Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Middletown Genung Street MGP Site
Middletown (C), Orange County, New York
Site No. 3-36-050

March 2005

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* DENISE M. SHEEHAN, *Acting Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Middletown Genung Street MGP Site
Middletown (C), Orange County, New York
Site No. 3-36-050

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the Middletown, Genung Street MGP site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Middletown, Genung Street MGP site, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened releases of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and/or the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) for the Middletown, Genung Street MGP site and the criteria identified for evaluation of alternatives, the NYSDEC has selected excavation and soil cover. The components of the remedy are as follows:

- A remedial design program will be developed to provide the details necessary to implement the remedial program.

- Approximately 12,500 cubic yards of soils with PAH levels greater than 500 parts per million (ppm), MGP structures, and debris will be excavated and transported off-site for disposal and/or treatment. The site will then be backfilled and graded with clean fill.

- A soil or pavement cover will be provided for all areas where remaining soil contains less than 500 ppm total PAHs, but contains contamination at levels above TAGM 4046 values.

- The potential for site-related soil gas impacts will be evaluated and, if identified in the indoor air of existing off-site structures, sub-slab depressurization system(s) will be installed, monitored and operated in accordance with the site management plan.

- Since the remedy will result in contamination above levels found in NYSDEC TAGM 4046 remaining at the site, a site management plan (SMP) will be developed and implemented. The SMP will include the institutional controls and engineering controls to: (a) address any residually contaminated soils that may be excavated from the site during future redevelopment. The plan will require soil characterization and, where applicable, disposal/reuse in accordance with NYSDEC regulations; (b) evaluate the potential for vapor intrusion for any buildings developed on the site, including provision for mitigation of any impacts identified; (c) provide for the operation and maintenance of the components of the remedy; (d) monitor the groundwater, etc. and (e) identify any use restrictions on site development or groundwater use.

- Imposition of an institutional control in the form of an environmental easement that will limit the use and development of the property to commercial, industrial or restricted residential uses and restrict use of groundwater.

- The SMP will require the property owner to provide an Institutional Control/ Engineering Control (IC/EC) certification on a periodic basis.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy selected for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

_____ _____

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

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RECORD OF DECISION

Middletown Genung Street MGP Site
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SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the Middletown Genung Street MGP Site. The presence of hazardous waste has created significant threats to human health and the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, operations at the former manufactured gas plant (MGP) have resulted in the disposal of hazardous wastes, including MGP tar produced in the water gas process. MGP tar contains chemicals including polycyclic aromatic hydrocarbons (PAHs) and benzene, toluene, ethylbenzene, and xylene (BTEX). These wastes have contaminated the soils, groundwater, and soil gas at the site and have resulted in

- a significant threat to human health associated with potential exposure to surface and subsurface soils, groundwater, and soil gas.

- a significant environmental threat associated with the impacts of contaminants to surface and subsurface soils, soil gas, and groundwater.

To eliminate or mitigate these threats, the NYSDEC has selected the following remedy:

- A remedial design program will be developed to provide the details necessary to implement the remedial program.

- Approximately 12,500 cubic yards of soils with PAH levels greater than 500 parts per million (ppm), MGP structures, and debris will be excavated and transported off-site for disposal and/or treatment. The site will then be backfilled and graded with clean fill.

- A soil or pavement cover will be provided for all areas where remaining soil contains less than 500 ppm total PAHs, but contains contamination at levels above TAGM 4046 values.

- The potential for site-related soil gas impacts will be evaluated and, if identified in the indoor air of existing off-site structures, sub-slab depressurization system(s) will be installed, monitored and operated in accordance with the site management plan.

- Since the remedy will result in contamination above levels found in NYSDEC TAGM 4046 remaining at the site, a site management plan (SMP) will be developed and implemented. The SMP will include the institutional controls and engineering controls to: (a) address any residually contaminated soils that may be excavated from the site

during future redevelopment. The plan will require soil characterization and, where applicable, disposal/reuse in accordance with NYSDEC regulations; (b) evaluate the potential for vapor intrusion for any buildings developed on the site, including provision for mitigation of any impacts identified; (c) provide for the operation and maintenance of the components of the remedy; (d) monitor the groundwater, etc. and (e) identify any use restrictions on site development or groundwater use.

- Imposition of an institutional control in the form of an environmental easement that will limit the use and development of the property to commercial, industrial or restricted residential uses and restrict use of groundwater.

- The SMP will require the property owner to provide an Institutional Control/ Engineering Control (IC/EC) certification on a periodic basis.

The selected 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.

SECTION 2: SITE LOCATION AND DESCRIPTION

The site is located in the City of Middletown in Orange County. The property consists of four parcels, one on each corner of the intersection of Genung Street with Philip Street and Palmer Avenue, as shown in Figure 1. The total acreage of the 4 parcels is approximately 2.6 acres. The parcels are referenced numerically with Parcel 1 in the northwest corner. Parcel numbers are included on Figure 2.

The surrounding area is a mix of multifamily residential (apartment/townhouse complexes) and industrial uses. The site is bounded to the west by a lightly used railroad track and to the north by an abandoned railroad embankment. The gas production was carried out on the northwest parcel (Parcel 1), which is also the location of the most significant contamination. The MGP at this site was a replacement for the OR-Middletown- Fulton Street MGP Site (Site No. 3-36-030), which is located approximately 0.6 miles to the northwest.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

An MGP was operated on this site by predecessor companies of Orange and Rockland Utilities (O&R) from 1918 to 1937. After 1937, the plant was used during times of peak demand, reportedly until the 1950s. It is not known when the plant was decommissioned, but all MGP buildings were razed by 1987. Following the MGP operations, the site was used for fuel oil and jet fuel storage. The layout of the facility during operations is shown on Figure 2, which also

identifies the 4 parcels. Parcel 1 was the site of the original MGP. Parcel 2 was the site of fuel oil and jet fuel storage. No production or storage is recorded for Parcel 3. Aboveground gas holders were located on Parcels 2 and 4.

The MGP generated a combustible gas from coal and petroleum feedstocks using the Lowe carbureted water gas system. This process involved the passage of steam through burning coal. This formed a gaseous mixture (water gas or blue gas) which was then passed through a super heater that had an oil spray. The oil spray would generate additional gas, enhancing the heat and light capacity of the overall gas mixture. The gas produced was then purified prior to distribution. MGP tar was a by-product of the gas production which formed as a condensate as the gas cooled.

3.2: Remedial History

A Preliminary Site Investigation (PSA) was performed in 1998 that identified contaminated soil and groundwater under the northwest parcel where the MGP production facilities were located. As a result, an RI was initiated to define the extent of contamination.

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.

The NYSDEC and Orange and Rockland Utilities Inc. (O&R) entered into a Consent Order on January 2, 1996. The Order obligates O&R to investigate the former MGP sites in their service area. This order was superceded by an second order dated March 5, 1999, which further clarified the obligation to investigate and, as necessary, remediate the Middletown (Genung Street) Site.

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 October 2000 and December 2002. Soil gas was investigated separately in July 2003, and additional investigation is ongoing. The field activities and findings of the investigation are described in the RI report.

The following activities were conducted during the RI:

- Research of historical information,

- Collection of 20 surface soil samples, including three off-site background samples,
- Excavation of 20 test pits to locate underground structures and subsurface contamination;
- Installation of 25 soil borings and eight monitoring wells for analysis of soils and groundwater, as well as physical properties of soil and hydrogeologic conditions;
- Sampling of 14 new and existing monitoring wells;
- Collection of four sediment samples from an adjacent seasonal creek;
- Collection of seven soil vapor samples.

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

- Groundwater and surface water SCGs are based on NYSDEC "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.
- Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046; Determination of Soil Cleanup Objectives and Cleanup Levels".
- Sediment SCGs are based on the NYSDEC "Technical Guidance for Screening Contaminated Sediments."
- Soil gas results were compared to typical background levels of ambient air in New York State.

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 below. More complete information can be found in the RI report.

5.1.1: Site Geology and Hydrogeology

A fill layer from 1 to 10 feet thick overlays the native material at this site. Below the fill is a 4 to 9 foot thick layer of sand and gravel, which is in turn underlain by a glacial till. This very low permeability till unit represents the hydraulic base in this area. Groundwater was observed in the sand and gravel layer. Groundwater appears to be flowing generally south across Parcels 1 and 2. No significant gradient was noted across parcels 3 and 4.

5.1.2: Nature of Contamination

As described in the RI report, many soil and groundwater 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 semi-volatile organic compounds (SVOCs).

Specific volatile organic compounds of concern are benzene, toluene, ethylbenzene, and xylenes. These are referred to collectively as BTEX in this document.

The specific semi-volatile organic compounds of concern in soil and groundwater are the following polycyclic aromatic hydrocarbons (PAHs):

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

PAH concentrations referred to in this plan are the summation of the individual PAHs listed above (i.e., total PAHs or tPAHs). The italicized PAHs are probable human carcinogens. The summation of the italicized PAHs are referred to in this document as cPAHs.

As reported in Section 5.1.3, MGP tars are present at this site in the form of a dense, oily liquid that does not readily dissolve in water. Materials such as this are typically found at MGP sites and are referred to as nonaqueous phase liquids or NAPL. Since this NAPL is more dense than water, it is also referred to as a dense NAPL or DNAPL. Analysis of the NAPL reveals that it contains BTEX and PAHs several orders of magnitude greater than the SCGs for these compounds. The NAPL was found to saturate the unconsolidated deposits and/or exist in scattered, discontinuous globules. Any of these conditions could coincide with high BTEX and PAH concentrations in soil, groundwater, and soil gas.

5.1.3: Extent of Contamination

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

Chemical concentrations are reported in parts per billion (ppb) for water, parts per million (ppm) for waste, soil, and sediment, and micrograms per cubic meter ($\mu g/m^3$) for air samples. For comparison purposes, where applicable, SCGs are provided for each medium.

Table 1 summarizes the degree of contamination for the contaminants of concern in surface soil, subsurface soil, groundwater, and soil gas, and compares the data with the SCGs for the site. The following are the media that were investigated and a summary of the findings of the investigation.

Waste Materials

MGP tar was found within and in the immediate vicinity of the MGP structures. On Parcel 1, structures include one above-grade gas holder, tar wells, a tar separator, purification facilities, and the plant building. From these structures, the tar migrated vertically downward until encountering the less permeable till layer discussed in Section 5.1.1. The tar appears to have migrated east under Philip Street onto Parcel 2 along the surface of this confining layer. The extent of MGP tar is presented on Figure 3. In addition to the MGP tars, some petroleum contamination was observed on Parcel 2 in the area of the former oil tanks.

Surface Soil

Surface soil (0-2 inches) on Parcel 1 contained cPAHs in excess of approriate SCGs. Carcinogenic PAH levels in surface soils ranged from 0.05 to 46 ppm. The extent of surface soil contamination is presented on Figure 4.

Subsurface Soil

Subsurface soil in direct contact with and in the vicinity of MGP structures or related MGP tar deposits has been impacted by PAHs and BTEX. Total PAH levels in subsurface soils ranged from non-detect to 7,737 ppm. BTEX levels in subsurface soils ranged from non-detect to 4,190 ppm. The extent of PAH and visible MGP tar contamination are shown on Figure 3.

Groundwater

Groundwater in the vicinity of the MGP tar and the contaminated subsurface soil has also been impacted by PAHs and BTEX. PAH levels in groundwater ranged from non-detect to 2,262 ppb. BTEX levels in groundwater ranged from non-detect to 4,656 ppb. These results are two to three orders of magnitude above SCGs. As with most MGP sites, the groundwater contamination was found only in close proximity to the MGP tar. Significant groundwater impacts appear to be limited to an area within 100 feet of MGP tar deposits. The extent of groundwater contamination is shown on Figure 5.

Sediment

Sediment in the seasonal stream adjacent to the Genung Street Site was evaluated. No BTEX compounds were detected in the sediment. Only one sample contained PAHs above screening criteria. This sample was collected in a pool five feet from the road and 250 feet from the impacted area of the site. Total PAHs at this location were 11.5 ppm which is above screening criteria but within PAH levels which would be expected in a roadside pool. Sediment did not appear to be impacted by site-related contamination.

Soil Gas

Soil gas in the vicinity of the site has been impacted by MGP-related volatile organic chemicals (VOCs). Total MGP-related VOCs in soil gas ranged from 447 to 1,774 $\mu g/m^3$.

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.

In November 2004, a fence was installed around Parcel 1 to eliminate potential human exposure to elevated cPAHs in surface soils. While isolated surface soil samples on other parcels contained cPAHs above screening levels, only Parcel 1 exhibited levels consistently above screening levels which could reasonably be attributed to MGP related contamination.

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 7.5 of the RI report. 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.

Under the current land use at the site, construction workers and trespassers could be exposed to site contamination in surface soil. During excavation work, construction workers could come in direct contact with contaminated subsurface soil and groundwater, potentially resulting in dermal exposures or exposure through the inhalation of soil particles or vapors released from groundwater.

Depending on future land use conditions at the site, future residents and construction workers could be exposed to contamination present in surface soil. Future residents and construction workers could come in direct contact with contaminated subsurface soils and groundwater if excavation work is conducted on the site. Inhalation of soil particles or vapors released from groundwater may also occur as a result of excavation.

5.4: Summary of Environmental Impacts

This section summarizes the 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 following environmental exposure pathways and ecological risks have been identified:

- NAPL has impacted the groundwater resource in the shallow aquifer at the site, and contamination is migrating off-site as NAPL, PAHs and BTEX in a dissolved phase.

- There is a potential for direct contact by fauna and flora with contaminated surface and subsurface soils.

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 375-1.10. 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

- the presence of NAPL and MGP-related contaminants as the sources of soil, groundwater, and soil gas contamination;

- migration of NAPL and MGP-related contaminants that would result in soil, groundwater, or soil gas contamination;

- the release of contaminants from NAPL in on-site soil into groundwater that results in exceedances of groundwater quality standards;

- the potential for ingestion of groundwater with contaminant levels exceeding drinking water standards;

- the potential for ingestion/direct contact with contaminated soil;

- impacts to biota from ingestion/direct contact with soil; and

- the release of contaminants from subsurface soil under buildings into indoor air through soil gas migration and intrusion; and

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

- recommended soil cleanup objectives in TAGM 4046; and

- 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 Middletown Genung Street MGP Site were identified, screened and evaluated in the FS report which is available at the document repositories identified in Section 1.

A summary of the remedial alternatives that were considered for this site are 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 soils, surface water, groundwater, and soil gas at the site.

Alternative 1: No Action

Present Worth: . . . . . *$ 0*
Capital Cost: . . . . . *$ 0*
Annual OM&M:
(Years 1-5): . . . . . *$ 0*

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It allows 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.

Alternative 2: Soil Cover and Excavation

Present Worth: . . . . . *$ 5, 487,000*
Capital Cost:. . . . . *$ 5,200,000*
OM&M Present Value:(10 Yrs): . . . . . *.$ 287,000*

Alternative 2 would excavate the heavily contaminated subsurface soils of Parcels 1 and 2.

Specific components include:

- Approximately 12,500 cubic yards of material would be excavated from Parcels 1 and 2, including MGP structures, MGP tars and tar contaminated soils containing total PAHs at levels above 500 ppm. Excavated material would be transported off-site for treatment and/or disposal at appropriately permitted facilities. Excavation would take place under a vapor containment structure or other suitable controls to manage emissions from excavation.

- Where subsurface soils contain PAHs above individual TAGM objectives, but below 500 ppm, a minimum soil cover of two feet would be provided.

- An environmental easement would be placed on the property that would (1) describe the location and characteristics of the remaining residual contamination,(2) restrict groundwater usage, (3) require that any future on-site building construction address the potential for soil gas intrusion and implement any necessary engineering controls,(4) require a soil management plan to control subsurface exploration or excavation, and (5) require certification that the institutional controls remain in place and are effective in controlling exposures.

Alternative 3: Soil Cover, Excavation and In Situ Solidification

Present Worth: . . . . . *$ 6, 020,000*
Capital Cost: . . . . . *$ 5,400,000*
OM&M Present Value:(30 Yrs): . . . . . *$ 620,000*

Alternative 3 would excavate the impacted subsurface structures, utilize in situ solidification (ISS) for the grossly contaminated subsurface soils, and install a soil cap over all site parcels.

Specific components include

- Excavation of approximately 1,700 cubic yards of material including impacted soils in and immediately adjacent to subsurface MGP structures. The gas holder on Parcel 1 would be completely excavated. A vapor containment structure would be constructed for these activities.

- Installation and operation of dense nonaqueous phase liquid (DNAPL) recovery wells on Parcel 1.

- In situ solidification of 8,000 cubic yards of grossly impacted soils on Parcels 1 and 2. Proper measures would be taken to protect against vapor emissions during this process.

- A subsurface drainage system may need to be designed as a result of any change in groundwater patterns associated with solidification.

- Installation of a 24 inch thick soil cover where soils contain PAHs above individual TAGM objectives, but below a total of 500 ppm.

- An environmental easement would be placed on the property which would (1) describe the location and characteristics of the solidified material, (2) restrict groundwater usage, (3) require that any future on-site building construction address the potential for soil gas intrusion and implement any necessary engineering controls, (4) require a soil management plan to control subsurface exploration or excavation, and (5) require certification that the institutional and engineering controls remain in place and are effective in controlling exposures.

Alternative 4:
Soil Cover and Containment

Present Worth: . . . . . $ 5, 420,000
Capital Cost: . . . . . $ 4,800,000
OM&M Present Value:(30 Yrs): . . . . . $ 620,000

Alternative 4 would include the construction of a sheet pile barrier to contain grossly impacted subsurface soils in Parcels 1 and 2 and the installation a soil cover above that containment cell.

Specific components include

- Installation of a sheet pile containment system to isolate contaminated soils**.** Sheet pile barriers will likely need to be constructed beneath the adjacent streets.

- A subsurface drainage system outside the containment system may need to be designed as a result of changes in groundwater flow patterns associated with the containment barrier.

- Installation and operation of dense non-aqueous phase liquid (DNAPL) recovery wells on Parcel 1 following the containment system construction.

- Installation of a 24" soil cover above the containment area.

- An environmental easement would be placed on the property which would (1) describe the location and characteristics of the remaining contamination, (2) restrict groundwater usage, (3) require that any future on-site building construction address the potential for soil gas intrusion and implement any necessary engineering controls, (4) require a soil management plan to control subsurface exploration or excavation, (5) require the ongoing operation and maintenance of the NAPL collection and groundwater management systems, and (6) require certification that the institutional and engineering controls remain in place and are effective in controlling exposures.

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 State. 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 NYSDEC 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 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 at the end of this document.

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 have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the NYSDEC addressed 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.

In general, the public comments received were supportive of the selected remedy.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the Administrative Record (Appendix B) and the discussion presented below, the NYSDEC has selected Alternative 2, Soil Cover and Excavation as the remedy for this site. The elements of this remedy are described at the end of this section.

The selected remedy is based on the results of the RI and the evaluation of alternatives presented in the FS.

Alternative 2 has been selected 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 will achieve the remediation goals for the site by removing the grossly impacted soils at the site, which will create the conditions needed to restore groundwater quality to the extent practicable. Removal of these materials and placement of a soil cover will eliminate the threats to public health and the environment posed by on-site MGP impacts. Alternatives 3 and 4 would also comply with the threshold selection criteria, but to a lesser degree of long-term effectiveness and permanence, as well as, less reduction in the toxicity and volume of the contaminated media remaining at the site.

Alternative 1 has been rejected as a remedy since it would not satisfy the threshold criteria of being protective of public health and the environment and complying with New York State standards, criteria, and guidance.

Alternative 3 would satisfy all of the threshold criteria and meet the remedial action goals for the site by removing and immobilizing the impacted soils at the site. This, along with a soil cover, would be protective of human health and the environment. However, this remedy offers little reduction of soil contaminant volume or toxicity for the site, resulting in a less certain elimination of the exposure pathways at the site. This remedy would require longer duration groundwater monitoring than the proposed remedy.

Alternative 4 would satisfy all of the threshold criteria and achieve the remedial action goals for the site by isolating the contaminated soils, preventing further migration of contamination. However, this remedy also does not reduce the soil contaminant volume or toxicity at the site, resulting in a less certain elimination of the exposure pathways at the site. This remedy would require extensive groundwater monitoring and be less permanent than the proposed alternative.

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

Alternatives 2 (soil cover and excavation), 3 (soil cover, excavation, and in situ solidification), and 4 (soil cover and in situ containment) all would have short-term impacts because they would have off-site transportation components. All of the short-term impacts could easily be controlled with the proper design and planning. Alternative 2 would incur the greatest short-term impacts because of the extensive excavation activities associated with the remedy.

Achieving long-term effectiveness would best accomplished by excavation and removal of the grossly contaminated soils and, thus, Alternative 2 would provide the greatest long-term effectiveness for the site since it would remove the bulk of the contamination. Alternatives 3 and 4 would also result in adequate long-term conditions at the site, but would be less favorable because they would leave the impacted soils at the site. Alternatives 4 would also require a significantly longer groundwater monitoring period (30 years each compared to 10 years for Alternative 2).

All of the Alternatives would provide a reduction in either the toxicity, mobility, or volume of the impacted material at the site. Alternative 2 would provide the greatest reduction of volume and mobility by removing the bulk of the contaminated soil and, thus, would nearly eliminate the toxicity levels at the site in the soils.

Both Alternatives 3 and 4 would exhibit a large reduction in the mobility of the impacted soil at the site, but would do little to reduce the toxicity in the environment. Alternative 3, which includes in situ solidification, would immobilize the soil preventing further migration of contaminated material. Alternative 4 (containment) would isolate the impacted soils reducing their mobility.

Alternatives 2 and 3 would both be highly implementable remedies. They would use conventional remedial techniques that have been proven to work and require materials that are readily available. Alternative 3 would provide some additional constraints due to the need for a treatability study and the more limited availability of stabilization contractors and the specialized equipment necessary.

The estimated cost of the alternatives would be very similar and, thus, played a minimal role in choosing the remedy. Alternative 4 has been estimated to be the least expensive remedy ($5.4 million), followed by Alternative 2 ($5.5 million) and then Alternative 3 ($6.0 million).

Alternative 2 would have the lowest OM&M cost because less monitoring would be anticipated. This is somewhat offset by the fact that the extensive excavation activities of this remedy would

be more expensive than the containment remedy of Alternative 4. As a result, Alternative 2 is a moderate cost remedy.

The estimated present worth cost to implement the remedy is $5,487,000. The cost to construct the remedy is estimated to be $5,200,000, and the estimated average annual operation, maintenance, and monitoring costs for 10 years is $35,000.

The elements of the selected remedy are as follows:

1. A remedial design phase will be carried out to provide the details necessary for the construction and implementation of the remedy. This will include an investigation to determine the extent of excavation necessary beneath Phillip and Genung Streets and a completion of the ongoing soil gas investigation.

2. Approximately 12,500 cubic yards of soils with total PAHS greater than 500 ppm, MGP structures, and debris will be excavated and transported off-site for disposal. The bulk of this material will be removed from Parcel 1 with a lesser amount from Parcel 2. It is estimated that a maximum depth of 15 feet will need to be excavated to remove the grossly contaminated soils from Parcel 1. Proper engineering controls will be implemented relating to odor and particulate emissions, as well as shoring and dewatering concerns associated with excavating. The site will then be backfilled and graded with clean fill.

3. A soil or pavement cover will be provided where remaining soil contains less than 500 ppm total PAHs, but contains contamination at levels above TAGM 4046 values. Since this area sees significant recreational vehicle and foot traffic, one of the following cover requirements will be applied: a)12 inches of clean soil with fencing to limit site access; b) 24 inches of clean soil; or c) asphaltic pavement. Soil cover will including 6 inches of topsoil of sufficient quality to support vegetation. Clean soil will constitute soil with no analytes in exceedance of NYSDEC TAGM 4046 soil cleanup objectives or local site background. The soil will be underlain by an indicator such as orange plastic snow fence to demarcate the cover soil from the subsurface soil;

4. The potential for site-related soil gas impacts will be evaluated and, if identified in the indoor air of existing off-site structures, sub-slab depressurization system(s) will be installed. If no existing indoor air impacts are identified, the proposed source removal would be expected to eliminate the soil gas risk, and continued monitoring of soil gas and indoor air may be considered on a short term basis to confirm the effectiveness of the remedy to address soil gas impacts. If impacts are detected, monitoring and/or depressurization system operation will be included as part of the site management plan.

5. Since the remedy results in contamination above levels found in NYSDEC TAGM 4046 remaining at the site, a site management plan (SMP) will be developed and implemented. The SMP will include the institutional controls and engineering controls to: (a) address residual contaminated soils that may be excavated from the site during

future redevelopment. The plan will require soil characterization and, where applicable, disposal/reuse in accordance with NYSDEC regulations; (b) prior to any future development of the site, surface soil in any areas that have not been provided with a clean soil cover will be evaluated and compared to any applicable SCGs and to background PAH levels found in the vicinity of the site. If surface soils present a concern based upon the proposed use of the parcel, appropriate remedial action will be required; (c) evaluate the potential for vapor intrusion for any buildings developed on the site, including provision for mitigation of any impacts identified; (d) provide for the operation and maintenance of the components of the remedy; (e) monitor the groundwater, etc. and (f) identify any use restrictions on site development or groundwater use.

6. Imposition of an institutional control in form of an environmental easement that will: (a) require compliance with the approved site management plan, (b) limit the use and development of the property to commercial, industrial or restricted residential uses, subject to approval by NYSDEC and NYSDOH; (c) restrict use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Orange County Department of Health; and, (d) require the property owner to complete and submit to the NYSDEC an Institutional Control/ Engineering Control (IC/EC) certification.

7. The SMP will require the property owner to provide an IC/EC certification on a periodic basis, prepared and submitted by a professional engineer or environmental professional acceptable to the Department for a period to be approved by the NYSDEC.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

1. Repositories for documents pertaining to the site were established.

2. A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.

3. A fact sheet was mailed to the parties on the public contact list. The fact sheet included an announcement of upcoming public meeting, the location of the document repositories and directions for accessing the PRAP on the internet.

4. A public meeting was held on March 3, 2005 to present and receive comment on the PRAP.

5. A responsiveness summary (Appendix A) was prepared to address the comments received during the public comment period for the PRAP.

TABLE 1
Nature and Extent of Contamination
June 1999-April 2001

SURFACE SOIL	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Carcinogenic Polyaromatic Hydrocarbons (cPAHs)	Benzo(a)pyrene	0.086 - 8.3	0.061	18 of 18
	Chrysene	0.16 - 10	0.4	14 of 18
	Benzo(a)anthracene	0.073 - 8.6	0.224	13 of 18
	Benzo(b)fluoranthene	0.1 - 5.8	1.1	7 of 18
	Benzo(k)fluoranthene	0.11 - 6.4	1.1	7 of 18
	Indeno(1,2,3-cd)pyrene	0.073 - 5.4	3.2	16 of 18
	Dibenz(a,h)anthracene	ND - 1.7	0.014	16 of 18
	Total cPAHs	0.633 - 46.2	10	6 of 18

SUBSURFACE SOIL	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
BTEX Compounds	Benzene	ND - 11	0.06	3 of 38
	Toluene	ND - 2.8	1.5	2 of 38
	Ethylbenzene	ND - 57	5.5	4 of 38
	Xylene (Total)	ND - 41	1.2	7 of 38
Semi-Volatile Organic Compounds (SVOCs)	Total PAH	ND - 2061	500	5 of 38

SEDIMENTS	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
BTEX Compounds	Benzene	ND	0.006	0 of 4
	Toluene	ND	0.049	0 of 4
	Ethylbenzene	ND	0.024	0 of 4
	Xylene (Total)	ND	0.092	0 of 4
Semi-Volatile Organic Compounds (SVOCs)	Total PAHs	ND - 11.5	NA	NA

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Benzene	ND - 820	1	3 of 16
	Toluene	ND - 270	5	1 of 16
	Ethylbenzene	ND - 1300	5	2 of 16
	Xylene	ND - 1800	5	5 of 16
Semi-volatile Organic Compounds (SVOCs)	Total PAHs	ND - 2,262	NA	NA

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
ug/m^3 = micrograms per cubic meter

[b] SCG = standards, criteria, and guidance values;

[c] LEL = Lowest Effects Level and SEL = Severe Effects Level. A sediment is considered to be contaminated if either of these criteria is exceeded. If both criteria are exceeded, the sediment is severely impacted. If only the LEL is exceeded, the impact is considered to be moderate.

{For marine and estuarine sediments, change LEL to ER-L and SEL to ER-M in Table 1 and replace the above footnote with:
[c] ER-L = EffectRange - Low and ER-M = Effect Range - Moderate. A sediment is considered to be contaminated if either of these criteria is exceeded. If both criteria are exceeded, the sediment is severely impacted. If only the ER-L is exceeded, the impact is considered to be moderate.}

{Add a footnote for ND, if used.}
{Add a footnote for acronyms, if used.}

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual OM&M	Total Present Worth
Alternative # 1 - No Action	$0	$0	$0
Alternative # 2 - Soil Cover and Excavation	$ 5,200,000	$ 287,000	$ 5,487,000
Alternative # 3 - Soil Cover, Excavation and ISS	$ 5,400,000	$ 620,000	$ 6,020,000
Alternative # 4 - Soil Cover and In-situ Containment	$ 4,800,000	$ 620,000	$ 5,420,000

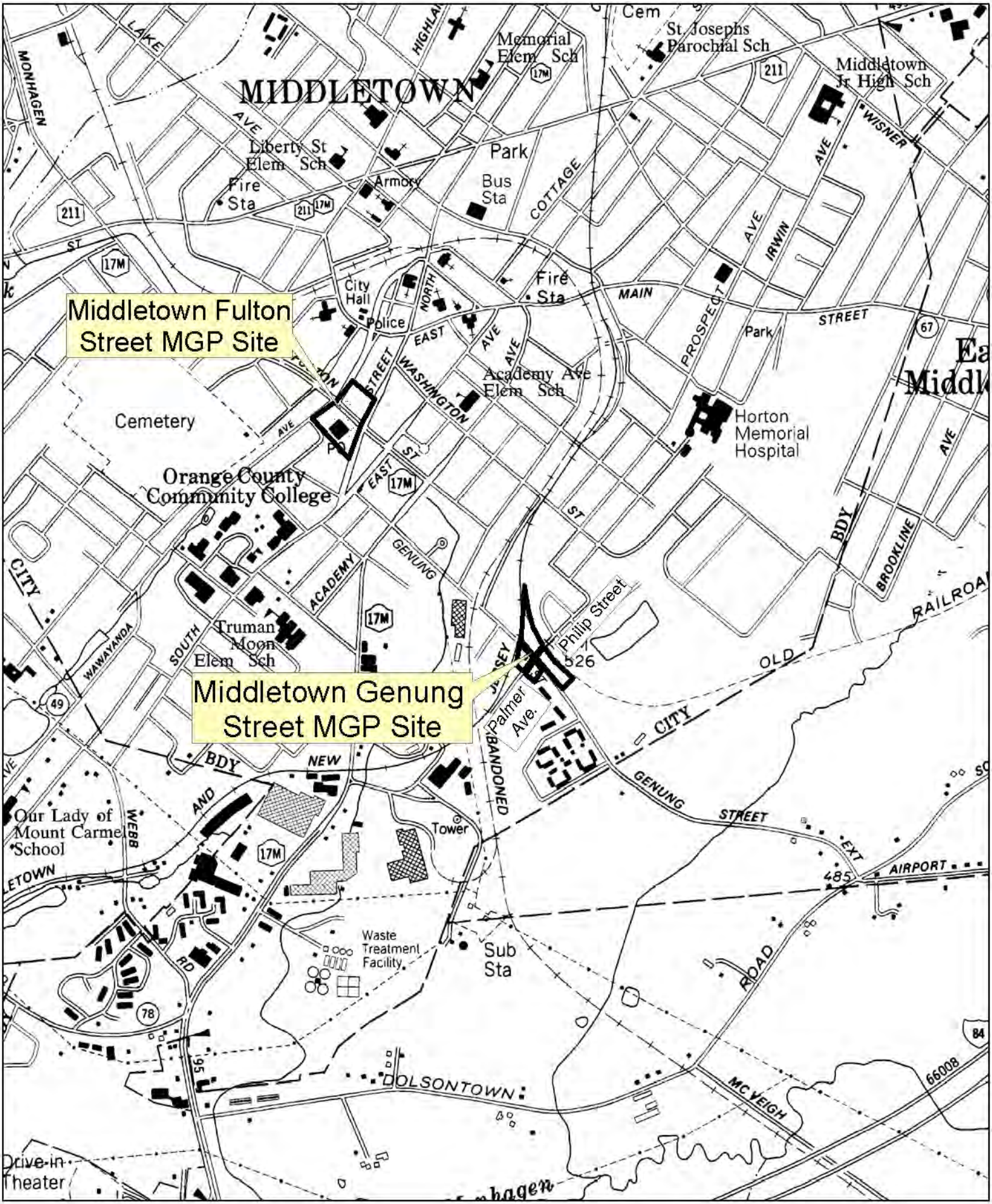

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Figure 1 - Site Map
Middletown Genung Street MGP Site ROD

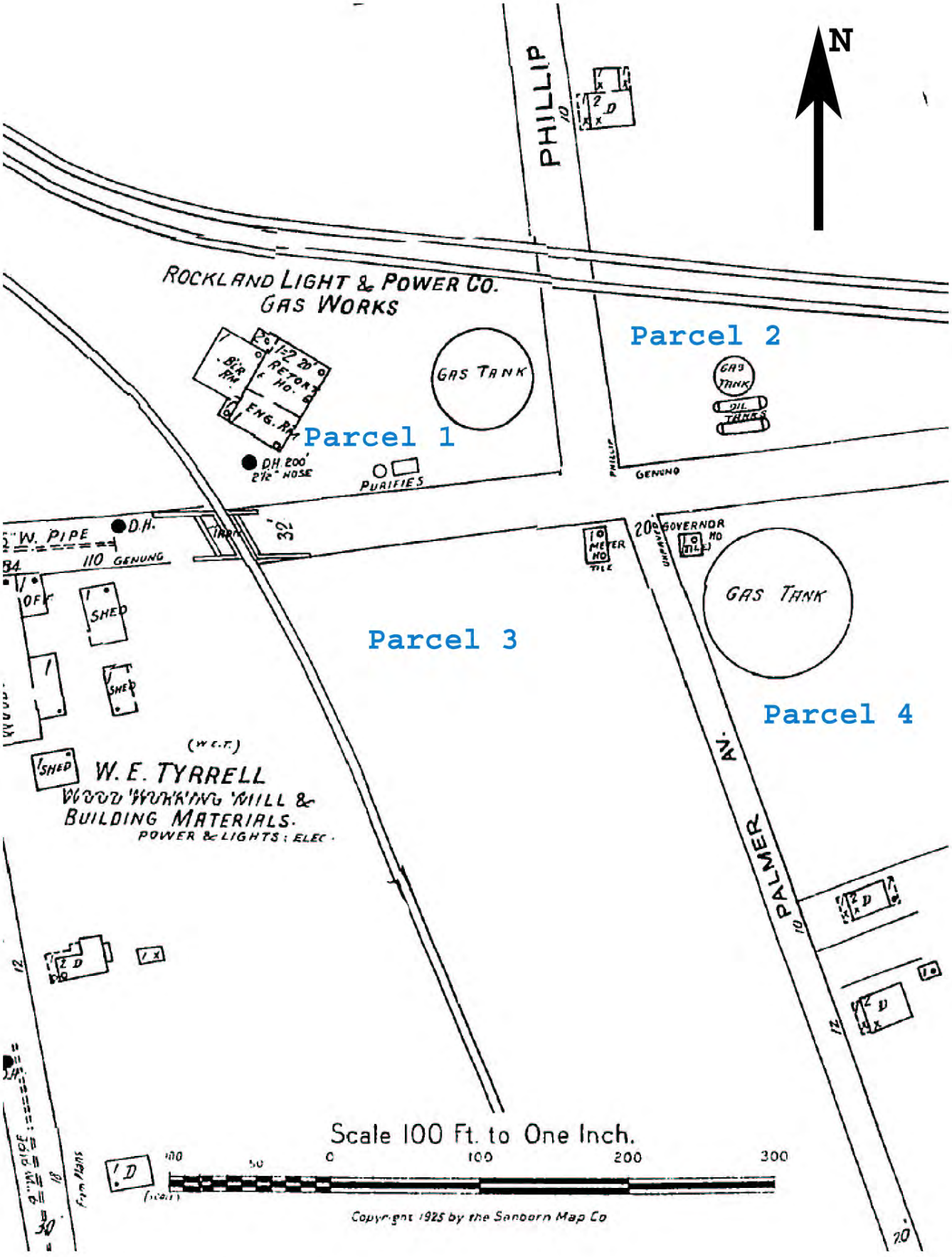

Figure 2 - Historical Layout
Middletown Genung Street MGP Site ROD

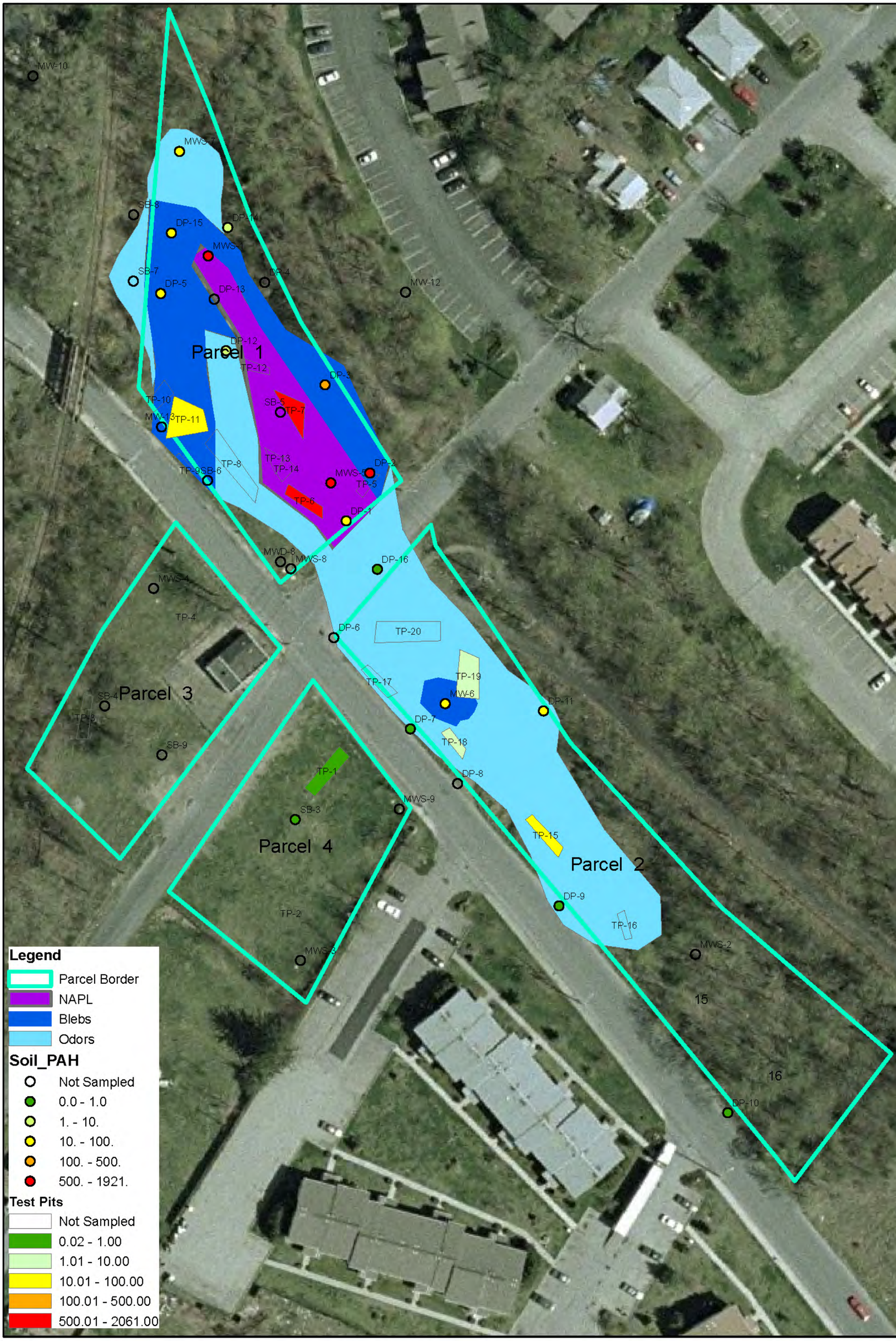

Figure 3 - Extent of Coal Tar and Subsurface PAHs
Middletown Genung Street MGP Site ROD

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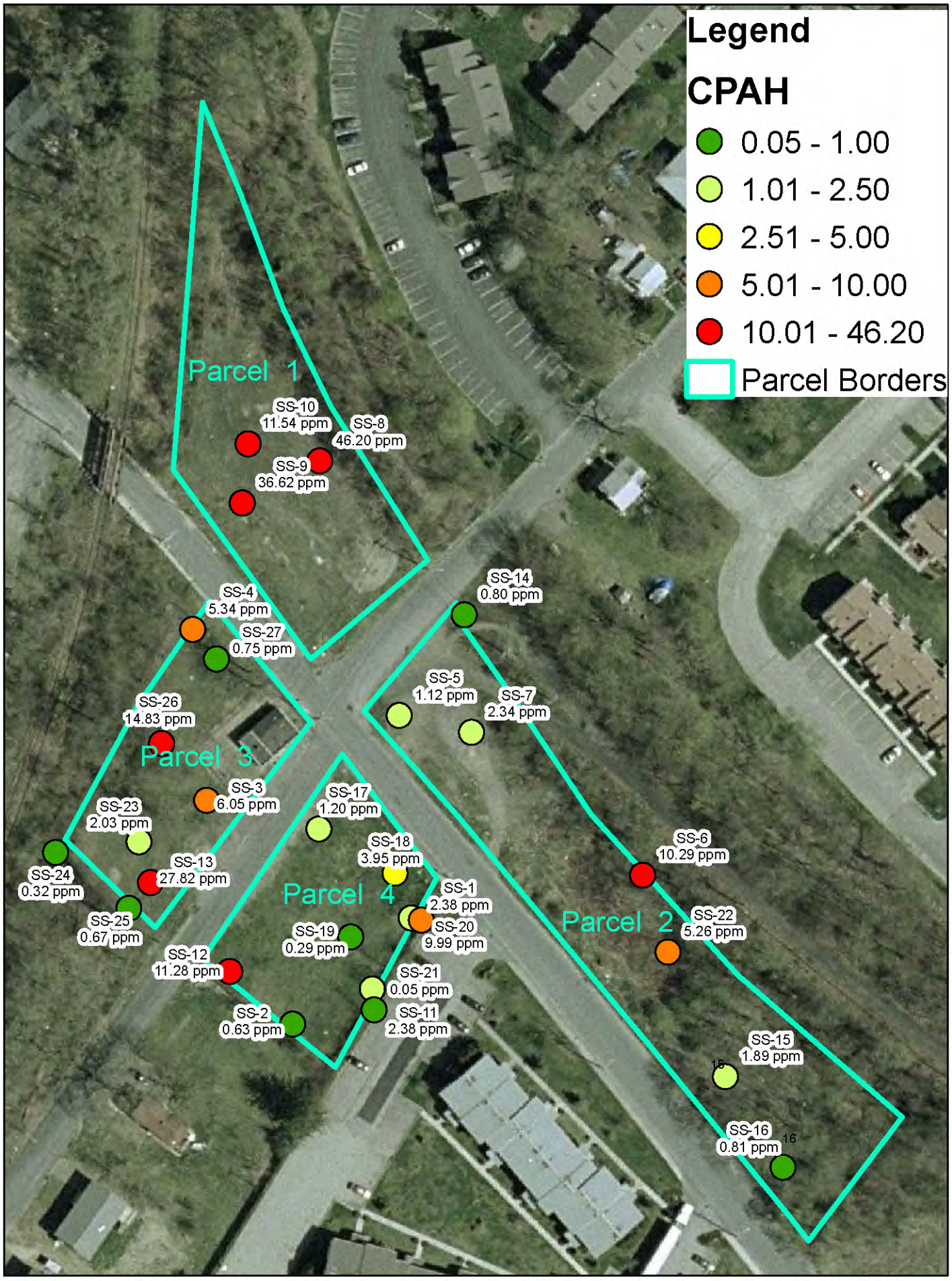

Figure 4 - Surface Soil cPAH Levels
Middletown Genung Street MGP Site ROD

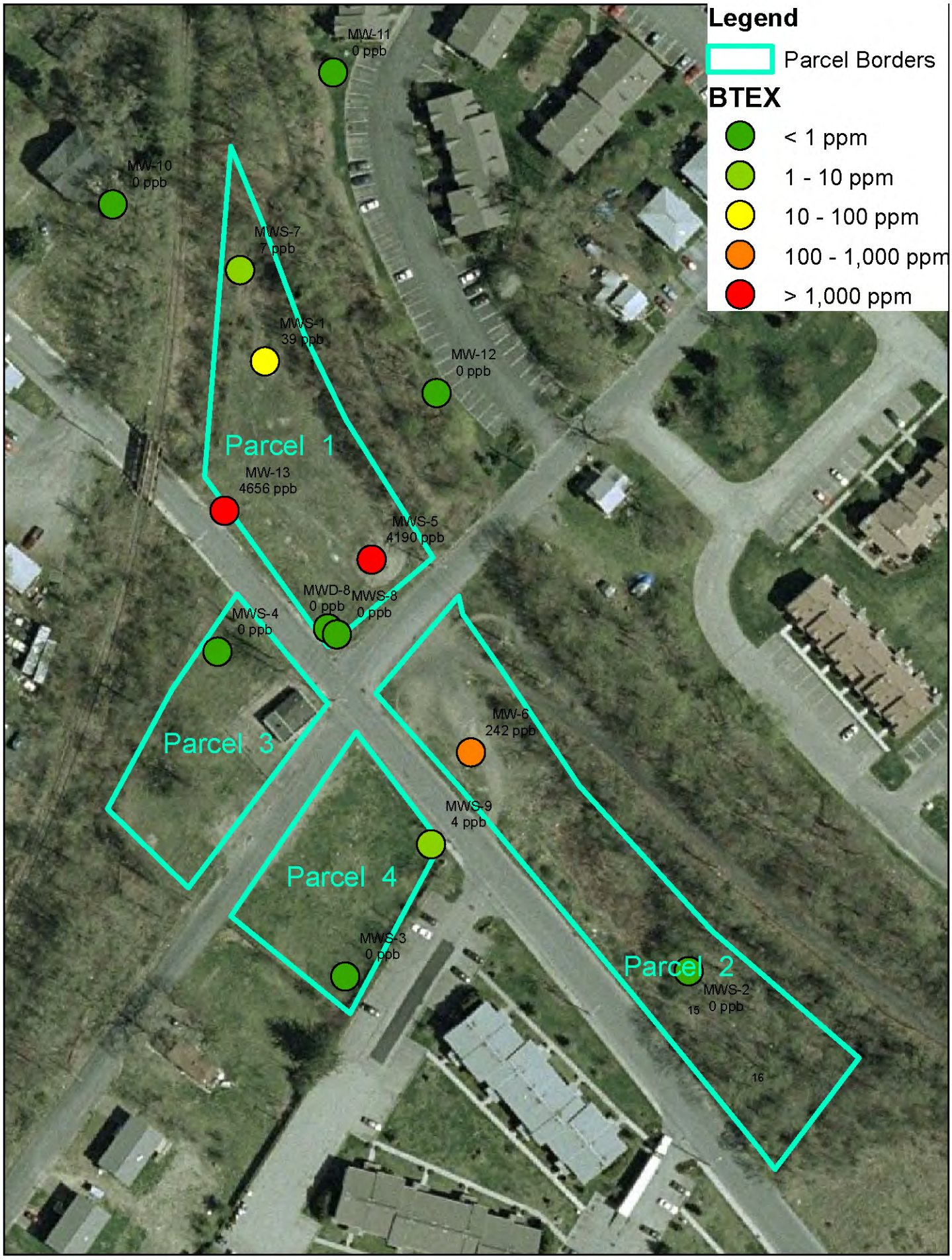

Figure 5 - Extent of Groundwater Contamination
Middletown Genung Street MGP Site ROD

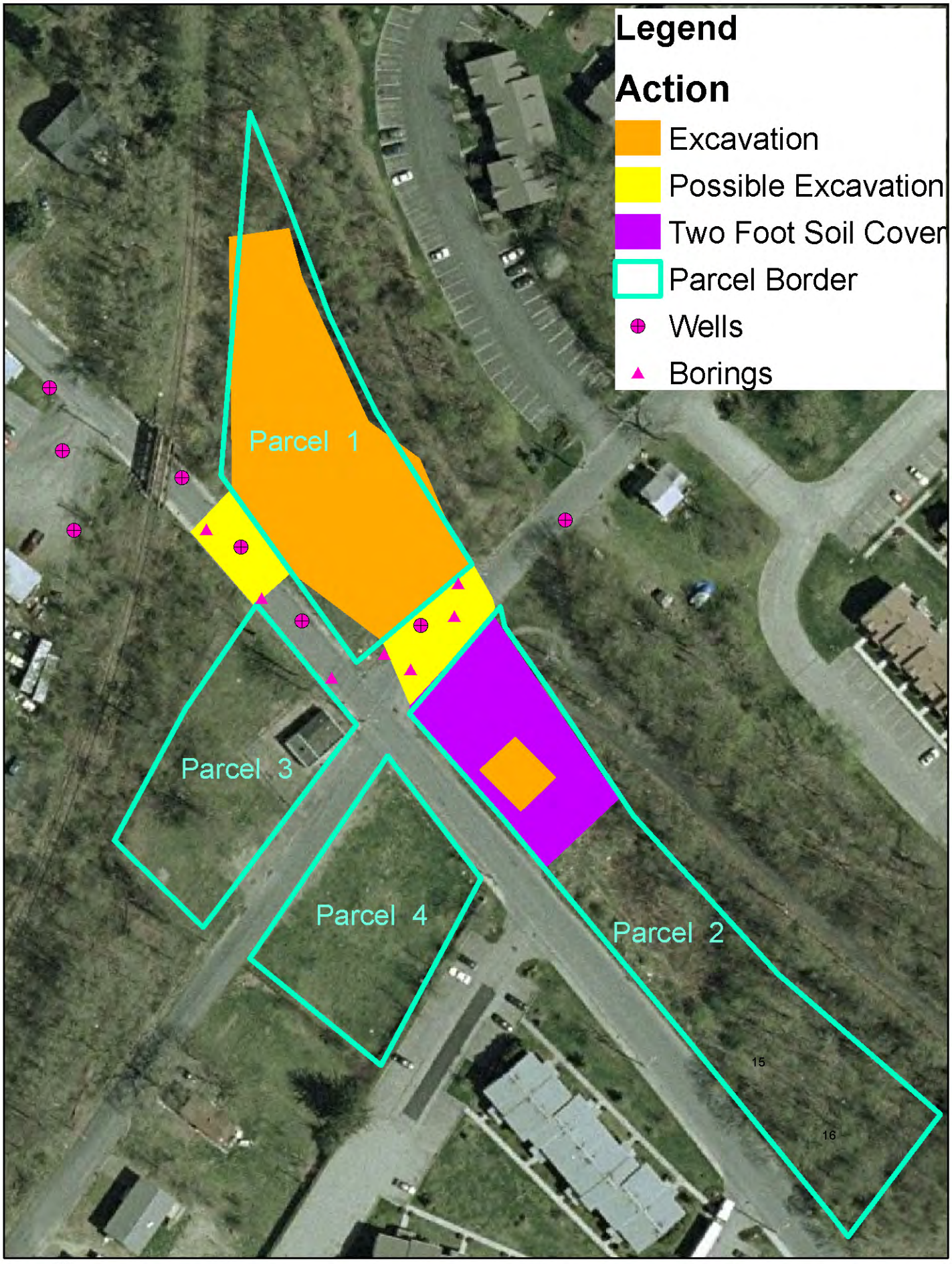

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Figure 6 - Selected Remedy
Middletown Genung Street MGP Site ROD

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Middletown, Genung Street MGP Site
Middletown (C), Orange County New York
Site No. 3-36-050

The Proposed Remedial Action Plan (PRAP) for the Middletown, Genung Street MGP site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on February 18, 2005. The PRAP outlined the remedial measure proposed for the contaminated surface soil, subsurface soil, groundwater and soil gas at the Middletown, Genung Street MGP site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on March 3, 2005, which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on March 18, 2005.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the NYSDEC's responses:

COMMENT 1: Would sheet pile contain the contamination at this site?

RESPONSE 1: The site is underlain by a dense layer of glacial till, which would prevent downward migration of contamination. This confining layer would allow sheet piling to effectively contain the contamination.

COMMENT 2: After the property is remediated, what is the possible usage of this property?

RESPONSE 2: After remediation, the property could be redeveloped for restricted residential, commercial or industrial use. This would allow the site to be developed with restrictions on the use of parcel 2 which would include a requirement to maintain the soil/pavement cover and controls over excavation activities. Use of groundwater would also be restricted for the site until such time as the groundwater quality is shown to meet applicable standards. Proposed buildings would also be evaluated to determine if sub-slab venting is needed to address potential soil gas impacts.

COMMENT 3: On the parcel with the proposed two foot cover, could you build a house with slab construction, rather than a basement?

RESPONSE 3: A wide variety of buildings could be constructed. The requirements of the site management plan would have to be adhered to. If the proposed construction is not specifically addressed in the site management plan, appropriate institutional and engineering controls could be developed on a case by case basis

which would maintain the effectiveness of the remedy and would address potential exposure concerns for the occupants.

COMMENT 4: Figure 6 shows the excavation extending across both lanes of Genung Street and Phillip Street. Is the extent of the work in the street known at this time?

RESPONSE 4: The extent of work that will take place in the streets has not been determined at this time. Additional pre-design investigation is scheduled to take place in March and April 2005 which will determine the extent of any contamination under the streets and the need for excavation in those areas. Figure 6 has been revised to reflect this.

COMMENT 5: The area to be excavated on Parcel 2 is in the vicinity of the old oil tanks. Was the contamination MGP tar or oil.

RESPONSE 5: The contamination on Parcel 2 was petroleum as opposed to MGP tar. Section 5.1.3 has been revised to clarify the nature of this contamination.

COMMENT 6: Please clarify item 4 of the selected remedy, regarding soil gas, in terms of potential and completed exposure pathways.

RESPONSE 6: An investigation of the soil gas is ongoing. If soil gas is detected at levels of concern in the immediate vicinity of the existing residential structures, further investigation would be required. The soil gas below the building (sub-slab), the indoor air, and the outdoor (ambient) air would all be sampled. If that additional sampling indicates that the sub-slab soil gas is impacted by contaminants at levels of concern, that would represent a potential exposure pathway. Comparing the indoor, ambient and sub-slab samples would allow the NYSDEC and Department of Health to determine if a completed exposure pathway exists. Mitigation would be required if either a potential exposure pathway or a completed exposure pathway is determined to exist. The remediation would involve a sub-slab ventilation system similar to those used to eliminate infiltration of radon gas.

APPENDIX B

Administrative Record

Administrative Record

Middletown, Genung Street MGP Site
Middletown (C), Orange County New York
Site No. 3-36-050

1. Proposed Remedial Action Plan for the Middletown, Genung Street MGP site, dated February 2005, prepared by the NYSDEC.

2. Order on Consent, Index No. D3-0002-9412, between NYSDEC and Orange and Rockland Utilities Inc., executed on January 2, 1996.

3. Order on Consent, Index No. D3-0001-99-01, between NYSDEC and Orange and Rockland Utilities Inc., executed on March 5, 1999.

4. "Draft Preliminary Site Assessment Report, Genung Street Former MGP Site, NYSDEC Consent Order D3-0002-9412, Middletown, NY" September 11, 1998, Prepared by GEI Consultants Inc.

5. "Remedial Investigation Report, Former Manufactured Gas Plant Site, Middletown, Genung Street Middletown, NY" October 29, 2003, Prepared by the Retec Group, Inc.

6. "Draft Feasibility Study Genung Street MGP site", January 12, 2005. Prepared by the Retec Group, Inc.

7. "Interim Remedial Measure Completion Report, Genung Street MGP Site, Middletown, NY" January 14, 2005, Prepared by the Retec Group, Inc.

8. Fact Sheet, February 2005: Notice of Public Meeting, Proposed Remedial Action Plan, Middletown, Genung Street MGP site