REMEDIAL ALTERNATIVES REPORT

SITE INVESTIGATION/REMEDIAL ALTERNATIVES REPORT
FORMER ROBLIN STEEL SITE
(NYSDEC SITE NO. B-00173-9)
320 SOUTH ROBERTS ROAD
CITY OF DUNKIRK
CHAUTAUQUA COUNTY, NEW YORK 14048

Prepared for:

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FORMER ROBLIN STEEL SITE

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1.0 INTRODUCTION

1.1 General Discussion

Chautauqua County entered into a State Assistance Contract with the New York State Department of Environmental Conservation (NYSDEC) to complete a Site Investigation/Remedial Alternatives Report (SI/RAR) for the former Roblin Steel property located at 320 South Roberts Road in the City of Dunkirk, Chautauqua County, New York (project site). Figure 1 is included as a Site Location Map. Figure 2 is included as a Site Plan.

The SI/RAR is being completed pursuant to the Environmental Restoration, or Brownfield Program, component of Title 5 of the Clean Water/Clean Air Bond Act of 1996, which is administered by the NYSDEC. The purpose of the SI/RAR is to characterize the nature and extent of contamination occurring on and emanating from the project site, and to develop and evaluate remedial alternatives.

TVGA Consultants (TVGA) has prepared this RAR on behalf of Chautauqua County to describe the process used to develop and evaluate alternatives for addressing the contaminated media at the project site.

1.2 Project History

The Site Investigation (SI) completed at the project site was performed during the summer of 2002 and identified twelve areas of concern (AOCs) on the project site. During the course of the SI, a local industry expressed interest in redeveloping the project site to accommodate the expansion of their nearby food processing operation if remedial measures could be implemented and the property could be transferred by the end of 2003. Therefore, to expedite the SI/RAR process, an Interim Remedial Measures (IRM) approach to facilitate redevelopment was discussed with the NYSDEC. In order to further define the lateral and vertical extent of contamination identified within the twelve AOCs, and determine if an IRM approach was applicable for the project site, a Supplemental Site Investigation (SSI) was performed during the winter of 2002-2003.

The nature of past operations at the project site resulted in the majority of the collected soil samples having detected concentrations of organic and/or inorganic compounds exceeding the concentrations defined in NYSDEC's Technical Administrative Guidance Memorandum (TAGM) 4046 (regulatory guidance levels). As such, a qualitative risk assessment was completed to assess potential human health and environmental risks associated with the identified contaminants at the project site. Furthermore, the risk assessment was completed to ultimately develop a listing of contaminants of concern and their associated Site Specific Cleanup Levels (SSCLs). Based on the SSCLs and the findings from the SSI, the twelve AOCs were redefined into fourteen operable units (OUs) that were to be addressed though the implementation of IRMs.

TVGA prepared and issued a May 2003 Draft Site Investigation Report to the NYSDEC that provided a detailed description of the SI, SSI, risk assessment and process utilized to develop the OUs. In addition to summarizing and documenting the methods used to investigate the project site, the report described the physical characteristics of the project site; defined the nature and extent of contamination encountered; and assessed the contamination with respect to fate, transport and exposure. TVGA then prepared and issued a June 2003 Draft IRM Work Plan that presented a remedial approach for each OU that was designed to render the site suitable for redevelopment as proposed by the local industry. In the summer of 2003, however, the local industry declined to tender a formal commitment to acquire and redevelop the property at that time. Consequently, Chautauqua County and the NYSDEC agreed to abandon the IRM approach and return to the conventional SI/RAR process, thereby necessitating the development and analysis of remedial alternatives and the preparation of this RAR.

During the preparation of this RAR, the analytical data collected during the SI and the SSI were reevaluated and used to identify impacted media. This was accomplished by comparing the analytical data for the contaminants of concern with the applicable regulatory standards and/or guidance values. Based on these data and an exposure assessment, remedial action objectives (RAOs) were developed for the various media groups. General response actions for each media group were subsequently developed, combined into site-wide remedial alternatives, and comparatively analyzed. The RAR concludes with a recommendation for remedy selection.

Upon confirmation of this recommendation by the NYSDEC, the proposed remedy will be summarized in a Proposed Remedial Action Plan (PRAP) for public review and comment. Following acceptance of the PRAP, NYSDEC will issue a Record of Decision (ROD) for the project site.

1.3 Intended Future Use of the Site

The project site is located in a former industrial corridor that parallels an active rail transportation corridor, has been largely converted to facilities associated with the food processing industry, and has supported the development of the adjacent Chadwick Bay Industrial Park. This industrial park also caters to the food processing industry. The project site is zoned for industrial use and is situated in a New York State designated economic development zone.

Significant interest in the redevelopment of the project site, once it has been remediated, has been expressed by several local companies, as shown by the letters of interest included in Appendix A. Chautauqua County's discussions with one of these companies, a locally headquartered, national food processor that is the nation's largest private label juice manufacturer, lead to the formulation of a redevelopment concept that would involve the investment of approximately $10,000,000 to redevelop the project site and an adjoining privately owned brownfield site to accommodate a major expansion of its nearby operation.

This potential redevelopment project would encompass approximately 30 acres and approximately 200,000 square feet of building space, and would feature the following:

- Rehabilitation of the existing 88,000 SF building on the project site for cold storage, distribution, and near-site vendor manufacturing;
- Construction of paved truck/employee parking facilities on the remainder of the project site;
- Adaptive reuse of the manufacturing building on the adjacent former Alumax site for warehousing and distribution;
- Conversion of an existing office building into research and design facilities;
- Linking the project site to the existing food processing facility via the conversion or modification of an existing railroad bridge; and
- Connecting the redevelopment site with the Chadwick Bay Industrial Park.

Although not yet fully defined, redevelopment interests expressed by other local companies would likely also involve the rehabilitation of the existing on-site structure and linkage with the existing Chadwick Bay Industrial Park.

The redevelopment of the project site provides an opportunity to salvage the existing 88,000 SF structure on the project site and to restore utilization of the existing utility infrastructure (e.g., sanitary sewer, storm sewer, natural gas, and electric). The redevelopment of the project site would also likely lead to the redevelopment of two adjacent brownfield sites, which are serviced by the same infrastructure as the project site, thereby facilitating the reuse of said infrastructure. Furthermore, the redevelopment of the project site would symbolize the further development of this corridor into a destination for food processing and associated industries. It should be noted that increasing demand for property in this corridor was exhibited by the recent purchase of a large brownfield site nearby, the Former Great Lakes Color Printing Site, which is reportedly being rehabilitated for use by the food processing industry. In addition, site redevelopment would create opportunities to better utilize the existing highway and rail transportation infrastructure by: (1) linking the site with a County highway, enabling site-generated vehicular traffic to avoid residential streets within the City and to better utilize the existing County and State highway network; and (2) re-establish a connection with the adjacent rail corridor.

The redevelopment concept developed for the project site is consistent with the business development goals established in the Chadwick Bay Region 1997 Comprehensive Plan, which encompasses the City of Dunkirk and surrounding community. The Comprehensive Plan places an emphasis on the reuse and redevelopment of brownfield sites as a means of creating opportunities for business and industrial development in the region. The project is also consistent with the community's economic development plan, which is reflected in the documentation generated in 1998 for the Dunkirk-Sheridan Empire Zone, which is a State-designated economic development zone. The Empire Zone indicates that brownfield redevelopment is an important component of the local and regional economic development strategy, and identifies the project site as a critical redevelopment site.

1.4 Report Organization

This report has been structured to present the results of the remedial alternatives analysis in accordance with the report format suggested in NYSDEC TAGM 4058 and 6 NYCRR 375. The three (3) major sections of this report are as follows:

Section 1.0 – Presents background information, summarizes the results of the SI and SSI, and develops the areas of impacted media.

Section 2.0 - Develops and identifies the RAOs for the areas of impacted media and develops general response actions for the affected media, which are assembled into site-wide remedial alternatives.

Section 3.0 - Presents detailed analyses of the remedial alternatives, both individually and comparatively, and identifies the recommended alternative.

1.5 Background Information

1.5.1 Site Description

The project site is located along the eastern side of South Roberts Road in the City of Dunkirk, New York and occupies approximately 12 acres of an inactive industrial park. The project site contains a former facility building that encompasses approximately 88,000 square feet. The former process equipment has been removed from the project site; however, a number of steel storage bins, wooden pallets, a dilapidated dump truck, and various wood and metal scraps remain inside the building. The external areas of the project site consist of a mixture of fill, soil, concrete, wood, brick, metal and construction and demolition debris piles; and several concrete foundations.

The adjoining properties located in this park include the former Alumax Extrusions site and the Edgewood Warehouse site. Over 90 years ago, all three of these sites were developed as part of a larger industrial complex operated by the American Locomotive Company (ALCO). The former Roblin Steel Site was most recently occupied by a rolling mill that was closed, dismantled and partially demolished in the late 1980's. Since that time, the former Roblin Steel Site has been vacant.

The project site is located in an area that is zoned for industrial use. Land use in the project site's vicinity is characterized by a mixture of commercial, industrial and residential. The project site is bounded to the north by an active CSX rail yard; to the east by active Norfolk Southern railroad tracks; to the south by the former Alumax Extrusions property; and to the west by the Edgewood Warehouse property. Residential properties are situated to the northwest and south of the project site beyond the adjoining properties. Additionally, mixed commercial and light industrial properties are located to the north and west of the project site, while an undeveloped wooded area and Hyde Creek are located to the east.

1.5.2 Site History

The project site and adjoining properties were first developed in 1910 as a locomotive manufacturing complex operated by the American Locomotive Company (ALCO). ALCO manufactured locomotives at this complex until 1930, at which time it was converted to manufacture process equipment primarily consisting of heat exchangers, feed water heaters, tunnel shields, pressure vessels and steel pipe, fittings and conduits until closure of the plant in 1962.

A historical site plan of the ALCO plant from the 1930's indicates that the project site was occupied by two buildings, one of which appears to represent a portion of the existing on-site structure. The northern-most building, which is no longer present, contained the boiler shop, while the central portion of the existing on-site structure was operated as a pipe dipping shop and the eastern half housed a crane runway. The western portion of the existing structure had an oil cellar, which is labeled as abandoned on historical plans from the 1950's. Three 157,000-gallon aboveground fuel oil storage and three pickling tanks were once located at the northeast corner of the project site.

A drainpipe was installed around 1938 across the Erie Railroad right-of-way (ROW) to convey stormwater under the railroad ROW to Hyde Creek.

During and after World War II, manufacturing operations at the ALCO plant were expanded to include military equipment. This equipment included gun carriages, fragmentation bombs, thrust shafts and king posts for navel vessels, missile housings, nozzles, boosters, and other components.

Historical site plans from the 1950's and 1960's indicate that the project site contained a plate shop wherein the manufacturing of pressure vessels and heavy fabricated plate equipment was conducted, as well as facilities for the manufacturing and hydrostatic testing of large diameter municipal water pipes. These plans indicate that the existing building was utilized for the application of corrosion preventative coatings to municipal water pipes, and, following its expansion, missile fabrication and heat-treating. Other facilities located on the project site during this time period included furnaces for the heat treatment of pressure vessels, and several areas containing x-ray equipment for the non-destructive examination of fabricated equipment.

Following the war, ALCO was contracted by the Atomic Energy Commission to manufacture nuclear reactor components and packaged reactor units. Work on nuclear reactors at the Dunkirk plant included the development, production and testing of a skid-mounted, portable nuclear power reactor, built to power a remote Army base on the Greenland icecap. However, it is not clear whether nuclear fuel was ever stored or utilized at the Dunkirk plant. In addition to the nuclear reactor, ALCO manufactured components for the crawler for the Apollo/Saturn V space rocket. In connection with these operations, ALCO maintained radiological sources at the Dunkirk plant that were used to inspect the integrity of welds on nuclear reactor and missile components. An undated article by the Chief Inspector of the Dunkirk plant indicated that the radiographic inspection setup consisted of five machines ranging from 140-kv to 1000-kv. The article also indicated that Cobalt 60 was used in an outdoor area of the project site on rare occasions.

After its closure, the ALCO complex was purchased by Progress Park in 1963, whose mission was to facilitate the re-occupation of the complex by new industrial concerns. The Roblin Steel Company acquired the project site in 1969, with the exception of the South Bay area that was briefly owned by Allegheny Ludlum. In 1984, the Roblin Steel Company purchased the remainder of the plant from Progress Park.

The Roblin Steel Company occupied the project site from 1969 to 1987 and operated a steel reclamation business on the property. High quality scrap steel was reclaimed using electric arc furnaces and then forged into steel rods. An historical facility plan depicting the nature and location of major operations and equipment at the Roblin Steel plant shows that the plant contained three electric arc furnaces, several dust collection system bag-houses, an outdoor electrical substation, numerous transformer rooms, rolling and hammer mills, a compressor house, and a variety of other process equipment (e.g., casting and cooling towers). Additionally, two large volume aboveground oil storage tanks and a scrap yard were located along the southern margins of the project site. An interview with a former long-time employee of the Roblin Steel Company indicated that the solvent 1,1,1-Trichloroethylene was widely used at the facility, especially in the vicinity of the casting tower, and that spent solvents were often released into the pits located below the electric arc furnaces. These pits were reportedly blasted 15 to 20 feet into the bedrock.

The operation of the arc furnaces generated air pollution emissions control dust (K061), which is listed as a Resource Conservation and Recovery Act (RCRA) hazardous waste. Following the closing of the Roblin Steel facility in 1987, Champion Inc. was contracted to salvage the equipment from the plant. Material Recovery of Dunkirk Inc. (MRDI), the reputed former owner of the project site acquired the property, from the bankruptcy of Roblin Industries in 1990. MRDI undertook the demolition of the portion of the plant located to the north of the existing on-site building, and continued salvage operations until the early to mid 1990's.

The project site and adjoining properties have been the subject of multiple environmental assessments and investigations. The results of these investigations confirmed the presence of contaminated fill, soil, groundwater, stormwater and sewer sediment on the project site. Contaminants detected on the project site included chlorinated solvents, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and heavy metals. However, the data collected was not sufficient to determine the magnitude and extent of contamination or the scope and cost of remediation required to enable redevelopment.

The former Roblin Steel property was the subject of an EPA removal action, completed pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), in 1994. The removal action was undertaken to address the presence of over 700 drums of hazardous waste as well as piles of hazardous emission control dust. The following materials were removed from the property during the course of the removal action for proper treatment and/or disposal at permitted off-site disposal facilities:

- 688 Empty Drums;
- 3,544 Gallons of K061 Liquids;
- 1,865 Gallons of K061 Oils;
- 20 Cubic Yards of K061 Debris;
- 330 Gallons of PCB Oil;
- 0.5 Tons of PCB Contaminated Equipment;
- 110 Gallons of Acids;
- 275 Gallons of Asbestos (Solid);
- 55 Gallons of Pesticide;
- 55 Gallons of Carbon Disulfide; and
- 165 Gallons of Flammable Liquid.

Prior to the removal of these materials, it was noted that 50 to 100 of the drums containing liquid wastes were either damaged, visually near the point of release, or leaking. Other mechanisms for the release of hazardous waste identified by the EPA included storm water runoff from piles of K061 wastes present at the project site. Poor housekeeping and improper storage practices were cited by the EPA as the likely source of past releases at the project site. Following the CERCLA removal action, EPA completed a Preliminary Assessment of the project site that resulted in its classification as a No Further Remedial Action Planned (NFRAP) site.

1.5.3 Site Investigation Results

The objective of the site investigation was to characterize the project site and determine the nature and extent of contamination occurring in the on-site soil/fill; groundwater; sewer system; and building surfaces, components and materials. Sample locations are shown on Figure 3. The scope of the site investigations were in general conformance with the Final SI/RAR Work Plan developed for the project site and approved by the NYSDEC. Minor modifications to the scope of the field program were made during the course of the investigations, in consultation with NYSDEC, to account for conditions encountered. The primary tasks associated with the SI included:

- Preparation of a topographic survey of the project site.
- Performance of a radiation survey over the building and ground surfaces as well as during the subsurface investigation of the project site in an effort to locate any potential areas of elevated radiation.
- Field screening of surface soil/fill utilizing an x-ray fluorescence (XRF) unit to identify areas of elevated metals concentrations.
- Representative samples of surface soil and fill materials were collected from previously identified areas of concern (e.g., fuel oil tank farm, residual K061 waste areas, construction and demolition debris areas, etc.), as well as from points selected to represent typical conditions across the project site.
- The drilling of 12 test borings, advancement of 62 soil probes, and the excavation of 44 test pits across the project site in areas of potential concern to collect, screen and classify surficial deposits.
- Installation of 11 groundwater monitoring wells to determine groundwater flow direction and facilitate the collection of representative groundwater samples. Four existing monitoring wells were also sampled.
- Inspection of drains and sumps located on the project site to identify and sample potentially contaminated liquids, sediments and sludges and to determine the function of these structures, if possible.
- The sampling of concrete building surfaces that may have been exposed to polychlorinated biphenyls (PCBs), and the identification of potential PCB-containing electrical equipment.
- Chemical analysis of soil/fill, sediment, sludge, surface water, groundwater and concrete samples.
- Disposal profiling of contaminated soil/fill and sediment, wood floor blocks and soil/debris piles.
- The identification, sampling and laboratory analysis of suspected asbestos-containing materials (ACMs).

1.5.3.1. Physical Conditions

The SI identified the presence of fill material consisting of slag, foundry sand, soil, gravel, brick and concrete across the project site. The fill material extends from the ground surface to a depth of 2 to 7 feet below grade with a site-wide average of about 3.5 feet. The fill overlies a heterogeneous mixture of fine-grained glacial deposits ranging from clayey silts to silty clay units with varying percentages of sand and gravel. The glacial deposits are generally comprised of an upper, lacustrine unit underlain by a thin till unit that unconformably overlies shale bedrock, which occurs at approximate depths ranging from 2 to 15 feet below the ground surface. Bedrock core samples collected during the site investigation indicate that the upper 3 to 5 feet of bedrock is slightly to severely weathered and consists mainly of a dark gray to gray shale.

Hyde Creek, which is located approximately 100 feet from the northeast corner of the project site, flows in a northwesterly direction towards Middle Road where it enters a City storm sewer that eventually discharges to Lake Erie at the foot of Serval Street. According to 6 NYCRR Part 839, Hyde Creek is a Class C stream.

Although perched water was encountered in the permeable fill at several locations of the project site, saturated conditions were not consistently observed in the fill layer. As such, the upper-most water-bearing zone defined on the project site occurs within the glacial till and weathered shale bedrock. Groundwater flow in this zone is generally to the northwest on the north side of the building and to the northeast on the east side of the building.

Although the building on the project site appears to be structurally sound, the exterior shell and roofing systems are substantially deteriorated. The floor within the building is a combination of concrete and earth. A review of historical maps and drawings indicates that the earthen portions are former below grade storage and processing areas, which have been backfilled with non-native soils and fill. These subsurface features include but are not limited to: an abandoned fuel oil storage cellar; a cooling bed; remnants of the descaling pit; and an AST basement. Other smaller earthen fill areas not identified in historical drawings were identified during the site investigation in the southwest and northwest portions of the building. Portions of the concrete floor on the east end of the building have heaved from frost penetration.

All process equipment has been removed from inside the building, but numerous light fixtures with ballasts that may contain PCBs are still present within the structure. Federal regulations require that PCB containing ballasts are properly transported to, and disposed of in, a Toxic Substance Control Act (TSCA) approved disposal facility upon removal from service.

The on-site storm water and wastewater systems are abandoned and not well understood. Catch basins and sumps were difficult to identify due to the condition of the building and presence of fill, debris and brush scattered across the project site. A single active catch basin approximately seven feet deep is located 28 feet to the west of the southwest building corner. The catch basin is believed to be connected to the sewer line that utility plans indicate runs along the south building wall. No other catch basins along the south wall could be located, so it is uncertain whether the line is abandoned.

Located north of the building are the concrete floor slab and portions of the exterior wall foundations of the former buildings. Within this building footprint were multiple soil/debris piles consisting of a mixture of fill, soil, concrete, wood, brick, metal and construction and demolition (C&D) debris. Also observed in this area are wooden blocks used in floor construction. Some of the flooring was still in place, while in other areas the blocks were in small piles. Additionally, remnants of railroad ballast and railroad ties were observed during the subsurface investigation performed in the northeastern portion of the property and in the vicinity of gravel road along the northern property line.

1.5.3.2. Contaminant Assessment

As discussed in Section 1.2, a risk assessment was completed, in part, to develop the contaminants of concern for the project site. The analytical data collected during the SI and SSI were compared to the standards and/or regulatory guidance levels for the contaminants of concern. In general, contaminants of concern were detected in the soil/fill across the project site and are the common by-products of the steel manufacturing operations. These contaminants of concern identified for the project site through the completion of a risk assessment include:

- **Volatile Organic Compounds (VOCs)** – VOCs detected are generally limited to BTEX compounds (i.e. benzene, toluene, ethylbenzene, and xylene) and chlorinated hydrocarbons consisting of trichloroethene and its degradation products, 1,1-dichloroethene, 1,2-dichloroethene, and vinyl chloride.
- **Polycyclic Aromatic Hydrocarbons (PAHs)** – PAHs detected fall under the more general category of semi-volatile organic

compounds (SVOCs). The specific PAH compounds identified at the project site primarily consist of carcinogenic PAHs (cPAHs) that are known to represent human health risks. These compounds are almost exclusively limited to benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and Dibenzo(a,h)anthracene.

- **Inorganics** – Inorganics detected consist of the heavy metals in the project site's soil/fill. The metals of concern at the project site consist of arsenic, barium, beryllium, cadmium, chromium, copper, lead, silver, selenium and zinc.
- **Polychlorinated Biphenyls (PCBs)** – Multiple PCB aroclors were detected on concrete surfaces and in surface soil/fill surrounding a former transformer pad and are identified as a contaminant of concern.

The following discussions generally focus on the contaminants of concern in relation to the regulatory guidance values.

Surface Soil / Fill

A total of 43 surface soil/fill samples were collected from across the project site and analyzed for various parameters. Every surface soil/fill sample collected, with the exception of two samples, contained at least one contaminant of concern at a concentration exceeding the regulatory guidance levels.

Metals concentrations exceeding the regulatory guidance levels were detected in surface soils/fill across the project site. The highest concentrations of metals were detected in the western portion of the project site north of the building, and in the eastern portion of the project site in the area of the former baghouse. The presence of elevated metals is likely related to the residual presence of emission control dust, as well as the deposition of foundry sands, slag, scrap metal and various other processing wastes associated with steel production that were likely discharged on the property. Additionally, large volumes of water were used to cool the molten steel, and the process wastewaters may have been released on the project site.

PAHs were detected in all of the composite surface soil/fill samples collected from the project site. The highest concentrations of PAHs were detected in the center of the project site north of the building. Additional surface soil samples collected during the SSI confirmed numerous PAHs above the guidance values in the area north of the building. The presence of these contaminants is likely related to poor housekeeping practices resulting in past releases of petroleum products used in connection with rolling mill operations and other processing equipment, which involved the use of large quantities of greases and oils, within the former Building No. 47. Additionally, the presence of PAHs may be associated with the operation of railroad spurs throughout the property, particularly on the eastern half of the project site.

PCBs were also detected in the surface soil/fill at three locations (excluding the transformer pad area) with the highest concentrations in the surface soil/fill to the north of the existing building. The presence of PCBs in these areas is potentially the result of poor housekeeping practices resulting in the spills and or releases of dielectric fluids; the staging of electrical transformers at various locations throughout the project site; or spills/releases occurring during routine maintenance activities. Additionally, large quantities of hydraulic oil that may have contained PCBs were used on the project site, some of which may have been discharged.

These contaminants (metals, PAHs and PCBs) have low solubilities in water, and are relatively immobile in soils, as they tend to adsorb onto soil particles. This is supported by the results of synthetic precipitation leaching procedure (SPLP) and toxicity characteristic leaching procedure (TCLP) analyses of the contaminated soil/fill, which demonstrated that the leachability of the inorganic and semi-volatile organic contaminants is very low. The absence of the metals of concern (e.g., cadmium, copper, lead, silver and zinc) and PCBs, and the relatively low concentrations of PAHs in the groundwater also support this assessment. Furthermore, subsurface soils/fill samples collected at a depth of 1 foot directly beneath the surface soil/fill samples generally revealed lower concentrations of metals. As such, significant concentrations of these contaminants are unlikely to leach into the subsurface and migrate in the groundwater. However, there is the potential for the mechanical transport of contaminated surface soil/fill via wind and water erosion.

Under the current use scenario, persons living and working in the vicinity of, and/or persons trespassing on, the project site could be exposed to metals, PAHs and PCBs in the surface soil/fill via inhalation of airborne particles, or through incidental ingestion of, or dermal contact with, the contaminated media. Although the potential for human exposure during re-development activities involving the disturbance of the contaminated surface soil/fill has been identified, the risk of exposure could be effectively minimized through the use of appropriate personal protective equipment and dust suppression techniques. No complete exposure pathways have been identified in connection with the post-redevelopment period, assuming that the remaining soil/fill is not exposed at the ground surface.

Subsurface Soil and Fill

A total of 28 subsurface soil/fill samples were collected from across the project site and analyzed for various parameters. Every subsurface soil/fill sample collected, with the exception of three samples, contained at least one contaminant of concern at a concentration exceeding the regulatory guidance levels. Contaminants of concern detected in subsurface soil/fill at concentrations that exceed the regulatory guidance levels consist primarily of PAHs, but also include the solvents detected in the samples collected from TB-12 and SP-46 located near the former GFM Cooling tower at the southern portion of the existing building, and the solvents detected in SP-60 located at the north end of the project site. Additionally, several metals concentrations exceeding the guidance levels were detected in the subsurface soil/fill samples throughout the project site.

PAHs are commonly associated with industrial applications involving petroleum-based products, and are found in heavy fractions of petroleum distillates, asphalt, coal tar, and creosote. The locations and the potential sources of contamination within these areas included:

- Test Pit Nos. 01 and 02 within the northeast corner of the project site, in the former location of the three 157,000-gallon fuel oil ASTs. The majority of the contamination in these two locations is within the upper six feet, based on soil gas readings, and visual/olfactory observations.
- Soil Probe No. 5 which is located within the boundaries of a former railroad spur that entered the property from the east.
- Test Pit No. 26, which is centrally located along the northern property line south of the gravel road, was excavated in the vicinity of a railroad track that traversed the northern portion of the project site.
- Soil Probe No. 36, which was located within the western half of the existing building on the north side between Piers 14 and 15. A subsurface oil cellar was operated in this location during the early to mid 1900s.

The remainder of the subsurface soil/fill sampling locations revealed concentrations of total SVOCs below 10,000 ppb, the majority of which are located on the western half of the project site. Potential sources of PAHs in these areas include the former operation of rail spurs; poor housekeeping practices resulting in past releases of petroleum products and/or wastes used in connection with machine shop and compressor operations; and/or past spills and/or leaks associated with the use of fuel oil.

The soil samples collected from TB-12 and SP-46, which were located within the area of the former GFM Cooling tower, and the soil sample from SP-60, which is located about 20 feet west of MW-07 were the only subsurface soil/fill sampling locations with detections of VOCs above the regulatory guidance values. Solvents consisting primarily of Trichloroethylene (TCE) and/or 1,2-dichloroethene (1,2 DCE) were detected at these locations. Interviews with former employees of Roblin Steel indicated that the area of the former GFM Cooling tower was a common dumping area for wastes associated with facility operations. The TCLP VOC results for SP46 indicated that this sample contained concentrations of TCE that are considered hazardous based on 40 CFR Part 261.

The majority of the metals detected at concentrations exceeding the guidance values were contained in the upper four feet of the fill layer. Although contaminants were detected within the underlying native lacustrine material, the concentrations were generally lower. As noted in the previous discussion of the surface soil/fill contamination, significant concentrations of these contaminants are unlikely to leach from these media and migrate in the groundwater.

Conversely, the chlorinated solvents detected in subsurface soil/fill in two areas of the project site are soluble in water and moderately to highly mobile in the subsurface. As such, they can migrate downward into the groundwater and be transported in the dissolved phase in flowing groundwater. Furthermore, organic vapors can also be released from these materials based upon the volatile nature of the contaminants.

Based upon their subsurface disposition and, in the case of the VOCs, the lack of local reliance on groundwater as a potable water source, the presence of these compounds is not interpreted to represent a significant human exposure risk under the current use scenario for the property because no complete exposure pathways were identified. Although the potential for human exposure during re-development activities involving the disturbance of the contaminated soil/fill has been identified, the risk of exposure could be effectively minimized through the use of appropriate personal protective equipment, air monitoring, and dust suppression techniques. Under the future use scenario, there is the potential for the exposure of site workers to organic vapors released from the VOC contaminated soil.

Surface Water

No site-derived contamination was detected in the surface water sample collected from Hyde Creek.

Groundwater

Contaminants of concern detected in the groundwater beneath the project site consist primarily of VOCs, including chlorinated and aromatic hydrocarbons. These contaminants were detected in both the upper most water-bearing unit, which occurs at the interface between the overburden and weathered bedrock, and in the shallow bedrock water-bearing unit. Relatively low concentrations of PAHs were also detected in a portion of the wells screened in the upper most water-bearing unit. Although metals were detected in all of the groundwater samples at concentrations above the NYS Ambient Water Quality Standards (WQS), these metals are commonly noted to occur naturally in the groundwater of the region and are not interpreted to be site-derived.

The chlorinated hydrocarbons detected in the groundwater include TCE, DCE, and vinyl chloride. TCE was widely used as a solvent for degreasing metal parts, while the latter two compounds are likely byproducts of the degradation of TCE. Because chlorinated hydrocarbons are denser than water, quantities that are not absorbed by surrounding soils can migrate vertically downward through an aquifer. Additionally, these compounds are soluble in water and can therefore migrate in the dissolved phase with flowing groundwater.

The highest levels of chlorinated hydrocarbons were encountered in existing well EX-MW-11, where the TCE concentration was 150 ppm and the concentration of total chlorinated hydrocarbons was 200 ppm. In contrast, the concentrations of total chlorinated hydrocarbons in nearby wells EX-MW-12 and MW-2 were 0.350 ppm and 0.151 ppm, respectively, and no chlorinated hydrocarbons were detected in nearby wells MW-3 (bedrock well) or EX-MW-10. The high concentration of TCE detected in EX-MW-11 appears to be associated with a source area identified on the adjacent Alumax property.

Chlorinated hydrocarbons at much lower concentrations were also detected in interface wells EX-MW-9 (0.870 ppm), MW-9 (0.766 ppm), and MW-7 (1.90 ppm); and in bedrock well MW-5 (0.008 ppm). While elevated concentrations of TCE were detected in subsurface soil/fill samples collected in the vicinity of MW-9, which is located in an area reportedly used for the discharge of spent solvents, no suspected point sources of the chlorinated hydrocarbon contamination were identified in connection with the other groundwater detection points. As such, the groundwater contamination observed in these wells may be the result of the use of chlorinated solvents in association with facility operations, poor housekeeping practices, and/or the on-site disposal of spent solvents.

The aromatic hydrocarbons detected in the groundwater samples from numerous wells across the project site include benzene, toluene, ethylbenzene and xylenes. These compounds are often referred to as BTEX compounds, and are commonly associated with gasoline. The mobility of these compounds ranges from low to moderate for toluene and xylenes, and moderate to high for ethylbenzene and benzene. Total BTEX levels detected in groundwater samples were relatively low, ranging from 0.005 ppm (MW-1) to 0.247 ppm (MW-6). No historical records indicating the on-site storage of gasoline were discovered during the course of this investigation, nor were any point sources of BTEX contamination encountered. However, given the nature of the former site operations, it is likely that gasoline was stored and utilized on-site, perhaps in small quantities. Therefore, the presence of these aromatic hydrocarbons in the groundwater on the project site is likely the result of past spills or leaks of gasoline from equipment and vehicles utilized on-site.

Low concentrations of SVOCs, including PAHs, were detected in the groundwater samples collected from MW-1, MW-4, MW-6, MW-7, MW-9, MW-11, and EX-MW-10. However, the concentrations of these compounds only slightly exceed the regulatory standards in three of these wells (MW-1, MW-4 and MW-6). The majority of the SVOCs detected have relatively low solubilities in water, and are characterized as slightly mobile to immobile in the subsurface. The wells in which these compounds were detected are located within or immediately down gradient from the area in which elevated SVOC levels were detected in surface soil/fill samples. As such, the presence of these compounds in the groundwater at these locations may be attributed to the leaching of contaminants from the overlying soil/fill.

The VOCs detected in the groundwater are moderately to highly mobile in the subsurface, and are expected to migrate in the dissolved phase with flowing groundwater. As such, they have the potential to be transported off-site in groundwater flow within both water-bearing units, and to ultimately be discharged to local surface water bodies including Hyde Creek and Lake Erie. The presence of these compounds in the monitoring wells located along the down-gradient project site boundary is evidence that this off-site migration may be occurring. Similarly, PAHs were also detected in a number of the down-gradient wells, and may also be migrating off-site in the groundwater within the upper-most water-bearing unit. However, given the relatively low concentrations of PAHs detected in these wells and the relatively low mobility of these compounds, significant concentrations of PAHs are not expected to migrate substantially in the groundwater. Moreover, the lack of local reliance on groundwater as a source of potable water, and the absence of residential receptors immediately to the north (down-gradient) of the project site minimizes the potential for direct human exposure to groundwater contaminants. Furthermore, it should be noted that no VOCs or PAHs were detected in surface water samples collected from Hyde Creek in the vicinity of the project site.

Groundwater potentiometric data indicates that the sewer line located along the southern margin of the project site may intercept groundwater within the upper-most water-bearing unit. As part of the environmental investigations completed at the adjoining Alumax property to the south, a sample of the water from the catch basin near MW-12 was collected and analyzed. This water is believed to originate from the sewer line located parallel to the southern edge of the building. The analytical results indicated the presence of five VOCs, with only xylene exceeding its water quality standard. Acetone, cis-1,2-dichloroethene, ethylbenzene, and TCE were detected at concentrations below their respective water quality standards. It is expected that contaminant concentrations within the sewer line will vary depending on the groundwater elevation and flow volume within this conveyance. As such, impacted groundwater appears to be migrating off-site in this sewer line and entering the City of Dunkirk's sewer system. As documented in the October 2000 Phase III ESA report prepared by IT Corporation for the Alumax site, this sewer line ultimately discharges to the City of Dunkirk's wastewater treatment plant. As such, off-site human and environmental exposure to contaminated groundwater carried in and/or discharged from the sewer line system is a slight concern. It should be again noted, however, that the chlorinated solvent contamination detected in EX-MW-11, which is located in close proximity to this sewer line, appears to be emanating from a source area located on the adjacent Alumax property to the south.

Based upon the presence of significant concentrations of DCE and vinyl chloride in the groundwater samples, the natural degradation of TCE, the suspected source product, has been occurring in the subsurface of the project site for some time. As such, it is reasonable to assume that the degradation of the aromatic, chlorinated and polycyclic aromatic hydrocarbons detected in the groundwater will continue to occur via natural chemical and biological processes.

Although no complete route for direct human exposure to contaminated groundwater has been identified under the current or future use scenarios, there is the potential for utility workers involved with the cleaning and/or maintenance of the sewer system to be exposed to the VOC contaminated groundwater that is believed to enter this system on the project site. Construction workers could also be exposed to the contaminated groundwater and organic vapors emanating therefrom during excavation activities performed in connection with redevelopment activities. However, the use of appropriate personal protective equipment, air monitoring and groundwater management techniques would likely minimize the risk of exposure during the re-development activities. Under the future use scenario, there is the potential for the exposure of site workers to organic vapors released from the VOC contaminated groundwater.

<u>Sediment/Sludge</u>

Contaminant concentrations exceeding the regulatory guidelines were detected in sediment and sludge collected from drains and sumps within the building (Sump Nos. 1 through 8), on the project site outside the building (Sump No. 9) and from current or past off-site discharge points (Hyde Creek outfall and the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building). These contaminants include metals, VOCs and SVOCs (and PCBs at SMP01). Metals are attributed to metal particulates (e.g., shaving, grindings, etc.) generated during process operations conducted at the former Roblin Steel facility that were likely washed or swept into the floor drains, as well as past process waste water discharges. The presence of VOCs, SVOCs and PCBs is likely related to poor housekeeping practices resulting in past releases of solvents, petroleum products and/or wastes used in connection with former industrial operations; as well as spills and/or releases of new and used solvents, petroleum products and dielectric fluid to the facility's internal drainage system. Contaminated sediment within the facility's sumps has the potential to become suspended in and transported by storm water that enters the sumps and overflows these structures or discharges to local surface water bodies, such as Hyde Creek.

Under the current use scenario, no complete human exposure pathways were identified in connection with the contaminated sludge and sediment in the on-site sumps and drains. However, given the fact that the on-site sewer system has not been fully delineated, and the documented impacts to the sediments at a known discharge location (Hyde Creek outfall and the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building), there is the potential for utility workers involved with the cleaning and/or maintenance of drainage structures owned by the City that may still be tied into the on-site sewer system to be exposed to the metals, VOCs, SVOCs and PCBs present in the contaminated sediments and sludge in these structures. The potential for the exposure of members of the public also exists should the sediment/sludge enter Hyde Creek and be transported by stormwater, or dispersed by wind currents. Lastly, fish and wildlife inhabiting Hyde Creek could be exposed to the contamination. If the migration of contaminated sediment were to occur in this manner, these exposure pathways would exist under the current and future use scenarios.

Construction workers, site visitors and persons, working and traveling through the project area could be exposed to the metals, VOCs, SVOCs and PCBs in the sediment and sludge during redevelopment activities. However, the use of appropriate personal protective equipment and dust suppression techniques would likely minimize the risk of exposure during redevelopment.

No complete exposure pathways for on-site sludge and sediment contamination have been identified in connection with the post redevelopment period, assuming that the sumps, drainage structures and their contents are not exposed at the ground surface after redevelopment.

Asbestos

Asbestos was the primary contaminant of concern detected in the building components. Non-friable ACMs are relatively resistant to weathering and are not expected to migrate from the project site. However, asbestos fibers released as a result of the degradation of friable ACMs are susceptible to dispersion via wind currents and/or transport via stormwater. Based upon the condition of the building and the fact that only limited friable ACMs were detected, it is not likely that friable ACMs are being exposed directly to the environment. The risk of asbestos exposure during building demolition or renovation activities would be minimized through the implementation of proper abatement, control and monitoring procedures as required by applicable state and federal regulations. The type and quantity of ACMs identified in the on-site structure is described in the Pre-Demolition Asbestos Survey Report included as Appendix I of the SI Report

PCBs

PCB concentrations exceeding the regulatory values for two parameters (Aroclor 1260 and 1242) were initially detected at one sampling location (SS05-CC) in the area of the former transformer room. Additional sampling completed during the SSI detected PCB concentrations above the regulatory values in the concrete sample (SS09-CC) and the surface soil/fill samples collected to the south, east and west of the pad (SS44 through SS46). The surface soil/fill sample collected from the west side of the concrete pad demonstrated the highest levels of PCBs. The extent of PCB contamination in the soil/fill surrounding the pad to the south, east and west has not been fully defined.

Based on interviews provided by former Roblin Steel employees, the elevated levels of PCBs detected on the concrete flooring of the former transformer rooms farthest to the west are likely the result of a large spill of transformer oil. The PCBs detected on the remaining concrete pads from the former electrical substation and the concrete flooring from the former transformer rooms on the east side of the project site are likely the result of the regular operation and maintenance of the transformers that were once present in these areas.

The presence of PCBs on the concrete transformer pad located north of the building on the western part of the project site is not interpreted to represent a human exposure risk because no complete exposure pathways were identified under the current use scenario for the property. This is based on the disposition of the PCBs within the concrete, which makes exposure to or inhalation of PCB contaminated concrete unlikely. The presence of PCBs in the surface soil/fill surrounding the concrete pad represents a human exposure risk to persons working in the vicinity of and/or persons trespassing on the project site. These potential receptors could be exposed to PCB contamination via inhalation of airborne particles, or through incidental ingestion of, or dermal contact with, the contaminated soil/fill.

Although the potential for human exposure during re-development activities involving the disturbance of the contaminated concrete and soil/fills has been identified, the risk of exposure could be effectively minimized through the use of appropriate personal protective equipment, air monitoring, and dust suppression techniques. Assuming that the contaminated concrete and soil/fills would not be exposed under the future use scenario, no exposure threat would exist under this scenario.

The presence of the potential PCB containing electrical equipment (e.g. fluorescent and HID light fixtures with ballasts) throughout the existing building is not interpreted to represent a significant human exposure risk because no complete exposure pathways were identified under the current use scenario for the property. This is based on the inaccessibility of this equipment and the sealed nature of the ballasts. However, construction workers involved in site redevelopment could be exposed to the PCBs when handling the fixtures during rehabilitation or demolition of the structure. This risk could be minimized, however, through the use of personal protective equipment and proper handling techniques. Assuming that the fixtures would no longer be present under the future use scenario, no exposure threat would exist under this scenario.

1.5.3.3. Identification of Impacted Media Groups

As a result of the SI, SSI and the environmental investigations completed at the adjacent Alumax facility, seven groups of impacted media were identified based on the type of media and type of contaminant. The seven impacted media groups (MGs) that are included for evaluation as part of this RAR include:

1. Surface Soil/Fill and Debris Piles.
2. Subsurface Soil/Fill Impacted with Chlorinated VOCs.
3. Subsurface soil/fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics.
4. Drainage Features and Contents.
5. Building Components.
6. Concrete and Surface Soil Impacted with PCBs.
7. Groundwater Impacted with VOCs.

2.0 IDENTIFICATION AND DEVELOPMENT OF ALTERNATIVES

2.1 Remedial Action Objectives

The following subsections summarize the contaminants of concern, general locations of contaminants, and the Remedial Action Objectives (RAOs) identified for each of the seven MGs. The approximate location of the MGs are shown on Figures 4A through 4C. These RAOs are based on the findings of the SI, SSI and the anticipated future use of the project site for light industrial and warehousing purposes.

2.1.1 MG #1 - Surface Soil/Fill and Debris Piles

The contaminants of concern detected in this MG include cPAHs, PAHs and metals (predominantly lead, chromium, cadmium and silver) in the soil/fill within 12 inches of the ground surface that exceed the regulatory guidance values. This impacted surface soil/fill is located throughout the entire project site. In addition to the surface soil/fill, various debris piles located north of the existing building are included with this MG. The piles consist of a mixture of fill, soil, concrete, wood, brick, metal, C&D debris, and wood block flooring. Some wood block flooring is still in place, while in other areas the wood blocks are in small piles. The soil piles and wood block flooring were analyzed and determined to be non-hazardous.

The RAO for the protection of human health is to prevent dermal contact with, incidental ingestion of, or inhalation of particulates originating from the contaminated surface soil/fill or debris piles. The RAO for environmental protection is to prevent precipitation from coming into contact with the contaminated surface soil/fill and debris piles causing a potential continuing source of groundwater contamination. Furthermore, this would serve to limit potential contaminated storm water runoff.

2.1.2 MG #2 - Subsurface Soil/Fill Impacted with Chlorinated VOCs

The contaminants of concern detected in this MG consist of chlorinated VOCs (mainly TCE) in the subsurface soil/fill that exceed the guidance values at the south side of the existing building and in the vicinity of SP-60 at the north end of the project site. Furthermore, TCLP analyses indicate the soil in the vicinity of SP-46 is considered a hazardous waste.

The RAO for protection of human health is to prevent the exposure of construction workers and future site workers to these contaminants via dermal contact, incidental ingestion, or inhalation of organic vapors and/or particulates. The RAO for environmental protection is to prevent these soils from acting as a continuing source of groundwater contamination.

Additional subsurface investigation is recommended to better define the vertical and lateral extent of VOC contamination in the area of SP-46. This would likely consist of a series of borings completed in the area of SP-46 to allow for the collection and analysis of additional soil samples. It is assumed that this work would be completed during the remedial design process.

2.1.3 MG #3 - Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics

The contaminants of concern identified in this MG consist of PAHs, metals, and petroleum nuisance characteristics (i.e. odor and visual staining) in the subsurface soils across the project site. The highest concentrations of impacts appear to be present within the fill-type soils. The RAO for protection of human health is to prevent the exposure of construction workers and future site workers to these contaminants via dermal contact, incidental ingestion, or inhalation of organic vapors and/or particulates. The RAO for environmental protection is to prevent these soils from acting as a continuing source of groundwater contamination.

2.1.4 MG #4 - Drainage Features and Contents

The contaminants of concern identified in this MG include:

- Metals, PAHs, VOCs and PCBs at concentrations that exceed the guidance values in the sediments located within a series of eight sumps within the existing building (interior Sump Nos. 1 through 8) and one sump outside of the building (exterior Sump No. 9);

- Metals and PAHs that exceed the guidance values in the sediments within the Hyde Creek outfall; and
- VOCs and SVOCs that exceed the guidance values in the sediments at the catch basin and end of the sewer pipe from the discharge location from the sewer line located along the south side of the existing building.

The RAO for protection of human health is to prevent dermal contact with, incidental ingestion of, or inhalation of organic vapors and/or particulates originating from the contaminated sediment. The RAO for environmental protection is to prevent the release of contaminated sediments from the sumps through remaining undocumented outfall pipes or through the off-site sewer locations.

2.1.5 MG #5 - Building Components

The contaminants of concern identified for this MG consist of friable and non-friable ACMs as well as the potential occurrence of PCBs associated with the fluorescent and HID light fixtures located throughout the existing building. Substantial quantities of non-friable and limited quantities of friable ACMs (white canvas cloth in the former boiler room) were identified throughout the on-site building.

The RAO for protection of human health is to prevent the inhalation or incidental ingestion of asbestos fibers, as well as dermal contact with contaminants originating from the light fixture ballasts. The RAO for environmental protection is to prevent the release of contaminants from the light fixture ballasts.

2.1.6 MG #6 - Concrete and Surface Soils Impacted with PCBs

The contaminant of concern detected in this MG consists of PCBs within a concrete pad and the surface soil/fill surrounding the pad at concentrations that exceed the guidance values. This area was a former transformer room located to the north of the central portion of the existing building.

The RAO for the protection of human health relative to the PCB-impacted concrete is to prevent construction workers and the surrounding public from the incidental ingestion of, or inhalation of particulates generated during redevelopment. The RAO for the protection of human health relative to the surrounding surface soil/fill is to prevent dermal contact with, incidental ingestion of, or inhalation of particulates originating from the contaminated soil/fill. The RAO for environmental protection is to prevent storm water from coming into contact with the contaminated surface of the concrete and surrounding soil/fill causing contaminated storm water runoff to off-site locations.

Additional investigation is recommended to further define the PCB impacts to the surface soil/fill to the south, east and west of existing surface soil samples that contained PCB concentrations exceeding the guidance values. It is assumed that this work would be completed during the remedial design process.

2.1.7 MG #7 - Groundwater Impacted with VOCs

The contaminants of concern detected in this MG consist of chlorinated and aromatic hydrocarbons and within the site-wide groundwater at levels that exceed the WQS.

It should be noted, however, that the substantially elevated levels of chlorinated VOCs detected in the groundwater along the project site's southern boundary, in the vicinity of well EX-MW-11, are attributed to contaminant trespass from a residual source area documented on the adjacent Alumax property. As part of the Voluntary Clean-Up Program, an Interim Remedial Measure (IRM) was implemented at the Alumax property to address the impacts in the residual source area. The IRM consisted of in-situ treatment of the impacted groundwater through the injection of zero valent iron at the Alumax property. Remedial work to address the contamination in the vicinity of EX-MW-11 was not completed.

The RAO for protection of human health is to prevent on site construction workers, future site workers and off-site utility workers from being exposed to the groundwater contaminants via dermal contact or inhalation of organic vapors. The RAO for environmental protection to eliminate suspected contaminant source areas, which primarily consist of areas of contaminated surface and subsurface soil/fills, and to prevent the discharge of contaminated groundwater into local surface water bodies (e.g., Lake Erie via the project site's storm sewer system, and Hyde Creek).

2.2 General Response Actions

General response actions for each of the seven MGs at the project site have been developed, summarized in Table 1, and described in the following subsections. Although these general response actions include no action as a means of source control, the no action response does not address the RAOs identified in the preceding section and is included for comparison purposes only.

2.2.1 MG #1 - Surface Soil/Fill and Debris Piles

General response actions available to satisfy the RAOs identified for the contaminated surface soil/fill and the debris piles include:

- No action.
- Institutional controls.

- Access controls.
- Disposal of surface debris.
- Containment (soil or pavement).
- Partial or complete excavation and off-site disposal of impacted soil/fill.

2.2.2 MG #2 - Subsurface Soil/Fill Impacted with Chlorinated VOCs

General response actions for the chlorinated VOC-impacted subsurface soil/fill include:

- No action.
- Institutional controls.
- Access controls.
- Containment (soil or pavement).
- Partial or complete excavation and off-site disposal of impacted soil/fill.
- In-situ treatment (soil vapor extraction system).

2.2.3 MG #3 - Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics

General response actions for this MG include:

- No action.
- Institutional controls.
- Access controls.
- Containment (soil or pavement).
- Partial or compete excavation and off-site disposal of impacted soil/fill.

2.2.4 MG #4 - Drainage Features and Contents

General response actions available to satisfy the RAOs for the contaminated sediments include:

- No action.
- Institutional controls.
- Access controls.
- Removal and off-site disposal of sediments from the drainage features.
- In-place closure of drainage features.
- Partial or complete removal and off-site disposal of the piping associated with the drainage features.
- Removal and off-site disposal of drainage features and contents.

2.2.5 MG #5 - Building Components

General response actions to satisfy the RAOs for the asbestos and potential PCBs associated with the light fixtures include:

- No action.
- Institutional controls.
- Access controls.
- Partial or complete removal and off-site disposal.

2.2.6 MG #6 - Concrete and Surface Soil/Fill Impacted with PCBs

General response actions available for the PCB-impacted concrete and surrounding surface soil/fill to satisfy the RAOs include:

- No action.
- Institutional controls.
- Access controls.
- Containment (soil or pavement).
- Excavation and off-site disposal of impacted soil and concrete.

2.2.7 MG #7 - Groundwater Impacted with VOCs

General response actions available to satisfy the RAOs identified for the contaminated groundwater include:

- No action.
- Institutional controls.
- Access controls.
- Groundwater monitoring.
- Sub-slab vapor venting system and air monitoring with long-term groundwater monitoring.
- Enhanced natural attenuation (HRC or ZVI injection) in areas of elevated chlorinated VOC concentrations.

2.3 Remediation Areas

Remediation areas and volumes have been estimated based on the MGs identified within this RAR. As previously noted, additional investigation is recommended to better define the extent of the chlorinated VOC impacts to the subsurface soil/fill in the area to the south of the existing building and to better define the extent of PCB impacts in the surface soil/fill surrounding the concrete pad. The areal extent of each of the MGs is shown on Figure 4A through 4C. The volumes developed from these areas are summarized below. Additional assumptions used to develop the remediation areas are included in Appendix B.

2.3.1 MG #1 - Surface Soil/Fill and Debris Piles

The estimated areal extent of the contaminated surface soil/fill included with this MG is outlined on Figure 4A and includes areas of the project site where surface soil/fill is exposed. The anticipated depth of contamination and the calculated soil/fill volume include the following:

- 332,200 square feet of surface area, one foot deep, totaling in approximately 12,300 cubic yards.
- 102,000 square feet of surface area (former building area), three inches deep, totaling approximately 950 cubic yards.

The total estimated contaminated surface soil/fill included with this MG is, therefore, approximately 13,250 cubic yards. An average depth of 3 inches was used for the 102,000 square feet area because portions of this area are known to have exposed concrete slabs from the former buildings where no surface soil/fill exists.

Five individual piles of debris/fill estimated to consist of a total of 1,100 cubic yards are located throughout the project site. Two areas of wood block flooring estimated to consist of 175 cubic yards exist at the project site. Together, the debris/fill piles and wood block flooring consist of an estimated 1,275 cubic yards of material.

2.3.2 MG #2 - Subsurface Soil/Fill Impacted with Chlorinated VOCs

The estimated areal extent of contaminated subsurface soil/fill included in this MG encompasses two separate areas as shown on Figure 4C. The first area, located on the south side of the building, includes an assumed surface area of approximately 2,700 square feet with a depth of four feet, resulting in about 400 cubic yards of impacted soil. A large portion of this area is located within the existing building beneath the concrete floor slab. The area in the vicinity of SP-60 includes an approximate 500 square feet surface area with the impacted zone of soil from four to eight feet below ground surface, resulting in about 75 cubic yards of impacted soil.

2.3.3 MG #3 - Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics

The estimated areal extent of the contaminated subsurface soil/fill included in this MG is outlined on Figure 4B and includes the entire project site excluding the footprint of the existing building. The depth of subsurface soil/fill generally includes the material identified as the fill layer, which exists at an average thickness of 3.5 feet across the project site. Some impacts to the native lacustrine material located directly below the fill layer have been detected that exceed the regulatory guidelines. However, due to the fine-grained nature of the lacustrine material and the documented reduction in contaminant concentration within the lacustrine material, it is estimated that only the top six inches of the lacustrine material would contain contaminant concentrations exceeding the regulatory guidelines. The calculated soil volume based on a surface area of 434,200 square feet and a thickness of three feet (top 12 inches is considered surface soil) is therefore 48,000 cubic yards.

2.3.4 MG #4 - Drainage Features and Contents

Contaminated sediments were documented in interior Sump Nos. 1 through 8, exterior Sump No. 9, the Hyde Creek outfall and at the catch basin and end of the sewer pipe from the discharge location from the sewer line located along the southern portion of the building. An estimated 50 cubic yards of impacted sediment is included in this MG.

2.3.5 MG #5 - Building Components

Asbestos-containing materials were identified throughout the building. The type and quantity of ACMs identified in the on-site structure is described in the Pre-Demolition Asbestos Survey Report included as Appendix I of the SI Report. Approximately 120 HID lights and ballast and 40 four-foot long fluorescent bulbs and ballasts exist at the project site.

2.3.6 MG #6 - Concrete and Surface Soils Impacted with PCBs

The estimated areal extent of PCB-impacted concrete is about 500 square feet. Assuming a one-foot thick concrete slab, approximately 20 cubic yards of impacted concrete exist at the project site. The lateral limits of the impacted surface soil/fill is assumed to extend 10 feet beyond the former transformer room resulting in an estimated 50 cubic yards of PCB-impacted surface soil/fill.

2.3.7 MG #7 - Groundwater Impacted with VOCs

Chlorinated and aromatic hydrocarbons and, to a lesser extent, SVOCs have been detected within the site-wide groundwater in exceedance of the WQS. As previously stated, the substantially elevated levels of VOCs detected in the groundwater along the southern project site boundary, in the vicinity of well EX-MW-11, are attributed to contaminant trespass from a documented source area on the adjacent Alumax property to the south.

Lower concentrations of chlorinated aromatic hydrocarbons have been detected across the project site. However, two localized areas of somewhat elevated chlorinated VOC contamination (total chlorinated VOCs of up to 1,500 ppb) exist in the area of MW-09 and MW-07. These areas correspond to areas where elevated concentrations of TCE were detected in subsurface soil/fill.

2.4 Development of Alternatives

The general response actions identified in Section 2.2 have been assembled into a series of site-wide remedial action alternatives. Each alternative includes some varying degree of institutional controls depending on the state and volume of contamination that will remain on the project site after implementation of the particular remedial alternative. These alternatives are summarized in Table 2 and outlined in the following subsections. A detailed summary of the assumptions for each site-wide alternative is included in Appendix B.

2.4.1 Alternative A – "No Action"

Under this alternative, the project site would remain in its current state and maintenance of the current access controls would be performed until the time that the potential for human exposure to site-derived contamination is no longer present. Remedial activities under this alternative would be limited to institutional controls to restrict future use of the site and long-term groundwater monitoring to monitor natural attenuation and the levels of contaminants in the downgradient wells to determine off-site migration.

This alternative does not satisfy the human health or environmental RAOs for the current use scenario, nor is it supportive of the redevelopment of the project site for manufacturing/industrial use. However, it has been retained for detailed analysis to provide a point of comparison for the other alternatives.

2.4.2 Alternative B – "Exposure Pathway Removal"

This "Exposure Pathway Removal" alternative combines institutional and access controls with long-term monitoring and the following general response actions to limit human and environmental exposure to the affected media.

- Surface Soil/Fill and Debris Piles (MG #1): Disposal of surface debris and containment through the installation of a soil cover.
- Subsurface Soil/Fill Impacted with Chlorinated VOCs (MG #2): Containment through the installation of a soil cover.
- Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics (MG #3): Containment through the installation of a soil cover.

- Drainage Features and Contents (MG #4): Removal and off-site disposal of the accessible sediment from the Hyde Creek outfall without entering the pipe and closure of the outfall in place. Removal and off-site disposal of accessible sediment from the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building and closure of the pipe in place. The interior Sump Nos. 1 through 8 and exterior Sump No. 9 would be addressed through institutional and access controls.
- Building Components (MG #5): Removal and off-site disposal of friable asbestos.
- Concrete and Surface Soils Impacted with PCBs (MG #6): Containment through the installation of a soil cover.
- Groundwater Impacted with VOCs (MG #7): Long-term groundwater monitoring.

Institutional and access controls combined with the imported cover soils would focus on preventing human and environmental exposure to the impacted media until the time that the potential for human exposure to site-derived contamination within these media is no longer present. Long-term monitoring would focus on the cover system and site-wide groundwater quality.

While this alternative satisfies the human health and environmental RAOs for the current use scenario, and limits the potential for point discharges from the project site, it represents the minimal approach to addressing site contamination and is not supportive of the redevelopment of the project site.

2.4.3 Alternative C – "Containment"

This alternative combines institutional and access controls with long-term environmental monitoring and the following general response actions for the affected media:

- Surface Soil/Fill and Debris Piles (MG #1): Disposal of surface debris and containment through the installation of asphalt pavement or a contingency soil cover.
- Subsurface Soil/Fill Impacted with Chlorinated VOCs (MG #2): In-situ treatment consisting of soil vapor extraction for soils under the building and containment through the installation of asphalt pavement or a contingency soil cover for areas outside the building.
- Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics (MG #3): Containment through the installation of asphalt pavement or a contingency soil cover.
- Drainage Features and Contents (MG #4): Removal and off-site disposal of sediments from interior Sump Nos. 1 through 8 and exterior Sump No.

9 and closure in place. Removal and off-site disposal of the accessible sediment from the Hyde Creek outfall without entering the pipe and closure of the pipe in place. Removal and off-site disposal of accessible sediment from the catch basin and end of sewer pipe from the discharge location of the sewer line along the southern portion of the building and closure of the pipe in place.

- Building Components (MG #5): Removal and off-site disposal of friable asbestos.
- Concrete and Surface Soils Impacted with PCBs (MG #6): Containment through the installation of asphalt pavement or a contingency soil cover.
- Groundwater Impacted with VOCs (MG #7): Engineering controls consisting of a sub-slab vapor venting system for the existing building, air monitoring, and long-term groundwater monitoring.

Under this alternative, contaminated media would be largely contained with some treatment and removal. Although it is anticipated that an asphalt pavement cover will be installed across the project site during redevelopment, a contingency soil cover will be installed if redevelopment is delayed or not undertaken. A soil/fill management plan would be required since impacted surface and subsurface soils would remain in place. Long-term monitoring would focus on the cover system, site-wide groundwater quality, and air monitoring within the building after redevelopment.

This alternative is somewhat conducive to redevelopment if the project site would be paved with an asphalt cover (during redevelopment). However, given the planned future use of the project site and existing building for light industrial and/or warehousing purposes, substantial site grading is anticipated during redevelopment to allow for drainage control and storm water management and to enable the construction of loading docks on the existing building while preserving required ceiling heights. This alternative does not facilitate these grading activities and, therefore, does not fully support the redevelopment of the site.

2.4.4 Alternative D – "Excavation"

This "Excavation" alternative combines institutional controls with complete removal or reduction of contaminants and short-term environmental monitoring. This alternative is the most comprehensive, involving the removal and off-site disposal of contaminated media from the site as well as active remedial methods to address the contaminated groundwater. This alternative includes the following general response actions for the affected media.

- Surface Soil/Fill and Debris Piles (MG #1): Disposal of surface debris and complete excavation and off-site disposal of soil/fill above TAGM 4046 levels.

- Subsurface Soil/Fill Impacted with Chlorinated VOCs (MG #2): Complete excavation and off-site disposal of soil/fill above TAGM 4046 levels.
- Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics (MG #3): Complete excavation and off-site disposal of soil/fill above TAGM 4046 levels.
- Drainage Features and Contents (MG #4): Complete removal and off-site disposal of the sediments, and piping related to interior Sump Nos. 1 through 8 and exterior Sump No. 9. Removal and off-site disposal of a portion of the piping associated with the Hyde Creek outfall and the sediment contained within that portion. Removal and off-site disposal of accessible sediment from the catch basin and end of sewer pipe from the discharge location of the sewer line along the southern portion of the building and closure of the pipe in place.
- Building Components (MG #5): Removal and off-site disposal of friable asbestos, non-friable asbestos and electrical components.
- Concrete and Surface Soils Impacted with PCBs (MG #6): Complete excavation and off-site disposal of concrete and soil/fill above guidance levels (TAGM 4046/TSCA).
- Groundwater Impacted with VOCs (MG #7): Enhanced natural attenuation (i.e. Hydrogen Releasing Compound or zero valent iron injection) with short-term groundwater monitoring.

Under this alternative, contaminated media would be largely removed from the project site. Environmental monitoring would focus on groundwater impacted with VOCs to monitor the effectiveness of the enhanced natural attenuation. Only short-term (two years) groundwater monitoring will be conducted because the in situ treatment is assumed to be successful in addressing the two areas with VOC impacts. This alternative is very conducive to redevelopment since only a limited number of institutional controls would be necessary. Therefore, the project site would be suitable for immediate redevelopment following the completion of this remedial alternative.

2.4.5 Alternative E – "Limited Excavation"

This "Limited Excavation" alternative combines institutional controls with partial removal or reduction of contaminants above the regulatory guidance values and long term environmental monitoring. This alternative assumes that the project site will be redeveloped as outlined in Section 1.3 shortly after the remedial activities have been completed. The partial removal would include areas with contaminant concentrations that exceed site-specific cleanup levels (SSCLs). The development of the SSCLs is discussed below.

2.4.5.1. Site-Specific Cleanup Levels

In conjunction with the SI, a qualitative risk assessment was performed to assess the potential human health and environmental risks associated with the contaminants detected on the project site. As part of the risk assessment, it was determined that, based on the intended end use of the project site for light industrial or warehousing purposes, the NYSDEC recommended cleanup levels for soil/fill set forth in TAGM No. 4046 could be adjusted while still maintaining protection of human health and the environment. Therefore, SSCLs for the contaminants of concern detected in surface and subsurface soil/fill, and sediment were developed for the project site.

Under the intended future use scenario for the project site, the primary consideration used during the determination of acceptable clean-up levels is the potential risk to human health posed by residual chemical constituents in the soil/fill and groundwater. The approach taken to develop SSCLs is detailed in the Risk Assessment Report included as Appendix J of the SI Report. The following table summarizes the SSCLs developed for the Site.

SSCLs

PARAMETER	MAXIMUM CONCENTRATION IN SOIL/FILL (mg/kg) (2)
Individual VOC	1
Total VOCs	10
Individual SVOCs	50
Total SVOCs (2)	500
Total cPAHs (3)	10
Arsenic	50
Barium	1000
Cadmium	20
Chromium	1000
Lead	1000
Zinc	85,000
Selenium	50
Silver	10
Beryllium	5
Copper	250
PCBs	10 (4)

Notes:

1. Analyses shall be performed per NYSDEC Analytical Services Protocol (ASP), October 1995 methodology or other methods acceptable to NYSDEC.
2. Target Compound List (TCL) SVOCs per USEPA Method 8270
3. Carcinogenic polycyclic aromatic hydrocarbons (i.e., benzo(a)anthracene, benzo(a)pyrene, dibenzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene.
4. Subsurface soil limit set in TAGM 4046.

2.4.5.2. Remediation Areas for Alternative E

As shown on Figure 5, a significantly reduced surface area and corresponding volume of surface soil/fill and subsurface soil/fill would require remediation if the SSCLs are utilized. The volume of sediments that would require remediation would also be reduced by eliminating the need to remediate Sump 9. The remediation areas for the remaining MGs would remain the same. Modifications to the remediation areas outlined in Section 2.3 are summarized below for this specific alternative.

MG #1 - Surface Soil/Fill and Debris Piles for Alternative E

The surface soil/fill that would require remediation under Alternative E includes four individual areas of the project site. These four areas, the anticipated depth of impacts and the calculated soil volume include the following:

- 11,000 square feet of surface area, one-foot deep, results in approximately 400 cubic yards.
- 2,900 square feet of surface area, one-foot deep, results in approximately 100 cubic yards.
- 12,300 square feet of surface area, one-foot deep, results in approximately 450 cubic yards.
- 102,000 square feet of surface area, 3-inches deep, results in approximately 950 cubic yards.

The total estimated contaminated surface soil/fill exceeding the SSCLs at the project site is therefore, approximately 1,900 cubic yards. An average depth of 3 inches was used for the 102,000 square feet area because portions of this area are known to have exposed concrete slabs from the former buildings where no surface soil/fill exists. The volume of the debris/fill piles and wood block flooring remains the same as listed in Section 2.3.1. Impacts beneath these concrete slabs were not identified.

MG #2 - Subsurface Soil/Fill Impacted with Chlorinated VOCs for Alternative E

The two areas of the project site associated with this MG include the same areas of the project site outlined in Section 2.3. However, since a higher allowable contaminant level is proposed as part of Alternative E, the estimated areal extent and corresponding volume of soil requiring remediation is expected to be slightly less. For estimating purposes, a 20% decrease in the volume of soil requiring remediation was used. This would include a surface area of approximately 2,200 square feet with a depth of four feet resulting in about 325 cubic yards of impacted soil in the area to the south of the existing building. Likewise, the surface area in the vicinity of SP-60 would include an approximate 400 square feet area with the impacted zone of soil from four to eight feet below ground surface resulting in about 60 cubic yards of impacted soil.

MG #3 - Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics for Alternative E

The analytical results for the subsurface soil/fill samples did not exceed the SSCLs. However, visual and olfactory observations revealed petroleum odors and stained soils (nuisance characteristics) in the northeast corner of the project site (former location of the three 157,000 gallon fuel oil ASTs). This area encompasses approximately 12,800 square feet of surface area. Approximately 4-feet of non-impacted soil (approximately 1,900 cubic yards) is situated above the impacted soils, which are also approximately 4-feet thick, resulting in approximately 1,900 cubic yards of soils with petroleum related nuisance characteristics.

MG #4 - Drainage Features and Contents for Alternative E

Sediment with contaminant concentrations above the SSCLs was documented in the interior Sump Nos. 1 through 8, the Hyde Creek outfall, and at the catch basin and end of the sewer pipe from the discharge location for the sewer line located along the southern portion of the building. However, the contaminant levels detected in the exterior sump (Sump 9) are below the SSCLs and therefore would not require remediation under Alternative E. As such, a slightly reduced volume of sediment for Alternative E would be realized.

2.4.5.3. General Response Actions for Alternative E – "Limited Excavation"

The general response actions for the "Limited Excavation" alternative would include the following:

- Surface Soil/Fill and Debris Piles (MG #1): Disposal of surface debris and excavation and off-site disposal of surface soil/fill that exceeds the SSCLs and containment through the installation of asphalt pavement or contingency soil cover for remaining soil/fill that exceeds TAGM values.
- Subsurface Soil/Fill Impacted with Chlorinated VOCs (MG #2): Excavation and off-site disposal of subsurface soils that exceed SSCLs and containment through the installation of asphalt pavement or contingency soil cover for remaining soil/fill that exceeds TAGM values.

- Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics (MG #3): Containment through the installation of asphalt pavement or contingency soil cover.
- Drainage Features and Contents (MG #4): Removal and off-site disposal of sediments from interior Sump Nos. 1 through 8 and closure in place. Removal and off-site disposal of the accessible sediment from the Hyde Creek outfall without entering the pipe and closure of the pipe in place. Removal and off-site disposal of accessible sediment from the catch basin and end of sewer pipe from the discharge location of the sewer line along the southern portion of the building and closure of the pipe in place.
- Building Components (MG #5): Removal and off-site disposal of friable asbestos, non-friable asbestos and electrical components.
- Concrete and Surface Soils Impacted with PCBs (MG #6): Excavation and off-site disposal of concrete and soil/fill above guidance levels (TAGM 4046/TSCA).
- Groundwater Impacted with VOCs (MG #7): Engineering controls consisting of a sub-slab vapor venting system for the existing building, air monitoring, enhanced natural attenuation, and long-term groundwater monitoring.

Under this alternative, media containing contaminant levels exceeding the SSCLs would be largely removed from the project site. Institutional and access controls would be utilized to prevent human and environmental exposure to the remaining impacted media. Residual contaminant levels that exceed the regulatory guidance values but are below the SSCLs would be contained with an asphalt pavement cover during the proposed redevelopment of the project site. Although it is anticipated that an asphalt pavement cover will be installed across the project site during redevelopment, a contingency soil cover will be installed if redevelopment is delayed or not undertaken. A soil/fill management plan would be required since impacted surface and subsurface soils would remain in place. Long-term monitoring would focus on the cover system, site-wide groundwater quality, and air monitoring within the building after redevelopment.

Since some soil will be removed from the project site, this alternative is more conducive to the grading necessary to allow on-site drainage control and storm water management, as well as the conversion of the building for the intended use.

3.0 DETAILED ANALYSIS OF ALTERNATIVES

3.1 General Discussion

The remedial alternatives outlined in Section 2.4 were individually and comparatively evaluated with respect to the following six criteria as defined in 6 NYCRR 375:

- Overall protection of human health and the environment;
- Compliance with Standards, Criteria and Guidance Values (SCGs);
- Short-term effectiveness;
- Long-term effectiveness;
- Reduction of toxicity, mobility and volume; and
- Feasibility.

A seventh criterion, community acceptance, will be evaluated by the NYSDEC at the conclusion of the public comment period. The results of these evaluations are presented in the following subsections.

3.2 Individual Analysis of Alternatives

3.2.1 Alternative A –"No Action"

The "No Action" alternative does not satisfy the RAOs because of its inability to limit the potential for the exposure of the public, future construction and site workers, and the environment to on-site contaminants. This alternative is not protective of human health with respect to the surrounding community because contamination would remain on-site and would not be effectively contained.

This alternative would not reduce the toxicity, mobility or volume of the contamination. Under this alternative, the project site and existing structure would remain in their current states. Existing access controls, (i.e. partial chain-link fencing, limited access controls to the building, and law enforcement patrols) have not been fully effective in the prevention of trespassing, resulting in the potential for chemical exposure to vandals and/or neighborhood children. Therefore, the existing threats to public health and the environment are expected to increase over time as site conditions continue to erode.

The estimated costs for implementing this alternative are $93,720, and are detailed in Table 3. These costs include a 30-year environmental monitoring period for groundwater. Although the cost to implement the "No Action" alternative is comparatively low, it is not considered to be practical considering its inability to satisfy the RAOs or to support the ultimate goal of redeveloping the project site.

3.2.2 Alternative B – "Exposure Pathway Removal"

The "Exposure Pathway Removal" alternative would satisfy the RAOs for the current use scenario, but would not be fully protective of human health with respect to construction workers or future use scenarios because most of the contamination, although contained, would remain on-site.

Contaminated media exceeding the SCGs remaining after implementation of this alternative include: the soils located beneath the proposed cover system; sediments within the drainage features (except for the Hyde Creek outfall and sewer south of the building); and the groundwater. In addition, the non-friable asbestos associated with the building and the potential PCB-containing electrical equipment would remain in place.

This alternative could be implemented during one construction season with minimal impacts to construction workers, the surrounding community and the environment, assuming proper construction and health and safety techniques are utilized. The cover system is subject to weathering, erosion, and degradation from tree growth and vector intrusion. As such, the long-term effectiveness of the cover system could be jeopardized if proposed long-term maintenance activities are not completed. In addition, access controls may not be fully effective in the prevention of trespassing, resulting in the potential for chemical and/or asbestos exposure to vandals and/or neighborhood children. Furthermore, said controls could deteriorate over time, and, thus, residual public health risks may persist in the long term.

With the exception of the limited amount of friable asbestos located within the building and the minor volume of contaminated sediment located in the Hyde Creek outfall and the west end of the south sewer line, this alternative would not reduce the toxicity, or volume of the contamination. The mobility of the contaminants would be somewhat reduced since the storm water and wind transport mechanisms would be limited.

This alternative is feasible for implementation at the project site. However, given the ultimate goal of redeveloping the project site for light industrial or warehousing use, the practicality of this alternative is questionable. The cover soils would not be suitable for paving and the institutional controls would prevent the buildings from future use. The estimated costs for implementing this alternative are approximately $1.3 million and are detailed in Table 4. These costs include a 30-year environmental monitoring period for groundwater and the cover system.

3.2.3 Alternative C – "Containment"

The "Containment" alternative would satisfy the RAOs for the protection of human health and the environment for the current and most future use scenarios. However, since most of the contaminants in the soils would remain after the implementation of this alternative, a future risk to construction and/or site workers would exist. Similar to Alternative B, short-term exposure risks to construction workers and the surrounding community resulting from construction activities could be effectively minimized through standard construction and health and safety precautions. After implementation of this alternative, the contaminants in the soils located beneath the pavement and the contaminants in the groundwater would exceed the SCGs. In addition, the non-friable asbestos associated with the building and the potential PCB-containing electrical equipment would remain in place.

This alternative would be effective on a short and long-term basis, with only temporary impacts on the surrounding community during implementation. However, proper maintenance of the cover system and proper operation and maintenance of the sub-slab vapor venting system would be required for the long-term effectiveness of this alternative.

The volume of contaminants will be reduced through the removal of contaminated sediment from the drains and sumps and through the removal of friable ACMs. In addition, the VOCs within the subsurface soils beneath the building slab would be significantly reduced through the installation and operation of a soil vapor extraction system. Reduction in the toxicity of the remaining contaminants in the soils will occur over time via natural degradation. The mobility of contaminants in the soils would be reduced by the cover system by effectively limiting the stormwater transport and wind transport mechanisms. The potential accumulation of organic vapors emanating from the impacted soil/fill and/or groundwater under the building would be mitigated through the use of a sub-slab vapor venting system.

This alternative is feasible and cost effective since a large portion of the remediation (pavement system) would be constructed during the project site redevelopment and maintained by the occupant. However, given the planned future use of the project site and existing building for light industrial and/or warehousing purposes, substantial site grading is anticipated during redevelopment to allow for drainage control and storm water management and to enable the construction of loading docks on the existing building while preserving required ceiling heights. Disturbed soil/fill will have to be handled in accordance with a soil/fill management plan increasing the overall cost of the redevelopment. Although it is anticipated that an asphalt pavement cover will be installed across the project site during redevelopment, a contingency soil cover will be installed if redevelopment is delayed or not undertaken.

The estimated costs for implementing this alternative are approximately $2.0 million and are detailed in Table 5. However, these costs include approximately $800,000 in interim measures (fencing and soil cover) that will not be necessary if asphalt pavement is installed during redevelopment. The costs of this alternative include a 30-year environmental monitoring period for groundwater, the sub-slab vapor venting system, and the cover system. It should be noted that this monitoring period could extend beyond 30 years should the potential for human exposure to site-derived contamination persist, in which case the costs for these activities would increase correspondingly.

3.2.4 Alternative D – "Excavation"

The "Excavation" alternative is fully protective of human health and the environment under current and future use scenarios. Temporary construction impacts to the surrounding community and the environment (e.g., dust generation, noise, etc.) would result during the implementation of this alternative. However, these impacts could be mitigated through standard construction practices. The application of common health and safety precautions would also minimize potential health risks to remedial contractors and the surrounding community during the implementation of this alternative.

The remaining media on-site immediately following implementation of this alternative would meet the SCGs with the possible exception of discrete zones of groundwater. However, the enhanced natural attenuation proposed to remediate the groundwater is expected to reduce the toxicity of the remaining contaminants over time.

This alternative represents an effective short-term and long-term approach to addressing on-site contamination and is fully supportive of the intended reuse of the project site for light industrial and/or warehousing purposes since most of the impacted media would be removed from the project site. In addition, the potential VOC impacts to the air quality in the on-site building from the groundwater would be mitigated through the performance of enhanced natural attenuation activities.

This alternative could be effectively implemented within one to two construction seasons and would render the project site suitable for immediate redevelopment. The estimated costs for implementing this alternative are approximately $4.5 million and are detailed in Table 6 and include a 2-year environmental monitoring period for the groundwater.

3.2.5 Alternative E – "Limited Excavation"

The "Limited Excavation" alternative, when coupled with the planned redevelopment of the project site, would satisfy the RAOs for the protection of human health and the environment for the current and most future use scenarios. The remedial areas and volumes for this alternative are based on the SSCLs that were developed during the risk assessment completed as part of the SI Report. Temporary impacts to the surrounding community and the environment (e.g., dust generation, noise, etc.) would result during the implementation of this alternative. However, these impacts could be mitigated through standard construction practices. The application of common health and safety precautions would also minimize potential health risks to remedial contractors and the surrounding community during the implementation of this alternative.

This alternative represents an effective short-term and long-term approach to addressing on-site contamination and is fully supportive of the intended reuse of the project site for light industrial and/or warehousing purposes since the impacted media at concentrations above the SSCLs would be removed from the project site. It is important to note that the primary consideration used during the determination of the SSCLs was the potential risk to human health posed by residual chemical constituents in the soil/fill and groundwater. Although it is anticipated that an asphalt pavement cover will be installed across the project site during redevelopment, a contingency soil cover will be installed if redevelopment is delayed or not undertaken.

After implementation of this alternative, the remaining contaminants in the soils and in the exterior sump (Sump No. 9) would exceed the SCGs but would be below the SSCLs developed for the project site. Discrete zones of groundwater may still exceed the SCGs; however, the toxicity of the groundwater would be reduced over time via enhanced natural attenuation. The magnitude of the contamination in the remaining soil/fill above the SCGs does not warrant active measures to reduce the toxicity of the contaminants given the intended future use of the project site. Instead, reduction in the toxicity of the organic contaminants will occur over time via degradation by naturally occurring microbes. The mobility of the remaining contaminants within the soil/fill would be reduced after the project site is paved during the planned redevelopment or when the interim soil cover is installed. In addition, potential VOC impacts on on-site building air quality from the groundwater would be mitigated through the installation of a sub-slab vapor venting system.

This alternative is feasible based on the fact it could be effectively implemented within one construction season and would render the project site, including the building, suitable for immediate redevelopment. The estimated costs for implementing this alternative are approximately $2.3 million and are detailed in Table 7. However, these costs include approximately $800,000 in interim measures (fencing and soil cover) that will not be necessary if asphalt paving is installed during redevelopment. The costs of this alternative include a 30-year environmental monitoring period for groundwater, the sub-slab vapor venting system, and the cover system.

3.3 Comparative Analysis and Recommendation

A comparative evaluation of the remedial alternatives is presented in the form of a matrix, shown in Table 8, which includes ratings for each of the criteria mandated by 6 NYCRR Part 375. The comparison of the alternatives is based upon a qualitative system that utilizes relative ratings of *high*, *medium* and *low* to define each alternative's performance with respect to the 6 NYCRR Part 375 criteria. These ratings are then equated to a numerical scale to produce a relative numerical score for final comparison purposes. The ratings equate to the following conditions and numerical scores:

RATING	DESCRIPTION	NUMERICAL RATING
HIGH	SATISFIES CRITERIA TO A HIGH DEGREE	3
MEDIUM	SATISFIES CRITERIA TO A MODERATE DEGREE	2
LOW	MINIMALLY SATISFIES CRITERIA	1

The aggregate numerical score for each of the alternatives evaluated is shown near the bottom of Table 8. Higher relative scores represent a higher level of effectiveness with respect to the evaluation criteria.

As reflected by Table 8, Alternatives D and E have been identified as the most effective alternatives. These alternatives rated significantly higher than Alternatives A, B, and C. Alternative D would fully satisfy the RAOs developed for the project site, would have high degrees of short- and long-term effectiveness, would render the project site suitable for immediate redevelopment, and received the highest rating. However, this alternative will take a substantially longer time to implement and is almost twice the cost of the other alternatives. Alternative E received a slightly lower rating than Alternative D for the criterion relating to remaining contaminant levels because the cleanup goals for the project site would be based on SSCLs instead of SCGs. As such, a significant cost savings would be realized by implementing Alternative E. Based upon this relatively higher degree of cost effectiveness, Alternative E is recommended for implementation. In addition to Table 8, Table 9 was developed in order to present a comparison of the remedies, the capital costs, the present worth of OM&M, and the total present worth associated with each of the remedial alternatives.

Under the recommended alternative, an institutional control, an environmental easement, would be imposed, in such form as the NYSDEC may approve, that would require compliance with an approved soil/fill management plan. The environmental easement would also limit the property to industrial and commercial use, would prevent the use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the Chautauqua County Health Department, and require the installation of a sub-slab vapor system in the construction of habitable buildings on the property.

The soil/fill management plan would be developed to address residual contaminated soils that may be excavated from the site during future redevelopment. The plan would require soil characterization and, where applicable, disposal/reuse in accordance with NYSDEC regulations. Air monitoring, appropriate personal protective equipment, and dust suppression measures should be employed during redevelopment activities that could disturb the contaminated fill in order to prevent exposure of the public and construction workers to the contaminants in the fill. If, during the course of redevelopment activities, gross contamination is encountered in the fill or underlying soil, the contamination should be removed for proper off-site disposal in an appropriately permitted facility.

Since the remedy results in residual contamination remaining at the site, a long-term monitoring program would be instituted. Monitoring will be required to document the effectiveness of the enhancement of natural attenuation in the areas of VOC contamination as well as the effectiveness of the sub-slab vapor system within the building structure. This program would also allow the effectiveness of the soil and pavement capping on the site to be monitored and would be a component of the operation, maintenance, and monitoring for the site.

The property owner would complete and submit to the NYSDEC an annual certification until the NYSDEC notifies the property owner in writing that this certification is no longer needed. This submittal would contain certification that the institutional controls and engineering controls put in place, pursuant to the Record of Decision, are still in place, have not been altered, and are still effective.

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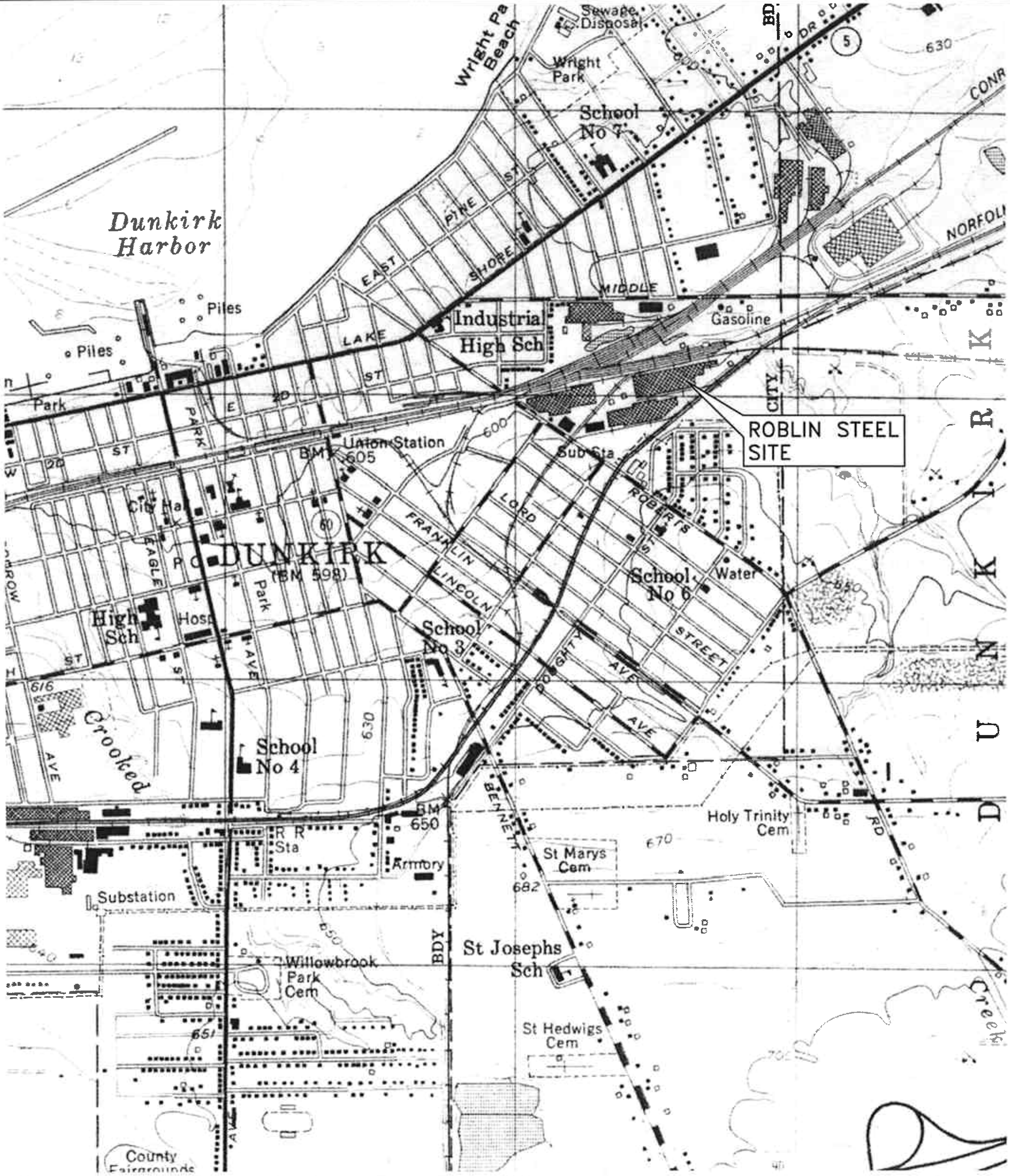
FIGURES



SITE LOCATION MAP

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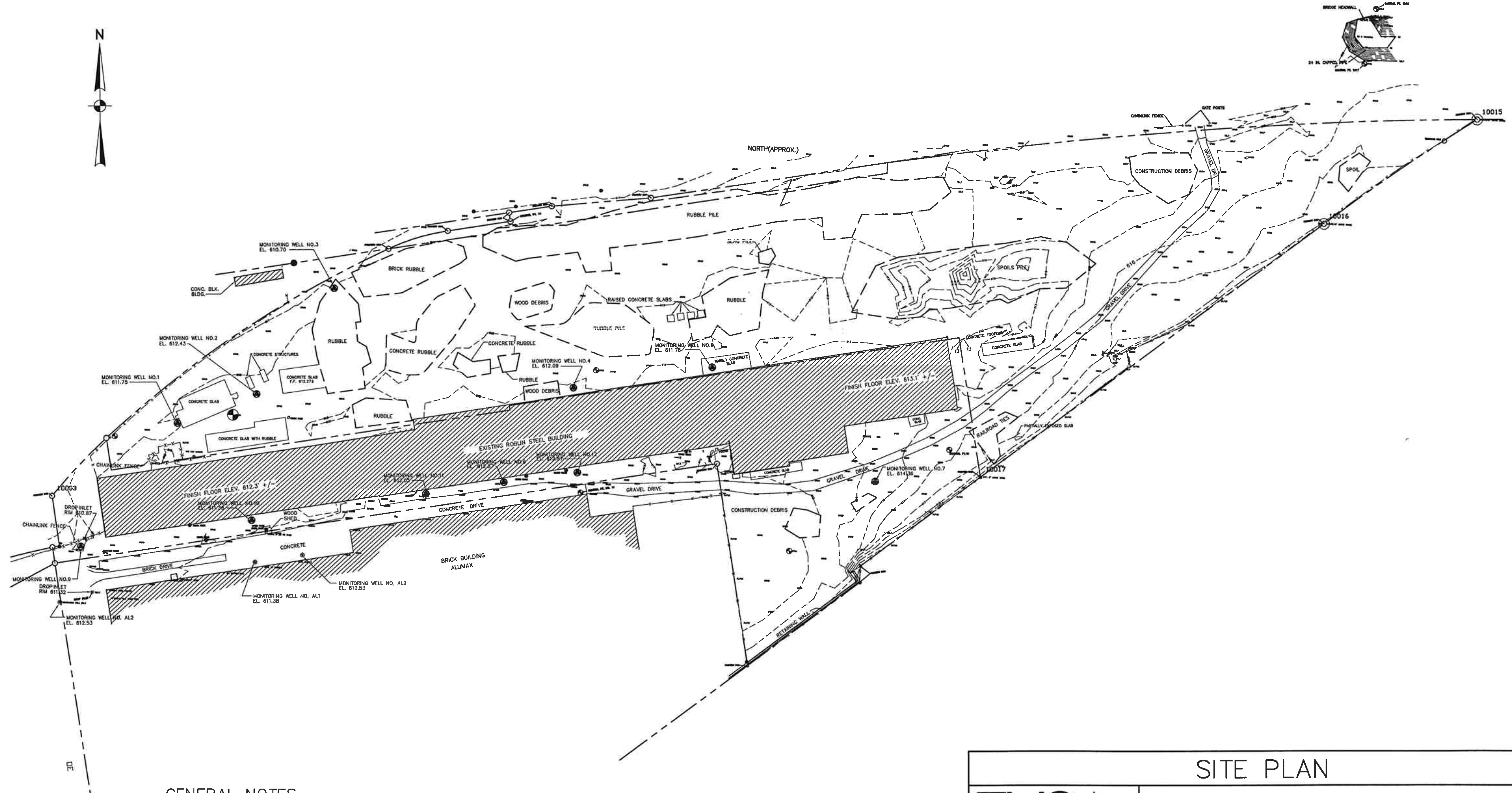
REMEDIAL ALTERNATIVES REPORT
FORMER ROBLIN STEEL SITE
DUNKIRK, CHAUTAUQUA CO., N.Y.

PROJECT NO. 0020006	SCALE: 1" = 2000'	DATE: 05/11/04	FIGURE NO. 1

S:\Engineering\0020006 Roblin Steel\CADD\remedial alt report\FIGURE 1.dwg 5/14/2004 8:37:31 AM EDT



GENERAL NOTES

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SITE PLAN

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PROJECT NO. 0020006	SCALE: 1" = 120'	DATE: 05/11/04	FIGURE NO. 2

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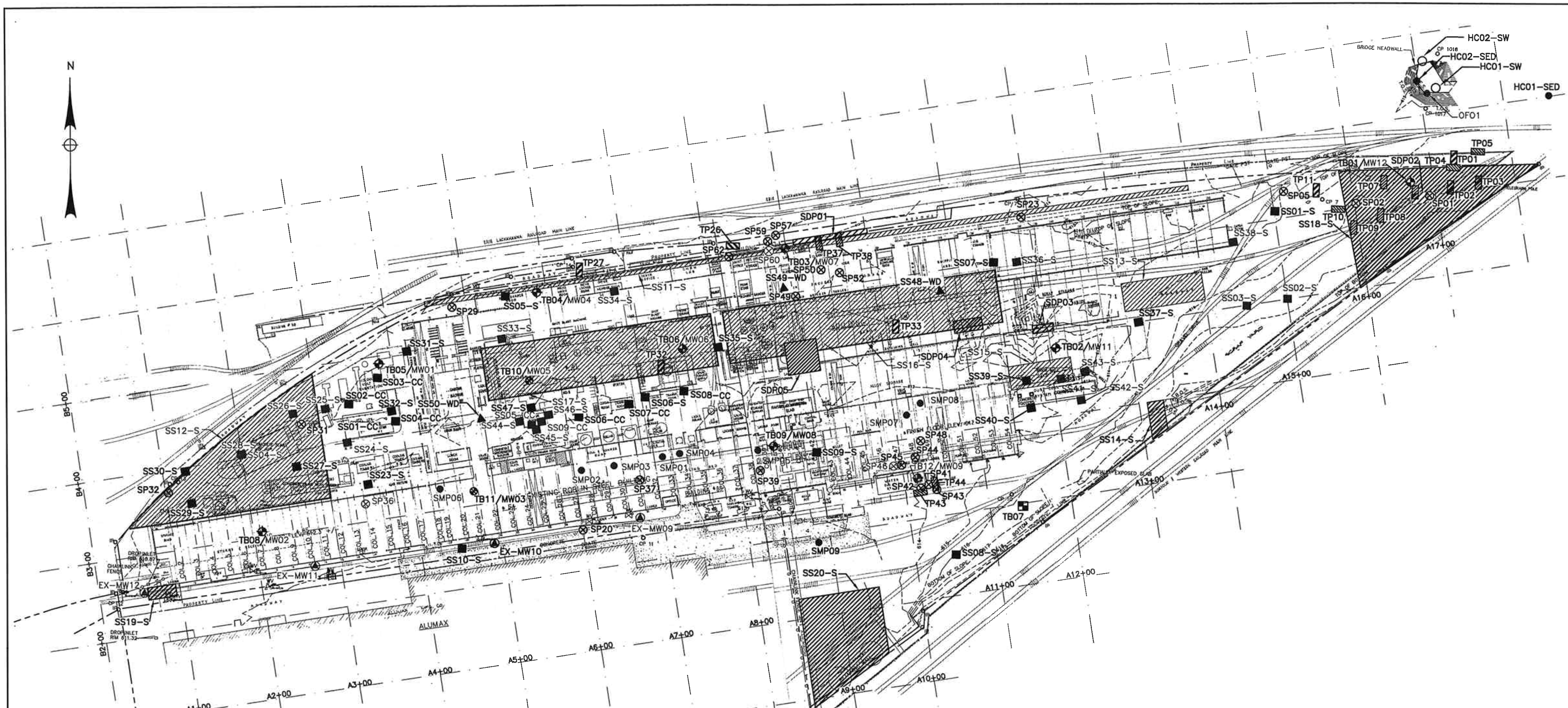

LEGEND

(solid line)	BUILDING LINE	EX-MW10	EXISTING GROUNDWATER MONITORING WELL
(dash-dot line)	PROPERTY LINE	MW03	BEDROCK GROUNDWATER MONITORING WELL
(dashed line)	SAMPLING GRID SYSTEM	MW01	INTERFACE GROUNDWATER MONITORING WELL
A1+00 B1+00	SAMPLING GRID SYSTEM STATIONING	(hatched box)	SS01-S COMPOSITE SURFACE SOIL SAMPLE
OF01	OUTFALL SAMPLING LOCATION	SP16	SUBSURFACE SOIL PROBE SAMPLED FOR CHEMICAL ANALYSIS
TB01	TEST BORING COMPLETED WITH INTERFACE GROUNDWATER MONITORING WELL	SDP01 THRU SDP05	SOIL/DEBRIS PILES
TP05	TEST PIT SAMPLE LOCATION	SMP01 THRU SMP08	SUMP SAMPLING LOCATION
SS42-S	GRAB SURFACE SOIL SAMPLE LOCATION	SS49-WD	WOOD FLOOR BLOCKS

SAMPLE LOCATION PLAN

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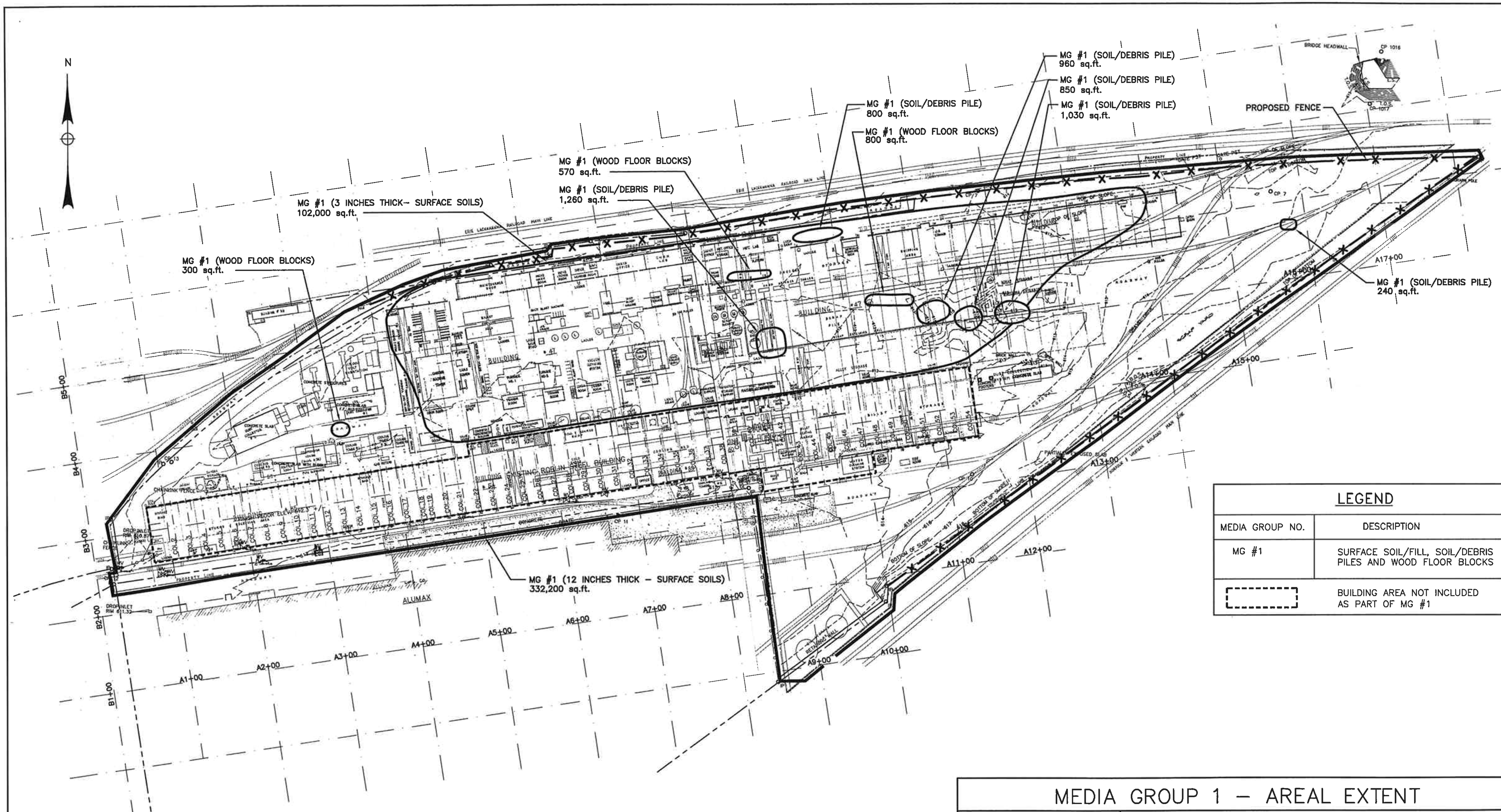
PROJECT NO. 0020006	SCALE: 1" = 120'	DATE: 05/11/04	FIGURE NO. 3

S:\Engineering\0020006 Roblin Steel\CADD\remedial alt report\FIGURE 3.dwg 5/11/2004 11:51:24 AM EDT



LEGEND

MEDIA GROUP NO.	DESCRIPTION
MG #1	SURFACE SOIL/FILL, SOIL/DEBRIS PILES AND WOOD FLOOR BLOCKS
[dashed box]	BUILDING AREA NOT INCLUDED AS PART OF MG #1

MEDIA GROUP 1 – AREAL EXTENT

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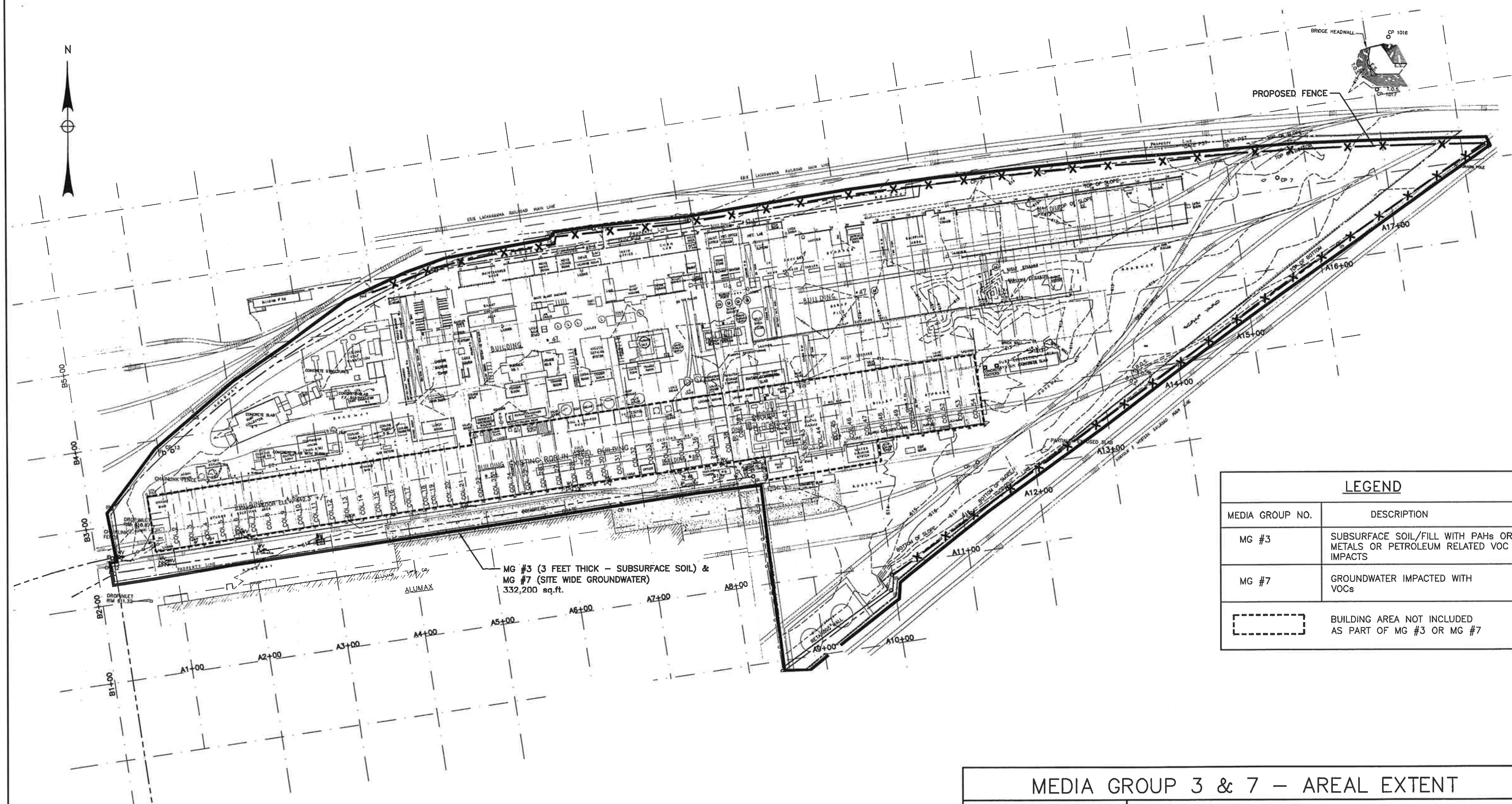
PROJECT NO. 0020006	SCALE: 1" = 120'	DATE: 05/11/04	FIGURE NO. 4A

S:\Engineering\0020006 Roblin Steel\CADD\remedial alt report\FIGURE 4A.dwg 5/11/2004 11:55:50 AM EDT



LEGEND

MEDIA GROUP NO.	DESCRIPTION
MG #3	SUBSURFACE SOIL/FILL WITH PAHs OR METALS OR PETROLEUM RELATED VOC IMPACTS
MG #7	GROUNDWATER IMPACTED WITH VOCs
(dashed box)	BUILDING AREA NOT INCLUDED AS PART OF MG #3 OR MG #7

MEDIA GROUP 3 & 7 – AREAL EXTENT

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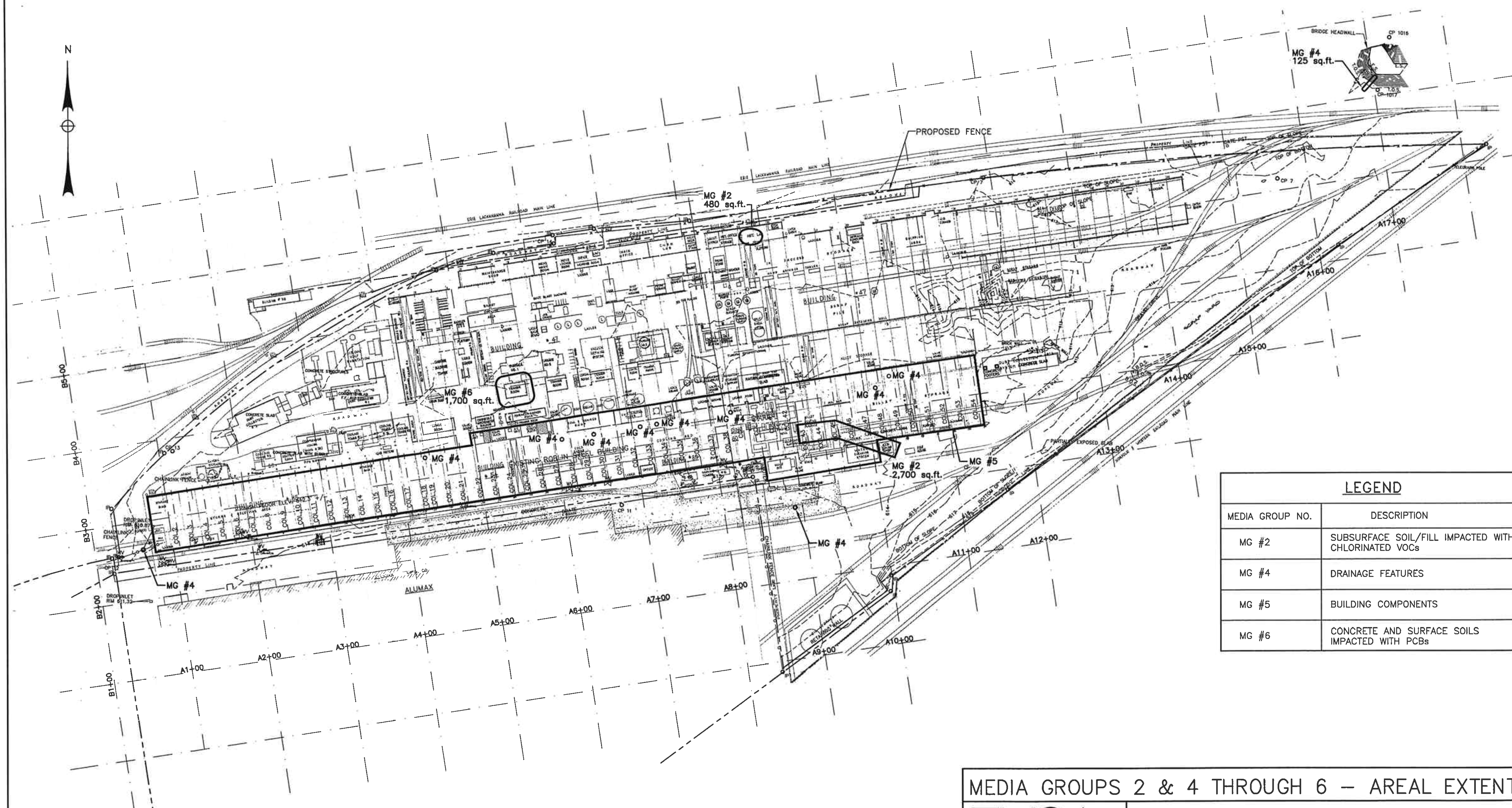
REMEDIAL ALTERNATIVES REPORT
FORMER ROBLIN STEEL SITE
DUNKIRK, CHAUTAUQUA CO., N.Y.

PROJECT NO. 0020006	SCALE: 1" = 120'	DATE: 05/11/04	FIGURE NO. 4B

S:\Engineering\0020006 Roblin Steel\CADD\remedial alt report\FIGURE 4B.dwg 5/14/2004 8:43:27 AM EDT



LEGEND

MEDIA GROUP NO.	DESCRIPTION
MG #2	SUBSURFACE SOIL/FILL IMPACTED WITH CHLORINATED VOCs
MG #4	DRAINAGE FEATURES
MG #5	BUILDING COMPONENTS
MG #6	CONCRETE AND SURFACE SOILS IMPACTED WITH PCBs

MEDIA GROUPS 2 & 4 THROUGH 6 – AREAL EXTENT

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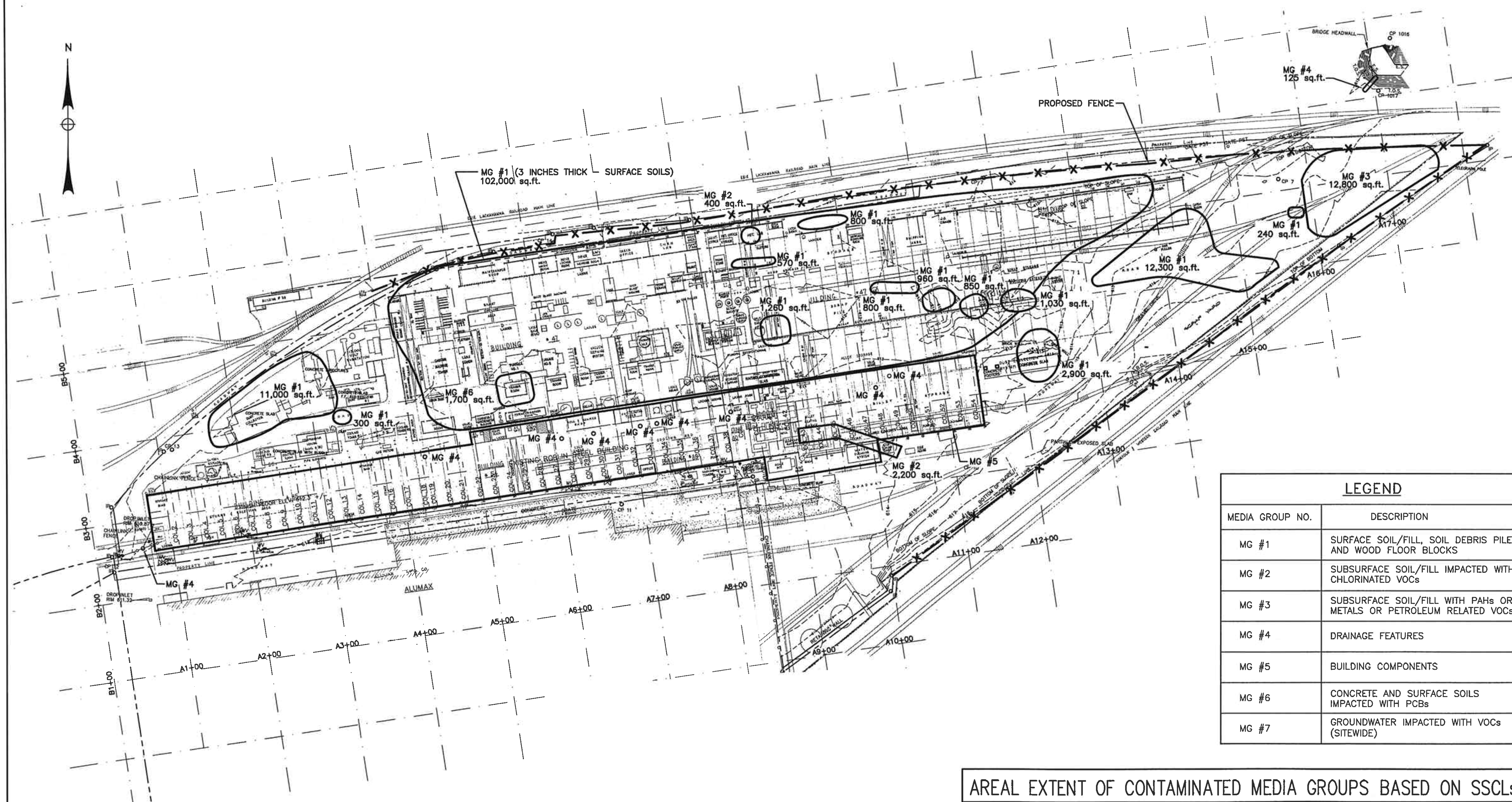
REMEDIAL ALTERNATIVES REPORT
FORMER ROBLIN STEEL SITE
DUNKIRK, CHAUTAUQUA CO., N.Y.

PROJECT NO. 0020006	SCALE: 1" = 120'	DATE: 05/11/04	FIGURE NO. 4C

S:\Engineering\0020006 Roblin Steel\CADD\remedial alt report\FIGURE 4C.dwg 5/14/2004 8:44:31 AM EDT



LEGEND

MEDIA GROUP NO.	DESCRIPTION
MG #1	SURFACE SOIL/FILL, SOIL DEBRIS PILES AND WOOD FLOOR BLOCKS
MG #2	SUBSURFACE SOIL/FILL IMPACTED WITH CHLORINATED VOCs
MG #3	SUBSURFACE SOIL/FILL WITH PAHs OR METALS OR PETROLEUM RELATED VOCs
MG #4	DRAINAGE FEATURES
MG #5	BUILDING COMPONENTS
MG #6	CONCRETE AND SURFACE SOILS IMPACTED WITH PCBs
MG #7	GROUNDWATER IMPACTED WITH VOCs (SITEWIDE)

AREAL EXTENT OF CONTAMINATED MEDIA GROUPS BASED ON SSCLs

TVGA CONSULTANTS
1000 MAPLE ROAD
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REMEDIAL ALTERNATIVES REPORT
FORMER ROBLIN STEEL SITE
DUNKIRK, CHAUTAUQUA CO., N.Y.

PROJECT NO. 0020006 | SCALE: 1" = 120' | DATE: 05/11/04 | FIGURE NO. 5

S:\Engineering\0020006 Roblin Steel\CADD\remedial alt report\FIGURE 5.dwg 5/14/2004 8:41:07 AM EDT

TABLES

Table 1
Media Groups and General Response Actions

Former Roblin Steel Site

General Response Actions for each Media Group						
MG #1 **Surface Soil/Fill and Debris Piles**	**MG #2** **Subsurface Soil/Fill Impacted with Chlorinated VOCs**	**MG #3** **Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics**	**MG #4** **Drainage Features and Contents**	**MG #5** **Building Components**	**MG #6** **Concrete and Surface Soils Impacted with PCBs**	**MG #7** **Groundwater Impacted with VOCs**
No action.	No action.	No action.	No action.	No action.	No action.	No action.
Institutional and access controls.	Institutional and access controls.	Institutional and access controls.	Institutional and access controls.	Institutional and access controls.	Institutional and access controls.	Institutional controls and access controls.
Disposal of surface debris and containment (soil or pavement).	Containment (soil or pavement).	Containment (soil or pavement).	Removal and off-site disposal of sediments from the drainage features and in place closure.	Partial or complete removal and off-site disposal.	Containment (soil or pavement).	Long-term groundwater monitoring.
Partial or complete excavation and off-site disposal of impacted soil/fill.	Partial or complete excavation and off-site disposal of impacted soil/fill.	Partial or complete excavation and off-site disposal of impacted soil/fill.	Partial or complete removal and off-site disposal of the piping associated with the drainage features and the sediments contained within.		Excavation and off-site disposal of impacted soil and concrete.	Sub-slab vapor venting system and air monitoring with long-term groundwater monitoring.
	In-situ treatment (soil vapor extraction system).					Enhanced natural attenuation (HRC or ZVI injection) in areas of elevated chlorinated VOC concentrations with short and long-term groundwater monitoring options.

Table 2

Development of Site-Wide Alternatives
Former Roblin Steel Site

Site Wide Alternative	Name	Site Wide Remedial Alternatives						
		MG #1 Surface Soil/Fill and Debris Piles	MG #2 Subsurface Soil/Fill Impacted with Chlorinated VOCs	MG #3 Subsurface Soil/Fill with PAH and Metals Impacts and/or Petroleum Nuisance Characteristics	MG #4 Drainage Features and Contents	MG #5 Building Components	MG #6 Concrete and Surface Soils Impacted with PCBs	MG #7 Groundwater Impacted with VOCs
A	"No Action"	Institutional controls.	Institutional controls.	Institutional controls.	Institutional controls.	Institutional controls.	Institutional controls.	Institutional controls. Long-term groundwater monitoring.
B	"Exposure Pathway Removal"	Institutional and access controls. Disposal of surface debris and containment (soil cover).	Institutional and access controls. Containment (soil cover).	Institutional and access controls. Containment (soil cover).	Institutional and access controls to address interior Sump Nos. 1 - 8 and exterior Sump No. 9. Removal and off-site disposal of accessible portions of the sediment in the outfall pipe to Hyde Creek and the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building followed by closure of the associated pipes in place.	Institutional and access controls. Removal and off-site disposal of friable asbestos.	Institutional and access controls. Containment (soil cover).	Institutional and access controls. Long-term groundwater monitoring.
C	"Containment"	Institutional and access controls. Disposal of surface debris and containment (soil or pavement).	Institutional and access controls. In-situ treatment (soil vapor extraction) for soils under building and containment (soil or pavement) for areas outside the building.	Institutional and access controls. Containment (soil or pavement).	Institutional and access controls. Removal and off-site disposal of sediments from the interior Sump Nos. 1 through 8 and exterior Sump No. 9 and accessible portions of the sediment in the Hyde Creek outfall and the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building followed by closure of the associated pipes in place.	Institutional and access controls. Removal and off-site disposal of friable asbestos.	Institutional and access controls. Containment (soil or pavement).	Institutional and access controls. Sub-slab vapor venting system and air monitoring with long-term groundwater monitoring.
D	"Excavation"	Disposal of surface debris and complete excavation and off-site disposal of soil/fill above TAGM 4046 levels.	Complete excavation and off-site disposal of soil/fill above TAGM 4046 levels.	Complete excavation and off-site disposal of soil/fill above TAGM 4046 levels.	Complete removal and off-site disposal of the sediments, and piping related to interior Sump Nos. 1 through 8 and exterior Sump No. 9. Removal and off-site disposal of a portion of the piping associated with the Hyde Creek outfall and the sediment contained within that portion. Removal and off-site disposal of accessible sediment from the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building and closure of the pipe in place.	Removal and off-site disposal of asbestos (friable and non-friable) and electrical components.	Complete excavation and off-site disposal of concrete and soil/fill above guidance levels (TAGM 4046/TSCA).	Enhanced natural attenuation (HRC or ZVI injection) in areas of elevated VOC concentrations with short-term groundwater monitoring. Institutional controls.
E	"Limited Excavation"	Institutional and access controls. Disposal of surface debris, excavation and off-site disposal of soil/fill exceeding the SSCLs, and containment (soil or pavement) for remaining soil/fill above TAGM 4046 levels.	Institutional and access controls. Excavation and off-site disposal of soil/fill exceeding the SSCLs and containment (soil or pavement) of remaining soil/fill exceeding TAGM 4046 values.	Institutional and access controls. Containment (soil or pavement).	Institutional and access controls. Removal and off-site disposal of sediments from the interior Sump Nos. 1 through 8 and accessible portions of the sediment in the Hyde Creek outfall and the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building followed by closure of the associated pipes in place.	Removal and off-site disposal of asbestos (friable and non-friable) and electrical components.	Institutional and access controls. Excavation and off-site disposal of concrete and soil/fill above guidance levels (TAGM 4046/TSCA).	Institutional and access controls. Sub-slab vapor venting system and air monitoring, enhanced natural attenuation (HRC or ZVI injection) in areas of elevated VOC concentrations, with long term groundwater monitoring.

Table 3
Former Roblin Steel Site
RAR Cost Estimate
Alternative A
"No Action"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Institutional Controls (MG Nos. 1 through 7)					
Deed Restrictions	Implementation	ls	1	$ 5,000.00	$5,000
Item	**Note**	**Unit**		**Cost**	**Present Worth**
Long-Term OM&M (Groundwater Monitoring) (MG No. 7)					
Collection	Labor/Equipment (annual for 30 years)	event		$ 1,170.00	$17,986
Analytical	Water Samples (annual for 30 years)	event		$ 2,600.00	$39,969
Evaluation	Annual Reporting (30 years)	event		$ 1,920.00	$29,515

Capital Costs (subtotal)					$5,000
Contingencies	15% of Capital Costs				$750
Engineering/Oversight	10% of Capital Costs				$500
Total Capital Costs					$6,250
OM&M (present worth)					$87,470
Project Present Worth (Total)					**$93,720**

Notes:

Sources include:

2004 RS Means Environmental Remediation Cost Data-Assemblies 10th Edition (unit prices include a 30% markup for overhead and profit).

2004 RS Means Heavy Construction Cost Data 16th Edition.

Engineer's Estimate.

Present Worth is the amount of money that must be invested today to cover future costs and is calculated by applying a present worth factor which is based on a 5% interest rate over the given time period.

ea = each
cy = cubic yard
lf = linear foot
sf = square foot
ls = lump sum
ton = 2,000 pounds

Table 4
Former Roblin Steel Site
RAR Cost Estimate
Alternative B
"Exposure Pathway Removal"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Institutional Controls (MG Nos. 1 through 7)					
Deed Restrictions	Implementation	ls	1	$ 5,000.00	$5,000
Access Controls (MG Nos. 1 through 7)					
Site Fencing	Six foot high	lf	2,375	$ 30.77	$73,081
Site Gates	Six foot high swing gate, 12-foot double	ea	2	$ 1,046.50	$2,093
Secure Building	Fencing for building	csf	100	$ 100.00	$10,000
Site Preparation (MG Nos. 1 through 3 & 6)					
Clear and Grub	Clear, Grub and haul	acre	6	$ 7,556.90	$45,341
C&D Debris Loading	1.5 CY Wheel-Mounted Loader	cy	50	$ 5.00	$250
C&D Debris Transportation	Trucking	cy	50	$ 21.50	$1,075
Non-Haz C&D Disposal	Disposal at County Landfill	ton	80	$ 11.50	$920
Import Soil Backfill	Fill for low areas	cy	500	$ 6.89	$3,445
Site Grading	Limited grading	sf	200,000	$ 0.09	$18,200
Soil Cover (MG Nos. 1 through 3 & 6)					
Low Permeability Soil	Clay Two 6-inch Lifts,	cy	16,000	$ 29.50	$471,952
Topsoil	4-inches Thick	cy	5,400	$ 36.19	$195,437
Seeding	Mechanical Seeding	acre	10	$ 4,712.50	$47,125
Drainage Features (Hyde Creek Outfall) (MG No. 4)					
Remove Gate/Sediments/ Grout In-Place	Three man crew (2 Laborers and a Forman)	day	1	$ 1,331.22	$1,331
Close In-Place	Materials	ea	1	$ 500.00	$500
Soil Transportation	Trucking	cy	1	$ 21.50	$22
Non-Haz Soil Disposal	Disposal at County Landfill	ton	1	$ 11.50	$12
Drainage Features (South Sewer) (MG No. 4)					
Remove Sediments/Grout In-Place	Three man crew (2 Laborers and a Forman)	day	2	$ 1,331.22	$2,662
Water Diversion	Upgradient access, removal of piping, & water diversion	ls	1	$ 1,300.00	$1,300
Close In-Place	Materials	ea	1	$ 500.00	$500
Soil Transportation	Trucking	cy	1	$ 21.50	$22
Non-Haz Soil Disposal	Disposal at County Landfill	ton	1	$ 11.50	$12

Table 4
Former Roblin Steel Site
RAR Cost Estimate
Alternative B
"Exposure Pathway Removal"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Friable Asbestos Removal (MG No. 5)					
Boiler Room	White Canvas Cloth	sf	80	$ 12.00	$960
Project/Air Monitoring	Air monitoring and project oversight	day	1	$ 450.00	$450
Item	**Note**	**Unit**		**Cost**	**Present Worth**
Long-Term OM&M (Groundwater (MG No. 7) and Cover System Monitoring (MG Nos. 1 through 3 & 6))					
Collection	Labor/Equipment (annual for 30 years)	event		$ 1,570.00	$24,135
Analytical	Water Samples (annual for 30 years)	event		$ 2,600.00	$39,969
Evaluation	Annual Reporting (30 years)	event		$ 2,330.00	$35,818

Capital Costs (subtotal)					$881,689
Mob/Demob/Decon	5% of Capital Costs				$44,084
Contingencies	15% of Capital Costs				$132,253
Engineering/Oversight	10% of Capital Costs				$88,169
Total Capital Costs					$1,146,196
OM&M (present worth)					$99,921
Project Present Worth (Total)					**$1,246,117**

Notes:

Sources include:

2004 RS Means Environmental Remediation Cost Data-Assemblies 10th Edition (unit prices include a 30% markup for overhead and profit).

2004 RS Means Heavy Construction Cost Data 16th Edition.

Engineer's Estimate.

Present Worth is the amount of money that must be invested today to cover future costs and is calculated by applying a present worth factor which is based on a 5% interest rate over the given time period.

ea = each
cy = cubic yard
lf = linear foot
sf = square foot
csf = 100 square feet
ls = lump sum
ton = 2,000 pounds

Table 5
Former Roblin Steel Site
RAR Cost Estimate
Alternative C
"Containment"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Institutional Controls (MG Nos. 1 through 7)					
Deed Restrictions	Implementation	ls	1	$ 5,000.00	$5,000
Site Preparation (MG Nos. 1 through 3 & 6)					
Clear and Grub	Clear, Grub and haul	acre	6	$ 7,556.90	$45,341
C&D Debris Loading	1.5 CY Wheel-Mounted Loader	cy	50	$ 5.00	$250
C&D Debris Transportation	Trucking	cy	50	$ 21.50	$1,075
Non-Haz C&D Disposal	Disposal at County Landfill	ton	80	$ 11.50	$920
Import Soil Backfill	Fill for low areas	cy	500	$ 6.89	$3,445
Site Grading	Limited grading	sf	200,000	$ 0.09	$18,200
Remedial Design Investigation for Soil Vapor Extraction System (MG No. 2)					
Sample Collection	Labor/Equipment	event	1	$ 4,000.00	$4,000
Analytical	6 Soil Samples	event	1	$ 800.00	$800
Evaluation	Reporting	event	1	$ 3,850.00	$3,850
Soil Vapor Extraction System (MG No. 2)					
Extraction Points	Materials & Installation and handeling of auger cuttings	ea	15	$ 300.00	$4,500
Header Piping	3-inch PVC (aboveground)	lf	250	$ 11.02	$2,755
Blower/Knockout Tank	1 HP Blower and condensation collection tank	ea	1	$ 4,200.00	$4,200
Granular Activated Carbon	4 changes during operation	ea.	4	$ 1,200.00	$4,800
Exhaust Piping	4" PVC	lf	40	$ 16.99	$680
Connections	Mechanical/Electrical	ls	1	$ 5,000.00	$5,000
Drainage Features (Hyde Creek Outfall) (MG No. 4)					
Remove Gate/Sediments/ Grout In-Place	Three man crew	day	1	$ 1,331.22	$1,331
Plug Inlet/Outfall Pipes	Materials	ea	1	$ 500.00	$500
Soil Transportation	Trucking	cy	1	$ 21.50	$22
Non-Haz Soil Disposal	Disposal at County Landfill	ton	1	$ 11.50	$12
Drainage Features (South Sewer) (MG No. 4)					
Remove Sediments/Grout In-Place	Three man crew	day	2	$ 1,331.22	$2,662
Water Diversion	Upgradient access, removal of piping, & water diversion	ls	1	$ 1,300.00	$1,300
Plug Inlet/Outfall Pipes	Materials	ea	1	$ 500.00	$500
Soil Transportation	Trucking	cy	1	$ 21.50	$22
Non-Haz Soil Disposal	Disposal at County Landfill	ton	1	$ 11.50	$12

Table 5
Former Roblin Steel Site
RAR Cost Estimate
Alternative C
"Containment"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Drainage Features (interior Sump Nos. 1 through 8 and exterior Sump No. 9) (MG No. 4)					
Remove/dispose water	vacuum truck	event	1	$ 2,500.00	$2,500
Solidification of Sludge	absorbent material	cy	20	$ 10.27	$205
Drain/Sump Cleaning/Close in-place	Three man crew	day	8	$ 1,331.22	$10,650
Sediment Transportation	Trucking	cy	50	$ 21.50	$1,075
Non-Haz Soil Disposal	Disposal at County Landfill	ton	75	$ 11.50	$863
Plug Inlet/Outfall Pipes	Materials	ea	18	$ 200.00	$3,600
Fracture Sump Bottoms/backfill	Hoe Ram Equip/Crew	day	2	$ 837.43	$1,675
Backfill	Sand and Gravel	cy	50	$ 14.69	$735
Friable Asbestos Removal (MG No. 5)					
Boiler Room	White Canvas Cloth (F)	sf	80	$ 12.00	$960
Project/Air Monitoring	Air monitoring and project oversight	day	1	$ 450.00	$450
Sub Slab Vapor Venting System (MG No. 7)					
Crushed Stone	Below, surrounding and above PVC (16-inches thick)	cy	4,350	$ 15.04	$65,428
Sub-slab/stack piping	4-inch PVC piping	lf	2,680	$ 22.09	$59,193
Cushion Layer	Geotextile below and above geomembrane	sf	177,000	$ 0.45	$79,650
Geomembrane	60 mil	sf	88,500	$ 0.75	$66,375
Blower/Knockout Tank	2 HP Blower and condensation collection tank	ea	6	$ 7,800.00	$46,800
Connections	Mechanical/Electrical	ls	1	$ 5,000.00	$5,000
Concrete Slab	Assumed to be installed during redevelopment	sf	88,500	$ -	$0
Interim Soil Cover (MG Nos. 1 through 3 & 6)					
Low Permeability Soil	Clay Two 6-inch Lifts,	cy	16,000	$ 29.50	$471,952
Topsoil	4-inch Thick	cy	5,400	$ 36.19	$195,437
Seeding	Mechanical Seeding	acre	10	$ 4,712.50	$47,125
Interim Access Controls (MG Nos. 1 through 7)					
Site Fencing	Six foot high	lf	2,375	$ 30.77	$73,081
Site Gates	Six foot high swing gate, 12-foot double	ea	2	$ 1,046.50	$2,093
Secure Building	Fencing for building	csf	100	$ 100.00	$10,000
Item	**Note**	**Unit - Quantity**		**Cost**	**Present Worth**
Long-Term OM&M					
Groundwater (MG No. 7) and Cover System Monitoring (MG Nos. 1 through 3 & 6) (30 years)					
Collection	Labor/Equipment (annual for 30 years)	event		$ 1,570.00	$24,135
Analytical	Water Samples (annual for 30 years)	event		$ 2,600.00	$39,969
Evaluation	Annual Reporting (30 years)	ea		$ 2,330.00	$35,818

Table 5
Former Roblin Steel Site
RAR Cost Estimate
Alternative C
"Containment"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Soil Vapor Extraction System (MG No. 2) (2 years)					
Sample Collection	Labor/Equipment	event		$ 850.00	$21,516
Analytical	Air Samples (1 per event)	event		$ 420.00	$10,631
Analytical	4 Soil Samples	event		$ 560.00	$1,041
Evaluation	Reporting (Quarterly)	event		$ 1,250.00	$9,297
Electricity Costs	Blower operation	KW-hr/yr	6,500	$ 845.00	$1,571
System Decommissioning		ls		$ 3,000.00	$3,000
Sub Slab Vapor Venting (MG No. 7) (30 years)					
Sample Collection	Labor/Equipment	event		$ 1,030.00	$44,036
Analytical	Air Samples (5 per event)	event		$ 1,350.00	$57,717
Evaluation	Reporting	ea		$ 1,670.00	$47,363
Electricity Costs	Blower operation (30 years)	KW-hr/yr	13,000	$ 1,690.00	$25,980

Capital Costs (subtotal)					$1,256,022
Mob/Demob/Decon	5% of Capital Costs				$62,801
Contingencies	15% of Capital Costs				$188,403
Engineering/Oversight	10% of Capital Costs				$125,602
Total Capital Costs					$1,632,829
OM&M (present worth)					$322,073
Project Present Worth (Total)					**$1,954,902**

Notes:

Sources include:

2004 RS Means Environmental Remediation Cost Data-Assemblies 10th Edition (unit prices include a 30% markup for overhead and profit).

2004 RS Means Heavy Construction Cost Data 16th Edition.

Engineer's Estimate.

Present Worth is the amount of money that must be invested today to cover future costs and is calculated by applying a present worth factor which is based on a 5% interest rate over the given time period.

ea = each
cy = cubic yard
lf = linear foot
sf = square foot
ls = lump sum
ton = 2,000 pounds

Table 6
Former Roblin Steel Site
RAR Cost Estimate
Alternative D
"Excavation"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Institutional Controls (MG No. 7)					
Deed Restrictions	Implementation	ls	1	$ 3,000.00	$3,000
Excavation/Off-Site Disposal (MG No. 1)					
Clear and Grub	Clear, Grub and haul	acre	6	$ 7,556.90	$45,341
Soil Excavation	1.5 CY Track-Mounted Excavator	cy	13,250	$ 2.25	$29,813
Soil/Debris Pile Loading	3 CY Wheel-Mounted Loader	cy	14,525	$ 1.00	$14,525
Soil/C&D Transport	Trucking	cy	14,525	$ 21.50	$312,288
Non-Haz Soil/C&D Disposal	Disposal at County Landfill	ton	23,240	$ 11.50	$267,260
Demo Concrete Slab	6-inch thick	cy	1,900	$ 63.60	$120,832
Crush Concrete	Stockpile for use as backfill	cy	1,900	$ 4.50	$8,550
Remedial Design Investigation for MG No. 2					
Sample Collection	Labor/Equipment	event	1	$ 4,000.00	$4,000
Analytical	6 Soil Samples	event	1	$ 800.00	$800
Evaluation	Reporting	event	1	$ 3,850.00	$3,850
Excavation/Off-Site Disposal (MG No. 2)					
Demo Concrete Slab	6" thick	cy	50	$ 63.60	$3,180
Soil Excavation	1.5 CY Track-Mounted Excavator	cy	475	$ 2.25	$1,069
Soil Loading	3 CY Wheel-Mounted Loader	cy	475	$ 1.00	$475
Post Excavation Sampling	8 Confirmatory Samples	event	1	$ 720.00	$720
Soil Transport	Trucking	cy	475	$ 21.50	$10,213
Non-Haz Soil Disposal	Disposal at County Landifill	ton	440	$ 11.50	$5,060
Haz Soil Disposal	Disposal at CWM	ton	320	$ 200.00	$64,000
Backfill	Sand and Gravel	cy	425	$ 14.69	$6,243
Excavation/Off-Site Disposal (MG No. 3)					
Demo Concrete Foundations	1' thick x 3' wide x 4' deep	lf	2,200	$ 19.50	$42,900
Crush Concrete	Stockpile for use as backfill	cy	570	$ 4.50	$2,565
Soil Excavation	1.5 CY Track-Mounted Excavator	cy	48,000	$ 2.25	$108,000
Soil Loading	3 CY track loader	cy	48,000	$ 1.00	$48,000
Soil Transport	Trucking	cy	48,000	$ 21.50	$1,032,000
Non-Haz Soil Disposal	Disposal at County Landfill	ton	76,800	$ 11.50	$883,200
Backfill	Unclassified fill 6" lifts	cy	5,000	$ 11.64	$58,175
Drainage Features (Hyde Creek Outfall) (MG No. 4)					
Remove Flapper Gate	Three man crew	day	1	$ 1,331.22	$1,331
Soil Excavation/Pipe Loading	1.5 CY Track-Mounted Excavator	cy	10	$ 2.25	$23
Remove Piping		lf	20	$ 20.71	$414
Plug Piping	Materials	ea	1	$ 500.00	$500
Soil Transportation	Trucking	cy	2	$ 21.50	$43
Non-Haz Soil Disposal	Disposal at County Landfill	ton	3	$ 11.50	$35

Table 6
Former Roblin Steel Site
RAR Cost Estimate
Alternative D
"Excavation"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Drainage Features (South Sewer) (MG No. 4)					
Remove Sediments/Grout In-Place	Three man crew	day	2	$ 1,331.22	$2,662
Water Diversion	Upgradient access, removal of piping, & water diversion	ls	1	$ 1,300.00	$1,300
Plug Inlet/Outfall Pipes	Materials	ea	1	$ 500.00	$500
Soil Transportation	Trucking	cy	1	$ 21.50	$22
Non-Haz Soil Disposal	Disposal at County Landfill	ton	1	$ 11.50	$12
Drainage Features (interior Sump Nos. 1 through 8 and exterior Sump No. 9) (MG No. 4)					
Remove/dispose water	vacuum truck	event	1	$ 2,500.00	$2,500
Solidification of Sludge	absorbent material	cy	20	$ 10.27	$205
Drain/Sump Cleaning	Three man crew	day	8	$ 1,331.22	$10,650
Demolish/Remove Overlying Concrete & Sumps	Hoe Ram Equip/Crew	day	5	$ 837.43	$4,187
Soil Excavation/Pipe Loading	1.5 CY Track-Mounted Excavator	cy	645	$ 2.25	$1,451
Piping/Sump Transport	Trucking	cy	145	$ 21.50	$3,118
Non-Haz Sump/Piping Disposal	Disposal at County Landfill	ton	290	$ 11.50	$3,335
Plug Piping	Materials	ea	18	$ 200.00	$3,600
Backfill	Sand and Gravel	cy	145	$ 14.69	$2,130
Backfill	Stockpiled soil	cy	500	$ 10.37	$5,187
Asbestos Removal (MG No. 5)					
Walls	Gray Window Caulk and Glaze	sf	6,000	$ 2.00	$12,000
Exterior Window Covering	Gray Transite Panels	sf	600	$ 2.00	$1,200
Interior/Exterior Walls and Ceilings	Black Tar Paper	sf	31,850	$ 1.50	$47,775
Windows	Gray Caulk and Glaze	sf	15,960	$ 2.00	$31,920
Walls	Gray Transite Panels	sf	23,365	$ 2.00	$46,730
Roof	Gray Transite Panels	sf	30,340	$ 2.00	$60,680
Boiler Room	Black Roof Tar	sf	30,000	$ 1.50	$45,000
Boiler Room	White Canvas Cloth (F)	sf	80	$ 12.00	$960
S. Side Room	Black Mastic	sf	35	$ 4.00	$140
Project/Air Monitoring		day	20	$ 450.00	$9,000
Electrical Component Removal (MG No. 5)					
Removal of HID Lights/Ballasts	Removal only from 50' ceiling with man-lift	ea	120	$ 10.00	$1,200
Removal of Fluorescent Lights/Ballasts	Removal only from 20' ceiling with man-lift	ea	40	$ 10.00	$400
Bulb Disposal	HID bulb recycle/disposal	ea	120	$ 7.50	$900
Bulb Disposal	4' Fluorescent bulbs	ea	40	$ 2.00	$80
Disposal/Recycling	PCB and non-PCB containing ballasts	drums	8	$ 250.00	$2,000

Table 6
Former Roblin Steel Site
RAR Cost Estimate
Alternative D
"Excavation"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Remedial Design Investigation (MG No. 6)					
Sample Collection	Labor/Equipment	event	1	$ 925.00	$925
Analytical	3 Soil Samples	event	1	$ 600.00	$600
Evaluation	Post Sampling Reporting	event	1	$ 1,500.00	$1,500
Concrete/Soil Excavation (MG No. 6)					
Demolish/Remove Concrete	Hoe Ram Equip/Crew	day	1	$ 837.43	$837
Soil/Concrete Excavation/Loading	1.5 CY Track-Mounted Excavator	cy	70	$ 2.25	$158
Soil Loading	3 CY Wheel-Mounted Loader	cy	70	$ 1.00	$70
Soil/Concrete Transport	Trucking	cy	70	$ 21.50	$1,505
Non-Haz Soil Disposal	Disposal at County Landifill	ton	100	$ 11.50	$1,150
Haz Concrete Disposal	Disposal at CWM	ton	20	$ 200.00	$4,000
Groundwater Treatment (MG No. 7)					
Zero Valent Iron or HRC Injection		ls	1	$ 33,000.00	$33,000
Item	**Note**	**Unit**		**Cost**	**Present Worth**
Short-Term OM&M (Groundwater Monitoring) (2 years) (MG No. 7)					
Collection	Labor/Equipment (quarterly)	event		$ 950.00	$7,066
Analytical	Water Samples (quarterly)	event		$ 830.00	$6,173
Evaluation	Quarterly Reporting (2 years)	event		$ 1,240.00	$9,223

Capital Costs (subtotal)					$3,422,992
Mob/Demob/Decon	5% of Capital Costs				$171,150
Contingencies	15% of Capital Costs				$513,449
Engineering/Oversight	10% of Capital Costs				$342,299
Total Capital Costs					$4,449,890
OM&M (present worth)					$22,462
Project Present Worth (Total)					**$4,472,351**

Notes:

Sources include:

2004 RS Means Environmental Remediation Cost Data-Assemblies 10th Edition (unit prices include a 30% markup for overhead and profit).

2004 RS Means Heavy Construction Cost Data 16th Edition.

Engineer's Estimate.

Present Worth is the amount of money that must be invested today to cover future costs and is calculated by applying a present worth factor which is based on a 5% interest rate over the given time period.

ea = each
cy = cubic yard
lf = linear foot
sf = square foot
ls = lump sum
ton = 2,000 pounds

Table 7
Former Roblin Steel Site
RAR Cost Estimate
Alternative E
"Limited Excavation"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Institutional Controls (MG Nos. 1 through 7)					
Deed Restrictions	Implementation	ls	1	$ 5,000.00	$5,000
Excavation/Off-Site Disposal (MG No. 1)					
Clear and Grub	Clear, Grub and haul	acres	2	$ 7,556.90	$15,114
Soil Excavation/Loading	1.5 CY Track-Mounted Excavator	cy	3,175	$ 2.25	$7,144
Soil/C&D Excavation/Loading	3 CY Wheel-Mounted Loader	cy	3,175	$ 1.00	$3,175
Soil/C&D/Concrete Transport	Trucking	cy	3,175	$ 21.50	$68,263
Non-Haz Soil/C&D Disposal	Disposal at County Landfill	ton	5,080	$ 11.50	$58,420
Remedial Design Investigation for MG No. 2					
Sample Collection	Labor/Equipment	event	1	$ 4,000.00	$4,000
Analytical	6 Soil Samples	event	1	$ 800.00	$800
Evaluation	Reporting	event	1	$ 3,850.00	$3,850
Excavation/Off-Site Disposal (MG No. 2)					
Demo Concrete Slab	6" thick	cy	50	$ 63.60	$3,180
Soil Excavation/Loading	1.5 CY Track-Mounted Excavator	cy	385	$ 2.25	$866
Post Excavation Sampling	8 Confirmatory Samples	event	1	$ 720.00	$720
Soil/C&D Excavation/Loading	3 CY Wheel-Mounted Loader	cy	385	$ 1.00	$385
Soil Transportation	Trucking	cy	385	$ 21.50	$8,278
Non-Haz Soil Disposal	Disposal at County Landfill	ton	355	$ 11.50	$4,083
Haz Soil Disposal	Disposal at County Landfill	ton	260	$ 200.00	$52,000
Backfill	Sand and Gravel	cy	335	$ 14.69	$4,921
Drainage Features (Hyde Creek Outfall) (MG No. 4)					
Remove Gate/Sediments/ Grout In-Place	Three man crew	day	1	$ 1,331.22	$1,331
Plug Inlet/Outfall Pipes	Materials	ea	1	$ 500.00	$500
Soil Transportation	Trucking	cy	1	$ 21.50	$22
Non-Haz Soil Disposal	Disposal at County Landfill	ton	1	$ 11.50	$12
Drainage Features (South Sewer) (MG No. 4)					
Remove Sediments/Grout In-Place	Three man crew	day	2	$ 1,331.22	$2,662
Water Diversion	Upgradient access, removal of piping, & water diversion	ls	1	$ 1,300.00	$1,300
Plug Inlet/Outfall Pipes	Materials	ea	1	$ 500.00	$500
Soil Transportation	Trucking	cy	1	$ 21.50	$22
Non-Haz Soil Disposal	Disposal at County Landfill	ton	1	$ 11.50	$12
Drainage Features (interior Sumps 1 through 8) (MG No. 4)					
Remove/dispose water	vacuum truck	event	1	$ 2,500.00	$2,500
Solidification of Sludge	absorbent material	cy	18	$ 10.27	$185
Drain/Sump Cleaning/Close-in place	Three man crew	day	7	$ 1,331.22	$9,319
Sediment Transportation	Trucking	cy	45	$ 21.50	$968
Non-Haz Soil Disposal	Disposal at County Landfill	ton	70	$ 11.50	$805
Plug Inlet/Outfall Pipes	Materials	ea	16	$ 200.00	$3,200
Fracture Sump Bottoms/backfill	Hoe Ram Equip/Crew	day	2	$ 837.43	$1,675
Backfill	Sand and Gravel	cy	45	$ 14.69	$661

Table 7
Former Roblin Steel Site
RAR Cost Estimate
Alternative E
"Limited Excavation"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Asbestos Removal (MG No. 5)					
Walls	Gray Window Caulk and Glaze	sf	6,000	$ 2.00	$12,000
Exterior Window Covering	Gray Transite Panels	sf	600	$ 2.00	$1,200
Interior/Exterior Walls and Ceilings	Black Tar Paper	sf	31,850	$ 1.50	$47,775
Windows	Gray Caulk and Glaze	sf	15,960	$ 2.00	$31,920
Walls	Gray Transite Panels	sf	23,365	$ 2.00	$46,730
Roof	Gray Transite Panels	sf	30,340	$ 2.00	$60,680
Boiler Room	Black Roof Tar	sf	30,000	$ 1.50	$45,000
Boiler Room	White Canvas Cloth (F)	sf	80	$ 12.00	$960
S. Side Room	Black Mastic	sf	35	$ 4.00	$140
Project/Air Monitoring	Air monitoring and project oversight	day	20	$ 450.00	$9,000
Electrical Component Removal (MG No. 5)					
Removal of HID Lights/Ballasts	Removal only from 50' ceiling with man-lift	ea	120	$ 10.00	$1,200
Removal of Fluorescent Lights/Ballasts	Removal only from 20' ceiling with man-lift	ea	40	$ 10.00	$400
Bulb Disposal	HID bulb recycle/disposal	ea	120	$ 7.50	$900
Bulb Disposal	4' Fluorescent bulbs	ea	40	$ 2.00	$80
Disposal/Recycling	PCB and non-PCB containing ballasts	drums	8	$ 250.00	$2,000
Remedial Design Investigation (MG No. 6)					
Sample Collection	Labor/Equipment	event	1	$ 925.00	$925
Analytical	3 Soil Samples	event	1	$ 600.00	$600
Evaluation	Post Sampling Reporting	event	1	$ 1,500.00	$1,500
Concrete/Soil Excavation (MG No. 6)					
Demolish/Remove Concrete	Hoe Ram Equip/Crew	day	1	$ 837.43	$837
Soil/Concrete Excavation/Loading	1.5 CY Track-Mounted Excavator	cy	70	$ 2.25	$158
Soil Loading	3 CY Wheel-Mounted Loader	cy	70	$ 1.00	$70
Soil/Concrete Transport	Trucking	cy	70	$ 21.50	$1,505
Non-Haz Soil Disposal	Disposal at County Landfill	ton	100	$ 11.50	$1,150
Haz Concrete Disposal	Disposal at CWM	ton	20	$ 200.00	$4,000
Sub Slab Vapor Venting System (MG No. 7)					
Crushed Stone	Below, surrounding and above PVC (16" thick)	cy	4,350	$ 15.04	$65,428
Sub-slab/stack piping	4" PVC piping	lf	2,680	$ 22.09	$59,193
Cushion Layer	Geotextile below and above geomembrane	sf	177,000	$ 0.45	$79,650
Geomembrane	60 mil	sf	88,500	$ 0.75	$66,375
Blower/Knockout Tank	2 HP Blower and condensation collection tank	ea	6	$ 7,800.00	$46,800
Connections	Mechanical/Electrical	ls	1	$ 5,000.00	$5,000
Concrete Slab	Assumed to be installed during redevelopment	sf	88,500	$ -	$0

Table 7
Former Roblin Steel Site
RAR Cost Estimate
Alternative E
"Limited Excavation"

Item	Note	Unit	Quantity	Cost/Unit	Cost
Interim Soil Cover (MG Nos. 1 through 3)					
Low Permeability Soil	Clay Two 6" Lifts,	cy	16,000	$ 29.50	$471,952
Topsoil	4" Thick	cy	5,400	$ 36.19	$195,437
Seeding	Mechanical Seeding	acre	10	$ 4,712.50	$47,125
Interim Access Controls (MG Nos. 1 through 7)					
Site Fencing	Six foot high	lf	2,375	$ 30.77	$73,081
Site Gates	Six foot high swing gate, 12' double	ea	2	$ 1,046.50	$2,093
Item	**Note**	**Unit - Quantity**		**Cost**	**Present Worth**
Long-Term OM&M (Groundwater, Sub-Slab Vapor Venting System (MG No. 7) and Cover System (MG Nos. 1 through 3)) (30 years)					
Collection	Labor/Equipment	event		$ 1,310.00	$30,253
Analytical	Water/Air Samples	event		$ 2,210.00	$51,038
Evaluation	Annual Reporting	ea		$ 1,920.00	$29,515
Electricity Costs	Blower operation (30 years)	KW-hr/yr	13,000	$ 1,690.00	$25,980

Capital Costs (subtotal)					$1,648,733
Mob/Demob/Decon	5% of Capital Costs				$82,437
Contingencies	15% of Capital Costs				$247,310
Engineering/Oversight	10% of Capital Costs				$164,873
Total Capital Costs					$2,143,353
OM&M (present worth)					$136,786
Project Present Worth (Total)					**$2,280,139**

Notes:

Sources include:

2004 RS Means Environmental Remediation Cost Data-Assemblies 10th Edition (unit prices include a 30% markup for overhead and profit).

2004 RS Means Heavy Construction Cost Data 16th Edition.

Engineer's Estimate.

Present Worth is the amount of money that must be invested today to cover future costs and is calculated by applying a present worth factor which is based on a 5% interest rate over the given time period.

ea = each
cy = cubic yard
lf = linear foot
sf = square foot
ls = lump sum
ton = 2,000 pounds

Table 8
Comparison of Site Wide Alternatives

Former Roblin Steel Site

Criteria	Site Wide Remedial Alternatives									
	A "No Action"		B "Exposure Pathway Removal"		C "Containment"		D "Excavation"		E "Limited Excavation"	
	Rating/Score									
Overall Protection Of Human Health And The Environment	Low	1	Medium	2	Medium	2	High	3	Medium-High	2.5
Compliance With SCGs	Low	1	Low	1	Low	1	High	3	Medium-High	2.5
Short-Term Effectiveness	Low	1	Medium	2	Medium	2	Medium	2	Medium	2
Long-Term Effectiveness	Low	1	Low-Medium	1.5	Medium	2	High	3	Medium-High	2.5
Reduction Of Toxicity, Mobility And Volume	Low	1	Low	1	Low-Medium	1.5	High	3	Medium-High	2.5
Feasibility	Medium	2	Medium	2	Medium	2	Medium	2	High	3
Aggregate Score		7		9.5		10.5		16		15

Notes:

1) If the Site Wide Remedial Alternative satisfies the criteria to a high degree it is assigned a score of 3.

2) If the Site Wide Remedial Alternative satisfies the criteria to a moderate degree it is assigned a score of 2.

3) If the Site Wide Remedial Alternative minimally satisfies the criteria it is assigned a score of 1.

Table 9
Remedial Action Alternative Comparisons
Former Roblin Steel Site
Project No. B00173-9

Alternative	A - No Action	B - Exposure Pathway Removal	C - Containment	D - Excavation	E - Limited Excavation
Remedy Description	Deed restriction on future use. Long-term groundwater monitoring. Contaminants would remain in place and would continue to effect local site groundwater. Contaminants would be potential threat for future exposure.	Disposal of surface debris to facilitate final cover grade. Containment of the impacted surface and subsurface soils/fill containing SVOCs, VOCs, and metals and impacted surface soil/fill and concrete containing PCBs through the installation of a 12-inch soil cover. Institutional and access controls to address interior Sump Nos. 1 through 8 and exterior Sump No. 9. Removal of accessible sediment from the Hyde Creek outfall without entering the pipe and closure of the outfall in place. Removal and off-site disposal of accessible sediment from the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building and closure of the pipe in place. Removal and off-site disposal of friable asbestos. Long-term groundwater monitoring. Long-term maintenance of cover system. Fence site and restrict access. Deed restriction on future use/development. Use of a soil/fill management plan for invasive activities. Contaminants would remain in place and would continue to effect local site groundwater. Site use would be restricted because of potential to future exposure if site cover was disturbed.	Disposal of surface debris to facilitate final cover grade. Containment of the impacted surface and subsurface soils/fill containing SVOCs, VOCs (outside building), and metals and impacted surface soil/fill and concrete containing PCBs through the installation of a 12-inch soil cover or asphalt pavement layer. In-situ treatment of VOC-impacted subsurface soil/fill via soil vapor extraction for soils under the building. Removal and off-site disposal of sediments from interior Sump Nos. 1 through 8 and exterior Sump No. 9 and closure in place. Removal of accessible sediment from the Hyde Creek outfall without entering the pipe and closure of the outfall in place. Removal and off-site disposal of accessible sediment from the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building and closure of the pipe in place. Removal and off-site disposal of friable asbestos. Engineering controls consisting of a sub-slab vapor venting system for the existing building. Long-term groundwater monitoring. Long-term maintenance of cover system. Fence site and restrict access. Environmental easement. Use of a soil/fill management plan for invasive activities. Contaminants would remain in place and would continue to effect local site groundwater. Site use would be restricted because of potential to future exposure if site cover was disturbed.	Disposal of surface debris to facilitate final grade. Excavation and off-site disposal of the impacted surface and subsurface soils/fill containing SVOCs, VOCs, and metals above NYSDEC TAGM values and the impacted surface soil/fill and concrete containing PCBs above TAGM/TSCA values. Complete removal and off-site disposal of the sediments, and piping related to interior Sump Nos. 1 through 8 and exterior Sump No. 9. Removal and off-site disposal of a portion of the piping associated with the Hyde Creek outfall and the sediment contained within that portion. Removal and off-site disposal of accessible sediment from the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building and closure of the pipe in place. Removal and off-site disposal of friable asbestos, non-friable asbestos and electrical components. Enhanced natural attenuation consisting of in situ treatment (i.e. Hydrogen Releasing Compound or zero valent iron injection) of VOC contaminated groundwater (two locations). Short-term groundwater monitoring. Deed restriction on future use. Contaminants would be removed and would no longer effect local site groundwater. VOC groundwater remediation is assumed to be successful; therefore, only short-term groundwater monitoring is required.	Disposal of surface debris to facilitate final cover grade. Excavation and off-site disposal of the impacted surface and subsurface soils/fill containing SVOCs, VOCs, and metals above the SSCLs and the impacted surface soil/fill and concrete containing PCBs above TAGM/TSCA values. Containment of the remaining surface and subsurface soils/fill containing contaminants above TAGM values through the installation of a 12-inch soil cover or asphalt pavement layer. Removal and off-site disposal of sediments that exceed the SSCLs and closure of drainage features in place. Removal and off site disposal of friable asbestos, non-friable asbestos and electrical components. Enhanced natural attenuation consisting of in situ treatment (i.e. Hydrogen Releasing Compound or zero valent iron injection) of VOC contaminated groundwater (two locations). Engineering controls consisting of a sub-slab vapor venting system for the existing building. Long-term groundwater monitoring. Long term maintenance of cover system. Fence site. Environmental easement. Use of a soil/fill management plan for invasive activities. Residual contaminants would remain in place exposure would be controlled through cover system and site use restrictions.
Capital Cost:	$6,250	$1,146,196	$1,632,829	$4,449,890	$2,143,353
Present Worth OM&M:	$87,470	$99,921	$322,073	$22,462	$136,786
Project Present Worth:	$93,720	$1,246,117	$1,954,902	$4,472,351	$2,280,139

APPENDIX A

LETTERS OF INTEREST

CLIFFSTAR CORPORATION • ONE CLIFFSTAR AVENUE • DUNKIRK, NEW YORK 14048

March 2, 2004

Cheryl A. Ruth
Brownfield Coordinator
Chautauqua County Dept. of Public Facilities
454 N. Work Street
Falconer, New York 14733

Re: ***Former Roblin Steel Site***
320 South Roberts Road, Dunkirk, New York

Dear Mrs. Ruth:

The purpose of this letter is to reiterate and confirm Cliffstar Corporation's interest in the acquisition and rehabilitation of the former Roblin Steel site located at the above listed address. As you are aware, Cliffstar is currently contemplating the acquisition of additional production lines that would increase the capacity of our Dunkirk facility. This would necessitate the reconfiguration and expansion of our operations to accommodate the expanded production, warehousing, distribution and research and design facilities.

The acquisition of the former Roblin Steel site and the adjacent former Alumax site would provide nearly 25-acres and approximately 200,000 square feet of building space that could be linked to our existing operation to address Cliffstar's critical need for expanded facilities. It is our understanding that the voluntary cleanup of the former Alumax site will receive regulatory approval later this spring, and that the cleanup of the former Roblin Steel site will be completed some time in 2005. As such, we would consider the phased acquisition and redevelopment of these sites, as they are remediated and become available. Potential concepts for the redevelopment of these sites include:

- Adaptive reuse of the manufacturing building on the Alumax site for warehousing and distribution;
- Use of the Alumax office building for research and design facilities;
- Rehabilitation of the high-bay building on the Roblin site for cold storage, warehousing and distribution, and/or near-site vendor manufacturing;
- Use of the Roblin site for truck parking and future development;
- Providing direct truck and/or automated trolley system access to the redevelopment site from Cliffstar's existing facility via the conversion or modification of the rail bridge over S. Roberts Road; and
- Linking the redevelopment site to Middle Road and the Chadwick Bay Industrial Park via a new access road.

This potential expansion would not only greatly enhance Cliffstar's ability to maintain its current operations in the City of Dunkirk, but would also create additional employment opportunities during the construction and operation of the expanded facilities. Furthermore, the potential expansion would represent a significant economic investment, while transforming these contaminated and deteriorated properties that have plagued the community for over a decade into viable operations.

The acquisition of these properties and the implementation of these potential plans are contingent upon a number of factors including, but not limited to, the following:

- The successful negotiation of purchase prices and terms with the current property owners;

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- The remediation of environmental contamination on both sites in accordance with applicable regulatory requirements;
- The transfer of releases for environmental liability from the current owners to Cliffstar.

This letter should not be construed as a commitment to undertake any of the property acquisitions and/or rehabilitation activities described above. Instead, it represents Cliffstar Corporation's current interests, which are contingent upon a number of factors and may be subject to change.

Very truly yours,

CLIFFSTAR CORPORATION

Eugene W. Bailen
Exec. V P Operations

/ewb

RECEIVED
MAR 5 2004
By________

10987 Bennett State Road
P.O.Box 356
Forestville, NY 14062
Bailey@netsync.net
Phone (716)965-2731 Fax (716) 965-2764

Bailey Manufacturing Company, LLC.

December 1, 2003

Mr. Larry D'Andrea
United States Environmental Protection Agency
290 Broadway, 18^{th}. Floor
New York, NY 10007

Dear Mr.D'Andrea:

I have been informed there is possibility that the former Roblin Steel Site in the city of Dunkirk may be available for sale.

Based on it's size, location, and position in the Dunkirk/Sheridan Empire Zone I feel our company could have some interest in acquiring for future expansion. I feel we would consider this site if the contamination issue had been properly addressed and resolved. I understand there is a proposal for a USEPA Brownfield Cleanup Fund being supported by the City of Dunkirk.

We currently have some future contracts that may constitute additional space needed, and this location has many favorable benefits. The location in the Dunkirk/Sheridan Empire zone, it is easily accessible for transportation issues, and the overall size are all benefits of this location.

Although this letter is not to be considered a commitment to acquire the Roblin Steel site, it simply expresses our possible interest as our needs develop. It also expresses out interest in the development of the above said Empire Zone.

Sincerely,

Dona Hines
Vice President

APPENDIX B

COST ESTIMATE ASSUMPTIONS FOR SITE-WIDE REMEDIAL ALTERNATIVES

APPENDIX B
Cost Estimate Assumptions
for
Site-Wide Remedial Alternatives

Former Roblin Steel Site

This document provides a summary of the assumptions used to develop the cost estimates for each site-wide remedial alternative. Additional information regarding remediation areas is included in Section 2.3 and 2.4 of the RAR. Common assumptions to the site-wide alternatives include: 1) assume soil/fill material weighs an average of 1.6 tons per cubic yard; and 2) assume concrete weighs an average of 2 tons per cubic yard.

Alternative A – "No Action"

Institutional Controls (MG #1 through #7)

Implement the following institutional controls in the form of deed restrictions.

Deed Restrictions

- Prevent the future use of the project site and building for any purpose.
- Prevent the use of on-site groundwater.
- Require the development of a soil/fill management plan for any future excavation activities.
- Provide notice to potential owners, operators, or members of the public on the conditions of the project site and building.
- Prevent any change in the current zoning of the site.

Long-term Groundwater Monitoring (MG # 7)

- No active treatment.
- Sample groundwater on an annual basis for 30 years to monitor natural attenuation.
  - Four down-gradient groundwater-monitoring wells (MW-01, MW-04, MW-12, and MW EX-12).
  - Two "hot-spot" monitoring wells (MW-09 and MW-07).
- Analyze collected groundwater samples for TCL VOCs and SVOCs.
- Assume purge water can be discharged to City of Dunkirk sewer system.
- Prepare and submit annual reports to NYSDEC.

Alternative B – "Exposure Pathway Removal"

Institutional and Access Controls (MG #1 through #7)

Implement the following institutional controls in the form of deed restrictions and access controls.

Deed Restrictions

- Same as Alternative A.

Access Controls

- Install a six-foot high chain link fence (approximately 2,375 linear feet) around portions of the project site not already enclosed by fencing.
- Install fencing and/or barricades to prevent access to the interior of the building.

Containment (MG #1, #2, #3, and #6)

Install a soil cover over all exterior portions of the project site (approximately 434,200 square feet).

Site Preparation

- Removal and offsite disposal of surface debris (rebar, railroad ties, miscellaneous metal pieces, etc.). This is estimated to include approximately 50 cubic yards (80 tons).
- Import soils (approximately 500 cubic yards) to fill low areas.
- Limited site grading across the project site prior to the soil cover installation (approximately 200,000 square feet) to promote positive drainage.

Soil Cover

- Twelve inches of compacted low permeability soil material (approximately 16,000 cubic yards).
- Four inches of topsoil (approximately 5,400 cubic yards).
- Seeding and mulch (approximately 434,200 square feet).

Operation, Maintenance and Monitoring (OM&M)

- Conduct annual site visits to inspect the integrity of the cover system and perform maintenance / repair tasks as required (assumed to be performed at the same time annual groundwater monitoring is performed).

Alternative B – "Exposure Pathway Removal" (Continued)

Sediment Removal and In-Place Closure of Point Source Outfalls (MG #4)

Interior Sump Nos. 1 through 8 and Exterior Sump No. 9

- Institutional and access controls.

24-inch Diameter Hyde Creek Outfall

- Remove backflow prevention gate.
- Remove accessible sediment from the outfall pipe without entering the pipe (assume one ton).
- Dispose of at a municipal solid waste facility.
- Close in place, by plugging the pipe with concrete.

Discharge Location of the 24-Inch Diameter Sewer Line Along Southern Portion of the Building

- Divert water flow from an upstream location of the catch basin near EX-MW-12.
- Remove accessible sediment from the catch basin and end of sewer pipe (assume one ton).
- Dispose of at a municipal solid waste facility.
- Close in place, by plugging the pipe with concrete.
- Maintain flow from sewer pipe from the south (Alumax site) during and after closure.

Friable Asbestos Removal (MG #5)

- Remove the friable asbestos (white canvas cloth) from the building and dispose of off-site in accordance with State and Federal regulatory requirements (approximately 80 square feet).
- Complete air monitoring as required.

Long-term Groundwater Monitoring (MG #7)

- Same as Alternative A.

Alternative C – "Containment"

Institutional and Access Controls (MG #1 through #7)

Implement the following institutional controls in the form of an environmental easement.

Environmental Easement

- Restrict the future use of the project site and building to industrial and commercial purposes.
- Prevent the use of on-site groundwater as a source of potable or process water without necessary water quality treatment as determined by the Chautauqua County Health Department.
- Require the development of and compliance with a soil/fill management plan for use during the redevelopment of the project site.
- Require the installation of a sub-slab vapor system in the construction of habitable buildings on the property.
- Provide notice to potential owners, operators, or members of the public on the conditions of the project site and building.
- Prevent any change in the current zoning of the site.

Access Controls

Access controls are presented as a contingency / interim remedial action that may be implemented in the interim and/or absence of site redevelopment plans.

- Install a six-foot high chain link fence (approximately 2,375 linear feet) around portions of the project site not already enclosed by fencing.

Containment (MG #1, #2 (outside areas only), #3 and #6)

The preferred option to address these media groups is to install a heavy-duty pavement section over all exterior portions of the project site (approximately 434,200 square feet) to allow for truck traffic and outside storage. This option would be initiated if the site were to undergo redevelopment. The cost for installation and maintenance are assumed to be part of the redevelopment cost for the project site. Site work activities during redevelopment would be completed in accordance with a soil/fill management plan. However, in the interim and/or in the absence of definite redevelopment plans, containment with a soil cover as outlined below would occur.

Install a soil cover over all exterior portions of the project site (approximately 434,200 square feet).

Site Preparation

- Same as Alternative B.

Alternative C – "Containment" (Continued)

Interim Soil Cover

- Same as Alternative B.

Soil Vapor Extraction System (MG #2 (inside areas only))

Install a soil vapor extraction system to treat the subsurface soil impacted with chlorinated VOCs beneath the southern portion of the building (SP-46 area). Assume an air permit is not required.

Remedial Design Investigation

Remedial design investigation work required to further delineate impacted area.

- Two days of subsurface drilling and sampling
- Six soil samples for VOC analysis.

Soil Vapor Extraction System

- 15 extraction points (two-inch diameter PVC). Each point to consist of:
  - Core the six inch thick concrete slab, use 4-1/4 inch I.D. hollow stem augers to drill four-feet deep boring.
  - Contain soil cuttings, analyze and dispose (three 55-gallon drums).
  - Install 24-inch long screen and 36-inch long riser with typical back-fill materials (sand, bentonite, and grout).
  - Elbow or tee.
  - Vacuum gauge.
- Three-inch diameter PVC header piping (250 linear feet).
- One 1-horse power blower with knockout tank.
- Treat off-gas through 200-pound granular activated carbon.
- Four-inch diameter PVC stack (40 linear feet).
- Electrical connections.

Operation, Maintenance and Monitoring (OM&M)

- Conduct weekly site visits during the first month of operation.
  - Screen exhaust with a PID.
  - Collect one air sample from the exhaust.
  - Analyze air sample for TCE, 1,2 DCE, and vinyl chloride.
- Conduct monthly visits during an estimated two-year operation period. Complete same tasks outlined above. Quarterly reports to NYSDEC.
- Granular activated carbon replacement every 6 months.
- Electrical cost (24 months of operation).
- Collect and analyzed four subsurface soil samples for VOCs after 1 year and at the completion of the 2-year operation period.

Alternative C – "Containment" (Continued)

Sediment Removal and In-Place Closure of Drainage Features (MG #4)

24-inch diameter Hyde Creek Outfall

- Same as Alternative B.

Discharge Location of the 24-Inch Diameter Sewer Line Along Southern Portion of the Building

- Same as Alternative B.

Interior Sump Nos. 1 through 8 and Exterior Sump No. 9

- Use vacuum truck to remove water contained in the sumps (approximately 700 gallons) and stage into 55-gallon drums. Analyze and dispose of off-site.
- Solidify remaining saturated sediments within the sumps with absorbent material.
- Remove the solidified material (approximately 30 cubic yards sediment and 20 cubic yards solidification material) from the sumps through the use of mechanical and/or hand labor.
- Dispose of at a municipal solid waste facility (75 tons).
- No verification sampling required.
- Plug any inlets and outfall pipes with concrete (assume two per sump).
- Fracture the base of the sumps with a hoe ram or wrecking ball to limit these areas from becoming collection areas for water.
- Backfill the sumps with a sand and gravel soil (approximately 50 cubic yards).

Friable Asbestos Removal (MG #5)

- Same as Alternative B.

Sub-Slab Vapor Venting System and Groundwater Monitoring (MG #7)

Sub-Slab Vapor Venting System

- Install above the existing concrete floor (88,500 square feet) since the floor of the building will be raised as part of the redevelopment project.
- Install system consisting of the following components.
  - Six inches of crushed stone (approximately 1,650 cubic yards) across the building floor.
  - Two lengths of four-inch diameter perforated PVC piping (approximately 2,000 linear feet) along the length of the building (east/west direction along the central northern half and the central southern half). Piping interconnected every 50 feet (approximately 600 linear feet with 40 tees).

Alternative C – "Containment" (Continued)

- Two 2-horsepower blowers with knock out tanks (one for the north portion and one for south portion) (assuming the original blowers will have to be replaced at least twice during the 30 year operation period).
- Four-inch diameter stacks to the roof.
- Ten inches of crushed stone (four inches for the pipe and six inches above the pipe (approximately 2,700 cubic yards)
- Cushion geotextile (88,500 square feet).
- 60-mil LLDPE geomembrane (88,500 square feet).
- Cushion geotextile protection layer (88,500 square feet).
- Assume a concrete floor slab would be installed during redevelopment.

Operation, Maintenance and Monitoring (OM&M) of Sub-Slab Vapor Venting System

- Conduct weekly site visits during the first month of operation.
  - Screen the exhaust with a PID.
  - Collect one air sample from each stack.
  - Collect three interior air samples.
  - Analyze all five air samples for BTEX, TCE, 1,2 DCE, and vinyl chloride.
- Conduct monthly visits during the first year, quarterly visits for years 2 through 5, semi-annual visits years 6 thru 10 and annual visits years 11 through 30. Complete same tasks outlined above.
- Quarterly reports to NYSDEC years 1 through 5, and semi-annual reports years 6 through 30.
- Electrical costs (13,000 KW-hr/yr per blower for 30 years of operation = 780,000 KW-hr).

Long-term Groundwater Monitoring (MG # 7)

- Same as Alternatives A and B.

Long-term Cover System Monitoring

- Conduct annual monitoring to document the effectiveness of the soil and pavement capping on the site.
- Complete and submit to the NYSDEC an annual report that certifies that the institutional controls and engineering controls put in place are still in place, have not been altered, and are still effective.

Alternative D – "Excavation"

Institutional Controls (MG #7)

Implement the following institutional controls in the form of deed restrictions.

Deed Restrictions

- Prevent the use of on-site groundwater.

Excavation and Off-Site Disposal of Surface Soil/Fill and Debris Piles (MG #1)

- Clearing and grubbing (approximately 6 acres).
- Load, transport and dispose of at a municipal solid waste facility the debris/fill piles and wood block flooring (approximately 1,275 cubic yards/2,040 tons).
- Excavate, load, transport and dispose of at a municipal solid waste facility the surface soil/fill (upper 12 inches) exceeding regulatory guidance values. This includes all exterior portions of the project site.
    - Surface soil underlain by concrete (former Building 47 area) has an approximate surface area of 102,000 square feet and is assumed to consist of 3 inches of soil (950 cubic yards/1,520 tons).
    - Remaining areas consist of approximately 332,200 square feet of surface area resulting in an estimated 12,300 cubic yards (19,680 tons).
- Excavate, crush, and stage concrete underlying the surface soils in the former Building 47 area. Assuming a six-inch thick concrete slab, this results in about 1,900 cubic yards of concrete. This action is required to access the subsurface soils beneath the concrete slab.

Excavation and Off-Site Disposal of Subsurface Soil/Fill Impacted with Chlorinated VOCs (MG #2)

- Area south of existing building (SP46).
    - Remedial design investigation work required to further delineate impacted area.
        - Two days of subsurface drilling and sampling
        - Six soil samples for VOC analysis.
    - Remedial work to consist of the following:
        - Use a concrete saw and hoe ram to remove the concrete from the proposed excavation area. Assuming a six-inch thick concrete slab over a 2,700 square feet surface area results in approximately 50 cubic yards.
        - Excavate, load, transport and dispose of impacted soils.

Alternative D – "Excavation" (Continued)

- Assume half of the soil (approximately 200 cubic yards/320 tons) will be disposed of at a hazardous landfill and the other half (approximately 200 cubic yards/320 tons) will be disposed of at a municipal solid waste facility.
- Confirmation sampling for VOCs (8 samples).
- Backfill with the 50 cubic yards of concrete and imported sand and gravel soil (350 cubic yards)

- Area at north end of project site (SP-60)
  - Remedial work to consist of the following:
    - Excavate and stage non-impacted soils (approximately 75 cubic yards).
    - Excavate, load, transport and dispose of at a municipal solid waste facility the impacted soils (approximately 75 cubic yards/120 tons).
    - Confirmation sampling for VOCs (8 samples).
    - Backfill with non-impacted soils (75 cubic yards).

Excavation and Off-Site Disposal of Subsurface Soil/Fill (MG #3)

- Excavate, load, transport and dispose of at a municipal solid waste facility the subsurface soil/fill with impacts exceeding the regulatory guidance values. This includes all exterior portions of the project site from a depth of 1 to 4 feet below grade (approximately 48,000 cubic yards/76,800 tons).
- Remove, crush, and stage the concrete foundations associated with former Building 47.
  - It is assumed this will included a one-foot thick wall extending to a depth of four feet below grade and a three foot wide by one foot thick footing. This equates to seven cubic feet of concrete per linear feet of foundation. Assuming a 2,200 linear feet perimeter results in approximately 570 cubic yards of concrete.
  - Import and install off-site soils to promote positive site drainage (approximately 5,000 cubic yards).

Sediment and Drainage Feature Removal (MG #4)

The sediments and liquids from the interior Sump Nos. 1 through 8, exterior Sump No. 9 and the catch basin and end of the sewer pipe from the discharge location of the sewer line along the southern portion of the building will be removed as outlined in Alternative C. The interior/exterior sumps and associated piping, and about 20 linear feet of piping from the Hyde Creek outfall will be completely removed.

Discharge Location of the 24-Inch Diameter Sewer Line Along Southern Portion of the Building

- Same as Alternatives B and C.

Alternative D – "Excavation" (Continued)

Hyde Creek Outfall Removal

- Excavate the soil/fill from above and around the storm sewer pipe. Stage soils near excavation for later use as backfill.
- Remove 20 linear feet of the storm sewer pipe and sediments contained in the pipe. This includes the backflow prevention gate. Headwall will remain in place.
- Load, transport and dispose of at a municipal solid waste facility.
- The end of the pipe will be closed in place by plugging the pipe with concrete.
- The previously excavated soils will be used to backfill the excavation.

Sump Removals

- Use a hoe ram and excavator to demolish and remove the concrete slab in the vicinity of each of the sumps and above the suspected piping associated with these sumps. It is assumed that one pipe connects the interior Sump Nos. 1 through 8 (approximately 600 linear feet), and about 100 linear feet of piping is associated with exterior Sump No. 9.
- Use a hoe ram and excavator to demolish and remove each of the nine sumps (approximately 45 cubic yards). Dispose of concrete (90 tons) at a municipal solid waste landfill.
- Excavate soils three feet wide from above the 700 linear feet of piping. Assume the piping is six feet below grade. This results in approximately 500 cubic yards of excavation.
- Remove piping and dispose of off-site at a municipal solid waste landfill. Assume 4 cubic feet per linear feet resulting in approximately 100 cubic yards/200 tons).
- Backfill piping excavation and sump areas with the concrete slab material and an imported sand and gravel material (approximately 145 cubic yards).

Building Component Removal (MG #5)

Friable Asbestos Removal

- Same as Alternatives B and C.

Non-Friable Asbestos Removal

- Remove the non-friable asbestos and dispose of off-site in accordance with State and Federal regulatory requirements. Refer to asbestos report in Appendix I of the SI Report for non-friable asbestos quantities.
- Complete air monitoring as required.

Alternative D – "Excavation" (Continued)

Electrical Component Removal

- Remove electrical equipment from the building (approximately 40 fluorescent light bulbs/ballasts, and 120 HID light bulbs/fixtures) and dispose of off-site.

Excavation and Off-Site Disposal of Concrete and Surface Soils Impacted with PCBs (MG #6)

The concrete and surface soils with PCB impacts above regulatory levels will be excavated and disposed of off-site at a properly permitted facility.

- Remedial design investigation work required to further delineate impacted area.
  - Three soil samples for PCB analysis.
- Remedial work.
  - Use a hoe ram and excavator to demolish and remove the concrete slab (approximately 20 cubic yards/40 tons).
  - Load, transport and dispose concrete at a properly permitted waste disposal facility. Assume half of the concrete (approximately 10 cubic yards/20 tons) will be disposed of at a hazardous landfill and the other half (approximately 10 cubic yards/20 tons) will be disposed of at a municipal solid waste facility.
  - Excavate, load, transport and dispose of at a municipal solid waste landfill the impacted surface soils (approximately 50 cubic yards/80tons).

Groundwater Treatment/Monitoring (Enhanced Natural Attenuation) (MG # 7)

Groundwater Treatment

- One injection event of either Hydrogen Releasing Compound (HRC) or Zero Valent Iron (ZVI) will be completed for the two areas of groundwater containing elevated chlorinated VOC concentrations (MW-09, MW-07) to enhance the natural degradation process. The HRC or ZVI will be injected through a series of geoprobe borings.

- The following parameters were used to estimate the amount of HRC and ZVI required to complete one injection.

  MW-09 Area
  - TCE concentration = 450 ppb.
  - Vinyl Chloride Concentration = 34 ppb.
  - 1,2, DCE concentration = 380 ppb.
  - Saturated zone from 4 to 7 feet below ground surface.
  - Treatment area = 10,000 square feet.

  MW-07 Area
  - TCE concentration = 56 ppb.
  - Vinyl Chloride Concentration = 330 ppb.

Alternative D – "Excavation" (Continued)

        - o 1,2, DCE concentration = 1,500 ppb.
        - o Saturated zone from 6 to 11 feet below ground surface.
        - o Treatment area = 2,000 square feet.
    - Common parameters to these areas include an estimated groundwater seepage velocity of 19 feet per year and a hydraulic conductivity range of 1 x 10^{-4} to $1x10^{-5}$ cm/sec.

Short-term Groundwater Monitoring

- Sample groundwater on a quarterly basis for 2 years to monitor the progress of the enhanced natural attenuation.
    - ▪ Two down-gradient groundwater-monitoring wells (MW-04, and MW-12).
    - ▪ Two zones of groundwater with elevated chlorinated VOC (MW-09 and MW-07).
- Analyze collected groundwater samples for TCL VOCs.
- Assume purge water can be discharged to City of Dunkirk sewer system.
- Prepare and submit quarterly reports to NYSDEC.

Alternative E – "Limited Excavation"

Institutional Controls (MG #1 through #7, except MG # 5)

Implement the following institutional controls in the form of an environmental easement.

Environmental Easement

- Same as Alternative C.

Access Controls

- Same as Alternative C.

Excavation and Off-Site Disposal of Surface Soil/Fill and Debris Piles (MG #1)

- Clearing and grubbing (approximately 2 acres).
- Load, transport and dispose of at a municipal solid waste facility the debris/fill piles and wood block flooring (approximately 1,275 cubic yards/2,040 tons).
- Excavate, load, transport and dispose of at a municipal solid waste facility the surface soil/fill (upper 12 inches) exceeding SSCLs (approximately 1,900 cubic yards/3040 tons).
  - Surface soil underlain by concrete (former Building 47 surface area of 102,000 square feet) is assumed to consist of 3 inches of soil (950 cubic yards/1,520 tons).
  - Remaining areas consist of approximately 26,200 square feet of surface area resulting in an estimated 970 cubic yards (1,550 tons).
  - Concrete underlying the surface soils encountered within the 12-inches of proposed surface soil excavation will not be removed.
  - Verification sampling of the completed excavation will not be completed.

Excavation and Off-Site Disposal of Subsurface Soil/Fill Impacted with Chlorinated VOCs (MG #2)

This is the same as Alternative D except the excavation quantities are expected to be approximately 20 percent less since the SSCLs will be used instead of guidance values. Quantities are summarized in Section 2.4.5.2 of the RAR.

Containment (MG #1, #2, and #3)

The preferred option to address these media groups is to install a heavy-duty pavement section over all exterior portions of the project site (approximately 434,200 square feet) to allow for truck traffic and outside storage. This option would be initiated if the site were to undergo redevelopment. The cost for

Alternative E – "Limited Excavation" (Continued)

installation and maintenance of the pavement is assumed to be part of the redevelopment cost for the project site. Site work activities during redevelopment would be completed in accordance with a soil/fill management plan. However, in the interim and/or in the absence of redevelopment activities, containment with a soil cover as outlined below would occur.

The analytical results for the subsurface soil/fill samples for MG # 3 do not exceed the SSCLs. However, visual and olfactory evidence of petroleum odors and stained soils (nuisance characteristics) has been identified primarily in the northeast corner of the project site (former location of the three 157,000 gallon fuel oil ASTs) and sporadically in other areas of the project site. As such, these soils will not be excavated. Instead, containment will be used to meet the RAOs.

Install a soil cover over all exterior portions of the project site (approximately 434,200 square feet).

Interim Soil Cover

- Same as Alternatives B and C.

Operation, Maintenance and Monitoring (OM&M)

Conduct annual site visits to inspect the integrity of the cover system and perform maintenance / repair tasks as required (assumed to be performed at the same time annual groundwater monitoring is performed).

Sediment Removal and In-Place Closure of Drainage Features (MG #4)

- Same as Alternative C, excluding exterior Sump No. 9.

Building Component Removal (MG #5)

- Same as Alternative D.

Excavation and Off-Site Disposal of Concrete and Surface Soils Impacted with PCBs (MG #6)

- Same as Alternative D.

Sub-Slab Vapor Venting System (MG #7)

- Same as Alternative C.

Alternative E – "Limited Excavation" (Continued)

Operation, Maintenance and Monitoring (OM&M) of Sub-Slab Vapor Venting System (to be performed in conjunction with groundwater OM&M)

- Conduct semi-annual basis for years 1 through 5, and on an annual visits for years 6 through 30.
  - Screen the exhaust with a PID.
  - Collect one air sample from each stack.
  - Collect three interior air samples.
  - Analyze all five air samples for BTEX, TCE, 1,2 DCE, and vinyl chloride.
- Annual reports to NYSDEC.
- Electrical costs (13,000 KW-hr/yr per blower for 30 years of operation = 780,000 KW-hr).

Groundwater Treatment/Monitoring (Enhanced Natural Attenuation) (MG # 7)

Groundwater Treatment

This is the same as Alternative D except the treatment areas are expected to be approximately 20 percent less since the SSCLs will be used instead of guidance values.

Long-term Groundwater Monitoring

- Sample groundwater on a semi-annual basis for years 1 through 5, and on an annual basis for years 6 through 30 to monitor the progress of the enhanced natural attenuation.
  - Four down-gradient groundwater-monitoring wells (MW-01, MW-04, MW-12, and MW EX-12).
  - Two "hot-spot" monitoring wells (MW-09 and MW-07).
- Assume purge water can be discharged to City of Dunkirk sewer system.
- Prepare and submit annual reports to NYSDEC.

Long-term Cover System Monitoring

- Same as Alternative C.

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