PROPOSED REMEDIAL ACTION PLAN

Magna Metals
State Superfund Project
Cortlandt, Westchester County
Site No. 360003
February 2011

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

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

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

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

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

SECTION 2: CITIZEN PARTICIPATION

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

Hendrick Hudson Library
185 Kings Ferry Road
Montrose, NY 10548
Phone: (914) 739-5654

NYS Dept. of Environmental Conservation

21 South Putt Corners Road
New Paltz, NY 12561
Phone: (845) 256-3133

NYSDEC
Attn: Sally Dewes
625 Broadway
Albany, NY 12233-7016
Phone: 518-402-9768

A public comment period has been set from:

2/25/2011 to 3/25/2011

A public meeting is scheduled for the following date:

Monday March 14, 2011 at 7:00 PM

Public meeting location:

Muriel H. Morabito Community Center
29 West Brook Drive, Cortlandt Manor, New York

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

Written comments may also be sent through 3/25/2011 to:

Sally Dewes
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
sxdewes@gw.dec.state.ny.us

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

Receive Site Citizen Participation Information By Email

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

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: Magna Metals is at 510 Furnace Dock Road in the Town of Cortlandt in Westchester County near the intersection of Furnace Dock Road and Maple Avenue. Nearby towns include Peekskill and Croton–on-Hudson. The Hudson River is located three miles west of the site.

Site Features: The entire parcel is currently owned by Baker Properties, has three buildings, and is used for offices, a laboratory, and warehousing. It was previously owned by ISC Corporation and Lightron Corp. Residential areas are located around the facility. A wetland area, Furnace Brook, an unnamed tributary, and an unnamed pond are located near the site. The portion of the parcel that includes the waste handling and disposal areas, referred to as “the site” encompasses the unoccupied dilapidated Magna Metals building and the north and westerly leach pits; a building used to warehouse paper; and a portion of the PolyMedco building, used for offices, a laboratory. The building and pits (on-site) and “off-site” were investigated as part of the remedial investigation.

Current Zoning/Use: The site is zoned commercial and is surrounded by residentially zoned property.

Historic Use: Metal plating, polishing, and lacquering operations were conducted at the Magna Metals site from 1955 to 1979. During operations, iron, lead, copper, nickel, zinc chlorides, cyanides, and sulfates were discharged to a series of leaching pits. Spent trichloroethene (TCE) was allegedly discharged to the septic system. Previous investigations and actions were performed by the Department and the Westchester County Health Department starting in 1978.

Site Geology and Hydrogeology: The primary characteristics of the subsurface at the site and surrounding area consist of a sandy to silty sand overburden unit, approximately 2 to 18 feet thick, overlying Hornblende bedrock. In the leach pit area it is presumed that much of the overburden material is fill resulting from the installation of the leach pits. The inferred depth is approximately 7 to 10 feet thick. Metal and lamp parts were found buried in this area.

Overburden groundwater exists in the form of a very shallow water-bearing unit (typically less than five feet thick). Overburden groundwater flow direction is to the west toward the unnamed tributary, the wetland area, and the confluence of the unnamed tributary and Furnace Brook. Bedrock groundwater flows in a similar direction and some may discharge into the overburden water units.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

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

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

SECTION 5: ENFORCEMENT STATUS

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

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

ISC Properties, Inc. a wholly-owned subsidiary of Griffon Corp.

Lightron Residential Lighting, Inc.

Magna Metals Finishing Corporation

Lightron Corporation

As a result of identified hazardous waste disposal, the Department listed the site as a Class 2 site on the Registry of Inactive Hazardous Waste Disposal Sites in New York in December 1985. 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.

The Department and the ISC Properties, Inc. entered into a Consent Order in May 1996. The Order obligates the responsible parties to implement a remedial investigation and feasibility study only. After the remedy is selected, the Department will approach the PRPs to implement the selected remedy.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

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

The following general activities are conducted during an RI:

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

6.1.1: Standards, Criteria, and Guidance (SCGs)

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

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

6.1.2: RI Information

The analytical data collected on this site includes data for:

- groundwater
- surface water
- soil
- sediment
- soil vapor
- indoor air

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

arsenic
cadmium

chromium	1,1,2,2-tetrachloroethane
copper	xylene (mixed)
lead	benzo(a)pyrene
nickel	benzo[k]fluoranthene
selenium	chrysene
zinc	barium
tetrachloroethylene (pce)	mercury
trichloroethene (tce)	silver
cyanides(soluble cyanide salts)	dichloroethylene

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable standards, criteria and guidance for:

- groundwater
- surface water
- soil
- sediment
- indoor air

6.2: Interim Remedial Measures

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

There were no IRMs performed at this site during the RI.

6.3: Summary of Human Exposure Pathways

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

People are not drinking the contaminated groundwater because the area is served by a public water supply that is not contaminated by the site. Access to the site is unrestricted, however, contact with contaminated soil or groundwater is unlikely unless they dig below the ground surface. Concentrations of site-related contaminants in sediments and surface water are not at levels that represent a health concern. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Soil vapor intrusion sampling identified impacts to indoor air quality. This impact is limited to one on-site building and represents a health concern.

6.4: Summary of Environmental Assessment

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

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

Nature and Extent of Contamination: Soil is contaminated with metals, cyanide, and lows levels of polyaromatic hydrocarbons (PAHs). This includes levels of PAHs up to 2.5 parts per million (ppm) and the metal contaminants of concern (COCs) arsenic up to 1,190 ppm, barium up to 721 ppm, cadmium up to 19.2 ppm, chromium up to 5,050 ppm, copper up to 34,700 ppm, cyanide up to 25,000 ppm, lead up to 1,030 ppm, mercury up to 1.1 ppm, nickel up to 63,700 ppm, selenium up to 1,410 ppm, silver up to 9 ppm, and zinc up to 37,300 ppm. These higher levels were found in and around the leaching pits, up to 12 feet below ground surface.

Groundwater is contaminated with volatile organic compounds (VOCs), cyanide, and metals. This includes tetrachloroethene up to 14 (parts per billion) ppb, trichloroethene up to 910 ppb, cis-1,2-dichloroethene up to 8.1 ppb, arsenic up to 133 ppb, barium up to 1,140 ppb, beryllium up to 5.6 ppb, chromium up to 139 ppb, copper up to 240 ppb, cyanide up to 560 ppb, nickel up to 108 ppb, selenium up to 131 ppb, thallium up to 14.4 ppb. These levels were detected up to 20 feet below ground surface, on the overburden/bedrock interface.

Surface water samples were collected downgradient of the site. Five VOCs were detected in at least one of the surface water samples. Cis-1,2-dichloroethene and trichoroethylene were present in 9 of 11 samples, with cis-1,2-dichloroethene present up to 18 ppb. Trichloroethene's maximum concentration was 5.5 ppb. Twenty metals and cyanide were detected in at least one of the surface water samples collected during the investigation and four metals plus cyanide were present at concentrations greater than their applicable surface water criteria. Concentrations of the majority of metals were greater in the downgradient tributary and/or wetlands surface water samples in comparison to the upstream samples.

Sediment is contaminated with arsenic up to 19.3 ppm, cadmium up to 1.4 ppm, chromium up to 166 ppm, copper up to 2,330 ppm, lead up to 112 ppm, mercury up to 0.25 ppm, nickel up to 835 ppm, silver up to 1.4 ppm, zinc up to 1,890 ppm. These samples were collected in the upper two feet of sediment downgradient of the site. Surface drainage from the site in the vicinity of the former Magna Metals building is directed into adjoining wetlands and streams. Site-related contaminants such as copper, nickel, and zinc are present in sediments at concentrations above background and above lowest effects and severe effect levels for sediment quality criteria in the adjoining streams and wetlands. The wetlands east of Furnace Brook and the unnamed tributary are impacted. Laboratory toxicity testing confirmed impacts to pelagic and benthic aquatic life.

The site presents a significant environmental threat due to the ongoing releases of contaminants from source areas (leach pits) into groundwater, sediments, surface water, and soil vapor.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

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

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

7.1: Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the 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 six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

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

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

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

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

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

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

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

7.2: Elements of the Proposed Remedy

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

The estimated present worth cost to implement the remedy is $10,242,000. The cost to construct the remedy is estimated to be $9,212,000 and the estimated average annual cost is $62,000.

The elements of the proposed remedy are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. This will include pre-design work required including delineating how much soil and sediment must he removed in accordance with the ROD. Green remediation principals and techniques will be implemented to

the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Demolition of the Magna Metals building. The building is dilapidated and sample data has not been collected underneath the building due to the building condition. After the demolition of the building, further soil sampling would be undertaken to define the limits of the contamination beneath the building footprint.

3. On-site soils identified in the former Magna Metals building footprint and areas adjacent to the former building and in the associated leach fields will be excavated and transported off-site for proper disposal. Excavation will extend to all soil which exceeds the commercial use soil cleanup objectives (SCOs) for, lead, mercury and zinc or the lower of the commercial use or protection of groundwater SCOs for the VOC COCs and arsenic, chromium, copper, cyanide, nickel and selenium. The excavation limits will be determined by confirmatory samples. Silver, barium, cadmium, and polyaromatic hydrocarbons (PAHs) are co-located with the other metals listed above and will be addressed by remediated the metals listed above.

4. Prior to backfilling the on-site excavation area, an application of permanganate (or other appropriate oxidizer) will be applied to the bottom of the excavation for the purpose of treating residual VOC contamination located within underlying bedrock fractures. The concentration and volume of oxidizer will be determined during per-design activities. Following the one-time application of the oxidizer the excavation will be backfilled with fill which meets the requirements of 6NYCRR 375-6.7(d), to establish the designed grades at the site. The excavated areas will be stabilized with vegetation.

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

6. Soils located off-site in areas downgradient of the former Magna Metals building and leach pits, which exceed the unrestricted use SCOs will be excavated and transported off-site for disposal. Approximately 11,000 cubic yards of soil will be removed. Fill and topsoil which meets the requirements of 6NYCRR 375-6.7(d) for unrestricted use, will be brought in to replace the excavated soil and establish the designed grades at the site. The sampling of the excavation will include confirmatory samples.

Off-site areas will be restored and re-vegetated with appropriate native species. Trees will be replaced using a one-to-one DBH (diameter breast height) ratio. For example, if a 12-inch diameter tree must be removed, it will be replaced with two (2) six-inch diameter trees or three (3) four-inch diameter trees.

7. Installation of a soil vapor mitigation system beneath the approximately 18,000 sq. feet of floor slab beneath the portion of the building currently occupied by Polymedco/Laboratory.

8. Excavation and off-site disposal of sediments from the unnamed tributary, Furnace Brook, and associated wetlands with analytical concentrations above pre-release/background conditions or New York State Lowest Effect Levels (LELs) for metals, whichever is higher. The average concentrations of nickel, copper, and zinc, from background sediment sample locations are to be used as pre-release levels. Additional investigation will be performed during the remedial design to determine the areal and vertical extent of contamination. Confirmatory sampling will be performed following remediation. Approximately 16,000 cubic yards of sediment are estimated to be excavated. Excavated wetland substrate will be restored with similar clean material which meets the unrestricted use requirements of 6NYCRR 375-6.7(d). All excavation areas associated with the streams and wetlands will be restored consistent with 6 NYCRR Parts 608 and 663. Wetlands and aquatic environments will be restored to original contours. Soil and sediment backfill in these areas will meet applicable sediment criteria from the Department's; Technical Guidance for Screening Contaminated Sediments. Trees will be replaced using a one-to-one DBH ratio as described above.

9. Imposition of an institutional control in the form of an environmental easement for the controlled property that:

a. requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3).

b. allows the use and development of the controlled property for commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;

c. restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or Westchester County DOH;

d. prohibits agriculture or vegetable gardens on the controlled property;

e. requires compliance with a Department approved Site Management Plan;

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

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

Institutional Controls: the Environmental Easement discussed in Paragraph 9 above.
Engineering Controls: the sub-slab depressurization system discussed in Paragraph7 above.

This plan includes, but is not limited to:
i. Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
ii. descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
iii. provisions for the management and inspection of the identified engineering controls;
iv. maintaining site access controls and Department notification; and
v. the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls;

b) a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but not be limited to:
i. monitoring of groundwater, surface water, and sediments to assess the performance and effectiveness of the remedy;
ii. a schedule of monitoring and frequency of submittals to the Department;
iii. restored areas will be monitored one year after the Department's determination of substantial completion of site remediation. The restored areas will be inspected for erosion, settlement and growth of plantings, and repaired and restored as directed by the Department;
iv. monitoring wells will be placed around the oxidation treatment area to monitor the treated groundwater. The number, location, and specifications of the monitoring wells will be determined during the design;
v. surface water and sediment in Furnace Brook, the unnamed pond and the unnamed tributary will be monitored. Details of the monitoring program will be included in the Site Management Plan.
vi. provision for evaluation of the potential for soil vapor intrusion should the on-site warehouse building become occupied and for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion.
vii. monitoring for vapor intrusion for any buildings occupied or developed on the site, as may be required pursuant to item 7 above.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1.2, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into four categories; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/ polychlorinated biphenyls (PCBs), and inorganics (metals and cyanide). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 6.1.1 are also presented.

Waste/Source Areas

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

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

Source areas were identified at the site within the former leach pits and former Magna Metals plating building. The building is standing but is very dilapidated and the leach pits remain in the ground but are not used. Soils contaminated with metals (arsenic, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc) and cyanide were found in the leach pits. Groundwater contaminated with VOCs was in the vicinity of the Magna Metals building and leach pits. Figures 2 and 3 show the leach pits and the Magna Metal building

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

Groundwater

Groundwater samples were collected from overburden and top-of-bedrock monitoring wells and sampled for VOCs, SVOCs, PCBs, and inorganics. The samples were collected to assess groundwater conditions on and off-site. The results indicate that contamination in shallow groundwater at the site exceeds the SCGs for volatile organic compounds (VOCs), cyanide and metals. Contaminant levels in bedrock groundwater also exceeded the SCG values for VOCs and inorganics. Off-site monitoring wells in the vicinity of the site were sampled and no site related contamination was found. Table 1-1 shows the ranges of concentrations found in the monitoring wells.

Table 1-1 - Groundwater Frequency Exceedance			
Detected Constituents	Concentration Range Detected (ppb)	SCG[a] (ppb)	Frequency Exceeding SCG
Volatile Organic Compounds			
cis-1,2-Dichloroethene	1.3 J to 8.1	5	3/7
Tetrachloroethene	2.2 J to 14	5	6/8
Trichloroethene	4.5 J to 910 D	5	9/10
Inorganics			
Aluminum	52.0 J to 46,300	NC	NA
Arsenic	4.8 J to 133	25	1/4
Barium	63.9 J to 1,140	1,000	1/8
Beryllium	0.10 J to 5.6	3	1/5
Calcium	20,400 to 127,000	NC	NA
Chromium	2.5 J to 139	50	1/7
Cobalt	1.1 J to 40.8 J	NC	NA
Copper	8.4 J to 210	200	1/5
Cyanide	27 J to 590	200	1/3
Iron	93.2 J to 57,200	300	7/8
Lead	3.1 to 13.2	25	0/5
Magnesium	14,600 to 74,300	35,000	6/8
Manganese	29.4 to 9,600	300	4/8
Mercury	0.29	0.7	0/1
Nickel	4.3 J to 106	100	1/8
Potassium	2,230 J to 17,100 J	NC	NA
Selenium	1.6 J to 131	10	3/6
Sodium	12,700 J to 264,000 J	20,000	7/8
Thallium	3.3 J to 14.4	0.5	4/4
Vanadium	1.8 J to 72.2	NC	NA
Zinc	4.3 J to 150 J	2,000	0/7

[a] SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), and 6 NYCRR Part 703, Surface Water and
D - From a diluted sample
J - Estimated
NA - Not applicable
NC - No criteria

The primary groundwater contaminants are the VOCs, specifically tetrachloroethylene, trichloroethene and cis-1,2-dichloroethene; and the metals, specifically arsenic, chromium, copper, cyanide, nickel and selenium. As noted on Figure 4, the primary groundwater contamination is associated with the leach pits and former Magna Metals building.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of groundwater. The site contaminants that are considered to be the contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are VOCs and metals.

Soil

Surface and subsurface soil samples were collected at the site during the RI. Surface soil samples were collected from a depth of 0-2 inches to assess direct human exposure. Subsurface soil samples were collected from a depth of 2 - 14 feet to assess soil contamination. The results indicate that soils at the site exceed the unrestricted SCGs for two VOCs, semi-volatile organics (SVOCs), cyanide and metals. The results indicate that soils also exceed the restricted commercial SCGs for VOCs, SVOCs, and metals.

Table 1-2 shows the ranges of concentrations found in the soils.

Table 1-2 - Soil Frequency Exceedance

Detected Constituents	Concentration Range Detected (ppm)	Unrestricted SCG[a] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Commercial SCG[b] (ppm)	Frequency Exceeding Restricted Commercial SCG
Volatile Organic Compounds					
1,1,2,2-Tetrachloroethane	0.003 J	NC	NA	NC	NA
2-Butanone	0.004 J	0.12	0/1	0.12	0/1
2-Hexanone	0.005 J	NC	NA	NC	NA
4-Methyl-2-pentanone	0.004 J	NC	NA	NC	NA
Acetone	0.005 JB - 0.040	0.05	0/11	0.05	0/11
Benzene	0.0085 J	0.06	0/1	0.06	0/1
cis-1,2-Dichloroethene	0.0072 J to 0.023 J	0.25	0/2	0.25	0/2
Ethyl benzene	0.180 J	1	0/1	1	0/1
m/p-xylene	0.0055 J to 1.6 JD	0.26	1/3	0.26	1/3
Methylene chloride	0.004 JB to 0.033 J	0.05	0/12	0.05	0/12
o-Xylene	0.73 JD	0.26	1/1	0.26	1/1
Toluene	0.0031 J to 0.12 J	0.7	0/3	0.07	0/3
Trichloroethene	0.0017 J to 0.018	0.47	0/10	0.47	0/10
Semi-Volatile Organic Compounds					
1,1-Biphenyl	3.3 J	NC	NA	NC	NA
2-Methylphenol	0.004 J to 0.039 J	NC	NA	NC	NA
Acenaphthylene	0.15 J	20	0/1	20	0/1
Anthracene	0.034 J to 0.081 J	100	0/3	500	0/3
Benzo(a)anthracene	0.013 J to 1.3 J	1	2/15	1	2/15
Benzo(a)pyrene	0.018 J to 1.9 J	1	3/12	1	3/12
Benzo(b)fluoranthene	0.021 J to 2.5 J	1	3/13	1.7	2/13
Benzo(g,h,i)perylene	0.046 J to 1.2 J	100	0/7	500	0/7
Benzo(k)fluoranthene	0.026 J to 1.3 J	0.8	1/6	1.7	0/6
Bis(2-ethylhexyl)phthalate	0.012 J to 13 JD	NC	NA	NC	NA
Butylbenzylphthalate	0.013 J to 0.36 J	NC	NA	NC	NA
Chrysene	0.019 J to 1.7 J	1	2/11	1	2/11
Dibenz(a,h)anthracene	0.089 J to 0.35 J	0.33	1/2	0.56	0/2

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Table 1-2 - Soil Frequency Exceedance					
Detected Constituents	Concentration Range Detected (ppm)	Unrestricted SCG[a] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Commercial SCG[b] (ppm)	Frequency Exceeding Restricted Commercial SCG
Diethylphthalate	0.018 J to 0.081 J	NC	NA	NC	NA
Di-n-butylphthalate	0.012 JB to 0.66 B	NC	NA	NC	NA
Di-n-octyl phthalate	0.013 J	NC	NA	NC	NA
Fluoranthene	0.008 J to 2.9 J	100	0/21	500	0/21
Indeno(1,2,3-cd)pyrene	0.022 J to 1.1 J	0.5	2/7	5.6	0/7
Phenanthrene	0.036 J to 1.8 J	100	0/18	500	0/18
Pyrene	0.038 J to 2.3 J	100	0/22	500	0/22
Inorganics					
Aluminum	2,260 to 21,295	NC	NA	NC	NA
Antimony	0.34 J to 22 J	NC	NA	NC	NA
Arsenic	0.936 J to 1,190 J	13	24/60	13	24/60
Barium	20.1 J to 721	350	5/61	400	5/61
Beryllium	0.114 J to 0.85	7.2	0/56	10	0/56
Cadmium	0.16 J to 19.2 J	2.5	6/29	4	5/29
Calcium	664 B to 18,200 J	NC	NA	NC	NA
Chromium	2.2 B to 5050	30	22/62	41	19/62
Cobalt	2.3 B to 88.6 J	NC	NA	NC	NA
Copper	12.8 to 34,700 JD	50	40/61	50	40/61
Cyanide	0.577 to 25,000 J	27	21/42	27	21/42
Iron	4,350 to 39,900	NC	NA	NC	NA
Lead	1.1 to 1,030 J	63	19/61	63	19/61
Magnesium	970 B to 12,700	NC	NA	NC	NA
Manganese	83 J to 864 J	1,600	0/61	1,600	0/61
Mercury	0.030 J to 1.1 J	0.18	10/33	0.18	10/33
Nickel	6.7 B to 63,700 JD	30	36/61	30	36/61
Potassium	267 B to 6,994 J	NC	NA	NC	NA
Selenium	0.63 J to 1,410 J	3.9	24/45	3.9	24/45
Silver	0.87 J to 9	2	12/19	2	12/19

Table 1-2 - Soil Frequency Exceedance					
Detected Constituents	Concentration Range Detected (ppm)	Unrestricted SCG[a] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Commercial SCG[b] (ppm)	Frequency Exceeding Restricted Commercial SCG
Sodium	50 B to 11,300 J	NC	NA	NC	NA
Thallium	1.8 J to 38.8	NC	NA	NC	NA
Vanadium	2.8 J to 69	NC	NA	NC	NA
Zinc	10.3 to 37,300 J	109	37/61	109	37/61
Pesticides					
4,4'-DDD	0.00068 JP to 0.01	0.0033	4/5	17	0/5
4,4'-DDE	0.0071 JPN to 0.008	0.0033	3/3	47	0/3
4,4'-DDT	0.00092 JP to 0.0089	0.0033	7/9	14	0/9
alpha-BHC	0.00005 JP	0.02	0/1	0.02	0/1
alpha-Chlordane	0.00027 JP to 0.021 P	0.094	0/3	1.3	0/3
Dieldrin	0.00028 JP	0.005	0/1	0.006	0/1
Endosulfan I	0.00082 JP	2.4	0/1	102	0/1
Endosulfan II	0.00015 JP	2.4	0/1	102	0/1
gamma-Chlordane	0.015 JP	NC	NA	NC	NA
Heptachlor	0.00019 JP	0.042	0/1	0.14	0/1
Polychlorinated Biphenyls (PCBs)					
Aroclor 1254	0.024 JP to 1.5 JD	0.1	5/10	1	1/10
Aroclor 1260	0.0072 J to 0.08	0.1	0/6	1	0/6
Total Organic Carbon (TOC)					
Total Organic Carbon	806 to 8,600 J	NC	NA	NC	NA

[a] SCG: Standard Criteria or Guidance - Part 375-6.8(a), Unrestricted Soil Cleanup Objectives

[b] SCG: Standard Criteria or Guidance - Part 375-6.8(b) - Restricted Commercial (Protection of Public Health - Commercial, Protection of Ecological Resources, and Protection of Groundwater) Soil Cleanup Objectives

B (organic) - Present in associated blank sample
B (inorganic) - Concentration above method detection limit but below reporting limit
D - From a diluted sample
J - Estimated
N - Presumptively present
P - Compound had >25% difference for the detected concentration values between two gas chromatograph columns
NA - Not applicable
NC - No criteria

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The primary soil contaminants are SVOCs (benzo(b)fluoranthene and benzo(a)pyrene), cyanide, and the metals arsenic, chromium, copper, lead, mercury, nickel, selenium and zinc. Figure 5 shows where soil contaminant levels exceed SCOs; the primary soil contamination is associated with the leach pits. The metals contamination identified above is the result of past operations at the site.

Surface soils on the site (in the vicinity of the Magna Metals building and leach pits) generally exceed the NYSDEC Restricted Commercial Use SCOs. Surface soil samples SS-06 through SS-09 were collected off-site but physically and hydrogeologically downgradient of the site. The concentrations of site related metals in these samples generally significantly exceed the unrestricted SCGs. North of the building there are several off-site surface soil samples (SS-04, SS-13, SS-14, SS-15, SS-801, SS-802, and SS-803) that contain levels of chromium, lead, and silver that are only slightly higher than unrestricted. It appears that those latter slightly elevated concentrations are not due to disposal of hazardous waste at the site but occur naturally in the background.

Based on the findings of the Remedial Investigation, the past disposal of hazardous waste has resulted in the contamination of soil. The site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are arsenic, chromium, copper, cyanide, lead, mercury, nickel, selenium, and zinc.

Surface Water

Surface water samples were collected downgradient of the site: four surface water samples from the tributary, one sample after the confluence of the stream and tributary, one sample from the confluence of the stream and pond, two samples from the pond, one sample at the drainage culvert from the pond along Cross Roads Ave., two samples in the wetlands area, and one upgradient sample from the stream.

Five VOCs were detected in at least one of the surface water samples. Cis-1,2-dichloroethene and trichoroethene were present in 9 of 11 samples, with cis-1,2-dichloroethene present up to 18 ppb. Trichloroethene's maximum concentration was 5.5 ppb. Six SVOCs were detected in the surface water samples at concentrations less than 4 ppb. Only one SVOC (bis(2-ethylhexyl)phthalate) was present in the upstream sample.

Twenty metals and cyanide were detected in at least one of the surface water samples collected during the investigation. Four of those metals (copper, iron, mercury, and zinc) plus cyanide were present at concentrations greater than their applicable surface water criteria. Concentrations of the majority of metals were greater in the downgradient tributary and/or wetlands surface water samples in comparison to the upstream samples. Aluminum, barium, copper, iron, manganese, nickel, and selenium were detected above chronic screening values from the NYSDEC Ambient water quality standards guidance. Copper and zinc were detected above the acute screening values from the NYSDEC Ambient water quality standards guidance.

Sediments

Sediment samples from 0-2 feet were collected during the RI from the off-site wetland and at locations upstream, adjacent and downstream of the site and analyzed for VOCs, SVOCs, PCBs, and inorganics. The samples were collected to assess the potential for impacts to wetland sediment from the site. The results indicate that sediment in the off-site wetland exceeds the Department's SCGs for sediments for several metals. Tables 1-3 and 1-4 show the extent of contamination in the collected sediment samples.

Figure 6 shows the area affected by contaminants from the site, particularly copper, which is indicative of the primary sediment contamination. The primary sediment contaminants are nickel, copper and zinc. The metals are associated with historic disposal of wastes in the leach pits at the Magna Metals site, as shown in Figure 3. Limited surface water and sediment toxicity testing was performed and impacts to pelagic and benthic aquatic life were observed in indigenous and laboratory based analyses.

Several of the other metals shown in Tables 1-3 and 1-4 were also found in the upstream sediment samples, are naturally occurring and appear to be associated with background levels. Therefore, iron, magnesium, and manganese in sediment are not considered site specific contaminants of concern.

Table 1-3 - Sediment (Organics) Frequency Exceedance					
Detected Constituents	**Concentration Range Detected (ppm)**	**SCG[a] (ppm)**	**Frequency Exceeding SCG**	**Site Derived Value[b] (ppm)**	**Frequency Exceeding Site-Derived Value**
Semi-Volatile Organic Compounds					
Anthracene	0.2 J	NC	NA	NC	NA
Benzo(a)anthracene	0.1 J to 0.47	1.3[c]	0/6	110.97[c]	0/6
Benzo(a)pyrene	0.12 J to 0.66 J	1.3[c]	0/6	110.97[c]	0/6
Benzo(b)fluoranthene	0.076 J to 1.2 J	1.3[c]	0/7	110.97[c]	0/7
Benzo(g,h,i)perylene	0.15 J to 0.22 J	NC	NA	NC	NA
Benzo(k)fluoranthene	0.065 J to 0.6 J	1.3[c]	0/5	110.97[c]	0/5
Chrysene	0.071 J to 0.65 J	1.3[c]	0/7	110.97[c]	0/7
Fluoranthene	0.16 J to 1.4 J	1,020[d]	0/9	87,069.24[d]	0/9
Fluorene	0.07 J	NC	NA	NC	NA
Indeno(1,2,3-cd)pyrene	0.049 J	1.3[c]	0/1	110.97[c]	0/1
Phenanthrene	0.05 J to 0.9	120[d]	0/7	10,243.44[d]	0/7
Pyrene	0.12 J to 1.3 J	NC	NA	NC	NA
Total Organic Carbon (TOC)					
Total Organic Carbon	1,700 J to 140,000 J	NC	NA	NC	NA

[a]SCG - Standard Criteria or Guidance: New York State Department of Environmental Conservation's "Technical Guidance for Screening Contaminanted Sediments"

[b]SCG normalized using site-specific TOC values.

[c]Value for Human Health Bioaccumulation

[d]Value for Benthic Aquatic Life Chronic Toxicity

J - Estimated

NA - Not applicable

NC - No criteria

Table 1-4 - Sediment (Inorganics) Frequency Exceedance					
Detected Constituents	Concentration Range Detected (ppm)	Lowest Effect Level SCG[a] (ppm)	Frequency Exceeding Lowest Effect Level SCG	Severe Effect Level SCG (ppm)	Frequency Exceeding Severe Effect Level SCG
Inorganics					
Aluminum	2,920 to 19,800 J	NC	NA	NC	NA
Arsenic	1.1 B to 19.3 J	6	10/22	33	0/22
Barium	32.6 J to 604 J	NC	NA	NC	NA
Beryllium	0.17 J to 1.6 J	NC	NA	NC	NA
Cadmium	0.31 J to 1.4 J	0.6	10/12	9	0/12
Calcium	682 B to 16,400	NC	NA	NC	NA
Chromium	11.4 J to 166 J	26	19/22	110	2/28
Cobalt	4.6 B to 58.8 J	NC	NA	NC	NA
Copper	4.4 J to 2,330 J	16	26/28	110	22/28
Iron	2,190 to 23,400 J	20,000 (2%)	11/28	40,000 (4%)	0/28
Lead	3 to 112 J	31	14/28	110	1/28
Magnesium	2,130 to 23,400 J	NC	NA	NC	NA
Manganese	87 to 958 J	460	4/21	1100	0/21
Mercury	0.01 J to 0.36 J	0.15	7/15	1.3	0/15
Nickel	17 to 853 J	16	26/28	50	23/28
Potassium	207 B to 1,970 J	NC	NA	NC	NA
Selenium	0.61 B to 68.2 J	NC	NA	NC	NA
Silver	0.19 J to 1.4 JB	1	2/8	2.2	0/8
Sodium	59.8 J to 770 J	NC	NA	NC	NA
Thallium	9.4 J	NC	NA	NC	NA
Vanadium	5.8 B to 61 J	NC	NA	NC	NA
Zinc	29.3 J to 1,880 J	120	20/28	270	6/28

[a]SCG - Standard Criteria or Guidance: New York State Department of Environmental Conservation's "Technical Guidance for Screening Contaminated Sediments"
J - Estimated NA - Not applicable NC - No criteria

Based on the findings of the RI, the disposal of hazardous has resulted in the contamination of wetland sediment. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of sediment to be addressed by the remedy selection process are nickel, copper and zinc.

Soil Vapor

The evaluation of the potential for soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of soil vapor, sub-slab soil vapor under structures, and indoor air inside structures. Due to the presence of buildings in the impacted area, sub-slab soil vapor and indoor air samples were collected to evaluate whether soil actions are needed to address exposures related to soil vapor intrusion (SVI).

Soil vapor samples were collected from beneath the occupied commercial structure located adjacent to the Magna Metals building. Indoor air and outdoor air samples were also collected at this time. The sampling results indicate trichloroethene (TCE) was detected in on-site sub-slab soil vapor and in the indoor air of the structure. The highest concentration of TCE was found under the southwestern portion of the building (location SV-12), in sub-slab soil vapor at 110,000 ug/m3. The highest concentration of TCE detected in the indoor air was 5.1 ug/m3 at location IA-12.

Figure 7 shows the indoor air, outdoor air, and subslab sample locations. The Magna Metals building was not sampled since it is uninhabitable (dilapidated). The environmental data indicates there is no need for off-site soil vapor sampling as no groundwater contamination was found near any off-site structures.

Based on the concentration detected, and in comparison with the NYSDOH Soil Vapor Intrusion Guidance, the primary soil vapor contaminant is trichloroethene (TCE) which is associated with the plating operations at Magna Metals. As noted on Figure 7, the primary soil vapor contamination is found under the southwestern corner of the building. Therefore, mitigation is necessary for that portion of the building, which is currently occupied by the PolyMedco Office/Laboratory.

Exhibit B

SUMMARY OF THE REMEDIATION OBJECTIVES

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

The remedial objectives for this site are:

Soil

- Prevent ingestion/direct contact with contaminated soil
- Prevent migration of contaminants that would result in groundwater or surface water contamination
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain
- Remove the source of soil contamination, to the extent practicable

Groundwater

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater
- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable
- Prevent the discharge of contaminants to surface water
- Remove the source of groundwater contamination

Sediments

- Prevent direct contact with contaminated sediments
- Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of ambient water quality criteria
- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain
- Remove the source of sediment contamination

Soil Vapor

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

Exhibit C

Description of Remedial Alternatives

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

The potential remedies, Alternative S-3 and S-4, were considered to address the site-related impacted soils. The potential remedies, Alternatives GW-2, GW-3, and GW-4 were considered to address the site-related impacted groundwater. The potential remedies, Alternatives SD-3A, SD-3B, and SD-3C were considered to address the site-related impacted sediments and wetlands. The NYSDEC determined that an evaluation of surface water remedial alternatives was not needed because once the contaminant sources and affected environmental media are remediated surface water is expected to substantially improve over time.

Alternative 1: No Action

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

Alternative 2: Site Management

The Site Management Alternative requires only institutional controls for the site. This alternative includes institutional controls, in the form of an environmental easement to restrict the use of the site to commercial/industrial and to prohibit the use of groundwater for potable purposes on-site or in the adjacent community, and a site management plan, necessary to protect public health and the environment from any contamination identified at the site.

SOIL

Alternative S-3: Building Demolition and Removal of Soil above Soil Cleanup Objectives

This alternative includes the excavation and removal of contaminants of concern (COCs) in overburden soils to achieve either the NYSDEC soil cleanup objectives (SCOs) for the protection of human health (commercial) for metals which have not impacted groundwater, protection of groundwater for metals and VOCs which have impacted groundwater and protection of ecological resources SCOs in the off-site area downgradient of the leach pits. Included in this alternative is the demolition and removal of the former Magna Metals building to access the soil contamination to be excavated and associated leach pits.

The footprint and vertical extent of overburden soil removal would be defined by occurrences of COC concentrations in excess of the appropriate SCOs identified above, as determined during a pre-design investigation, as well as from post-excavation sampling during implementation of remedial activities. Figure 8 shows the approximate extent of soil removal based on the relevant SCOs. Overburden soil removal would extend vertically to approximately 10 to 15 feet below ground surface (bgs) (the approximate depth to bedrock). An estimated volume of 7,000 cubic yards (cy) of soil would be removed. If the pre-design sampling and/or remedial activities identify additional contamination associated with the leach pits extending off-site, the excavation will be extended as necessary to address the highly contaminated subsurface soils. This alternative does not include removal of COCs in excess of NYSDEC SCOs in off-site soils that are considered background samples (SS-04 and SS-13 through 15, SS-801 through SS-803).

The alternative includes demolition of the former Magna Metals building and leach pits and post-demolition sampling of subsurface conditions. This alternative includes a contingency for the potential removal of contaminated soils above NYSDEC Restricted Commercial Use SCOs or above the NYSDEC protection of groundwater SCOs, whichever is lower, below the building floor to an extent of approximately 10 to 15 feet bgs. The volume of soil to be removed from beneath the former Magna Metals building is estimated to be approximately 3,900 cy.

Shoring and/or sheet piling may be needed for this alternative for slope stability and safety, as well as for dewatering purposes since the excavation proceeds below the water table.

A site cover will be required to allow for commercial use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer.

Post-remediation sampling will be performed to ensure that remedial action objectives have been met.

This alternative would also include preparing and implementing a Site Management Plan (SMP), employing institutional controls in the form of an EE to control and/or prohibit access to remaining contaminated soils on-site, and periodic reviews to assess the continued effectiveness of the remedy.

Present Worth: $3,752,000
Capital Cost: $3,696,000
Annual Costs: $20,000

Alternative S-4: Building Demolition and Removal of Soil above Unrestricted Use Soil Cleanup Objectives

This alternative includes the excavation and removal of COCs in overburden soils to NYSDEC unrestricted SCOs and demolition and removal of the former Magna Metals building and leach pits.

The footprint and vertical extent of overburden soil removal would be defined by occurrences of COC concentrations in excess of the NYSDEC unrestricted use SCOs as determined during a pre-design investigation, as well as from post-excavation sampling during implementation of remedial activities. Overburden soil removal would extend vertically to approximately 10 to 15 feet bgs (the approximate depth to bedrock). An estimated volume of 36,000 cubic yards (cy) of soil would be removed. If the pre-design (i.e., design stage) sampling investigation and/or remedial activities identify additional contamination associated with the leach pits extending off-site, the excavation will be extended as necessary to address highly contaminated subsurface soils. This alternative does not include removal of COCs in excess of NYSDEC SCOs in off-site soils that are considered background samples (SS-04, SS-13 through 15, and SS-801 through 803).

The alternative includes demolition of the former Magna Metals building and post-demolition sampling of subsurface conditions is included. The volume of soil to be removed from beneath the former Magna Metals building is estimated to be approximately 3,900 cy.

Shoring and/or sheet piling may be needed for this alternative for slope stability and safety, as well as for dewatering purposes since the excavation proceeds below the water table.

Post-remediation sampling will be performed to ensure that remedial action objectives have been met.

This alternative would not include employing institutional controls to control access to soils at the property.

Present Worth: *$11,819,000*
Capital Cost: *$11,819,000*
Annual Costs: *$0*

Groundwater

Alternative GW-2: Groundwater Monitoring and Sub-Slab Vapor Mitigation

This alternative includes monitoring of groundwater in conjunction with the removal of contaminated soil during implementation of either Alternatives S-3 or S-4, and installation of a sub slab depressurization system.

A sub-slab depressurization system (SSDS) would be installed beneath approximately 18,000 square feet of floor slab of the Polymedco Office/Laboratory, as shown on Figure 8. The proposed system consists of a series of collection pipes and one or more fans/blowers, which will draw air from beneath the building, and will actively vent it outside. As part of the proposed SSDS , the floor slab of the Polymedco Office/Laboratory may need to be sealed (i.e., no cracks, gaps, etc. in the slab). After system start-up, if pressure testing indicates a negative pressure field has not been established, the SSDS would be expanded.

A Site Management Plan (SMP) would be developed and implemented. The SMP would include a monitoring program to verify ongoing reduction of remaining groundwater contamination. Both new and existing monitoring wells would be incorporated within the monitoring network.

This alternative would include institutional controls in the form of an EE to prohibit the use of groundwater for potable purposes on-site or in the adjacent community, provision to evaluate the potential for vapor intrusion for any buildings developed on the site including provision for mitigation of any impacts identified, provision to evaluate the potential for soil vapor intrusion for existing buildings if building use changes significantly or if a vacant building become occupied, provision to monitor for vapor intrusion for any buildings occupied or developed on the site, and periodic reviews to assess the continued effectiveness of the remedy.

Present Worth: *$927,000*
Capital Cost: *$250,000*
Annual Costs: *$60,000*

Alternative GW-3: In-Situ Treatment of Groundwater and Sub-Slab Vapor Mitigation

This alternative provides for *in situ* treatment of contaminated groundwater to significantly reduce or eliminate residual contaminants in groundwater, groundwater monitoring, and installation of a sub slab depressurization system.

In situ chemical oxidation would be performed by injection of a chemical reagent (e.g., Fenton's reagent) into the subsurface through injection points located on-site. *In situ* chemical oxidation could be effective for organic contaminants in groundwater. The amount of reagent needed, spacing of injection points, injection point requirements and the frequency of addition to achieve cleanup goals would be determined during pre-design investigation activities.

Monitoring wells, located downgradient of the injection locations, would be used to monitor the treated groundwater. The location and requirements of downgradient monitoring wells would be determined during design activities.

A sub slab depressurization system (SSDS) would be installed beneath approximately 18,000 square feet of floor slab of the Polymedco Office/Laboratory and SMP developed, similar to GW-2 above as shown on Figure 8.

This alternative would include institutional controls in the form of an EE to prohibit the use of groundwater for potable purposes on-site or in the adjacent community and other provisions as described in Alternative GW-2, and periodic reviews to assess the continued effectiveness of the remedy.

Present Worth: *$2,167,000*
Capital Cost: *$1,490,000*
Annual Costs: *$60,000*

Alternative GW-4: Limited Permanganate Addition, Groundwater Monitoring and Sub-Slab Vapor Mitigation

This alternative provides for a single, one-time application of permanganate within the soil excavation area in conjunction with alternatives S-3 or S-4. This alternative also includes groundwater monitoring and installation of a sub slab vapor depressurization system.

Prior to backfilling the excavation, permanganate would be applied at the bottom of the excavation area for the purpose of oxidizing residual groundwater contamination located within underlying bedrock. The concentration and volume of permanganate would be determined during pre-design investigation activities. Permanganate would enter the bedrock through any existing cracks or fissures such as fractures. Following the one-time application of the permanganate, the excavation area would be backfilled.

Monitoring wells, located downgradient of the injection locations, would be used to monitor the treated groundwater. The location and requirements of downgradient monitoring wells would be determined during design activities.

A sub slab depressurization system (SSDS) would be installed beneath approximately 18,000 square feet of floor slab of the Polymedco Office/Laboratory and SMP developed, similar to GW-2 above as shown on Figure 8.

This alternative would include institutional controls in the form of an EE to prohibit the use of groundwater for potable purposes on-site or in the adjacent community and periodic reviews to assess the continued effectiveness of the remedy.

Present Worth: $1,054,000
Capital Cost: $377,000
Annual Costs: $60,000

Sediment

Alternative SD-3A: Sediment Removal to Concentrations below Habitat Based Preliminary Remedial Goals (PRGs)

Alternative SD-3A would include the removal of wetland sediments with contaminant concentrations above the Preliminary Remedial Goals (PRGs) developed during the Habitat assessment (as part of the RI). Sediments have been grouped into two separate areas (referred to as “sediment systems”) based on location and the areas of concern established in the Habitat Assessment. The first is the Furnace Brook/Unnamed Pond sediment system; the second is the Unnamed Tributary system. This alternative also includes post-remedial monitoring of surface water to monitor the effectiveness of sediment remediation on surface water.

This alternative would involve removal of sediments from the Furnace Brook/Unnamed Pond sediment system with concentrations of nickel and copper above 200 mg/kg and 415 mg/kg, respectively (PRGs developed during the RI), and sediments from the Unnamed Tributary sediment system with concentrations of nickel and copper above 143 mg/kg and 107 mg/kg, respectively (PRGs). In the Habitat Assessment, no toxicity was observed attributable to zinc in sediments, and therefore, a PRG was not developed for zinc for this alternative.

In addition, COCs in excess of NYSDEC ecological SCOs will be removed from off-site surface soils in the locations of SS-06 through 10. These soils are downgradient of the leaching pits and have been affected by disposal in the leach pits. The soils are easily accessible and also erodible, meaning they can migrate into the wetlands. Surface soils in these wetland locations are included with this sediment alternative. The approximate areas of sediments and surface soils to be removed under this alternative can be seen in Figure 4-4A.

During pre-design activities, additional investigation will be performed to determine the vertical extent of contamination. In addition, post excavation sampling will be performed following remediation. For estimating purposes, materials will be removed to a depth of approximately two (2) feet bgs and replaced with comparable materials to pre-existing grade to re-establish the sediment ecosystem. Excavation beyond 2 feet bgs to meet PRGs for this alternative is not proposed, as ecological exposures to deeper contamination is not considered a significant exposure pathway.

The quantity of off-site sediment and surface soil to be removed and replaced under this alternative is approximately 3,840 CY. The areal extent is estimated to be approximately 1.2 acres. Excavated wetland substrate will be restored with similar clean material, matching the organic content to existing. In the submerged aquatic excavation areas, clean sand or similar material will be used. All excavation areas will be revegetated in kind through replanting and reseeding. Wetlands and aquatic environments will be restored to original contours, ensuring little to no change in drainage patterns and ensuring re-establishment of vegetation.

A Site Management Plan (SMP) would be developed and implemented. This alternative also includes post-remedial monitoring of surface water to monitor the effectiveness of sediment remediation on surface water. Furnace Brook, the unnamed pond, and the unnamed tributary would be sampled periodically and compared to regulatory criteria. Surface water data would be included in periodic site reviews.

This alternative includes institutional controls (i.e., an environmental easement) and periodic reviews to assess the continued effectiveness of the remedy.

Present Worth: *$1,815,000*
Capital Cost: $1,427,000
Annual Costs: $44,000

Alternative SD-3B: Sediment Removal to Concentrations below Background

Alternative SD-3B would include the removal of sediments with analytical concentrations above background levels. The average concentrations of nickel, copper, and zinc from background sediment sample locations SD-27 through SD-31 were used to establish the goals. The average background concentrations of nickel, copper, and zinc from these locations are 24.1, 13.7, and 54.1 mg/kg respectively. Sediment will be removed from off-site areas in locations exceeding these conditions. This alternative also includes post-remedial monitoring of surface water to monitor the effectiveness of sediment remediation on surface water.

In addition off-site surface soils in the locations of SS-06 through 10 will be addressed the same as in SD-3B
The quantity of sediment to be removed and replaced under this alternative is approximately 16,000 CY. Excavated wetland substrate will be restored with similar clean material, matching the organic content to existing. In the submerged aquatic excavation areas, clean sand or similar will be used. All excavation areas will be revegetated in kind through replanting and reseeding, Wetlands and aquatic environments will be restored to original contours, ensuring little to no change in drainage patterns and ensuring re-establishment of vegetation.

A Site Management Plan (SMP) and ICs will also be similar to SD-3B.

Present Worth: $5,467,000
Capital Cost: $5,079,000
Annual Costs: $44,000

Alternative SD-3C: Sediment Removal to Concentrations below LELs

Alternative SD-3C includes the removal of sediments with analytical results above NYSDEC Lowest Effect Levels (LELs) for inorganic COCs in sediment. NYSDEC Sediment Cleanup Criteria Lowest Effect Level (LEL) for both nickel and copper is 16 mg/kg. The NYSDEC LEL for zinc is 120 mg/kg. Sediment locations with analytical results of nickel, copper, and zinc exceeding LEL criteria will be removed from the off-site areas as part of this alternative. This alternative also includes post-remedial monitoring of surface water to monitor the effectiveness of sediment remediation on surface water.

In addition, COCs in excess of NYSDEC Ecological SCOs will be removed from off-site surface soils in the locations of SS-06 through 10, wetland restoration, the SMP and ICs will be addressed as outlined in SD-3A

Present Worth: $5,436,000
Capital Cost: $5,048,000
Annual Costs: $44,000

Exhibit D
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
No Action	$0	$0	$0
Limited Action	$39,000	$20,000	$95,000
S-3 (**Building Demolition and Removal of Soil above NYSDEC Restricted Commercial Use Soil Cleanup Objectives**)	$3,696,000	$20,000	$3,752,000
S-4 (**Building Demolition and Removal of Soil above NYSDEC Unrestricted Use Soil Cleanup Objectives**)	$11,819,000	$0	$11,819,000
GW-2 (**Groundwater Monitoring and Sub-Slab Vapor Mitigation**)	$250,000	$60,000	$927,000
GW-3 (**In-Situ Treatment of Groundwater and Sub-Slab Vapor Mitigation**)	$1,490,000	$60,000	$2,167,000
GW-4 (**Limited Permanganate Addition, Groundwater Monitoring and Sub-Slab Vapor Mitigation**)	$377,000	$60,000	$1,054,000
SD-3a (**Sediment Removal to Concentrations below Habitat Based PRGs**)	$1,427,000	$42,000	$1,815,000
SD-3b (**Sediment Removal to Concentrations below Background**)	$5,079,000	$42,000	$5,467,000
SD-3c (**Sediment Removal to Concentrations below LELs**)	$5,048,000	$42,000	$5,436,000

Exhibit E

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing **Alternatives S-3, GW-4, and SD-3C, Building Demolition and Removal of Soil above NYSDEC Soil Cleanup Objectives**, **Limited Permanganate Addition, Groundwater Monitoring and Sub-Slab Vapor Mitigation**, **and Sediment Removal to Concentrations below LELs** as the remedy for this site. The elements of this remedy are described in Section 7.2. The proposed remedy is depicted in Figures 8 and 9.

Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives.

Alternatives S-3, GW-4, and SD-3C are being proposed because, as described below, they satisfy the threshold criteria and provide the best balance of the balancing criterion described in Exhibit C. They would achieve the remediation goals for the site by removing contaminated soils in the source area, treating groundwater near the source area, preventing indoor air exposures by installing a mitigation system, and removing off-site sediments that were contaminated by on-site disposal. Alternative GW-4 does not completely address groundwater contamination, but does offer a cost effective and feasible treatment option for that area.

Protection of Human Health and the Environment

The No Action Alternative, Alternative 1, would not be protective of public health or the environment since it would not achieve remediation goals described in Exhibit B. Alternative 2 does not comply with this threshold criterion inasmuch as administrative controls alone would not be effective. Alternative S-4, by removing all soil contaminated above the "Unrestricted" soil cleanup objective, meets the threshold criteria. Alternative S-3 meets this threshold criterion since it would be protective for the intended use of the site. All groundwater alternatives would be protective of health by protecting against vapor intrusion on-site with the installation of a sub slab depressurization system and by restricting groundwater use on site. Groundwater alternative GW-2 would not offer any improvement to the groundwater contamination as it would only monitor the groundwater. Alternatives GW-3 and GW-4 could improve groundwater. Sediment alternative SD-3A would not be protective of public health and the environment since it would not achieve remediation goals described in Exhibit B. Alternative SD-3A, removal of off-site contaminated sediments and surface soils to site derived remediation goals, would reduce the potential for migration of contaminants and potential for exposure. However, significant contamination would remain behind, potentially impacting public health and the environment. As stated earlier, concentrations of contaminants in the sediments in some cases are significantly above the LELs. These wetlands and adjacent soils are used by flora and fauna. Additionally, the resource is used by people in the area. The concentrations of contaminants in the sediments in some cases are significantly above the LELs. These wetlands and adjacent soils are not only used by flora and fauna but by people in the area as well. Sediment alternatives SD-3B and SD-3C would eliminate that potential exposure and be protective of public health and the environment.

Compliance with New York State Standards, Criteria, and Guidance (SCGs)

The No Action Alternative, Alternative 1, would not meet this threshold criterion since it would not meet the SCGs for soil, groundwater, indoor air, or sediment criteria. Alternative 2 (Limited Action) would similarly not achieve SGCs for the above-mentioned environmental media. Since Alternatives 1 and 2 would not satisfy the two threshold criteria, they are not considered further in this evaluation.

Alternatives S-3 would achieve applicable SGCs based on site use, while S-4 would achieve unrestricted use. Construction activities would be conducted in accordance with action- and location-specific SCGs. Wastes generated would be managed, transported, and treated in accordance with applicable local, State, and Federal requirements.

Implementation of Alternative GW-2 would be performed in compliance with action- and location-specific SCGs but would take no active measures to achieve chemical-specific SCGs. Groundwater concentrations may slowly reduce over time. Implementation of GW-3 and GW-4 are expected to reduce impacts to groundwater and soil vapor more quickly than alternative GW-2. Residual concentrations of inorganics in groundwater are possible and likely. Activities associated with these alternatives would be performed in accordance with applicable location and action-specific SCGs.

Alternative SD-3A, excavating sediments to site derived PRGs, would not comply with Department SCGs. The SD-3A goals are not adequate to protect the environment. Since Alternative SD-3A would not satisfy the two threshold criteria, it is not considered further in this evaluation. During Alternatives SD-3B and SD-3C removal and restoration activities would be performed in accordance with all applicable action- and location-specific SCGs. Mitigation of wetlands would also be performed as required based on the disturbed wetlands within the sediment system areas. Alternatives SD-3B and SD-3C would comply with chemical-specific SCGs. Removal and restoration activities would be performed in accordance with applicable action- and location-specific SCGs. Mitigation of wetlands would also be performed as required based on the disturbed wetlands within the sediment system areas. Because Alternatives S-3 and S-4; GW-2, GW-3, and GW-4; and SD-3B and SD-3C satisfy the two threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the site.

Short-term Effectiveness

Alternatives S-3 and S-4 would have comparable short term impacts to each other. These alternatives would involve extensive on-site remedial activities to remove contaminated soils, demolition of the former Magna Metals building, and installation of monitoring wells. There would be risks typically associated with construction activities, including movement of heavy equipment through areas adjacent to roads and residential properties. These risks would be addressed by developing and implementing a health and safety plan (HASP) and community air monitoring plan (CAMP) to provide protection for workers and the surrounding community. All of the alternatives mentioned in this paragraph would take 6-12 months or less.

Alternatives GW-2, GW-3, and GW-4 would have comparable, minor short term impacts related to mobilizing to sample wells and perform chemical additions for groundwater treatment.

Alternatives SD-3B and SD-3C would have comparable short term impacts. SD-3A would involve an on-site construction effort to remove contaminated sediment and surface soils. There would be risk of exposure to contaminants that are mobilized during these activities. There would also be risks typically associated with construction activities, including movement of heavy equipment. These risks would be addressed by developing and implementing a health and safety plan (HASP) and community air monitoring plan (CAMP) to provide protection for workers and the surrounding community. In addition, appropriate engineering controls (i.e., controlling access, controlling transport of contaminants to surface water bodies, etc.) would be needed. The timeframe required for implementation of Alternative SD-3A is estimated to be approximately 6-12 months, for alternatives SD-3B and SD-3C the estimated time required is approximately 12 to 18 months. There would be significant short-term damage to the wetlands adjacent to the property during remediation for all three sediment alternatives. Restoration, including returning soils and similar vegetation and trees, would be done as part of the remedy but it would take time for the wetland to return its pre-remediation state.

Long-term Effectiveness and Permanence

Long-term effectiveness is best accomplished by those alternatives involving excavation of the contaminated overburden soils and sediments. Since most of the soil contamination is concentrated on-site near the leach pits, it would be effective to remove that contamination above the Department's restricted use SCOs (Alternative S-3). This alternative would be effective and permanent over the long-term. Limited controls would be implemented to manage remaining contamination, specifically, restricting future use to commercial activities.

Removing all the on-site soil exceeding Unrestricted SCOs (Alternative S-4) would be effective and have greater permanence, as the maximum removal of contaminated materials is performed under this alternative. However, removal of soil over the entire site to Unrestricted SCGs, which are very low and perhaps below background levels, could result in a very large and expensive excavation that removes large quantities of soil that is not significantly contaminated but is above the Unrestricted SCOs. Alternative S-3 would remove all soils above applicable restricted use SCOs on site and Unrestricted SCOs off site, which would remove significant quantities of contaminated material.

None of the groundwater alternatives would effectively cleanup the groundwater to meet standards in the near term. Alternative GW-2 would not provide any additional long term effectiveness. GW-3 and GW-4 would both treat volatile organic chemicals in groundwater to some extent and reduce the amount of contamination (in groundwater and soil vapor) in the long term. The oxidative treatment described in GW-3 and GW-4 would not treat the metals in groundwater.

Of the sediment alternatives, SD-3B and SD-3C would have the most long term effectiveness as most contamination would be removed. These two alternatives are virtually identical; SD-3B and SD-3C would each require 16,000 cubic yards (cy) and 15,900 cy of sediment be removed, respectively.

Reduction of Toxicity, Mobility or Volume

Alternative S-4, removal of COCs exceeding Unrestricted Use SCOs from the Site would eliminate the potential for exposure and migration of site-related impacts. Alternative S-3, removal of COCs in overburden soil and source areas above Restricted Commercial Use SCOs, would significantly reduce the potential for exposure and migration of contaminants. Treatment at the off-site disposal facility would substantially reduce the toxicity and/or volume of contaminated soil.

Alternative GW-2 by itself would not involve any containment, removal, treatment, or disposal of the contaminated groundwater. Therefore, this alternative would not result in any immediate reduction in the toxicity, mobility, or volume of contaminants in groundwater or soil vapor. Over time, organic contaminant concentrations in the groundwater may eventually decline to be in compliance with Class GA standards resulting in a reduction in toxicity of the contaminated groundwater and/or a reduction in the dissolved phase plume volume.

Alternative GW-4 would involve oxidation of contaminated groundwater largely in bedrock in combination with the selected soil alternative. The toxicity of groundwater would be reduced by the oxidation of contaminants. In addition, the volume of contaminated groundwater (specifically overburden) would be reduced as a result of the removal of contaminants in groundwater during dewatering activities associated with soil removal. Local groundwater is not used for drinking and monitoring wells installed beyond the wetlands have not been contaminated. Alternative GW-3 would also reduce the amount and toxicity of the groundwater and hence, soil vapor.

Alternative SD-3B and SD-3C, removal and disposal of contaminated sediments to background levels or LELs, respectively, would significantly reduce the potential for migration of contaminants and potential for exposure. The amount of material removed by these two latter remedies, as mentioned above, is very similar. Alternative SD-3C would remove material that is above the lowest effect levels (LELs). Alternative SD-3B (removal to background) would remove slightly more material because background levels are slightly lower than LELs, but would not provide any additional ecological or environmental benefit since achieving LELs would mean removing all contaminants that would have a pejorative effect. Treatment of removed sediments at the off-site disposal facility could potentially reduce the mobility, toxicity and/or volume of contaminated sediment.

Implementability

For soil excavation alternatives S-3 and S-4 there are no major technical feasibility concerns with these alternatives. Demolition, excavation, transportation, and disposal are conventional technologies that are typically easy to implement. Excavation is not anticipated to extend below approximately 15 feet below ground surface (bgs); therefore, significant technical challenges are not anticipated and conventional equipment can be used. Subsurface structures (i.e., leach pits, septic tanks, and PVC piping) would be removed prior to soil excavation. Based on historic information, subsurface utilities are not present within the excavation area; however, a utility mark-out is required before any intrusive activities. Dewatering using well points outside the excavation area may be required.

However, removal of soil to Unrestricted SCGs could result in a very large and expensive excavation that remove large quantities of soil that is only slightly above unrestricted SCOs, but not actually contaminated by the activities at the site.

For all of the groundwater alternatives, there are no feasibility issues with installing a sub slab depressurization system. That is a standard, readily available technology. Alternative GW-2 and GW-4 are implementable. Alternative GW-3 may be more difficult. The installation of injection points and can be readily implemented using conventional technologies. However, due to the limited aquifer depth and limited hydraulic conductivities, getting the oxidants to contact the contaminated groundwater through in-situ treatment would be extremely difficult. Also, the shallower groundwater flows in the direction of the wetland; Alternatives GW-3 and GW-4 both address this shallower groundwater to some degree, by removing contaminated soils and treating the shallow groundwater. However, some of the groundwater contamination is in bedrock, making it very difficult to find and to more difficult treat. Small amounts of contaminated groundwater move through fissures and cracks that are difficult at best to treat, but may be impossible to treat.

For the sediment alternatives, there are technical feasibility concerns with these alternatives. For all the sediment alternatives, excavation, transportation, and disposal are conventional remedial technologies that are typically easy to implement. If the excavation doesn't extend below two feet bgs conventional equipment can be used. However for Alternatives SD-3B and SD-3C, significant degradation of the existing wooded wetland system is likely to occur, resulting from the expansive excavation footprint created by attaining LEL levels. Trees would have to be worked around and/or removed. Native habitats would be destroyed and extensive wetland restoration would be required.

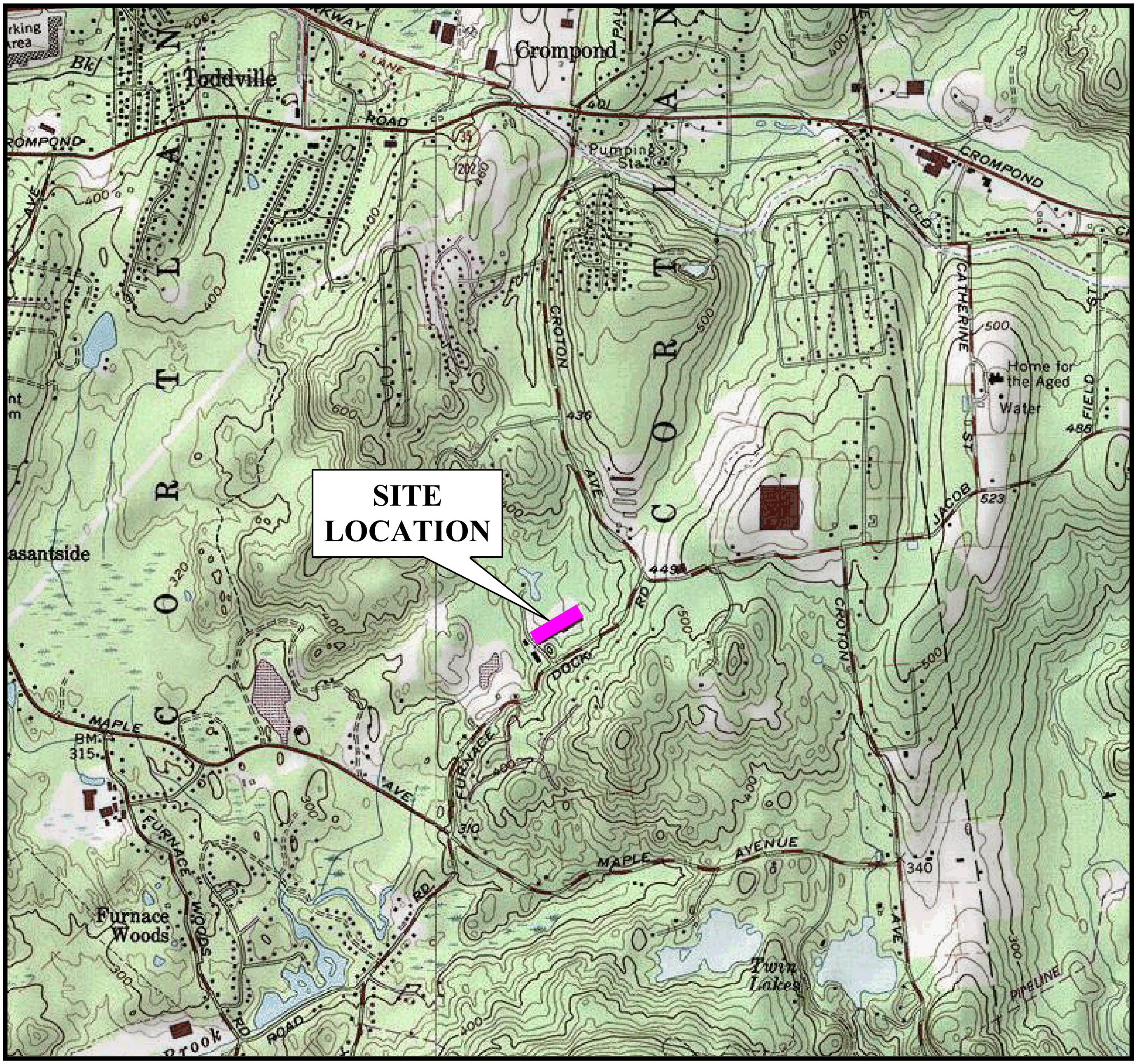
Cost-Effectiveness

The costs of the alternatives vary significantly. Soil Alternative S-3 is protective of public health and the environment for the use of the property and off-site the property as well; this is estimated to cost approximately $3.7 million (present value). Alternative S-4 has costs that are significantly higher than Alternative S-3 and, as stated above, may result in a large excavation with substantial costs to remove material that, while slightly above unrestricted SCOs, was not contaminated by the waste disposal at Magna Metals. The cost difference between the two alternatives is approximately $8 million dollars. Given this information and all the information above, the Department proposes Alternative S-3.

Alternative GW-4 will be an effective remedy for improving groundwater quality at the site and groundwater and surface water downgradient of the site. Alternative GW-2 will not improve groundwater quality in any way. GW-4 is more expensive but comparable to the cost of GW-2; Alternative GW-4 ($377,000) is approximately $130,000 more than GW-2 ($250,000).

Alternative GW-3 is significantly more expensive than the former two alternatives, estimated at $1,490,000, but is not feasible, making it a poor but choice regardless of cost. Alternative GW-3 costs approximately $1.2 million more than GW-4. Give this information, it is appropriate to recommend Alternative GW-4.

The costs of the sediment alternatives SD-3B and SD-3C are virtually the same, $5,079,000 and $5,048,000, respectively. Alternative SD-3B may be slightly more expensive but offer no substantially improved public health or environmental benefit over Alternative SD-3C. Given the above information, the Department is proposing Alternative SD-3C be selected in conjunction with the soils and groundwater alternatives to remediate the site. The estimated present worth cost to implement the remedy is $10,242,000.



SCALE IN FEET

0' 1000' 2000' 4000'

SCALE: 1"=2000'

N

SOURCE:
7.5 MINUTE SERIES USGS TOPOGRAPHIC MAP
QUADRANGLE: MOHEGAN LAKE, NY 1981

Magna Metals
Site No. 360003
510 Furnace Dock Road
Cortlandt New York

PROJECT SITE LOCATION

AKRF
Environmental Consultants
440 Park Avenue South, New York, N.Y. 10016

DATE	1.08.06
PROJECT No.	40256
SCALE	AS SHOWN
FIGURE	1

LEGEND

LP-02 ▽ LEACH PIT LOCATION

MW-01 ⊕ MONITORING WELL LOCATION

SV-02 ● SUPPLEMENTAL SOIL VAPOR LOCATION

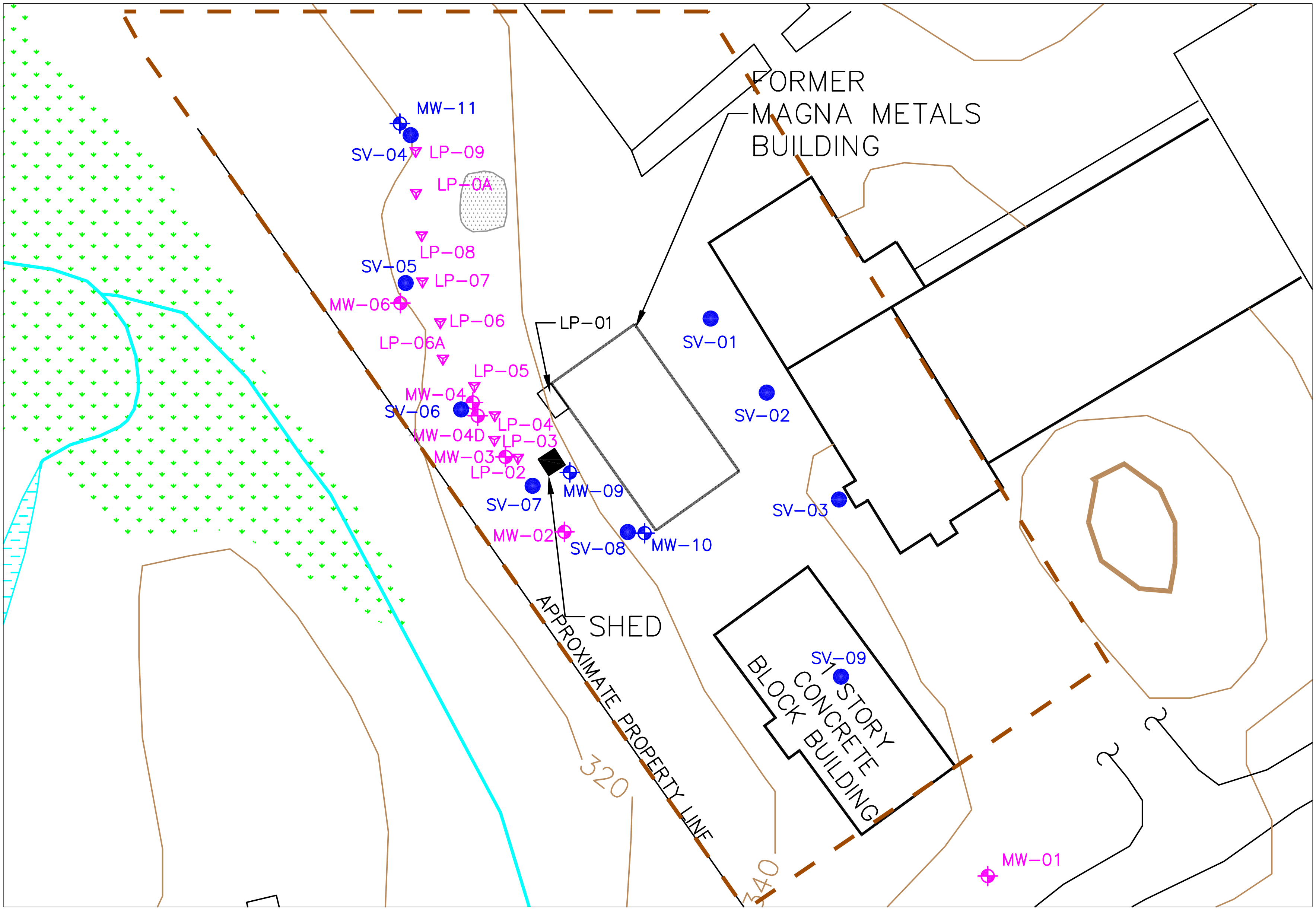
MW-10 ⊕ SUPPLEMENTAL MONITORING WELL LOCATION

320 CONTOUR LINE (20 FT INTERVAL)

APPROXIMATE REFUSE AREA

APPROXIMATE WETLAND AREA

APPROXIMATE SITE AREA



NOTES:
1. LOCATIONS OF FORMER MAGNA METALS BUILDING, 1 STORY CONCRETE BLOCK BUILDING, SHED, GEOPHYSICAL SURVEY AREA, AND MONITORING WELLS ARE BASED ON SURVEY DATA.

2. LOCATIONS OF LEACH PITS ARE BASED ON GPS COORDINATES.

SOURCES:
1. CONTOUR LINES, FURNACE DOCK ROAD, AND FURNACE BROOK BELOW POND BASED ON MOHEGAN LAKE, NY AND PEEKSKILL, NY TOPOGRAPHIC QUADRANGLES, 7.5-MINUTE SERIES, DATED 1956 AND 1957, RESPECTIVELY, AND PHOTOREVISED IN 1981.

2. ADDITIONAL SURFACE FEATURES BASED ON WESTCHESTER COUNTY DEPARTMENT OF PLANNING AERIAL PHOTOGRAPH (SPRING 1990), DECEMBER 18, 1999 AERIAL PHOTOGRAPH, AND SURVEY DATA.

3. APPROXIMATE REFUSE AREA BASED ON NYSDEC DRAWING.

4. APPROXIMATE WETLAND AREA BASED ON FIELD OBSERVATIONS.

5. TOPOGRAPHIC LINES ARE APPROXIMATE ESTIMATIONS.

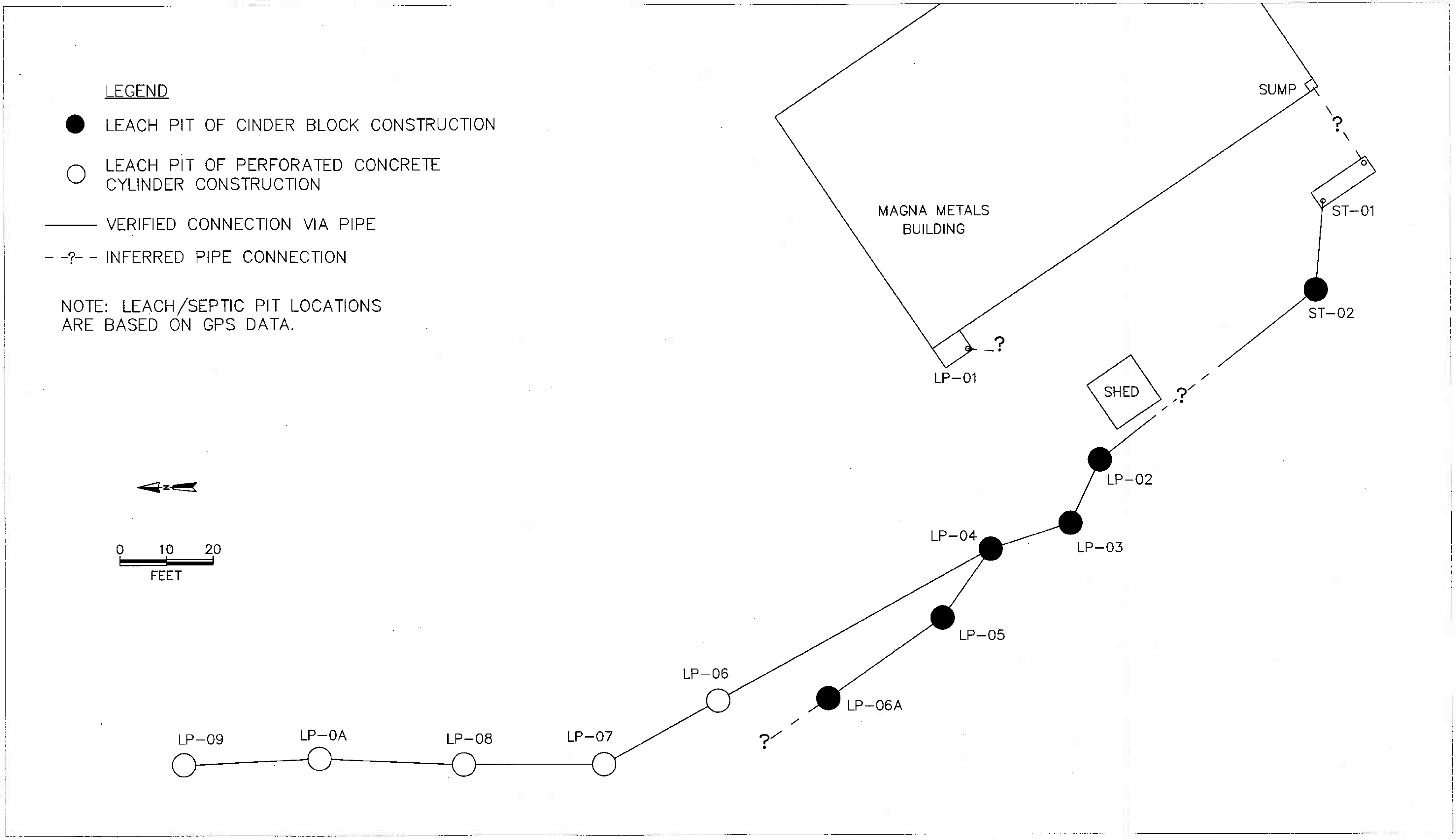
0 15 30
FEET

TETRA TECH EC, INC.

TITLE:
Soil Vapor Samples, Sub-Slab Vapor Sample, and Monitoring Well Locations
Supplemental RI/FS – September 2005 Work Plan Addendum
Magna Metals, Cortlandt, New York

DWN: CTS	DES.: CTS	PROJECT NO.: 106-1172
CHKD: DPC	APPD:	FIGURE NO.: 2
DATE: 08/21/2007	REV.: 0	

N:\GIS\GISKEY\GISPROJ31\MAGNA METALS\DRAFT FINAL RI\FIGURE 2-4 082107.DWG



TETRA TECH EC, INC

TITLE:
Leach/Septic Pit Location Map – 2004 Supplemental RI
Magna Metals
Cortlandt, New York

DWN.: CTS	DATE: 08/21/07	PROJECT NO.: 106-1172
CHKD.:	REV.: 0	FIGURE NO.: 3
DES.: DPC	APPD.:	

N:GIS\GISKEY\GISPROJ31\MAGNA METALS\DRAFT FINAL RI\FIGURE 2-3 082107.DWG

LEGEND

MW-02 GROUNDWATER SAMPLE LOCATION

320 CONTOUR LINE (20 FT INTERVAL)

APPROXIMATE GROUNDWATER FLOW DIRECTION

APPROXIMATE REFUSE AREA

APPROXIMATE WETLAND AREA

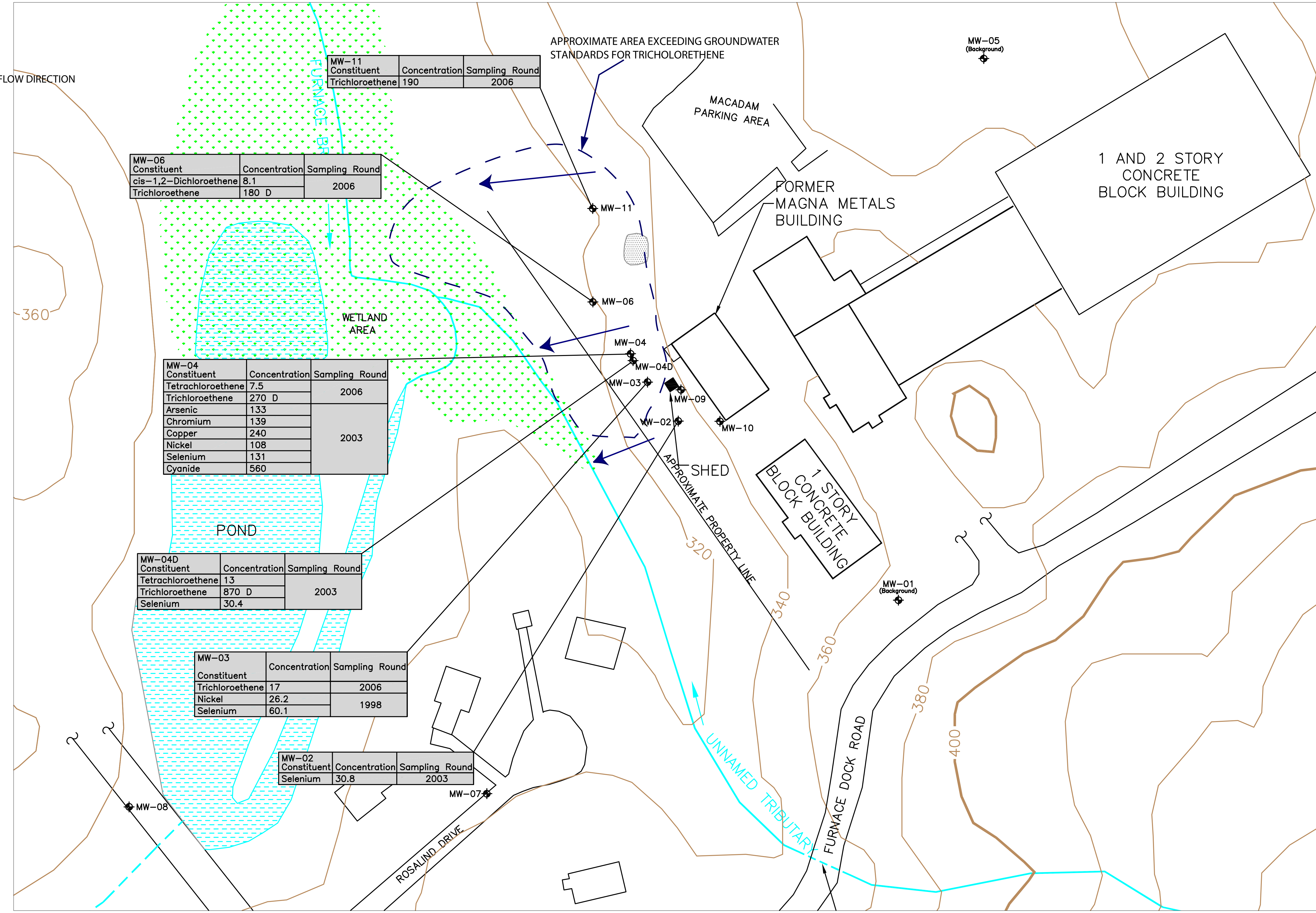
NOTES:

1. ALL UNITS IN UG/L.
2. D - FROM A DILUTED SAMPLE.
3. ONLY THE MOST RECENT SAMPLING ROUND FOR EACH PARAMETER IS SHOWN.
4. LOCATIONS OF FORMER MAGNA METALS BUILDING, 1 STORY CONCRETE BLOCK BUILDING, SHED, GEOPHYSICAL SURVEY AREA, AND MONITORING WELLS ARE BASED ON SURVEY DATA.

Constituent	New York Groundwater Quality Standard
Tetrachloroethene	5
Trichloroethene	5
cis-1,2-Dichloroethene	5
Arsenic	25
Chromium	50
Copper	200
Nickel	100
Selenium	10
Cyanide	200

SOURCES:
1. CONTOUR LINES, FURNACE DOCK ROAD, AND FURNACE BROOK BELOW POND BASED ON MOHEGAN LAKE, NY AND PEEKSKILL, NY TOPOGRAPHIC QUADRANGLES, 7.5-MINUTE SERIES, DATED 1956 AND 1957, RESPECTIVELY, AND PHOTOREVISED IN 1981.
2. ADDITIONAL SURFACE FEATURES BASED ON WESTCHESTER COUNTY DEPARTMENT OF PLANNING AERIAL PHOTOGRAPH (SPRING 1990), DECEMBER 18, 1999 AERIAL PHOTOGRAPH, AND SURVEY DATA.
3. APPROXIMATE REFUSE AREA BASED ON NYSDEC DRAWING.
4. APPROXIMATE WETLAND AREA BASED ON FIELD OBSERVATIONS.
5. TOPOGRAPHIC LINES ARE APPROXIMATE.

0 60 120
FEET



MW-11 Constituent	Concentration	Sampling Round
Trichloroethene	190	2006

MW-06 Constituent	Concentration	Sampling Round
cis-1,2-Dichloroethene	8.1	2006
Trichloroethene	180 D	

MW-04 Constituent	Concentration	Sampling Round
Tetrachloroethene	7.5	2006
Trichloroethene	270 D	
Arsenic	133	2003
Chromium	139	
Copper	240	
Nickel	108	
Selenium	131	
Cyanide	560	

MW-04D Constituent	Concentration	Sampling Round
Tetrachloroethene	13	2003
Trichloroethene	870 D	
Selenium	30.4	

MW-03 Constituent	Concentration	Sampling Round
Trichloroethene	17	2006
Nickel	26.2	1998
Selenium	60.1	

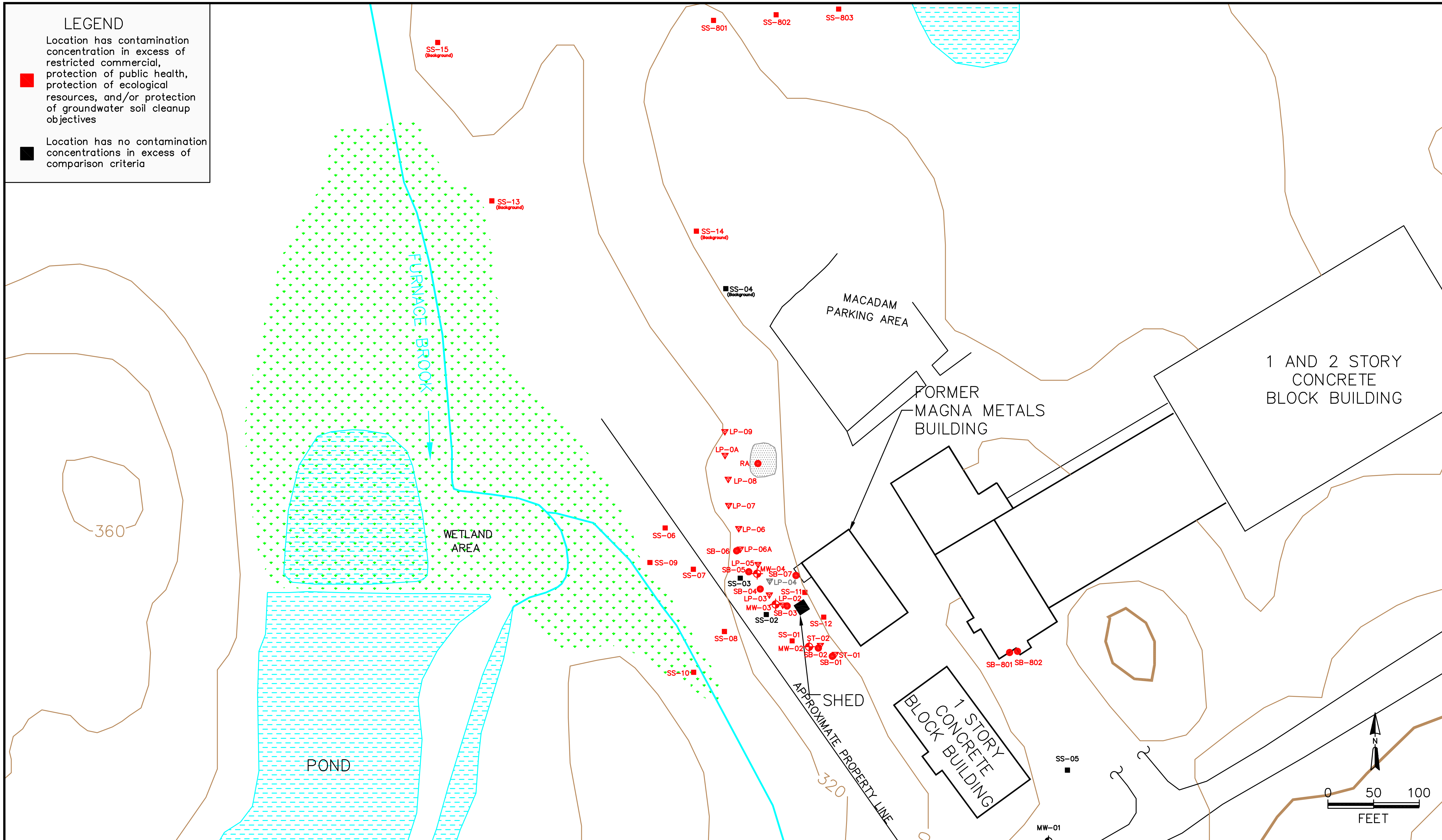
MW-02 Constituent	Concentration	Sampling Round
Selenium	30.8	2003

TETRA TECH EC, INC.

TITLE:
Contaminants of Concern in Excess of Class GA Groundwater Quality Criteria
Magna Metals
Cortlandt, New York

DWN: LMC	DES.: EAG	PROJECT NO.: 106-1172
CHKD:	APPD:	FIGURE NO.: 4
DATE: 12/10/09	REV.: 0	

N:\GIS\GISKEY\GISPROJ31\MAGNA METALS\FS FIGURES\FIGURE 2-3 GW 121009.DWG



TETRA TECH EC, INC.

TITLE:
Exceedances of Comparison Criteria in Soil (Inorganics)
Magna Metals
Cortlandt, New York

DWN.: LMC	DATE: 12/09/10	PROJECT NO.: 106-1172
CHKD: RC	REV.: 0	FIGURE NO.: 5
DES.: LMC	APPD: RC	

N:\GIS\GISKEY\GISPROJ31\MAGNA METALS\FS FIGURES\NOV 2010 FIGURES\FIGURE 1-1 N&E OF SOIL INORGANICS 120910.DWG

LEGEND

SD-18 ◆ 220 SEDIMENT SAMPLE LOCATION
COPPER CONCENTRATION IN MG/KG

320 CONTOUR LINE (20 FT INTERVAL)

APPROXIMATE SOURCE AREA

APPROXIMATE REFUSE AREA

APPROXIMATE WETLAND AREA

1. THE PRE-RELEASE REMEDIAL GOAL FOR COPPER IS 13.7 MG/KG.

2. THE NYSDEC LEL FOR COPPER IS 16 MG/KG.

3. CONCENTRATIONS FROM UPGRADIENT SAMPLES SD-12, SD-13, AND SD-29 THROUGH SD-31 ARE EXCLUDED IN CONCEPTUAL ILLUSTRATIONS.

4. EXCEEDANCES OF THE PRE-RELEASE REMEDIAL GOAL FOR COPPER ARE CO-LOCATED WITHIN THE AREA OF THE NYSDEC LEL EXCEEDANCES.

13.7-16 MG/KG COPPER

> 16 MG/KG COPPER

NOTES:
1. SAMPLE LOCATIONS FOR SD-01 TO SD-12 ARE APPROXIMATE.

2. SD-27 THROUGH SD-31 ARE BACKGROUND SAMPLE LOCATIONS.

3. LOCATIONS OF FORMER MAGNA METALS BUILDING, 1 STORY CONCRETE BLOCK BUILDING, SHED, AND GEOPHYSICAL SURVEY AREA ARE BASED ON SURVEY DATA.

4. THE EXTENT OF THE CONTAMINATED AREA IS APPROXIMATE.

5. SAMPLE LOCATIONS FOR SD-13 TO SD-26 ARE BASED ON GPS COORDINATES.

SOURCES:
1. CONTOUR LINES, FURNACE DOCK ROAD, AND FURNACE BROOK BELOW POND BASED ON MOHEGAN LAKE, NY AND PEEKSKILL, NY TOPOGRAPHIC QUADRANGLES, 7.5-MINUTE SERIES, DATED 1956 AND 1957, RESPECTIVELY, AND PHOTOREVISED IN 1981.

2. ADDITIONAL SURFACE FEATURES BASED ON WESTCHESTER COUNTY DEPARTMENT OF PLANNING AERIAL PHOTOGRAPH (SPRING 1990), DECEMBER 18, 1999 AERIAL PHOTOGRAPH, AND SURVEY DATA.

3. APPROXIMATE REFUSE AREA BASED ON NYSDEC DRAWING.

4. APPROXIMATE WETLAND AREA BASED ON FIELD OBSERVATIONS.

5. TOPOGRAPHIC LINES ARE APPROXIMATE.

0 125 250
FEET

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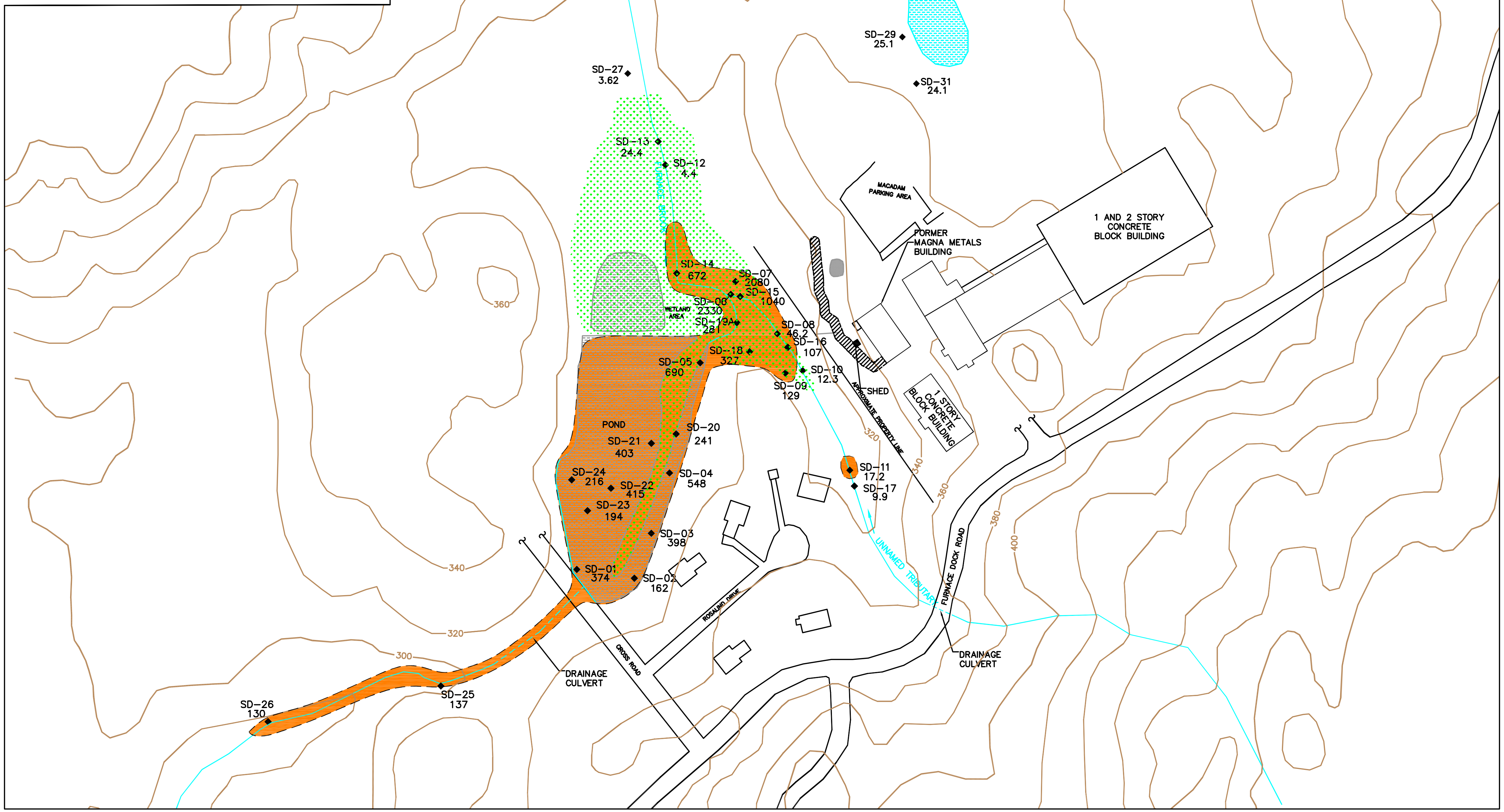
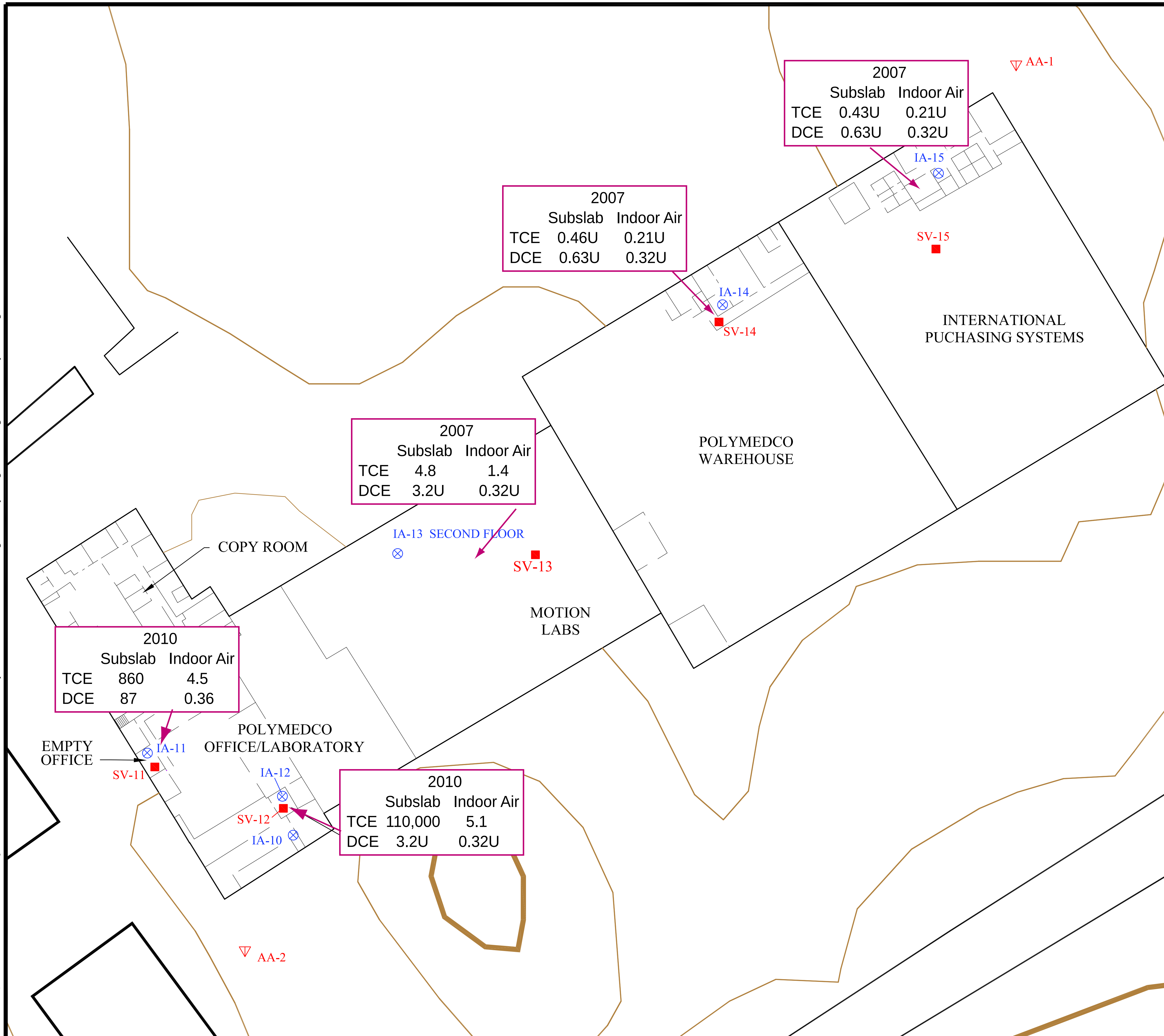


TETRA TECH EC, INC.

TITLE:
Copper in Off-Site Sediment Above Pre-Release Conditions and LELs
Magna Metals
Cortlandt, New York

DWN: LMC	DES.: EAG	PROJECT NO.: 106-1172
CHKD:	APPD:	FIGURE NO.: 6
DATE: 12/10/09	REV.: 0	

N:\GIS\GISKEY\GISPROJ31\MAGNA METALS\FS FIGURES\FIGURE 2-6 COPPER SED PRE-RELEASE AND LEL 121009.DWG



SOURCES:
1. BASE MAP PROVIDED BY TETRA TECH EC, INC. JUNE 2006.

2. CONTOUR LINES BASED ON MOHEGAN LAKE, NY AND PEEKSKILL, NY TOPOGRAPHIC QUADRANGLES, 7.5-MINUTE SERIES, DATED 1956 AND 1957, RESPECTIVELY, AND PHOTOREVISED IN 1981.

3. ADDITIONAL SURFACE FEATURES BASED ON WESTCHESTER COUNTY DEPARTMENT OF PLANNING AERIAL PHOTOGRAPH (SPRING 1990), DECEMBER 18, 1999 AERIAL PHOTOGRAPH, AND SURVEY DATA.

subslab and indoor air concentrations in ug/m3

LEGEND:

- SV-14 — SUBSLAB VAPOR SAMPLING LOCATION
- IA-11 — INDOOR AIR SAMPLING LOCATIONS
- AA-1 — OUTDOOR AIR SAMPLING LOCATION
- 320 — CONTOUR LINE (20 FT INTERVAL)

NOTES:
1. LOCATIONS OF FORMER MAGNA METALS BUILDING, 1 STORY CONCRETE BLOCK BUILDING, SHED, GEOPHYSICAL SURVEY AREA, AND MONITORING WELLS ARE BASED ON SURVEY DATA.

0' 30' 60' 120'
SCALE IN FEET

AKRF Environmental Consultants
34 South Broadway, White Plains, N.Y. 10601

MAGMA METALS
CORTLANDT, NEW YORK

SITE PLAN SHOWING SAMPLING LOCATIONS

DATE 5.02.08
PROJECT NO. 40256
SCALE 1"=60'
FIGURE 7

LEGEND

SB–07 ● SUBSURFACE SOIL BORING SAMPLE LOCATION
SS–15 ■ SURFACE SOIL BORING SAMPLE LOCATION
LP–03 ▽ LEACH PIT LOCATION
MW–02 ⊕ MONITORING WELL LOCATION
ST–01 ▽ SEPTIC TANK LOCATION

APPROXIMATE EXCAVATION AREA

SUBSURFACE SOIL AREA TO BE EXCAVATED (CONTINGENT UPON ANALYTICAL DATA OBTAINED FOLLOWING THE FORMER MAGNA METALS BUILDING DEMOLITION)

320 CONTOUR LINE (20 FT INTERVAL)

APPROXIMATE REFUSE AREA

APPROXIMATE WETLAND AREA

SUB-SLAB DEPRESSURIZATION SYSTEM LOCATION

NOTES:

1. SAMPLE LOCATIONS AND PIT/TANK LOCATIONS ARE APPROXIMATE.

2. LOCATIONS OF FORMER MAGNA METALS BUILDING, 1 STORY CONCRETE BLOCK BUILDING, SHED, AND GEOPHYSICAL SURVEY AREA ARE BASED ON SURVEY DATA.

3. EXCAVATION AREAS TO BE DETERMINED IN THE FIELD BASED ON CONFIRMATORY SAMPLE RESULTS.

4. EXCAVATED SOILS TO BE REPLACED WITH CLEAN FILL, TOPSOIL, AND SEEDING.

5. COC – CONTAMINANT OF CONCERN

6. SCO – SOIL CLEANUP OBJECTIVE

SOURCES:

1. CONTOUR LINES, FURNACE DOCK ROAD, AND FURNACE BROOK BELOW POND BASED ON MOHEGAN LAKE, NY AND PEEKSKILL, NY TOPOGRAPHIC QUADRANGLES, 7.5–MINUTE SERIES, DATED 1956 AND 1957, RESPECTIVELY, AND PHOTOREVISED IN 1981.

2. ADDITIONAL SURFACE FEATURES BASED ON WESTCHESTER COUNTY DEPARTMENT OF PLANNING AERIAL PHOTOGRAPH (SPRING 1990), DECEMBER 18, 1999 AERIAL PHOTOGRAPH, AND SURVEY DATA.

3. APPROXIMATE REFUSE AREA BASED ON NYSDEC DRAWING.

4. APPROXIMATE WETLAND AREA BASED ON FIELD OBSERVATIONS.

5. TOPOGRAPHIC LINES ARE APPROXIMATE.

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FEET

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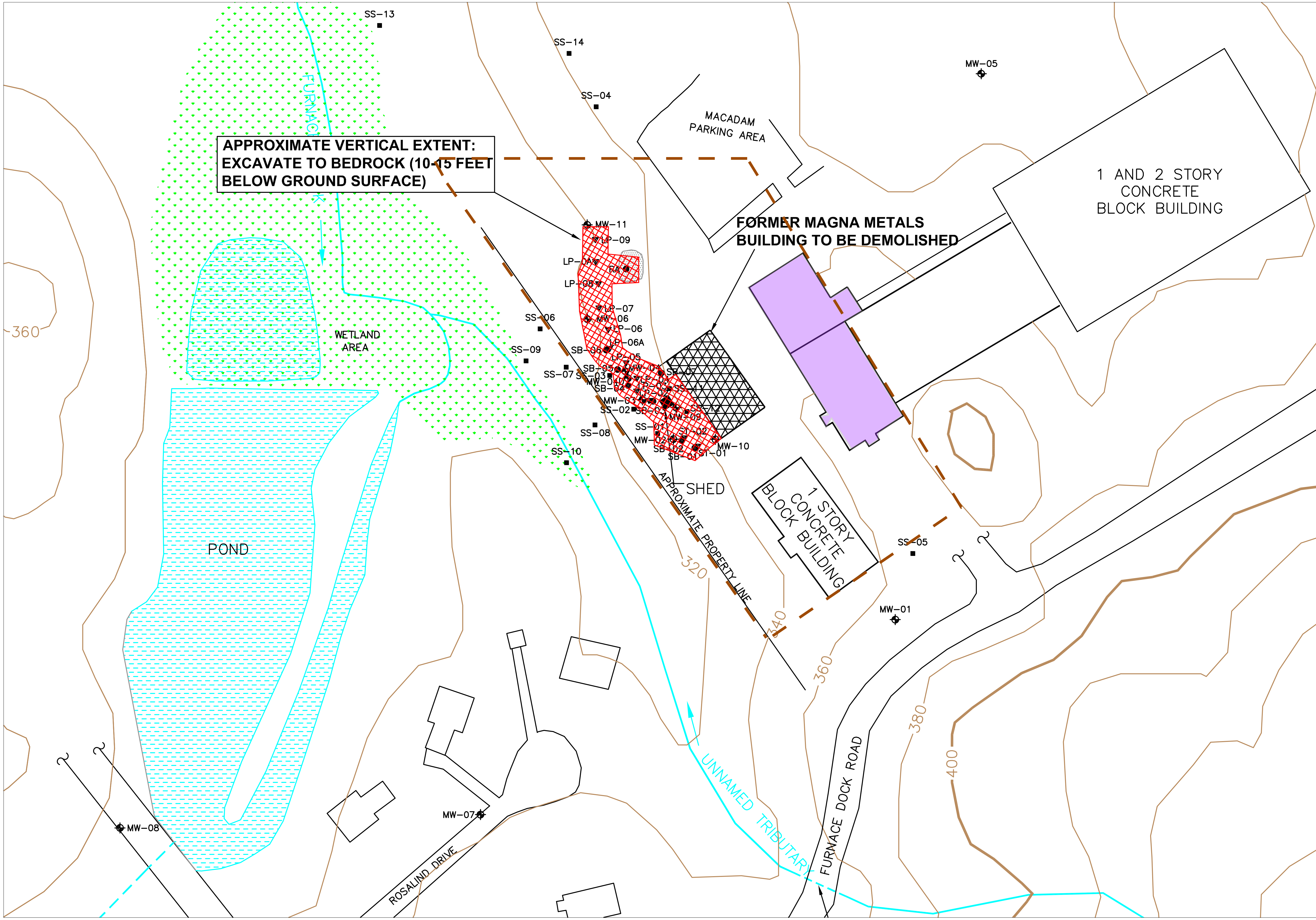


TITLE:

Alternative S–3: Removal of COCs in Soil Exhibiting Concentration in Excess of NYSDEC Restricted Use Commercial SCOs and Building Demolition
Magna Metals
Cortlandt, New York

TETRA TECH EC, INC.

DWN: LMC	DES.: EAG	PROJECT NO.: 106–1172
CHKD:	APPD:	FIGURE NO.: 8
DATE: 12/09/10	REV.: 1	

N:\GIS\GISKEY\GISPROJ31\MAGNA METALS\FS FIGURES\NOV 2010 FIGURES\FIGURE 4–1 ALTERNATIVE S–3 120910.DWG

LEGEND

SD–18 ◆ SEDIMENT SAMPLE LOCATION

SS–06 ◆ SURFACE SOIL SAMPLE LOCATION

320 CONTOUR LINE (20 FT INTERVAL)

POND

APPROXIMATE AREA OF SEDIMENT TO BE REMOVED

APPROXIMATE AREA OF OFF–SITE SOILS TO BE REMOVED

APPROXIMATE REFUSE AREA

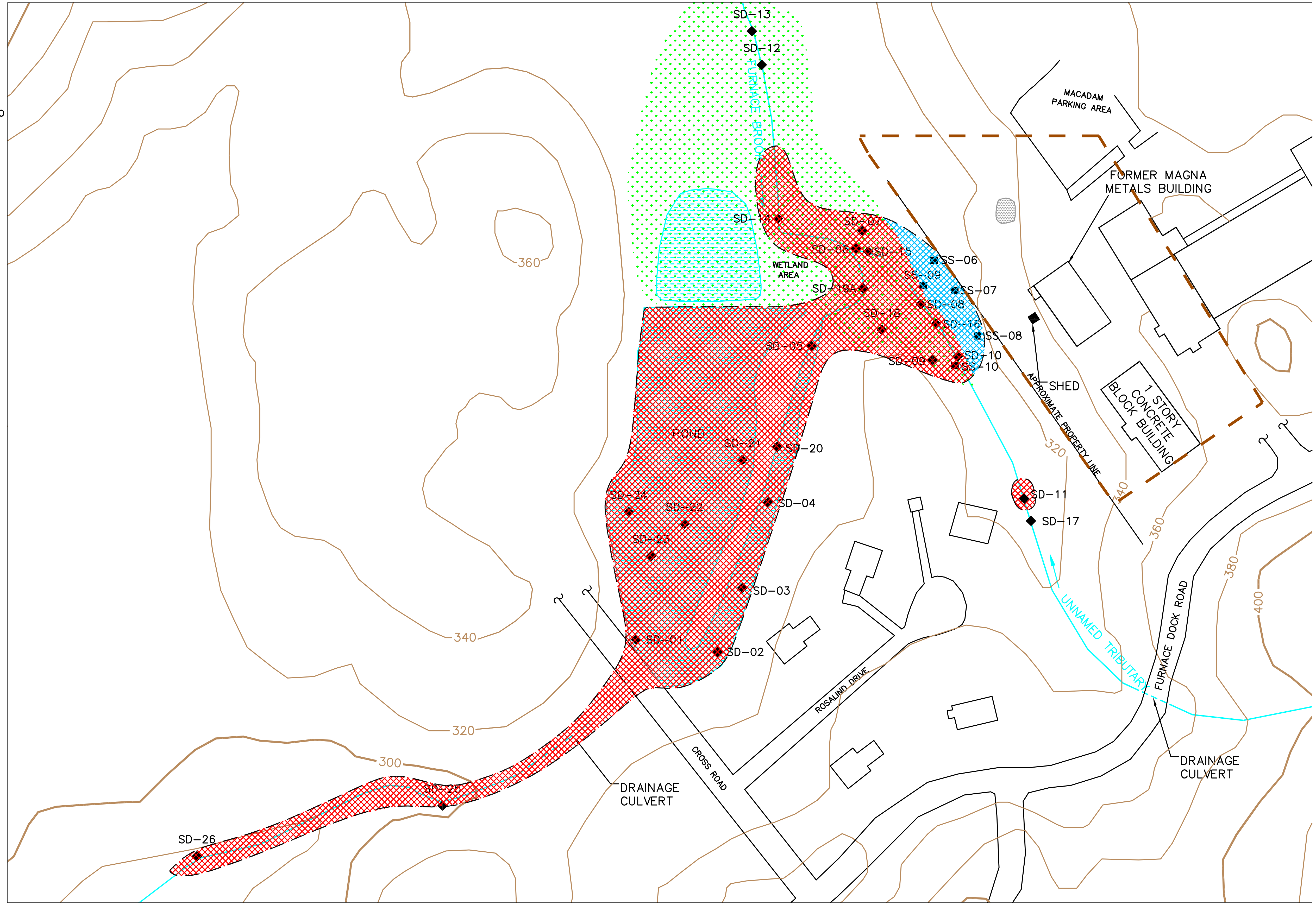
APPROXIMATE WETLAND AREA

NOTES:
1. SAMPLE LOCATIONS FOR SD–01 TO SD–12 ARE APPROXIMATE.
2. LOCATIONS OF FORMER MAGNA METALS BUILDING, 1 STORY CONCRETE BLOCK BUILDING, SHED, AND GEOPHYSICAL SURVEY AREA ARE BASED ON SURVEY DATA.
3. SAMPLE LOCATION FOR SD–13 IS BASED ON GPS COORDINATES.
4. SEDIMENTS AND SURFACE SOILS TO BE REMOVED TO APPROXIMATELY 2 FT. BGS AND FILLED WITH LIKE MATERIAL.
5. NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION.
6. LEL – LOWEST EFFECT LEVEL.

SOURCES:
1. CONTOUR LINES, FURNACE DOCK ROAD, AND FURNACE BROOK BELOW POND BASED ON MOHEGAN LAKE, NY AND PEEKSKILL, NY TOPOGRAPHIC QUADRANGLES, 7.5–MINUTE SERIES, DATED 1956 AND 1957, RESPECTIVELY, AND PHOTOREVISED IN 1981.
2. ADDITIONAL SURFACE FEATURES BASED ON WESTCHESTER COUNTY DEPARTMENT OF PLANNING AERIAL PHOTOGRAPH (SPRING 1990), DECEMBER 18, 1999 AERIAL PHOTOGRAPH, AND SURVEY DATA.
3. APPROXIMATE REFUSE AREA BASED ON NYSDEC DRAWING.
4. APPROXIMATE WETLAND AREA BASED ON FIELD OBSERVATIONS.
5. TOPOGRAPHIC LINES ARE APPROXIMATE.

0 75 150
FEET

N



TETRA TECH EC, INC.

TITLE:
Alternative SD–3C: Off–Site Removal of Metals – Impacted Sediments Above NYSDEC LELs
Magna Metals
Cortlandt, New York

DWN: LMC	DES.: EAG	PROJECT NO.: 106–1172
CHKD:	APPD:	FIGURE NO.: 9
DATE: 05/20/10	REV.: 1	

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