September 2001
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# Remedial Alternatives Report

# Environmental Restoration Project
# Clean Water / Clean Air Bond Act of 1996
# Risedorph Tannery
# 130-146 West Eighth Avenue
# City of Gloversville
# Fulton County, New York

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**ENVIRONMENTAL RESTORATION PROJECT**
**REMEDIAL ALTERNATIVES REPORT**
**RISEDORPH TANNERY**
**GLOVERSVILLE, NEW YORK**

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# 1.0 INTRODUCTION

## 1.1 Purpose and Organization

The intent of this Remedial Alternatives Report (RAR) is to present site specific remediation options based on the findings and conclusions of the Site Investigation Report (SIR) for the Risedorph Tannery Environmental Restoration Project prepared by C.T. Male Associates, P.C., dated August 2006. The overall goal of the RAR is to describe and analyze a feasible remedial action(s) to either achieve compliance with established regulatory clean up guidance levels and/or to protect human health and the environment from contaminated media which may remain at the subject site. Ultimately, a Proposed Remedial Action Plan (PRAP) and then a Record of Decision (ROD) will be made by the NYSDEC on the basis of this RAR.

This RAR was organized and prepared in accordance with the New York State Department of Environmental Conservation (NYSDEC) Revised Technical and Administrative Guidance Memorandum (TAGM) issued December 22, 1997, entitled Municipal Assistance Environmental Restoration Projects, "Brownfield Program" (the "Procedures Handbook"). The RAR consists of four (4) main sections. Section 1 is an introduction that presents the purpose of the project and background information such as a site description, site history, and extent and properties of remaining contamination. Section 2 is related to the identification of remedial alternatives currently available, their objectives, and their development. Section 3 presents an individual analysis of each of the alternatives discussed within the report. Section 4 presents a comparative analysis of each of the remedial alternatives.

## 1.2 Background Information

In 2000, the City of Gloversville applied for and was approved for funding by the NYSDEC under the Clean Water/Clean Air Bond Act of 1996 for performing an Environmental Restoration "Site Investigation" Project of the Risedorph Tannery in the City of Gloversville, Fulton County, New York. Risedorph Tannery is one of several defunct tannery complexes that have been abandoned in the City of Gloversville. Risedorph Tannery was in an advanced state of decay and dilapidation, and was

suspected to be contaminated by industrial wastes that potentially contain hazardous wastes and substances from the tannery processes.

C.T. Male Associates, P.C. (C.T. Male) was retained by the City of Gloversville to perform the site investigative and subcontract site remediation activities. There has been a variety of subsurface investigative and site remediation activities completed at the subject site, which have included the following:

- The initial phase of subsurface investigations and site remediation work was completed between October 2000 and January 2001 to characterize the environmental quality of the subject site and to address abandoned materials left on-site. The investigation work generally consisted of an historical assessment, site survey, geophysical survey, building component evaluations (floor drains, wastewater plant, etc.), site wide subsurface / hydrogeologic evaluation (test pits and soil borings), pond and stream surface water and sediment sampling, fish and wildlife impact analysis, and asbestos pre-demolition survey. The remediation activities during this time period included inventory and disposal of abandoned drums and cleaning and removal of above ground and below ground tanks.

- In April 2001, supplemental surface soil samples were collected and analyzed from across the site and wood samples were collected and analyzed from select tanning drums within the Main Tannery Building.

- In December 2001 through January 2002, the contents of the pretreatment plant (liquids and sludge) were removed and properly disposed. The liquids were discharged to the sanitary sewer and the sludge was transported to Fulton County Landfill. The interior of the sedimentation tanks was decontaminated using a hot water pressure washer. During this time period the building floor drains were also cleaned and light fixtures were dismantled and properly disposed.

- In February 2002, twenty-five additional wood samples were collected and analyzed from the various wood structural members and three wooden tannery wheels. Supplemental pond and creek sediment samples were also collected in February 2002 to further define the horizontal and vertical extent of suspect contamination detected in previous phases of work.

- In March and April 2002, supplemental soil probes were completed to define the vertical and horizontal extent of soil contamination beneath the Main Tannery Building, which included subsurface soil sampling and analysis of 0-4 feet, 4-8 feet and 8-12 feet below grade sampling intervals.

- In May 2002, a second round of groundwater samples were collected and analyzed for limited analysis to focus on those parameters that were suspect contaminants based on the first round of groundwater analytical results.

- In July 2002, the area beneath the former No. 6 fuel oil tank was excavated to remove suspected oil contaminated soil resulting from the tank use.

- Starting in September 2002, asbestos abatement of friable materials in the Main Tannery Building began in preparation for demolition of the building. After friable materials were abated, the building was demolished and completed in December 2002.

- In March 2006, ten sediment samples were collected from the creek and six sediment samples were collected from the lower pond to further define the extent of arsenic and chromium impacts on sediment.

- In April 2006, three sub-slab soil vapor samples were collected to evaluate the soil vapor intrusion potential in the existing buildings.

The majority of the work was performed in accordance with the Final Site Investigation/Remedial Alternatives Report Work Plan dated December 21, 2000, the Supplemental Work Plan dated January 30, 2002 and/or the Supplemental Monitoring Well Sampling Plan dated April 11, 2002. The balance of the work completed in 2006 was performed in accordance with NYSDEC approved February 10, 2006 Vapor Intrusion Assessment Work Plan and the NYSDEC approved February 12 and March 13, 2006 Sediment Sampling Plans.

### 1.2.1 Site Description

The project site is located in the northwestern quadrant of the intersection of West Eighth Avenue and Wilson Street in the City of Gloversville, County of Fulton, New York. The boundaries of the site are rectangular (longer in the east-west direction) and

the site is comprised of approximately 13 acres of land (two contiguous parcels). The majority of the site investigation and remediation activities were performed on the easternmost 3.9 acres of land, which is developed with the Risedorph Tannery complex. The surface soil sampling and analysis and boundary survey was performed across the entire site. A site location map is included as Figure 1 in the Site Investigation Report, dated August 2006. An aerial photograph showing adjoining property utilization is presented as Figure 1A. A site survey depicting the locations of the site's building and features is presented as Figure 2 in the Site Investigation Report, dated August 2006.

The Risedorph Tannery complex consists of one main building (referred to as Main Tannery Building which was demolished) and three smaller separate warehouse buildings (Warehouse #1, #2 and #3). The tanning of hides was reportedly performed primarily in the Main Tannery Building. The warehouse buildings being were used for skin washing and fleshing, and storing raw and finished hides. The ground cover in the eastern area of the Risedorph Tannery complex consists mainly of asphalt pavement. The land west of the Risedorph Tannery complex is undeveloped wooded land and is referred to as the "Back Lot". Two ponds (an upper and lower), separated by a concrete spillway, are located along the southern property boundary. A stream enters the site in the southwest corner of the site, connects to the upper pond, and ultimately continues after a spillway of the lower pond. The stream generally flows west to east, and continues under Wilson Street via a concrete bridge.

Area utilities currently consist of municipal water supply and sanitary sewer disposal by the City of Gloversville. The main building at the site housed a wastewater treatment plant that was used to pre-treat the tannery wastes prior to being discharged to the City's sewer system. Niagara Mohawk Power Corporation supplies natural gas and electricity. As of the date of this report, all of the utilities to the site have either been terminated or temporarily shut-off. There are no records of private or public wells within approximately 0.5 mile radius south and east of the site.

### 1.2.2 Site History

The Johnston / Gloversville area has been the home to leather tanning industries since the 1800's. The site has been used for leather tanning since the mid 1800's up until the 1980's. In the 1980's the business owners abandoned the site and became delinquent on their property taxes. In 1994, NYSDEC conducted a multi-media site inspection of

various tanneries within the Gloversville / Johnstown area, the Risedorph Tannery being one of these. The inspection of the Risedorph Tannery documented the presence of treatment tanks full of industrial liquid wastes, the presence of industrial chemicals, contaminated concrete pads and flooring, dried solids within tanks, underground storage tanks containing suspect petroleum or solvent wastes, above ground tanks / vats of sulfuric acid and other solidified wastes. The site had remained essentially "as is" since it was last occupied in the 1980's. The City of Gloversville instituted a tax foreclosure proceeding in 1999 and later obtained ownership in March 2000.

### 1.3 Nature and Extent of Contamination

Media and sampling locations used for determining the extent of contamination, as presented in the SI report included the following:

- Four surface water samples from the ponds and creek.
- Eleven sediment samples from the lower pond.
- Five sediment samples from the upper pond.
- Eighteen sediment samples from the creek.
- Three sediment samples from the catch basins of the storm water system.
- Thirty-eight surface soil samples site wide.
- Twenty-one subsurface soil samples from the test borings and test pits.
- Sixty-eight supplemental subsurface soil samples from the soil probes within the area of the Main Tannery Building.
- Sixteen groundwater samples from permanent wells (1-inch and 2-inch diameter).
- Four wood samples from the wooden tanning process wheels.
- Twenty-four wood samples from structural members of the Main Tannery Building.
- One liquid sample and one sludge sample from the Pretreatment Waste Water Plant.
- Three sub-slab soil vapor sampled from beneath the existing warehouse buildings (one from each).

Based on the findings of the Brownfield site investigation and analysis of surface and subsurface soil, groundwater, surface water, sediments and building material samples,

contamination at the subject site was determined to consist primarily of heavy metals, and to a lesser extent isolated VOC and SVOC contaminants. A summary of the various media impacts is discussed below.

**Creek & Pond Surface Water:**

Based on analytical results for surface water samples collected from the upper and lower ponds and creek, aluminum and iron were detected above surface water quality standards. The concentrations of aluminum and iron are at the highest concentrations at the up-gradient (up-stream) sampling location, and are not considered contaminants of concern relative to past activities at the site. Therefore, this finding is not considered as part of the remedial actions proposed for the site.

**Creek & Pond Sediment:**

Analysis of the sediment samples (upper pond, lower pond, and in the stream) detected five SVOCs and eight metals (arsenic, beryllium, chromium, copper, iron, mercury, nickel and zinc) at concentrations above cleanup criteria. Considering the relatively low level concentrations of the SVOCs in sediments, the lower concentration of these SVOCs in downstream locations compared to upstream locations, and the absence of these SVOCs in surface water, it is inferred that these SVOCs do not represent a significant source of contamination to surface water. Of the metals detected, arsenic and chromium are considered potential contaminants of concern at the site based on their significant use in the tanning industry.

Arsenic was detected above the method detection limit in the pond and creek sediment samples at concentrations above its NYSDEC Technical Guidance for Screening Contaminated Sediments lowest effect level value and/or severe effect level value. The arsenic concentrations are of similar magnitude with a slight increase in concentrations in the samples collected from the section of the creek downstream of the lower pond spillway (and on-site). Chromium concentrations in sediments were slightly elevated in the lower pond and immediately downstream of the lower pond spillway (on-site along the former tannery building). The concentrations of chromium within the samples collected from the creek below the lower pond spillway were above its NYSDEC Technical Guidance for Screening Contaminated Sediments lowest effect level value and/or severe effect level value. The concentration of chromium in the samples

collected downstream of the site (off-site) and upstream of the upper pond (on-site) were below its NYSDEC Technical Guidance for Screening Contaminated Sediments lowest effect level value and severe effect level value.

**Storm Water System Sediment:**

Sediment samples were collected from three catch basins connected to the storm water systems within the site. The analytical results indicate VOCs, pesticides and PCBs were not detected above regulatory standards. However, one SVOC (benzo(a)pyrene) and several metals (magnesium and zinc in Catch Basin #1; chromium, magnesium and zinc in Catch Basin #2; and arsenic, chromium, and copper, magnesium, nickel and zinc in Catch Basin #3) were detected above regulatory standards.

**Surface Soil:**

Based on the analytical results of the surface soil samples, there appears to be an area in the western portion of the site (Grids #31, #32, #34 and #37) that is potentially impacted by SVOCs. At these locations elevated concentrations of up to seven SVOCs were detected and are located along the south side of the site near the toe of the slope adjacent to West Eight Avenue. This SVOC finding along the toe of the slope is not considered as part of the remedial actions proposed for the site, as explained in the SI report.

Elevated concentrations of mercury at levels greater than recommended cleanup objective values were identified within the western portion of the site (i.e., Back Lot), presumably up-gradient of the tannery complex outside of the developed tannery buildings. Arsenic, chromium, and magnesium were also identified as contaminants of concern in surface soil. These metals were detected at elevated concentrations primarily in developed or disturbed areas of the site. Arsenic and chromium concentrations are elevated beyond recommended cleanup objective values in the Back Lot, west of Warehouse #3 and beneath the main building. Magnesium was detected at abnormally high concentrations beneath Warehouse #1, just north of the Main Tannery Building, and just west of Warehouse #3.

**Subsurface Soil:**

The analysis of twenty-one subsurface soil samples detected one VOC (TP-17), four SVOCs (TP-6, TP-17 and MW-8) and seven metals (various locations across the site) above NYSDEC guidance values. Only one SVOC was detected above its NYSDEC guidance value at TP-6, but was not detected in the fill materials sampled from the other test pits in the area of TP-6. Therefore, it is inferred that there is no source of SVOC's at TP-6. A possible source of contamination is located at TP-17, as evidenced by elevated PID readings, black stained soils, and the detection of one VOC and two SVOCs above NYSDEC guidance values. VOCs or SVOCs were not detected within groundwater at monitoring well MW-11 installed slightly down-gradient of TP-17. Three SVOCs were detected above NYSDEC guidance values at MW-8, none of which were detected within the groundwater at this location. It is inferred that the SVOCs detected at TP-17 and MW-8, although present above guidance values in subsurface soils, are not contributing to groundwater contamination, and the soil at these referenced locations is not considered to be a significant source of contamination.

Of the seven metals detected above NYSDEC guidance values in subsurface soils, arsenic, chromium and mercury are present within areas of the site at elevated concentrations. These areas are primarily within the footprint of the Main Tannery Building, west of Warehouse #3 (Grids #7, #14 and #15), and south of the upper pond (Grids #35 and #36) for arsenic and/or chromium and primarily the Back Lot for mercury. In addition to these metals, calcium and magnesium appear to exist in areas of the site at concentrations above site background and Eastern USA soil background levels and therefore are suspect contaminants. These areas are subsurface soils at monitoring wells MW-2, MW-5, MW-12, MW-13 and MW-14 (calcium) and at monitoring wells MW-1, MW-2, MW-5 and MW-9 (magnesium).

There appeared to be a distinct trend in elevated concentrations of arsenic and chromium (in comparison to other locations) in subsurface soils beneath the Main Tannery Building based on the first phase of subsurface soil sampling analytical results. Subsequent supplemental soil probe sampling focused on the arsenic and chromium within the area of the Main Tannery Building to refine the horizontal and vertical extent of these metals. Arsenic is the primary contaminant of concern. The highest concentrations of arsenic in soil exist in the area of monitoring wells MW-13 and MW-14. Chromium is also a contaminant of concern, but is less prevalent than arsenic. The

highest chromium concentrations were detected in the area of SP-18 and SP-19, which is adjacent to the area of the pretreatment wastewater plant.

**Groundwater:**

Twenty-one monitoring wells were installed across the site to evaluate groundwater quality. The analytical results revealed three VOCs (methylene chloride, m-&p-xylenes and o-xylene), one SVOC (naphthalene), and eleven metals above guidance/standard values. Methylene chloride concentrations were generally less than 2 ug/l above its standard. According to the data validation process methylene chloride was detected at a level typical of external contamination. Therefore, methylene chloride is not considered to be of concern. M-&p-xylene was detected at two well locations (MW-12 and SP-19) with the concentration at SP-19 slightly above its NYSDEC standard value. O-xylene was also detected at these two well locations at similar concentrations above its NYSDEC standard value. Xylene detections are considered to be isolated occurrences and not contaminants of concern due to their low concentrations. Naphthalene was detected at three locations, one well in January 2001 (MW-13) and two different wells in May 2002 (SP-8 and SP-19). Naphthalene was detected at relatively low concentrations but above its guidance value at MW-13 in January 2001 and SP-19 in May 2002. The highest concentration of naphthalene was detected at monitoring well SP-19 at a concentration of 160 ug/l, which is also above its guidance value. As the elevated detection of naphthalene is isolated from the other monitoring well locations, and naphthalene is present at relatively low levels at only two other locations, it is inferred that the naphthalene detected at MW-13 and SP-19 is an isolated occurrence and is not considered a contaminant of concern.

Eleven metals were detected in groundwater above NYSDEC water quality standards at one or more well locations in January 2001 and May 2002. The concentrations between the two sampling events varied, some of which were lower in the most recent sampling event, as explained within the text of the report. The concentrations of the select metals detected in the groundwater as compared to their concentrations in subsurface soil across the site, their concentrations at inferred up-gradient well locations (MW-2, MW-3 and MW-9) and their apparent absence in the tanning process suggest antimony, beryllium, iron, lead, magnesium, manganese and mercury are not contaminants of concern in groundwater. The metals considered to be site contaminants of concern in groundwater are arsenic, chromium, and sodium.

The concentrations of arsenic in groundwater were elevated and concentrated in the area of the Main Tannery Building, centralized in the area of monitoring well MW-13 and MW-14. Arsenic in groundwater appeared to be elevated at similar locations where the arsenic concentrations in soil were generally elevated.

The elevated concentrations of chromium in groundwater were not as prevalent as arsenic. Chromium concentrations exceeded its groundwater standard at six well locations, five of which (MW-8, MW-12, MW-16, SP-9, SP-19) were generally downgradient locations with respect to the developed area of the site. The sixth location (SP-8), which was generally upgradient with respect to the others, revealed the highest concentration of chromium. Elevated concentrations of chromium in monitoring wells between these five monitoring wells were not apparent. The concentrations of chromium in January 2001 were generally lower than the concentrations in May 2002. In summary, chromium is a contaminant of concern in groundwater within a few isolated areas if the site.

Concentrations of sodium were elevated across the site, particularly along the adjoining roadways and beneath the Main Tannery Building in January 2001. At the monitoring well locations resampled in May 2002, similar and lower concentrations of sodium were detected, but still above its standard value.

On the basis of the nature and extent of contamination described above, suggested remedial alternatives for site contaminants of concern are discussed in Section 2.0. The goals of the remedial actions are to achieve compliance with regulatory cleanup levels so that the property can be used for unrestricted recreational use.

### 1.4 Contaminant Fate & Transport

The site contaminants are metals, primarily arsenic, chromium, magnesium, sodium and zinc, and to a lesser extent volatile and semi-volatile organic compounds. The elevated concentrations of metals were found beneath the Main Tannery Building in surface and subsurface soils, and groundwater. The VOCs exist within the groundwater in a dissolved phase, and the SVOCs are adsorbed to subsurface soil and sediments (except for naphthalene which was the only compound detected in groundwater in a dissolved phase).

The fate of the VOCs and SVOCs are influenced by several factors including the contaminant compounds' organic carbon / water partition coefficients, water solubility, volatility and ability to biodegrade by natural processes. Metals are not generally influenced by these factors, except for solubility. The VOCs and SVOCs have low to high organic carbon sorption capacity (water partition coefficients). This indicates that the contaminants have an affinity to be absorbed by organic carbon within the site soils, primarily within the upper soil horizon where the organic carbon within the project site would tend to be more prevalent. Since an organic layer or peat material was encountered at several exploratory locations from 2 to 7 feet below grade beneath the main tannery building, it is expected that the organic carbon content of the native soils remaining in place is moderate to high. With high organic carbon content in the soil, the mobility of contaminants is typically low. In the absence of organic carbon or once the sorption sites have been expended, the mobility of the contaminants will usually increase. Some absorption may occur between the contaminants and inorganic soil and sediment particles; however, literature suggests that the absorption of nonionic chemicals to inorganic soil is low.

Each of the VOC and SVOC contaminants remaining in the groundwater and soil are relatively soluble in water, in the range of 21 to 5,500,000 (unit-less Koc value). The VOC or SVOC contaminant concentrations within the site do not generally approach the lower end of this solubility range. As two VOCs and one SVOC are present within the groundwater in dissolved state, they will generally migrate in the direction of groundwater flow. Metals are generally insoluble and will not typically migrate in the direction of groundwater flow unless attached to a colloid or are soluble in groundwater (i.e. sodium).

Metals are not capable of volatilization under site conditions. The VOCs and SVOCs are volatile to some degree, which indicates they will volatilize readily when unsaturated vapor, such as soil gas or ambient air is present. Contaminants which may volatilize from the groundwater or soils to the atmosphere will disperse or abiotically degrade at rates dependent upon wind speed and the levels of atmospheric radicals. These rates are anticipated to generate undetectable levels of VOCs and SVOCs based on the low level concentrations of these contaminants.

Metals, because of their chemical composition, do not biodegrade. The VOCs and SVOCs are biodegradable. Biodegradation of the site contaminants has been found to

occur under aerobic and anaerobic conditions. The volatile and semi volatile organic compounds will readily biodegrade under aerobic conditions, whereas the heavier hydrocarbons will biodegrade more readily under anaerobic conditions. Microorganisms within the soils which have been acclimated to the contaminants by producing enzymes to withstand the toxic effects can readily metabolize the contaminants, particularly when nutrients are used to amend the soils.

The transport mechanisms for the contaminants within the site are migration within the groundwater, surface water, and/or volatilization into the atmosphere. The VOCs tend to occur and migrate within the upper portions of the aquifer due to their densities being less than 1. The SVOCs will tend to sink to the bottom of the aquifer to a less permeable soil type and migrate in the direction of groundwater flow and/or the direction of the surface of the less permeable unit. Most metals are strongly held, inhibiting their migration and the extent of contamination. VOC and SVOC contaminants within the groundwater and vadose zone will volatilize into the unsaturated soils above the water table, and eventually will diffuse into the atmosphere.

# 2.0 IDENTIFICATION AND DEVELOPMENT OF ALTERNATIVES

## 2.1 Introduction

The site investigation included intrusive and non-intrusive investigations to determine the quality of the surface soil, subsurface soil, surface water, sediment, groundwater and building materials at the site. Tank and drum removal activities were also concurrently performed during the completion of the preliminary phase of site investigation, and the Main Tannery Building was demolished as the contaminants of concern (arsenic and chromium) were not accessible beneath the unsafe building. As required by the Environmental Restoration Program it was the intent of the City of Gloversville to remove the remaining petroleum and chemical storage tanks and drums from the subject site. It was not part of the work scope to address contaminated media until the results of the site investigation were received and evaluated. The results of the site investigation, as discussed in the Site Investigation Report (August 2006), were used for the identification and development of the remedial alternatives described within this report.

Feasible remedial action(s) were identified to either achieve compliance with established regulatory cleanup guidance levels and/or to protect human health and the environment. The remedial alternatives for the site were developed based on published literature and current knowledge of the technologies commonly employed in similar situations and circumstances.

### 2.1.1 Areas & Media of Concern

Table 2.1.1-1 summarizes the contaminants of concern (COCs) for various media and the generalized remediation goal anticipated. The COCs were selected based on exceedance of their SCGs. Consideration was also given to those metals that are above their numeric SCGs, but within typical NYSDEC background levels in Eastern USA soils.

**Table 2.1.1-1**
**Contaminants of Concern for Various Media and Remediation Goal**

| Area of Concern | Media | Contaminants of Concern | Anticipated Remediation Goal |
|---|---|---|---|
| Creek Entering Site | Surface Water | Aluminum & Iron | No remediation recommended since the contaminants of concern were detected at their highest concentrations at up-stream sampling locations. |
| Creek Entering Site, Upper Pond, and Creek Leaving Site | Sediment | Arsenic and chromium | No remediation recommended since the concentrations of these metals are generally less than NYSDEC Sediment Criteria. |
| Lower Pond & Creek Section Below Lower Pond Spillway | Sediment | Chromium with consideration given to arsenic and select SVOCs | Reduce, eliminate, or control SVOCs & metals from entering surface water and causing potential biological impairment. |
| Storm Water System | Sediment | One SVOC (benzo(a)pyrene) & six metals (arsenic, chromium, copper, magnesium, nickel and zinc) | Reduce, eliminate, or control SVOC & metals from entering creek surface water and sediment. |
| Main Tannery Building | Sub-surface Soil | Arsenic and chromium with consideration given to VOCs (xylenes), and four SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and 2,4,5-trichlorophenol) | Reduce, eliminate, or control VOCs, SVOCs and metals from entering ground water and/or surface water, and to prevent direct contact with soils. |
| Main Tannery Building | Ground-water | Arsenic and chromium with consideration given to VOCs (xylenes), and one SVOC (naphthalene) | Reduce, eliminate, or control further migration of VOCs, SVOCs, metals in groundwater and/or surface water. |

**Table 2.1.1-1**
**Contaminants of Concern for Various Media and Remediation Goal**

| Area of Concern | Media | Contaminants of Concern | Anticipated Remediation Goal |
|---|---|---|---|
| Supplemental Main Tannery Building | Surface Soil | Arsenic and chromium with consideration given to SVOCs | Reduce, eliminate, or control SVOCs & metals from entering ground water and/or surface water, and to prevent direct contact with soils. |
| Beneath Existing Buildings | Soil Vapor | Requires further evaluation after completion of remedial action | Reduce, eliminate, or control VOCs from entering habitable buildings. |

Based on the findings of the site investigation, metals are the primary contaminants of concern, and VOCs/SVOCs are secondary. The specific remediation goals considered for this project are presented in subsequent sections herein.

In review of the data collected from the site investigation, five distinct areas of the site were evaluated in terms of remedial actions. These target areas are the following:

1. The lower pond and creek below the lower pond spillway,
2. The storm water system,
3. The Main Tannery Building, the eastern developed portion of the site, and
4. The Supplemental Main Tannery Building which is defined as the land between the Back Lot and warehouses, and the land south of the Upper Pond.

These general remediation areas of the site are depicted in Figure 1.

### 2.1.2 Lower Pond & Creek Sediment

The site creek originates off-site, enters the property near the southwest corner of the site, and discharges to the upper pond. The upper pond then discharges into the lower pond, which in turn discharges to the creek bordering the south wall of the Main Tannery Building. The creek exits the site at the extreme southeastern corner of the site flowing beneath Wilson Street. The contaminants of concern were detected within the

surface water and sediments primarily within the north side of the lower pond and in the creek below the lower pond spillway. Refer to Figure 1 of this report, which depicts the boundaries of the lower pond and creek for this remediation area.

### 2.1.3 Storm Water System

Based on the evaluations performed, three drainage systems exist within the site, some of which are connected with drainage structures within the warehouse buildings. The drainage systems are identified and depicted with single, double and triple arrow heads on the Drainage Pattern & Historical Usage Map (Figure 3 of the August 2006 Site investigation Report). Refer to Figure 1 of this report, which depicts the general location of the storm water systems.

The first system appears to be a french drain system (single arrow heads) located primarily north of the main tannery building. Water within this system appears to discharge to the sanitary sewer located on Wilson Street, as confirmed by a dye test. Since the system appears to only transmit storm water and up-gradient groundwater, and discharged directly to the sanitary sewer system, no sediment samples were collected and analyzed from this french drain system and therefore, it was not evaluated as part of the remedial alternatives.

The second system layout is depicted Figure 3 of the August 2006 Site Investigation Report with two arrow heads. It includes the floor drains within Warehouse #1 and #3 which appear to be connected, with water flow from Warehouse #1 going to the catch basin (#3) just east of Warehouse #1. The water then flows to a storm water pipe between two other catch basins (#1 and #2) in the courtyard area north of the boiler house stack. Ultimately the water from the second system combines with the third system as discussed below, and discharged to the stream east of the lower pond spillway.

The third system is identified on the Figure 3 of the August 2006 Site investigation Report with three arrow heads. This system appears to collect groundwater within a second french drain pipe located along the northern property line, north of the warehouses. The water ultimately enters a catch basin north of monitoring well MW-11, flows to a catch basin to the west and then discharged to the stream east of the lower pond spillway.

It should be noted that the storm water system does not include those drains associated with or installed within the floor slab of the Main Tannery Building. Those drains were cleaned as part of the preliminary remedial actions prior to demolition of the Main Tannery Building, and discharged to the on-site pretreatment wastewater Plant.

### 2.1.4 Main Tannery Building

The Main Tannery Building is located within the eastern developed portion of the subject site. This area generally consists of the footprint of the Main Tannery Building. The contaminants of concern were detected in subsurface soil and groundwater. Refer to Figure 1 of this report, which depicts the boundaries of this remediation area.

### 2.1.5 Supplemental Main Tannery Building

The Supplemental Main Tannery Building is lands generally located west of Warehouse #3 and south of the Upper Pond. This includes areas within Grids #7, #14, #15, #23, #35 and #36 (refer to Figure 6 of the August 2006 Site Investigation Report). The contaminants of concern were detected in surface soil. Refer to Figure 1 of this report, which depicts the boundaries of this remediation area.

## 2.2 Remedial Action Objective

As part of the site decontamination activities performed to date, petroleum and chemical storage tanks were permanently closed, waste materials and raw product drums and containers were gathered and disposed off-site, and the Main Tannery Building (including asbestos containing materials) were disposed off-site. Therefore, the potential for future contamination from these items has been eliminated leaving the areas of soil, sediment and groundwater contamination to be addressed. The objective of the proposed remedial actions is to control and possibly eliminate the metal contamination present in the various areas and medium within the site, and at the same time address residual and isolated VOC and SVOC contamination. The ultimate goal of the remedial actions is to protect human health and the environment, and meet regulatory standard and guidance values set forth in NYSDEC TAGM 4046 Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC TOGS 1.1.1. Ambient Water Quality Standards, NYSDEC Technical Guidance for Screening

Contaminated Sediments, and other NYSDEC approved acceptable Standards, Criteria and Guidance (SCGs).

### 2.2.1 Lower Pond & Creek Sediment

The contaminants of concern within the ponds & creek sediment are metals (primarily chromium and to a lesser extent arsenic) and to a minor degree SVOCs. The concentrations of SVOCs in sediment were above, but close to regulatory values within the ponds and creek, and are not the primary focus of the remedial action. The metals' concentrations in sediment are above, but close to regulatory values within the lower pond and creek sediment, but were highest within the samples collected from the creek just below the lower pond along the former tannery building, and are the focus of the remedial action. Considering these findings, the development of remediation goals is focused on controlling and/or reducing the levels of metals within the lower pond sediment and the creek sediment below the lower pond spillway, and/or performing additional investigation during Remedial Design.

### 2.2.2 Storm Water System

The contaminants of concern within the Storm Water System sediments are metals and to a lesser extent SVOCs. The concentration of benzo(a)pyrene (SVOC) and arsenic, beryllium, chromium, copper, nickel and zinc (metals) were above regulatory values, but were generally highest within catch basin #3. The remediation goals for the storm water system are focused on eliminating the metal contaminated sediment within the storm water system piping and basins.

### 2.2.3 Main Tannery Building

The contaminants of concern in the Main Tannery Building are primarily arsenic and chromium in soil and groundwater, with a few isolated VOCs and SVOCs. The development of remediation goals for this area focus on controlling and/or reducing the levels of metals, VOCs and SVOCs within soils and groundwater beneath and immediately adjacent to the Main Tannery Building.

### 2.2.4 Supplemental Main Tannery Building

The contaminants of concern in the Supplemental Main Tannery Building areas are primarily arsenic and chromium. The development of remediation goals for this area focus on controlling and/or reducing the levels of metals within surface soils.

## 2.3 General Response Actions

Based on the PID screening and analytical results of the site investigation, select areas of the site were identified as impacted primarily by metals used in the tanning process, and/or to a lesser extent by petroleum constituents (VOCs and SVOCs). As such, general response actions for each of these areas were developed as presented in the following sections. The intent of the general response actions is to address contamination and mitigate potential off-site impacts from the subject site.

In developing remediation goals for the subject site, the following design considerations were evaluated relative to economical and feasible solutions for addressing the residual metals and organic contamination remaining on-site:

- The proposed use of the site is for municipal purposes, most likely warehouse storage and potentially office space in the future. Residential uses of the site will not be allowed.

- Groundwater extraction/pumping and treating (i.e., carbon filtration or air strippers) are feasible remedial alternatives for addressing groundwater contaminated solely by petroleum constituents (VOCs and SVOCs). However, these treatment methods are not effective in removing metal analytes from groundwater. As the petroleum constituents in groundwater were residual in nature (no source area identified), are relatively low in concentration, and exist in areas with elevated metal contamination, evaluation of groundwater pump and treat methods were eliminated for the purpose of this project.

- Air sparging (AS) is the process of injecting air into the subsurface through vertical AS well points to enable a phase transfer of hydrocarbons from a dissolved state to a vapor phase. The air is then vented through the unsaturated zone. Soil vapor extraction (SVE) is an air removal process that strips and captures VOCs, and to a lesser extent SVOCs from the subsurface soil, typically through a series of horizontal

and/or vertical vapor extraction wells. These remedial action technologies, when utilized together, will remove or volatilize VOCs from the subsurface soil and groundwater and enhance natural degradation through the introduction of oxygen. The SVE system collects VOCs and depending on state and local air discharge requirements, the VOCs are discharged to the atmosphere, treated using carbon filtration, or destroyed in a catalytic (thermal) emission control system. As the VOCs in soil and groundwater were residual in nature (no source area identified) and present in areas with elevated metal contamination, evaluation of an AS/SVE system was eliminated for the purpose of this project.

- Bioremediation in the form of injecting an oxygen releasing compound (ORC)™ or hydrogen releasing compound (HRC)™ into the subsurface is currently employed at sites as a passive approach to degrade chlorinated solvents and petroleum related contaminants. ORC™ is a patented formulation of magnesium peroxide that slowly releases oxygen upon hydration for six months to a year. The oxygen supply thereby can accelerate remediation of any aerobically degradable compound. HRC™ is a polylactate ester used to remediate anaerobically degradable chlorinated hydrocarbons. HRC™, when contacted with water, slowly releases lactic acid that releases hydrogen (through microbes metabolizing) for bioremedation of the subsurface. However, these bioremediation technologies are specifically effective on compounds such as BTEX, MTBE and vinyl chloride (ORC™) or perchloroethylene and trichloroethylene (HRC™). Therefore, biroremediation was not considered a possible treatment technology at Risedorph Tannery as metals (the primary concern) are not anaerobically or aerobically biodegradable.

### 2.3.1 Lower Pond & Creek Sediment

The analytical data indicates that arsenic and chromium are present in sediment samples collected upstream of the upper pond, the upper pond, the lower pond and the creek along the former tannery building and downstream (off-site) of the site. The concentrations of arsenic and chromium upstream and within the upper pond, and downstream (off-site) of the creek are generally less than NYSDEC SCGs and therefore sediment remediation is not warranted. The chromium concentrations and to a lesser degree the arsenic concentrations in sediment in the lower pond are slightly above NYSDEC SCGs. The chromium and arsenic concentrations in sediment in the creek along the former tannery building are above NYSDEC SCGs. Considering this

information, the general response action is further investigation of the lower pond sediment to determine if biological impairment exists and targeted removal of the sediments in the creek along the former tannery building. Further evaluation of the lower pond sediments would be completed as a function of the Remedial Design.

In-place treatment or remediation of the contaminants of concern was ruled out due to the inherent difficulties with containing sediment within a constantly flowing surface water body.

### 2.3.2 Storm Water System

Based on analytical data, concentrations of metals within the sediment of the storm water system are elevated beyond SCGs. Similar contaminant concentrations were identified in the stream sediments immediately downstream of the outfall of the storm water system. The following general response actions were considered to address the contaminated sediments within the storm water system.

- No action with institutional controls,
- Remediation by sediment removal and cleaning,
- Closure of storm water system in place, or
- Remediation by removal of storm water system.

### 2.3.3 Main Tannery Building

The analytical data indicates that metals (mainly arsenic and chromium, and to a lesser extent magnesium and sodium) and a limited number of VOCs/SVOCs are present in soil and groundwater above regulatory values beneath and adjacent to the Main Tannery Building. The remediation area for the Main Tannery Building is estimated to be the footprint of the main building, but may be modified depending on site constraints and the extent of contamination. The general response actions to be considered are as follows:

- No action with institutional controls,
- Placement of soil barrier cover for contaminated areas with institutional controls,
- Limited hotspot soil excavation and disposal followed by placement of soil barrier cover with institutional controls,

- Excavation and disposal of all contaminated soil in excess of SCGs, or
- On-site stabilization, soil dewatering, temporary groundwater treatment and placement of soil barrier cover.

### 2.3.4 Supplemental Main Tannery Building

The analytical data indicates that arsenic and chromium are present in soil above regulatory values west of Warehouse #3 and south of the Upper Pond. The remediation area west of Warehouse #3 shall include Grids #7, #14, #15, #23, #35 and #36. The general response actions to be considered are as follows:

- No action with institutional controls,
- Placement of soil barrier cover with institutional controls, or
- Excavation and disposal of all contaminated soil in excess of SCGs.

## 3.0 DETAILED ANALYSIS OF ALTERNATIVES

### 3.1 Introduction

A detailed evaluation of the various remedial alternatives suitable for the four targeted remediation areas is summarized below. Refer to Figure 1 for location of general remediation areas listed.

Lower Pond

- No action with institutional controls
- Sediment removal
- Further investigation as part of Remedial Design

Creek Along the Former Tannery Building

- No action with institutional controls, or
- Sediment removal

Storm Water System

- No action with institutional controls,
- Cleaning the interior surfaces of the pipes and catch basins of the storm water system,
- Seal the storm water system by capping / filling the pipes and catch basins with concrete, or
- Demolition and removal of entire system.

Main Tannery Building and Supplemental Main Tannery Building

- No action with institutional controls,
- Placement of soil barrier cover for contaminated areas with institutional controls,
- Limited hotspot soil excavation and disposal followed by placement of soil barrier cover with institutional controls,
- Excavation and disposal of all contaminated soil in excess of SCGs, or
- On-site stabilization, soil dewatering, temporary groundwater treatment and placement of soil barrier cover.

Each remedial alternative was evaluated based on specific criteria set forth in 6NYCRR Part 375-1.10(c)(1-7, inclusive). The evaluation criteria will be used by the NYSDEC in

the selection process for the most appropriate remedy considering the site conditions, level of implementation, and cost-effectiveness. From this RAR and the SI Report, the Department will then prepare a Proposed Remedial Action Plan (PRAP) to be submitted to the public with the SIR and the RAR. Any issues raised by the public will be addressed by the Department in a Responsiveness Summary. The final remedy for the site will be documented in the Record of Decision (ROD) prepared by NYSDEC after a 45 day public comment period.

The first six (6) of the following seven (7) topics form the basic components of the detailed analysis of each alternative whereby each topic will be compared to others to determine the most cost effective, protective remedy. The Department will use topic #7 in their evaluation once the public comment period has ended.

1. Overall protection of human health and the environment;
2. Compliance with Standards, Criteria, and Guidance (SCGs);
3. Short-term effectiveness;
4. Long-term effectiveness;
5. Reduction of toxicity, mobility, and volume;
6. Feasibility; and
7. Community acceptance.

The remedial alternative approach of no action with institutional controls could be applied to most sites where low level contamination is present and fully delineated, and does not pose a significant threat to human health or the environment. This alternative is best suited for low level contamination, but could also be applied if higher levels of contamination are present and there is no significant threat to the human health or the environment.

Institutional controls are means of attaching restrictions to the property to limit site activities and future use of the property, and to assure due diligence in notification of prospective purchasers and the public. These restrictions could also include installation of fencing or other means of limiting access to the site or a particular area of the site. The site's current and future land use plays a significant role in selecting the most effective institutional controls. Examples of institutional controls typically include land use and drinking water use restrictions, deed restrictions, and notification in public

registries of excavation and construction work activity, and appropriate posting of informational signs at the site. Depending on the severity of contamination, institutional controls could be required as well as other feasible remedial alternatives being performed. For the purpose of analyzing the alternatives below specific examples of institutional controls (as discussed above) are not referenced, as institutional controls would be selected based on the results of remedial action performed.

### 3.2 Individual Analysis of Alternatives – Pond Sediment

The analytical data generated during the site investigation phase of this project identified SVOCs and metals (arsenic, chromium and zinc) in sediment above regulatory guidance values in the ponds, but at levels close to SCGs. Based on the concentrations and physical composition of the detected contaminants, it is not likely that the contaminants would be released from the sediments without disturbance.

The remedial alternatives evaluated included the following:

- *No Action with Institutional Controls*

The No Action with Institutional Controls alternative would consist of leaving sediments in-place as is and implementing institutional controls. The institutional controls would be selected to provide notification of the existence of the contamination and control future disturbance.

- *Targeted Sediment Removal*

The Targeted Sediment Removal alternative would consist of removal of sediment from the localized areas within each pond. The limits of the sediment removal would be based on arsenic levels in the Upper Pond and chromium levels in the Lower Pond. To effectively complete the removal, the pond would have to be separated so that a portion of the pond could be dewatered and excavated to access sediments and also deter them from migrating downstream. Once the sediment removal activity is completed, confirmatory samples would be required to determine the satisfactory completion of the targeted action. The sediment, once excavated and dewatered, would be sampled and analyzed to determine the most suitable disposal method. As an alternative to disposal, soil stabilization may be considered. Stabilization refers to those techniques that reduce the hazard potential of a waste by converting the contaminants into their

least soluble, mobile, or toxic form. Stabilization of soil is performed by a mechanical system consisting of mixers, chemical storage and feeding devices, pumps, conveyors and ancillary equipment. Stabilized soil would be managed on-site.

- *Further Investigation as part of Remedial Design*

The impacts from arsenic and chromium being present in the sediment are undetermined at this time. As part of the Remedial Design phase of this project further investigation of the ponds may be warranted to determine the level, if any, of biological impairment. The further investigation would include a benthic community assessment and sediment toxicity tests. The results of these additional investigations would be used to determine if targeted sediment removal is warranted.

### 3.2.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment would not be significantly improved by implementing the No Action with Institutional Controls alternative. The potential exposure to human health includes ingestion or direct contact with sediments or ingestion of organisms taken from the pond. Implementing this alternative would not alter current or future impacts to the environment. Residual public health risks in the form of potential exposure to the contaminants in the sediment will be slightly less with effective institutional controls, but not eliminated. Residual environmental risks will remain as they currently exist and will not change as a result of implementing the No Action with Institutional Controls alternative.

Exposure to human health and the environment would be reduced upon completion of the Targeted Sediment Removal alternative since this action would remove the majority, if not all of the metals contamination from the pond sediments. If compliance with SCGs were achieved with implementation of this alternative, it is expected that there would be no residual public health risks. There would be residual environmental risks associated with this alternative in that this action would temporarily impair the environment, but over time, would re-acclimate itself to the new pond conditions.

### 3.2.2 Compliance with Standards, Criteria and Guidance

The applicable standards, criteria and guidance (SCG) for this project were previously established as NYSDEC TAGM 4046 for soil and, in part, NYSDEC Technical Guidance

for Screening Contaminated Sediments for sediments. The sediments do not currently comply with NYSDEC guidance values primarily for arsenic and chromium and to a lesser extent copper, mercury and zinc. No Action with Institutional Controls may control potential human exposure to the site contaminants; however, natural attenuation would not likely reduce contaminant concentrations over time. Therefore, compliance with SCGs may never be reached with the No Action alternative.

With the implementation of Targeted Sediment Removal alternative, sampling and analysis of the sediments remaining after contaminated sediment removal would be necessary. This sampling would confirm that the quality of sediment remaining in-place meets or exceeds NYSDEC standard and guidance values. If standard and guidance values were achieved, compliance with SCGs would be immediate.

### 3.2.3 Short-term Effectiveness

The short-term effectiveness of No Action with Institutional Controls alternative could be observed immediately provided the institutional controls were implemented immediately and are effective. A slight reduction in the potential for impacts to human health will be realized once institutional controls have been put in-place. There will be no impact to the community or the environment during the implementation of this alternative. The City of Gloversville could initiate no action with institutional controls quickly and could be in-place less than two months after the Record of Decision.

The effectiveness of the Targeted Sediment Removal alternative will be realized almost immediately, upon successful removal of the contaminated sediments and restoration of the stream. The community will be protected during the remedial action by establishing a work zone that excludes unauthorized individuals and by performing the sediment removals in a manner that deters the generation of airborne particles that may be contaminated. Initially, environmental impacts to the pond would include significant disturbance to the pond bed as a result of this remedial action. Otherwise, the short-term effectiveness of the Targeted Sediment Removal will be immediately effective provided that the SCGs are achieved as confirmed by sampling and analysis of the sediment remaining in-place. Initiating the Targeted Sediment Removal alternative would include pond flow diversion and sediment excavation. It is anticipated that this alternative could be completed within two months depending on the severity and extent of the sediment contamination, and weather.

### 3.2.4 Long-term Effectiveness and Permanence

Implementing the No Action with Institutional Controls alternative may have limited long-term effectiveness as institutional controls may tend to break down and lose effectiveness over the long-term due to diminished enforcement of controls and turnover of individuals knowledgeable of the controls. Although the placement of institutional controls are intended to be long-term and permanent, the long-term effectiveness is also a function of record keeping whereby files may become lost or certain individuals fail to review property information prior to purchasing the property or prior to performing construction activities. Residual risks will remain after implementing this alternative because natural attenuation would not likely reduce contaminant levels over time since the contaminants (metals) do not readily degrade. This alternative is not considered to be an adequate or reliable means of mitigating the potential for impacts to human health or the environment.

The long-term effectiveness of the Targeted Sediment Removal alternative would be similar to the short-tem effectiveness, but may also improve over time. Residual risks include the effects on the environment as a result of implementing this alternative. Flora and fauna native to the area would become re-established over the long-term and may ultimately benefit from an improved environment. As the elimination of sediment contamination is the focus of the remedial alternative and the metals do not typically leach from the sediment, residual surface water impacts would not be anticipated. There would also be no long-term remedial actions required with implementation of the targeted removal provided the SCGs are reached. This alternative is considered to be an adequate and reliable means of mitigating the potential for impacts to human health and the environment.

### 3.2.5 Reduction of Toxicity, Mobility, and Volume

The implementation of No Action with Institutional Controls alternative will not result in reduction of toxicity, mobility, and volume of metals contamination present in the pond sediment. Natural attenuation is not known to be effective in reducing the toxicity of metal analytes. Implementation of institutional controls is a reversible action.

The implementation of the Targeted Sediment Removal alternative will largely reduce if not eliminate the volume of metals contamination in the pond. With the removal of the contaminated pond sediments, the toxicity of the sediment will be reduced. The mobility of metals contamination in this area will be reduced or eliminated upon successful removal of the contaminated sediments. Implementation of Targeted Sediment Removal is not a reversible action.

### 3.2.6 Feasibility

Site conditions have no bearing on the implementation of the No Action with Institutional Controls alternative and therefore are considered suitable. It is reasonable to assume that placement of institutional controls can be implemented and is feasible since the City currently owns the property. City personnel and services are available to implement this alternative. This alternative is considered cost effective relative to the limited reduction in potential impacts to human health. However, the remedial option of No Action with Institutional Controls alternative is considered a feasible option since the concentrations of metals are only slightly elevated above SCGs, are not readily accessible, and do not appear to be present in pond surface water.

The site conditions are not favorable for implementation of the Targeted Sediment Removal remedial alternative as separating a portion of the pond and dewatering for sediment excavation may be difficult and labor intensive. Furthermore, the estimated area potentially requiring remediation is large. Contractors and materials are readily available to implement this alternative. From a cost perspective, sediment removal is a one-time cost that is effective in removing the contamination quickly to achieve compliance with SCGs.

## 3.3 Individual Analysis of Alternatives – Creek Sediment

Chromium was detected in stream sediments at concentrations above regulatory standards that warrant evaluation of remedial alternatives. The highest concentrations were detected immediately downstream of the lower pond spillway along the former tannery building and the storm water discharge pipe outfall into the site creek. Therefore, the remediation area would be slightly up-stream of the discharge point of the outfall of the storm water system to a point estimated to be one hundred and fifty

feet downstream. Confirmatory sampling at the time of remedial action implementation will determine the extent of the area to be treated.

The remedial alternatives evaluated included the following:

- *No Action with Institutional Controls*

The No Action with Institutional Controls alternative would be similar to those imposed on the ponds whereby the sediments would be left in-place and institutional controls would be implemented. The institutional controls would be selected to provide notification of the existence of the contamination and control future disturbance.

- *Targeted Sediment Removal*

The Targeted Sediment Removal alternative would consist of removal of sediment from the localized area starting around the discharge pipe and would be continued upstream and downstream from that point until removal of the chromium contamination was adequately completed. To effectively complete the removal, the stream flow would have to be temporarily diverted so that the stream could be excavated to deter sediments from migrating downstream. Once the sediment removal activity is completed, confirmatory samples would be required to determine the satisfactory completion of the targeted action. The sediment, once excavated and dewatered, would be sampled and analyzed to determine the most suitable disposal method. As an alternative to disposal, soil stabilization may be considered. Stabilization refers to those techniques that reduce the hazard potential of a waste by converting the contaminants into their least soluble, mobile, or toxic form. Stabilization of soil is performed by a mechanical system consisting of mixers, chemical storage and feeding devices, pumps, conveyors and ancillary equipment. Stabilized soil would be managed on-site.

### 3.3.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment would not be significantly improved by implementing the No Action with Institutional Controls alternative. The potential exposure to human health includes ingestion or direct contact with sediments or ingestion of organisms taken from the stream. Implementing this alternative would not alter current or future impacts to the environment. Residual public health risks in

the form of potential exposure to the contaminants in the sediment will be slightly less with effective institutional controls, but not eliminated. Residual environmental risks will remain as they currently exist and will not change as a result of implementing the No Action with Institutional Controls alternative.

Exposure to human health and the environment would be reduced upon completion of the Targeted Sediment Removal alternative since this action would remove the majority, if not all of the metals contamination from the stream sediments. If compliance with SCGs were achieved with implementation of this alternative, it is expected that there would be no residual public health risks. There would be residual environmental risks associated with this alternative in that this action would temporarily impair the environment, but over time, would re-acclimate itself to the new stream conditions.

### 3.3.2 Compliance with Standards, Criteria and Guidance

The applicable standards, criteria and guidance (SCG) for this project were previously established as NYSDEC TAGM 4046 for soil and, in part, NYSDEC Technical Guidance for Screening Contaminated Sediments for sediments. The sediments do not currently comply with NYSDEC guidance values primarily for chromium and to a lesser extent arsenic, copper and zinc. No Action with Institutional Controls may control potential human exposure to the site contaminants; however, natural attenuation would not likely reduce contaminant concentrations over time. Therefore, compliance with SCG may never be reached with the No Action alternative.

With the implementation of Targeted Sediment Removal alternative, sampling and analysis of the sediments remaining after contaminated sediment removal would be necessary. This sampling would confirm that the quality of sediment remaining in-place meets or exceeds NYSDEC standard and guidance values. If standard and guidance values were achieved, compliance with SCG would be immediate.

### 3.3.3 Short-term Effectiveness

The short-term effectiveness of No Action with Institutional Controls alternative could be observed immediately provided the institutional controls were implemented immediately and are effective. A slight reduction in the potential for impacts to human health will be realized once institutional controls have been put in-place. There will be

no impact to the community or the environment during the implementation of this alternative. The City of Gloversville could initiate no action with institutional controls quickly and could be in-place less than two months after the Record of Decision.

The effectiveness of the Targeted Sediment Removal alternative will be realized almost immediately, upon successful removal of the contaminated sediments and restoration of the stream. The community will be protected during the remedial action by establishing a work zone that excludes unauthorized individuals and by performing the sediment removals in a manner that deters the generation of airborne particles that may be contaminated. Initially, environmental impacts to the stream would include significant disturbance to the streambed as a result of this remedial action. Otherwise, the short-term effectiveness of the Targeted Sediment Removal will be immediately effective provided that the SCGs are achieved as confirmed by sampling and analysis of the sediment remaining in-place. Initiating the Targeted Sediment Removal alternative would include stream flow diversion and sediment excavation. It is anticipated that this alternative could be completed within two months depending on the severity and extent of the sediment contamination, and weather.

### 3.3.4 Long-term Effectiveness and Permanence

Implementing the No Action with Institutional Controls alternative may have limited long-term effectiveness as institutional controls may tend to break down and lose effectiveness over the long-term due to diminished enforcement of controls and turnover of individuals knowledgeable of the controls. Although the placement of institutional controls are intended to be long-term and permanent, the long-term effectiveness is also a function of record keeping whereby files may become lost or certain individuals fail to review property information prior to purchasing the property or prior to performing construction activities. Residual risks will remain after implementing this alternative because natural attenuation would not likely reduce contaminant levels over time since the contaminants (metals) do not readily degrade. This alternative is not considered to be an adequate or reliable means of mitigating the potential for impacts to human health or the environment.

The long-term effectiveness of the Targeted Sediment Removal alternative would be similar to the short-tem effectiveness, but may also improve over time. Residual risks include the effects on the environment as a result of implementing this alternative.

Flora and fauna native to the area would become re-established over the long-term and may ultimately benefit from an improved environment. As the elimination of sediment contamination is the focus of the remedial alternative and the metals do not typically leach from the sediment, residual surface water impacts would not be anticipated. There would also be no long-term remedial actions required with implementation of the targeted removal provided the SCGs are reached. This alternative is considered to be an adequate and reliable means of mitigating the potential for impacts to human health and the environment.

### 3.3.5 Reduction of Toxicity, Mobility, and Volume

The implementation of No Action with Institutional Controls alternative will not result in reduction of toxicity, mobility, and volume of metals contamination present in the stream sediment. Natural attenuation is not known to be effective in reducing the toxicity of metal analytes. Implementation of institutional controls is a reversible action.

The implementation of the Targeted Sediment Removal alternative will largely reduce if not eliminate the volume of metals contamination in the area downstream of the lower pond spillway. With the removal of the source of contamination (stream sediments), and anticipated remedial actions for the storm water drainage system (as discussed in subsequent sections), the toxicity of the sediment will be reduced. The mobility of metals contamination in this area will be reduced or eliminated upon successful removal of the contaminated sediments. Implementation of Targeted Sediment Removal is not a reversible action.

### 3.3.6 Feasibility

Site conditions have no bearing on the implementation of the No Action with Institutional Controls alternative and therefore are considered suitable. It is reasonable to assume that placement of institutional controls can be implemented and is feasible since the City currently owns the property. City personnel and services are available to implement this alternative. This alternative is considered cost effective relative to the limited reduction in potential impacts to human health. However, the remedial option of No Action with Institutional Controls alternative is not considered a feasible option

since the concentrations of metals are abnormally high and will not likely be reduced over time to comply with SCG.

The site conditions are considered suitable for the Targeted Sediment Removal remedial alternative since the stream flow is generally low, the stream width is no more than twenty-five feet, and the estimated area requiring remediation is isolated. Contractors and materials are readily available to implement this alternative. From a cost perspective, sediment removal is a one-time cost that is effective in removing the contamination quickly to achieve compliance with SCG.

### 3.4 Individual Analysis of Alternatives – Storm Water System

One SVOC and six metals were detected at concentrations above regulatory standards in sediments associated with the storm water system located in the vicinity of the main tannery building area. Furthermore, contamination was identified in stream sediments located immediately downstream of the outfall of the storm water system. The contaminated sediments exist in the sumps of catch basins and possibly within the inverts of the pipes between catch basins. The remediation area would be catch basins #1, #2 & #3 and the pipes connecting these catch basins to the outfall at the stream.

The remedial alternatives evaluated included the following:

- *No Action with Institutional Controls*

The No Action with Institutional Controls alternative would consist of leaving the storm water system as is and implementing institutional controls. The institutional controls would be selected to provide notification of the existence of the contamination and control future disturbance.

- *Remediation By Sediment Removal and Cleaning*

The Remediation by Sediment Removal and Cleaning alternative would involve accessing and removing contaminated sediments from catch basin sumps, manually or mechanically cleaning sediments within pipes, power washing the entire system and collecting / treating residual wash water.

- *Closure of Storm Water System In Place*

The Closure of Storm Water System In Place alternative would involve filling and sealing all catch basins and openings to pipes with inert material and concrete to effectively seal the system.

- *Remediation by Removal of Storm Water System*

The Remediation by Removal of Storm Water System alternative would consist of physically removing the storm water system catch basins and pipe structures. Sediments in the system would be removed prior to demolishing the structures.

### 3.4.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment would not be significantly improved by implementing the No Action with Institutional Controls alternative. The potential for exposure to human health after implementation of this alternative would be slightly mitigated provided the institutional controls are effective. Impacts to the environment would not be mitigated by implementation of this alternative. Residual public health risks in the form of potential exposure to the contaminants in the storm water system will remain, and not be significantly mitigated by implementation of this alternative. Residual environmental risks will remain and will not be mitigated at all by implementation of this alternative.

Exposure to human health and the environment would be effectively eliminated upon completion of the Remediation by Sediment Removal and Cleaning alternative because contaminated sediments would no longer exist at the site after proper disposal. There would also be no residual public health or environmental risks after the remediation for the same reason.

Exposure to human health and the environment would be minimized upon completion of the Closure In Place of Storm Water System alternative because a barrier to contact to the contaminated sediments would be created. There would be some residual public health risks remaining after the remediation, mainly if the barrier to contact was breached or the storm water system was disturbed by invasive activities such as construction. There would also be some residual environmental risks for the same reason.

Exposure to human health and the environment would be effectively eliminated upon completion of the Remediation by Removal of Storm Water System alternative because contaminated sediments would no longer exist at the site after proper disposal. There would also be no residual public health or environmental risks after the remediation for the same reason.

### 3.4.2 Compliance with Standards, Criteria and Guidance

The standards, criteria and guidance (SCGs) applicable to remediation of the storm water system are NYSDEC TAGM 4046 for sediments and, in part, NYSDEC Technical Guidance for Screening Contaminated Sediments. Sediments within the storm water system do not currently comply with NYSDEC TAGM 4046 recommended cleanup objective values for soils. The No Action with Institutional Controls will not reduce contaminant concentrations and it is not likely that contaminant concentrations will be reduced over time by natural attenuation.

Upon successful implementation of the Remediation by Sediment Removal and Cleaning alternative, the contaminated sediments within the storm water system would no longer exist and therefore compliance with applicable standards, criteria and guidance will be achieved.

Upon completion of the Closure In Place alternative, contaminated sediments will remain and therefore compliance with SCG will not be achieved. It is not anticipated that remaining concentrations will be significantly reduced by natural attenuation over time.

Upon successful implementation of the Remediation by Removal alternative, compliance with applicable standards, criteria and guidance will be achieved, as the systems and contaminated sediments would no longer exist.

### 3.4.3 Short-term Effectiveness

The effectiveness of the No Action with Institutional Controls alternative will be realized in the short term and could be implemented in less than two months. A small reduction in the potential for impacts to human health will be realized once institutional controls have been put in place. There will be no impact to the community or the environment during implementation of this alternative.

The effectiveness of the Remediation by Sediment Removal and Cleaning alternative will be realized immediately upon removal of the contaminated sediments from the storm water system. The community will be protected during the remedial action by establishing a work zone that excludes unauthorized individuals and by performing the sediment removals in a manner that limits the generation of airborne particles that may be contaminated. There will be no significant environmental impacts as a result of implementing this alternative. This alternative could be implemented within a few months following authorization to proceed.

The effectiveness of the Closure In Place alternative will be realized immediately upon closure of the storm water system. Potential impacts to the community are expected to be minimal because little disturbance to the contaminated sediments will occur during remediation and a work zone exclusion area will be established. There will be no significant environmental impacts as a result of implementing this alternative. The alternative could be implemented within a few months following authorization to proceed.

The effectiveness of the Remediation by Removal alternative will be realized immediately upon demolition of the storm water system. The community will be protected during the remedial action by establishing a work zone that excludes unauthorized individuals and by performing the demolition in a manner that limits the generation of airborne particles that may be contaminated. There will be no significant environmental impacts as a result of implementing this alternative. This alternative could be implemented within a few months of authorization to proceed.

### 3.4.4 Long-term Effectiveness and Permanence

Implementing the No Action with Institutional Controls alternative will have limited long term effectiveness. A small reduction in the potential for impacts to human health will be realized as long as institutional controls remain in place. There will be no impact to the environment by implementing this alternative. The remedial action (placement of institutional controls) is intended to be long term and permanent. Residual risks will remain after implementing this alternative because contaminated sediments will remain in the storm water system. This alternative is not considered to be an adequate or reliable means of mitigating the potential for impacts to human health or the environment.

Implementation of the Sediment Removal and Cleaning alternative will be a long term and permanently effective means of remediating contamination in this area. There will be no residual risks remaining upon completion of the remediation. This alternative is considered an adequate and reliable means of eliminating the potential for impacts to human health and the environment.

Implementation of the Closure In Place alternative is intended to provide long term effectiveness, but cannot be considered permanent. This alternative is considered moderately effective in the long term because the contamination will remain in place and may be disturbed in the future. Residual risks will exist if this alternative is implemented. The contamination will remain in place and exposure to human health or the environment may occur if the sediments are disturbed by construction or other activities or if the materials utilized to close the system degrade. This alternative is considered adequate, but not a fully reliable means of controlling contamination in the long term.

Implementation of the Removal of Storm Water System alternative is a long term and permanently effective means of remediating contamination in this area. There will be no residual risks remaining upon completion of the remediation. This alternative is considered an adequate and reliable means of eliminating the potential for impacts to human health and the environment.

### 3.4.5 Reduction of Toxicity, Mobility and Volume

Implementing the No Action with Institutional Controls alternative will not reduce the toxicity, mobility or volume of the contamination present in the storm water system sediments. Implementation of institutional controls is a reversible action.

Implementing the Remediation by Sediment Removal and Cleaning alternative will effectively eliminate the toxicity, mobility and volume of the contaminated sediments in the storm water system as the contaminated sediments will be removed from the site and properly disposed. This remediation alternative is irreversible.

Implementing the Remediation by Closure In Place alternative will not reduce the toxicity and volume of contaminated sediments in the storm water system, but will eliminate the mobility, as the contaminated sediments will be sealed in place. This alternative is considered to be a virtually irreversible remedial activity.

Implementing the Remediation by Removal of the Storm Water System alternative will effectively eliminate the toxicity and mobility of the contaminated sediments in the storm water system. The entire volume of contaminated sediments will be removed from the site and properly disposed as well as the storm water structures. This remedial alternative is irreversible.

### 3.4.6 Feasibility

Site conditions are suitable for the implementation of the No Action with Institutional Controls alternative and therefore are considered feasible. It is reasonable to assume that placement of institutional controls can be implemented and is feasible since the City currently owns the property. City personnel and services are available to implement this alternative. This alternative is considered cost effective relative to the limited reduction in potential impacts to human health.

Site conditions are suitable for implementation of the Remediation by Sediment Removal and Cleaning alternative. Affected catch basins are accessible. Pipe diameters and configurations may make it difficult to remove the contaminated sediments from the pipes. This alternative could be easily implemented by retaining a remediation contractor to perform the work. Remediation contractors available to implement this alternative routinely provide this service and have the materials necessary to complete the work. This alternative is considered to be a moderately cost effective means of controlling the potential impacts to human health.

Site conditions are suitable for implementation of the Remediation by Closure In Place alternative with one exception. Affected catch basins are located such that they can be accessed, filled and sealed. However, it may be difficult to completely fill all structures with inert material or concrete (i.e., pipes) and consideration will have to be given to upgradient surface water flow in the absence of this drainage system. This alternative could be implemented by retaining a contractor to fill the structures. There may be some difficulty in completely sealing structures and fully implementing this remedial alternative. Contractors and materials are readily available to implement this alternative. This alternative is considered to be a moderately cost effective means of controlling the potential impacts to human health.

Site conditions are generally suitable for implementation of the Remediation by Removal alternative with one exception. Affected catch basins are accessible; however, consideration will have to be given to upgradient surface water flow in the absence of this drainage system. The majority of the piping to be demolished is accessible. The location of the pipe location between the outfall and the nearest upstream location has not been fully defined, but appears to be accessible for demolition. It is assumed that site and system conditions will be suitable for removal and segregation of the majority of the contaminated sediments prior to and during demolition. This alternative could be readily implemented by retaining a remediation contractor to perform the work. Remediation contractors available to implement this alternative routinely provide similar services and have the materials necessary to complete the work. This alternative is considered to be a highly cost effective means of controlling the potential impacts to human health.

### 3.5 Individual Analysis of Alternatives – Main Tannery Building and Supplemental Main Tannery Building

The Main Tannery Building and Supplemental Main Tannery Building are separate areas of the site. Based on similarities of contaminants of concern and applicable remedial technologies available, both areas are evaluated within this section.

The contaminants of concern for the Main Tannery Building are metals (primarily arsenic and chromium, but also to a lesser degree magnesium, and sodium) in soil and groundwater, and residual levels of VOCs and SVOCs in the same media. The contaminants of concern were detected in below grade soils and the shallow groundwater table. Most of the contaminants are currently inaccessible to direct contact due to the fact that the building's concrete floor slab covers the majority of the remediation area.

The contaminants of concern for the Supplemental Main Tannery Building area are primarily arsenic and chromium in surface soil and the upper portions of the subsurface soil (i.e., generally less than four feet below grade). Groundwater in this area is not impacted beyond regulatory values and would not require remedial action.

The remedial alternatives evaluated included the following:

- *No Action with Institutional Controls*

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison to other remedial alternatives. This alternative requires continued groundwater monitoring, allowing the site to remain in an unremediated state. Under this remedial alternative the site would be left in its current condition and would remain as a potential hazard to human health and/or the environment. Future site development or other uses would be reasonable scenarios during which potential exposure could occur. Institutional controls would have to be tailored with these concepts in consideration.

- *Placement of Soil Barrier Cover for Contaminated Areas With Institutional Controls*

This alternative would place a protective soil barrier or other low permeability material over the footprint of the Main Tannery Building, the courtyard area and the Supplemental Main Tannery Building (i.e., the area west of Warehouse #3 and the area south of the Upper Pond). The thickness of the soil cover is anticipated to be one to two feet with an appropriate six inch layer of topsoil over the soil cover. The soil cover would require periodic maintenance (O&M) to monitoring the vegetative growth and potential erosion. Since this alternative would leave contaminated soil on site, institutional controls in the form of deed restrictions would be required to notify future owners and/or developers of the restricted use of the property.

Other acceptable forms of protective cover would include concrete sidewalks, asphalt/concrete parking lots, building footprints, or other acceptable strategies that provide a barrier to contact with the contaminated soils. Any excavated contaminated soil needed to implement an acceptable alternative protective cover would be properly managed according to regulatory requirements. Figure 2 depicts the areas of the site influenced by the implementation of this alternative.

The overall intent of this option would be to deter surface water infiltration into those contaminated soils being left in-place, specifically those beneath the Main Tannery Building. Currently, storm water ponds on the floor slab of the former Main Tannery Building and likely infiltrates through the incompetent floor and slab perforations. This alternative also includes demolition of those portions of foundation walls that remain

above grade (floor slab to remain in place) to allow for proper placement and grading of the barrier.

- *Limited Hotspot Soil Excavation and Disposal followed by Placement of Soil Barrier Cover with Institutional Controls*

This alternative is identical to Alternate #2 above except that additional remedial action is included prior to placement of the soil cover. This remedial action involves limited excavation and proper disposal of arsenic and/or chromium impacted soils beyond 30 mg/kg and 50 mg/kg concentrations, respectively. The values of 30 and 50 mg/kg were selected based on review of the analytical results so that the majority of the highly contaminated soils would be addressed. These concentration limits translate to those areas depicted on Figure 3. Based on the analytical testing performed during the site investigation, the impacted soils are assumed to be non-hazardous.

- *Excavation and Disposal of All Contaminated Soil In Excess of SCGs*

This alternative would remediate all the impacted soil in the main tannery area to meet NYSDEC TAGM 4046 recommended soil cleanup objectives. Soils would be excavated and properly disposed of according to Department regulations. The remediation area for this alternative consists of the soil beneath the Main Tannery Building floor slab, limited areas outside and adjacent to the footprint of the Main Tannery Building and the Supplemental Main Tannery Building (i.e., the area west of Warehouse #3 and the area south of the Upper Pond). The concrete floor slab associated with the Main Tannery Building would be removed to access the contaminated media and soil dewatering and treatment would be implemented at the time of excavation due to the shallow groundwater condition. Confirmatory soil samples would be collected and analyzed to ensure NYSDEC TAGM 4046 objectives are met. Figure 4 depicts the areas of the site influenced by the implementation of this alternative.

The soil beneath the Main Tannery Building, once excavated and dewatered (as necessary) and the soil removed from the Supplemental Main Tannery Building (i.e., the area west of Warehouse #3), would be characterized to determine the most suitable disposal method. As an alternative to disposal, soil stabilization may be considered as described in the following alternative.

- *On-Site Stabilization, Soil Dewatering, Temporary Groundwater Treatment and Placement of Soil Barrier Cover*

This alternative would involve amending the excavated soils with chemicals to bind (stabilize) the metal contaminants. Stabilization refers to those techniques that reduce the hazard potential of a waste by converting the contaminants into their least soluble, mobile, or toxic form and replacing back in the open excavation from which they were generated. Stabilization of soil is performed by a mechanical system consisting of mixers, chemical storage and feeding devices, pumps, conveyors and ancillary equipment. If ex-situ methods are employed, soil dewatering and groundwater treatment for metals must be a component of the remedial action. The last step of this remedial alternative would be placement of a soil barrier to contact. The stabilization of the soil impacted by metals would be generally within the footprint of the Main Tannery Building and depending on characterization results, the Supplemental Main Tannery Building (i.e., the area west of Warehouse #3 and the area south of the Upper Pond)) to the appropriate excavation limits shown in Figure 4.

### 3.5.1 Overall Protection of Human Health and the Environment

Implementing the No Action with Institutional Controls alternative would not significantly improve overall protection of human health and the environment. Limited protection of human health would be established provided the institutional controls are implemented and maintained. Impacts to the environment would not be mitigated by implementing this alternative. Residual public health risks in the form of potential exposure to the contaminants below grade in soil and groundwater will remain, and will not be mitigated by this alternative. Residual environmental risk will remain after implementing this remedial alternative.

The Placement of a Soil Barrier Cover alternative would provide effective protection to human health and the environment. The barrier would prevent contact by humans passing over the area and contact by non-burrowing wildlife. Overall protection to human health and the environment is a function of the long-term maintenance of the barrier to contact. Upon completion of this alternative, residual public health risk will not be eliminated, but will be significantly reduced. Residual risks to the environment after implementation of this alternative would also exist at a reduced level.

The Limited Hotspot Soil Excavation and Disposal followed by Placement of Soil Barrier Cover with Institutional Controls alternative is the same as the previous alternative (placement of soil barrier) except that there would be excavation and disposal of select areas where impacts are relatively high (hotspot removal). The alternative would reduce exposure to human health and the environment in areas of elevated metals impacts, and would minimize exposure to human health and environment in the remaining portions of the site due to the placement of the soil barrier to contact.

The Excavation and Disposal of All Contaminated Soil In Excess of SCGs alternative would remove the majority, if not all, of the metals contamination from within the Main Tannery Building and associated area west of Warehouse #3 (i.e., the Supplemental Main Tannery Building). After remediation is completed, there would be no anticipated exposure to human health and the environment unless groundwater contamination remained above SCGs. Residual public health risks and environmental risks after completion of remediation would be minimal, if any. These residual risks would be related to potential contact with residually contaminated groundwater if groundwater remained above SCGs (Main Tannery Building only).

The On-Site Stabilization, Soil Dewatering, Temporary Groundwater Treatment and Placement of Soil Barrier Cover consists of stabilization of metals in soil, groundwater treatment during implementation of this alternative and soil barrier to contact components. By implementing the stabilization and barrier to contact component, overall protection of human health and the environment would be realized upon completion of this activity. The temporary groundwater treatment aspect of this alternative would provide additional protection of human health and the environment, as reduction of the groundwater contamination would occur (Main Tannery Building only). There would be public health risks associated with the implementation of this alternative as it includes some form of in-situ or ex-situ soil mixing and/or chemical reagent injection, and operation of the soil dewatering/groundwater treatment system (mainly if the equipment fails to operate properly). There would be some residual environmental risks present depending on the effectiveness of the stabilization, barrier to contact or groundwater treatment system.

### 3.5.2 Compliance with Standards, Criteria and Guidance

The applicable standards, criteria and guidance (SCG) for this project were previously established as NYSDEC TAGM 4046 (soil) and NYSDEC Ambient Water Quality Standards (groundwater). Currently, the soil and groundwater beneath the Main Tannery Building do not meet SCGs. The soils in the Supplmental Main Tannery Building area west of Warehouse #3 do not meet soil SCGs. Groundwater in the Supplemental Main Tannery Building area is not impacted. The residual VOCs and SVOCs exist at relatively low levels approaching SCGs, and their concentrations would likely decrease due to natural attenuation in conjunction with the No Action or Placement of Soil Barrier alternatives. The concentrations of metals, however, would likely remain similar due to their physical characteristics and may not ever reach SCGs.

The Placement of Soil Barrier alternative is similar to the Limited Hotspot Soil Excavation alternative, and compliance with SCGs will not be achieved except for those areas where excavation of impacted soil is planned. Under the Limited Hotspot Soil Excavation alternative, compliance with applicable SCGs is expected unless groundwater impacts remain. Compliance with SCGs would be determined through sampling and analysis of soil and groundwater left in-place after completion of this alternative.

With the Excavation and Disposal of All Contaminated Soil In Excess of SCGs alternative, compliance with SCGs would likely be achieved. Compliance with SCGs would be determined through sampling and analysis of soil and groundwater left in-place after completion of this remedial alternative. If soil and groundwater standard and guidance values were achieved, compliance with SCG would be immediate.

The stabilization component of the On-Site Stabilization, Soil Dewatering, Temporary Groundwater Treatment and Placement of Soil Barrier Cover alternative would achieve compliance with SCGs. The contaminants should be physically and chemically bound within a solidified matrix (solidification) or converted into a more immobile form usually by a chemical reaction (stabilization). These methods would inhibit the contaminants from leaching from the soil into groundwater thereby eliminating the source of these contaminants. The temporary soil dewatering and groundwater treatment part of this alternative would involve treating the groundwater extracted from the area to allow for the soil excavation to occur, therefore compliance with SCGs

may or may not be achieved. However, it is expected that the level of metals contaminants would be significantly reduced and would possible meet SCGs once the soils have been treated. Compliance with SCGs for the barrier to contact is discussed under Alternative No. 2, above. Residual impacts to the groundwater may remain in the area of the Main Tannery Building depending on the effectiveness of the temporary groundwater treatment and the stabilization efforts.

### 3.5.3 Short-term Effectiveness

The effectiveness of No Action with Institutional Controls could be realized in the short-term provided the desired controls were implemented immediately. A slight reduction in the potential for impacts to human health would be achieved once institutional controls have been put in place. There will be no impact to the community with implementation of this alternative. The No Action with Institutional Controls alternative would have little effect on the soil and groundwater contamination in the short-term.

The effectiveness of the Placement of Soil Barrier Cover alternative will be realized immediately upon placement of the soil barrier. The community will be protected during the remedial action by establishing a work zone that excludes unauthorized individuals and by placing the barrier to contact in a manner that limits the generation of airborne particles that may be contaminated. There will be no significant environmental impacts as a result of implementing this alternative. This alternative could be implemented within a few months of authorization to proceed. The environment would not be significantly impacted due to the placement of the barrier.

The effectiveness of the Limited Hotspot Soil Excavation and Excavation and Disposal of All Contaminated Soil in Excess of SGCs alternatives will be realized upon removal of contaminated soils in those designated areas, and placement of the barrier to contact (Limited Hotspot Soil Excavation only). The community will be protected during the remedial action by establishing a work zone that excludes unauthorized individuals and by performing the soil activity in a manner that limits the generation of airborne particles that may be contaminated. There will be no significant environmental impacts as a result of implementing these alternatives. These alternatives could be implemented within a few months following authorization to proceed.

The effectiveness of the stabilization portion of the On-Site Stabilization, Soil Dewatering, Temporary Groundwater Treatment and Placement of Soil Barrier Cover alternative will be realized immediately after completion of the remedial action. The effectiveness would be moderate to high. The effectiveness of the temporary groundwater treatment part of this alternative (Main Tannery Building only) will be moderate, but only in the short-term. The effectiveness of the Soil Barrier to Contact alternative is discussed above. The community will be protected during the stabilization, temporary groundwater treatment and barrier to contact by establishing a work zone that excludes unauthorized individuals and by performing stabilization or immobilization work in a manner that limits the generation of airborne particles.

### 3.5.4 Long-term Effectiveness and Permanence

Implementing the No Action with Institutional Controls alternative will have limited long term effectiveness. A reduction in the potential for impacts to human health will be realized as long as institutional controls remain in place. There will be no change in the impact to the environment by implementing this alternative. The remedial action (establishment of institutional controls) is intended to be long term and permanent. Residual risks will remain after implementing this alternative because contaminated media will remain. This alternative is not considered to be an adequate or reliable means of mitigating the potential for impacts to human health or the environment.

The Placement of a Soil Barrier Cover alternative provides an effective long-term barrier to contact to humans, but is not permanent as it is a reversible action. This alternative does not provide effective protection of human health and environment with respect to mitigation of groundwater contamination. The long-term effectiveness of this alternative would continue to be protective of human health and the environment provided the barrier to contact was well maintained.

Implementation of the Limited Hotspot Soil Excavation and Placement of Soil Barrier to Contact alternative will be a long term and permanently effective means of remediating contamination in this area. There will be some residual risks remaining upon completion of this alternative. This alternative is considered an adequate and reliable means of reducing the potential for impacts to human health and the environment with the level of reduction dependent on the quantity of contaminated media removed from the site.

Implementing the Excavation and Disposal of All Contaminated Soils In Excess of SCGs alternative will be a long term and permanently effective means of remediating contamination at the site. There should be no residual risks remaining upon completion of this alternative unless groundwater contamination remains. If the soil removal activities are successful to a point where soil and groundwater conditions meet SCGs, institutional controls may not be required. Institutional controls, if required, would be adequate and reliable for reducing any potential long-term residual risks. This alternative is considered to be a reliable means of reducing the potential impacts to human health and the environment.

Implementation of the On-Site Stabilization, Soil Dewatering, Temporary Groundwater Treatment and Placement of Soil Barrier to Contact alternative will be a long-term and permanently effective alternative. A reduction in the potential for impacts to human health and the environment will be realized as long as the contaminants remain stabilized and the groundwater contaminants have been reduced. This alternative is considered to be an adequate and reliable means of eliminating the potential for impacts to human health and the environment.

### 3.5.5 Reduction of Toxicity, Mobility, and Volume

The implementation of No Action with Institutional Controls alternative would not create any significant reduction of toxicity, mobility, and volume of metals contamination. Natural attenuation is not known to be effective in degrading metal analytes, but would likely reduce the residual VOC and SVOC contaminants over time. The No Action with Institutional Controls alternative is a reversible remedial action.

The implementation of the Placement of Soil Barrier Cover alternative would not create any significant reduction of toxicity and volume of metals contamination. The mobility of the contamination in groundwater may be reduced if an impervious surface was placed over the area of the Main Tannery Building. Natural attenuation is not known to be effective in degrading metal analytes, but would likely reduce VOC and SVOC contamination over time. The Placement of a Soil Barrier to Contact alternative is a reversible remedial action.

Implementing the Limited Hotspot Soil Excavation and Placement of Soil Barrier to Contact alternative would reduce the toxicity, mobility and volume of the contaminated

soil as the most impacted soil will no longer exist. Soil removal is irreversible, whereas the placement of the soil barrier is reversible.

The volume and toxicity of the metals contamination would be largely reduced if not eliminated by the Excavation and Disposal of All Contaminated Soil In Excess of SCGs alternative. The mobility of the contaminants would also be reduced or eliminated. Implementing this remedial alternative is not a reversible action.

Implementing the On-Site Stabilization, Soil Dewatering, Temporary Groundwater Treatment and Placement of Soil Barrier to Contact alternative will reduce the mobility and toxicity of contaminants in soil, dependent on the effectiveness and amount of reagent used to immobilize contaminants. The volume of contaminated soil should remain unchanged by implementing this alternative. Reduction of groundwater contaminants in the area of the Main Tannery Building would be a function of the quantity and concentration treated by the temporary groundwater treatment system. This remediation alternative is reversible as the soil could be excavated and made subject to other remedial actions such as off-site disposal or other on-site treatment methods and permanent groundwater treatment components are not being used.

### 3.5.6 Feasibility

Site conditions are suitable for implementation of the No Action with Institutional Controls alternative. It is reasonable to assume that placement of institutional controls can be implemented and is feasible since the City currently owns the property. City personnel and services are available to implement this alternative. This alternative is considered cost effective relative to the limited reduction in potential impacts to human health.

The Placement of a Barrier to Contact alternative is a suitable option for the site conditions as the Main Tannery Building has been demolished. Implementing this alternative would also be feasible since there are contractors locally available that are experienced with this type of work. Placement of a barrier to contact is considered to be a cost effective remedial alternative.

The Limited Hotspot Soil Excavation and Placement of soil Barrier to Contact alternative is a suitable option for the site conditions as only portions of the remaining concrete floor slab would have to be removed to access the localized areas of targeted

hotspot removal. In addition, only limited clearing would be required to access the contaminants of concern within the Supplemental Main Tannery Building area west of Warehouse #3. Implementing this alternative would also be feasible since there are contractors locally available that are experienced with this type of work. This alternative is considered to be a cost effective remedial alternative.

Site conditions are poor for implementation of the Excavation and Disposal of All Contaminated Soil In Excess of SCGs. The contaminated soils lie beneath the former Main Tannery Building concrete floor slab and portions of above ground concrete walls. In addition, the area of the building has shallow groundwater conditions and a nearby stream traverses the site. Control and treatment of groundwater during excavation activities in the Main Tannery Building may make implementing this alternative difficult. In addition, controlling creek overflows will be difficult during storm events especially under unexpected events which would create large creek flows. This alternative could be implemented, as services to complete this alternative are locally available. This alternative is not considered a cost effective remedial alternative.

Site conditions are poor for implementation of the On-Site Stabilization, Soil Dewatering, Temporary Groundwater Treatment, and Placement of Soil Barrier to Contact for the same reasons as explained for the excavation and disposal of all contaminated soil in excess of SCGs alternative. This alternative could be implemented as services are commercially and readily available. Additional investigations and design would be associated with implementation of this alternative. The On-Site Stabilization, Soil Dewatering, Temporary Groundwater Treatment, and Placement of Soil Barrier to Contact alternative is not considered a cost effective remedial alternative.

## 4.0 COMPARATIVE ANALYSIS

Utilizing the evaluation criteria described in the previous section of this report, each remedial alternative for each targeted area of remediation identified in this Remedial Alternatives Report is compared to each other on the basis of cost and effectiveness to identify the most cost effective, protective remedy. The evaluation of the various remedies is summarized in the tables within each section.

### 4.1 Lower Pond

No Action with Institutional Controls

The remedial alternative of No Action with Institutional Controls was the least expensive remedial alternative for this area. The effectiveness of this remedy is considered to be low as SCGs would not be achieved. Protection of human health would be controlled but not significantly improved by implementing this remedial alternative. Table 4.1-1 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.1-1**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS FOR THE POND**
**NO ACTION WITH INSTITUTIONAL CONTROLS**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Install Chain-link Fence | LF | $35 | 800 | $28,000 |
| Institutional Controls: | | | | |
| Legal and Filing Fees | LS | $5,000 | 1 | $5,000 |
| Total Capital Costs | | | | $33,000 |

Targeted Sediment Removal

The costs associated with implementing the Targeted Sediment Removal alternative may be relatively high. The effectiveness of this alternative is high since compliance with SCGs is the probable outcome after completion of this alternative. This alternative would also be protective of human health and the environment. It should be noted that the estimated costs for this action can vary dramatically depending on the method of

pond dewatering diversions, quantity of sediment removed, limit of pond disturbance (i.e., dictates the type of permit required), and type of pond rehabilitation. Therefore, these costs must be considered approximate, as this remedial alternative will require preliminary engineering prior to implementation. Table 4.1-2 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.1-2**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE PONDS**
**TARGETED SEDIMENT REMOVAL**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Institutional Controls: | | | | |
| Legal and Filing Fees | LS | $5,000 | 1 | $5,000 |
| Sediment Removal: | | | | |
| Mobilization | LS | $15,000 | 1 | $15,000 |
| Permit Preparation & Preliminary Engineering | LS | $5,000 | 1 | $5,000 |
| Temporary Segregation of Ponds | LS | $75,000 | 2 | $150,000 |
| Pond Dewatering System and Treatment | LS | 100,000 | 2 | $200,000 |
| Contaminated Sediment Removal | DAY | $2,500 | 10 | $25,000 |
| Sediment Dewatering & Treatment | DAY | $10,000 | 10 | $100,000 |
| Pond Restoration | LS | $60,000 | 1 | $60,000 |
| Confirmatory Soil Sampling | EACH | $300 | 40 | $12,000 |
| Transportation and Off-site Disposal of Contaminated Sediments (Assume Non-Hazardous) | TON | $60 | 5,000 | $300,000 |
| Subtotal | | | | $872,000 |
| Contingency (20%) | | | | $174,400 |
| Engineering (20%) | | | | $174,400 |
| Total Capital Costs | | | | $1,220,800 |
| Present Worth – O&M such as Pond / Vegetation Monitoring & Maintenance ($2,000 Each Year for Years 1 to 5 at 5%) | | | | $8,659 |

## 4.2 Creek

No Action with Institutional Controls

The remedial alternative of No Action with Institutional Controls is the least expensive remedial alternative for this area. The effectiveness of this remedy is considered to be low as SCGs would not be achieved. Protection of human health would be controlled by not be significantly improved by implementing this remedial alternative. There would be little change in terms of overall protection to the environment. Table 4.2-1 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.2-1**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE STREAM**
**NO ACTION WITH INSTITUTIONAL CONTROLS**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Install Chain-link Fence | LF | $35 | 500 | $17,500 |
| Institutional Controls: | | | | |
| Legal and Filing Fees | LS | $5,000 | 1 | $5,000 |
| Total Capital Costs | | | | $22,500 |

Targeted Sediment Removal

The costs associated with implementing the Targeted Sediment Removal alternative may be relatively high. The effectiveness of this alternative is high since compliance with SCGs is the probable outcome after completion of this alternative. This alternative would also be protective of human health and the environment. It should be noted that the estimated costs for this action can vary dramatically depending on the method of stream diversions, quantity of sediment removed, linear footage of creek disturbance (i.e., dictates the type of permit required), and type of creek rehabilitation. Therefore, these costs must be considered approximate, as this remedial alternative will require preliminary engineering prior to implementation. Table 4.2-2 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.2-2**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE CREEK**
**TARGETED SEDIMENT REMOVAL**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Institutional Controls: | | | | |
| Legal and Filing Fees | LS | $5,000 | 1 | $5,000 |
| Sediment Removal: | | | | |
| Mobilization | LS | $5,000 | 1 | $5,000 |
| Permit Preparation & Preliminary Engineering | LS | $7,000 | 1 | $7,000 |
| Temporary Diversion of Stream | LS | $50,000 | 1 | $50,000 |
| Contaminated Sediment Removal | DAY | $2,500 | 10 | $25,000 |
| Sediment Dewatering & Treatment | DAY | $10,000 | 5 | $50,000 |
| Creek Restoration | LS | $20,000 | 1 | $20,000 |
| Confirmatory Soil Sampling | EACH | $300 | 20 | $6,000 |
| Transportation and Off-site Disposal of Contaminated Sediments (Assume Non-Hazardous) | TON | $60 | 450 | $27,000 |
| Subtotal | | | | $195,000 |
| Contingency (20%) | | | | $39,000 |
| Engineering (20%) | | | | $39,000 |
| Total Capital Costs | | | | $273,000 |
| Present Worth – O&M such as Creek / Vegetation Monitoring & Maintenance ($2,000 Each Year for Years 1 to 5 at 5%) | | | | $8,659 |

## 4.3 Storm Water System

No Action with Institutional Controls

The remedial alternative of No Action with Institutional Controls is the least expensive remedial alternative for this area. The effectiveness of this remedy is considered to be low as SCGs would not be achieved and the contaminated sediments within the basins and piping may become mobile. Protection of human health would be increased. Protection of the environment would not significantly increase. Table 4.3-1 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.3-1**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE STORM WATER SYSTEM**
**NO ACTION WITH INSTITUTIONAL CONTROLS**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | None | None | None | $0 |
| Institutional Controls: | | | | |
| Legal and Filing Fees | LS | $5,000 | 1 | $5,000 |
| Total Capital Costs | | | | $5,000 |

Remediation by Sediment Removal and Cleaning

The costs associated with the Remediation by Sediment Removal and Cleaning alternative are moderate. The effectiveness of this remedy is considered to be moderate as the source would be removed, but residual sediments may remain both within and outside of the system, and the system remains active. Protection of human health and the environment would be improved. Table 4.3-2 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.3-2**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE STORM WATER SYSTEM**
**REMEDIATION BY SEDIMENT REMOVAL AND CLEANING**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Sediment Removal and Cleaning: | | | | |
| Mobilization | LS | $1,000 | 1 | $1,000 |
| Water Control (Upgradient and Downgradient) | LS | $5,000 | 1 | $5,000 |
| Pressure Jetting & Cleaning | DAY | $2,200 | 2 | $4,400 |
| Vacuum Tank Truck to Collect Sediments | DAY | $1,500 | 2 | $3,000 |
| Roll-Off Containers for Sediments | EACH | $500 | 2 | $1,000 |
| Transportation and Disposal of Contaminated Sediments (Assume Non-Hazardous) | TON | $60 | 100 | $6,000 |
| Subtotal | | | | $20,400 |
| Contingency (20%) | | | | $4,080 |
| Engineering (20%) | | | | $4,080 |
| Total Capital Costs | | | | $28,560 |

Closure of Storm Water System In Place

The costs associated with the Closure of Storm Water System In Place alternative are considered to be relatively high. The effectiveness of this alternative is considered to be moderate, as compliance with SCGs will not be achieved. Protection of human health and the environment would be improved. Table 4.3-3 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.3-3**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE STORM WATER SYSTEM**
**CLOSURE OF STORM WATER SYSTEM IN PLACE**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Closure In Place: | | | | |
| Mobilization | LS | $2,000 | 1 | $2,000 |
| Installation of Bulkheads or Formwork to Contain Concrete | LS | $15,000 | 1 | $15,000 |
| Placement of Concrete or Flowable Fill (Material and Labor) | CY | $100 | 50 | $5,000 |
| Install New Drainage Network | LS | $10,000 | 1 | $10,000 |
| Subtotal | | | | $32,000 |
| Contingency (20%) | | | | $6,400 |
| Engineering (20%) | | | | $6,400 |
| Total Capital Costs | | | | $44,800 |

Remediation by Removal of Storm Water System

The Remediation by Removal of Storm Water System alternative may be the most effective alternative and the costs are relatively high. The effectiveness of this alternative is high since the contaminants within and about the system would be removed and compliance with SCGs would be achieved. Protection of human health and the environment would be significantly improved. Table 4.3-4 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.3-4**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE STORM WATER SYSTEM**
**REMEDIATION BY REMOVAL OF STORM WATER SYSTEM**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Remediation by Demolition: | | | | |
| Mobilization | LS | $2,000 | 1 | $2,000 |
| Excavate Existing Drainage Pipe & Structures | DAY | $1,200 | 5 | $6,000 |
| Transportation and Disposal of Contaminated Sediments and Pipes (Assume Non-Hazardous) | TON | $60 | 250 | $15,000 |
| Install New Drainage Network | LS | $10,000 | 1 | $10,000 |
| Subtotal | | | | $33,000 |
| Contingency (20%) | | | | $6,600 |
| Engineering (20%) | | | | $6,600 |
| Total Capital Costs | | | | $46,200 |

## 4.4 Main Tannery Area

No Action with Institutional Controls

The remedial alternative of No Action with Institutional Controls is the least expensive remedial alternative for this area. The effectiveness of this remedy is considered to be low as the site will remain unchanged and SCGs would not be achieved. Groundwater sampling and analysis will allow for continued monitoring to observe changes in the environmental quality of the groundwater at the site. Protection of human health would only slightly improve by implementing this alternative, and protection of the environment would not change significantly. Table 4.4-1 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.4-1**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE MAIN TANNERY BUILDING**
**NO ACTION WITH INSTITUTIONAL CONTROLS**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Install Chain-link Fence | LF | $35 | 1,500 | $52,500 |
| Institutional Controls: | | | | |
| Legal and Filing Fees | LS | $5,000 | 1 | $5,000 |
| Total Capital Costs | | | | $57,500 |
| Present Worth – O&M such as Annual Groundwater Monitoring ($6,000 Each Year for Years 1 to 5 at 5%) | | | | $25,977 |
| Present Worth – O&M such as Annual Groundwater Monitoring ($6,000 Each Year for Years 5 to 30 at 5%) | | | | $66,258 |

Placement of Soil Barrier Cover for Contaminated Areas With Institutional Controls

This remedial alternative is considered low in terms of cost. The effectiveness of this remedy is considered moderate as SCGs would not be achieved, but protection of human health and the environment would be increased. The institutional controls would further enhance the protection of human health and the environment. The estimated cost associated with implementing this remedial alternative is presented in Table 4.4-2.

The placement areas for soil barrier cover are depicted on Figure 1. For the purpose of estimating costs a two foot thick soil barrier was used in the area of the Main Tannery Building and the area west of Warehouse #3. Due to the poor condition of the existing asphalt along the northern entrance and the planned grade increase from soil placement, the northern area of the site between Wilson Street and Warehouse #1 and #2 will be asphalt paved (six inches) so access to the warehouse buildings can remain for the City of Gloversville. In addition, portions of the above grade foundation walls left in-place from the recent demolition activities would be removed.

**TABLE 4.4-2**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE MAIN TANNERY BUILDING AND**
**SUPPLEMENTAL MAIN TANNERY BUILDING**
**PLACEMENT OF SOIL BARRIER COVER FOR CONTAMINATED AREAS WITH INSTITUTIONAL CONTROLS**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Institutional Controls: | | | | |
| Legal and Filing Fees | LS | $5,000 | 1 | $5,000 |
| Soil Barrier to Contact (2 Feet Thick): | | | | |
| Mobilization | LS | $5,000 | 1 | $5,000 |
| Demolition of Above Grade Foundation Walls | LS | $30,000 | 1 | $30,000 |
| Demarcation Layer | MSF | $250 | 50 | $12,500 |
| Clean Backfill w/Compaction | CY | $20 | 7,399 | $147,980 |
| Rip-rap Placement for Erosion Protection Along Creek | SY | $80 | 54 | $4,320 |
| Drainage Upgrades | LS | $5,000 | 1 | $5,000 |
| Site Grading and Seeding | SY | $5 | 5,549 | $27,745 |
| Additional 6" Base (¾" Stone) | SY | $4.61 | 2,045 | $9,427 |
| Asphalt Paving (6" Stone Base, 2" Binder Course, 1" Topping) | SF | $1.72 | 18,400 | $31,648 |
| Subtotal | | | | $278,620 |
| Contingency (20%) | | | | $55,724 |
| Engineering (20%) | | | | $55,724 |
| Total Capital Costs | | | | $390,068 |
| Present Worth – O&M such as Barrier Maintenance ($2,000 Each Year for Years 1 to 5 at 5%) | | | | $8,659 |
| Present Worth – O&M such as Barrier Maintenance ($2,000 Each Year for Years 5 to 30 at 5%) | | | | $22,086 |

Limited Hotspot Soil Excavation and Disposal followed by Placement of Soil Barrier Cover with Institutional Controls

The Remediation by Excavation, Transportation and Disposal alternative is considered to be one of the most expensive remedial alternatives for this area and is therefore rated moderately high in terms of cost. The effectiveness of this alternative is also high, as compliance with SCGs would likely be achieved in the areas excavated after

completion. This alternative would be protective of human health and the environment with the placement of the barrier to contact although some residual risks would remain in areas not excavated. The estimated cost associated with implementing this remedial alternative is presented in Table 4.4-3.

Soil excavation and disposal costs are dependent on the quantity of contaminated soil generated and whether it is defined as hazardous or non-hazardous. Additional sampling would be required to determine if the current concentrations of contaminants of concern exceed hazardous waste levels. For the purpose of presenting costs, the soil is assumed to be non-hazardous based on analytical testing performed during the site investigation. From a cost perspective, soil excavation and disposal is a one-time cost that is typically effective in achieving immediate compliance with SCG. It should also be noted that this remedial action will require soil dewatering and treatment. Water treatment technologies for metal contamination are limited and expensive. As an alternative to off-site disposal of contaminated soil, treatment by soil stabilization may need to be considered. Soil stabilization reduces the hazard potential of a waste by converting the contaminants into their least soluble, mobile, or toxic form. Soil stabilization is also a feasible option for handling the contaminated soil and is evaluated in another remedial alternative.

The limits for the hotspot soil excavation were selected based on a value of 30 mg/kg for arsenic and NYSDEC TAGM recommended soil cleanup objective value of 50 mg/kg for chromium. The arsenic cleanup value of 30 mg/kg is higher than its NYSDEC TAGM recommended soil cleanup objective value of 7.5 mg/kg and its upper background range of 12 mg/kg. However, this arsenic value was selected so that those locations above 30 mg/kg for arsenic also include the areas where chromium concentrations exceed its NYSDEC TAGM recommended soil cleanup objective value. Some of the areas targeted for removal did not necessarily exceed both arsenic and chromium cleanup criteria. Figure 2 depicts those areas planned for removal under this remedial alternative.

**TABLE 4.4-3**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE MAIN TANNERY BUILDING AND**
**SUPPLEMENTAL MAIN TANNERY BUILDING**
**LIMITED HOTSPOT SOIL EXCAVATION AND DISPOSAL FOLLOWED BY**
**PLACEMENT OF SOIL BARRIER COVER WITH INSTITUTIONAL CONTROLS**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Institutional Controls: | | | | |
| Legal and Filing Fees | LS | $5,000 | 1 | $5,000 |
| Soil Barrier to Contact (2 Feet Thick): | | | | |
| Costs From Table 4.4-2 | | | | $390,068 |
| Limited Hotspot Soil Excavation (generally arsenic concentrations greater than 30 mg/kg and chromium greater than 50 mg/kg) | | | | |
| Mobilization | LS | $7,000 | 1 | $7,000 |
| Concrete Removal & Disposal | CY | $100 | 753 | $75,300 |
| Excavate Contaminated Soils | DAY | $1,200 | 16 | $19,200 |
| Soil Dewatering & Treatment For Metals | DAY | $10,000 | 16 | $160,000 |
| Clean Backfill w/Compaction | CY | $20 | 13,016 | $260,320 |
| Confirmatory Soil Sampling | EACH | $300 | 40 | $12,000 |
| Transportation and Off-site Disposal (Assume Non-Hazardous) | TON | $60 | 19,524 | $1,171,440 |
| Subtotal | | | | $2,100,328 |
| Contingency (20%) | | | | $420,066 |
| Engineering (20%) | | | | $420,066 |
| Total Capital Costs | | | | $2,940,460 |
| Present Worth – O&M such as Barrier Maintenance ($2,000 Each Year for Years 1 to 5 at 5%) | | | | $8,659 |
| Present Worth – O&M such as Barrier Maintenance ($2,000 Each Year for Years 5 to 30 at 5%) | | | | $22,086 |

Excavation and Disposal of All Contaminated Soil In Excess of SCGs

The Remediation by Excavation, Transportation and Disposal alternative is considered the most expensive remedial alternative for this area and is therefore rated high in terms of cost. The effectiveness of this alternative is high, as compliance with SCGs would likely be achieved after completion. This alternative would be protective of

human health and the environment. Table 4.4-4 summarizes the estimated costs associated with implementing this remedial alternative.

Soil excavation and disposal can be costly and is dependent on the quantity of contaminated soil generated and whether it is defined as hazardous or non-hazardous. Additional sampling would be required to determine if the current concentrations of contaminants of concern exceed hazardous waste levels. From a cost perspective, soil excavation and disposal is a one-time cost that is typically effective in achieving immediate compliance with SCG. It should also be noted that this remedial action will require soil dewatering and treatment. Water treatment technologies for metal contamination are limited and expensive. As an alternative to off-site disposal of contaminated soil, treatment by soil stabilization may need to be considered. Soil stabilization reduces the hazard potential of a waste by converting the contaminants into their least soluble, mobile, or toxic form. Soil stabilization is also a feasible option for handling the contaminated soil.

**TABLE 4.4-4**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS**
**FOR THE MAIN TANNERY BUILDING AND**
**SUPPLEMENTAL MAIN TANNERY BUILDING**
**EXCAVATION/DISPOSAL OF ALL CONTAMINATED SOIL IN EXCESS OF SCGS**

| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| *Capital Costs (Includes Labor):* | | | | |
| Mobilization | LS | $20,000 | 1 | $20,000 |
| Concrete Removal & Disposal | CY | $100 | 1,190 | $119,000 |
| Excavate Contaminated Soils | DAY | $1,200 | 30 | $36,000 |
| Soil Dewatering & Treatment | DAY | $5,000 | 20 | $100,000 |
| Clean Backfill w/Compaction | CY | $20 | 9,060 | $181,200 |
| Site Grading & Seeding | SY | $5 | 8,700 | $43,500 |
| Confirmatory Soil Sampling | EACH | $300 | 200 | $60,000 |
| Transportation and Off-site Disposal (Assume Non-Hazardous) | TON | $60 | 32,323 | $1,939,380 |
| Subtotal | | | | $2,499,080 |
| Contingency (20%) | | | | $499,816 |
| Engineering (20%) | | | | $499,816 |
| Total Capital Costs | | | | $3,498,712 |

On-Site Stabilization, Soil Dewatering, Temporary Groundwater Treatment and Placement of Soil Barrier Cover

This remedial alternative is the most expensive alternative evaluated. The effectiveness of this alternative is high, however, the work tasks are more complex which are more labor and engineering intensive in comparison to other alternatives. This alternative would be protective of human health and the environment. Table 4.4-5 summarizes the estimated costs associated with implementing this remedial alternative.

**TABLE 4.4-5**
**SUMMARY OF REMEDIAL ALTERNATIVE ESTIMATED COSTS FOR THE MAIN TANNERY BUILDING AND SUPPLEMENTAL MAIN TANNERY BUILDING ON-SITE STABILIZATION, GROUNDWATER TREATMENT AND BARRIER TO CONTACT**

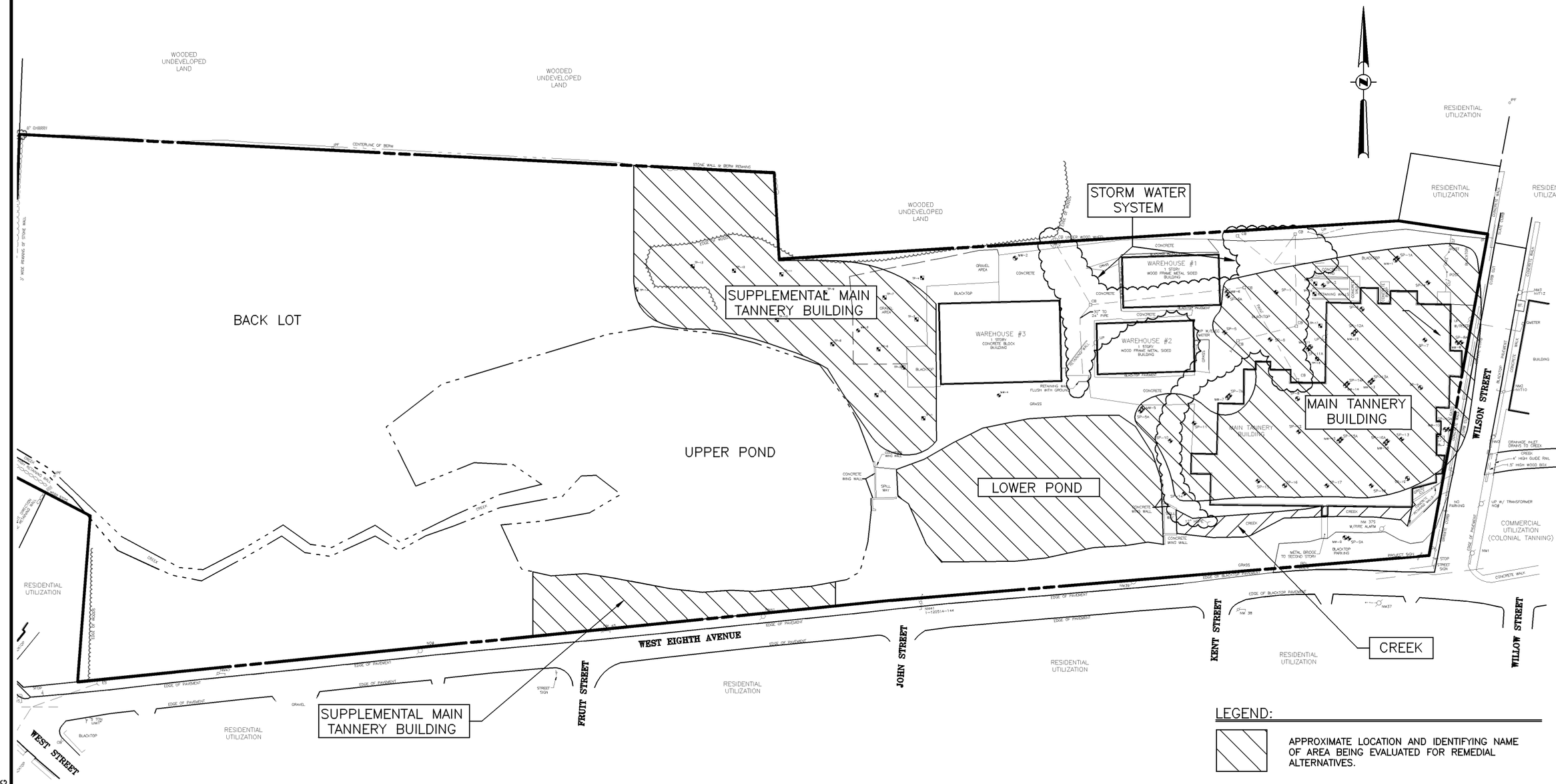
| Work Task | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| Site Preparation: | | | | |
| Concrete Removal & Disposal | CY | $100 | 1,190 | $119,000 |
| Groundwater Treatment: | | | | |
| Treatment Shed | LS | $8,000 | 1 | $8,000 |
| Treatment System For Arsenic | LS | $150,000 | 1 | $150,000 |
| Carbon Treatment Canisters For Residual VOCs/SVOCs | EACH | $600 | 6 | $3,600 |
| Dewatering Wells Installation | DAY | $2,400 | 4 | $9,600 |
| Dewatering Pumps | EACH | $1,500 | 3 | $4,500 |
| Misc. Plumbing & Labor | LS | $50,000 | 1 | $50,000 |
| SPDES Permitting & Discharge Sampling | LS | $6,000 | 1 | $6,000 |
| On-site Stabilization: | | | | |
| Mobilization | LS | $20,000 | 1 | $20,000 |
| Excavate Contaminated Soils | DAY | $1,200 | 30 | $36,000 |
| Treatment of Impacted Soils | TON | $200 | 13,661 | $2,732,200 |
| Various Analytical Services | LS | $40,000 | 1 | $40,000 |
| Replacement of Treated Soils | CY | $12 | 13,661 | $163,932 |
| Barrier to Contact (2 feet thick): | | | | |
| Mobilization | LS | $1,000 | 1 | $1,000 |
| Clean Backfill w/Compaction | CY | $20 | 2,358 | $47,160 |
| Demarcation Layer | MSF | $250 | 32 | $8,000 |
| Site Grading & Seeding | SY | $5 | 3,536 | $17,680 |
| Subtotal | | | | $3,416,672 |
| Contingency (20%) | | | | $683,334 |
| Engineering (20%) | | | | $683,334 |
| Total Capital Costs | | | | $4,783,340 |
| Present Worth – O&M such as utilities, carbon disposal, etc. ($30,000 Each Year for 10 Years @ 5%) | | | | $231,651 |

# FIGURES

NO XREFS

PROJECT NUMBER: 00.6630

CAD DWG. FILE NAME: FIG 1-GEN REM AREAS_REV2.DWG




GENERAL NOTES:
1.) THE LOCATIONS AND FEATURES DEPICTED ON THIS MAP ARE APPROXIMATE AN DO NOT REPRESENT AN ACTUAL FIELD SURVEY.

MAP REFERENCE:
1.) BASE MAP PREPARED BY C.T. MALE ASSOCIATES, P.C., BOUNDARY SURVEY, DRAWING NO.: 00-596R, DATED DECEMBER 1, 2000.

| DATE | | REVISIONS RECORD/DESCRIPTION | DRAFTED | CHECK | APPR. |
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| 11/05 | 1 | ADDED ADJOINING PROPERTY UTILIZATION | J.MARX | K.MOLINE | |
| 9/06 | 2 | REMOVED BACKLOT & UPPER POND REM. AREA | J.MARX | K.MOLINE | |
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# FIGURE 1
# GENERAL REMEDIATION AREAS

## RISEDORPH TANNERY

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**RAR-1**
SHEET 1 OF 4
DWG. NO: 04-0342

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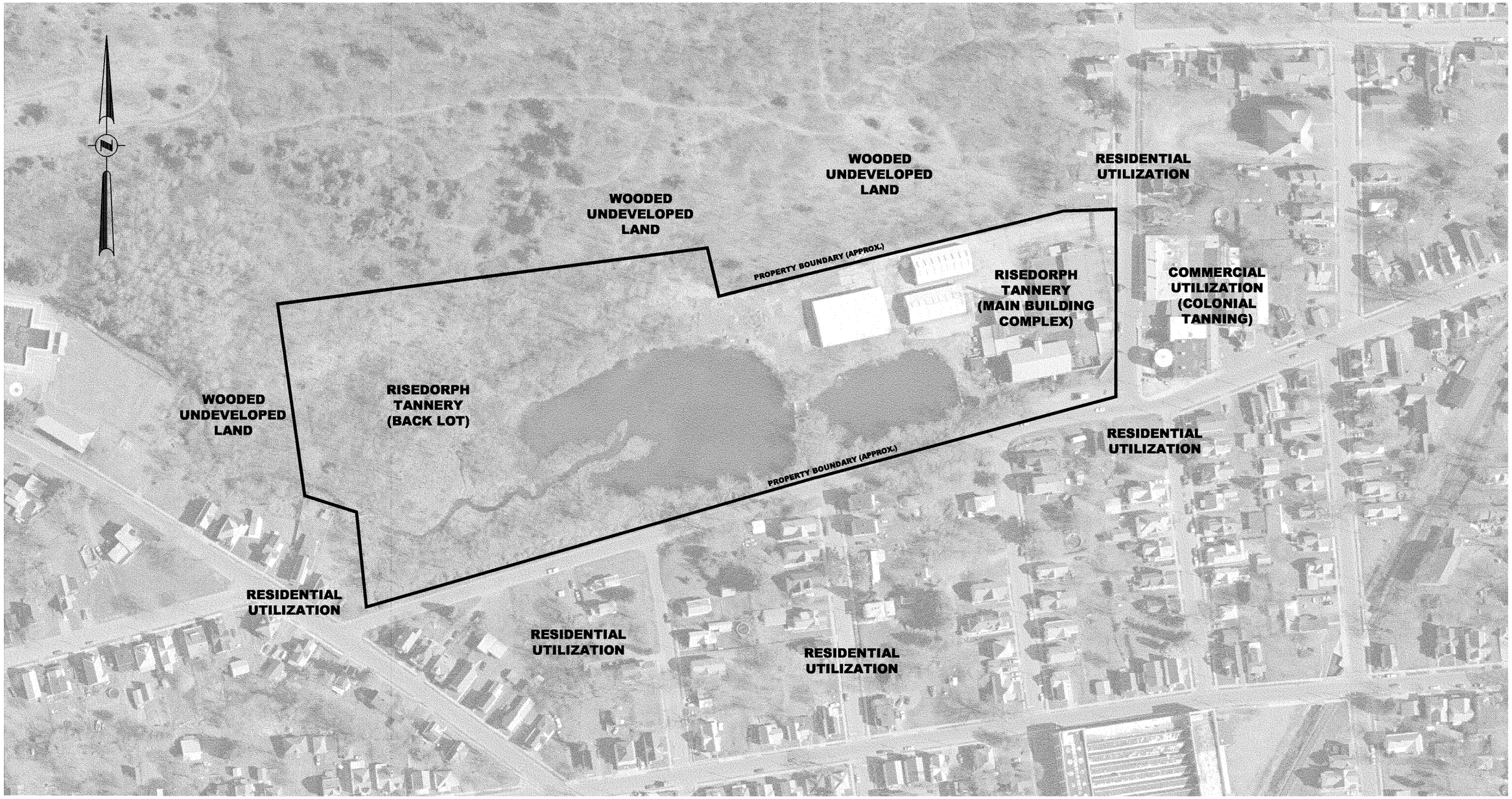


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2.) 2001 AERIAL PHOTOGRAPH COURTESY OF NYS GIS CLEARING HOUSE.

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# FIGURE 1A
# ADJOINING PROPERTY UTILIZATION MAP

## RISEDORPH TANNERY

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DWG. NO: 06-0620

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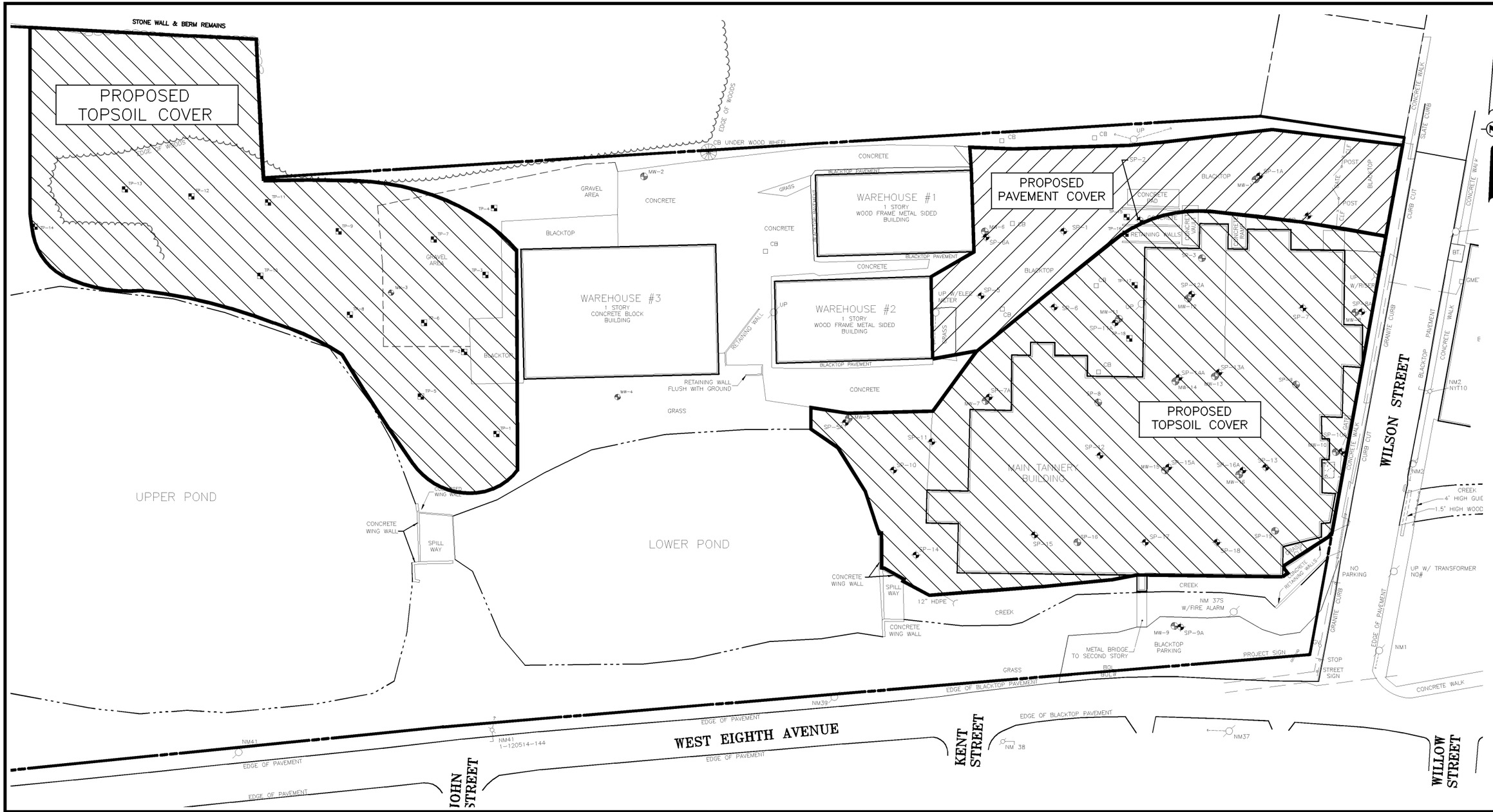


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# FIGURE 2
# MAIN TANNERY BLDG. REMEDIAL ALTERNATIVE PLACEMENT AREAS FOR SOIL BARRIER COVER

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**RAR-2**
SHEET 2 OF 4
DWG. NO: 04-0342

CAD DWG. FILE NAME: SOIL COVER.DWG

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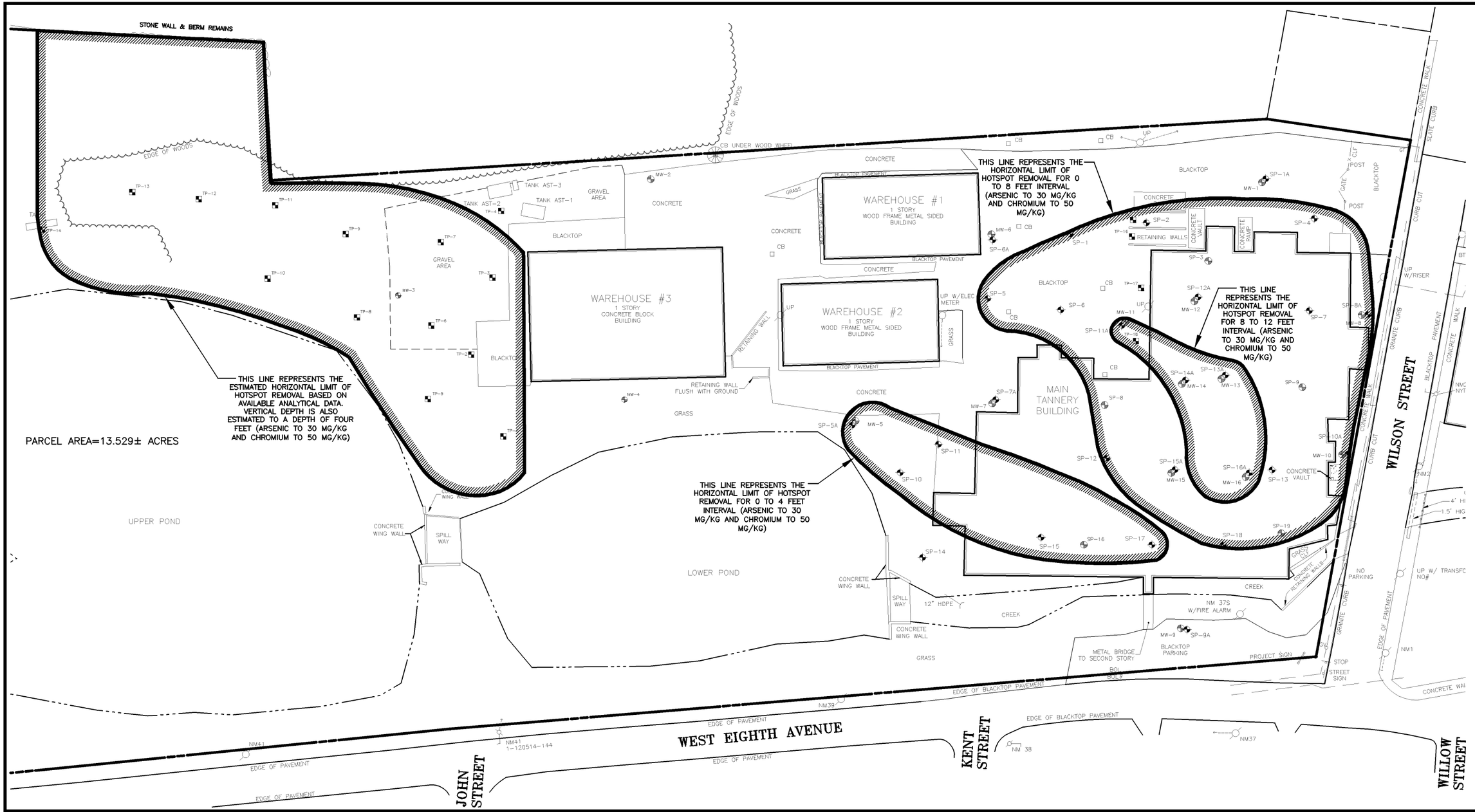
PROJECT NUMBER: 00.6630

CAD DWG. FILE NAME: HOTSPOT.DWG

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# FIGURE 3
# MAIN TANNERY BLDG. REMEDIAL ALTERNATIVE APPROXIMATE EXTENT OF HOTSPOT REMOVAL

## RISEDORPH TANNERY

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**RAR-3**
SHEET 3 OF 4
DWG. NO: 04-0342

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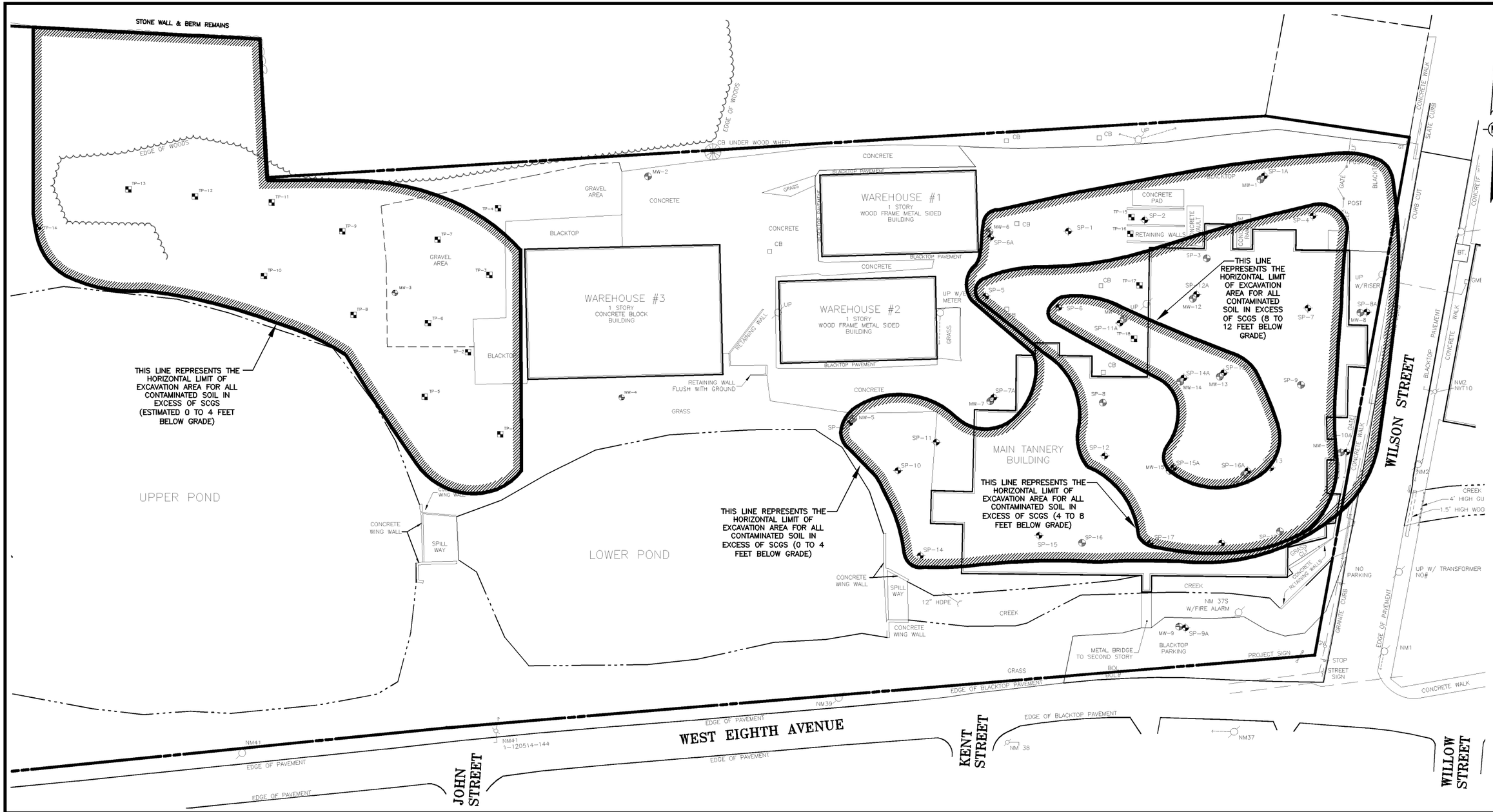
PROJECT NUMBER: 00.6630




CAD DWG. FILE NAME: ALL REMOVAL.DWG

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# FIGURE 4 - MAIN TANNERY BLDG. REMEDIAL ALTERNATIVE - EXCAVATION AREAS FOR ALL CONTAMINATED SOIL IN EXCESS OF SCGS

## RISEDORPH TANNERY

CITY OF GLOVERSVILLE, NEW YORK — FULTON COUNTY, NEW YORK

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