM 4046.

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual (O&M) Costs ($)	Total Present Worth ($)
Alternative 1: No Action.	$140,000	$13,000	$300,000
Alternative 2: Targeted Removal of Source Areas and Passive Recovery of MGP tar.	$3,550,000	$73,000	$4,450,000
Alternative 3: Removal of MGP Impacted Soil Containing PAHs Greater Than 500 mg/kg and BTEX Greater Than 10 mg/kg (to a depth of approximately 20 feet below grade) and Monitored Groundwater Natural Attenuation.	$14,685,000	$56,000	$15,383,000
Alternative 4: Excavation of Heavily Impacted Soil, In-situ Solidification/Stabilization (ISS) of Deeper Soils, Passive MGP Tar Recovery, and Oxygen Enhancement of Groundwater.	$9,320,000	$90,000	$10,440,000
Alternative 5: Removal of Soil Exceeding TAGM 4046 Recommended Soil Cleanup Objectives (RSCOs) and Monitored Natural Attenuation of Groundwater.	$80,163,000	$50,000	$80,783,000



REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., ELMIRA, N.Y.-PA., 1969.

2000' 0 2000'

Approximate Scale: 1" = 2000'

Area Location

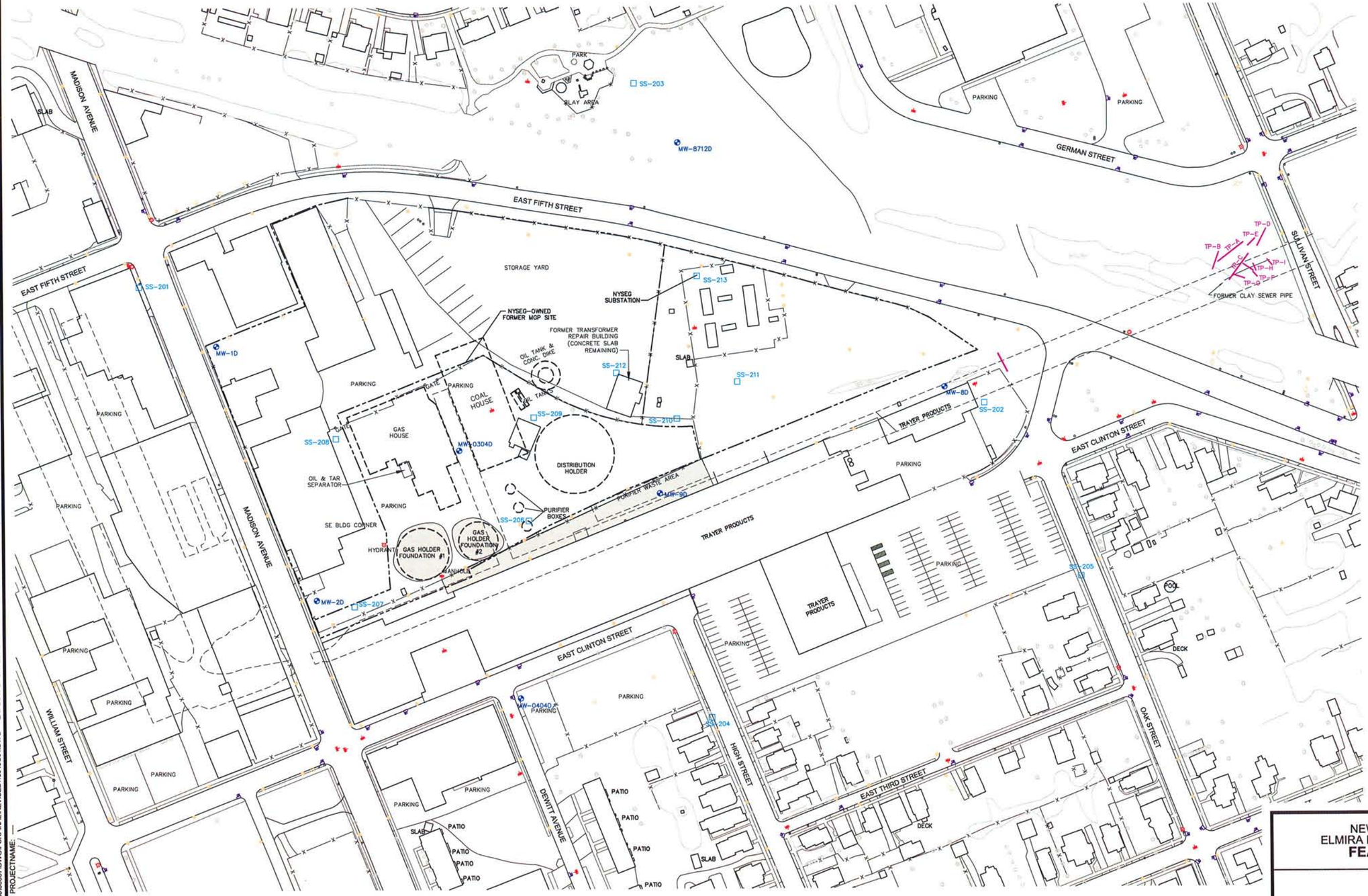
NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT

SITE LOCATION MAP

ARCADIS

FIGURE
1

01/15/07 SYR-D85-KLS, DJH
B0013043/0000/00007/CDR/13043N02.CDR



LEGEND:

- PROPERTY LINE
- CHAIN-LINK FENCE
- BRUSH
- FORMER MGP STRUCTURES - REMOVED
- SURFACE SOIL SAMPLING LOCATION
- POWER POLE
- UTILITY POLE WITH GUY
- LIGHT POLE
- CATCHBASIN
- MANHOLE
- APPROXIMATE MGP IRM REMOVAL AREAS (DEPTHS VARY)

NOTES:

1. BASE MAP SUPPLIED BY NYSEG, LATEST REVISION DATED APRIL 2004, AT A SCALE OF 1" = 60'.
2. ALL LOCATIONS ARE APPROXIMATE.

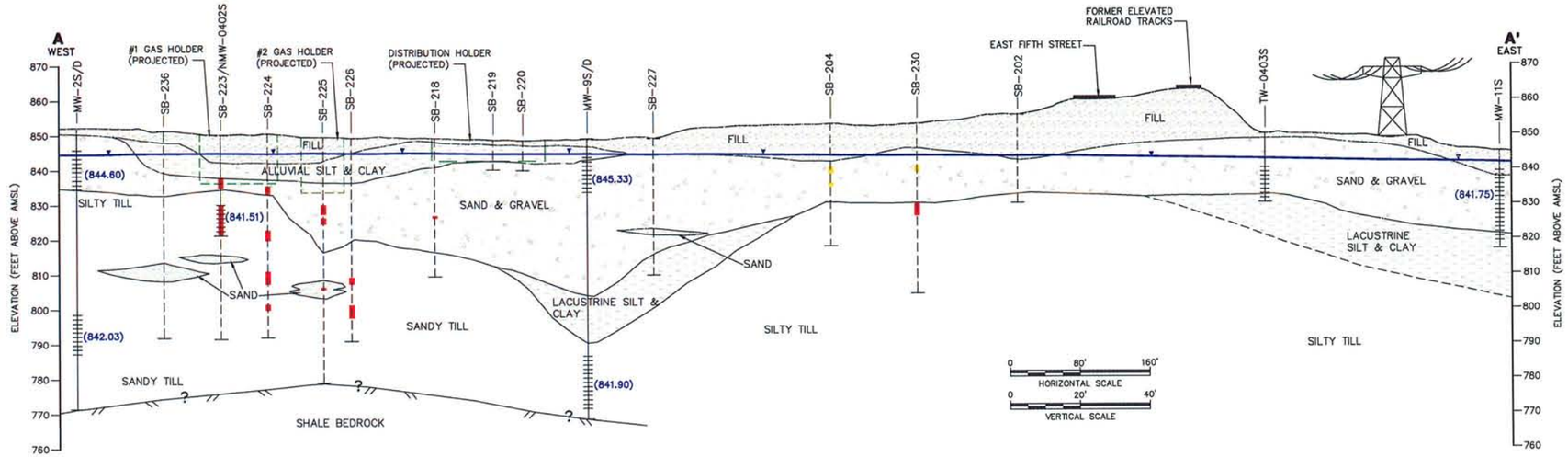
0 80' 160'
GRAPHIC SCALE

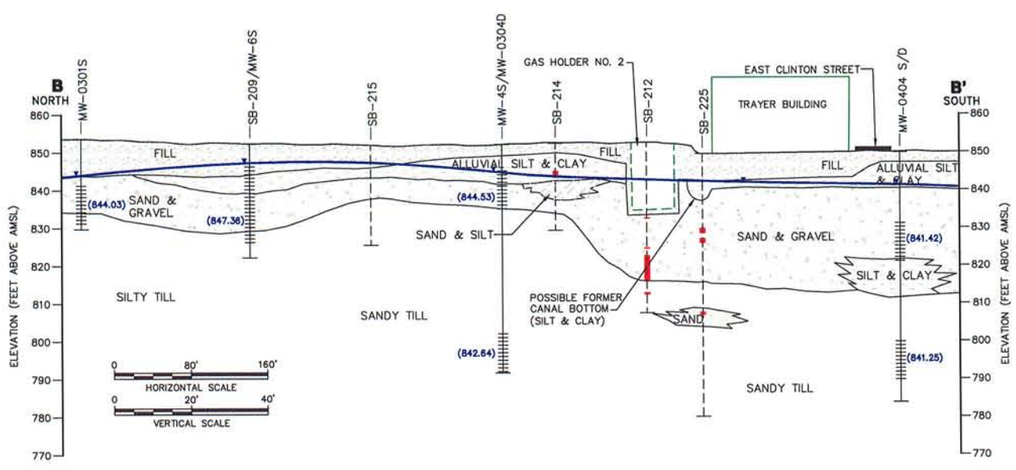
NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT

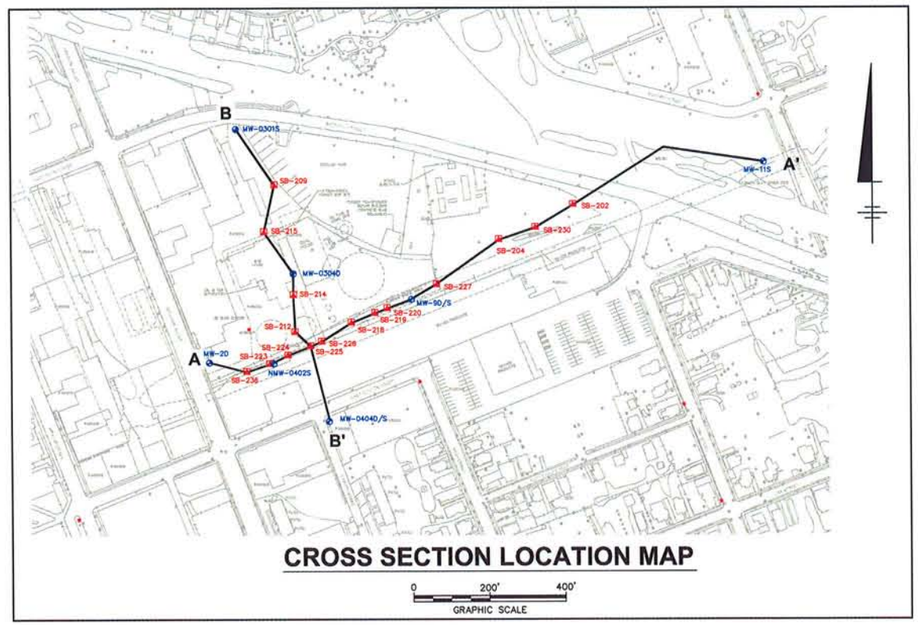
SITE MAP

ARCADIS

FIGURE
2



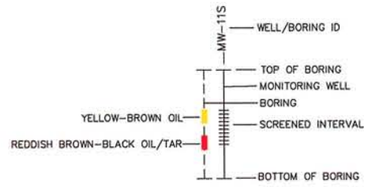




CROSS SECTION LOCATION MAP

LEGEND:

- FILL
- SILT AND CLAY
- SAND AND GRAVEL
- TILL (DENSE UNSORTED SAND AND GRAVEL WITH VARYING AMOUNT OF SAND AND SILT)
- (841.71) GROUNDWATER ELEVATION (4/20/04)



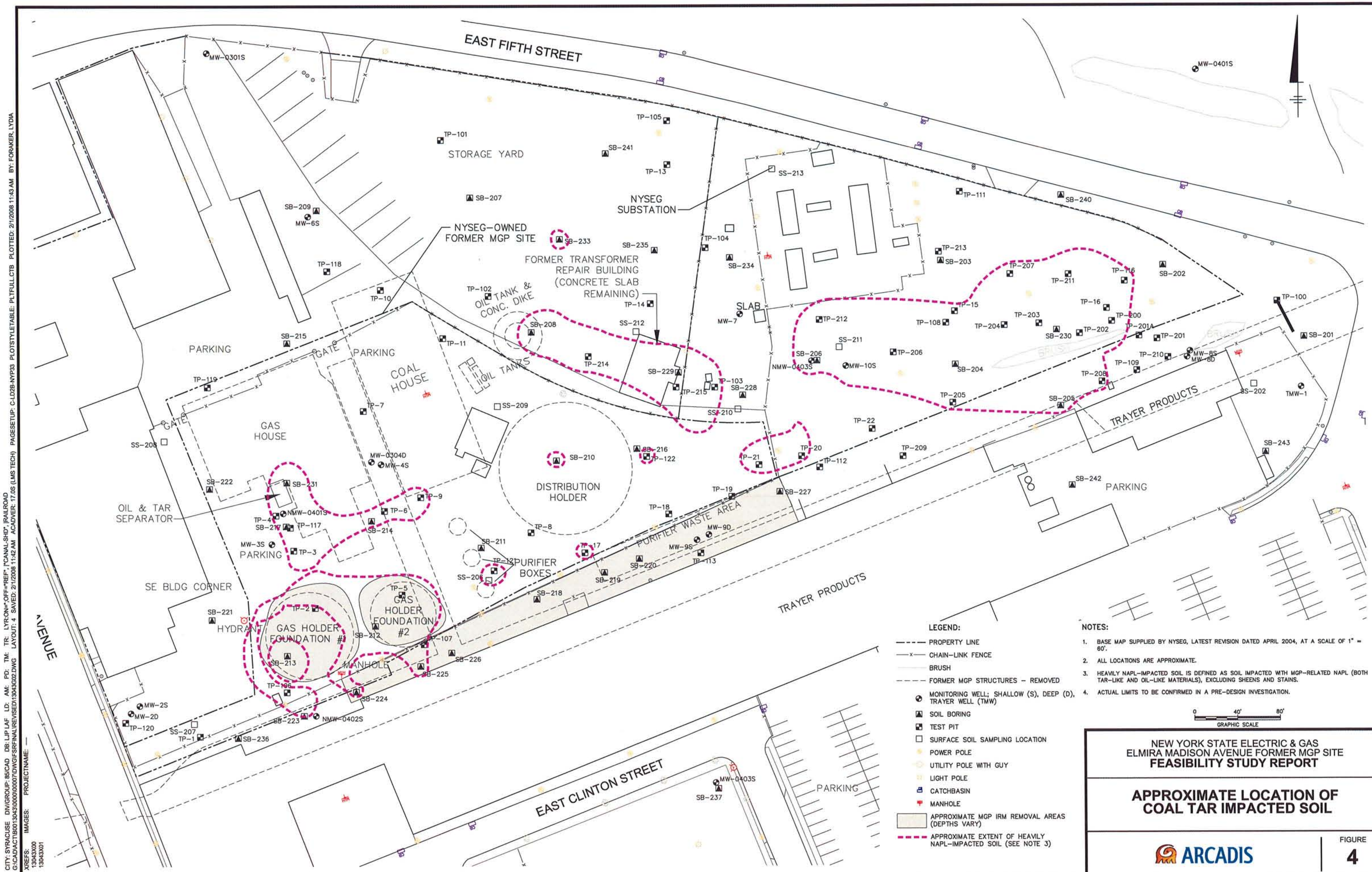
NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT

GEOLOGIC CROSS SECTIONS A-A' AND B-B'

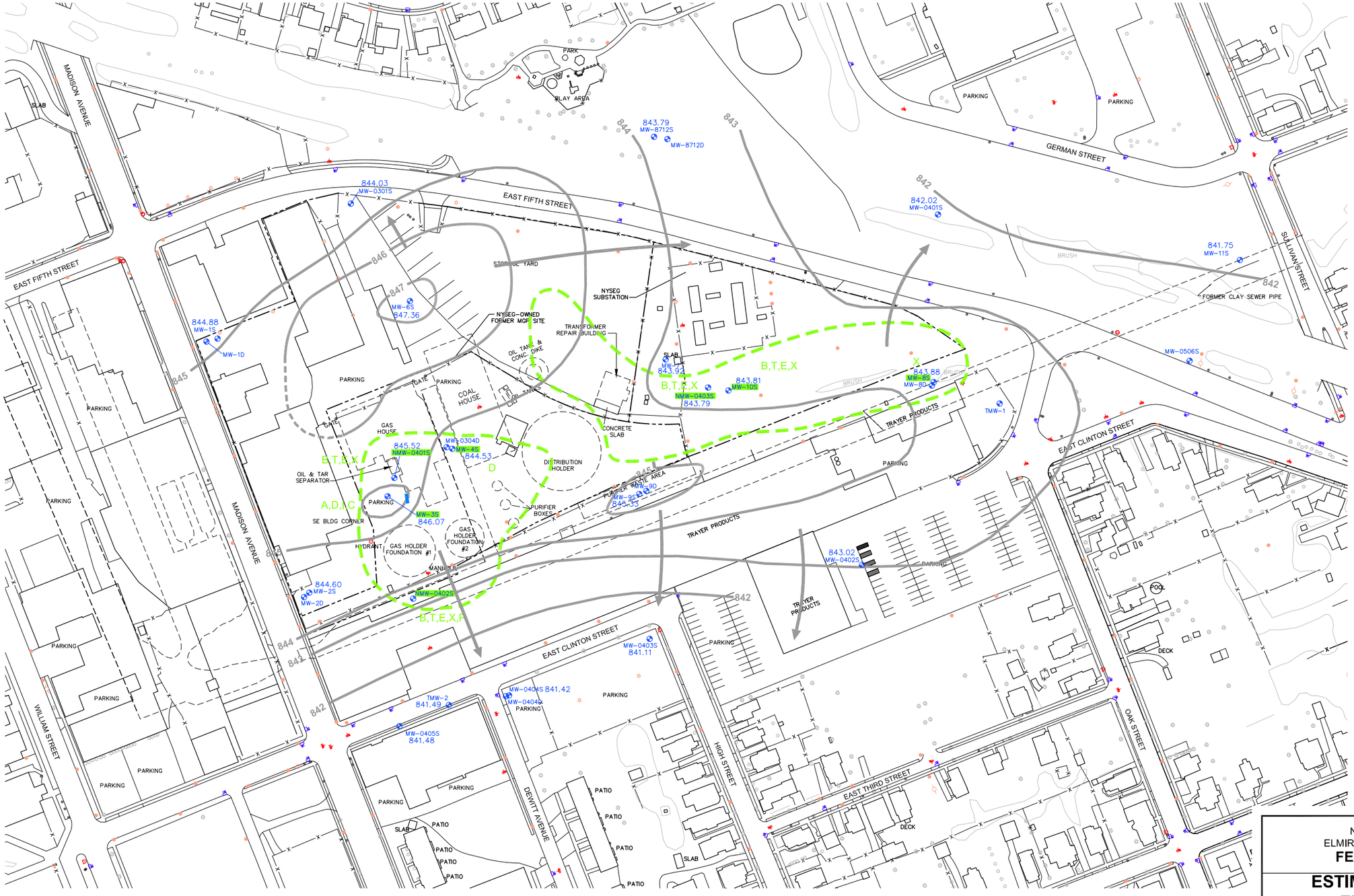
ARCADIS

FIGURE 3

CITY: SYRACUSE DIV/GROUP: 8S/CAD DB: LJP LAF LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF*;"CANAL-SHD","RAILROAD
G:\CAD\ACT\B0013043000000007\DWG\FSRFINAL\REVISED\13043V01.DWG LAYOUT: 3 SAVED: 2/1/2008 11:39 AM ACADVER: 17.0S (LMS TECH) PAGESETUP: C-LD2B-NYP33 PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 2/1/2008 11:39 AM BY: FORAKER, LYDIA
XREFS:
13043X00
13043X01
IMAGES:
PROJECTNAME: —



EAST FIFTH STREET
EAST CLINTON STREET
AVENUE
STORAGE YARD
NYSEG SUBSTATION
NYSEG-OWNED FORMER MGP SITE
FORMER TRANSFORMER REPAIR BUILDING (CONCRETE SLAB REMAINING)
OIL TANK & CONC. DIKE
OIL TANKS
SLAB
PARKING
GATE
COAL HOUSE
GAS HOUSE
OIL & TAR SEPARATOR
DISTRIBUTION HOLDER
PURIFIER BOXES
PURIFIER WASTE AREA
SE BLDG CORNER
HYDRANT
GAS HOLDER FOUNDATION #1
GAS HOLDER FOUNDATION #2
MANHOLE
TRAYER PRODUCTS
BRUSH
LEGEND:
PROPERTY LINE
CHAIN-LINK FENCE
BRUSH
FORMER MGP STRUCTURES - REMOVED
MONITORING WELL; SHALLOW (S), DEEP (D), TRAYER WELL (TMW)
SOIL BORING
TEST PIT
SURFACE SOIL SAMPLING LOCATION
POWER POLE
UTILITY POLE WITH GUY
LIGHT POLE
CATCHBASIN
MANHOLE
APPROXIMATE MGP IRM REMOVAL AREAS (DEPTHS VARY)
APPROXIMATE EXTENT OF HEAVILY NAPL-IMPACTED SOIL (SEE NOTE 3)
NOTES:
1. BASE MAP SUPPLIED BY NYSEG, LATEST REVISION DATED APRIL 2004, AT A SCALE OF 1" = 60'.
2. ALL LOCATIONS ARE APPROXIMATE.
3. HEAVILY NAPL-IMPACTED SOIL IS DEFINED AS SOIL IMPACTED WITH MGP-RELATED NAPL (BOTH TAR-LIKE AND OIL-LIKE MATERIALS), EXCLUDING SHEENS AND STAINS.
4. ACTUAL LIMITS TO BE CONFIRMED IN A PRE-DESIGN INVESTIGATION.
0 40' 80'
GRAPHIC SCALE
NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT
APPROXIMATE LOCATION OF COAL TAR IMPACTED SOIL
ARCADIS
FIGURE
4
CITY: SYRACUSE DIV/GROUP: 85/CAD DB: LJP LAF LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF*, [*CANAL-SHD*, [RAILROAD
G:\CAD\ACT\B0013043\0001\00007\DWG\FS\FINAL\REVISED\13043G02.DWG LAYOUT: 4 SAVED: 2/1/2008 11:42 AM ACADVER: 17.0S (LMS TECH) PAGESETUP: C-LD28-NYP33 PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 2/1/2008 11:43 AM BY: FORAKER, LYDIA
XREFS: IMAGES: PROJECTNAME: ---
13043X00
13043X01



LEGEND:

- PROPERTY LINE
- CHAIN–LINK FENCE
- BRUSH
- FORMER MGP STRUCTURES – REMOVED
- MONITORING WELL; SHALLOW (S), DEEP (D), TRAYER WELL (TMW)
- POWER POLE
- UTILITY POLE WITH GUY
- LIGHT POLE
- CATCHBASIN
- MANHOLE
- 841.75 GROUNDWATER ELEVATION
- 842 INFERRED GROUNDWATER ELEVATION CONTOUR (APRIL 2004)
- GROUNDWATER FLOW DIRECTION
- INFERRED EXTENT OF SHALLOW GROUNDWATER CONCENTRATIONS ABOVE NYSDEC CLASS GA GROUNDWATER STANDARDS
- B,T,E,X,C APRIL 2004 GROUNDWATER SAMPLE CONTAINED ONE OR MORE CONSTITUENTS OF CONCERN (BTEX AND PAHs) AT A CONCENTRATION GREATER THAN THE NYSDEC CLASS GA GROUNDWATER STANDARD (TOGS 1,1,1, JUNE 1995). THE LETTER GIVEN REPRESENTS THE COMPOUNDS THAT EXCEED THEIR RESPECTIVE STANDARD, AS FOLLOWS:

  A = 1,1,1,–TRICHLOROETHANE
  D = 1,1–DICHLOROETHANE
  I = 1,1–DICHLOROETHENE
  C = CHLOROETHANE
  X = XYLENES
  B = BENZENE
  E = ETHYLBENZENE
  T = TOLUENE
  P = BENZO(A)PYRENE

NOTES:

1. BASE MAP SUPPLIED BY NYSEG, LATEST REVISION DATED APRIL 2004, AT A SCALE OF 1" = 60'.
2. ALL LOCATIONS ARE APPROXIMATE.

0 80' 160'
GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT

ESTIMATED EXTENT OF COCs EXCEEDING CLASS GA GROUNDWATER STANDARDS

DRAFT

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
5

SYR-85-LJP LAYER: ON=*; OFF=*REF*; |HIST-1876-CANAL-SHD, |RM-RMVL, |RAILROAD
G:\CAD\ACTIVE\-DWG\ACT\13043007\FSR\13043W01.DWG SAVED:9/11/2007 3:27 PM LAYOUT:5 PAGESETUP:---- PENTABLE:PLTFULL.CTB PRINTED:9/11/2007 3:57 PM BY:LPOSENAUER
PROJECTNAME:----
XREFS: 13043X0
IMAGES: 13043X01

EAST FIFTH STREET

STORAGE YARD

NYSEG SUBSTATION

NYSEG–OWNED FORMER MGP SITE

FORMER TRANSFORMER REPAIR BUILDING (CONCRETE SLAB REMAINING)

SLAB

OIL TANK & CONC. DIKE

OIL TANKS

PARKING

GATE

PARKING

COAL HOUSE

GAS HOUSE

GATE

DISTRIBUTION HOLDER

BRUSH

BRUSH

TRAYER PRODUCTS

PARKING

OIL & TAR SEPARATOR

PARKING

PURIFIER WASTE AREA

PURIFIER BOXES

SE BLDG CORNER

HYDRANT

GAS HOLDER FOUNDATION #1

GAS HOLDER FOUNDATION #2

MANHOLE

TRAYER PRODUCTS

MADISON AVENUE

EAST CLINTON STREET

PARKING

LEGEND:

- PROPERTY LINE
- CHAIN–LINK FENCE
- BRUSH
- FORMER MGP STRUCTURES – REMOVED
- POWER POLE
- UTILITY POLE WITH GUY
- LIGHT POLE
- CATCHBASIN
- MANHOLE
- APPROXIMATE MGP IRM REMOVAL AREAS (DEPTHS VARY)
- APPROXIMATE PCB IRM REMOVAL AREAS (1–5 FEET BGS)

NOTES:

1. BASE MAP SUPPLIED BY NYSEG, LATEST REVISION DATED APRIL 2004, AT A SCALE OF 1" = 60'.
2. ALL LOCATIONS ARE APPROXIMATE.

0 40' 80'
GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT

IRM REMOVAL AREAS

ARCADIS

FIGURE
6

EAST FIFTH STREET

MW-0301S

MW-0401S

STORAGE YARD

NYSEG SUBSTATION

NYSEG-OWNED FORMER MGP SITE

FORMER TRANSFORMER REPAIR BUILDING (CONCRETE SLAB REMAINING)

SLAB

OIL TANK & CONC. DIKE

OIL TANKS

PARKING

GATE

COAL HOUSE

GAS HOUSE

DISTRIBUTION HOLDER

OIL & TAR SEPARATOR

PURIFIER WASTE AREA

PURIFIER BOXES

SE BLDG CORNER

HYDRANT

GAS HOLDER FOUNDATION #1

GAS HOLDER FOUNDATION #2

MANHOLE

TRAYER PRODUCTS

N AVENUE

EAST CLINTON STREET

18'

14'

13'

12'

9.5'

8'

6.5'

SB-201 SB-202 SB-203 SB-204 SB-205 SB-206 SB-207 SB-208 SB-209 SB-210 SB-211 SB-212 SB-213 SB-214 SB-215 SB-216 SB-217 SB-218 SB-219 SB-220 SB-221 SB-222 SB-223 SB-224 SB-225 SB-226 SB-227 SB-228 SB-229 SB-230 SB-231 SB-233 SB-234 SB-235 SB-236 SB-237 SB-240 SB-241 SB-242 SB-243

MW-1S MW-2S MW-2D MW-3S MW-4S MW-6S MW-7 MW-8S MW-8D MW-9S MW-9D MW-10S MW-0304D MW-0401S MW-0402S MW-0403S MW-0404S NMW-0403S TMW-1

TP-1 TP-2 TP-3 TP-4 TP-5 TP-6 TP-7 TP-8 TP-9 TP-10 TP-11 TP-12 TP-13 TP-14 TP-15 TP-16 TP-17 TP-18 TP-19 TP-20 TP-21 TP-22 TP-100 TP-101 TP-102 TP-103 TP-104 TP-105 TP-106 TP-107 TP-108 TP-109 TP-111 TP-112 TP-113 TP-116 TP-117 TP-118 TP-119 TP-120 TP-122 TP-200 TP-201 TP-201A TP-202 TP-203 TP-204 TP-205 TP-206 TP-207 TP-208 TP-209 TP-210 TP-211 TP-212 TP-213 TP-214 TP-215

SS-202 SS-207 SS-208 SS-209 SS-210 SS-211 SS-212 SS-213

LEGEND:

- PROPERTY LINE
- CHAIN-LINK FENCE
- BRUSH
- FORMER MGP STRUCTURES – REMOVED
- MONITORING WELL; SHALLOW (S), DEEP (D), TRAYER WELL (TMW)
- SOIL BORING
- TEST PIT
- SURFACE SOIL SAMPLING LOCATION
- POWER POLE
- UTILITY POLE WITH GUY
- LIGHT POLE
- CATCHBASIN
- MANHOLE
- APPROXIMATE MGP IRM REMOVAL AREAS (DEPTHS VARY)
- APPROXIMATE LIMITS OF CONCRETE PIPE REMOVAL (SEE NOTE 3)
- REMOVAL AREA BOUNDARIES (SEE NOTE 4)
- 9.5' REMOVAL AREA DEPTHS

NOTES:

1. BASE MAP SUPPLIED BY NYSEG, LATEST REVISION DATED APRIL 2004, AT A SCALE OF 1" = 60'.
2. ALL LOCATIONS ARE APPROXIMATE.
3. LIMITS OF CONCRETE PIPE REMOVAL ARE APPROXIMATE AND UNKNOWN. ACTUAL REMOVAL LIMITS WILL BE DETERMINED DURING IMPLEMENTATION OF THE CHOSEN REMEDY FOR THE SITE.
4. REMOVAL AREA BOUNDARIES ARE APPROXIMATE AND BASED ON DATA PROVIDED IN THE FEBRUARY 2007 SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT (ARCADIS BBL, 2007). ALTERNATIVE S2: TARGETED SOURCE OF NAPL REMOVAL, REMOVAL OF CONCRETE PIPE, INSTITUTIONAL CONTROLS, DEED RESTRICTIONS AND SITE RESTORATION – IS THE TARGETED REMOVAL OF SOURCES OF NAPL AND REMOVAL OF VISUAL EVIDENCE OF COAL TAR OUTSIDE OF MGP STRUCTURES.

0 40' 80'
GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT

ALTERNATIVE 2

ARCADIS

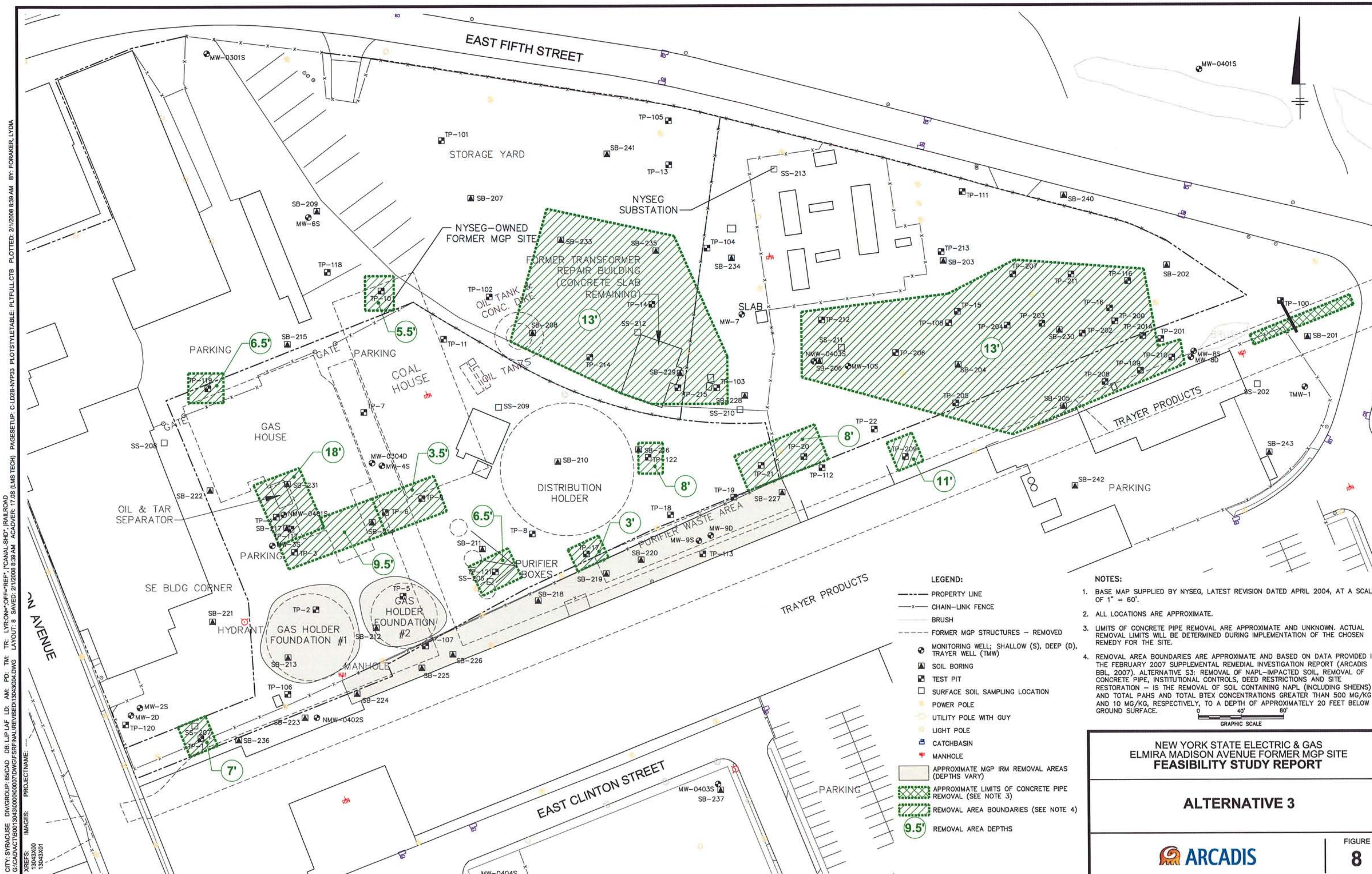
FIGURE 7

CITY: SYRACUSE DIV/GROUP: 85/CAD DB: LJP LAF LD: AM: PD: TM: TR: LYRON=*OFF=*REF*;"CANAL-SHD,IRAILROAD
G:\CADACT\B0013043\0000\0000071\DWG\FSRFINAL\REVISED\13043X03.DWG LAYOUT: 7 SAVED: 2/12/2008 8:39 AM ACADVER: 17.0S (LMS TECH) PAGESETUP: C-LD2B-NYP33 PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 2/12/2008 8:39 AM BY: FORAKER, LYDIA

XREFS:
13043X00
13043X01

IMAGES:

PROJECTNAME: —



LEGEND:

- PROPERTY LINE
- CHAIN-LINK FENCE
- BRUSH
- FORMER MGP STRUCTURES – REMOVED
- MONITORING WELL; SHALLOW (S), DEEP (D), TRAYER WELL (TMW)
- SOIL BORING
- TEST PIT
- SURFACE SOIL SAMPLING LOCATION
- POWER POLE
- UTILITY POLE WITH GUY
- LIGHT POLE
- CATCHBASIN
- MANHOLE
- APPROXIMATE MGP IRM REMOVAL AREAS (DEPTHS VARY)
- APPROXIMATE LIMITS OF CONCRETE PIPE REMOVAL (SEE NOTE 3)
- REMOVAL AREA BOUNDARIES (SEE NOTE 4)
- 9.5' REMOVAL AREA DEPTHS

NOTES:

1. BASE MAP SUPPLIED BY NYSEG, LATEST REVISION DATED APRIL 2004, AT A SCALE OF 1" = 60'.
2. ALL LOCATIONS ARE APPROXIMATE.
3. LIMITS OF CONCRETE PIPE REMOVAL ARE APPROXIMATE AND UNKNOWN. ACTUAL REMOVAL LIMITS WILL BE DETERMINED DURING IMPLEMENTATION OF THE CHOSEN REMEDY FOR THE SITE.
4. REMOVAL AREA BOUNDARIES ARE APPROXIMATE AND BASED ON DATA PROVIDED IN THE FEBRUARY 2007 SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT (ARCADIS BBL, 2007). ALTERNATIVE S3: REMOVAL OF NAPL-IMPACTED SOIL, REMOVAL OF CONCRETE PIPE, INSTITUTIONAL CONTROLS, DEED RESTRICTIONS AND SITE RESTORATION – IS THE REMOVAL OF SOIL CONTAINING NAPL (INCLUDING SHEENS) AND TOTAL PAHS AND TOTAL BTEX CONCENTRATIONS GREATER THAN 500 MG/KG AND 10 MG/KG, RESPECTIVELY, TO A DEPTH OF APPROXIMATELY 20 FEET BELOW GROUND SURFACE.

0 40' 80'
GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT

ALTERNATIVE 3

ARCADIS

FIGURE
8

CITY: SYRACUSE DIV/GROUP: 85/CAD DB: LIP LAF LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF*, *CANAL-SHD*, IRAILROAD PAGESETUP: C-LD28-NYP33 PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 2/1/2008 8:39 AM BY: FORAKER, LYDIA
G:\CAD\ACT\B0013043\0000\00007\DWG\FSRFINAL\REVISED\13043G04.DWG LAYOUT: 8 SAVED: 2/1/2008 8:39 AM ACADVER: 17.0S (LMS TECH)
XREFS: 13043X00 13043X01 IMAGES: PROJECTNAME: ---

EAST FIFTH STREET

STORAGE YARD

NYSEG SUBSTATION

NYSEG-OWNED FORMER MGP SITE

FORMER TRANSFORMER REPAIR BUILDING (CONCRETE SLAB REMAINING)

OIL TANK & CONC. DIKE

SLAB

PARKING

GATE

COAL HOUSE

OIL TANKS

GAS HOUSE

OIL & TAR SEPARATOR

SE BLDG CORNER

HYDRANT

GAS HOLDER FOUNDATION #1

GAS HOLDER FOUNDATION #2

MANHOLE

DISTRIBUTION HOLDER

PURIFIER BOXES

PURIFIER WASTE AREA

BRUSH

TRAYER PRODUCTS

EAST CLINTON STREET

N AVENUE

MW-0301S
MW-0401S
MW-6S
MW-7
MW-0304D
MW-4S
MW-0401S
MW-3S
MW-2S
MW-2D
MW-10S
MW-8S
MW-8D
MW-9D
MW-9S
NMW-0402S
NMW-0403S
MW-0403S
MW-0404S
TMW-1

SB-201 SB-202 SB-203 SB-204 SB-205 SB-206 SB-207 SB-208 SB-209 SB-210 SB-211 SB-212 SB-213 SB-214 SB-215 SB-216 SB-217 SB-218 SB-219 SB-220 SB-221 SB-222 SB-223 SB-224 SB-225 SB-226 SB-227 SB-228 SB-229 SB-230 SB-231 SB-233 SB-234 SB-235 SB-236 SB-237 SB-240 SB-241 SB-242 SB-243

TP-1 TP-2 TP-3 TP-4 TP-5 TP-6 TP-7 TP-8 TP-9 TP-10 TP-11 TP-13 TP-14 TP-15 TP-16 TP-17 TP-18 TP-19 TP-20 TP-21 TP-22 TP-100 TP-101 TP-102 TP-103 TP-104 TP-105 TP-106 TP-107 TP-108 TP-109 TP-111 TP-112 TP-113 TP-116 TP-117 TP-118 TP-119 TP-120 TP-122 TP-200 TP-201 TP-201A TP-202 TP-203 TP-204 TP-205 TP-206 TP-207 TP-208 TP-209 TP-210 TP-211 TP-212 TP-213 TP-214 TP-215

SS-202 SS-203 SS-205 SS-206 SS-207 SS-208 SS-209 SS-210 SS-211 SS-212 SS-213

13' 24' 26' 8' 28' 18' 3.5' 6.5' 3' 9.5'

NOTES:

1. BASE MAP SUPPLIED BY NYSEG, LATEST REVISION DATED APRIL 2004, AT A SCALE OF 1" = 60'.
2. ALL LOCATIONS ARE APPROXIMATE.
3. LIMITS OF CONCRETE PIPE REMOVAL ARE APPROXIMATE AND UNKNOWN. ACTUAL REMOVAL LIMITS WILL BE DETERMINED DURING IMPLEMENTATION OF THE CHOSEN REMEDY FOR THE SITE.
4. IN-SITU SOLIDIFICATION/STABILIZATION AND REMOVAL AREA BOUNDARIES ARE APPROXIMATE AND BASED ON DATA PROVIDED IN THE FEBRUARY 2007 SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT (ARCADIS BBL, 2007).
5. ALTERNATIVE S4: IN-SITU SOLIDIFICATION/STABILIZATION AND EXCAVATION, REMOVAL OF CONCRETE PIPE, INSTITUTIONAL CONTROLS, DEED RESTRICTIONS AND SITE RESTORATION – IS THE IN-SITU SOLIDIFICATION/STABILIZATION OF HEAVILY NAPL-IMPACTED SOIL ABOVE THE TILL LAYER TO DEPTHS RANGING FROM APPROXIMATELY 13 TO 28 FEET BGS AND THE EXCAVATION OF SHALLOW, HEAVILY NAPL-IMPACTED SOIL AND THE OIL AND TAR SEPARATOR.
6. ALTERNATIVE GW4: NAPL RECOVERY AND OXYGEN ENHANCEMENT INCLUDES THE INSTALLATION OF NAPL RECOVERY AND OXYGEN ENHANCEMENT WELLS SOUTH OF THE FORMER GAS HOLDERS. LOCATIONS OF WELLS ARE APPROXIMATE AND WILL BE DETERMINED DURING A PRE-DESIGN INVESTIGATION (PDI).
7. IN ADDITION TO THE PDI AREAS DEPICTED ON THIS FIGURE, ALL IN-SITU SOLIDIFICATION/STABILIZATION AND EXCAVATION AREAS/BOUNDARIES ARE TO BE FURTHER EVALUATED DURING A PDI.

0 40' 80'
GRAPHIC SCALE

LEGEND:

- PROPERTY LINE
- CHAIN-LINK FENCE
- BRUSH
- FORMER MGP STRUCTURES – REMOVED
- MONITORING WELL; SHALLOW (S), DEEP (D), TRAYER WELL (TMW)
- SOIL BORING
- TEST PIT
- SURFACE SOIL SAMPLING LOCATION
- POWER POLE
- UTILITY POLE WITH GUY
- LIGHT POLE
- CATCHBASIN
- MANHOLE
- APPROXIMATE MGP IRM REMOVAL AREAS (DEPTHS VARY)
- APPROXIMATE LIMITS OF CONCRETE PIPE REMOVAL (SEE NOTE 3)
- IN-SITU SOLIDIFICATION/STABILIZATION BOUNDARIES (SEE NOTE 5)
- REMOVAL AREA BOUNDARIES (SEE NOTE 5)
- 9.5' IN-SITU SOLIDIFICATION/STABILIZATION AND EXCAVATION DEPTHS
- ALTERNATIVE GW4 (SEE NOTE 6)
- POTENTIAL PDI AREAS (SEE NOTE 7)

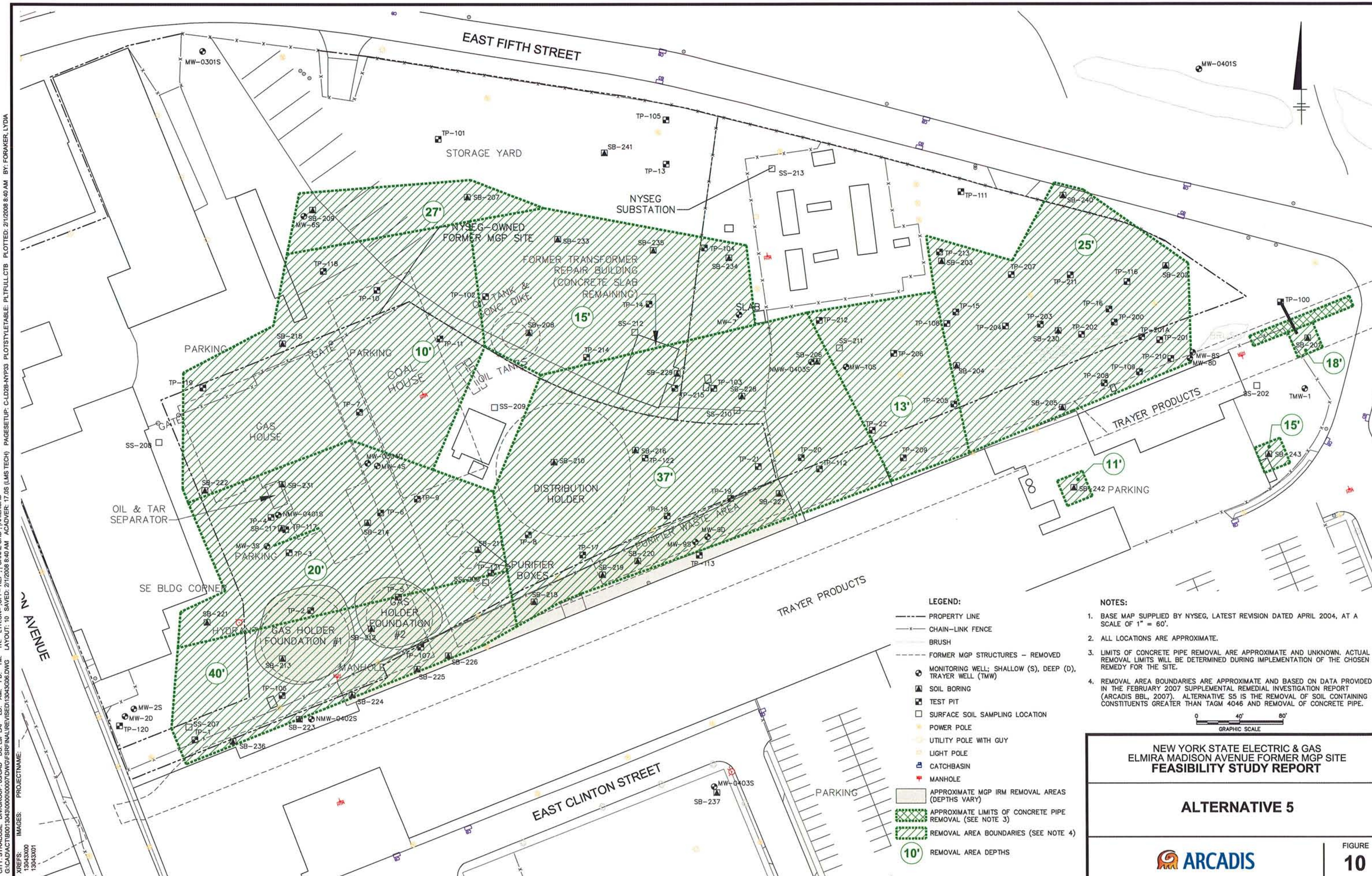
NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT

ALTERNATIVE 4

ARCADIS

FIGURE
9

CITY: SYRACUSE DIV/GROUP: 85/CAD DB: LJP LAF ROA LD: AM: PD: TM: TR: LYRON=OFF=REF*;*CANAL-SHD*;RAILROAD
G:\CAD\ACTIVE\013043000\0000007\DWG\FINAL\REVISED\13043G05.DWG LAYOUT: 9 SAVED: 2/12/2008 1:48 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: C4_02B-PDF PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 2/12/2008 1:49 PM BY: ALLEN, ROYCE
XREFS: 13043X00 13043X01 IMAGES: PROJECTNAME:


EAST FIFTH STREET
EAST CLINTON STREET
ON AVENUE
STORAGE YARD
NYSEG SUBSTATION
NYSEG-OWNED FORMER MGP SITE
FORMER TRANSFORMER REPAIR BUILDING (CONCRETE SLAB REMAINING)
OIL TANK & CONC. DIKE
OIL TANK
SLAB
PARKING
GATE
COAL HOUSE
GAS HOUSE
DISTRIBUTION HOLDER
PURIFIER BOXES
PURIFIER WASTE AREA
OIL & TAR SEPARATOR
SE BLDG CORNER
HYDRANT
GAS HOLDER FOUNDATION #1
GAS HOLDER FOUNDATION #2
MANHOLE
TRAYER PRODUCTS
27'
15'
10'
25'
13'
18'
37'
20'
40'
11'
MW-0301S
MW-0401S
TP-101
TP-105
SB-241
TP-13
SS-213
TP-111
SB-207
SB-209
MW-6S
SB-233
SB-235
TP-104
SB-234
SB-240
TP-213
SB-203
TP-207
TP-211
TP-116
SB-202
TP-118
TP-10
TP-102
SB-208
TP-14
SS-212
MW-7
TP-212
TP-15
TP-108
TP-204
TP-203
SB-230
TP-202
TP-16
TP-200
TP-201A
TP-201
TP-100
SB-215
TP-11
TP-214
SB-229
SS-211
SB-206
NMW-0403S
MW-10S
TP-206
SB-204
TP-210
MW-8S
MW-8D
SB-201
TP-119
TP-7
SS-209
TP-103
SB-228
TP-215
SS-210
TP-205
TP-208
TP-109
SB-205
SS-202
TMW-1
SS-208
TP-22
SB-243
MW-0304D
MW-4S
SB-210
SB-216
TP-122
TP-21
TP-20
TP-112
TP-209
SB-222
SB-231
TP-9
TP-6
TP-19
SB-227
SB-242
NMW-0401S
TP-4
SB-217
TP-117
SB-214
TP-18
MW-9D
MW-3S
TP-3
SB-211
TP-8
TP-17
SB-220
MW-9S
TP-113
SS-206
TP-121
SB-219
TP-5
SB-218
SB-221
TP-2
SB-212
SB-213
TP-107
SB-226
SB-225
TP-106
SB-224
MW-2S
MW-2D
TP-120
SS-207
TP-1
SB-223
NMW-0402S
SB-236
MW-0403S
SB-237

LEGEND:

- PROPERTY LINE
- CHAIN-LINK FENCE
- BRUSH
- FORMER MGP STRUCTURES – REMOVED
- MONITORING WELL; SHALLOW (S), DEEP (D), TRAYER WELL (TMW)
- SOIL BORING
- TEST PIT
- SURFACE SOIL SAMPLING LOCATION
- POWER POLE
- UTILITY POLE WITH GUY
- LIGHT POLE
- CATCHBASIN
- MANHOLE
- APPROXIMATE MGP IRM REMOVAL AREAS (DEPTHS VARY)
- APPROXIMATE LIMITS OF CONCRETE PIPE REMOVAL (SEE NOTE 3)
- REMOVAL AREA BOUNDARIES (SEE NOTE 4)
- 10' REMOVAL AREA DEPTHS

NOTES:

1. BASE MAP SUPPLIED BY NYSEG, LATEST REVISION DATED APRIL 2004, AT A SCALE OF 1" = 60'.
2. ALL LOCATIONS ARE APPROXIMATE.
3. LIMITS OF CONCRETE PIPE REMOVAL ARE APPROXIMATE AND UNKNOWN. ACTUAL REMOVAL LIMITS WILL BE DETERMINED DURING IMPLEMENTATION OF THE CHOSEN REMEDY FOR THE SITE.
4. REMOVAL AREA BOUNDARIES ARE APPROXIMATE AND BASED ON DATA PROVIDED IN THE FEBRUARY 2007 SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT (ARCADIS BBL, 2007). ALTERNATIVE S5 IS THE REMOVAL OF SOIL CONTAINING CONSTITUENTS GREATER THAN TAGM 4046 AND REMOVAL OF CONCRETE PIPE.

0 40' 80'
GRAPHIC SCALE

NEW YORK STATE ELECTRIC & GAS
ELMIRA MADISON AVENUE FORMER MGP SITE
FEASIBILITY STUDY REPORT

ALTERNATIVE 5

ARCADIS

FIGURE
10

CITY: SYRACUSE DIV/GROUP: 85/CAD DB: LJP LAF LD: AM: PD: TM: TR: LYR:ON=*;OFF=*REF*; [*CANAL-SHD*, RAILROAD
G:\CAD\ACT\B0013043\0000\00007\DWG\FS\FINAL\REVISED\13043G06.DWG LAYOUT: 10 SAVED: 2/1/2008 8:40 AM ACADVER: 17.0S (LMS TECH) PAGESETUP: C-LD2B-NYP33 PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 2/1/2008 8:40 AM BY: FORAKER, LYDIA
XREFS: IMAGES: PROJECTNAME: ---
13043X00
13043X01