Feasibility Study

Former C & F Plating
406 North Pearl Street
Albany, New York, 12207

Site Code # 401057
WA # D006130-26

PREPARED BY:

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HRP Associates, Inc.

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1.0 INTRODUCTION

This report presents a feasibility study for remediation prepared by HRP Engineering P.C. (HRP) in connection with the Former C & F Plating Facility at 406 North Pearl Street in the City of Albany, Albany County, New York (Site # 401057), referred to herein as the Site (Figure 1).

A Remedial Investigation (RI) Report, dated August 17, 2012, was completed for the New York State Department of Environmental Conservation (NYSDEC) pursuant to the NYSDEC's Work Assignment (WA) number D006130-26. The RI was carried out during the period of September 2011 through July 2012. Tasks included debris removal and gate repair, advancement of soil borings, installation of groundwater monitoring wells, a survey event, two (2) rounds of groundwater monitoring including on-site and off-site monitoring well locations, and the completion of a RI report.

This report summarizes the findings of the RI report, discusses the probable future use of the Site, and finally presents and compares potential remedial alternatives for remediation of the Site.

2.0 SITE DESCRIPTION AND HISTORY

The purpose of the RI was to characterize the source(s) of contamination and define the extent of hazardous substances located on the property. The purpose of this Engineering Services Standby Contract WA was to conduct a RI to characterize on-site and off-site media potentially impacted by historic activities at the Former C & F Plating Site (Figure 2). The Site is approximately 0.34 acres in size and is improved by an approximately 6,600-square foot, vacant two-story building with a second floor loft area. According to the City of Albany Code Enforcement Supervisor, the Site is zoned Commercial/Industrial, and is identified with section/lot/block number 65.16-1-25. The Site was used as a chrome plating facility from the 1920's until its abandonment in 1985. Since 1985, the facility has stored miscellaneous equipment and household items, resulting in an accumulation of debris on-site that was partially removed prior to the Site investigation. The Site and surrounding area is generally flat and featureless, and is located approximately 30 feet above mean sea level.

A May 14, 2003 joint NYSDEC/USEPA inspection uncovered caustic waste, cyanide, and paint waste at the Site. The Site was referred to the USEPA by the NYSDEC on May 27, 2003 for an emergency removal action. On June 27, 2003, the USEPA conducted a Removal Site Evaluation (RSE) which included a limited inventory of over 40 containers and several vats. Labeling on these materials indicated the presence of strong acids and bases including containers of chromic acids, sodium hydroxide, and zinc solutions. An estimated 2,000 gallons of hazardous waste was present throughout the building and were stored in an unsafe manor. USEPA conducted an emergency removal between November 2003 and July 2004, effectively removing all waste materials stored in drums, canisters, vats, or otherwise

existing on the Site.

A subsurface investigation of the Site completed by Precision Environmental Services, Inc. (Precision) completed for the NYSDEC occurred in 2006 to determine the presence, if any, of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), target analyte list (TAL) metals, and polychlorinated biphenyl (PCBs) in soil, sediment, and groundwater on-site and off-site. Six (6) soil borings and five (5) groundwater-monitoring wells were installed to varying depths at the Site to investigate the subsurface. In addition, eleven (11) surface soil samples were collected around the Site, as well as five (5) sediment samples from the adjacent Patroon Creek.

The laboratory results from the surface and subsurface soil samples collected during the Precision investigation indicated that elevated levels of inorganic contaminants existed at the Site above Recommended Soil Cleanup Objectives (RSCO) levels as published in NYSDEC TAGM 4046 Heavy Metals Soil Cleanup Criteria Table (standard since revised). Several of these inorganics, specifically cadmium, chromium and nickel, are readily attributed to typical chrome plating operations. Cadmium was detected at concentrations greater than the corresponding RSCO level in ten (10) out of the eleven (11) surface soil samples and five (5) of the six (6) subsurface soil samples collected. Elevated chromium concentrations were detected in seven (7) of the eleven (11) surface soil samples and in two (2) subsurface soil samples. The concentration of nickel was detected at elevated levels in six (6) of the eleven (11) surface samples and three (3) subsurface samples.

On December 10, 2010, the NYSDEC placed this Site in the Inactive Hazardous Waste Disposal program for further investigation. An overview of HRP's activities is presented in Section 3, Summary of Remedial Investigation and Exposure Assessment.

3.0 SUMMARY OF REMEDIAL INVESTIGATION AND EXPOSURE ASSESSMENT

3.1 Summary of Remedial Investigation

Compounds detected in the various media tested during this RI were compared to the following New York State guidance documents and standards:

- Groundwater: NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1); Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations dated October 1993; Revised June 1998; ERRATA Sheet dated January 1999; and Addendum dated April 2000 (NYSDEC Class GA).

- NYSDEC Regulation, 6 NYCRR Subpart 375-6: "Remedial Program Soil Cleanup Objectives" which applies to the development and implementation of the remedial programs for soil and other media set forth in subparts 375-2 through 375-4 [Inactive Hazardous Waste Disposal Site Remedial Program, Brownfield Cleanup Program, and Environmental Restoration Program] and includes the soil cleanup objective tables developed pursuant to ECL 27-1415(6).

- NYSDEC, Division of Environmental Remediation, DER-10 (DER-10): "Technical Guidance For Site Investigation and Remediation", dated May 2010.

In order to identify the nature and extent of contamination from the Former C & F Plating, HRP submitted soil and groundwater samples to a certified laboratory for analysis. The various media samples were analyzed for one or more of the following including: volatile organic compounds (VOCs); semi-volatile organic compounds (SVOCs); Target Analyte List (TAL) Metals including mercury; PCBs and pesticides; and total cyanide.

The nature and extent of contamination and RI activities can be summarized by the following:

- Nine (9) metals (barium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) were detected in subsurface soil samples (5 to 17.5 feet below ground surface [bgs]) at concentrations exceeding one (1) or more Subpart 375-6 Soil Cleanup Objectives (SCOs) (including Unrestricted, Residential, Restricted Residential, Commercial, and Industrial). In addition, cadmium, nickel, and lead exceeded the Commercial SCO, and cadmium also exceeded the Industrial SCO. Based on the sampling results, subsurface soils (primarily five (5) to fifteen (15) feet bgs) have been impacted by past Site operations.
- Based on the findings to date, the detections of VOCs, SVOCs, PCBs, and pesticides in soils do not exceed Restricted Residential, Commercial and Industrial land use values listed for 6 NYCRR Part 375-6 Soil Cleanup Objectives for the protection of public health.
- One (1) subsurface sample (HRP-MW-9 [7.5-10 feet bgs]) and one (1) surface soil sample (HRP-SS-1 [0-6 inches bgs]) were submitted for TCLP metals. Eight (8) metals were detected; however with one (1) exception the TCLP metals sample results did not exceed USEPA Regulatory Levels. Cadmium exceeded the USEPA Regulatory Level for TCLP in the surface soil sample (HRP-SS-1). Because the soil sample exceeded the TCLP level, any soil removal activities in the area of HRP-SS-1 (floor drain) may result in the removed soil being characterized as hazardous waste based on the toxicity levels.
- Three (3) surface soil samples (HRP-SS-1 through HRP-SS-3), taken across the Site at a depth of zero to six inches, were analyzed for TAL metals and twenty-three (23) metals were detected. Of these twenty-three (23) metals, chromium, lead, mercury, silver, and zinc exceeded the Unrestricted SCOs; chromium and mercury exceeded Restricted Residential SCOs; barium, chromium, copper, lead, and nickel exceeded Commercial Soil Cleanup Objectives (SCOs); and cadmium and lead exceeded Industrial SCOs. Therefore, based on the sampling results, surface soils have been impacted by past Site operations.
- HRP installed six (6) groundwater monitoring wells and part of this remedial investigation. The six (6) groundwater wells were sampled, and the samples were submitted for analysis of SVOCs, TAL metals, mercury, and cyanide. The laboratory detected nineteen (19) metals within the six (6) groundwater samples. Of those nineteen (19) metals detected, seven (7) (aluminum, antimony, cadmium, iron, magnesium, manganese, and sodium) exceed the NYSDEC TOGS GA values for

their respective compounds. Based on the previous indentified contaminants of concern (cadmium, chromium, and nickel) in the groundwater at the Site this investigation detected cadmium well above the NYSDEC TOGS value for chromium at HRP-MW-9 (outside the main structure in the former drum storage area) and HRP-MW-10 (inside the main building, south of the floor drain). The groundwater at the Site has been impacted by past Site operations. Groundwater remediation is not addressed in this analysis and is assumed to be a consequence of soil remediation.

- There were no exceedances above the NYSDEC TOGS GA values in the six (6) analyzed groundwater samples for SVOCs, mercury, or cyanide.

3.2 Summary of Potential Human Exposure Pathways

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from the Site. As defined by the NYSDEC, an exposure pathway has five (5) elements: 1) a contaminant source, 2) contaminant release and transport mechanisms, 3) a point of exposure, 4) a route of exposure and 5) a receptor population. An exposure pathway is complete when all five (5) elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future. An exposure assessment including potential migration routes by which chemicals in the environment may be able to reach human receptors was conducted during the RI. Potential points of human contact with contaminated media and exposure pathways were identified for the Site and Study Area.

- Overburden Groundwater

  There is currently no direct exposure pathway to overburden groundwater. Since groundwater is not used as a drinking water supply, ingestion, dermal contact and inhalation of vapors is low. At the time of investigation, the Site vicinity utilized municipal water for drinking water only. Therefore, a threat of exposure could occur during future development or utility repair upon the Site should excavation and dewatering occurs, exposing workers to groundwater. A second threat of exposure could occur if visitors or trespassers were to come on-site during potential future development therefore being exposed to the groundwater. The likelihood for these exposure scenarios to occur is considered low due to the depth of groundwater.

- Surface Water

  Surface water is not present on the Site. Exposure to surface water is feasible during temporary ponding subsequent to a rainfall or snowmelt event or if the abutting Patroon Creek overruns its banks and floods the Site. Population receptors could include trespassers, Site visitors, or future Site workers. The overall likelihood for exposure to surface water is considered minimal at the Site.

  The Patroon Creek abuts the northern property line of the Site. The Patroon Creek, which exists to the north of the Site, has the potential to overrun the culvert and be on-site. The creek's source is Rensselaer Lake in the western section of

the city of Albany. This creek is defined on the NYSDEC Environmental Resource Mapper as entering the Hudson River from the northwest in Albany. The creek flows underground through a man-made culvert before passing the Site boundary until it reaches the Hudson River to the east. The NYSDEC has classified this creek as "C", which is a fresh water surface creek and has a best use for fishing.

To assess potential impacts to the Patroon Creek five (5) sediment soil samples were obtained from the creek bottom in October 2006. The analytical results suggested that the creek sediments have not been adversely impacted by Site operations. The creek flows primarily through commercial and industrial properties where numerous releases and environmental impacts to the creek have been documented. The compounds identified in the sediment samples both near the Site and downcreek are commonly found in such settings. According to the RI, the lack of a marked increase in concentrations downcreek as compared to those discovered upcreek, provide further support that the creek had not been impacted by the Site.

- Subsurface and Surface Soils

Potential routes of exposure to contaminants in subsurface and surface soils include dermal contact, ingestion and inhalation of soil particulates. Exposure to surface soils is possible for Site visitors, trespassers or future Site workers. Exposure through dermal contact or inhalation is considered high since surface soils in the floor drain area are easily disturbed and generate inhalable dust. At present, the exposure to surface and subsurface soils is minimal since the Site is unused and access to the building is limited by a fence and the also the Albany Fire Department must provide a mandatory escort to enter the building.

During any on-site work, specifically disturbance of soils, the potential for exposures to soils would increase for on-site workers, utility workers, and visitors.

4.0 REMEDIAL GOALS AND REMEDIAL ACTION OBJECTIVE

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

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

- Exposures of persons at or around the Site to elevated metals detected in the interior floor drain and surrounding subsurface areas;
- Exposures of persons both on-site and off-site to groundwater that contains elevated levels of aluminum, antimony, cadmium, iron, magnesium, manganese, and sodium;
- Prevent migration of contaminants that would result in surface water contamination; and

- The release of contaminants from subsurface or surface soils into potential indoor air and/or ambient air through soil vapor.

The remedial action objectives (RAO) for the Site are:

A. Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

RAOs for Environmental Protection

- Remove the source of ground or surface water contamination.

B. Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

RAOs for Environmental Protection

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

C. Surface and subsurface soils to achieve the soil cleanup objectives for the protection of public health for commercial use, set forth in 6 NYCRR, subpart 375-1.8 (g)(2)(iii) and presented in the protection of public health-commercial use column of Table 375-6.8(b); and

D. Groundwater onsite to achieve the New York State Ambient water quality standards and guidance values listed in NYSDEC, Division of Water Technical and Operational Guidance Services (TOGS 1.1.1) and addendums.

5.0 IDENTIFICATION AND SCREENING OF ALTERNATIVES

This section of the report provides an overview of potential remedial alternatives which are screened for possible detailed consideration, for the Site to achieve the remedial action objectives.

- **Alternative No. 1: No Action**
- **Alternative No. 2: Site Management**
- **Alternative No. 3: Excavation with Building Removal**
- **Alternative No. 4: Solidification/Stabilization with Portland Cement with Building Removal**
- **Alternative No. 5: Floor Drain Excavation with Building Removal and In-situ Treatment Remedy**

5.1 Alternative No. 1: No Action

The "No Action" Alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the Site to remain in an unremediated state. This alternative would leave the Site in its present condition and would not provide any additional protection to human health or the environment. The "No Action" Alternative would not involve any surface soil, subsurface soil, or groundwater, remedial activity. In addition, the "No Action" alternative would not place any institutional or engineering controls on the Site property, such as future land use restrictions, groundwater use limitations, and/or application of protective soil cover/barrier. However, the No Action Alternative would include the abandonment of the on-site monitoring wells according to NYSDEC guidance documents, including removal of screens and risers when possible and backfilling with a bentonite slurry.

Present Worth: $20,000
Capital Cost:.....$20,000
Annual Costs (Years 0-30): $0

5.2 Alternative No. 2: Site Management

The Site Management alternative would involve the implementation of future land use and securing the site. This alternative would not involve any additional surface soil or subsurface soil or groundwater remedial actions. Institutional controls (ICs) would consist of restricting the future use of the site to restricted residential purposes. Engineering controls (ECs) would include securing the site through installation of fencing as possible to restrict site access.

An Environmental Easement and a Site Management Plan (SMP) would be needed to provide an enforceable legal instrument to ensure compliance with all ECs and ICs placed on the site. A Site Management Plan (SMP) would be required and it would specify the methods necessary to ensure compliance with all ECs and ICs required by the Environmental Easement for contamination that remains at the site. The SMP would provide a detailed description of all procedures required to manage remaining contamination at the site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; and (3) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports. Specifically, the SMP would include annual monitoring and a provision for a soil management plan for any future site excavation or development, and site security.

This alternative would also include the abandonment of the remaining on-site monitoring wells according to NYSDEC policy CP-43, Groundwater Monitoring Well decommissioning policy.

Estimated costs associated with Alternative 2 are listed in Table 1.

Present Worth:.....$25,000
Capital Cost: $25,000
Annual Costs (Years 0-30):.....$0

5.3 Alternative No. 3: Excavation with Building Removal

This alternative would include returning the Site to Part 375 Unrestricted SCOs by excavating and removing all historic fill and contaminated soils above unrestricted soil clean up values or with unacceptable nuisance characteristics (i.e. soil staining, odor, etc.) from the Site for proper disposal off-site. This remedial alternative would generally consist of excavation to varying depths, between fifteen (15) and twenty (20) feet below grade, in the area of the floor drain and immediately north and south and the areas of HRP-SB-1 and HRP-SB-4 and HRP-MW-8 and HRP-MW-9, and the subsequent disposal of fill materials and contaminated soil. Prior to any excavation activities, the current building (assumed to contain asbestos) would have to be evaluated for stability or the building may have to be demolished, and any on-site foundation slabs would be broken up and disposed of for access to underlying soils. If contaminated groundwater is encountered during excavation (expected), the groundwater will need to be pumped from the excavated areas and properly disposed of off-site or treated on-site. The contaminated soil and historic fill materials would be properly disposed of and transported to an approved off-site disposal facility, or off-site incinerator to destroy any combustible compounds. Clean off-site backfill would be used to restore the excavation to the original grade. The backfill must be below unrestricted SCOs set forth in 6 NYCRR Part 375-6.7(d) and meet DER-10 fill requirements.

The excavation and removal of soil that exceeded hazardous levels for TCLP metals in soil off-site to a NYSDEC would be overseen. During the previous investigation, surface soils at hazardous levels in the floor drain area apparently underlain by non-hazardous subsurface soils were identified. The hazardous surface soils impacted from historical activities will be placed into labeled 55-gallon drums for off-site removal. Non-hazardous soils will be excavated and loaded into permitted trucks for disposal at a thermal destruction facility. The excavated soil will be transported to a NYSDEC approved disposal facility as per DER-10 guidance. The soils will be screened with a Photoionization Detector (PID) and proposes to excavate visually impacted soils or soils with a PID reading greater than 25 ppm. The proposed excavation area will be approximately 30-feet by 50-feet by 20-feet deep in the area of the floor drain and to 15-feet deep and includes the area immediately north and south of the floor drain, as well as area of soil borings HRP-SB-1 and HRP-SB-4 and HRP-MW-8 and HRP-MW-9 to a depth of 5-feet deep, respectively.

Pursuant to the NYSDEC's Technical Guidance for Site Investigation and Remediation (DER-10, dated May 2010) confirmatory end point samples will be collected along the sidewalls and bottom throughout the excavation. All soil samples will be labeled, preserved on ice in coolers, and sent to the analytical laboratory under chain of custody procedures. The soil samples will be submitted to a NYSDOH-certified laboratory for analysis of Complete Volatile Organic Compounds (VOCs) via USEPA Method 8260B, Semi Volatile Organic Compounds (SVOCs) via USEPA Method 8270C, and TAL metals. Backfill activities will occur prior to receipt of confirmatory sample results, via 24-hour turnaround due to the excavations proximity to the creek.

If contaminated groundwater is encountered during excavation, the groundwater would need to be pumped from the excavated areas and properly disposed of off-site or treated on-site. The contaminated soil and historic fill materials would be properly disposed of and

transported to an approved off-site disposal facility, or off-site incinerator to destroy any combustible compounds. Clean off-site backfill would be used to restore the excavation to the original grade. The backfill must be below the Site's RAO's and meet DER-10 fill requirements. The purpose of this alternative would be to return the Site to 375-6 SCO – Protection of Public Health - Unrestricted. Long term monitoring would not be needed.

In addition, this alternative would include the abandonment of the onsite monitoring wells according to NYSDEC guidance documents, including removal of screens and risers when possible and backfilling with a bentonite slurry.

Present Worth: $712,405
Capital Cost:.....$712,405
Annual Costs (Years 0-30): $0

5.4 Alternative No. 4: Solidification/Stabilization with Portland Cement with Building Removal

This NYSDEC presumptive/ proven remedial technology for metals contamination in soil would include returning the Site to clean condition by solidification/ stabilization (S/S) prior to excavating and removing all historic fill and contaminated soils above unrestricted soil clean up values or with unacceptable nuisance characteristics (i.e. soil staining, odor, etc.) from the Site for proper disposal off-site. This remedial alternative would generally consist of excavation to varying depths, between fifteen (15) and twenty (20) feet below grade, in the area of the floor drain and immediately north and south of HRP-SB-4 and the subsequent disposal of fill materials and contaminated soil. Prior to any solidification/ stabilization (S/S) excavation activities, the current building (assumed to contain asbestos) would have to be evaluated for stability and a potion or all of the building may have to be demolished, and any on-site foundation slabs would be broken up and disposed of for access to underlying soils. The dilapidated condition of the building is necessitating the completion of a building demolition survey prior to any additional work occurring inside of the building. It is assumed that the western (back) portion of the building (approximately 70-feet by 70-feet) will most likely have to be demolished prior to any work occur in the building. Prior to demolition or additional debris removal from within the building, an asbestos and a lead survey will be completed. Based on the close proximity of the Patroon Creek and the instability of the building and building foundation in relation to the creek culvert and surrounding soils, temporary installation of sheet piling and sand bags will be required to ensure that the creek remains in its banks and does not flood the Site. Approximately 80 linear feet of sheetpiling will be driven to a depth determined by a NYS licensed structural engineer to be adequate to ensure removal of the contaminated soils adjacent to the creek culvert. The location of the sheetpiling may limit the extent of the remediation adjacent to the creek.

S/S treatment of waste involves mixing cement into contaminated media or waste to immobilize contaminants within the treated material. By mixing portland cement into a waste containing free liquids, the waste gains physical integrity or becomes more solid. The chemical properties of hydrating portland cement are used to lower the solubility of

toxic contaminants in the waste and is some cases, to also lower the toxicity of a hazardous constituents.

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S/S treatment technology contributes to "Green Remediation" and the sustainable development of a contaminated property. While immobilizing hazardous constituents, the technology can also improve the construction properties of the treated materials, enabling reuse. The technology can also alleviate the concerns of surrounding communities that are often associated with the off-site transportation and disposal of contaminated materials. Finally, the technology contributes to the conservation of landfill capacity, replacement fill, and fuel used in transportation with the associated air pollutants and green house gases.

Pursuant to the NYSDEC's Technical Guidance for Site Investigation and Remediation (DER-10, dated May 2010) confirmatory end point samples will be collected along the sidewalls and bottom throughout the active S/S cell. All soil samples will be labeled, preserved on ice in coolers, and sent to the analytical laboratory under chain of custody procedures. The soil samples will be submitted to a NYSDOH-certified laboratory for analysis of Complete Volatile Organic Compounds (VOCs) via USEPA Method 8260B, Semi Volatile Organic Compounds (SVOCs) via USEPA Method 8270C, and TAL metals. Backfill activities will occur prior to receipt of confirmatory sample results, via 24-hour turnaround due to the excavations proximity to the creek.

If contaminated groundwater is encountered during excavation, the groundwater would need to be pumped from the excavated areas and properly disposed of off-site or treated on-site. The S/S cell would be covered with black top or a similar paving material. The purpose of this alternative would be to return the Site to 375-6 SCO – Protection of Public Health – Unrestricted Residential. Long term groundwater monitoring would not be needed.

In addition, this alternative would include the institutional controls described in alternative 2 and abandonment of the on-site monitoring wells according to NYSDEC guidance documents, including removal of screens and risers when possible and backfilling with a bentonite slurry.

Present Worth:.....$440,000
Capital Cost: $423,000
Annual Costs (Years 0-30):.....$500

5.5 Alternative No. 5: Floor Drain Excavation with Building Removal and In-situ Treatment Remedy

This alternative would include returning the Site to Part 375 Commercial SCOs by excavating the floor drain area and the area immediately north and south of HRP-SB-4. and removing associated contaminated soils above commercial soil clean up values or with unacceptable nuisance characteristics (i.e. soil staining, odor, etc.) from the Site for proper disposal off-site. This remedial alternative would generally consist of excavation to approximately five (5) feet below grade or to the groundwater interface, in the area of the floor drain and immediately north and south of HRP-SB-4 and the subsequent disposal of fill materials and contaminated soil. Soils below the groundwater interface will not be excavated, however they will be remediated with in-situ geochemical fixation. Prior to any excavation activities, the current building (assumed to contain asbestos) would have to be evaluated for stability or the building may have to be demolished, and any on-site foundation slabs would be broken up and disposed of for access to underlying soils.

If deemed safe, the excavation will be left open until analytical results are returned and reviewed to ensure that all hazardous material has been removed from the excavation. If the excavation is deemed unsafe to leave open, a demarcation barrier will be placed in the excavation prior to backfilling activities. The contaminated soil and historic fill materials would be properly disposed of and transported to an approved off-site disposal facility, or off-site incinerator to destroy any combustible compounds. Clean off-site backfill would be used to restore the excavation to the original grade and will be graded to accommodate the installation of a cover system. The backfill must be below Commercial SCOs and meet 6 NYCRR Part 375-6.7(d) and DER-10 fill requirements. The purpose of this alternative would be to return the floor drain area to predisposal conditions. Long term monitoring would be needed to monitor groundwater quality.

The excavation and removal of soil that exceeded hazardous levels for TCLP metals in soil off-site to a NYSDEC would be overseen. During the previous investigation, surface soils at hazardous levels in the floor drain area apparently underlain by non-hazardous subsurface soils were identified. The hazardous surface soils impacted from historical activities will be placed into labeled 55-gallon drums for off-site removal. Non-hazardous soils will be excavated and loaded into permitted trucks for disposal at a thermal destruction facility. The excavated soil will be transported to a NYSDEC approved disposal facility as per DER-10 guidance. The soils will be screened with a Photoionization Detector (PID) and proposes to excavate visually impacted soils or soils with a PID reading greater than 25 ppm. The proposed excavation area will be approximately 20-feet by 10-feet by 5-feet deep in the area of the floor drain and to 5-feet deep and includes the area immediately north and south of the floor drain. Approximately 20 cubic yards of soil will be removed from the Site.

In addition to the excavation, Calcium polysulfide (CPS) will be applied to bottom of the excavation(s) prior to backfilling the excavation. This is being completed to remediate the soils below the groundwater in the face with in-situ chemical reduction. The CPS will be applied to the excavation in a slurry form (CPS and water) as instructed by the manufacture. The CPS will remediate non-hazardous subsurface soils that were not excavated and also remediate metals contamination in the groundwater.

Pursuant to the NYSDEC's Technical Guidance for Site Investigation and Remediation (DER-10, dated May 2010) confirmatory end point samples will be collected along the sidewalls and bottom throughout the excavation. All soil samples will be labeled, preserved on ice in coolers, and sent to the analytical laboratory under chain of custody procedures. The soil samples will be submitted to a NYSDOH-ELAP certified laboratory for analysis of Complete Volatile Organic Compounds (VOCs) via USEPA Method 8260B, Semi Volatile Organic Compounds (SVOCs) via USEPA Method 8270C, and TAL metals. Backfill activities will occur prior to receipt of confirmatory sample results, via 24-hour turnaround due to the excavation remaining open until results are reviewed to ensure Commercial SCOs are meet.

The contaminated soil and historic fill materials would be properly disposed of and transported to an approved off-site disposal facility, or off-site incinerator to destroy any combustible compounds. Clean off-site backfill would be used to restore the excavation to the original grade. The backfill must be below the Site RAO's and meet DER-10 fill requirements. The purpose of this alternative would be to return the Site to 375-6.7(d) SCO – Protection of Public Health - Commercial. A site cover will include a demarcation layer and the upper six inches of the soil of sufficient quality to maintain a vegetation layer. In addition, it will consist of either pavement or a similar impermeable cover or a soil cover in areas where the upper one foot of exposed surface soil will exceed the commercial SCOs.

There will also be institutional control in the form of an environmental easement for the controlled property that will encompass the following:

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

A Site Management Plan (SMP) will be required for the Site. The SMP will include an Institutional and Engineering Control Plan including an Environmental Easement and groundwater use restrictions, a long term groundwater monitoring plan, an Excavation Plan, and annual Periodic Review including certification of the institutional and/or engineering controls. In order to achieve RAO's, groundwater monitoring for two to five years is recommended.

Present Worth: $314,000
Capital Cost:.....$270,000
Annual Costs (Years 0-30): $4,500

6.0 DETAILED ANALYSIS AND COMPARISON OF ALTERNATIVES TO PROTECTION CRITERIA

Alternative selected for detailed analysis include:

- **Alternative No. 1: No Action**
- **Alternative No. 2: Site Management**
- **Alternative No. 3: Excavation with Building Removal**
- **Alternative No. 4: Solidification/Stabilization with Portland Cement with Building Removal**
- **Alternative No. 5: Floor Drain Excavation with Building Removal and In-situ Treatment Remedy**

These alternatives are developed in sufficient detail to allow an analysis of their effectiveness and implementability with the Sites remedial action objective and NYSDEC criteria for the ERP program, DER - 10 Technical Guidance for Site Investigation and Remediation, which require consideration of the following criteria:

- Overall Protection of Public Health and Environment
- Compliance with NYSDEC Standards, Criteria, and Guidance (SCGs) for Investigation and Remediation of Inactive Hazardous Waste Disposal Sites
- Long Term Effectiveness and Permanence
- Reduction in Toxicity and Mobility
- Short Term Effectiveness
- Implementability
- Cost Effectiveness
- Land Use

6.1 Alternative No. 1 - No Action

- **Overall Protection of Public Health and Environment** – This alternative does not provide sufficient protection to human health and the environment. Residual public health risks would be high in consideration of: 1) the future use of the off-site, contaminated groundwater for drinking water or other purposes and 2) exposure to subsurface that exhibit levels of contamination over SCGs. This alternative would not achieve Site RAO's.

- **Compliance with SCGs** – This alternative will not comply with SCGs since known contaminants exist in subsurface soils and the use of the Site's groundwater for any purpose would be allowable without the implementation of institutional and engineering controls.

- **Long Term Effectiveness and Permanence** – This alternative will not constitute an effective long term solution because the lack of any remedial action or set controls may result in significant public health risks.

- **Reduction in Toxicity and Mobility** – This alternative will not reduce the toxicity or mobility of the known contaminants on-site since no remedial action is proposed.

- **Short Term Effectiveness** – This alternative will not provide any benefits in the short term except for zero cost associated with "No Action" and the time to implement the remedy. Potential human exposure, adverse environmental impacts and nuisance conditions at the Site resulting from this alternative are not anticipated.

- **Implementability** – This alternative could be easily implemented.

- **Cost** – The initial cost to implement this alternative would be zero. Future costs, however, may arise if the Site is developed and public health suffers as a result.

- **Land Use** – This alternative will not comply with the future proposed land use of the Site or the revitalization plans of the area and could possibly affect the general public that utilize the adjacent properties.

Although the "No Action" alternative would be the least expensive alternative financially, it would represent the greatest risk to public health and to any future development of the Site property. As a result of the known residual contamination of the Site's surface and subsurface soil, groundwater, the No Action alternative is an impractical alternative. This alternative poses the greatest risk to public health risk and to the Sites viability for any future development or inhabitation. In addition, the No Action alternative may result in an unknown amount of future costs related to public health and/or future remedial action costs.

6.2 Alternative No. 2 - Site Management

- **Overall Protection of Public Health and Environment** – This alternative does provide minimal protection to both public health and the environment. This alternative would control potential exposure pathways through the implementation of institutional and engineering controls, however this alternative would not achieve the RAOs for soil or groundwater.

- **Compliance with SGCs** – This alternative will not comply with the SGCs regarding surface or subsurface soils SCGs. With no remedial actions under this alternative, contaminated soils would be left onsite.

- **Long Term Effectiveness and Permanence** – This alternative would be somewhat effective long term due to restricting land use to restricted residential purposes. However, this alternative will not constitute an effective long term solution because the lack of any remedial actions and contaminated soils would remain onsite.

- **Reduction in Toxicity and Mobility** – This alternative does not reduce the toxicity and mobility of contaminants in the soils because remedial actions are not included as part of this alternative.

- **Short Term Effectiveness** - This alternative will not provide any benefits in the short term. Potential human exposure, adverse environmental impacts and conditions at the Site resulting from this alternative would be anticipated.

- **Implementability** - This alternative is easily implementable through the placement of Institutional and Engineering Controls and the preparation of a Site Management Plan and an Environmental Easement. Implementing an Environmental Easement requires the corporation of the absentee land owner. Every attempt will be made to execute an environmental easement for the Site, however, the land owner has not been historically compliant.

- **Cost** - The cost to implement this alternative would be minimal, due to the lack of any remedial activities (i.e. soil excavation). Costs would include the preparation of a Site Management Plan and the periodic certification required by an easement.

- **Land Use** - This alternative would comply with the current land use of the Site by implementing the ICs and ECs and would be consistent with current zoning and surrounding land use.

  This alternative would be the second least expensive alternative to implement after the No Further Action Alternative and would be easily implemented. This alternative would control potential exposure pathways through the implementation of institutional and engineering controls, however this alternative would not achieve the RAOs for soil or groundwater because of the lack of remedial actions. In addition, this alternative would provide no reduction of the toxicity and mobility of contaminants in the soils. This alternative would not comply with the SCGs for surface or subsurface soils and would provide very minimal protection to both public health and the environment.

6.3 Alternative No. 3 –Excavation with Building Removal

- **Overall Protection of Public Health and Environment** – Upon completion, this alternative provides a sufficient level of protection to both public health and the environment by removing all contaminated soil and an unknown amount of groundwater and associated dewatered zones of soil. Because the contamination would be removed from the Site, there would be no residual public health or environmental risks remaining after remediation. Because the Site would be restored to predisposal conditions, this alternative is protective to public health. This alternative would achieve the Site RAO's.

- **Compliance with SCGs** – This alternative will comply with the SCGs regarding surface and subsurface soil and groundwater requirements.

- **Long Term Effectiveness and Permanence** – This alternative will constitute an effective long term solution due to the removal of the contaminated soil and groundwater on the Site.

- **Reduction in Toxicity and Mobility** – This alternative will significantly decrease the

toxicity of the contaminants in the soils. Full reduction in toxicity and mobility will be achieved via soil removal in the areas excavated. Additionally, the source of groundwater contamination would be removed.

- **Short Term Effectiveness** – This alternative will provide significant benefits in the short term, notably the removal of contaminated soil that would aid in the increasing the already shrinking plumes ability to digest contamination in the groundwater. Potential human exposure, adverse environmental impacts and nuisance conditions at the Site resulting from this alternative are anticipated to be for a period of several weeks during which time Site work will occur.

- **Implementability** – This alternative will result in the remediation of the Site to unrestricted levels. A structural building survey completed by a licensed professional engineer would have to be completed prior to implementing this alternative to ensure that working in the building is safe to work in. This alternative is easily implementable through the demolition of the building, temporary stabilization of the Patroon Creek, and use of available contractors under the supervision and oversight of qualified field personnel to excavate and dispose of contaminated soil. Such activities are performed frequently with high rates of success. The job can be completed over several weeks.

- **Cost** – The cost to implement this alternative would be the most expensive alternative. Costs would include design, building demolition, Site preparation, excavation, and the implementation of the soil cover would be required.

- **Land Use** – The current on- building could have to be demolished, however once the work was completed, uninterrupted use of the Site would be possible. The future land use under this alternative would be consistent with current zoning and surrounding land use.

This alternative is the most expensive remedial alternative, although it would restore the Site to Unrestricted SCOs and thus be the protective alternative to public health. Also, this alternative would not consist of any future land use or groundwater use restrictions and would likely yield the lowest risk to public health and to any future on-site development.

6.4 Alternative No. 4 – Solidification/Stabilization with Portland Cement with Building Removal

- **Overall Protection of Public Health and Environment** – This alternative provides sufficient protection to both public health and the environment by reducing the threat of exposure to surface and subsurface contaminated soils as well as treating the groundwater. This alternative would achieve the Site RAO's to a lesser degree or with lower certainty than Alternatives 3 and 5.

- **Compliance with SCGs** – SCGs are satisfied under this remedial alternative. Contaminants in the surface and subsurface soil would remain on-site below the soil

cover, and below recommended oil clean-up objectives for Commercial Use, Part 375-6 and would restore the Site to Unrestricted Use Soil Cleanup Objectives. The source of the groundwater contamination would be removed.

- **Long Term Effectiveness and Permanence** – This alternative will constitute an effective long term solution due to the removal of the contaminated soil and groundwater on-site. There would be no residual risks since the source(s) of the contamination would be removed, restoring the Site to Unrestricted Use Soil Cleanup Objectives.

- **Reduction in Toxicity and Mobility** – This alternative will significantly decrease the toxicity of the contaminants in the soils. Full reduction in toxicity and mobility of the areas excavated will be achieved via soil removal. However, this alternative could have future structural impacts on the Site and limit on-site redevelopment.

- **Short Term Effectiveness** – This alternative will provide significant benefits in the short term, notably the removal of contaminated soil that would aid in the increasing the already shrinking plumes ability to digest contamination in the groundwater. Potential human exposure, adverse environmental impacts and nuisance conditions at the Site resulting from this alternative are anticipated to be for a period of several weeks during which time Site work will occur.

- **Implementability** – This alternative will result in the remediation of the Site. A structural building survey completed by a licensed professional engineer would have to be completed prior to implementing this alternative to ensure that working in the building is safe to work in. This alternative is implementable through the demolition of the building, temporary stabilization of the Patroon Creek, and use of available contractors under the supervision and oversight of a qualified field personnel to perform in-situ soil stabilization followed by excavation and backfill activities. The time to perform the job can be completed over several weeks.

- **Cost** – The cost to implement this alternative would be the second most expensive alternative. Cost would include design, building demolition, Site preparation, Solidification/Stabilization with portland cement followed by excavation, and the implementation of the soil cover would be required.

- **Land Use** – This alternative would comply with the current land use of the Site by implementing the ICs and ECs and would be consistent with current zoning and surrounding land use.

This alternative provides adequate protection of public health. The risk of exposure to remaining soil contamination is very low because there are no completed pathways through which the public may be exposed upon removal of the contaminated surface and subsurface soil. This alternative would provide the most public protection and would be effective faster than the other Alternatives. This alternative is less cost effective than Alternatives 3.

6.5 Alternative No. 5 – Floor Drain with Building Removal and In-situ Treatment Remedy

- **Overall Protection of Public Health and Environment** – Upon completion, this alternative provides a sufficient level of protection to both public health and the environment by removing hazardous surface and accessible subsurface soil. Because the surface contamination would be removed from the Site and access to the subsurface is limited, there would be no residual public health or environmental risks remaining after remediation. Because the surface soil would be removed and a foot of clean fill or a cover system would be installed at the site, the subsurface will be inaccessible; this alternative is protective to public health. Also, use of groundwater will be restricted through the use of institutional controls, including a site management plan.

- **Compliance with SCGs** – This alternative will comply with the SCGs regarding surface soil and the application of Calcium Polysulfide would aid in the subsurface soil and groundwater remediation of potential remaining soil contamination. Alternative 5 would create Site conditions necessary to restore groundwater quality to meeting NYSDEC Class GA metals Criteria.

- **Long Term Effectiveness and Permanence** – This alternative will constitute an effective long term solution due to the removal of the contaminated surface and subsurface soil on the Site.

- **Reduction in Toxicity and Mobility** – This alternative will significantly decrease the toxicity of the contaminants in the surface soils; however this alternative will only moderately decrease the toxicity of the contaminants in the subsurface soils and groundwater. The contaminants would be removed in the specific areas where the levels have been historically highest. Calcium polysulfide (CPS) would form trivalent chromium ions and then either adsorb to soil particles or drop out of solution in the form of less-soluble and non-toxic chromium hydroxide.

- **Short Term Effectiveness** – This alternative will provide significant benefits in the short term, notably the removal of contaminated surface soil and that would aid in the increasing the already shrinking plumes ability to digest contamination in the groundwater. Potential human exposure, adverse environmental impacts and nuisance conditions at the Site resulting from this alternative are anticipated to be for a period of several weeks during which time Site work will occur.

- **Implementability** – This alternative will result in the remediation of the Site. A structural building survey completed by a licensed professional engineer would have to be completed prior to implementing this alternative to ensure that working in the building is safe to work in. This alternative is easily implementable through the demolition of the building, and use of available contractors under the supervision and oversight of qualified field personnel to excavate and dispose of contaminated surface soil and apply the CPS. Such activities are performed frequently with high rates of success. The time to perform the job can be completed over several weeks.

- **Cost** – The cost to implement this alternative would be the third most expensive alternative, however it will provide equal source removal and protection of the groundwater resource and soils. Costs would include design, building demolition, Site preparation, excavation, and the implementation of the soil cover and a Site Management Plan would be required.

- **Land Use** – The current on- building could have to be demolished, however once the work was completed, this alternative would comply with the current land use of the Site by implementing the ICs and ECs and would be consistent with current zoning and surrounding land use.

This alternative is the third most expensive remedial alternative, although it would restore the Site to Commercial SCOs and thus be the protective alternative to public health. Also, this alternative would consist of future land use or groundwater use restrictions and would likely yield the lowest risk to public health and to any future on-site development.

7.0 SUMMARY OF PROPOSED REMEDY

The following is a summary of the advantages and disadvantages for each of the five alternatives:

Alternative No. 1 - No Action

Although the No Action alternative would be the least expensive alternative financially, it would represent the greatest risk to public health and to any future development of the Site property. As a result of the known residual contamination of the surface and subsurface soil and groundwater, the No Action alternative is an impractical remedial action. In addition, the No Action alternative may result in an unknown amount of future costs related to public health and/or future remedial action costs.

Alternative No. 2 - Site Management Plan

The Site Management Plan alternative would be the least expensive alternative financially; it would represent a greater risk to public health and environment than Alternative 3, 4, and 5. As a result of the known contamination of the saturated soil and groundwater, the No Further Action with Site Management Plan alternative would restrict site use and access during current and future site use.

Alternative No. 3 - Excavation with Building Removal

This alternative provides adequate protection of public health and environment. The risk of exposure to remaining soil contamination is very low because the soil contamination would be removed. This alternative would provide the similar public protection and effectiveness as Alternative 3, and because there would be off-site thermal destruction of the contaminated soil the disposal costs would be higher. This alternative is the most expensive remedy.

Alternative No. 4 - Solidification/Stabilization with Portland Cement with Building Removal

This alternative provides adequate protection of public health and environment. The risk of exposure to remaining soil contamination is very low because of limited exposure to the soils. This alternative would provide the similar public protection and effectiveness as Alternative 3. Due to the solidification/stabilization of the contamination, the disposal costs would be lower but the time to complete the work would be slightly longer than Alternative 3, and the Site's ability to be developed may be restricted. This alternative is the second most expensive remedy.

Alternative No. 5 - Floor Drain Excavation with Building Removal and In-situ Treatment Remedy

This alternative provides adequate protection of public health and environment. The risk of exposure to remaining subsurface soil contamination is very low because there is a low possibility of encountering the subsurface soils. This alternative would provide the similar public protection and effectiveness as Alternatives 3 and 4, and because there would be less volume of contaminated soil removed and properly disposed of off-site this option would be less expensive than Alternatives 3 and 4.

After considering the proposed future use of the Site, as well as reviewing and comparing the four alternatives for the Site, it appears that Alternative No. 5- “Floor Drain Excavation with Building Removal and In-situ Treatment Remedy” would be the best choice for Site remediation. Alternative 5 was found to be protective of human health and the environment to Part 375 commercial SCOs, fulfills the RAO’s, and eliminates potential exposure to contaminants in the surface soil on-site. Therefore, remediation with floor drain excavation with application of CPS in slurry form with building removal is suggested as the proposed remedy.

TABLE 1 Alternative No. 1- No Action		
Description	**Quantity**	**Cost (estimated)**
Subcontractor Costs (well abandonment only)	1 day	$2,000
Staff prep time ($80/hr)	5 hours	$400
Staff on-site labor ($80/hr)	10 hours	$800
Senior staff oversight ($100/hr)	3 hours	$300
PID, 2 required ($50/day)	2 day	$200
CAMP Air monitoring equipment ($200/day)	2 day	$400
Field Equipment/PPE	2 day	$300
Site ALTA Survey for environmental easement	Lump sum	$9,000
Legal fees for the protection of an environmental easement	Estimated	$600
Prepare Site Management Plan	1 Plan	$6,000
TOTAL		**$20,000**

TABLE 2
Alternative No. 2 - Site Management

Description	Quantity	Cost (estimated)
Staff prep time ($80/hr)	10 hours	$800
Staff on-site labor ($80/hr)	14 hours	$1,120
Senior staff oversight ($100/hr)	3 hours	$300
Field Equipment/PPE	2 day	$200
Prepare Site Management Plan	1 plan	$6,000
Subcontractor Costs (well abandonment only)	Lump sum	$2,000
Prepare Environmental Easement	Lump sum	$7,000
Site ALTA Survey for environmental easement	Lump sum	$7,580
Total		**$25,000**

TABLE 3 Alternative No. 3- Excavation with Building Removal		
Description	**Quantity**	**Cost (estimated)**
Building Survey ($150/hr)	20 hours	$3,000
Asbestos Abatement	lump sum	$65,000
Asbestos Debris Pile Removal	Estimated	$63,000
Building Demolition	lump sum	$25,000
Excavation Preparation- Installation of 80 linear feet of sheeting and sand bag dam along excavation area adjacent to Patroon Creek	lump sum	$80,000
Subcontractor Costs (includes labor, equipment for excavation, in-situ soil stabilization, excavate and live load stabilized soil info permitted trucks for disposal, and transportation and disposal of stabilized soil as a landfill cover)	3 weeks	$397,250
Transportation and disposal of hazardous soil in foot print of former floor drain ($290/ton)	15 tons	$4,350
Furnish, place and compact structural backfill ($24/ton)	1200 tons	$28,800
Transportation and disposal of non-hazardous petroleum impacted groundwater ($1.10/gallon)	unknown	unknown
On-site treatment and discharge of non-hazardous petroleum impacted groundwater ($0.64/gallon)	unknown	unknown
Staff prep time ($80/hr)	20 hours	$1,600
Staff on-site labor ($50/hr)	160 hours	$8,000
Senior staff oversight ($80/hr)	20 hours	$1,600
PID, 2 required ($200/wk)	3 weeks	$600
CAMP Air monitoring equipment ($735/wk)	3 weeks	$2,205
Field Equipment/PPE	3 weeks	$3,000
Confirmatory soil samples from excavation (VOCs, SVOCs, TAL Metals, PCBs, Pesticides - $328/sample)	Estimated 35 samples	$11,480
Confirmatory soil samples of clean backfill (VOCs, SVOCs, TAL	Estimated 5 samples	$1,640

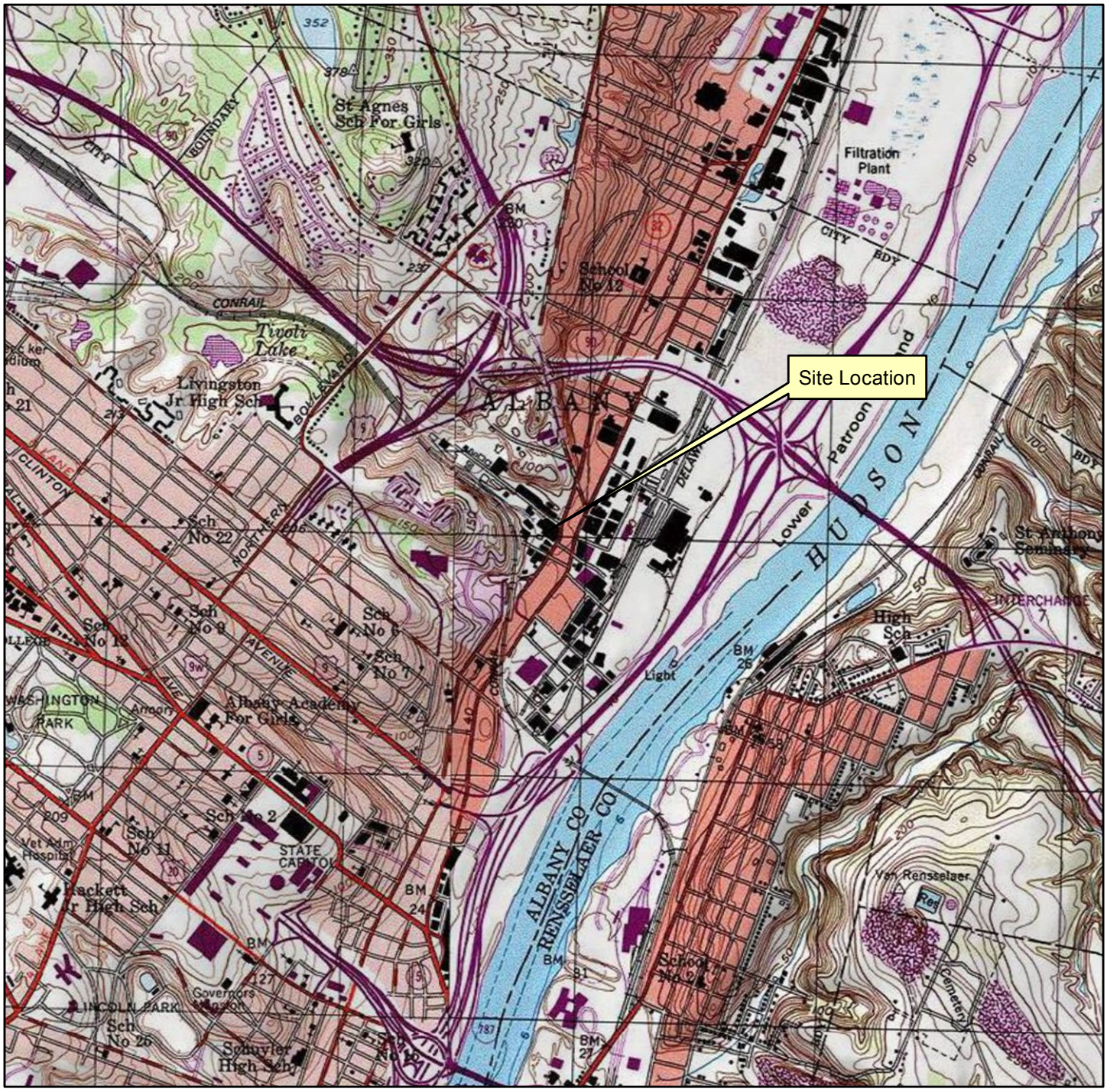
Metals, PCBs, Pesticides - $328/sample)		
Waste Characterization Samples (VOCs, SVOCs, TCLP RCRA 8 Metals, DRO, GRO- $298/sample)	Estimated 15 samples	$4,470
Lab Shipping Fees	Estimated	$2,000
Prepare Site Management Plan	Lump sum	$3,000
Certification required by easement		$4,500
Subcontractor Costs (well abandonment only)	Lump sum	$1,910
TOTAL		**$712,405**

TABLE 4 Alternative No. 4: Solidification/Stabilization with Portland Cement with Building Removal		
Description	**Quantity**	**Cost (estimated)**
Building Survey ($150/hr)	20 hours	$3,000
Asbestos Abatement	lump sum	$62,000
Asbestos Debris Pile Removal	Estimated	$63,000
Building Demolition	lump sum	$25,000
Excavation Preparation-Installation of 80 linear feet of sheeting and sand bag dam along excavation area adjacent to Patroon Creek	lump sum	$80,000
Subcontractor Costs (includes labor, equipment for excavation, in-situ soil stabilization, excavate and live load stabilized soil info permitted trucks for disposal, and transportation and disposal of stabilized soil as a landfill cover)	3 weeks	$112,000
Transportation and disposal of hazardous soil in foot print of former floor drain ($290/ton)	15 tons	$4,350
Furnish, place and compact structural backfill ($24/ton)	1200 tons	$28,800
Transportation and disposal of non-hazardous petroleum impacted groundwater ($1.10/gallon)	Unknown	unknown
On-site treatment and discharge of non-hazardous petroleum impacted groundwater ($0.64/gallon)	Unknown	unknown
Staff prep time ($80/hr)	20 hours	$1,600
Staff on-site labor ($50/hr)	160 hours	$8,000
Senior staff oversight ($80/hr)	20 hours	$1,600
PID, 2 required ($200/wk)	3 weeks	$600
CAMP air monitoring equipment ($735/wk)	3 weeks	$2,205
Field Equipment/PPE	3 weeks	$3,000
Confirmatory soil samples from excavation (VOCs, SVOCs, TAL Metals, PCBs, Pesticides - $328/sample)	Estimated 35 samples	$11,480
Confirmatory soil samples of clean backfill (VOCs, SVOCs, TAL Metals, PCBs, Pesticide.0s -	Estimated 5 samples	$1,640

$328/sample)		
Waste Characterization Samples (VOCs, SVOCs, TCLP RCRA 8 Metals, DRO, GRO- $298/sample)	Estimated 15 samples	$4,470
Lab Shipping Fees	Estimated	$2,000
Subcontractor Costs (well abandonment only)	Lump sum	$2,000
Prepare Site Management Plan	Lump sum	$3,000
Certification required by easement		$3,255
Total		**$423,000**
Annual Cost	0-30 years	$500

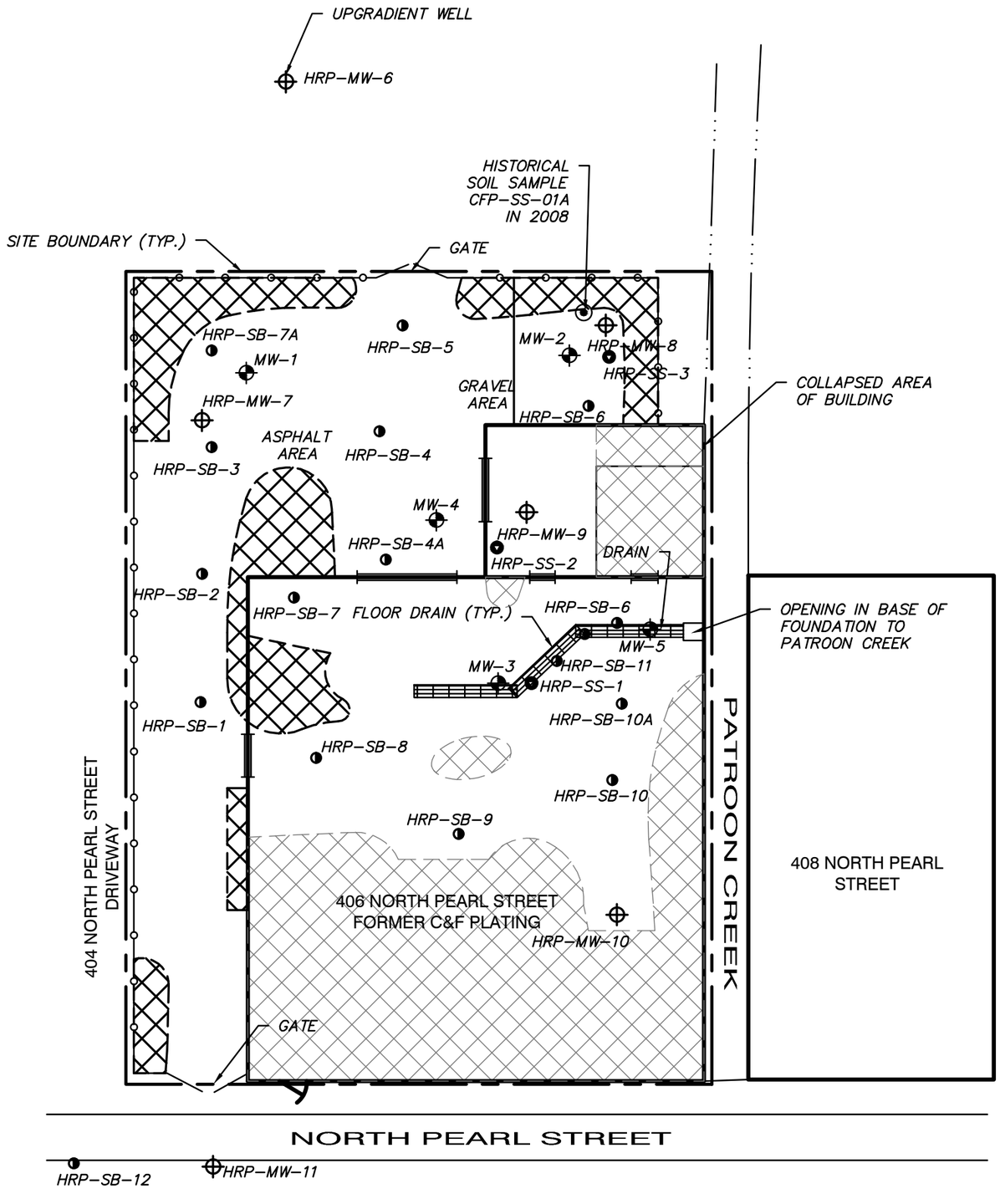
TABLE 5 Alternative No. 5- Floor Drain Excavation with Building Removal and In-situ Treatment Remedy		
Description	**Quantity**	**Cost (estimated)**
Building Survey ($150/hr)	20 hours	$3,000
Asbestos Abatement	lump sum	$64,500
Asbestos Debris Pile Removal	Estimated	$63,000
Building Demolition	lump sum	$25,000
Subcontractor Costs (includes labor, equipment for excavation, excavate and live load soil info permitted trucks for disposal, and transportation and disposal)	5 days	$83,250
Transportation and disposal of hazardous soil in foot print of former floor drain ($290/ton)	25 tons	$7,250
Calcium polysulfide (CPS)	Lump Sum	$4,000
Furnish, place and compact structural backfill ($24/ton)	25 tons	$1,400
Staff prep time ($50/hr)	30 hours	$1,500
Staff on-site labor ($50/hr)	100 hours	$5,000
Senior staff oversight ($80/hr)	20 hours	$1,600
PID, 2 required ($200/wk)	2 week	$400
CAMP Air monitoring equipment ($735/wk)	2 week	$1,470
Field Equipment/PPE	2 week	$500
Confirmatory soil samples from excavation (VOCs, SVOCs, TAL Metals, PCBs, Pesticides - $328/sample)	Estimated 12 samples	$3,936
Confirmatory soil samples of clean backfill (VOCs, SVOCs, TAL Metals, PCBs, Pesticides - $328/sample)	Estimated 4 samples	$1,312
Waste Characterization Samples (VOCs, SVOCs, TCLP RCRA 8 Metals, DRO, GRO- $298/sample)	Estimated 2 samples	$596
Lab Shipping Fees	Estimated	$286
Prepare Site Management Plan	Lump Sum	$3,000
Subcontractor Costs (well abandonment only)	Lump sum	$2,000
TOTAL		**$273,000**

Annual Cost	0-30 years	$4,500



USGS Quadrangle data Copyright:
© 2009 National Geographic Society, i-cubedxt
USGS Quad ID: 42073-F7
Quad Name: Albany, New York
Publish Date: 1983

Figure 1
Site Location
CF Plating Facility
406 North Pearl Street
Albany, New York
Scale 1"=2,000'



LEGEND

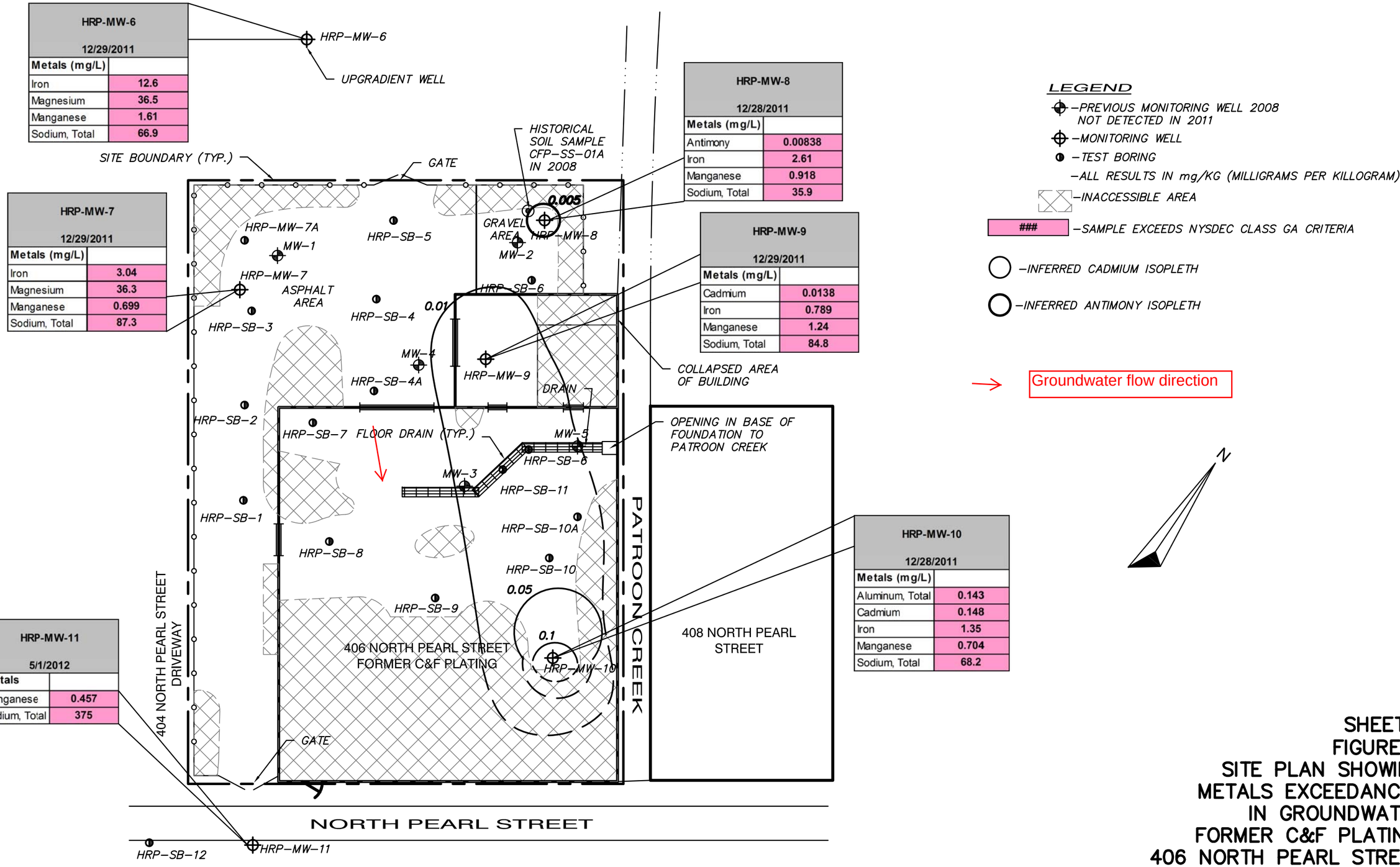
- –PREVIOUS MONITORING WELL 2008 NOT DETECTED IN 2011
- –SURFACE SOIL SAMPLE LOCATION
- –MONITORING WELL
- –TEST BORING
- –INACCESSIBLE AREA
- –FORMERLY INACCESSIBLE AREA

N

MAP REFERENCE:
DERIVED FROM A MAP ENTITLED "SITE PLAN" BY PRECISION ENVIRONMENTAL SERVICES OF BALLSTON SPA, NY, PROJECT # NYSDEC SPILL #02-09561, DATED MAY 2008, FIGURE 2, DRAWN BY SMP, NOT TO SCALE.

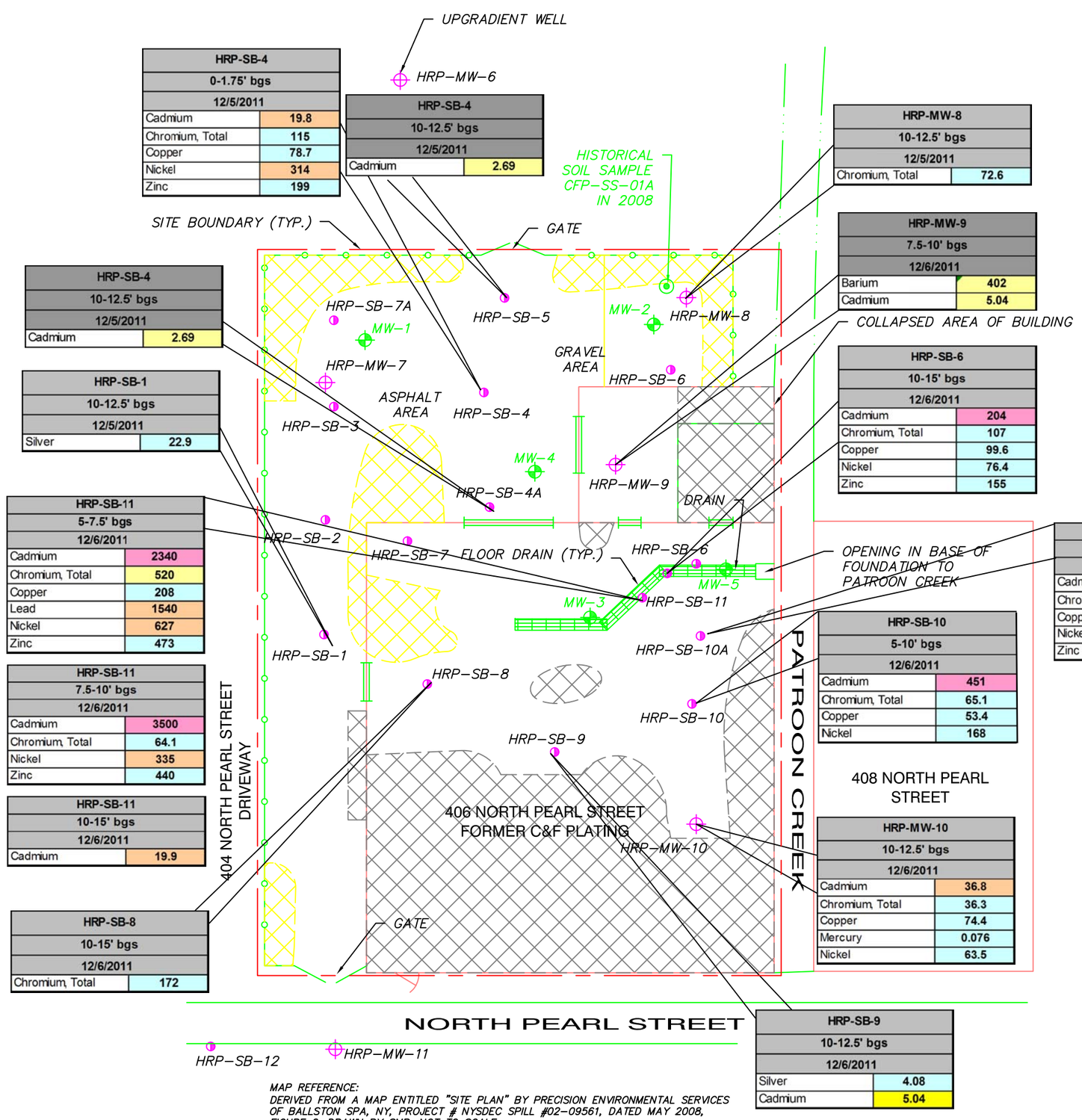
FIGURE 2
SITE PLAN
FORMER C&F PLATING
406 NORTH PEARL STREET
ALBANY, NEW YORK
NOT TO SCALE

S:\DATA\NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\SPILLS\ALBANY FACILITY - 406 NORTH PEARL STREET (C&F PLATING)\CAD\SITE SAMPLING LOCATIONS.dwg 12/19/2013 3:08:59 PM, DWG To PDF.pc3



MAP REFERENCE:
DERIVED FROM A MAP ENTITLED "SITE PLAN" BY PRECISION ENVIRONMENTAL SERVICES OF BALLSTON SPA, NY, PROJECT # NYSDEC SPILL #02-09561, DATED MAY 2008, FIGURE 2, DRAWN BY SMP, NOT TO SCALE.

SHEET 1
FIGURE 3
SITE PLAN SHOWING
METALS EXCEEDANCES
IN GROUNDWATER
FORMER C&F PLATING
406 NORTH PEARL STREET
ALBANY, NEW YORK
NOT TO SCALE



LEGEND

- –PREVIOUS MONITORING WELL 2008 NOT DETECTED IN 2011
- –MONITORING WELL
- –TEST BORING
- –ALL RESULTS REPORTED IN mg/KG (MILLIGRAMS PER KILLOGRAMS
- –INACCESSIBLE AREA
- –FORMERLY INACCESSIBLE AREA

###	Sample location has one or more values exceeding 6NYCRR Part 375-6.8 (b) unrestricted use SCOs. Values Reported in mg/kg.
###	Sample location has one or more values exceeding 6NYCRR Part 375-6.8 (b) restricted-residential use SCOs. Values Reported in mg/kg.
###	Sample location has one or more values exceeding 6NYCRR Part 375-6.8 (b) commercial use SCOs. Values Reported in mg/kg.
###	Sample location has one or more values exceeding 6NYCRR Part 375-6.8 (b) restricted industrial values. Values Reported in mg/kg.

MAP REFERENCE:
DERIVED FROM A MAP ENTITLED "SITE PLAN" BY PRECISION ENVIRONMENTAL SERVICES OF BALLSTON SPA, NY, PROJECT # NYSDEC SPILL #02-09561, DATED MAY 2008, FIGURE 2, DRAWN BY SMP, NOT TO SCALE.

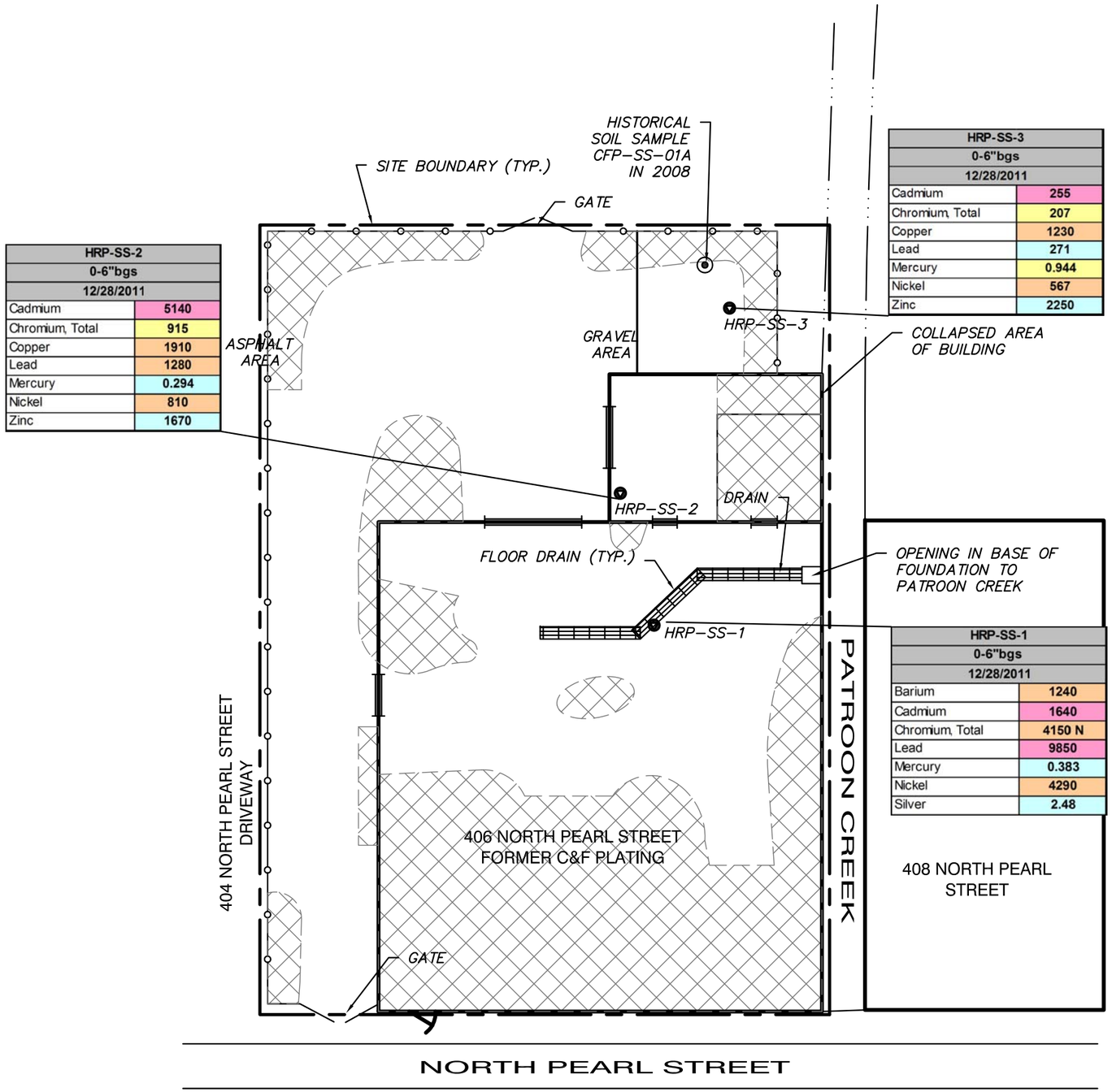
Sheet 1
Figure 4
Site Plan Showing Metal Exceedances in Subsurface Soils
Former C&F Plating
406 North Pearl Street
Albany, New York
Not to Scale

LEGEND

● – SURFACE SOIL SAMPLE LOCATION

– INACCESSIBLE AREA

###	Sample location has one or more values exceeding 6NYCRR Part 375-6.8 (b) unrestricted use SCOs. Values Reported in mg/kg.
###	Sample location has one or more values exceeding 6NYCRR Part 375-6.8 (b) restricted-residential use SCOs. Values Reported in mg/kg.
###	Sample location has one or more values exceeding 6NYCRR Part 375-6.8 (b) commercial use SCOs. Values Reported in mg/kg.
###	Sample location has one or more values exceeding 6NYCRR Part 375-6.8 (b) restricted industrial values. Values Reported in mg/kg.



HRP-SS-2	
0-6"bgs	
12/28/2011	
Cadmium	5140
Chromium, Total	915
Copper	1910
Lead	1280
Mercury	0.294
Nickel	810
Zinc	1670

HRP-SS-3	
0-6"bgs	
12/28/2011	
Cadmium	255
Chromium, Total	207
Copper	1230
Lead	271
Mercury	0.944
Nickel	567
Zinc	2250

HRP-SS-1	
0-6"bgs	
12/28/2011	
Barium	1240
Cadmium	1640
Chromium, Total	4150 N
Lead	9850
Mercury	0.383
Nickel	4290
Silver	2.48

MAP REFERENCE:
DERIVED FROM A MAP ENTITLED "SITE PLAN" BY PRECISION ENVIRONMENTAL SERVICES OF BALLSTON SPA, NY, PROJECT # NYSDEC SPILL #02-09561, DATED MAY 2008, FIGURE 2, DRAWN BY SMP, NOT TO SCALE.

FIGURE 5
SITE PLAN SHOWING METAL EXCEEDANCES IN SURFACE SOILS
FORMER C&F PLATING
406 NORTH PEARL STREET
ALBANY, NEW YORK
NOT TO SCALE

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Legend

- Calcium Polysulfide Chemical application area
- Areas to be excavated
- Building Addition to be demolished
- Original Portion of Building to Remain

Figure 6
Remediation Overview
CF Plating Facility
406 North Pearl Street
Albany, New York
Not To Scale