SITE INVESTIGATION WORK PLAN

FOR THE

BUFFALO HARBOR STATE PARK SITE
BUFFALO, ERIE COUNTY, NEW YORK

DRAFT
MAY 2006
(Version 2)

PREPARED FOR:

CANNON DESIGN
2170 WHITEHAVEN ROAD
GRAND ISLAND, NEW YORK 14072

ON BEHALF OF:

NEW YORK STATE OFFICE OF PARKS,
RECREATION AND HISTORIC PRESERVATION
WESTERN DISTRICT – NIAGARA FRONTIER REGION
P.O. BOX 1132
NIAGARA FALLS, NEW YORK 14303-0132

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PREPARED BY:

WATTS ENGINEERING & ARCHITECTURE, P.C.
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SITE INVESTIGATION WORK PLAN
FOR THE
PROPOSED BUFFALO HARBOR STATE PARK SITE
CITY OF BUFFALO, ERIE COUNTY, NEW YORK

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Dated April 21, 2004

1.0 INTRODUCTION

This ***Site Investigation Work Plan*** has been prepared to identify the field activities, methodology and costs for the site investigation and subsequent Remedial Alternatives Report for the proposed Buffalo Harbor State Park site in Buffalo, New York. Watts Engineering & Architecture, P.C., (Watts Engineers) has been asked to prepare this document on behalf of the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP) as defined in the "Agreement" signed between the NYSOPRHP and the New York State Department of Environmental Conservation (NYSDEC). Watts Engineers has also prepared and included a Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP) as appendices to this document. This Work Plan document is identified as "Exhibit B" in the Agreement. The investigation described herein has been designed in accordance with the New York State Department of Environmental Conservation (NYSDEC) Draft DER-10 Technical Guidance for Site Investigation and Remediation (December 2002).

1.1 Site Background

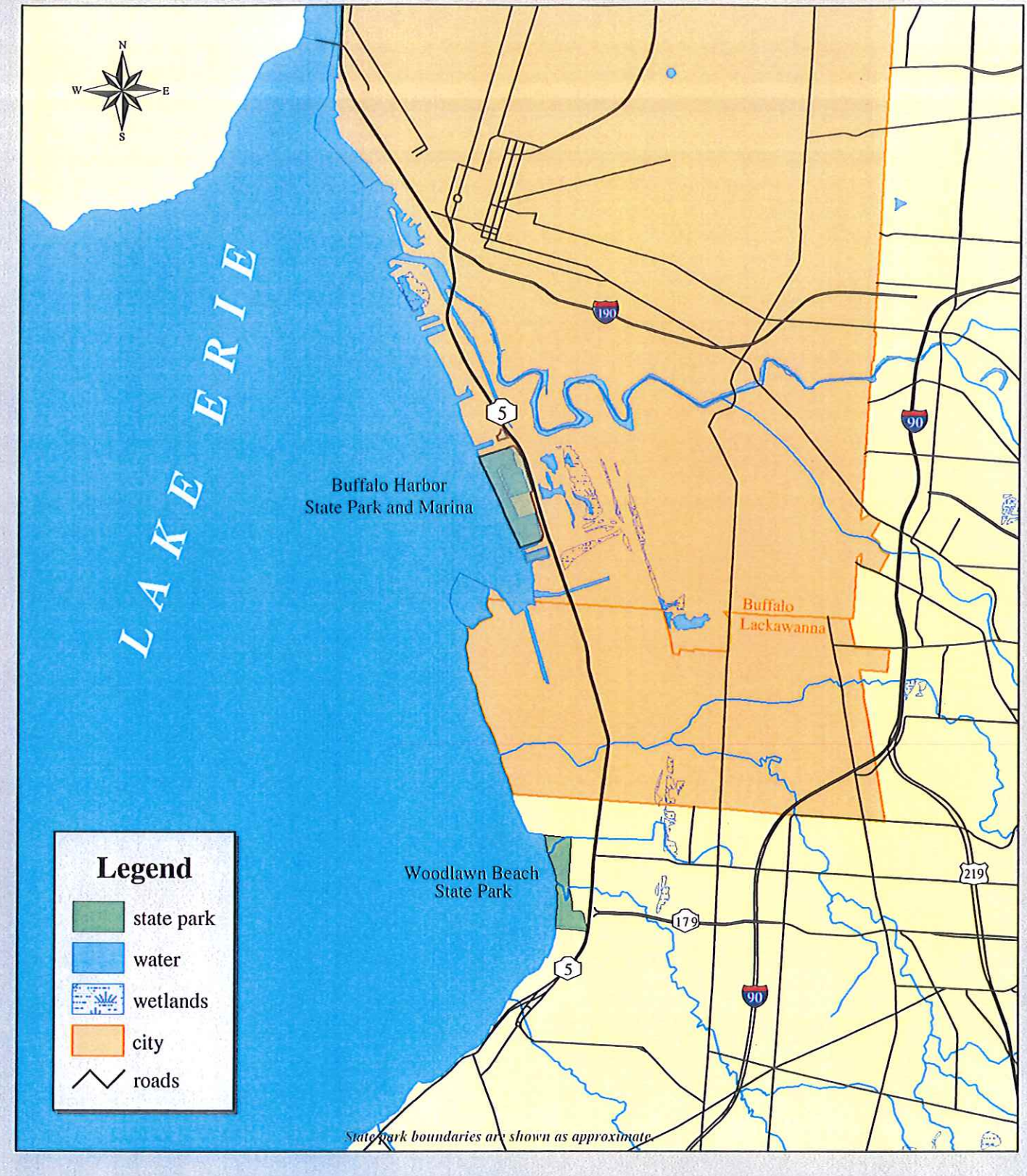
1.1.1 *Site Description and History*

Site Description

The proposed purchase by the NYSOPRHP of the Buffalo Small Boat Harbor is to include the Small Boat Harbor marina, marina support areas (restaurants, store, bait shop, gas shed, offices, restrooms, parking lots, trails, and open greenspace); the area known as Gallagher Beach that is used primarily for personal watercraft and windsurfers; another separate parcel south of Gallagher Beach that consists of landfill area and adjacent underwater lands; and, a small parcel north of the main property that is currently used for operation, maintenance and storage. The entire property is currently owned and operated by the Niagara Frontier Transportation Authority (NFTA) and is located in the City of Buffalo, Erie County, New York (**Site Location Map - Figure 1-1**).

The property as identified above consists of three distinct parcels. Parcel 1 is generally bound by Lake Erie on the west, Fuhrmann Boulevard to the east, abandoned grain storage towers to the south, and the Freezer Queen frozen food plant and Port Terminal "A" to the north. Parcel 2 is located south of Parcel 1, just south of the abandoned grain elevators and consists mainly of water rights and a small strip of land on the southern edge. Parcel 3 has no water frontage and is essentially a triangular piece of land which is located just north of the Freezer Queen frozen food plant. Please reference the property map identified as "Exhibit A – Site" found in the Agreement for approximate property boundary limits and parcel locations. These parcels are identified in the **Proposed Recreation Use Plan - Figure 1-2**.

The Investigation Work Plan developed for this Agreement covers the entire site (all three parcels), however, primary and short term changes proposed by



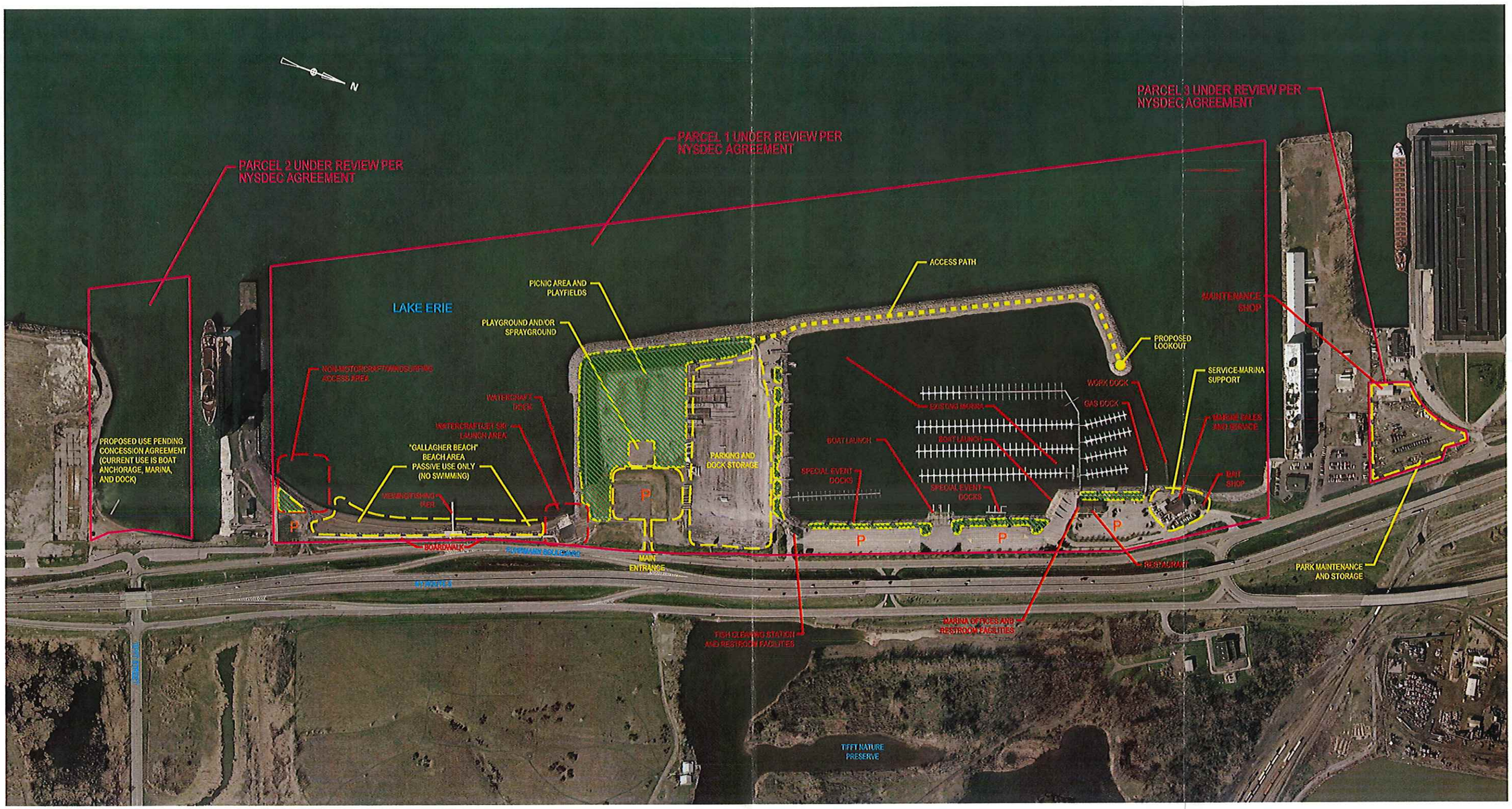
Buffalo Harbor State Park and Marina

OFFICE OF PARKS, RECREATION, HISTORIC PRESERVATION
NEW YORK STATE

George E. Pataki, Governor

Berndatte Castro, Commissioner

Map produced by NYS OPRHP GIS unit, January 2004.



LEGEND

- P - PROPOSED PARKING (MOST EXISTING PARKING IS TO REMAIN)
- RECREATION CONTACT LAWN AREAS (SOME EXISTING WILL REMAIN)
- PROPOSED RECREATION USE IMPROVEMENT (YELLOW TEXT)
- EXISTING RECREATION USE TO REMAIN (RED TEXT)
- AREA UNDER REVIEW PER NYSDEC AGREEMENT

0 100 200 300 400 FT

WATTS ENGINEERS
TRANSPORTATION ENGINEERING
CIVIL/MUNICIPAL/SITE DEVELOPMENT
ENVIRONMENTAL ENGINEERING
ASBESTOS MANAGEMENT
CONSTRUCTION INSPECTION
3826 MAIN ST. BUFFALO, N.Y. 14226
(716) 836-1540 TEL (716) 836-2402 FAX

FIGURE 1-2

PROPOSED RECREATION USE PLAN

BUFFALO HARBOR STATE PARK
CITY OF BUFFALO
ERIE COUNTY, NEW YORK

DATE: MAY 2006

SCALE 1" = 500' (11"x17" PLOT)
SCALE 1" = 200' (28"x40" PLOT)

H:\Y3000\Y3056\nyoprhp-tm\Y3056.01 BHSP\CADD\Recreation use Plan Figure 1-2 v3.dgn
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NYSOPRHP are restricted to limited areas within the site. These improvement areas have been identified for additional development and recreational use in general accordance with the goals defined in the *Buffalo Harbor State Park and Marina Interim Management Guide* dated April 21, 2004 and found in Appendix D.

NYSOPRHP proposes to construct a small playground and possibly a splash park, adjoining passive recreational area consisting of picnic tables, park benches, and walking paths in a 23 acre area that is identified as a former U.S. Army Corps of Engineers confined disposal facility (CDF). This area represents the location where the public is most likely to gather and be in close contact with the park soils. Therefore, one of the primary focuses of this Site Investigation Work Plan is to examine and document the environmental conditions in this area.

Currently the northern half of this area is a parking area constructed of mostly asphalt pavement in good to fair condition with some gravel areas. This parking area is used for parking in the summer and for dock storage in the winter. The NYSOPRHP intends to continue support parking and dock storage in this area. Another smaller parking lot is located to the east of the proposed recreation area adjacent to Fuhrman Boulevard and was constructed in the past few years. This parking lot may be expanded slightly to the north in the future to meet the anticipated increased parking demands once the recreation improvements have been made.

An examination of **Figure 1-2 – Proposed Recreation Use Plan**, identifies each of these areas. Undeveloped spaces within the recreational area will ultimately be regraded, covered with soil and seeded with grass. Additionally, NYSOPRHP is proposing a walking path along the breakwall jetty with a lookout at the northernmost tip.

Other areas of the parcel 1 (e.g., Ship Aweigh Restaurant, Worms N Things Bait Shop, Olson Brothers Marine Sales and Service, fuel and pump out facilities, storage shed, fish cleaning station, underwater lease for mooring, boat docks, roadway and parking areas) are not designed for direct recreational usage. Improvements proposed to these areas include a new contact station for vehicle user fee collection, new signage throughout the park, and upgrading of existing conveniences but none of these actions are anticipated to disturb soil, sediment or groundwater to any extent. As a result, investigation activities in these areas will be restricted to a site reconnaissance and literature searches, followed by a limited field investigation (a few soil borings and surface soil samples from grassy areas) to determine environmental conditions in these areas. See **Section 2** of this Work Plan for specific tasks with regards to the investigation.

The area informally known as Gallagher Beach consists of the boardwalk, non-

swimming beach, fishing pier, watercraft dock and launch, and a small triangular grassy area located on a knoll at the extreme southern end of the beach. Gallagher Beach over the past several years has become a gathering point for wind surfers and personal water craft users. Currently, a personal watercraft dock and launch area is located at the north end of the beach and a fishing pier is located in the central part of the beach. In addition, NYSOPRHP is evaluating the opportunity to enhance an informal windsurfing launch area at the southern end of the beach. These areas are shown on **Figure 1-2**.

Parcel 2 is a small rectangular area consisting mostly of underwater lands and a narrow strip of land at the extreme southern boundary. Currently NYSOPRHP has no plans to develop this land to foster or encourage its use by the public. Most of the land mass appears to have been constructed through fill deposition over the past 50 plus years.

Parcel 3 represents a northern, non-contiguous parcel utilized as a maintenance shop and yard. NYSOPRHP proposes to continue using this parcel for similar purposes. This parcel has been historically located between two large manufacturing and warehousing operations and surrounded by numerous underground storage tanks. One active underground storage tank is also located on this parcel.

Site History

The site geology in the former confined disposal facility area where the recreational improvements are to be constructed consists of urban land as mapped by the Erie County Soil Survey. Urban land is a term that can apply to landfills that have not been built upon or covered with asphalt. As evidenced by previous investigations described below, the site is generally underlain by construction and demolition debris including wood, slag, concrete and brick; dredged sediments; miscellaneous excavation debris; buried trees that washed up on shore and general excess soil fill.

Based on recent field investigations, the upper 5 to 8 feet is composed primarily of reddish-brown silty clay with intermixed gravel, brick, wood, steel and other debris. A thick layer of fine grained, gray to black dredge sediments varying in thickness of between 15 to 25 feet is found below. These sediments were deposited in this area when it functioned as a confined disposal facility for the Army Corps of Engineers. These dredge sediments are underlain by very soft fine-grained lake sediments that extend to bedrock which occurs at a depth of approximately 70-80 feet.

The soil stratigraphy underlying the portion of the site known as Gallagher Beach, further south in the vicinity of the grassy knoll, and within parcels 2 and 3 is not known at this time. General subsurface stratigraphy and soil conditions will be examined within each of these parcels during this

investigation.

The entire site (all 3 parcels) presently above mean lake level consists of "made land". Over the past 150 years the shoreline from the Buffalo River on the north, southward to past the site has been constructed with the shoreline moving anywhere from several hundred to over 1000 feet westward through the deposition of fill materials, dredged sediments and other spoil.

Parcel 1 - Dredged sediments were placed in the Buffalo Harbor Dike 1 (Small Boat Harbor) confined disposal facility (CDF) starting in 1967. Filling operations ceased after 1974 and ownership was transferred to the NFTA. NYSDEC records document that many of the materials disposed of at this site were contaminated with several priority pollutants. The site was originally on the NYSDEC's Registry of Inactive Hazardous Waste Disposal Sites. In the fall of 1986, the NFTA began filling the remaining capacity of the CDF for eventual use as a parking lot. In 1991, the site was removed from the Registry of inactive hazardous waste disposal sites because of the information gathered to date and the samples submitted for analysis did not meet criteria for hazardous waste according to 6NYCRR part 371.

The history and environmental conditions and concerns of other portions of the site to the north and south of this disposal area are not as well documented. However, the Sanborn maps indicate that a filling station with multiple gas tanks was located immediately adjacent to the northeast corner of Parcel 1.

Parcel 1 is known to currently contain two active 6000-gallon USTs which are used at the gas dock and that were apparently installed in 1985 and 1990. A Phase I ESA prepared by Ecosystems Strategies in 2003 also identified building permits for two other gasoline USTs that were installed in 1955 and 1963 at the site.

Additional research at the City of Buffalo Building Department and Fire Prevention Bureau identified a total of five USTs associated with the gas dock. The five USTs include one of the two active 6000-gallon USTs, three 2000-gallon USTs that were noted as removed in 1973 and 1983, and one 4000 gallon UST that was noted as removed in 1986. Therefore, a total of six USTs (2 active and 4 closed/removed) are associated with the gas dock area. In addition, the Fire Department research identified one 10,000 gallon diesel UST that was installed in the 1970s in the area of the windsurfing access parking lot.

Parcel 2 – Parcel 2 consists primarily of water rights, however, a narrow strip of land area is included on the south and east borders of the lake within this parcel. A former auto repair shop with a large footprint operated immediately south of this area based on historical Sanborn map information. The Lehigh Portland Cement (later Saint Lawrence) Company was historically located south and west of this auto repair shop. Air photos and Sanborn maps indicate

that the land within Parcel 2 was constructed over many years by successively filling the lake. Based on a recent walkover reconnaissance of the property the fill forming the 20 foot high bluff on the western portion of this strip of land looks to be composed of cement production by products and fire brick with some intermixed metal scrap, wood and miscellaneous garbage.

Parcel 3 - To the north, a Phase I Environmental Site Assessment (ESA) was prepared in 1997 for the Niagara Frontier Transportation Authority (NFTA) for 901 Fuhrmann Boulevard (Port Terminal A). The subject site was formerly utilized as the Tops Markets Distribution Center and also has been utilized by numerous other distribution companies. Records indicate that the facility was originally constructed as the Ford Motor Company assembly plant from the 1930's through the 1950's. The site was formerly part of Lake Erie prior to filling of the area for the existing facility. This property lies contiguous to the small boat maintenance facility owned by the NFTA (Parcel 3). The Phase I report identified a number of potential environmental issues for the Port Terminal site including the record of at least 11 underground storage tanks (USTs) and two aboveground storage tanks (ASTs). Soil contamination was identified during the removal of some of these tanks. According to the Phase I document, all USTs associated with Port Terminal A have been removed.

The 1940 Sanborn map indicates that Parcel 3 appears to be part of an automobile convoy loading yard. In addition, the Sanborn map shows multiple gas tanks located immediately adjacent to the south boundary of Parcel 3. The historical information indicates that a boiler house used to exist on the boat maintenance facility parcel based on the 1925-1951 Sanborn map. An oil house also appears on the map immediately to the west of the parcel. The Phase I ESA prepared by Ecosystems Strategies in 2003 identified an active 6000 gallon UST on the boat maintenance facility parcel (Parcel 3).

Additional research at the City of Buffalo Building Department and Fire Prevention Bureau identified a total of two USTs associated with the maintenance area proposed for NYSOPRHP purchase. The two USTs include the active 6000-gallon USTs and a 3000-gallon UST that was noted as removed in 1985.

The additional research also identified 7 other USTs which were formerly located on the adjacent NFTA property to the north and west of Parcel 3 that have since been removed. The closest of the USTs was approximately 230 feet from Parcel 3. It is unlikely that the petroleum contamination, if present, has migrated from these former USTs to Parcel 3, however, the scope of the sampling plan will allow for inspection of the perimeter soils through soil borings.

1.1.2 *Previous Investigations*

Numerous field investigations have been conducted over the years on the area

of Parcel 1 identified as the former US Army COE confined disposal facility and Gallagher Beach. Environmental field investigations conducted in other areas of Parcel 1 and for Parcels 2 and 3 have not been identified.

A brief summary of some of these previous environmental investigations is found below. Watts Engineers conducted three rounds of investigations on behalf of the NYSOPRHP between July 2004 and January 2005. The work was requested based on the findings of a Phase I Environmental Site Assessment prepared by Ecosystems Strategies Inc. (Ecosystems) dated April 2003 and the knowledge that solid waste and contamination is present at the site within the confined disposal facility. Additional information will be reviewed and added by reference for use in the Remedial Alternatives Report.

NYSDOT Soil Boring/Piezometer Installation Program (September 2005)

As part of the New York State Department of Transportation (NYSDOT) Southtowns Connector project (PIN 5044.01.121) design, geotechnical and/or environmental borings were advanced at 36 locations from April through June 2005. Of the 36 borings, 9 were in the vicinity of the proposed Buffalo Harbor State Park. In addition, piezometers (wells) were installed at 2 of the 9 closest borings. The locations where these borings and piezometers were completed are shown on **Figure 2-1 – Field Investigation Plan**.

Most of the borings were drilled to bedrock and cores of bedrock were collected. The depth to bedrock ranged from 61 to 77 feet below ground surface in the 11 nearby borings. Fill was generally present in the upper reaches (5 to 25 feet) with generally fine grained soils (clay, silt, and sand) below. A thick (35-40 feet) stratum of very soft silty clay with a "peanut butter-like" consistency was generally present starting at approximately 30-35 feet.

No hazardous wastes were identified through the sampling program, however, semi-volatile organics and metals were identified in the soils that were above the NYSDOT TAGM 4046 guidance standards. In addition, many volatile organics, pesticides, dioxins, and furans were identified in the soils and groundwater at concentrations below the TAGM guidance standards.

Watts Engineers (July 2004 through January 2005)

Watts Engineers conducted three rounds of field investigations over this period. The objective was to collect surface soil, subsurface soil and deep subsurface soil samples from across the site to determine sequence of fill units and the types of compounds present in each and their concentrations. Samples were collected by a variety of means including using hand augers, conventional drilling rig with hollow stem augers, and via backhoe test pits.

The first investigation was conducted on July 15th, 2004, and involved the excavation of four test pits and the collection of six (6) soil samples from Parcel 1. Two (2) surface, two (2) shallow subsurface and two (2) deep subsurface soils samples were collected.

The second investigation was conducted on September 30th, 2004, and involved the collection of thirty (30) soil samples using manual methods from across Parcel 1. Twenty-four (24) of the samples were collected from within the proposed central rectangular recreation area. Of the twenty-four (24) samples, twenty (20) were collected from surface soils and four (4) were collected to represent shallow subsurface samples. The remaining samples were collected as follows: three (3) surface samples from the beach area, one (1) shallow subsurface sample from the grassy knoll south of Gallagher Beach and two (2) surface samples from the area near the start of the access path to the proposed lookout point.

The third round of investigations was conducted on December 20, 2004. Two borings were completed by conventional drilling methods using hollow stem augers and continuous split spoon sampling. Three (3) deep subsurface samples were collected for lab analysis.

The three investigations concluded with the collection of 39 soil samples. Of this total, 27 were surface soil samples (collected from 0 to 6 inches), 7 samples were subsurface samples (collected from 6 to 36 inches) and 5 samples were deep subsurface samples (collected from 4 to 20 feet). No groundwater or sediment samples were collected. The location where these samples were collected is shown in **Figure 2-1**.

Laboratory test results show in general that the number and concentration of both organic and inorganic contaminants increases with depth. Contaminants identified in the soil and fill include:

- Volatile organics – benzene, methycyclohexane, xylenes, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene and 1,2,4-trichlorobenzene;
- Semi-volatile organics – naphthalene, 2-methylnaphthalene, acenaphthene, dibenzofuran, anthracene, phenanthrene, fluoranthene, fluorene, dibenzo(a,h)anthracene, pyrene, benzo(a)pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perlyene and 2-methylnaphthalene;
- PCBs;
- Pesticides – 4,4-DDT, 4,4-DDD, 4,4-DDE, aldrin, dieldrin, alpha-BHC, beta-BHC, delta-BHC, endrin, endrin aldehyde, endrin ketone, endosulfan sulfate, endosulfan I, endosulfan II, heptachlor, heptachlor epoxide, methoxychlor; and,

- Inorganics - arsenic, beryllium, cadmium, chromium, copper, cyanide, iron, magnesium, mercury, nickel, and zinc (other inorganic compounds were detected but not at elevated concentrations)

Most compounds were detected at low concentrations with a few semi-volatile organics and inorganics exceeding NYSDEC recommended soil cleanup objectives as defined in Technical and Administrative Guidance Memorandum (TAGM) No. 4046. In addition, a few volatile organics exceeded cleanup objectives, but exceedances were restricted to the dredged sediments found at depth from within the former confined disposal facility.

NYSDEC Letter to NFTA (1991)

A letter received on November 21, 1991 by the NFTA states that based on the information available, the NYSDEC has not identified any hazardous wastes at the site. As a result, the NYSDEC will remove the site from the Registry of Inactive Hazardous Waste Disposal Sites.

Army Corps of Engineers Investigations and Assessments (1987-1988)

In a letter dated received July 18, 1988 from the Army COE to the NFTA, the COE responds with regards to questions on contaminant mobility and the long-term management of the confined disposal facility. The letter summarizes that the results of considerable testing and data evaluation at the site indicates that no contaminants which would be considered harmful to man or the aquatic environment are leaking from this containment area at unacceptable levels. They further state that the sediments do no exhibit the characteristic of TCLP toxicity though it appears only three samples were analyzed. They concluded hat the primary force for discharges from the confined disposal facility are due to surface water infiltration and that capping the area with low permeability soils will enhance surface runoff.

NYSDEC Letter to NFTA (July 1, 1987)

The NYSDEC re-states an apparent earlier position that they do want any excavation into the existing containment wall dike. They also identify the placement of excavation spoil from the Pilot Field construction project and note that some of the fill being brought to the site is not "clean" and contains bricks, stone, asphalt and other non-soil materials. They conclude by stating that "drainage should be diverted outside the containment area to prevent dissolution and migration of the contaminants from the containment area into the Small Boat Harbor or into the outer harbor".

NYSDOH Letter to NYSDEC (May 4, 1987)

Assessment of available data by the New York State Department of Health

(NYSDOH) Office of Public Health in a letter dated May 4, 1987, concluded that while capping the site followed by construction of an asphalt parking lot would effectively reduce infiltration and surface contact, it would not prevent substances from reaching surface waters or shoreline areas. This could therefore fall short in preventing adverse health and environmental affects and have a compression effect counterproductive to the prevention of lateral migration of contaminants and likely increase the potential for human exposure to these compounds.

NYSDEC Letter to NFTA (April 17, 1987)

In this letter the NYSDEC essentially advises the NFTA that filling of the disposal area is a "continuing concern relative to its impact on possible future remediation, water quality, and public concern". They go on to state that "this Department does not now have sufficient information to cause this operation to cease, and filling continues to be done solely at NFTA's risk". The NYSDEC concludes that long term use of the diked disposal area should wait further studies and any Department approved remediation plans.

Environmental Study Niagara Frontier Transportation Authority Diked Disposal Area, Buffalo, New York – Empire Soils Investigations (February 1987)

According to this report the diked disposal area was used by the Army Corps of Engineers from 1967 to 1979 for the placement of dredged materials from the Buffalo Harbor. The investigations included the installation of thirteen (13) soil borings completed as monitoring wells/piezomenters to depths varying from 10 to 28 feet below existing grade. Nine (9) surface soil samples (composited from four locations each), nine (9) subsurface soil samples, nine (9) well and four (4) piezometer groundwater samples, one (1) lake water sample and one (1) ponded water sample were collected for laboratory analysis. Samples were analyzed for priority pollutants, pesticides, volatile organics, extractable organics, and inorganic priority pollutants. In addition, electromagnetic (EM) conductivity and magnetometer surveys were conducted across the area.

Investigations identified various concentrations of heavy metals, pesticides, and both semi-volatile and volatile organics throughout the site. Groundwater samples contained pesticides (endosulfan I, endosulfan II, dieldrin and hexachlorocyclohexane [BHC]), volatile organics (benzene, toluene, chlorobenzene and 1,2-dichlorobenzene), semi-volatile organics (naphthalene, 2,4-dinitrophenol, and benzo(a) anthracene) and inorganics (lead, arsenic, chromium) at elevated concentrations 10 times the historical guidance criteria. Soil sample analysis identified pesticides, PCBs, volatile and semi-volatile organics and inorganics but mentioned that there were no regulatory or guidance criteria with which to compare the soil concentrations to at that time.

In addition, the consultants were unable to establish a strong correlation between the contaminants observed in the surface soils and subsurface boring soils, or between the soil and groundwater results identified by laboratory analysis.

The Niagara River Toxics Committee (October 1984)

Investigations conducted in the early 1980's at the Small Boat Harbor containment site included the collection of surface and subsurface water samples. Lab results indicated the presence of a variety of inorganics in addition to a number of organics including benzene, chlorobenzene, ethylbenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, xylene and n-nitrosodiphenylamine were found in the subsurface water samples. No organics and only a few inorganic compounds at very low concentration were found in the surface water sample.

1.2 Site Investigation Scope-of-Work

The following section of this *Site Investigation Work Plan* provides a task-by-task description of the investigation proposed for the Buffalo Harbor State Park Site. In this section, the major components of the project are summarized. Major tasks included in this work assignment include:

- Review existing background data including NYSDEC and other agency files and discussions with appropriate personnel.
- Work plan development including Health and Safety Plan **(Appendix A)** and Site Specific Quality Assurance Project Plan **(Appendix B).**
- Field Work - Site investigation (including soil borings, monitoring well installation and soil, sediment and groundwater sampling).
- Site Investigation Report, and
- Remedial Alternatives Report.

The objectives of the Site Investigation Work Plan include:

- Assess the overall environmental liability for the parcels involved in the land transfer from the NFTA to the NYSDEC.
- Further define the extent and magnitude of possible contamination throughout the three parcels especially of the surface soils across the recreational areas of the site. Also identify contamination where deeper excavations may occur for the possible splash park water storage tank, sanitary lift station(s), building foundations and utilities. Analyze the soil samples for constituents including inorganics, volatile and semi-volatile organics and pesticides/PCBs.
- Install up to eight (8) new groundwater monitoring wells. The exact location and final number of wells will be determined in the field, however, at this time one to three wells are proposed for Parcel 3 and none for Parcel

2. The remaining wells will be installed in the main recreation area proposed for Parcel 1. Watts will collect two rounds of groundwater samples from each of the wells. The lab will analyze the groundwater samples for inorganics, volatile and semi-volatile organics and pesticides/PCBs. The groundwater results from this investigation will provide information on the current condition of the groundwater quality.

- Collect additional sediment, surface soil and subsurface soil samples from a variety of locations across the three parcels. Sediment and surface soil sample locations will be collected as indicated on **Figure 2-1**. Collection of subsurface samples will be dependent upon the findings of the borehole investigation and appearance of subsurface soils.
- Survey the soil sampling locations and monitoring wells.
- Determine if deed/activity/development restrictions will be placed on the property limiting the use of the site.
- Evaluate viable remedial alternatives. Alternatives will be identified in cooperation with the NYSDEC.
- Based on the new data obtained from the above investigation and the preferred alternative, complete a design program to implement the remedy. The cost estimate associated with the design shall be determined after the alternative has been selected. All components of the design must be in conformance with the New York State laws, rules, regulations, and guidelines **(not a part of this work assignment)**.
- Determine how a long-term monitoring program will be implemented to monitor the effectiveness of the remedy.

2.0 MAJOR TASKS AND SUBTASKS

This section describes the major tasks associated with the Site Investigation Work Plan for the Buffalo Harbor State Park Site. These tasks include Site Investigation Work Plan development; Site Characterization; and Remedial Alternatives Report. Remedial Design plans will be developed in the future based upon the remedy selected by NYSOPRHP in consultation with the NYSDEC for the site.

2.1 Task 1 – Site Investigation Work Plan Development

This Work Plan includes the following elements:

- Description of tasks and subtasks associated with the site investigation and remedial alternatives report.
- Level of effort and budget estimates for performing the Site Characterization field work, Site Investigation Report, and Remedial Alternatives Report tasks.
- Preliminary project schedule, including milestones and deliverables.
- Project staffing plan.
- Identification of work items to be subcontracted.

Budget Assumptions

- All relevant and available site information is included in the documents provided by the NYSDEC and NYSOPRHP.
- Watts Engineers has assumed that citizen's participation activities or plan are not required at this time. If required by the NYSDEC and requested by NYSOPRHP, Watts Engineers will develop this plan and include it as an appendix in this work plan prior to the initiation of field activities.

Deliverables

- *Site Investigation Work Plan* (draft and final).
- *Site Investigation Report* (draft and final).
- *Remedial Alternatives Report* (draft and final).

Eight copies (plus one electronic copy) of each report, draft and final will be provided to the NYSOPRHP for distribution to the parties identified under item IX – Communications found in the "Agreement".

2.2 Task 2 – Site Characterization

In general all field activities shall follow Watts Engineers Environmental Sampling Protocols and Procedures as described in Chapter 6 of Watts Engineers Technical Procedures Manual. A copy of these protocols and procedures has been attached as **Appendix C**. All field activities are expected to be conducted by personnel wearing Level D personal protective equipment (PPE). However, field team members will

maintain Level C respiratory protection on site, should the need for its use arise.

2.2.1 *Subtask: Soils Investigation and Sampling*

Description of Work

The Remedial Investigation of the proposed Buffalo Harbor State Park will include soil borings, qualitative soil-gas survey of returned soils for volatile organic vapors, and soil/sediment sampling. Previous investigation results indicate that various volatile organic compounds, semi-volatile organic compounds, and inorganic metals are present above the New York State Department of Environmental Conservation recommended soil clean up levels. However, elevated levels of volatile organic compounds were previously only detected within the dredge sediments present in the deeper subsurface soils based on Watts' earlier investigations.

The following approach will be used to evaluate the extent of soil contamination present at the site:

Parcel 1:

Surface Soil Samples

- A surface soil sampling program will take place throughout the proposed recreational green-space locations on Parcel 1. Approximately twenty-three (23) locations represented by hollow triangles will be designated by field personnel for the surface soil sample locations. Each surface soil sample will be collected from a depth interval of approximately 0-3 inches.

  Twelve (12) of the locations (SS-1 through SS-12) will be in the area where the playground, splash park and passive recreation area will be constructed (see **Figure 2-1**) in the area of the former confined disposal facility.

  Eleven (11) surface soil samples (SS-13 through SS-23) will be collected from the manicured lawn areas across Parcel 1 essentially outside the limits of the confined disposal facility. Three (3) of the eleven will be collected from the triangular shaped parcel at the extreme southern end of the beach at discrete sample locations. The remaining eight (8) will be composite samples collected from manicured lawn areas, proposed access paths, or overlook areas. The composite samples will be composed from two or three locations as identified on **Figure 2-1**.

  Each of these samples will be collected manually from the upper three inches of soil using a soil (hand) auger or trowel to represent

those contaminants and their concentrations found in the soils that will be in direct contact with the public.

Sediment Samples

- Seven (7) sediment samples (represented by SD-1 through SD-7 and shown by the hollow square symbols on **Figure 2-1**) will be collected in the vicinity of Gallagher Beach. Two (2) samples will be collected from the existing personal watercraft launch ramp. Two (2) other samples will be collected at the other end of the beach where a non-watercraft/windsurfing access area is proposed. The remaining three (3) samples of sediment will be collected from the central beach area. All the sediment samples will be collected from the beach area either from within the water or the immediately adjacent beach to represent those sediments that the public is most likely to be in contact with.

Soil Borings

- Approximately 24 locations will be designated by field personnel for the deeper soil boring (SB-1 through SB-24) locations throughout Parcel 1. The soil boring survey will include the north end of the parcel due to the adjacent former gas station, the linear parking lot adjacent to the main marina and boat launch, and additional borings within the primary recreation area.

  Each soil boring will be advanced to a depth of approximately 10 feet. Deeper soils will only be examined at the location where the monitoring wells will be installed. At each boring location, the soils will be screened for VOCs, visual evidence of contamination (i.e. staining, color, consistency, NAPL, etc.), olfactory evidence of contamination, and soil description. Watts Engineers will attempt to develop a identification of the depth to the interface between the underlying dredge sediments and the overlying soil/fill unit across the site. The results of this work will be documented in the investigation report.

- Up to three (3) soil samples will be collected during the soil boring investigation from the recreation area collected from a depth of between 1 to 6 feet. The intention of these samples will be to represent the conditions of the soil at a location and depth where the water storage tank, sewage lift station(s), building foundations, and utilities will require excavation of these subsurface soils to be constructed. These samples will be used to determine the likely restrictions with regards to soil handling and disposal.

- Up to three (3) additional soil samples will be collected from across the site if evidence of contamination, discoloration, or strange odors are identified.

- One (1) soil sample will potentially be collected, if warranted, based on the results of the field investigation at the north end of the parcel (due to the adjacent former gas station). A soil sample will be collected if the field investigation of the soil borings identifies evidence of soil contamination (e.g. PID readings, staining, odors).

- All completed boreholes will be backfilled with the drilling spoil to the ground surface except for areas in pavement which shall be completed with asphalt patch or concrete mix.

Monitoring Well Installation

- See **Section 2.2.2**. Up to five (5) monitoring wells (MW-1 through MW-5 see **Figure 2-1**) will be installed within the confined disposal facility. Monitoring wells will be installed to a depth of 20 feet below existing grade with 10 foot slotted screen. Each will be completed with 3-foot riser stickups or flush mount depending upon their location.

  One deep soil sample (> 10 feet) will be collected during monitoring well installation from each well location using conventional drilling techniques for a total of up to five (5) samples. These samples will be collected to represent the deeper dredge sediments.

Site Survey

- Once soil sampling, soil boring investigation and groundwater well installation is completed, the locations will be surveyed.

Lab Analysis

- Each of the collected samples will be analyzed for SW-846 Target Compound List (TCL) volatiles, semi-volatiles, pesticides, PCBs, and Target Analyte List (TAL) inorganics plus cyanide. No herbicides were detected in Watts Engineers previous investigations and, therefore, this suite of compounds has been eliminated from additional testing. If a soil sample is collected as a result of the three soil borings drilled at the north end of the parcel (due to the adjacent former gas station), analysis of that sample will not include pesticides or cyanide.

Parcel 2:

Soil Borings

- Approximately four (4) locations will be designated by field personnel for the deeper soil borings (SB-39 through SB-42). The soil boring survey will be conducted using a track mounted Geoprobe rig to investigate subsurface soil conditions along the beach and determine if contaminant migration from the former auto repair facility is occurring onto this parcel.

  Each soil boring will be advanced to a depth of approximately 10 feet or until refusal occurs. At each boring location, the soils will be screened for VOCs, visual evidence of contamination (i.e. staining, color, consistency, NAPL, etc.), olfactory evidence of contamination, and soil description. Up to four (4) soil samples will be collected during the soil boring investigation.

Sediment and Surface Soil Samples

- Approximately four (4) surface soil/sand locations will be sampled and composited to form two (2) surface soil samples (SS-24 and SS-25) representative of the land adjacent to the beach. In addition, two (2) sediment samples (SD-8 and SD-9) will be collected from the beach area. The sampling will be performed due to an adjacent former auto repair shop and large amount of fill material present across the area.

Lab Analysis

- Each of the collected samples will be analyzed for SW-846 Target Compound List (TCL) volatiles, semi-volatiles, pesticides, PCBs, and Target Analyte List (TAL) inorganics plus cyanide and for asbestos due to the vast quantities of fire brick and concrete by-products that make up the cliffs and beach area.

Parcel 3:

Soil Borings

- Approximately fourteen (14) locations will be designated by field personnel for the deeper soil boring (SB-25 through SB-38) locations throughout Parcel 3. A soil boring survey will be performed throughout the parcel due to the multiple former UST locations adjacent to the south of the site, on the north and west due to the former Ford Plant and Oil house, and throughout the site due

to its former use as a boiler house by the Ford Plant as well as its unknown fill composition and former use as automobile storage and loading with potential USTs throughout.

Each soil boring will be advanced to a depth of approximately 10 feet. At each boring location, the soils will be screened for VOCs, visual evidence of contamination (i.e. staining, color, consistency, NAPL, etc.), olfactory evidence of contamination, and soil description.

- Up to seven (7) soil samples will be collected for analysis based upon field inspection of the boreholes (e.g. staining, odor, high PID readings). Each of the collected samples will be analyzed for SW-846 Target Compound List (TCL) volatiles, semi-volatiles, PCBs, and Target Analyte List (TAL) inorganics.

- All completed boreholes will be backfilled with drilling spoil to the ground surface except for areas in pavement which shall be completed with asphalt patch or concrete mix.

Monitoring Well Installation

- See **Section 2.2.2**. Up to three (3) monitoring wells (MW-6 through MW-8, see **Figure 2-1**) will be installed within this parcel. Monitoring wells will be installed to a depth of 20 feet below existing grade with 10 foot slotted screen. Each will be completed with 3-foot riser stickups or flush mount depending upon their location.

  One deep soil sample (> 10 feet) will be collected during monitoring well installation from each well location using conventional drilling techniques for a total of up to three (3) samples. These samples will be collected to represent the deeper fill sediments in this area that has previously not been characterized.

Site Survey

- Once soil sampling, soil boring investigation and groundwater well installation is completed, the locations will be surveyed.

Lab Analysis

- Each of the collected samples will be analyzed for SW-846 Target Compound List (TCL) volatiles, semi-volatiles, pesticides, PCBs, and Target Analyte List (TAL) inorganics plus cyanide. No

herbicides were detected in Watts Engineers previous investigations and, therefore, this suite of compounds has been eliminated from additional testing. If a soil sample is collected as a result of the soil boring survey at the north end of the parcel (due to the adjacent former gas station), analysis of that sample will not include pesticides or cyanide.

Budget Assumptions

- No more than two Geoprobe® mobilizations will be required to conduct the "direct-push" borehole investigation. One for the track rig and one for a tire mounted unit.
- Approximately forty-two (42) Geoprobe boreholes will be completed. Drilling production rate is approximately 8 borings per day averaging 10 feet deep working 10 hours drilling [Assume 5 to 6 days total for the Geoprobe investigation].
- Up to nineteen (19) soil samples will be collected from the forty-two (42) borings at locations where indications of contamination are identified are identified in the field or to confirm clean subsurface soil conditions.
- Approximately twenty-five (25) surface soil samples will be collected [Assume sampling will take 2 days].
- Approximately nine (9) sediment samples will be collected [Assume sampling will take 1 day].
- Additional samples will be analyzed to meet investigation QC requirements including field duplicates (1 per 20), matrix spike samples (1 per 20), matrix spike duplicates (1 per 20), matrix spike blanks (1 per 20), trip blanks (1 per 20) and field (equipment rinsate, 1 per 20) blanks. All samples will be analyzed for TCL VOAs, SVOAs, pesticides, PCBs and TAL inorganics plus cyanide except for the trip blanks which will be analyzed for volatile organics only. In addition, samples from Parcel 2 will be sampled for the presence of asbestos associated with the fire brick and cement by-product waste.
- Drill cuttings will be backfilled within the borehole from which the cuttings originated.
- Watts Engineers will provide site security only while onsite during the Site Investigation. Two of Watts staff will be present at all times on during the active investigation.
- Due to the limited duration of the investigation, no office trailer or office equipment will be available at the site (reference Agreement item IV – Entry upon Site).
- All drilling will be completed in Level D personal protective equipment (PPE).
- PPE will be double bagged and disposed of as non-hazardous waste.

2.2.2 *Subtask: Monitoring Well Installation and Sampling*

Description of Work

Field assessment of the seven previously installed groundwater wells at this site (shown on **Figure 2-1**) indicate that none of them can be used for this investigation as they have either been removed or are not in usable condition (i.e., seals are broken, wells are not secure, casing is damaged, wells have foreign materials in them).

For this investigation, a total of up to eight (8) new wells will be installed: five new monitoring wells are proposed to be drilled and installed in the playground area and up to three (3) others in the area of Parcel 3. The need for and the locations of the wells will be selected in the field based upon the results of the soil boring program. The new monitoring wells will be located so as to provide adequate coverage for purposes of evaluating groundwater flow direction, contaminant concentrations within the groundwater, and potential contaminant transport from the site.

Drilling will utilize 4¼-inch or 6¼-inch ID hollow stem augers following standard rotary methods. Continuous soil sampling using 2-inch outer diameter (OD) split-spoon samples will be conducted at each well boring location to characterize site soil stratigraphy. Each borehole will be advanced to a depth of 20 to 25 feet and completed as 2-inch diameter schedule 40, 0.10-inch machine-slotted polyvinyl chloride (PVC) wells. The wells will be constructed with 10 or 15-foot screened sections, threaded bottom plugs, and sufficient flush-threaded PVC riser pipe to extend to just below the surface or to a height of 2.0 feet above grade depending upon whether they are finished with flush-mount or stickup protective casings. A sand pack of Morie #0 sand (or equivalent size) will extend from the bottom of the screen to a height of 2 feet above the screen. It will be followed by a 2-feet thick seal of pelletized or granular bentonite. A 5% bentonite/cement grout mix will then be installed to grade. The bentonite will be allowed to hydrate at least 30 minutes prior to the installation of the grout mix. Well depths will be targeted to monitor the overburden groundwater levels field based on the elevation of the water table.

Wells will be completed with a locking cover and a 2-foot diameter concrete apron and anti-percolation pad. Locks will be provided for all monitoring wells. All wells will be keyed alike. One soil sample for chemical analysis will be collected from each well from soil that represents Buffalo Harbor and Buffalo River dredge sediments and/orfill soils at depth. These soils will be collected from a depth of not less than 10 feet below current ground level.

Approximately one week after well installation, Watts Engineers will return to the site to develop each of the wells using a bailer. Prior to development or sampling, the static water level will be recorded to within 0.01 foot in each

well. The wells will be developed until pH, temperature and specific conductance are stable, and turbidity is 50 nephelometric turbidity units (NTUs) or less. If after significant development effort of at least 2 hours or five well volumes the development criteria have not stabilized, or the goal of 50 NTUs or less have not been met, Watts Engineers will document these conditions and proceed with groundwater sampling. All well development data will be recorded on a standard form found in Watts Engineers Technical Procedures Manual – Chapter 6. All purged water will be returned to the ground surface in proximity to the well allowed to infiltrate back into the formation.

Groundwater elevation measurements will be recorded to evaluate trends in water table elevations and direction of groundwater movement which is expected to be out from the center of the storage disposal area. Water level measurements will be collected with an electronic interface probe from all new wells after the completion and development of the new monitoring wells, and then again during each round of groundwater sampling. Water levels will be measured and recorded on a standard form found in Watts Engineers Technical Procedures Manual – Chapter 6.

Two rounds of groundwater samples will be collected from the newly installed monitoring wells to establish current conditions. The first round of samples will be collected a minimum of one week after the development of the new monitoring wells. A second round of samples will be collected three (3) months after the first set is collected. Prior to collecting the groundwater samples, the wells will be purged of three to five volumes the standing volume of water or until dry. All samples will be collected using dedicated disposable bailers for each well. The sample for TCL VOC analysis will be collected first. If 50 NTUs could not be obtained after well purging or if the water becomes cloudy during sampling, the water column in the well will be allowed to settle for no longer than 24 hours before sampling the metals portion. Upon returning to the well the turbidity will be measured again and recorded. No additional purging will be performed. Turbidity will be noted on the chain-of-custody documents. No field filtering will be performed.

Budget Assumptions

- One drill rig mobilization will be required.
- Assume up to eight (8) groundwater wells will be completed to a depth of 20 to 25 feet below grade [Assume 5 days total for groundwater well installation].
- Up to a total of eight (8) deep soil samples will be collected and submitted for chemical analysis during well installation (these samples were previously accounted for in Section **2.2.1**).
- Two rounds of groundwater sampling from the the wells will be conducted. Additional samples will be analyzed to meet

investigation QC requirements including one field duplicate (1 per 20), one matrix spike sample (1 per 20), one matrix spike duplicate (1 per 20), one matrix spike blanks (1 per 20), one trip blank (1 per 20), and one field (equipment rinsate) blank per sampling event. All samples will be analyzed for TCL VOAs, SVOAs, pesticides, PCBs and TAL inorganics plus cyanide except for the trip blanks which will be analyzed for volatile organics only.

- A total of three rounds of water level measurements will be collected from all wells, two during the course of the initial field activities and one during the subsequent sampling round.
- Watts Engineers will provide site security only while onsite during the interim remedial design investigation. Two of Watts Engineers staff will be present at all times on during the active investigation.
- Due to the limited duration of the investigation, no office trailer or office equipment will be available at the site (reference agreement item IV – Entry upon Site).
- All drilling will be completed in Level D personal protective equipment (PPE).
- PPE will be double bagged and disposed of as non-hazardous waste.

2.2.3 *Subtask: Hydraulic Testing*

Description of Work - Hydraulic Testing

Watts Engineers will measure the hydraulic properties of the aquifer in each of the monitoring wells. The in-situ permeability test will be conducted by evacuating from a well a sufficient volume of water or introducing a solid slug of known volume to create a potential hydraulic difference between the well and the surrounding aquifer. Water levels will be measured and recorded at specific time intervals on a standard form found in Watts Engineers Technical Procedures Manual – Chapter 6 for four hours or until the water level returns to the initial static water level, whichever occurs first. These measurements will monitor the rate of recovery which is a function of the hydraulic conductivity of the aquifer/fill material. All water level measurements will be recorded to the nearest hundredth of a foot. The water level probe will be cleaned between each monitoring well. Values for hydraulic conductivity will then be calculated using standard industry accepted methods.

Budget Assumptions

- Slug tests will be conducted in each of the new monitoring wells.

2.2.4 *Subtask: Site Survey*

Description of Work

A survey will be conducted to locate the soil boring locations and soil sampling points, monitoring wells, and other key site features. The existing site basemap (supplied by NYSOPRHP) will be updated with the new information. Vertical control will reference to the New York State Plane Coordinates, North American Vertical Datum of 1988 (NAVD 1988 - meters) and horizontal control will be referenced to the New York State Plane West, 1983 North American Datum (NAD 1983 -meters).

The site survey will be conducted at the completion of the field activities. The elevation of the monitoring well casings will be established to within +/- 0.01 feet (NAVD 88). A notch will be placed in all interior casings to provide the reference point for future groundwater elevation measurements.

All maps created during this project will be delivered to NYSOPRHP and NYSDEC in hard copy and in electronic file format. All surveying and mapping will be performed under the supervision of a New York State-licensed land surveyor.

Budget Assumptions

- The NYSOPRHP will obtain access agreements with the owner(s) of the site as identified by Watts Engineers, if necessary.

2.2.5 Subtask: Site Investigation Report

Description of Work

Upon completion of the Site Investigation field program and the receipt of analytical data, a report will be prepared which details the findings of the site investigation. The report will address:

- Site History/Background
- Summary of Previous Investigations
- Contamination Assessment
- Data gaps (if any)
- Data Quality Evaluation and submittal of DUSR
- Conclusions and Recommendations

Data generated during the investigation will be used to define the concentrations and extent of site contamination in subsurface soil and groundwater. The data generated from the investigation will be reduced to findings and provided to the NYSDEC and NYSDOH for review. The findings will be used to determine if additional investigations and data are required, or if sufficient data exists to initiate the Remedial Design Alternatives Report.

Watts Engineers will conduct a data quality evaluation for analytical data gathered as part of the site investigation. The laboratory selected for analysis of project samples will be certified under the New York State Department of Health Environmental Laboratory Accreditation Program (ELAP). A specialty subconsultant will be hired to perform a validation of laboratory data, sufficient to prepare a Data Usability Summary Report (DUSR). The DUSR will be developed from a full NYSDEC ASP Category B deliverables package. Upon validation, all sample results will be grouped by media (e.g. soil, groundwater) and tabulated.

Deliverables

- Site Investigation Report (draft and final)
- Data Usability Summary Report (final only)
- Eight (8) copies of the final *Site Investigation Report* will be submitted to NYSOPRHP to be forwarded to the NYSDEC and NYSDOH, as well as an electronic version of the report.
- Five (5) copies of the final DUSR will be submitted to NYSOPRHP to be forwarded to the NYSDEC and NYSDOH, as well as an electronic version of the report.

After the Site Investigation Report is finalized, a public informational meeting may be scheduled by the NYSDEC to explain the findings of the investigation to the public. The NYSDEC will organize and direct the meeting and NYSOPRHP and Watts Engineers personnel will attend the meeting to answer technical questions regarding methodologies and findings of the site investigation. Watts Engineers will supply visual aids (maps, slides, data sheets and photographs), as required, for the meeting.

Budget Assumptions

- The Watts Engineers Project Manager and SI Coordinator will attend one public meeting in Buffalo.

2.3 Task 3 – Remedial Alternatives Design Report

The results of the investigation will be used to develop the Remedial Alternatives Design Report for the various areas of the site and proposed park improvements. The report will be prepared to evaluate the applicability of appropriate remedial alternatives for each area. The report will be initiated by attending a scoping meeting at the NYSDEC offices in Buffalo, New York. The purpose of the meeting will be to discuss the remedial alternatives available to the site. Based upon the discussions at the meeting, Watts Engineers will prepare and submit to NYSDEC a letter summarizing the remedial alternatives to be considered for the site.

Following approval from the NYSDEC Project Manager, remedial alternatives agreed upon at the scoping meeting will be subjected to detailed analysis. The alternatives will be further refined or developed, if necessary, with respect to the volumes or areas of contaminated media to be addressed, the technologies to be used, any performance requirements associated with those technologies. A detailed analysis will be presented in narrative form, and will provide a basis for the final selection of the remedy. Specifically, the alternatives will be evaluated against the following criteria:

- Overall protection of human health and the environment.
- Compliance with SCGs.
- Reduction of toxicity, mobility and volume.
- Long-term effectiveness and permanence.
- Short-term impacts and effectiveness.
- Implementability and technical feasibility.
- Cost.

A comparative analysis of the alternatives against these criteria will also be presented. The report will conclude with a scoping or ranking of the alternatives and a recommendation of a specific remedy in consultation with NYSDEC, NYSDOH and NYSOPRHP.

Budget Assumptions

- One meeting in Buffalo to be attended by Watts Engineers project manager and IRM Design coordinator.
- Three alternatives will be considered including the No Action alternative for each area where changes/improvements are identified as part of the NYSOPRHP park plans.

Deliverables

- Eight copies (plus one electronic copy) of the *Remedial Alternatives Design Report*, draft and final will be provided to the NYSOPRHP for distribution to the parties identified under item IX – Communications found in the Agreement.

2.4 Task 4 - Plans and Specifications

The Remedial Design and required plans and specifications are not a component of this Work Assignment. The scope for this task will be determined after the Site Investigation Report and the Remedial Alternatives Design Report have been completed and approved by the NYSDEC and NYSDOH in consultation with NYSOPRHP and their park improvement plan.

3.0 PROJECT SCHEDULE

Table 3-1 presents the project schedule dates, milestone dates, and deliverable due dates. The schedule does not include any formal review periods for the NYSOPRHP.

TABLE 3-1
BUFFALO HARBOR STATE PARK SITE
PROJECT SCHEDULE AND MILESTONES

	WORK ELEMENT	DURATION (DAYS)	DATE
SITE INVESTIGATION WORK PLAN	Issuance of Work Assignment	Complete	
	Data Gathering, Meetings and Scoping	Complete	
	Prepare *Draft Site Investigation Work Plan*	Complete	
	Submit *Draft Site Investigation Work Plan*	May 30, 2006	
	NYSDEC Review of Draft Work Plan	TBD[1]	
	Prepare *Final Site Investigation Work Plan*	14	
	Submit *Final Site Investigation Work Plan*	0	
	NYSDEC Review of Final Work Plan	TBD[1]	
INVESTIGATION & REPORT	NYSDEC Issue of Notice-to-Proceed	0	
	Start – Site Investigation Field Work	30	
	Submit *Draft Site Investigation Report*	60	
	NYSDEC Review of Draft Site Investigation Report	TBD[1]	
	Submit *Final Site Investigation Report*	14	
REMEDIAL ALTERNATIVES DESIGN REPORT	Remedial Alternatives Scoping Meeting	0	
	Submit *Draft Remedial Alternatives Design Report (includes scoping letter)*	60	
	NYSDEC Comments on draft Remedial Alternatives Design Report	TBD[1]	
	Submit *Final Remedial Alternatives Design Report*	14	
	Alternative Selection/Record of Decision		

Notes:
[1] To be determined per the signed agreement with NYSDEC.

4.0 IDENTIFICATION OF AREAS OF WORK REQUIRING SUBCONTRACTING

As prime contractor, Watts Engineers will be responsible for coordinating all subcontractor activities. All subcontractors will be subject to approval by the NYOPRHP before award of the subcontracts. Watts Engineers will conduct all project activities not specifically designated to other subcontractors.

Watts Engineers has preliminarily identified the following tasks and portions of the work assignment that we propose to subcontract:

- Geoprobe®, Drilling and/or Excavation Services (includes soil boring and monitoring well installation services)
- Laboratory Analytical Services
- Site Survey Services
- Third Party Data Validation and Data Usability Evaluation
- Quantitative Risk Analysis (If Required – Not Included in Base Scope of Services)

5.0 STAFFING PLAN / KEY PERSONNEL

The proposed staffing plan, including key personnel and their responsibilities, is described below.

- Project Director (Ed Watts, P.E.) is the Watts Engineers corporate officer responsible for assuring the availability of resources, overall project performance, and representing Watts Engineers in all contractual matters with NYSOPRHP.
- Project Manager (Andrew Klimek, CHMM) will be responsible for technical and financial management of the project, and for overall coordination and review of component work activities. The Project Manager will serve as the initial and primary contact with NYSOPRHP throughout the project.
- Project Quality Assurance Officer/Project Health & Safety Officer (Justin Kellogg, QEP) will ensure that all project deliverables undergo a thorough QA review by senior staff members who are qualified and experienced in appropriate disciplines. He will also coordinate the development of the Health/Safety and QA/QC Plans, and will provide technical guidance and input to their implementation.
- Remedial Alternatives Design Coordinator (Michael Pratt, P.E.) will be responsible for overall coordination of all RD activities. He will be responsible for developing each of the alternatives and their cost estimates.

6.0 PROJECT COST

Watts Engineers estimate for each task is presented below.

TASK	COST (estimate)
Site Investigation Work Plan	$25,000.00
Site Investigation – Field Activities	
- Watts Labor	$25,000.00
- Drilling Contractor	$10,000.00
- Geoprobe Contractor	$6,000.00
- Laboratory Contractor	$65,000.00
- Surveyor	$7,500.00
Site Investigation Report	
- Watts Labor	$25,000.00
- Data Validation/Data Usability Summary Report	$12,500.00
Interim Remedial Measure Design Report	TBD
Total	

APPENDIX A -
HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

FOR THE

INTERIM REMEDIAL MEASURE WORK PLAN

FOR THE

PROPOSED BUFFALO HARBOR STATE PARK SITE
BUFFALO, ERIE COUNTY, NEW YORK

MAY 2006
(Version 2)

PREPARED FOR:

CANNON DESIGN
2170 WHITEHAVEN ROAD
GRAND ISLAND, NEW YORK 14072

ON BEHALF OF:

NEW YORK STATE OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION
WESTERN DISTRICT – NIAGARA FRONTIER REGION
P.O. BOX 1132
NIAGARA FALLS, NEW YORK 14303-0132

HEALTH AND SAFETY PLAN

FOR THE

INTERIM REMEDIAL MEASURE WORK PLAN

FOR THE

PROPOSED BUFFALO HARBOR STATE PARK SITE
BUFFALO, ERIE COUNTY, NEW YORK

PREPARED FOR:

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AND HISTORIC PRESERVATION
WESTERN DISTRICT – NIAGARA FRONTIER REGION
P.O. BOX 1132
NIAGARA FALLS, NEW YORK 14303-0132

MAY 2006
(Version 2)

PREPARED BY:
WATTS ENGINEERING & ARCHITECTURAL, P.C.
3826 MAIN STREET
BUFFALO, NEW YORK 14226

HEALTH AND SAFETY PLAN
FOR THE INTERIM REMEDIAL MEASURE WORK PLAN FOR THE
PROPOSED BUFFALO HARBOR STATE PARK SITE
CITY OF BUFFALO, ERIE COUNTY, NEW YORK

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1.0 INTRODUCTION

1.1 General

In accordance with Watts Engineering & Architecture, P.C. (Watts Engineers) policies and OSHA regulations, this Health and Safety Plan (HASP) describes specific health and safety practices and procedures to be followed during the Interim Remedial Measure Investigation of the proposed Buffalo Harbor State Park, located in the City of Buffalo, Erie County, New York. Watts Engineers will be conducting the project as a subconsultant to Cannon Design (CD). The New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP) has contracted with CD to perform architectural and engineering services.

This HASP covers Watts Engineers employees and the activities of Watts Engineers subcontractors and all other personnel on the site. This HASP presents information on known site health and safety hazards and includes the equipment, materials and procedures that will be used to eliminate or control these hazards and is based on an assessment of potential health and safety hazards at the site using available historical information. Environmental monitoring will be performed by Watts Engineers during the course of the investigation to provide real-time data for an on-going assessment of potential chemical hazards.

Watts Engineers personnel involved with the project, health and safety oversight, and/or general field assistance will be required to comply with this HASP. Tasks on this site will be completed using methods that meet the requirements set forth in the OSHA Health and Safety regulations contained in 29 CFR 1910 and 1926.

1.2 Organization

The Watts Engineers Project Manager, the Health and Safety Manager and the Site Health and Safety Officer (or his designee) identified below will determine and enforce compliance.

- PROJECT MANAGER:
  Name: Andrew Klimek, CHMM
  Telephone: (716) 836-1540

- HEALTH AND SAFETY MANAGER
  Name: Justin K. Kellogg, M.S., Q.E.P.
  Telephone: (716) 836-1540

- SITE HEALTH AND SAFETY OFFICER:
  Name: onsite Environmental Scientist
  Telephone: (716) 836-1540

The following roles have been defined for Watts Engineers project personnel:

Project Manager - The Project Manager has full responsibility for implementing and executing an effective program of employee protection and accident prevention. He may delegate authority to expedite and facilitate any application of the program.

Health and Safety Manager - The Health and Safety Manager serves as the administrator of the office health and safety program. He is responsible for ensuring that field personnel are properly trained, that they have medical clearance to wear respiratory protection (per 29 CFR Part 1910.134(b)(10)), and that they are properly trained in the selection, use, and maintenance of personnel protective equipment, including qualitative respirator fit testing.

Site Health and Safety Officer - The Watts Engineers Site Health and Safety Officer will be responsible for the implementation of this HASP for all employees at the site and for ensuring that monitoring is performed for the personal exposures of employees to hazardous substances contained in air, soil or water. This will consist of continuous real time measurements of organic vapors and the documentation of such data. As data is received and evaluated, Watts Engineers Health and Safety Officer will adapt this HASP to fit the current employee protection needs at the site. All affected employees will be informed of the ambient air monitoring measurements.

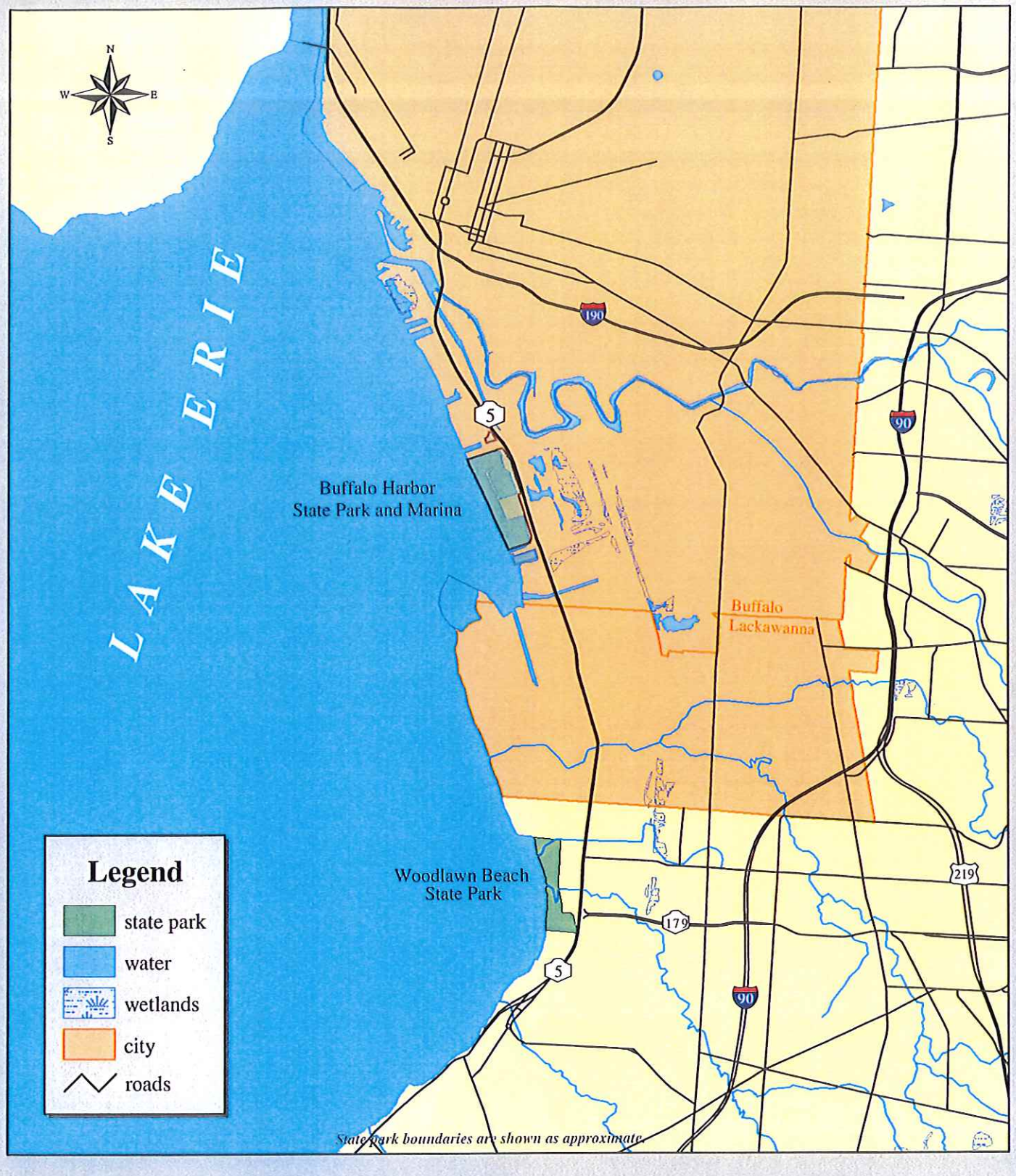
Any health and safety briefings required during the course of the project will be conducted by the Site Health and Safety Officer. Examples of briefings might include accident prevention, respirator refresher topics or current issues on site-specific conditions. The frequency of safety briefings will be based upon the potential hazards specific to the designated work tasks and any new information relative to such hazards which are discovered during the project. This individual will provide technical assistance to Watts Engineers project management on problems relating to industrial hygiene and work site safety.

When unsafe work conditions are identified, the Site Health and Safety Officer is authorized to order Watts Engineers, CD, and subcontractor personnel to stop work. Resolution of all on-site health and safety problems will be coordinated through the Project Manager with assistance from the Health and Safety Manager.

Watts Engineers personnel will be responsible for site security during normal work hours and the control of access of non-essential personnel into the work zone. The NYSOPRHP will be responsible for answering any questions from the general public regarding the on-site activities.

1.3 Background

The NYSOPRHP has assigned investigation services to Watts Engineers for the proposed Buffalo Harbor State Park site, City of Buffalo, Erie County, New York (**Figure 1**). The proposed Buffalo Harbor State Park is located in an area of historical fill activities and contains materials such as Buffalo River and Buffalo Harbor dredge



Buffalo Harbor State Park and Marina

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE

George E. Pataki, Governor

Berndatte Castro, Commissioner

Map produced by NYS OPRHP GIS unit, January 2004.

spoils and construction and demolition materials. This site at one time was listed on the NYSDEC Inactive Hazardous Waste Disposal Site (IHWDS) Registry as NYSDEC Site No. 915127. Numerous investigations performed over the past 20 years indicate that volatile and semi-volatile organic compounds, pesticides/PCB's, and inorganic (metal) compounds are found within the subsurface soils. According to miscellaneous NYSDEC file information, reviewed by others and contained in the Phase I Environmental Site Assessment Report, the NYSDEC apparently removed the site from the IHWDS registry in 1991 because no hazardous wastes, as defined in 6 NYCRR Part 371, were identified at the site.

Currently, NYSOPRHP intends to enter into an agreement with the NYSDEC to prepare an Interim Remedial Measure (IRM) Work Plan to be used as a guide for activities required to be performed within areas-of-concern of the proposed Buffalo Harbor State Park. The IRM Work Plan will describe the scope of the project and specific work to be performed. The plan will cover two greenspace areas that will be used recreationally by the public and where human contact with soils will likely occur. Depending upon the findings, NYSOPRHP will be required to complete Remedy Selection/Remedial Design of an acceptable Interim Remedial Measures to remove, treat, contain, and/or stabilize these areas-of-concern to prevent contaminant exposure or migration.

1.4 Interim Remedial Measure Investigation Objectives

Primary objectives of the investigation will be to gather high quality data to further delineate the extent of contamination, define the contaminants present within the subsurface soils and groundwater, and determine the potential human and environmental health risks associated with the proposed Buffalo Harbor State Park site.

1.5 Scope of Interim Remedial Measure Investigation Services

Watts Engineers personnel will be responsible for the coordination, oversight, and completion of all field services including borehole drilling, monitoring well installation, and health and safety monitoring. In addition, Watts Engineers will be responsible for the collection of groundwater and soil samples. The major activities to be completed during fieldwork include:

- Geoprobe soil survey
- Soil sampling
- Monitoring well installation
- Sampling of new monitoring wells
- Water level measurement
- Hydraulic conductivity test (slug test)
- Health and safety monitoring

2.0 HAZARD EVALUATION

2.1 Summary of Projected Risks

Due to the contaminants at the site, the possibility exists that workers will be exposed to hazardous substances during field activities (see Section 2.2). The principal points of exposure would be through direct contact with contaminated fill/soil and groundwater, and through the inhalation of contaminated particles or vapors. In addition, the use of drill rigs on-site will present conditions for potential physical injury to workers. Further, weather and climate may dictate heat and/or cold related hazards.

Although no work can be considered completely risk-free, logical and reasonable precautions will be implemented to provide an adequate level of protection for workers. The integration of medical evaluations, worker training relative to chemical hazards, safe work practices, proper personal protection, environmental monitoring, work zones and site control, appropriate decontamination procedures and contingency planning into the project approach will minimize the chance of unnecessary exposures and physical injuries.

2.2 Chemical Hazards

The sampling performed during previous investigations has provided information concerning the types of contaminants which are likely to be encountered during the remedial investigation. Table 2-1 identifies contaminants determined to be present at levels exceeding NYSDEC Technical Administrative Guidance Memorandum (TAGM) 4046 recommended clean-up levels. Potential contaminants include volatile organic compounds (VOCs) (benzene, chlorobenzene, 1,2-dichlorobenzene, 1,2,4-trichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and xylene), semi-volatile organic compounds (SVOCs) (benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)pyrene), and various inorganics (arsenic, beryllium, cadmium, calcium, chromium, copper, iron, magnesium, mercury, nickel, and zinc).

Additional contaminants, including pesticides, PCB's, and additional VOCs and SVOCs were detected at levels less than NYSDEC recommended clean-up levels and are not included within Table 2-1. For a detailed list of all contaminants detected at the proposed Buffalo Harbor State Park, please refer to the previous investigation reports. Table 2-1 also lists toxicity and exposure data for the "contaminants of concern". Additionally, Health Hazard Information Sheets can be found within Attachment 3. Brief descriptions of the toxicology of these materials and related health and safety guidance criteria were obtained from the following resources:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA)
- U.S. Department of Health and Human Services, Center for Disease Control (CDC), National Institute for Occupational Safety and Health (NIOSH)

- U.S. Department of Health and Human Services, National Institutes of Health (NIH), National Libraries of Medicine (NLM)

The use of proper respiratory equipment, as outlined in Section 7.0, will minimize the potential for exposure to airborne contamination. Further, exposure to contaminants through dermal and other routes will also be minimized through the use of protective clothing (Section 6.0), safe work practices (Section 5.0), and proper decontamination procedures (Section 10.0).

Table 2.1
Chemical Hazard Evaluation

Compound	CAS #	Exposure Limits (TWA)				Dermal Hazard (Y/N)	Route of Exposure	Acute Symptoms	Odor Threshold/ Description	MiniRae PID	
		OSHA PEL	NIOSH REL	ACGIH STEL	ACGIH TLV					Conversion Factor (10.6 eV lamp)	Ionization Energy (eV)
Volatiles											
Benzene	71-43-2	1 ppm	0.1 ppm	2.5 ppm	0.5 ppm	Y	Inh, Ing, Skin absorption, E/S	DIZZ, GD, HA, NAU, Drowsiness, IRR of E/S/URT/GI, Pulmonary edema, Convulsions	1.5 ppm Aromatic	0.53	9.25
Chlorobenzene	108-90-7	75 ppm	-	-	10 ppm	N	Inh, Ing, E/S	IRR of E/S/N, Drowsiness, HA, NAU, CNS depression	0.08 ppm Almond-like	0.40	9.06
1,2-Dichlorobenzene	95-50-1	50 ppm	50 ppm	50 ppm	25 ppm	N	Inh, Ing, Skin absorption, E/S	IRR of E/N, CGH, Drowsiness, NAU, V, Diarrhoea	0.02 ppm Pleasant, Aromatic	0.47	9.08
1,2,4-Trichlorobenzene	120-82-1	-	5 ppm	-	5 ppm	N	Inh, Ing, Skin absorption, E/S	IRR of E/S and mucous membrane, CGH, V	2.96 ppm Aromatic	0.46	9.04
1,3-Dichlorobenzene	541-73-1	-	-	-	-	N	Inh, Ing.	IRR of E/S, CGH, Drowsiness, NAU, Sore throat, V, Diarrhoea	-	-	-
1,4-Dichlorobenzene	106-46-7	75 ppm	Carcin	-	10 ppm	N	Inh, Ing, Skin absorption, E/S	IRR of E/S, Swelling of the eye, HA, NAU, V, Diarrhoea	0.12 ppm Mothball-like	-	8.98
Xylene (all isomers)	m- 108-38-3 o- 95-47-6 p- 106-42-3	100 ppm	100 ppm	150 ppm	100 ppm	N	Inh, Ing, Skin absorption, E/S	IRR of E/N/T, Drowsiness, DIZZ, HA, NAU	0.08 ppm Aromatic, sweet	0.43 0.59 0.45	8.56 8.56 8.44
Semi-volatiles											
Benzo(a)anthracene	56-55-3	-	-	-	-	-	Inh, Ing, S	-	-	N/A	N/A
Chrysene	65966-93-2	0.2 mg/m^3	0.1 mg/m^3	-	0.2 mg/m^3	N	Inh, E/S	Sneezing, CGH, IRR of E/S	-	N/A	N/A
Benzo(b)fluoranthene	205-99-2	-	-	-	-	-	Inh, S	-	-	N/A	N/A

Table 2.1
Chemical Hazard Evaluation

Compound	CAS #	Exposure Limits (TWA)				Dermal Hazard (Y/N)	Route of Exposure	Acute Symptoms	Odor Threshold/ Description	MiniRae PID	
		OSHA PEL	NIOSH REL	ACGIH STEL	ACGIH TLV					Conversion Factor (10.6 eV lamp)	Ionization Energy (eV)
Benzo(k)fluoranthene	207-08-9	-	-	-	-	-	Inh, S	-	-	N/A	N/A
Benzo(a)pyrene	50-32-8 65966-93-2	0.2 mg/m^3	0.1 mg/m^3		0.2 mg/m^3	N	Inh, E/S	Sneezing, CGH, IRR of E/S	-	N/A	N/A
Inorganic Metals											
Arsenic	7440-38-2	0.010 mg/m^3	0.002 mg/m^3	-	0.010 mg/m^3	N	Inh, Ing, Skin absorption, E/S	CGH, Sore throat, Diarrhoea, NAU, V, Unconciousness	Odorless solid	N/A	N/A
Beryllium	7440-41-7	0.002 mg/m^3	0.0005 mg/m^3	0.01 mg/m^3	0.002 mg/m^3	N	Inh, E/S	CGH, Shortness of breath, Sore throat, WK, IRR of E/S	Odorless solid	N/A	N/A
Cadmium	7440-43-9 1306-19-0	0.005 mg/m^3	Carcin	-	0.01 mg/m^3	N	Inh, Ing	CGH, Sore throat, HA, Diarrhoea, NAU, V, IRR of E/S	Odorless solid	N/A	N/A
Calcium	7440-70-2	-	-	-	-	-	-	IRR of E	-	N/A	N/A
Chromium	7440-47-3	0.1 mg/m^3	0.5 mg/m^3	-	0.01 mg/m^3	N	Inh, Ing, E/S	CGH, IRR of E/URT	Odorless solid	N/A	N/A
Copper	7440-50-8	1 mg/m^3	1 mg/m^3	-	1 mg/m^3	N	Inh, Ing, E/S	IRR of E/URT, CGH, difficulty breathing	Odorless solid	N/A	N/A
Iron	1309-37-1	10 mg/m^3	5 mg/m^3	-	5 mg/m^3	N	Inh	IRR of E, CGH	Odorless solis	N/A	N/A
Magnesium	1309-48-4	15 mg/m^3	-	-	10 mg/m^3	N	Inh, E/S	IRR of E/N, Metal fume fever, CGH, Chest pain, Diarrhoea	-	N/A	N/A
Mercury	7439-97-6	0.1 mg/m^3	0.1 mg/m^3	-	0.02 mg/m^3	Y	Inh, Ing, Skin absorption, E/S	IRR of E/S, CGH, Diarrhoea, NAU, Shortness of breath, V, Fever, Chest pain	Odorless liquid	N/A	N/A

Table 2.1
Chemical Hazard Evaluation

Compound	CAS #	Exposure Limits (TWA)				Dermal Hazard (Y/N)	Route of Exposure	Acute Symptoms	Odor Threshold/ Description	MiniRae PID	
		OSHA PEL	NIOSH REL	ACGIH STEL	ACGIH TLV					Conversion Factor (10.6 eV lamp)	Ionization Energy (eV)
Nickel	7440-02-0	1 mg/m^3	Carcin	-	0.1 mg/m^3	N	Inh, Ing, E/S	CGH, Shortness of breath	Odorless solid	N/A	N/A
Zinc	1314-13-2	5 mg/m^3	5 mg/m^3	10 mg/m^3	2 mg/m^3	N	Inh	Metal fume fever, muscle ache, NAU, Fever, CGH, WK, Metallic taste, HA, Blurred vision, Low back pain, V, Chest tightness	Odorless solid	N/A	N/A

KEY:

*	= known or suspected carcinogens	E/N/T	= Eyes/Nose/Throat	Ing	= Ingestion	PWP	= Poor Warning Properties
---	= Information not available	E/S	= Eyes/Skin	IRR	= Irritaion	URT	= Upper Respiratory Tract
PEL	= Permissible Exposure Limit	FA	= Fatigue	LFC	= Lowest Feasible Concentration	V	= Vomiting
REL	= Recommended Exposure Limit	F/CC	= Fibers per cubic centimeter	LOC	= Loss of Consciousness	WK	= Weakness
TLV	= Threshold Limit Value	GD	= Giddiness	mg/m^3	= Milligrams per cubic meter	SK	= Skin Notation
C	= Ceiling Limit	GI	= Gastrointestinal Tract	NAU	= Nausea	SP	= Slow Pulse
CGH	= Cough	HA	= Headaches	ppm	= parts per million	STEL	= Short Term Exposure Limit
CNS	= Central Nervous System	Inh	= Inhalation	DIZZ	= Dizziness	Carcin	= Carcinogen

2.3 Physical Hazards

Geoprobe survey, drill-rig operations, subsurface soil sampling, well/piezometer installation, hydraulic conductivity test (slug test), and groundwater monitoring at the proposed Buffalo Harbor State Park site may present the following physical hazards:

- The potential for physical injury associated with heavy construction equipment use, such as excavators, dump trucks, backhoes, drill rigs, geoprobe equipment, etc.
- The potential for noise associated with construction equipment use.
- The potential for cold stress to employees during the fall/winter months (see Section 8.2).
- The potential for heat stress to employees during the summer months (see Section 8.1).
- The potential for slip-and-fall injuries due to rough, uneven terrain.
- The potential for overhead obstructions and hazards.
- Potential for cuts and lacerations during the use of hand tools and mechanical equipment.
- The potential for inclement weather including lighting.
- The potential for encountering unmarked and/or energized utilities.
- The potential for animal and insect bites which may cause irritation, illness, or poisoning.
- The potential for fire and explosion.

3.0 MEDICAL SURVEILLANCE

Medical monitoring, including initial employment, annual and employment termination examinations are provided to Watts Engineers employees whose work may result in potential chemical exposure or present unusual physical demands. Medical evaluations are performed by an occupational physician designated by Watts Engineers. The medical evaluations are conducted according to the Watts Engineers policy and include an evaluation of the workers' ability to use respirator protective equipment (as per 29 CFR 1910). The examination includes:

- Occupational history;
- Medical history;
- Medical review;
- Medical certification of physical requirements (sight, hearing, pulmonary function, musculoskeletal, cardiovascular) for safe job performance; and
- Laboratory testing to include a complete blood count, white cell differential count, blood biochemistry and urinalysis.

The purposes of the medical evaluation is to: (1) determine fitness for duty on hazardous waste sites (such an evaluation is based upon the employee's occupational and medical history, a comprehensive physical examination and evaluation of the ability to work while wearing protective equipment); and (2) establish baseline medical data.

Supplemental examinations may be performed whenever there is an actual or suspected excessive exposure to chemical contaminants or upon experience of exposure symptoms, or following injuries or temperature stresses.

In conformance with OSHA regulations, Watts Engineers will maintain and preserve medical records for a period of 30 years following termination of employment. Employees have access to the results of medical testing and to full medical records and analyses.

The Watts Engineers Site Health and Safety Officer will be responsible for providing evidence of medical clearance for any Watts Engineers personnel (see Section 1.2).

4.0 EMPLOYEE TRAINING PROGRAM

All employees who may be exposed to hazardous substances, health hazards, or safety hazards are adequately trained prior to engaging in any on-site work activities. At a minimum, such training includes an initial 40-hour Hazardous Waste Site Worker Protection Course, an 8-hour Annual Refresher Course subsequent to the initial 40-hour training, and 3 days of actual field experience under the direct supervision of a trained, experienced supervisor (i.e., the branch Health and Safety Coordinator or his/her designee). This training is conducted by a qualified instructor and is specifically designed to meet the requirements of OSHA Standard 29 CFR 1910.120(e)(2). At a minimum, the initial 40-hour training course includes the following:

TOPICS

- OSHA/SARA/EPA/RCRA/HCS Requirements
- Decontamination of Personnel & Equipment
- Fire, Explosion & Accident Prevention
- Respiratory Protection Selection & Use
- Preparation of Health & Safety Plans
- Emergency Preparedness & Escape
- Protective Clothing Use & Selection
- Air Monitoring & Surveillance
- Work Practices to Minimize Risk
- Waste Site Safety
- Hazard Recognition
- Medical Surveillance
- Cold & Heat Stress
- Site Entry & Set-Up
- Permissible Exposure Limits
- Site Control & Work Zones
- Chemical & Physical Hazards
- Confined Space Entry

WORKSHOPS/EXERCISES

- Self-Contained Breathing Apparatus
- Air Monitoring Equipment Workshop
- Air Purifying Respirator Workshop
- Decontamination
- Qualitative/Quantitative Fit Test
- Level A/B Field Exercise
- Level B/C Field Exercise
- Air Tank Refilling Workshop

Records and certifications received from the course instructor documenting each employee's successful completion of the training identified above are maintained on file in Watts Engineers' office. Upon request, Watts Engineers will provide documentation of training for all their personnel who will be involved in on-site work activities.

Any employee who has not received adequate training and has been so certified is prohibited from engaging in on-site work activities that may involve exposure to hazardous substances, health hazards or safety hazards.

Periodic health and safety briefings will be conducted by Watts Engineers' Site Health and Safety Officer for Watts Engineers employees on an as-needed basis. Problems relative to respiratory protection, inclement weather, heat/cold stress or the interpretation of newly-available environmental monitoring data are examples of topics which might be covered during these briefings.

5.0 SAFE WORK PRACTICES

All Watts Engineers employees shall obey the following safety rules during on-site work activities conducted within the exclusion and support zones:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice which increases the probability of hand-to-mouth transfer of contaminated material is strictly prohibited;
- The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above;
- Any required respiratory protective equipment and clothing **must** be worn by all personnel going on-site. Excessive facial hair (i.e., beards, long mustaches or sideburns), which interferes with the satisfactory respirator-to-face seal is prohibited;
- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross contamination and need for decontamination;
- Medicine and alcohol can potentiate the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the Watts Engineers occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during site work activities;
- All personnel shall be familiar with standard operating safety procedures and additional instructions contained in this HASP;
- On-site personnel shall use the "buddy" system. No one may work alone, i.e., out of earshot or visual contact with other workers in the exclusion zone;
- Personnel and equipment in the contaminated area shall be minimized, consistent with effective site operations;
- All employees have the obligation to correct or report unsafe work conditions;
- Hard hats and safety boots must be worn at all times in the vicinity of the site. Hearing protection and safety glasses are also recommended when appropriate conditions exist;
- The presence of combustible gases should be checked before igniting any open flame (e.g., flame ionization detector ignition or other);
- Watts Engineers personnel shall be aware of slip and fall hazards associated with the site at all times;
- The drilling subcontractor will employ lockout/tagout procedures when the drill rig is not in operation (i.e., after normal work hours).

The recommended general safety practices for working around the drilling Subcontractor's equipment are as follows:

- Subcontractor's Duties:
    - The drilling Subcontractor is responsible for the condition of his equipment and its safe operation on the site. Watts Engineers personnel are responsible for their own safety when working around this equipment. The inspection will include a check for obvious

structural damage, loose nuts and bolts, loose or missing guards, cable guides or protective covers, fluid leaks, damaged hoses, cables, pressure gauges or pressure relief valves, and damaged drilling tools and equipment. The equipment should also have a fire extinguisher. The subcontractors are expected to conduct daily inspections of their equipment and report any potential problems to the Site Safety Technician. If the condition of the equipment is considered to be unsafe based on the Subcontractor's inspection, and/or the Site Safety Technician's inspection, have the Subcontractor make the necessary repairs prior to beginning work. If the Subcontractor refuses to fix the equipment or is not operating the equipment safely, the job site will be closed down and the Project Manager contacted for additional instructions;

- Drilling will not be initiated without first clearing underground services such as; gas, electricity, water, telephone, sewer, hydrogen, steam, and cable T.V;
- Drill rigs should not be operated within 20 feet of overhead wires. This distance may be increased if windy conditions are anticipated. The site should also be clear to ensure the project staff can move around the heavy machinery safely;
- Slippage is one of the most common causes of accidents around drill rigs. Drainage should be provided to divert mud and water away from the construction site;
- The Subcontractor should keep the construction site tidy. This will prevent personnel from tripping and will allow for fast emergency exit from the site;
- A drill rig must not be moved from site to site with the drill mast in the raised position;
- Proper lighting will be provided if drilling at night;
- Drilling will be discontinued during an electrical storm;
- The drilling subcontractor will employ lockout/tagout procedures when the drill rig is not in operation (i.e., after normal work hours).

- Watts Engineers' Duties:
  - Hard hats and safety boots must be worn at all times in the vicinity of the drill rig and/or backhoe. Hearing protection is also recommended. Safety glasses are necessary;
  - The presence of combustible gases should be checked before igniting any open flame (e.g., flame ionization detector ignition or other);
  - Watts Engineers personnel shall stand upwind of any drilling operation when not immediately involved in sampling/logging activities.

6.0 PERSONAL PROTECTIVE EQUIPMENT

6.1 Protection Levels

Personnel must wear protective equipment when work activities involve known or suspected atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with dermally active substances may occur. Full-face respirators will be used to protect the lungs, the gastro-intestinal tract and the eyes against air toxicants. Chemical-resistant clothing will be used to protect the skin from contact with skin-destructive and skin-absorbable chemicals. Good personal hygiene and safe work practices, as identified in Section 6.0, are also necessary to limit or prevent the ingestion of potentially harmful substances.

Based upon current information regarding the contaminants suspected to be present at the proposed Buffalo Harbor State Park site and the various tasks that are included in the project, the minimum required Levels of Protection shall be as identified in Table 6-1.

TABLE 6-1
REQUIRED LEVELS OF PROTECTION: *(1)*

Activity	*Respiratory**	*Clothing*	*Gloves*	*Boots*	*Other Modifications(2)*
Drill Boreholes	*C/D*	*T or PT*	*L or N*	*L or CO*	*Hard Hat, Respirator (if necessary), Safety Glasses, Hearing Protection, Safety Boots*
Subsurface Soil Sampling	*C/D*	*T or PT*	*L or N*	*L or CO*	*Hard Hat, Respirator (if necessary), Safety Glasses, Hearing Protection, Safety Boots*
Piezometer Installation	*C/D*	*T or PT*	*L or N*	*L or CO*	*Safety Glasses, Hard Hat, Safety Boots*
Collect Groundwater	*C/D*	*T or PT*	*L or N*	*L or CO*	*Safety Glasses, Hard Hat, Safety Boots*
Water Level Measurement	*C/D*	*T or PT*	*L or N*	*L or CO*	*Safety Glasses, Hard Hat, Safety Boots*
Other Intrusive Site Work	*C/D*	*T or PT*	*L or N*	*L or CO*	*Hard Hat, Respirator (if necessary), Safety Glasses, Hearing Protection, Safety Boots*
Non-Intrusive Site Work	*C/D*	—	—	—	*Safety Glasses, Hard Hat, Safety Boots*

Notes:

(1) T = Tyvek; PT = Polyethylene-coated Tyvek; L = Latex; N = Nitrile; CO = Construction Overboot

(2) At the discretion of the Site Health and Safety Officer, respirators will be donned whenever potentially contaminated airborne particulate (i.e., dust) are generated in significant amounts in the breathing zone.

** Respiratory protection shall correspond to guidelines presented in Section 8.2. The Level C requirement is an air-purifying cartridge respirator equipped with Organic Compound/Acid Gases/Dust cartridges.*

7.0 ENVIRONMENTAL MONITORING

7.1 General Approach to On-site Monitoring

Modifications to the level of protection established for Watts Engineers employees for each task will be based upon Watts Engineers Site Health and Safety Officer's professional interpretation of the measurements of the contaminants present in the work environment. Tasks and activities proposed for this site along with the estimated potential of exposure to contaminants known to be present in the groundwater and soil at the site have been used to determine the minimum required levels of personal protection described in Section 6.0. It is possible that ambient breathing zone concentrations exceed the permissible exposure limits (PEL) established by OSHA for the individual compounds (see Table 2-2). Respiratory and dermal protection may be modified (upgraded or downgraded) based upon real-time field monitoring data.

Contaminated soil and groundwater are most likely to be encountered during intrusive activities, such as excavation, borehole drilling, subsurface sampling, and groundwater sampling activities. The air monitoring program to be implemented will monitor volatile contaminants. A combustible gas meter and total organic vapor analyzer (OVA/PID) shall be utilized by the party responsible for monitoring to verify real time field conditions during drilling/soil sampling operations. Observed values will then be recorded and maintained as part of the permanent field record. Breathing zone monitoring with an OVA/PID will be performed continuously during drilling. Contaminant values which are in excess of established action levels appropriate for the prescribed level of protection will be immediately addressed. These action levels are given in Section 7.2 of this HASP

Monitoring instruments will be protected from surface contamination during use to allow for easy decontamination. When not in use, the monitoring instruments will be placed on plastic sheeting to avoid surface contact. Additional monitoring instruments may be required if the situations or conditions change.

Any split-spoon or Geoprobe™ samples which are collected will be surveyed with the OVA/PID as each sample is retrieved. These values will be recorded with the respective sample number and will assist in the determination of the adequacy of employee protective equipment. In addition, to minimize dermal contact with potentially contaminated fill/soils, long-handled spoons and knives shall be used during split-spoon sampling and examination of the soil-core sample.

7.2 Monitoring Action Levels

The OVA/PID or other appropriate instrument(s) will be used by Watts Engineers to monitor organic vapor concentrations as specified in the work plan. Methane gas will be monitored with the "combustible gas" option on the explosimeter or other appropriate instrument(s) in accordance with the HASP. Readings obtained in the breathing zone may be interpreted (with regard to other site conditions) as follows for on-site Watts Engineers personnel:

- Total atmospheric concentrations of unidentified vapors or gases ranging from 0 to 1 ppm on the OVA/PID - Continue Operations Under Level D (see Attachment 1).
- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings above 1ppm to 25 ppm on the OVA/PID (vapors not suspected of containing high levels of chemicals toxic to the skin) - Continue Operations Under Level C (see Attachment 1).
- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings 25 to 50 ppm above background on the OVA/PID - continue operations under Level B (see Attachment 1), re-evaluate and alter (if possible) Work Plan to achieve lower vapor concentrations.
- Total atmospheric concentrations of unidentified vapors or gases above 50 ppm on the OVA/PID - discontinue engineering operations and exit the work zone immediately.

The explosimeter will be used by Watts Engineers to monitor levels of both combustible gases and oxygen during drilling and/or test pit excavation activities. Action levels based on the instrument readings shall be as follows:

- Less than 10% LEL - Continue work in accordance with action levels for other instruments; monitor continuously for combustible atmospheres.
- Greater than 10% LEL - Evacuate area; eliminate ignition sources; reassess conditions.
- Less than 19.5% or greater than 22.0% oxygen - Evacuate area; eliminate ignition sources; reassess conditions.
- 19.5% to 22.0% oxygen - Continue work in accordance with action levels for other instruments.

Readings with the explosimeter and organic vapor analyzer will be recorded and documented in the field logbook. All instruments will be calibrated before use and the procedure will be documented in the field logbook.

8.0 HEAT/COLD STRESS MONITORING

8.1 Heat Stress Monitoring

Watts Engineers Site Health and Safety Officer or designee will be responsible for monitoring Watts Engineers employees for symptoms of heat stress. Personal protective equipment may place an employee at risk of developing heat stress, probably one of the most common (and potentially serious) illnesses encountered at hazardous waste disposal sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. Personal protective equipment may severely reduce the body's normal ability to maintain equilibrium (via evaporation, convection and radiation), and by its bulk and weight increases energy expenditure.

The signs and symptoms of heat stress are as follows:

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
    - muscle spasms
    - pain in the hands, feet and abdomen
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
    - pale, cool, moist skin
    - heavy sweating
    - dizziness
    - nausea
    - fainting
- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:
    - red, hot, usually dry skin
    - lack of or reduced perspiration
    - nausea
    - dizziness and confusion
    - strong, rapid pulse
    - coma

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70°F or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism.

Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 110 beats per minute. If the rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%.

Body temperature may be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99.6 F. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.6 F at the beginning of the next period, the following work cycle may be further shortened by 33%. Oral temperature should be measured again at the end of the rest period to make sure that it has dropped below 99.6 F. No Watts Engineers employee will be permitted to continue wearing semipermeable or impermeable garments when his/her oral temperature exceeds 100.6 F.

8.2 Cold Stress Monitoring

In the winter months, thermal injury due to cold exposure can be a potential concern for field personnel. Systematic cold exposure is referred to as hypothermia. Local cold exposure is generally termed frostbite.

The signs and symptoms of cold stress are as follows:

- Hypothermia is defined as a decrease in a person's core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include:
    - Shivering
    - Apathy
    - Listlessness
    - Sleepiness
    - Unconsciousness
- Frostbite is both a general and medical term given to areas of local cold injury. Unlike systematic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite include:
    - Sudden blanching or whitening of the skin
    - The skin has a waxy or white appearance and is firm to the touch
    - Tissue is cold, pale, and solid

To monitor for cold stress, conduct oral temperature monitoring at the job site:

- at the Field Team Leader's discretion, based on changes in a worker's performance or mental status.
- at a worker's request, or
- as a screening measure whenever any one worker on site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92°F) can not return to work for 48 hours.

9.0 WORK ZONES AND SITE CONTROL

Work zones around the areas designated for drilling, sample collection, test pit excavation, and piezometer and monitoring well installation will be established by the Watts Engineers on a daily basis and communicated to all employees and other site users by the Site Health and Safety Officer. It shall be the Site Health and Safety Officer's responsibility to ensure that all site workers are aware of the work zone boundaries and to enforce proper procedures in each area. The zones will include:

- **Exclusion Zone ("Hot Zone")** - the area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. All personnel entering the Exclusion Zone must wear the prescribed level of personal protective equipment identified in Section 7.0;

- **Contamination Reduction Zone** - the zone where decontamination of personnel and equipment takes place. Any potentially contaminated clothing, equipment and samples must remain in the Contamination Reduction Zone until decontaminated;

- **Support Zone** - the part of the site which is considered non-contaminated or "clean". Support equipment will be located in this zone, and personnel may wear normal work clothes within this zone.

Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled. Only personnel who are essential to the completion of the task will be allowed access to these areas and only if they are wearing the prescribed level of protection. Entrance of all personnel must be approved by the Site Health and Safety Officer. Local persons and/or regulatory personnel who have been denied access will be directed to the public information officer.

A field logbook containing the names of Watts Engineers Personnel and their level of protection will be maintained by Watts Engineers.

The zone boundaries may be changed by the Site Health and Safety Officer as environmental conditions warrant, and to respond to the necessary changes in work locations on-site.

10.0 DECONTAMINATION PROCEDURES

10.1 Personal Decontamination for Watts Engineers Employees

The degree of decontamination required is a function of both a particular task and the physical environment within which it takes place. The following decontamination procedure, although somewhat specific to the tasks described herein, will remain flexible, thereby allowing the decontamination crew to respond appropriately to the changing environmental conditions which may arise at the site. The procedure shall be followed by all Watts Engineers and subcontractor personnel who are on the site.

- Station 1: Equipment Drop
  - Deposit Equipment used on-site (tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination.
- Station 2: Boots and Glove (Wash and Rinse)
  - Scrub outer boots and outer gloves with decontamination solution or detergent water. Rinse off using copious amounts of water.
- Station 3: Tape, Outer Boot and Glove Removal
  - Remove tape, outer boots and gloves. Deposit tape and gloves in container provided by drilling Subcontractor.
- Station 4: Canister or Mask Change
  - If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and worker returns to duty.
- Station 5: Outer Garment (Removal)
  - Protective suit removed and deposited in separate container provided by drilling Subcontractor(s).
- Station 6: Face Piece, Hard Hat, Safety Goggles Removal
  - Face piece or safety glasses removed (if used). Avoid touching face with fingers. Face piece and/or safety glasses deposited on plastic sheet. Hard hat removed and placed on plastic sheet.
- Station 7: Inner Glove Removal
  - Inner gloves are the last personal protective equipment to be removed. Avoid touching the outside of the gloves with bare fingers. Dispose of these gloves in container provided by drilling Subcontractor.

10.2 Decontamination for Medical Emergencies

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as defined, and then administer first-aid.

In the event of a major injury or other serious medical concern (i.e., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu

of further decontamination efforts unless exposure to a site contaminant would be considered "Immediately Dangerous to Life or Health."

10.3 Decontamination of Field Equipment

Decontamination of any heavy equipment if used will be conducted by the remediation contractors. Decontamination will generally be by steam cleaning. Decontamination of all bailers, split-spoons, spatula knives, and other tools used for multi-media environmental sampling and examination shall be as follows:

- disassemble the equipment;
- water wash to remove all visible foreign matter;
- wash with detergent;
- rinse all parts with distilled-deionzed water;
- allow to air dry; and
- wrap all parts in aluminum foil or to prevent contamination of clean equipment.

11.0 FIRE PREVENTION AND PROTECTION

11.1 General Approach

Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs. When required by regulatory (DEC) authorities, the project management will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper site preparation and safe storage of combustible and flammable materials;
- Availability of coordination with private and public fire authorities;
- Adequate job-site fire protection and inspections for fire prevention; and
- Adequate indoctrination and training of employees.

11.2 Equipment and Requirements

- Fire extinguishers will be provided by the Remediation Contractor;
- Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary; and
- Immediately after each use, fire extinguishers will be either recharged or replaced.

11.3 Flammable and Combustible Substances

- All storage, handling or use of flammable and combustible substances will be under the supervision of qualified persons; and
- All tanks, containers and pumping equipment, whether portable or stationary, which are used for the storage and handling of flammable and combustible liquids, will meet the recommendations of the National Fire Protection Association.
- If the LEL exceeds 10% for any compound, fans will be used to dissipate volatile/combustible gases and to minimize the explosion hazard during drilling/excavation activities. In addition, $\%O_2$/explosive gas monitoring will be conducted throughout the drilling operations by Watts Engineers.

12.0 EMERGENCY INFORMATION

In accordance with OSHA 29 CFR Part 1910, an Emergency Response Plan is attached to this HASP as Attachment 2.

ATTACHMENT 1

Protection Ensembles

ATTACHMENT 1
PROTECTION ENSEMBLES

Equipment designed to protect the body against contact with known or anticipated chemical hazards have been divided into four categories according to the degree of protection afforded:

Level A: Should be selected when the highest level of respiratory, skin and eye protection is needed.

Level B: Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required; Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by on-site studies.

Level C: Should be selected when the types of airborne substances are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. In atmospheres where no airborne contaminants are present, Level C provides dermal protection only.

Level D: Should not be worn on any site with respiratory or skin hazards. This is primarily a work uniform providing minimal protection.

The level of protection selected is based primarily on:

- Types and measured concentrations of the chemical substances in the ambient atmosphere and their associated toxicity; and
- Potential or measured exposure to substances in air, splashes of liquids, or other indirect contact with material due to the task being performed.

In situations where the types of chemicals, concentrations, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards may be further characterized. Watts Engineers personnel will have equipment for Level D and Level C PPE on hand while on-site. The use of Level B PPE has not been included in the Watts Engineers Scope. If Level B PPE is required for site work, the Watts Project Manager will be notified and arrangements will be made for the appropriate actions. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components based on the widely used USEPA Levels of Protection are detailed below for levels B, C, and D protection.

Level B Protection Ensemble:

Recommended

- Pressure-demand, full-face piece self-contained breathing apparatus (MSHA/NIOSH approved) or pressure-demand supplied-air respirator with escape SCBA;
- Saranex chemical-resistant clothing (overalls and long-sleeved jacket; hooded one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit); disposable chemical-resistant one-piece suit);
- Inner and outer chemical resistant gloves (silver shell);
- Chemical-resistant latex safety boots/shoes; and
- Hard hat.

Optional

- Coveralls.
- Disposable boot covers.
- Face shield.
- Long cotton underwear.

Level B protection would be warranted if any of the following types of atmospheres or atmospheric concentrations of toxic substances have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection:

- with concentrations Immediately Dangerous to Life and Health (IDLH);
- exceeding limits of protection afforded by a full-face air-purifying mask;
- containing substances for which air-purifying canisters do not exist or have low removal efficiency;
- containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard;
- containing less than 19.5% oxygen; or
- with evidence of incompletely identified vapors or gases as indicated by direct reading organic vapor detection instrument, but those vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.

Level B equipment provides a high level of protection to the respiratory tract, but a somewhat lower level of protection to skin. The chemical-resistant clothing required in Level B is available in a wide variety of styles, materials, construction detail and permeability. These factors all affect the degree of protection afforded. Therefore, a specialist should select the most effective, chemical-resistant clothing based on the known or anticipated hazards and task. Level B skin protection is selected by comparing the concentrations of identified substances in the air with skin toxicity data or assessing the effect of the substance (at its measured air concentrations or splash potential) on the small area of the head and neck unprotected by chemical-resistant clothing.

Level C Protection Ensemble:

Recommended:

- Full-face piece, air-purifying respirator equipped with MSHA and NIOSH approved organic vapor/acid gas/dust/mist combination cartridges or as designated by the Health and Safety Officer;
- Chemical-resistant clothing (Tyvek or Polycoated Tyvek overalls and long-sleeved jacket, hooded, one- or two-piece chemical splash suit or disposable chemical-resistant one-piece suit);
- Inner and outer chemical-resistant gloves (butyl, latex, or nitrile; nitrile);
- Chemical-resistant latex safety boots/shoes; and
- Hardhat.

Optional:

- Coveralls;
- Disposal boot covers;
- Face shield;
- Escape mask;
- Long cotton underwear.

The use of Level C protection is permissible upon satisfaction of these criteria:

- Measured air concentrations of identified substances will be reduced by the respirator to below the substance's permissible exposure limit (PEL), threshold limit value (TLV), and/or the concentration is within the service limit of the cartridge;
- Atmospheric contaminant concentrations do not exceed IDLH levels; and
- Atmospheric contaminants, liquid splashes or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing an air-purifying device. The device (when required) must be an air purifying respirator (MSHA/NIOSH approved) equipped with filter cartridges. Cartridges must be able to remove the substances encountered. Respiratory protection will be used only with proper fitting, training and the approval of a qualified individual. In addition, an air-purifying respirator can be used only if:

- Oxygen content of the atmosphere is at least 19.5% in volume;
- Substances are identified and concentrations measured;
- Substances have adequate warning properties;
- Individual passes a qualitative fit-test for the mask; and
- Appropriate cartridge/canister is used, and its service limit concentration is not exceeded.

An air monitoring program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be monitored thoroughly when personnel are wearing air-purifying respirators. Continual surveillance using direct-reading instruments is needed to detect any changes in air quality necessitating a higher level of respiratory protection.

Level D Protection Ensemble:

Recommended:

- Protective coveralls (Tyvek);
- Safety boots/shoes;
- Safety glasses or chemical splash goggles;
- Hardhat;
- Nitrile gloves.

Optional:

- Escape mask;
- Face shield.

The use of Level D protection is permissible upon satisfaction of these criteria:

- No hazardous air pollutants have been measured; and
- Work functions preclude splashes, immersion or the potential for unexpected inhalation of any chemicals; and
- Atmospheric contains at least 19.5% oxygen.

Level D protection is primarily a work uniform. It can be worn in areas where only boots can be contaminated, or where there are no inhalable toxic substances.

ATTACHMENT 2

Emergency Response Plan

ATTACHMENT 2
EMERGENCY RESPONSE PLAN

Chain of Command

The following chain of command will be followed for any on-site emergency:

1. Watts Engineers Site Health and Safety Officer/Safety Technician
2. Justin Kellogg – Health and Safety Officer
3. Andrew Klimek – Project Manager

Communications

Internal emergency communication systems are used to alert workers to danger, convey safety information, and maintain site control. Any effective system can be employed. Two-way radio headsets or field telephones are often used when work teams are far from the command post. Hand signals and air-horn blasts are also commonly used. Every system must have a backup. It shall be the responsibility of the Site Health and Safety Officer to ensure that an adequate method of internal communication is understood by all personnel entering the site. Unless all personnel are otherwise informed, the following signals shall be used.

1. Emergency signals by portable air horn, siren, or whistle: two short blasts, personal injury; continuous blast, emergency requiring site excavation.
2. Visual signals: hand gripping throat, out of air/cannot breathe; hands on top of head, need assistance; thumbs up, affirmative/ everything is OK; thumbs down, no/negative; grip partner's wrist or waist, leave area immediately.

Watts Engineers Emergency Telephone Numbers

Watts Engineers PROJECT MANAGER:

Andrew Klimek	Office:	(716) 836-1540

Watts Engineers HEALTH AND SAFETY MANAGER:

Justin K. Kellogg, M.S., Q.E.P.	Office:	(716) 836-1540

Watts Engineers SITE HEALTH AND SAFETY OFFICER:

Environmental Scientist	Office:	(716) 836-1540

MERCY HOSPITAL OF BUFFALO **(716) 859-5600**

FIRE	**911**
AMBULANCE	**911**
POLICE	**911**

The site location is:
Gallagher Beach (proposed Buffalo Harbor State Park)
(approximately 1351 Furhmann Blvd.)
Buffalo, New York 14203

Directions to Hospital:

The following directions describe the most efficient route to Mercy Hospital of Buffalo (see next page for map):

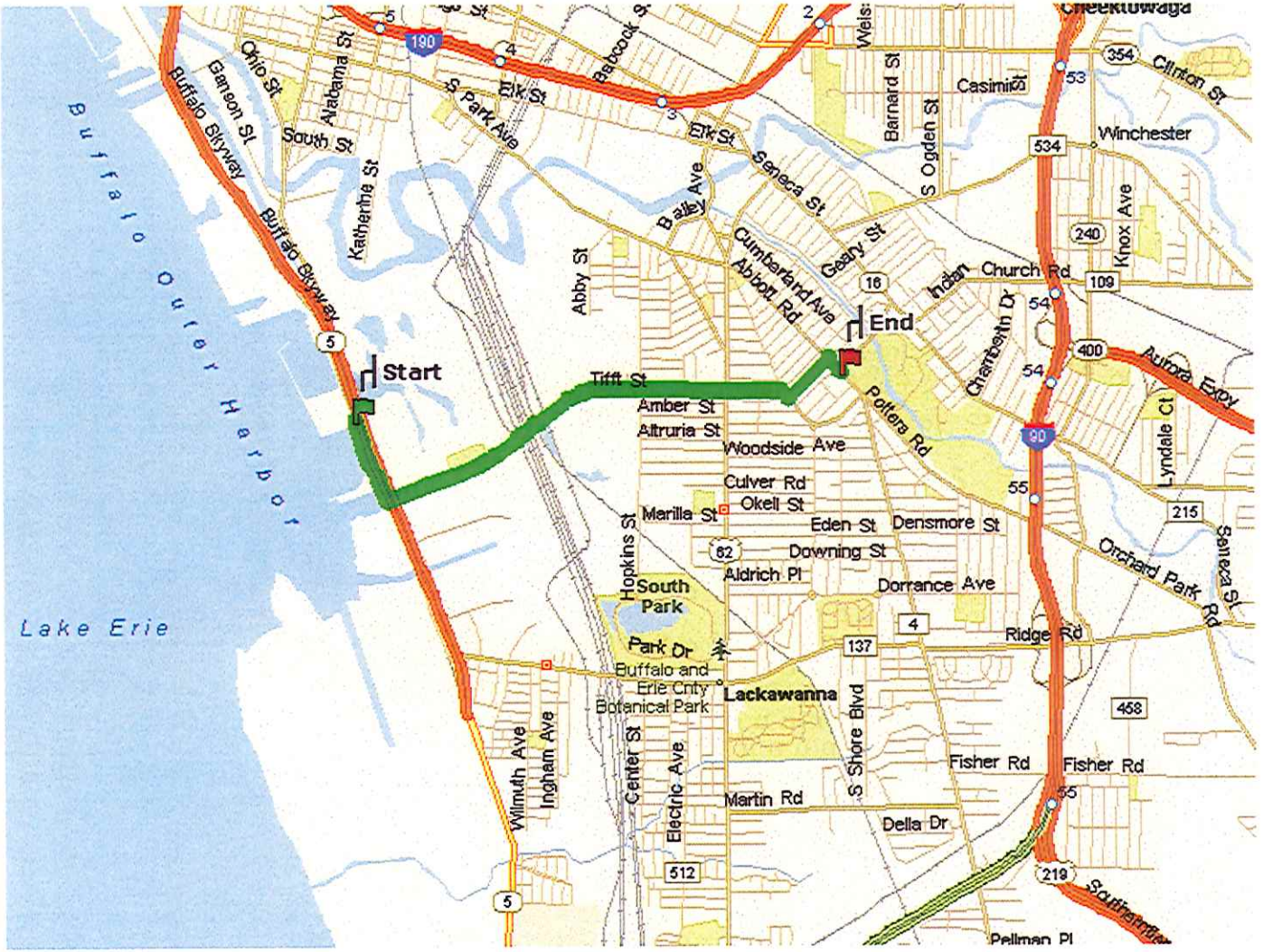
(1) Travel SOUTH on Fuhrmann Blvd. – go 0.4 miles.
(2) Turn LEFT on Tifft St. – go 2.2 miles.
(3) Turn RIGHT on McKinley Pky. – go 0.1 miles
(4) Turn LEFT on Lorraine Ave. – go 0.3 miles.
(5) Turn RIGHT on Abbott Rd.
(6) Arrive at Mercy Hospital of Buffalo

Personnel Exposure

- Skin contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention. Eyewash stations will be provided on site. If necessary, transport to Mercy Hospital of Buffalo.
- Inhalation: Move to fresh air and, if necessary, transport to Mercy Hospital of Buffalo.
- Ingestion: Decontaminate and transport to Mercy Hospital of Buffalo.

Personal Injury

Minor first-aid will be applied on-site as deemed necessary. In the event of a life threatening injury, the individual should be transported to Mercy Hospital of Buffalo via ambulance. The Watts Engineers and/or subcontractor Health and Safety Officers will supply available chemical specific information to appropriate medical personnel as requested.



Project Location

WATTS ENGINEERS
3826 MAIN STREET
BUFFALO, NEW YORK 14226

Source: *http://mappoint.msn.com*

Driving Directions to Hospital

Proposed Buffalo Harbor State Park
City of Buffalo, Erie County, New York

Not to Scale	August 2005

Watts Engineers first aid kits will conform to Red Cross and other applicable good health standards. The first aid kits shall consist of a weatherproof container with individually-sealed packages for each type of item. First aid kits will be fully equipped before being sent out on each job and will be checked weekly by the Site Health and Safety Officer to ensure that the expended items are replaced.

Adverse Weather Conditions

In the event of adverse weather conditions, the Watts Engineers Site Health and Safety Coordinator will determine if engineering operations can continue without sacrificing the health and safety of employees. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat/cold stress;
- Inclement weather - related working conditions;
- Limited visibility; and
- Potential for electrical storms.

Evacuation

In the event that an area must be evacuated due to an emergency, such as a chemical spill or a fire, workers shall exit upwind, if possible. Since work conditions and work zones within the site may be changing on daily basis, it shall be the responsibility of the Watts Engineers Site Health and Safety Officer to review evacuation routes and procedures as necessary and to inform site workers of any changes.

Records and Reporting

It shall be the responsibility of each employer to establish and assure adequate records of the following:

- Occupational injuries and illnesses;
- Accident investigations;
- Reports to insurance carrier or State compensation agencies;
- Reports required by client;
- Records and reports required by local, state, federal and/or international agencies;
- Property or equipment damage;
- Third party injury or damage claims;
- Environmental testing logs;
- Explosive and hazardous substances inventories and records;
- Records of inspections and citations;
- Related correspondence; and
- Safety training.

ATTACHMENT 3

Health Hazard Qualities of Hazardous Substances of Concern

Gallagher Beach Contaminents								
	CAS #	Round 1	Round 2	Round 3	OSHA PEL	NIOSH REL	ACGIH STEL	ACGIH TLV
Volitiles								
Benzene	71-43-2	-	-	X	1 ppm	0.1 ppm	2.5 ppm	0.5 ppm
Chlorobenzene	108-90-7	-	-	X	75 ppm	-	-	10 ppm
1,2-Dichlorobenzene	95-50-1	-	-	X	50 ppm	50 ppm	50 ppm	25 ppm
1,2,4-Trichlorobenzene	120-82-1	-	-	X	-	5 ppm	-	5 ppm
1,3-Dichlorobenzene	541-73-1	-	-	X	-	-	-	-
1,4- Dichlorobenzene	106-46-7	-	-	X	75 ppm	Carcin	-	10 ppm
Xylenes	m-108-38-3 o- 95-47-6 p- 106-42-3	-	-	X	100 ppm	100 ppm	150 ppm	100 ppm
Semi volitiles								
Benzo(a)Anthracene	56-55-3	X	X	-	-	-	-	-
Chrysene (coal tar pitch)	65966-93-2	X	X	-	0.2 mg/m^3	0.1 mg/m^3	-	0.2 mg/m^3
Benzo(b)fluoranthene	205-99-2	-	X	-	-	-	-	-
Benzo(k)fluoranthene	207-08-9	-	X	-	-	-	-	-
Benzo(a)pyrene(coal tar pitch)	50-32-8 65966-93-2	-	X	-	0.2 mg/m^3	0.1 mg/m^3	-	0.2 mg/m^3
Inorganics								
Arsenic	7440-38-2	X	X	X	0.010 mg/m^3	0.002 mg/m^3	-	0.010 mg/m^3
Beryllium	7440-41-7	X	X	X	0.002 mg/m^3	0.0005 mg/m^3	0.01 mg/m^3	0.002 mg/m^3
Cadmium	7440-43-9 1306-19-0	X	X	X	0.005 mg/m^3	Carcin	-	0.01 mg/m^3
Calcium	7440-70-2	X	X	-	-	-	-	-
Chromium (values for IV)	7440-47-3	X	X	X	0.1 mg/m^3	0.5 mg/m^3	-	0.01 mg/m^3
Copper (dusts and mists)	7440-50-8	X	X	X	1 mg/m^3	1 mg/m^3	-	1 mg/m^3
Iron (oxide)	1309-37-1	X	X	X	10 mg/m^3	5 mg/m^3	-	5 mg/m^3
Magnesium (oxide)	1309-48-4	X	X	X	15 mg/m^3	-	-	10 mg/m^3
Mercury	7439-97-6	X	X	X	0.1 mg/m^3	0.1 mg/m^3	-	0.02 mg/m^3
Nickel	7440-02-0	X	X	X	1 mg/m^3	Carcin	-	0.1 mg/m^3
Zinc (oxide)	1314-13-2	X	X	X	5 mg/m^3	5 mg/m^3	10 mg/m^3	2 mg/m^3

APPENDIX B -
QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

FOR THE

SITE INVESTIGATION WORK PLAN

FOR THE

PROPOSED BUFFALO HARBOR STATE PARK SITE
BUFFALO, ERIE COUNTY, NEW YORK

MAY 2006
(Version 2)

PREPARED FOR:

CANNON DESIGN
2170 WHITEHAVEN ROAD
GRAND ISLAND, NEW YORK 14072

ON BEHALF OF:

NEW YORK STATE OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION
WESTERN DISTRICT – NIAGARA FRONTIER REGION
P.O. BOX 1132
NIAGARA FALLS, NEW YORK 14303-0132

QUALITY ASSURANCE PROJECT PLAN

FOR THE

SITE INVESTIGATION WORK PLAN

FOR THE

PROPOSED BUFFALO HARBOR STATE PARK SITE
BUFFALO, ERIE COUNTY, NEW YORK

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WESTERN DISTRICT – NIAGARA FRONTIER REGION
P.O. BOX 1132
NIAGARA FALLS, NEW YORK 14303-013

MAY 2006
(Version 2)

PREPARED BY:
WATTS ENGINEERING & ARCHITECTURAL, P.C.
3826 MAIN STREET
BUFFALO, NEW YORK 14226

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List of Attachments

Attachment 1	Analytical Laboratory (Severn Trent Laboratories, Inc.) Quality Assurance Plan (Upon Request)
Attachment 2	Data Validator's Qualifications Statement (Upon Request)

QUALITY ASSURANCE PROJECT PLAN
FOR THE SITE INVESTIGATION WORK PLAN FOR THE
PROPOSED BUFFALO HARBOR STATE PARK SITE
CITY OF BUFFALO, ERIE COUNTY, NEW YORK

Table of Contents

1.0 INTRODUCTION

The objective of the Site Investigation Work Plan is to define a program to determine the environmental conditions at the proposed Buffalo Harbor State Park (Site) in Buffalo, New York, and to evaluate the potential for human exposure. The area of investigation will be concentrated where the public is most likely to gather and be in close contact with underlying materials.

This Site-Specific Quality Assurance Project Plan (QAPP) outlines the measures that will be taken to ensure that the data generated are of quality sufficient to meet the data quality objectives of precision, accuracy and completeness. The primary objective of the QAPP is to provide the type and quality of environmental data needed to accurately reflect the effectiveness of the proposed remedial action at the Site in achieving the remedial action objectives discussed in the Site Investigation Work Plan. Deviations from expected conditions will be noted, and appropriate corrective measures will be taken to maintain quality in the sample collection and analysis program.

This QAPP presents the organization, objectives, functional activities and specific quality assurance (QA) and quality control (QC) (QA/QC) activities for the Site. This QAPP also describes the specific protocols that will be followed for sampling, sample handling and storage, chain of custody, and laboratory and field analysis activities. Additional information is found in Watts Engineers Technical Procedures Manual – Environmental Sampling Protocols and Procedures found in Appendix C of the Work Plan.

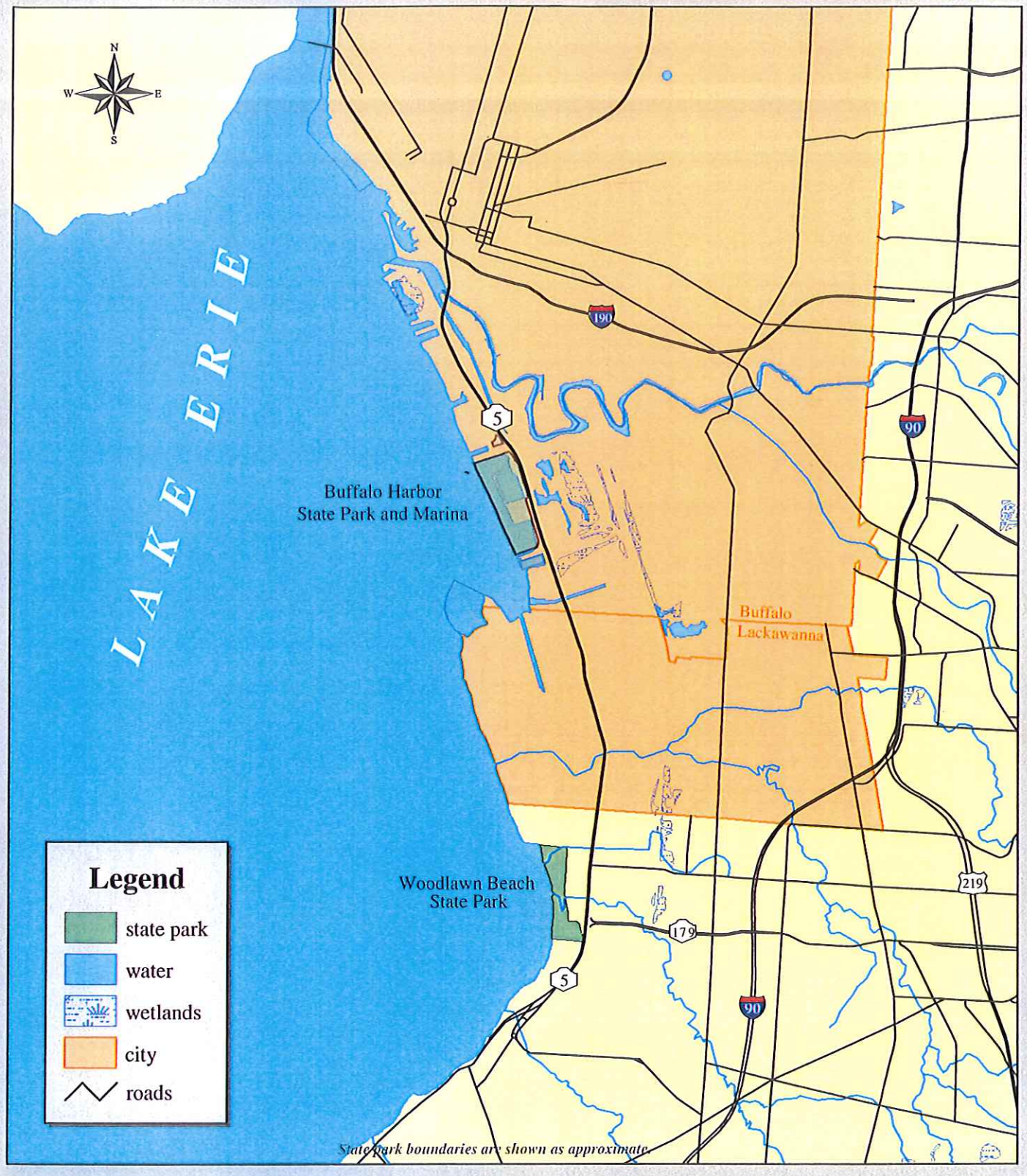
All QA/QC procedures will be developed and implemented in accordance with applicable professional technical standards, New York State Department of Environmental Conservation (NYSDEC), standards and specific project goals and requirements.

1.1 Contents

As provided in the USEPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, the elements presented in this QAPP include Project Management (Sections 2 and 3), Measurement Data Acquisition (Sections 4 through 10), and Data Validation (Section 11).

1.2 Project Location

The proposed Buffalo Harbor State Park is located on Fuhrmann Boulevard at the Buffalo Small Boat Harbor (aka Buffalo Outer Harbor) marina that is currently operated by the Niagara Frontier Transportation Authority (NFTA) in the City of Buffalo, Erie County, New York. The property consists of three distinct parcels. Parcel 1 is generally bound by Lake Erie on the west, Fuhrmann Boulevard to the east, abandoned grain storage towers to the south, and the Freezer Queen frozen food plant and Port Terminal "A" to the north. Parcel 2 is located south of Parcel 1, just south of



Buffalo Harbor State Park and Marina

OFFICE OF PARKS, RECREATION & HISTORIC PRESERVATION
NEW YORK STATE

George E. Pataki, Governor

Berndatte Castro, Commissioner

Map produced by NYS OPRHP GIS unit, January 2004.

the abandoned grain elevators and consists mainly of water rights and a small strip of land on the southern edge. Parcel 3 has no water frontage and is essentially a triangular piece of land which is located just north of the Freezer Queen frozen food plant. **Figure 1-1** shows the project location.

1.3 Project Description

Environmental conditions at the Site are the result of deposition of construction and demolition debris, dredged sediments, buried trees that washed up on shore, underground storage tanks, and general excess soil fill brought in from a number of sources outside of the immediate area. Numerous field investigations have been conducted over the years at this site. The laboratory results have identified various organic and inorganic contaminants, which generally increase in number and concentration with depth.

The following is a brief summary of the scope of work to be performed at the Site:

1. Conduct a soils investigation and collect soil samples for laboratory analysis.
2. Collect sediment samples from the beach areas for laboratory analysis.
3. Install up to eight new groundwater monitoring wells within the site and collect groundwater samples for laboratory analysis.
4. Survey the soil sampling points and the monitoring wells.

Based on the new data obtained from the above investigation and the final remedy selected, complete a design program to implement the remedy. The cost estimate associated with the design shall be determined after the final remedy has been selected. A more detailed description is provided in the Site Investigation Work Plan.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The overall management structure and a general summary of the responsibilities of project team members are presented below. **Figure 2-1** provides and organizational chart of the project management structure.

Project Manager
The Project Manager (PM) bears the primary responsibility for the successful completion of the work assignment within the budget and schedule, and:

- Provides overall management for the execution of the remedial investigation and directs the activities of the Site Manager and technical staff.
- Performs technical review of all field activities, data review and interpretation and the preparation of all investigation reports.
- Works closely with the analytical laboratory, data validation contractors, drillers, and surveyors during the execution of the field program.
- Activities of the PM are supported by senior management, the Project Quality Assurance Coordinator, and support staff.

Site Manager
The Site Manager (SM) bears the primary responsibility for the successful execution of the field program, and:

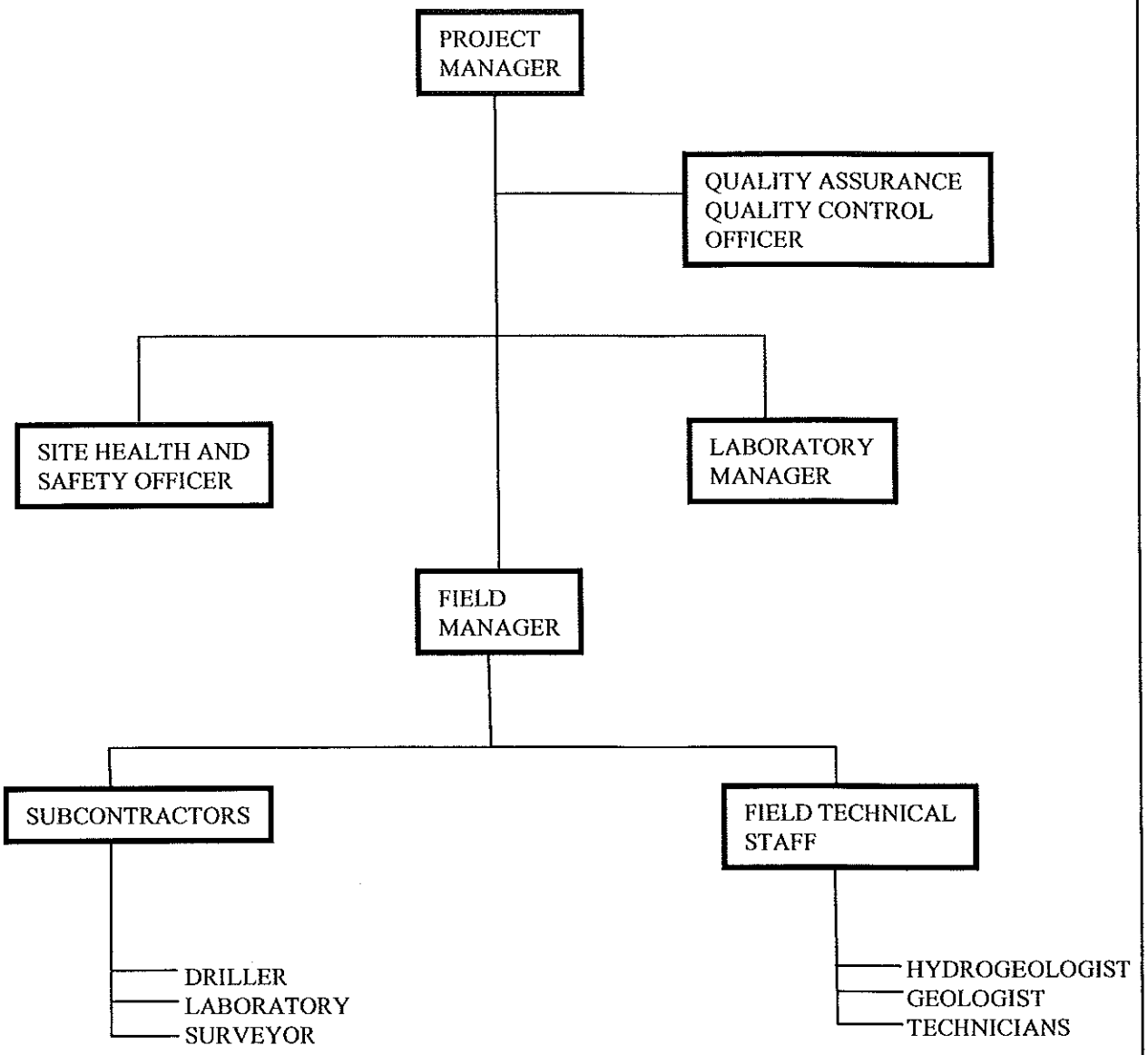
- Directs the activities of technical staff in the field and assists in the interpretation of all physical and chemical data, and report preparation.
- Responsible for the management of technical staff and subcontractors such as drillers and surveyors.
- Works closely with the Site Health and Safety Officer to ensure compliance with the Health and Safety Plan (HASP).

Field Technical Staff
Field technical staff consists of engineers, geologists and technicians who will perform activities such as soil and groundwater sampling, and preparation of any field documentation which may be necessary.

Laboratory Manager
The Laboratory Manager (LM) is responsible for sample container preparation, sample custody in the laboratory, and completion of the required analyses through oversight of the laboratory staff. The LM will ensure that quality assurance procedures are followed and that an acceptable laboratory report is prepared and submitted. The LM reports to the PM.

Quality Assurance and Quality Control Officer
Quality Assurance and Quality Control (QA/QC Officer) is responsible for conducting reviews, inspections, and audits to assure that the data collection is conducted in accordance with the Site Investigation Work Plan. These responsibilities range from

Figure 2-1.
Proposed Buffalo Harbor State Park Field Organization Chart.



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effective field equipment decontamination procedures, to proper sample collection, to review of all laboratory analytical data (including tentatively identified compounds, if analyzed) to ensure completeness and usefulness. The QA/QC Officer reports to the PM.

3.0 PROJECT/TASK DESCRIPTIONS

Overall objectives for data generated as part of this remedial investigation are described in the Site Investigation Work Plan. The Site Investigation Work Plan objectives require collection of samples to determine the following:

- The contamination concerns within the three parcels;
- Determine if hazardous waste is present and if so, the significance of the threat it poses to the public health and environment;
- Remedial alternative measures suitable for addressing on-site contamination. Alternatives will be identified in cooperation with the NYSDEC; and
- How long-term monitoring will be implemented to determine the effectiveness of the remedy.

The following is a description of the scope of work to be performed at the site.

- Further define the extent and magnitude of possible contamination especially in the surface and near surface soils and sediment samples across the site where recreational use will be the greatest. Analyze the soil samples for metals, volatile and semi-volatile organics, pesticides, and PCBs. The soil results from this investigation will provide information on the current condition of the soil quality.
- Install eight new groundwater monitoring wells. The exact location of the wells will be determined in the field. Collect two rounds of groundwater sample from the wells. Analyze the groundwater samples for metals, volatile and semi-volatile organics, pesticides, and PCBs. The groundwater results from this investigation will provide the current condition of the groundwater quality.
- Survey the soil sampling points and the monitoring wells.

Based on the new data obtained from the above investigation and the final remedy selected, complete a design program to implement the remedy. The cost estimate associated with the design shall be determined after the final remedy has been selected.

Soil samples will be analyzed for Target Compound List (TCL) Volatile Organics via EPA SW-846 Method 8260, Target Compound List (TCL) Semi-Volatile Organics via EPA SW-846 Method 8270, Target Compound List (TCL) Pesticides/PCBs via EPA SW-846 Method 88081/8082, and Target Analyte List (TAL) Metals plus Cynanide via EPA SW-846 Method 6010/7471/9012.

Groundwater samples will be analyzed for Target Compound List (TCL) Volatile Organics via EPA SW-846 Method 8260B, Target Compound List (TCL) Semi-Volatile Organics via EPA SW-846 Method 8270C, Target Compound List (TCL) PCBs via EPA SW-846 Method 8082, and Target Analyte List (TAL) Metals via EPA SW-846 Method 6010/7471/9012.

In addition, samples collected from Parcel 2 will be tested for the presence of asbestos.

The projected sample media, analytical parameters and frequencies of field sample collection are provided in **Table 3-1** and **Table 3-2**.

Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements used to develop a scientific and resource effective sampling design. A DQO planning process has been developed to assist in determining the amount and type of information required, including acceptable levels of error.

The objective of the sampling program is to further assess the vertical and lateral extent of contamination at the site and to determine the current groundwater quality conditions.

Based on the results obtained and the final remedy selected, complete a design program to implement the remedy.

Laboratory confirmation will be performed according to Test Methods for Evaluating Solid Waste (SW-846) in accordance with the NYSDEC Analytical Services Protocol (ASP).

Table 3-1
Sample Types/Analyses by Task
Buffalo Harbor State Park Site
City of Buffalo, Erie County, New York.

Task	Media	Field Analyses	Laboratory Analyses
Task 1: Soil Sampling	Soil	PID[(1)] Screening	TCL Volatile Organics TCL Semi-Volatile Organics TCL Pesticides/PCBs TAL Inorganics plus Cyanide Asbestos (Parcel 2)
Task 2: Groundwater Sampling	Water	PID[(1)] Screening, pH, Temperature, Specific Conductance, Turbidity	TCL Volatile Organics TCL Semi-Volatile Organics TCL Pesticides/PCBs TAL Inorganics plus Cyanide

(1) Photoionization Detector - screens for volatile organic compounds (vapor phase).

TCL Target Compound List
TAL Target Analyte List

Table 3-2
Projected Number of Field Samples
Buffalo Harbor State Park Site
City of Buffalo, Erie County, New York

Task	Parameter	Field Samples	Field Duplicates	Field Blanks[a]	Trip Blanks[b]	(MS/MSD/MSB)[c] (ExtraVolume)	Total Laboratory Samples
Task 1. Soil Sampling							
Soil/Sediment/Fill	TCL Volatile Organics	60	3	3	6 (est.)	3/3/3	83
	TCL Semi-Volatile Organics	60	3	3	NA	3/3/3	75
	TCL Pesticides/PCBs	60	3	3	NA	3/3/3	75
	TAL Inorganics + cyanide	60	3	3	NA	3/3/3	75
	Asbestos	4-8[d]	NA	NA	NA	NA	4-8
Task 2. Groundwater Sampling							
Groundwater	TCL Volatile Organics	16	2	2	2 (est.)	2/2/2	28
	TCL Semi-Volatile Organics	16	2	2	NA	2/2/2	26
	TCL Pesticides/PCBs	16	2	2	NA	2/2/2	26
	TAL Inorganics + cyanide	16	2	2	NA	2/2/2	26

(a) Field blank frequency estimates based on one per twenty, or one per day minimum, whichever is more frequent.
(b) The number of trip blanks is estimated due to requirement of one trip blank per cooler. Volatile parameter analysis only.
(c) Frequency estimates based on one per twenty, where applicable.
(d) Final number that will be analyzed will vary depending upon the number of samples that are collected.

NA Not Applicable
TCL Target Compound List
TAL Target Analyte List
MS/MSD Matrix Spike/Matrix Spike Duplicate
MSB Matrix Spike Blank

4.0 QUALITY ASSURANCE OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results which maximize the likelihood that the data are collected, analyzed and documented such that it is defensible.

Specific procedures for sampling, chain-of-custody, laboratory instruments calibration, laboratory analysis, data reporting, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP.

The purpose of this section is to address the project specific objectives for precision, accuracy, representativeness, completeness, and comparability, known as the "PARCC parameters.

4.1 Accuracy, Precision, and Sensitivity of Analysis

The fundamental QA objective with respect to accuracy, precision, and sensitivity of laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols.

Accuracy, precision and completeness requirements will be addressed for all the data generated. Accuracy, the ability to obtain a true value, is monitored through the use of field and method blanks, spikes, and standards, and compared to federal and state regulations and guidelines. This will reflect the impact of matrix interferences. Precision, the ability to replicate a value, is monitored through duplicate (replicate) samples. It is assessed for each matrix. Corrective actions and documentation for substandard recoveries, or substandard precision, must be performed by the laboratory.

Instrument sensitivity must be monitored to ensure the data quality through constant instrument performance. Method detection limits (MDLs) depend on instrument sensitivity and matrix effects. Monitoring of instrument sensitivity is performed through the analysis of reagent blanks, near detection limit standards and response factors.

Quality control criteria for laboratory and field analyses are provided in **Table 4-1**. Required field and laboratory QC samples and frequencies are summarized in **Table 4-2** and **Table 4-3**, respectively.

4.2 Completeness, Representativeness and Comparability

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the laboratory will provide data meeting QC acceptance criteria for 95 percent or more for all samples tested using the ASP Routine Analytical

Table 4-1
Project Quality Control Summary
Buffalo Harbor State Park Site
City of Buffalo, Erie County, New York

Parameter	Matrix	Quantitation Limit[a]	Estimated Accuracy	Estimated Precision	Completeness	Analysis Method[b]
TCL Volatiles	Soil	0.01 mg/kg	59 -172%	24% RPD	95%	USEPA 8260
TCL Semi-Volatiles	Soil	0.33 – 0.83 mg/kg	11-137%	50 % RPD	95%	USEPA 8270
TCL Pesticides/PCBs	Soil	0.0017 – 0.03 mg/kg	46-139%	50% RPD	95%	USEPA 8081/8082
TAL Inorganics plus cyanide	Soil	300 mg/kg	70-130%	20% RPD	95%	USEPA 6010/7470/9012
TCL Volatiles	Water	0.01 mg/l	61-145%	15% RPD	95%	USEPA 8260
TCL Semi-Volatiles	Water	0.010 – 0.025 mg/kg	10-127%	50% RPD	95%	USEPA 8270
TCL Pesticides/PCBs	Water	0.00005 – 0.001 mg/kg	38-131%	27% RPD	95%	USEPA 8081/8082
TAL Inorganics plus cyanide	Water	0.01-0.06 mg/l	75-125%	20% RPD	95%	USEPA 6010/7470/9012

(a) Quantitation limits are based on Contract Laboratory Program Statement of Work (CLP SOW) OLM04.2 & ILM05.2 requirements (where applicable) or on method references.
(b) Test Methods for Evaluating Solid Waste (SW-846).
(c) Limits are based on nominal wet weight of sample. Dry weight limits will be higher.
(d) Actual limits for matrix spikes, surrogates and laboratory control samples are provided in the CLP SOW.
(e) Actual limits for relative percent difference (RPD) of matrix spike duplicates are provided in the CLP SOW.

Table 4-2
Field Quality Control Sample Frequency
Buffalo Harbor State Park Site
City of Buffalo, Erie County, New York

Parameters	Media	Trip Blank[1]	Field Blank[2]	Field Duplicates[3]
TCL Volatiles	Soil	1/20	1/20	1/20
TCL Semi-Volatiles, Pesticide, PCBs	Soil	1/20	1/20	1/20
TAL Inorganics plus cyanide	Soil	1/20	1/20	1/20
TCL Volatiles	Water	1/20	1/20	1/20
TCL Semi-Volatiles	Water	1/20	1/20	1/20
TCL Pesticides/PCBs	Water	1/20	1/20	1/20
TAL Inorganics plus cyanide	Water	1/20	1/20	1/20

(1) Where applicable, one per twenty or fewer field samples, or one per shipment container.
(2) Where applicable, one per twenty or fewer field samples, or one per day, whichever is most frequent.
(3) Where applicable, one per twenty or fewer field samples.

TCL Target Compound List
TAL Target Analyte List

Table 4-3
Laboratory Quality Control Sample Frequency
Buffalo Harbor State Park Site
City of Buffalo, Erie County, New York

Parameter	Matrix	Method Blank[1]	Matrix Spikes or MS/MSD[1]	Laboratory Replicates[1]	Analysis Methods[2]
TCL Volatiles	Soil	1/20	1/20	1/20	USEPA 8260
TCL Semi-Volatiles	Soil	1/20	1/20	1/20	USEPA 8270
Pesticide/PCBs	Soil	1/20	1/20	1/20	USEPA 8081/8082
TAL metals plus cyanide	Soil	1/20	1/20	1/20	USEPA 6010/7471/9012
TCL Volatiles	Water	1/20	1/20	1/20	USEPA 8260
TCL Semi-Volatiles	Water	1/20	1/20	1/20	USEPA 8270
TCL PCBs	Water	1/20	1/20	1/20	USEPA 8081/8082
TAL metals plus cyanide	Water	1/20	1/20	1/20	USEPA 6010/7471/9012

(1) Where applicable, one per twenty or fewer field samples, or one per analytical batch, whichever is more frequent
(2) Actual analysis method (CLP SOW) version will be dependent on contract held by laboratory

USEPA United States Environmental Protection Agency
MS/MSD Matrix Spike/Matrix Spike Duplicate
TCL Target Compound List
TAL Target Analyte List
MSB Matrix Spike Blank

Services (RAS) methods and 90 percent for other methods. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness} = \frac{\text{Valid Data Obtained}}{\text{Total Data Planned}} \times 100$$

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network was designed to provide data representative of site conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, and physical setting and processes. The rationale of the sampling network is discussed in detail in the Work Plan. Representativeness will be satisfied by ensuring that the QAPP is followed, proper sampling techniques are used, proper analytical procedures are followed and holding times of the samples are not exceeded in the laboratory. Representativeness will be assessed in part by the analysis of field duplicate samples.

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods.

5.0 SAMPLING PROCESS DESIGN AND METHOD REQUIREMENTS

Detailed sampling procedures in Watts Engineering and Architecture, P.C. (Watts Engineers) Standard Operating Procedures (SOP) included in Appendix C describe the sampling and data gathering methods. For the planned tasks (i.e., soil and groundwater sampling), the SOP includes the following:

- description of sampling procedures;
- description of containers, preservation, holding times, etc., used in sample collection, transport, and storage;
- procedures for decontamination of equipment; and
- chain-of-custody procedures.

Table 5-1 presents a summary of sample containers, preservation, and holding times.

Table 5-1
Preservation, Holding Times and Sample Containers
Buffalo Harbor State Park Site
City of Buffalo, Erie County, New York

Parameter	Preservation	Holding Time	Containers
Soil Matrix			
TCL Volatiles	Cool to 4°C	10 days from VTSR to analysis	4 oz glass jar w/teflon lined lid
TCL Semi-Volatiles/Pesticides/PCBs	Cool to 4°C	10 days to extraction from VTSR, 40 days from extraction to analysis	4 oz glass jar w/teflon lined lid
TAL Inorganics/Cyanide	Cool to 4°C	from VTSR 6 months (mercury 26 days) (cyanide 12 days)	4 oz glass jar w/teflon lined lid
Asbestos	None	None	Plastic Bag
Water Matrix			
TCL Volatiles	Cool to 4°C HCL to pH <2	10 days from VTSR to analysis	2-40 ml glass w/teflon-lined septum
TCL Semi-Volatiles	Cool to 4°C	5 days to extraction from VTSR, 40 days from extraction to analysis	1 liter amber w/teflon-lined cap (provide 2 bottles)
TCL Pesticides/PCBs	Cool to 4°C	5 days to extraction from VTSR, 40 days from extraction to	1 liter amber w/teflon-lined cap (provide 2 bottles)

Table 5-1
Preservation, Holding Times and Sample Containers
Buffalo Harbor State Park Site
City of Buffalo, Erie County, New York

Parameter	Preservation	Holding Time	Containers
		analysis	
TAL Inorganics	Cool to 4°C HNO_3 to pH < 2	from VTSR 6 months (mercury 26 days)	500 ml glass/plastic
Cyanide	Cool to 4°C NaOH to pH > 12	12 days to extraction from VTSR to analysis	1 liter glass/plastic

VTSR Validated Time of Sample Receipt
MS/MSD Matrix Spike/Matrix Spike Duplicate
TCL Target Compound List
TAL Target Analyte List

6.0 SAMPLE CUSTODY AND DOCUMENT CONTROL

The following documentation procedures will be used during sampling and analysis to provide chain-of-custody control during transfer of samples from collection through storage. Recordkeeping documentation will include use of the following:

- Field log book (bound) to document sampling activities in the field;
- Labels to identify individuals samples;
- Chain-of-custody record sheet to document analyses to be performed; and
- Laboratory sample custody log book.

6.1 Field Log Book

In the field, sampler will record the following information in the field log book (bound) for each sample collected:

- Project number;
- Sample matrix;
- Name of sampler;
- Sample source;
- Time and date
- Pertinent data (e.g. depth, water surface elevation, pumping method);
- Analysis to be conducted;
- Sampling method (e.g. pump type, split-spoon);
- Appearance of each sample (e.g. color, odor, sheen)
- Analysis performed in the field (temperature, pH, specific conductance); and
- Pertinent weather data.

Field log book pages will be signed by the sampler.

6.2 Chain-of-Custody Record

A chain-of-custody form will be completed to document the transfer of sample containers. **Figure 6-1** illustrates a sample of the chain-of-custody form. Each sample will be properly sealed. Sample container labels will include sample number, place of collection and date and time of collection.

The chain-of-custody record, completed at the time of sampling, will contain, but not limited to, the sample number, date and time of sampling, preservative, and the name of the sampler. The record sheet will be signed, timed, and dated by the sampler when transferring the samples. Custody transfers will be recorded for each individual sample. For example, if samples are split and sent to more than on laboratory, a record sheet will accompany each sample. The number of custodians in the chain of possession will be kept to a minimum. The chain-of-custody forms will be returned to the Project Manager.

Figure 6-1. Sample Chain-of-Custody Form

Chain of Custody Record

SEVERN TRENT **STL**
Severn Trent Laboratories, Inc.

STL-4124 (0901)

Client	Project Manager	Date	Chain of Custody Number 168034
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page ____ of ____
City / State / Zip Code	Site Contact / Lab Contact	Analysis (Attach list if more space is needed)	Special Instructions/ Conditions of Receipt
Project Name and Location (State)	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H_2SO_4	HNO_3	HCl	NaOH	ZnAc/NaOH	Analysis

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other____

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Each sample container being delivered to the laboratory will contain a chain-of custody form. The chain-of-custody form will consist of three copies which will be distributed to the sampler and the receiving laboratory. The first copy will remain the field copy and will be returned to the sampler after laboratory receipt. The second copy will be returned to the Project Manager with the data deliverables package. The final copy will stay with the sample. The sample number of each sample delivered will be recorded on the sheet.

Upon receipt of the samples at the laboratory, the samples will be inspected by a designated sample custodian. The condition of the samples will be noted on the chain-of-custody record sheet by the sample custodian. The sample custodian will document the date and time of receipt of the samples, and sign the form.

If damage or discrepancies are noticed, they will be recorded in the remarks column of their record sheet, date and signed. Any damage or discrepancies will be reported to the lab supervisor who will inform the lab manager and QA officer.

Completed chain-of-custody forms describing the transport to and receipt at the lab are required to be returned to the Project Manager with the hard copy of the analytical report.

6.3 Sample Documentation in the Laboratory

Each sample or group of samples delivered to the laboratory for analysis will be given a unique identification number. The laboratory Sample Custodian will record the client name, number of samples and date of receipt of samples in the Sample Control Log Book.

The laboratory will be responsible for maintaining analytical log books and laboratory data as well as a sample (on hand) inventory for submittal to the Project Manager on "an as required" basis. Raw laboratory data produced from the analysis of samples submitted for this program will be inventoried and maintained by the laboratory for a period of five years at which time the Project Manager will advise the laboratory regarding the need for additional storage.

6.4 Storage of Samples

After the sample custodian has completed the chain-of-custody forms and the incoming sample log, the custodian will check to insure that all samples are stored in the appropriate locations. All samples will be stored within an access controlled custody room and will be maintained at 4°C (± 2°C) until all analytical work is acceptable to the QA/QC Officer.

6.5 Sample Documentation

Evidentiary files for the entire project shall be inventoried and maintained by the Project Manager and shall consist of the following:

- Project Plan
- Project Logbooks
- Field Data Records
- Sample Identifications
- Chain-of-Custody Records
- Laboratory Data etc.
- Correspondence
- Report Notes, Calculations, etc.
- References, Copies of Pertinent Literature
- Miscellaneous – photos, maps, drawings, etc.
- Final Report

The evidentiary file materials shall be the responsibility of the Project Manager with respect to maintenance and document removal.

7.0 ANALYTICAL METHOD REQUIREMENTS

Analytical procedures for this project have been selected to generate data meeting the DQOs required for the scope of work. A summary of the methods chosen and the rationale for each method selected is presented below. These methods are summarized in **Table 4-1**. Sampling methods and procedures applicable to health and safety (e.g., personnel monitoring) are described in the HASP (**Appendix A of the Site Investigation Work Plan**).

7.1 Laboratory Parameters

Methods published by USEPA will be used as the basis for all analyses for which such methods exist. The methods specified in **Table 4-1** shall be followed for all analytical parameters. These methods have been chosen based on applicability to the investigation and the level of data quality provided by the method.

7.2 Field Parameters

The procedures for field measurement of organic vapors (PID) are described in the Watts Engineers SOPs (**Appendix C of the Site Investigation Work Plan**).

Portable probes operated according to the manufacturer's instructions and/or Watts Engineers SOPs will be used, if applicable, for the measurement of specific conductance, turbidity, temperature, and pH for groundwater samples. For these field measurements, groundwater will be collected and transferred into clean containers. The turbidity, separate specific conductance and temperature/pH probes will be inserted into the containers and allowed to equilibrate prior to recording the readings.

7.3 Analytical Quality Control

The analytical measurement QC for field and laboratory analyses will generally address the parameters of precision and accuracy. The required QC sample types, frequency and acceptance criteria for the laboratory and field measurements are summarized in **Table 4-2** and **Table 4-3**. Assessment of data quality based on the QC results is part of the data validation process and is discussed in Section 11.

7.4 Proposed Analytical Laboratories

All analytical laboratories used for this work will meet the requirements of the laboratory QA plan and any other requirements for performing analyses to meet the required DQOs. The laboratory qualifications statement and/or QA plan will be submitted upon request.

7.5 Rationale for Analytical Method Selection

All analytical methods selected for use during this project have been chosen based upon the following criteria:

- ability of the method to meet the established DOQ for the parameter;
- validity and reproducibility of the method;
- ability to report detection limits below the Contract Required Quantitation Limit (CRQL) for compounds with action levels below the CRQL;
- conformance of the method to standard USEPA methods and practices.

After reviewing these criteria, the analytical methods summarized in **Table 4-1** were chosen for this project. The rationale for choosing the specific analytical method is presented below for field and laboratory analyses.

Physical Analysis of Water Samples
Water samples requiring analyses for pH, temperature, specific conductance and turbidity will be analyzed using Watts Engineers SOPs (**Appendix C of the Site Investigation Work Plan**) and/or manufacturer's specifications, which are based upon the published USEPA methods for water. These analyses will be performed to provide supplementary data for off-site laboratory analyses and to assist in the overall water quality characterization. Data generated through the use of these methods will meet or exceed the established task-specific data needs/uses.

Chemical Analysis of Water Samples
Water samples requiring chemical analyses for Target Compound List (TCL) Volatile Organics via EPA SW-846 Method 8260, Target Compound List (TCL) Semi-Volatile Organics via EPA SW-846 Method 8270, Target Compound List (TCL) Pesticides via EPA SW-846 Method 8081, Target Compound List (TCL) PCBs via EPA SW-846 Method 8082, and Target Analyte List (TAL) Metals via EPA SW-846 Methods 6010/7470/9012, respectively. These analyses will be performed to provide current groundwater conditions.

Data generated through the use of these methods will meet or exceed the established task-specific data needs/uses.

Chemical Analysis of Soil Samples
Soil samples requiring chemical analyses for Target Compound List (TCL) Volatile Organics via EPA SW-846 Method 8260, Target Compound List (TCL) Semi-Volatile Organics via EPA SW-846 Method 8270, Target Compound List (TCL) Pesticides/PCBs via EPA SW-846 Method 8081/8082, and Target Analyte List (TAL) Metals plus Cyanide via EPA SW-846 Method 6010/7470/9012. The analyses will be performed to provide information regarding evaluation of cleanup goal objectives.

In addition, samples of fire brick and brick sediments collected from Parcel 2 will be tested for asbestos.

Data generated through the use of these methods will meet or exceed the established task-specific data needs/uses.

8.0 QUALITY CONTROL CHECKS

The following sections describe the QC checks that are commonly applied to investigations and their definition and purpose. Field blanks, field duplicates, and matrix spike samples are analyzed to assess the quality of the data resulting from the field investigation soil sampling and groundwater monitoring efforts. A summary of the various field and laboratory QC checks applicable to this project and their required frequencies are provided in **Table 4-2** and **Table 4-3**, respectively.

8.1 Field Generated Quality Control Checks

Field generated QC checks are samples sent to the laboratory from the field by either the field sampling team (internal) or by a third party (state agency). These types of samples serve as checks on both the sampling and measurement systems, and assist in determining the overall data quality with regard to representativeness, accuracy and precision. The number and type of field QC samples submitted varies with the intended data use and the level of contamination (i.e., sample analyte concentrations) expected.

8.1.1 *Internal Field Checks*

Field Blank

Field blanks (also called decontamination rinsate blanks) are defined as samples which are obtained by running analyte-free water through sample collection equipment (bailer, pump, auger, etc.) after decontamination, and placing it in the appropriate sample containers for analysis. These samples are used to determine if decontamination procedures are adequate.

Duplicates

Field duplicates (also called replicates or collocates) are individual portions of the same (replicates) or essentially the same (collocated) field sample. Collocates are independent samples collected in close proximity to one another such that they are essentially an equal representation of the parameter(s) of interest at a given point in space and time.

Collocated samples, when collected, processed, and analyzed by the same organization, provide intra-laboratory precision information for the entire measurement system including sample acquisition, homogeneity, handling, shipping, storage, preparation and analysis. Collocated samples, when collected, processed and analyzed by different organizations, provide inter-laboratory precision information for the entire measurement system.

Trip blanks

Trip blanks generally pertain to volatile organic samples only. Trip blanks are prepared by filling a sample container with analyte-free water prior to the sampling event. The trip blanks are then transported to the field and are kept with the investigative samples throughout the sampling event. They are then

packaged for shipment with the other samples and sent for analysis. There should be one trip blank included in each sample shipping container for shipments with aqueous VOC samples. The samples are used to determine if any cross-contamination between sample containers occurs. At no time after their preparation are the trip blank sample containers opened before they reach the laboratory.

8.2 Laboratory Generated Quality Control Checks

Laboratory generated QC check samples are samples generated at the analytical laboratory by the laboratory personnel from the same (internal) or a different (external) laboratory. These types of samples serve as checks on the laboratory sampling and measurement systems and assist in determining the data quality with regard to laboratory accuracy and precision. The number and type of laboratory QC check samples varies with the intended data use and the level of contamination (i.e., sample analyte concentrations) expected.

Laboratory QC check samples may measure either method and/or instrument performance. Method (preparation) performance check samples collectively measure the entire laboratory analytical data generation process, from sample allocating in the laboratory through the analysis and data reduction. Instrument (analysis) check samples measure the laboratory performance from the point where analysis begins, generally excluding any preparation/extraction affects, through the analysis and data reduction.

8.2.1 *Internal Laboratory Checks*

Method Blank

Method blanks (also called preparation blanks) are usually aliquots of analyte free water which are processed through all procedures, materials, reagents, and labware used for sample preparation and analysis. However, a method blank may be an aliquot of a known low level analvte matrix (such as washed sand) in order to more appropriately match the matrix of interest. Method blanks are used to determine if contaminants are present in the reagents, laboratory preparation, or analysis systems.

Reagent Blank

A reagent blank is prepared in the same manner as a method blank but is not subjected to the preparation procedures (digestion and/or extraction). Reagent blanks are used to determine the purity of the reagents used in the preparation/extraction and to isolate other contamination present in the analysis system.

Matrix Spike Blanks

Matrix spike blanks (MSBs) are aliquots of reagent water spiked with known quantities of specific compounds and subjected to the entire analytical procedure. MSBs are used to determine the appropriateness of the spiking

solution used for the matrix spikes/matrix spike duplicates (MS/MSDs).

Duplicates

Laboratory duplicate samples fall into two basic categories: samples run through the entire sample allocating, preparation and analysis method (method or matrix duplicates) and samples run through only the analysis method (analysis or instrument duplicates). In either case a "duplicate" is a second, additional aliquot of the same sample generated at either the pre-preparation or post-preparation step of the method and carried from that point on through the rest of the method as a routine sample. Duplicate samples are used to define either method (preparation plus instrument) or instrument precision. In some organic methods, two additional duplicate aliquots of the same sample are prepared and spiked (matrix spike and matrix spike duplicate) in lieu of a normal matrix duplicate.

8.3 Database/Electronic Media Quality Control Checks

For data entered into electronic media by laboratories and contractors other than Watts Engineers, all electronic media will be verified through the data validation and authentication (if applicable) programs as described in Section 11. Hardcopy data from the laboratories and/or contractors will also be compared against the electronic media generated by these sources at the level and frequency specified in Section 11.

For data input into databases, or electronic media generated by Watts Engineers, the quality of the data entry and output will be verified according to the Watts Engineers' SOP for Project Quality Assurance/Quality Control Procedures included in **Appendix C of the Site Investigation Work Plan.**

9.0 INSTRUMENT/EQUIPMENT TESTING. INSPECTION AND MAINTENANCE REQUIREMENTS

The preventative maintenance procedures described below are designed to prevent injury and loss of time and data due to faulty equipment/instrumentation. The purpose of preventative maintenance is to address potential problems before they occur and to help assure that equipment/measurement systems operate adequately when used for routine project activities.

9.1 Field Equipment/Instruments

The planned field instruments for this project include PID, four gas monitor, water-level indicator, pH meter, turbidity meter, specific conductance meter, and thermometer. Specific preventative maintenance procedures to be followed for this and other field equipment are those recommended by the manufacturer and described in the applicable Watts Engineers' SOPs (**Appendix C of the Site Investigation Work Plan**).

Table 9-1 summarizes the relevant preventive maintenance procedures for specific pieces of field equipment to be used for sampling, monitoring, and documentation for this project.

Field instruments will be checked and calibrated in the office before they are shipped or carried to the field at the start of the project. These instruments will be checked and calibrated in the field on a daily basis before and after use. Calibration checks will be performed and will be documented in the field logbook.

9.2 Laboratory Instruments

As part of their QA/QC Program, the laboratory will conduct a routine preventative maintenance program to minimize the occurrence of instrument failure and other system malfunctions.

These procedures are documented in the laboratory QA plan.

9.3 Documentation

Appropriate documentation of all equipment/instrument maintenance shall be maintained by the field and laboratory personnel and shall include what was done, date, time (if appropriate), next scheduled maintenance, equipment status, anomalies, and person performing maintenance. This documentation shall be entered into field logbooks, or into specific maintenance log forms for off-site maintenance activities.

Table 9-1
Field Equipment Calibration Requirements and Maintenance Schedule
Buffalo Harbor State Park Site
City of Buffalo, Erie County, New York.

Equipment Type	Calibration Requirements	Maintenance Schedule
Photoionization Detector (PID)	Daily or Per Manufacturer's Recommendation	Recharge or replace battery. Regularly clean lamp window. Regularly clean and maintain the instrument and accessories.
Turbidity Meter	Daily or Per Manufacturer's Recommendation	See Manufacturer's Manual. Recharge or replace battery. Regularly clean and maintain the instrument and accessories.
pH, Specific Conductivity and Temperature Meter	Daily or Per Manufacturer's Recommendation	See Manufacturer's Manual. Recharge or replace battery. Regularly clean and maintain the instrument and accessories.
Four Gas Monitor	Daily or Per Manufacturer's Recommendation	See Manufacturer's Manual. Recharge or replace battery. Regularly clean and maintain the instrument and accessories.
Personal Protective Equipment	Not Applicable	Integrity function test prior to donning equipment. Visual inspection for donning defects/leakage for all reusable gear.

10.0 INSTRUMENT CALIBRATION PROCEDURES AND FREQUENCY

This section describes procedures for maintaining the accuracy of all measurements and measuring equipment which are used for conducting field tests and laboratory analyses. All equipment must be calibrated prior to each use and on a periodic basis.

10.1 Field Instruments/Equipment

Field instruments and equipment used to gather, or generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. The calibration and use of field instruments is referenced in Watts Engineers SOP **(Appendix C of the Site Investigation Work Plan)**.

Equipment to be used during field sampling will be examined to certify that it is in operating condition. This includes checking the manufacturer's operating manual to ensure that all maintenance requirements are being observed. Backup instrumentation will be sent into the field where possible. Two thermometers will be sent to sampling locations where measurement of temperature is required, including those locations where a specific conductance probe/thermometer is required. Preventive maintenance will be conducted for equipment and instruments to ensure the accuracy of measurement systems, and to verify the availability of spare parts and backup systems (see Section 9.0).

Calibration of field instruments is governed by the specific SOP for the applicable field analysis method, and such procedures take precedence over the following general discussion.

Calibration of field instruments will be performed at the intervals specified by the manufacturer or more frequently as conditions dictate. Field instrumentation may include a PID, four gas monitor, pH meter, turbidity meter, water-level indicator, specific conductance meter, and thermometer for soil and/or groundwater analyses. In the event that an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be removed from service until the problem is resolved.

10.2 Laboratory Instruments

The ASP calibration procedures and frequencies are specified in the ASP protocols. In all cases where analyses are conducted according to the ASP protocols, the calibration procedures and frequencies specified in the applicable ASP protocols will be followed.

Calibration of laboratory equipment for non-ASP analyses will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing QC activities. These records will be filed at the location where the work is performed and will be subject to

QA audits. For all instruments, the laboratory will retain a factory-trained repair staff with in-house spare parts or will maintain service contracts with vendors.

The records of laboratory calibration will be kept as follows:

- if possible, each instrument will have a record of calibration permanently affixed with an assigned record number;
- a label will be affixed to each instrument showing description, manufacturer, model numbers, date of last calibration, by whom calibrated (signature), and due date of next calibration. Reports and compensation or correction figures will be maintained with the instrument;
- a written stepwise calibration procedure will be available for each piece of test and measurement equipment; and
- any instrument that is not calibrated with manufacturer's original specification will display a warning tag to alert the analyst that the device carries only a "Limited Calibration."

More detailed information on the calibration of laboratory equipment is presented in Section 8.0 of this QAPP and in the laboratory QA plan.

10.3 Standards/Calibration Solutions Preparation

The standards/calibration solutions preparation will be performed in accordance with the ASP protocols, if applicable, and using good laboratory practice (GLP) in all cases.

11.0 DATA REDUCTION, VALIDATION AND REPORTING

Applicable methods and procedures will be required for the reduction, validation and reporting of data generated during all phases of this project. Both the field and laboratory data will be subjected to a level of data validation commensurate with the required data quality level. If required by the NYSDEC, all data will be validated using either the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October, 1999), the NYSDEC guide to preparing data usuability summary reports, USEPA Region II CLP Organics Data Review and Preliminary Review (SOP No. HW-6, Revision 12), USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October, 2004) and/or the Evaluation of Metals Data for the Contract Laboratory Program (SOP No. HW-2, Revision #11) or the same guidelines modified for non-ASP analyses. The level of complete transcription checks (raw data to reporting for calculation checks) shall nominally be 10 percent, but this percentage may be increased or decreased depending on the nature and significance of the individual results.

11.1 Data Reduction

Data reduction involves the generation, interpretation and calculation of results from the field and laboratory analyses performed as part of the data gathering effort. In order to make the appropriate decisions, it is necessary to verify that the reported values are correct, both in the way they have been generated (instrument calibration, etc.) and the way they are calculated and reported. Due to the different quantities of documentation and the different quality levels of data generated in the field and the laboratory, somewhat different levels of effort are required for reduction verification for these different data sources.

11.1.1 *Field Data Reduction*

Raw data from field measurements and sample collection activities will be appropriately recorded in the field logbook. If the data are to be used in the project reports, they will be documented in the report. All measurement data recorded in field logbooks or field forms will be reviewed by the PM for completeness and clarity. Any discrepancies noted will be resolved by the PM. All calculation equations shall also be verified by the PM and individual calculations will be verified at a minimum frequency of 10 percent by the QA/QC Officer. Any field information entered into data systems will be subject to the Watts Engineers QA/QC procedures found within the Watts Engineers Technical Procedures Manual which is attached to the Watts Engineers SOP (**Appendix C of the Site Investigation Work Plan**).

11.1.2 *Laboratory Data Reduction*

The off-site laboratory will perform in-house analytical data reduction and validation under the direction of the Laboratory QA Officer. The Laboratory QA Officer is responsible for assessing data quality and advising of any data

which were rated "preliminary" or "unacceptable" or other notations which would caution the data user of possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as follows:

- raw data produced by the analyst is turned over to the respective area supervisor;
- the area supervisor reviews the data for attainment of QC criteria as outlined in ASP protocols and/or established USEPA methods and for overall reasonableness;
- upon acceptance of the raw data by the area supervisor, a computerized report is generated and sent to the Laboratory QA Officer;
- the Laboratory QA Officer will complete a thorough audit of reports at a frequency of one in ten, and an audit of every report for consistency;
- the Laboratory QA Officer and area supervisors will decide whether any sample re-analysis is required; and
- upon acceptance of the preliminary reports by the Laboratory QA Officer, final reports will be generated and signed by the LM. The laboratory package shall be presented in the same order in which the samples were analyzed.

Laboratories will prepare and retain full analytical and QC documentation the same as (ASP analyses) or similar to that (non-ASP analyses) required by the ASP protocols.

The laboratory will report the data in chronological order along with all pertinent QC data. Laboratories will provide the following information to the prime contractor in each analytical data package submitted:

- Cover sheets listing the samples included in the report and narrative comments describing problems encountered in analysis.
- Tabulated results of inorganic and organic compounds identified and quantified.
- Analytical results for QC samples, spikes, sample duplicates, initial and continuing calibration verification standards and blanks, standard procedural (method) blanks, laboratory control samples, and Inductively Coupled Plasma (ICP) interference check samples.
- Tabulation of instrument detection limits determined in pure water.
- Raw data system printouts (or legible photocopies) identifying: date of analysis, analyst, parameter(s) determined, calibration curve, calibration verifications, method blanks, sample and any dilutions, sample duplicates, spikes and sample controls.
- Sample preparation/extraction/analysis logs including weights, volumes and dilutions.

11.2 Field Data Validation

Field data assessment will be accomplished by the efforts of the QA/QC Officer and/or PM. The data assessment by the PM or his/her designee will be based on the criteria that the sample was properly collected and handled according to the SOP's (**Appendix C of the Site Investigation Work Plan**) and Section 6.

11.3 Laboratory Data Validation

Validation of laboratory generated data may be performed by Watts Engineers' subcontractor. The Contractor data reviewer will conduct a systematic review of the data for compliance with the established QC criteria based on the spike, duplicate and blank results provided by the laboratory. An evaluation of data accuracy, precision, representativeness and completeness, based on criteria in Section 4, will be performed and presented in the summary report.

The data reviewer will identify any out-of-control data points and data omissions and interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the PM based on the extent of the deficiencies and their importance in the overall context of the project.

Data validation for laboratory data will be performed in accordance with the NYSDEC Guidelines for Preparing a Data Usability Summary Report. Non-ASP analysis data will also be validated using the functional guidelines, but use of the guidelines will be modified according to the applicable method and required QA/QC. It is anticipated that all laboratory data will be validated (i.e., complete transcription checks, calculation checks, etc.) by the laboratory.

11.4 Data Reporting

All data generated for the Site will be computerized in a database format organized to facilitate data review and evaluation. The computerized data set will include the data flags provided in accordance with the USEPA Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses and Inorganic Analyses, as well as additional comments of the data reviewer for ASP analyses. For non-ASP analysis, the data will include appropriate flags based on the data validation functional guidelines. The data flags will include such items as: 1) concentration below required detection limit, 2) estimated concentration due to poor recovery below required detection limit, 3) estimated concentration due to poor spike recovery, and 4) concentration of chemical also found in laboratory blank. Selected data reviewer comments will also become part of the database in order to indicate whether the data are usable as a quantitative concentration, usable with caution as an estimated concentration, or unusable due to out-of-control QC results.

The Site data set(s) will be available for controlled access by the PM, and authorized personnel. The complete data set(s) will be incorporated into the report.

12.0 REFERENCES

USEPA. 1994. Guidance for the Data Quality Objectives Process. September 1994, EPA QA/G-4.

ATTACHMENT 1

Analytical Laboratory (Severn Trent Laboratories, Inc.)
Quality Assurance Plan (Upon Request)

Attachment 1. All laboratory handling and custody procedures must conform to the ASP or USEPA requirements. A brief summary of the required laboratory custody and sample handling procedures is presented below.

The laboratory's QA officer will ensure that chain-of-custody records are filled out upon receipt of the samples and will note questions or observations concerning sample integrity. The laboratory's QA officer will also ensure that sample-tracking records are maintained. These records will follow each sample through all stages of laboratory processing. The sample tracking records must show the date of sample extraction or preparation and the date of instrument analysis. These records will be used, in part, to determine compliance with holding time requirements.

ATTACHMENT 2

Data Validator's Qualifications Statement
(Furnished Upon Request)

APPENDIX C - WATTS ENGINEERS TECHNICAL PROCEDURES MANUAL ENVIRONMENTAL SAMPLING PROTOCOLS AND PROCEDURES

Technical Procedures Manual

June 2005

6.0 INTRODUCTION AND OVERVIEW

Watts Engineers Field Sampling Manual (FSP) is found in this section and describes the basic equipment, techniques, and procedures that environmental staff may be required to know on a project specific basis. The manual should be used as a guide. Relevant standards and practices are referenced within the subsections for additional and more detailed sources of information. Several field data forms for use with tasks such as boring log completion, monitoring well completion, record of well purging/development and sampling have been included with the FSP Manual for employee use.

Review and applicability of each environmental procedure should be confirmed with the individual project manager prior to their use since it is possible site-specific requirements may override these standard practices.

FIELD SAMPLING SUPPLY LIST (General)

Logs:
- Boring Logs
- GW Level
- GW Develop
- GW Purge/Sample

Field Notebook:
- Plans
- FSP
- HSP
- Authorization letter(s)
- field book

PPE:
- Hardhat
- Gloves: (inner, outer, work)
- APR
- APR cartridges
- Glasses
- Boots
- Tyveks
- Outer Boots
- Safety Vest

Clothing:
- Long underwear
- Extra Socks
- Extra pants
- Extra shirts
- Gloves
- Heavy Coat
- Coverall
- Hat
- Helmet Liner
- Sun hat
- Ear Plugs
- Rain gear

Sampling Supplies:
- Sample Jars (extras)
- Coolers
- Ice
- Spoons
- Bowls
- Foil
- Labels
- Chain-of-custody forms
- Fed-Ex forms
- Clear packing Tape
- Bubble wrap
- Zip-loc bags
- COC seals

Sampling Equipment:
- PID
- FID
- Charcoal Filters
- Manuals
- Calibration gases
- Drum bailer
- Bucket Auger
- hydrogen

Decon Supplies:
- Alconox
- Several Squirt Bottles
- Garden Sprayer
- Water
- Brushes
- Garbage bags
- Buckets
- Distilled water
- Plastic rolls

Misc:
- Map
- Flashlight
- Pocket knife
- Sharpies
- Utility Knife
- Scale
- Measuring Wheel
- Measuring Tape
- Duct tape
- Toolbox
- Pens
- Camera
- Folding Ruler
- Straping Tape
- Folding table
- Folding chair(s)
- Paper towels
- Snow shovel
- Snow sled
- Kleenex
- First aid kit
- Clipboard
- Hammer
- Stakes
- Scissors
- Calculator
- Cell Phone
- Traffic Signs and Cones

Groundwater:
- Generator
- Redi-Flo 2 Pump(s)
- 110v Converter
- Water Level Meter
- pH/Conductivity/Temp Meter
- Turbidity Meter
- D.O. Meter
- Hose
- Hose Connectors
- Bailers
- Bailer Line
- Hermit Data Logger
- Pressure X-ducers

List of Procedures

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Split-Spoon Sampling Procedures (Drill Rig)

Split-spoon sampling is a standard method of soil sampling to obtain representative samples for identification and laboratory testing, as well as to serve as a measure of resistance of soil to sampler penetration.

Procedure:

1) Measure the sampling equipment lengths to ensure that they conform to specifications. Confirm the weight of the hammer (140 lbs.).

2) Clean out the auger flight to the bottom depth prior to sampling. Select additional components as required (i.e. leaf spring core retainer for clays or a sand trap for non-cohesive sands).

3) Lower the sampler to the bottom of the auger column and check the depth against length of the rods and the sampler.

4) Attach the drive head and hammer to the drill rods without the weight resting on the rods.

5) Lower the weight and allow the sampler to settle up to 6 inches. If it settles more, consider use of another sampler.

6) Mark four 6-inch intervals on the drill rods relative to a drive reference point on the rig. With the sampler resting on the bottom of hole, drive the sampler with the 140 lb. hammer falling freely over its 30 inch fall until 24 inches have been penetrated or 100 blows applied.

7) Record the number of blows per 6 inches. Determine the "N" value by adding the blows for the 6- to 12- to 18-inch interval of each sample attempt.

8) Open sample, describe the soil and collect a moisture content sample from the nose of the spoon if only one soil is present and additionally if more than one soil type is present. Place moisture content sample in an appropriate container and label the container. Collect an environmental sample if required.

9) Document all properties and sample locations on the attached Boring Log form.

10) Place sample in a suitable container, and store on-site until work has been completed, at which time the samples will be prepared for off-site disposal at a licensed facility.

11) Decontaminate split-spoon sampler properly prior to next use.

Reference: *American Society of Testing Materials (ASTM), 1999, ASTM D1586-99, Standard Method for Penetration Test and Split Barrel Sampling of Soils.*

BORING LOG

Drill Rig:	Date Drilled:	Logged By:
Boring Dia:	Boring Number:	

Sample	Blow Counts	Completion	OVA (ppm)	Depth	Lithology	Description
				4		
				8		
				12		

Completion Notes:

Site:

Project No.:

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WATTS ENGINEERS

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Unified Soil Classification System

Soils are classified for engineering purposes according to the United Soil Classification System (USCS) adopted by the U. S. Army Corps of Engineers and Bureau of Reclamation. Soil properties which form the basis for the USCS are:

- Percentage of gravel, sand, and fines
- Shape of the grain-size distribution curve
- Plasticity and compressibility characteristics

According to this system, all soils are divided into three major groups: coarse-grained, fine-grained, and highly organic (peaty). The boundary between coarse-grained and fine-grained soils is taken to the 200-mesh sieve (0.074 mm). In the field, this distinction is based on whether the individual particles can be seen with the unaided eye. If more than 50% of the soil by weight is judged to consist of grains that can be distinguished separately, the soil is considered to be coarse-grained.

The coarse-grained soils are divided into gravelly (G) or sandy (S), depending on whether more or less than 50% of the visible grains are larger than the No. 4 sieve (3/16 inch). They are each divided further into four groups:

W: Well graded; fairly clean (<5% finer than 0.074 mm)
P: Poorly graded (gap-graded); fairly clean (<5% finer than 0.074 mm)
C: Clayey (<12% finer than 0.074 mm); plastic (clayey) fines. Fine fraction above a line with plasticity index above 7.
M: Silty (>12% finer than 0.074 mm); non-plastic or silty fines. Fine fraction below a line with plasticity index below 4.

The soils are represented by symbols such as GW or SP. Borderline materials are represented by a double symbol, as GW-GC.

The fine-grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are divided further into those having liquid limits lower than 50% (L) or higher (H).

The distinction between the inorganic clays C and the inorganic silts M, and organic soils O is made on the basis of a modified plasticity chart. Soils CH and CL are represented by points above the line, whereas soil OH, OL and MH correspond to positions below the line. Soil ML, except for a few clayey fine sands, are also represented by points below the line. The organic soils O are distinguished from the inorganic soils M and C by their characteristics odor and dark color.

Visual Identification

Soil properties required to define the USCS are the primary features to be considered in field identification. These properties and other observed characteristics normally identified in describing a soil are:

a. Color

b. Moisture conditions

c. Grain size

   1) Estimated maximum grain size
   2) Estimated percent by weight of fines (material passing No. 200 sieve)

d. Gradation

e. Grain shape

f. Plasticity

g. Predominant soil type

h. Secondary components of soil

I. Classification symbol

j. Other features such as:

- organic, chemical or metallic content
- compactness
- consistency
- cohesiveness near plastic limit
- dry strength
- source-residential, or transported (aeolian, water borne,
- glacial deposit, etc.)
- evidence of contamination

Shelby Tube Sampling Procedure

Shelby (thin-wall) tube sampling is commonly used in cohesive soils (where split-spoon sampling results in an "N" value less than 15) to obtain relatively undisturbed samples. The thin-walled tube accepts the least frictional resistance as the soil moves up into the sampler. The sampler is advanced in a continuous and rapid motion without twisting on impact.

Procedure:

1) Clean borehole to the required sampling depth, using care not to disturb the material to be sampled during the cleaning process.

2) Prepare the sample for use, verifying that the tube is round, smooth, not dented or scratched, rust-free, and that the cutting edge has been hone to proper dimensions (ASTM D1587-00, 2000).

3) Record dimensions of the sampler. Note that the length and diameter of the sampler can be varied depending on soil conditions.

4) Lower the sampler on the drill rods to the bottom of the hole.

5) Make a reference point on the drilling rig and measure a length on the rods equivalent to the sample tube length, minus 10% (this allows for slough in the hole).

6) Raise the water level in the hole to ground surface or above, if practical (this step likely may be omitted).

7) Push the sampler the required distance into the soil with continuous motion of consistent weight.

8) If the sampler cannot be advanced by pushing, note the length advanced and stop sampling.

9) Rotate the rods three revolutions, using a wrench to shear the sample. Allow the sampler to sit undisturbed for five minutes.

10) Withdraw the sampler slowly and pull rods evenly to retrieve the sample. Break the thin-walled tube out of the sampler. Measure sample length and calculate recovery.

11) Clean out the rod end of the tube and discard disturbed slough. Trim cutting edge of the sampler. Use the cuttings for onsite description, and if required, a moisture content sample.

12) If sample length is recessed from either end, insert plug and seal with wax. If the tube is full, seal ends with caps and/or wax the ends, including the caps if possible.

13) Label the sample container and prepare sample for shipping and/or storage.

References: *American Society of Testing Materials (ASTM) 2000. ASTM D1587-00, Standard Method for Thin-Walled Tube Sampling of Soils.*

Documentation of Soil Borings Performed with a Drill Rig

Each subsurface boring will be logged in a bound field logbook during drilling by the supervising geologist. Field logs will include descriptions of subsurface material encountered during drilling, sample numbers, and types of samples recovered from the borehole. Additionally, the geologist will note time and material expenditures for later verification of contractor invoices.

Upon completion of daily drilling activities, the geologist will complete the daily drilling record form and initiate chain of custody on any samples recovered for geotechnical or chemical laboratory testing. Following completion of the drilling program, the geologist will transfer field logs onto standard boring log forms for the final investigation report.

On a weekly basis, the project geologist will submit a summary report to the project manager containing, at a minimum, the following records: (1) a summary of the daily drilling, (2) a progress report on field activities, and (3) a record of site visitors.

Procedure:

The proper completion of the following forms/logs will be considered correct procedure for documentation during the drilling program.

1) Field Log Book, weather-proof and hand-bound, will be used by the project geologist.

2) The attached Boring Log will be filled out daily or as needed by the project geologist.

3) All daily drilling activities will be recorded in the Field Log Book by the project geologist.

4) The attached Summary of Well Installation and Summary of Bedrock Well Installation forms will be filled out as needed or on a daily basis.

BORING LOG

Drill Rig:	Date Drilled:	Logged By:
Boring Dia:	Boring Number:	

Sample	Blow Counts	Completion	OVA (ppm)	Depth	Lithology	Description
				4		
				8		
				12		

Completion Notes:

Site:

Project No.:

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WATTS ENGINEERS

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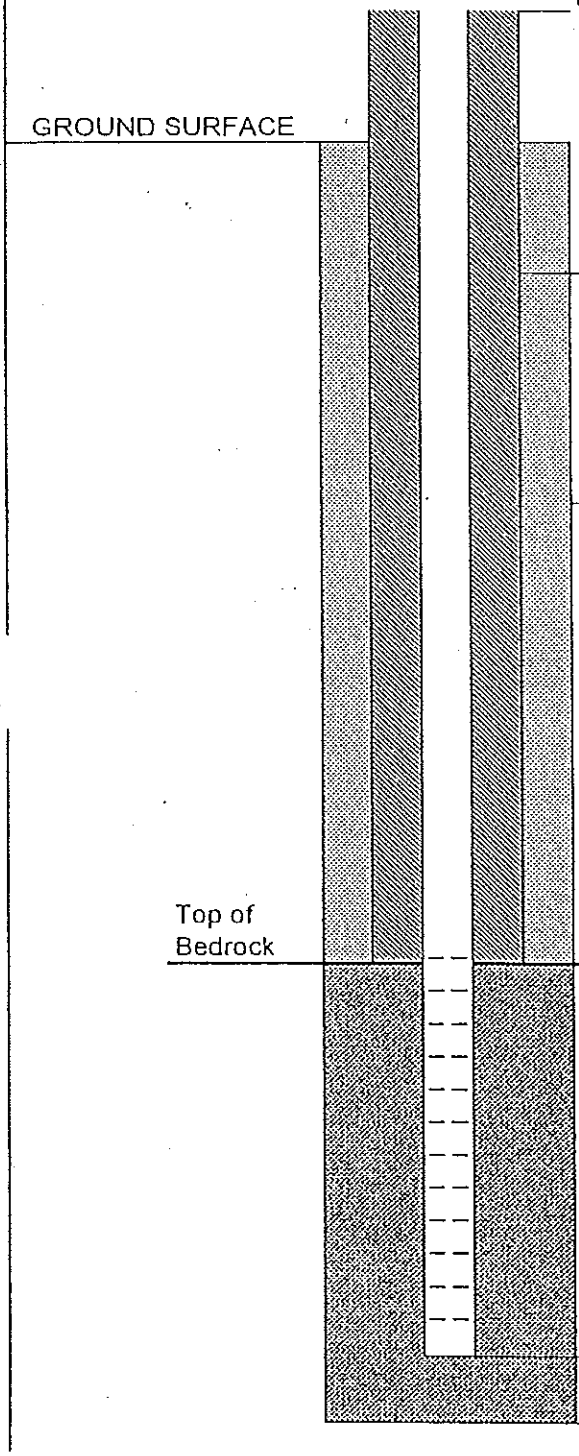
SUMMARY OF BEDROCK WELL INSTALLATION

WATTS ENGINEERS
3826 MAIN STREET
BUFFALO, NY 14226

.IENT:
. ROJECT:

BORING NO:
DATE STARTED
DATE COMPLETED



Height of riser above ground surface: _____

Type of protective casing _____

Length of casing _____

Depth to bottom of casing: _____ bgs

Type of seal: _____

Depth to bottom of seal: _____ bgs

Depth to top of wellscreen: _____ bgs

Type of well screen: _____

Depth to bottom of well screen _____ bgs

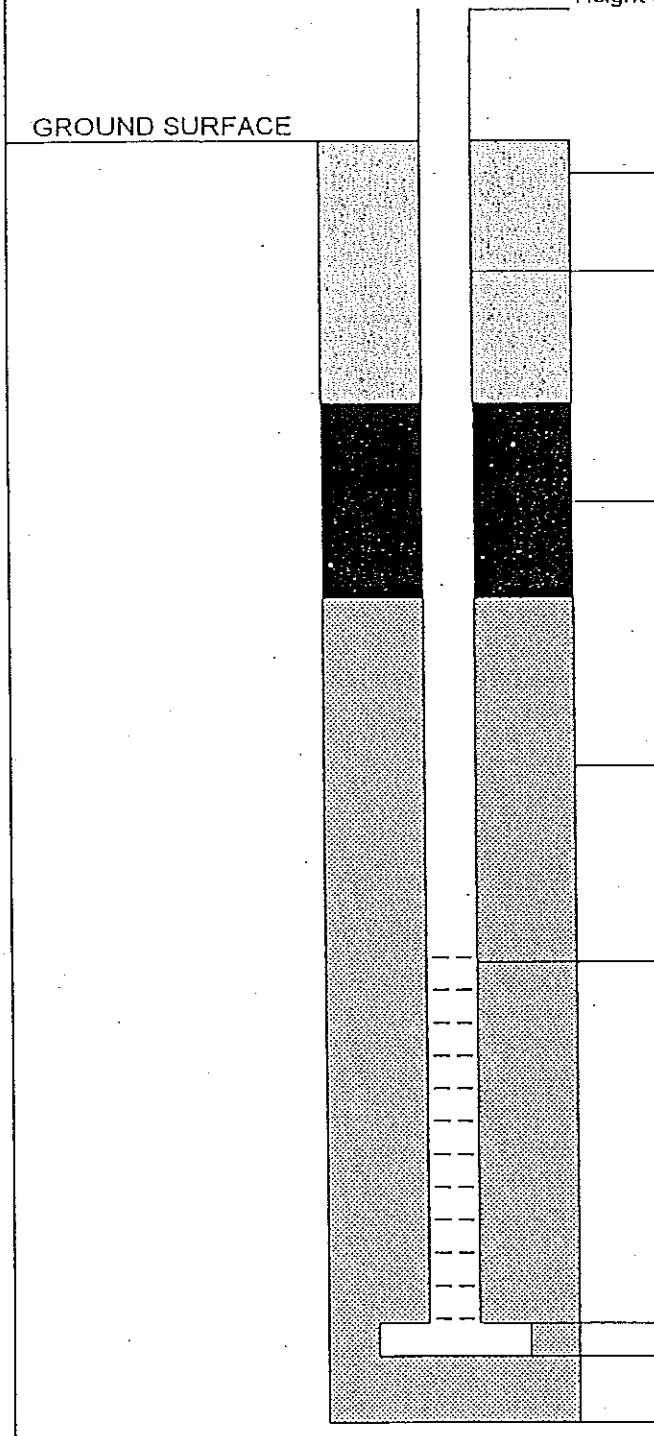
Depth of borehole: _____ bgs

SUMMARY OF WELL INSTALLATION

WATTS ENGINEERS
3826 MAIN STREET
BUFFALO, NY 14226

CLIENT:
PROJECT:

BORING NO:
DATE STARTED
DATE COMPLETED



Height of riser above ground surface: _____

Type of backfill: _____

Type of riser: _____

Depth to top of Seal: _____ bgs

Type of seal: _____

Depth to bottom of seal: _____ bgs

Type of sand pack: _____

Depth to top of sandpack: _____ bgs

Depth to top of well screen: _____ bgs

Type of well screen: _____

Depth to bottom of well screen: _____ bgs

Depth to tip of well: _____ bgs

Depth of borehole: _____ bgs

bgs = Below ground surface.

Soil Sampling by Test Trenching and Sampling of Depth

Test trenches, pits and deep excavations in conjunction with or independent of deep soil/waste sampling, can be a useful tool in delineating waste areas and for environmental and chemical characteristics of a site. Trench locations and dimensions are determined based upon the results of geophysical surveys, soil gas surveys, site inspections, and discussions with state and local authorities (NYSDOT, NYSDEC etc.).

Deep soil/waste will be collected from areas which exhibit elevated organic vapor readings, or other evidence of contamination (i.e., visual staining). Under no circumstances will personnel be allowed to enter a test trench. Additional health and safety issues will be presented in the site-specific Scope of Services/Work Plan.

Sampling Equipment

The following equipment will be used for test trenching and deep soil/waste sampling:

- Backhoe
- Appropriate organic vapor monitor
- Stainless steel spoon and bowl
- Shovel
- Field logbook and pen
- Plastic sheeting
- Precleaned sample containers
- Latex gloves (disposable)
- Neoprene gloves
- Decontamination equipment

Trenching and Sampling Procedures

In order to minimize the spread of potentially contaminated soils, plastic sheeting will be spread out adjacent to trenching areas and excavated soil will be stockpiled on sheeting. The trench will be excavated by means of removing soils in six-inch lifts or by excavating into the face of any slope to the predetermined dimensions. Each lift and bucket removed from the trench will be screened using the organic vapor monitor and the concentration will be noted in the field logbook and on the test pit log.

Samples for analysis will be selected based on elevated organic vapor readings and/or visual observation of stained materials. Soil samples will also be collected from any areas that have been directly impacted by a leaking drum, containers, or tanks. All samples will be collected from the backhoe bucket using the following procedures:

- The bucket will be screened using an organic vapor monitor and the results noted. A judgment will then be made by the field staff to determine if a sample is to be taken. If a sample is to be taken from the bucket, a decontaminated shovel will be used to dig a hole approximately six inches to one foot into the soil. The purpose of this hole is to allow for collection of a fresh sample which has not been in contact with the bucket. A stainless steel spoon or spatula will then be used to collect the exposed soil and place it into either a stainless steel bowl for composting or directly into the appropriate sample container. Samples may also be collected based on headspace screening.

Disposable gloves will be worn by the sampling personnel and changed between samples. An entry will be made in the field logbook for each sample collected. The information will include the following:

- Sample designation, location;
- Name of sampler;
- Method of collection;
- Time and date of sampling;
- Organic vapor readings;
- Type of sample;
- Depth of sample;
- Analysis required and container type;
- Field measurements and calibration;
- Stratigraphy, and observed conditions which may impact the chemistry of the sample; and;
- Observation and remarks

Excavations should be immediately backfilled upon completion of trenching and sampling activities.

Groundwater Well Development Procedures

Following completion of drilling and well installation, each monitoring well will be developed by purging until the discharged water is relatively sediment-free and the indicator parameters (pH, temperature, and specific conductance) have reached steady-state. Developing the well not only removes any sediments but also may improve the hydraulic properties of the sand pack. All discharged water will be collected for possible disposal off site. The effectiveness of the development measures will be monitored closely in order to keep the volume of discharged water to the minimum necessary to obtain the sediment-free samples. Portable meters for turbidity, pH, temperature, and specific conductivity will be used to monitor effectiveness of development. A turbidity reading of 50 NTU and steady-state pH, temperature, and specific conductivity readings will be used as a guide for discontinuing well development.

Procedure:

1) An appropriate well development method should be selected, depending on water level depth, well productivity, and sediment content of the water. Well development options include: (a) bailing; (b) manual pumping; (c) powered suction-lift pumping; and (d) air-lift development.

2) Using an electronic water level indicator, measure the water level below top of riser. Knowing the total depth of the well will enable the calculation of the volume of water in the well. Between measurements, wash the end of the water level probe with soap and water. Rinse it with deionized water.

3) Equipment should be assembled, decontaminated properly, if necessary, and installed in the monitor. Care should be taken not to introduce contaminants to the equipment during installation.

4) Well development should proceed by repeated removal of water from the well until the discharged water is relatively sediment-free. All discharged waters will be collected. Effectiveness of development should be monitored at regular intervals by periodically collecting a separate sample of approximately 200 mls into a 16-ounce plastic bottle to measure pH, temperature, conductivity, and turbidity of the water in the field using a portable meters (The collected water may be disposed of with the other discharge waters after measurements have been taken.). Volume of water removed, turbidity, pH, conductivity measurements, and detection of immiscible layers are recorded on the attached Well Development/Purging Log.

5) Well development may be discontinued either when the turbidity of the discharged water reaches a predetermined value or when the turbidity level, pH, temperature, and conductivity stabilize, indicating that additional development will be ineffective.

6) The collected development water will be containerized and disposed of after the groundwater results are received from the laboratory.

WELL DEVELOPMENT/PURGING LOG

OJECT TITLE : _____
OJECT NUMBER : _____
STAFF : _____
DATE : _____

WELL NUMBER : _____

1. TOTAL CASING AND SCREEN LENGHT (ft) : _____
2. CASING INTERNAL DIAMETER (in) : _____
3. WATER LEVEL BELOW TOP OF CASING (ft.) : _____
4. VOLUME OF WATER IN CASING (GAL.): _____

$V = 0.0408(2)^2 X (\#1 - \#3) =$ _____ GAL.

WELL ID	VOL GAL./FT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.5
8"	2.6

.RAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)						
TEMPERATURE							
pH							
CONDUCTIVITY							
TURBIDITY							

COMMENTS :

WATTS ENGINEERS

Groundwater Well Purging Procedures

In order for representative groundwater samples to be collected, groundwater wells must be purged adequately prior to sampling. Purging will require the removal of three to five volumes of standing water in rapidly recharging wells, and at least one volume from wells with slow recharge rates. Shallow wells in which the screen intersects the water table should require a minimum amount of purging since the groundwater will flow through the screen and not be entrapped in the casing. Deeper wells should be purged more thoroughly, since water may rise up into the casing. A thorough purging will require the removal of several volumes of this trapped water to ensure that representative groundwater enters the casing for sampling.

Procedure:

1) Unlock and carefully remove the well cover to avoid foreign material from entering the well. Monitor the interior of the riser pipe for organic vapors using a the appropriate organic vapor monitor. If there is a reading above the acceptable levels noted in the site specific Health and Safety Plan (HASP), vent the well until levels are within acceptable levels before pumping. If organic vapors do not vent below acceptable levels in the breathing zone, respiratory protection may be utilized in accordance with the site specific HASP.

2) Using an electronic water level indicator, measure the water level below top of riser. Knowing the total depth of the well will enable the calculation of the volume of water in the well. Between measurements, wash the end of the water level probe with soap and water. Rinse it with deionized water.

3) In wells with water levels that remain 25 feet or less below top of casing, use a suction-lift pump to remove three to five times the well volume, and measure into a calibrated pail (a well volume will be defined as the volume of water standing inside the casing measured prior to evacuation). Use new dedicated polyethylene discharge and intake tubing (½" I.D. high-density polyethylene) for each well.

   During evacuation of the well, position the intake openings of the pump tubing just below the surface of the well water. If the water level drops, lower the tubing as needed to maintain flow. Pump from the top of the water column to ensure proper flushing of the well. Continue pumping until the required volumes are removed.

   If the well purges to dryness and recharges rapidly (within 15 minutes), continue to remove water as it recharges until the required volumes are removed. If the well purges to dryness and is slow to recharge (greater than 15 minutes), terminate evacuation. The tubing is then removed from the well and is appropriately discarded.

4) If the water level of a well is initially below 25 feet, or draws down to this level because of a slow recharge rate, use a pre-cleaned 1-1/2 inch bailer, 3 to 5 feet in length, to evacuate the well. The line for this bailer should be new dedicated 1/4 inch nylon. Discard after use.

   Optional methods to purge deeper or high volume wells include: the Waterra hydrolift pump with dedicated polyethylene tubing, and a check valve or an electric submersible pump.

5) Continue purging until a predetermined volume of water has been removed. Effectiveness of purging should be monitored at regular intervals by periodically (usually each well volume) collecting a separate sample of approximately 200 mls into a 16-ounce plastic bottle to measure pH, temperature, conductivity, and turbidity of the water in the field using a portable meters. Use the stability of these measurements with time to guide the decision to discontinue purging. The collected water may be disposed of with the other discharge waters after measurements have been taken. The discharge volume will be established on a well-by-well basis.

6) All well purge water will be collected in drums or tanks at the well head and later transferred to a storage tank or onsite storage area for proper disposal.

7) Record well purging data in the field notebook and on the attached Well Development/Purging Log.

WELL DEVELOPMENT/PURGING LOG

OJECT TITLE : _____
PROJECT NUMBER : _____
STAFF : _____
DATE : _____

WELL NUMBER : _____

1. TOTAL CASING AND SCREEN LENGHT (ft) : _____
2. CASING INTERNAL DIAMETER (in) : _____
3. WATER LEVEL BELOW TOP OF CASING (ft.) : _____
4. VOLUME OF WATER IN CASING (GAL.): _____

$V = 0.0408(2)^2 X (\#1 - \#3) =$ _____ GAL.

WELL ID	VOL GAL./FT
1"	0.04
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8"	2.6

.RAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)						
TEMPERATURE							
pH							
CONDUCTIVITY							
TURBIDITY							

COMMENTS :

WATTS ENGINEERS

Groundwater Sampling Procedures Using a Bailer

Samples will be taken from purged wells as soon as adequate recharge has occurred. Groundwater sampling locations and frequency of sampling shall be defined in each site specific work plan.

Procedure:

1) Well sampling may be performed on the same date at any time after the well has recovered sufficiently to sample, or within 24 hours after purging if the well recharges slowly. If a well does not contain or yield sufficient volume for all required laboratory analytical testing (including quality control), then a decision must be made to prioritize analyses. If a well takes longer than 24 hours to recharge, then a decision must be made after consultation with the client whether or not the sample will be considered valid.

2) After well purging is completed and the well has recharged sufficiently per the previous item, collect a sample into appropriate containers using a decontaminated stainless-steel or a disposable high-density polyethylene bailer. The bailer will be attached to a clean, dedicated 1/4-inch nylon line. Lower the bailer below the surface of the water to attain the sample. Prior to its use and after sampling each well, clean the stainless steel bailer according to standard decontamination procedures. The dedicated rope will be appropriately discarded after each well is sampled. Sample parameters will be prioritized, as organic parameters will be collected prior to inorganic parameters.

3) Properly label all sample bottles in the field using a water-proof permanent marker. Labels will include:

   - Site name
   - Sample identification code
   - Project number
   - Date/time
   - Sampler's initials
   - Preservation added (if any)
   - Analysis to be performed

4) Collect samples into pre-cleaned bottles (containing required preservatives) and place on ice in coolers for transport to the onsite command office for processing (preservation and packing) prior to shipment to the analytical laboratory. Initiate a chain of custody.

5) Collect a separate sample of approximately 200 mls into a 16-ounce plastic bottle to measure pH, temperature, conductivity, and turbidity of the well in the field.

6) Record well sampling data in the field notebook and on the attached Well Development/Purging Log.

WELL DEVELOPMENT/PURGING LOG

ROJECT TITLE : _____
ROJECT NUMBER : _____
STAFF : _____
DATE : _____

WELL NUMBER : _____

1. TOTAL CASING AND SCREEN LENGHT (ft) : _____
2. CASING INTERNAL DIAMETER (in) : _____
3. WATER LEVEL BELOW TOP OF CASING (ft.) : _____
4. VOLUME OF WATER IN CASING (GAL.): _____

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5"	1.04
6"	1.5
8"	2.6

ARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)						
TEMPERATURE							
pH							
CONDUCTIVITY							
TURBIDITY							

COMMENTS :

WATTS ENGINEERS

Groundwater Sampling Procedures Using a Geoprobe™

A truck-mounted or ATV-mounted direct push sampling system will be operated by a selected Geoprobe™ subcontractor for groundwater sampling procedures using a Geoprobe™. The equipment will be set up and operated in accordance with standard drilling practices, and in a manner that will ensure safe and efficient operation.

Procedure:

1. Using the standard Geoprobe™ screen point sampler, a clean unit is driven to the desired depth and then retracted approximately 0.6 m (2 ft.).

2. Using chase rods from the surface, push the stainless steel screen into the resulting void space. The design of the sampler allows the screen to remain retracted within the probe rods until it is driven to the appropriate sampling depth. The screen is held in place by a sacrificial point fitted with a watertight O-ring seal.

3. Once the screen has been exposed, fit an unused, clean section of polyethylene tubing with a stainless steel bottom check valve and insert down the probe rod to the desired sampling depth.

4. Oscillate the poly tubing up and down to drive a column of water to the surface.

5. Collect the water into sample containers while taking care not to introduce air into the water stream. Fill containers so that no air bubbles remain when capped. Label bottle appropriately and record in field book.

Groundwater Level Monitoring

Determination of groundwater surface elevations throughout a monitoring well network makes it possible to create a water surface contour map and determine approximate groundwater flow patterns. Water levels in all monitoring wells will be measured using a Solinst water level indicator or equivalent. Initially, measurements will be taken following well development after the well has recovered to anticipated static conditions. Subsequently, measurements will be taken as described in the site specific Work Plan. Water levels will also be measured prior to groundwater sampling. Water level measurement procedures are presented below.

Procedure:

1) Clean the water level probe and lower portion of cable following standard decontamination procedures and test water level meter to ensure that batteries are charged.

2) Lower the probe slowly into the monitoring well until the audible alarm indicates water.

3) Read the depth of the nearest 100th of a foot from the graduated cable, using the notched point on the riser pipe as a reference. If the riser is not notched, the highest point on the riser should be used as a reference.

4) Repeat the measurement for confirmation and record the water level. The attached Groundwater Level Log form may be used for measuring multiple wells over various times and dates.

5) Remove the probe from the monitor slowly, drying the cable and probe with a clean "Chem Wipe" or tissue.

6) Replace the monitoring well cap and lock the protective cap in place.

7) Return the water level meter for standard decontamination.

GROUND WATER LEVEL LOG

Date								
Well/ Borehole No.	Time	Depth BRP (FT)	Time	Depth BRP (FT)	Time	Depth BRP (FT)	Time	Depth BRP (FT)

BRP = BELOW REFERENCE POINT

WATTS ENGINEERS

In-Situ Groundwater Permeability Testing (Slug Testing)

Slug tests are performed in groundwater monitoring wells to determine the in-situ hydraulic conductivity of the hydrostraitigraphic unit. The parameters are estimated by analyzing the water level response in the well following an induced instantaneous change in water level. Procedures and equipment requirements are expected to vary depending on the recharge rate of the well.

In-situ permeability tests will be performed on wells as specified in the site-specific work plan. Tests will be logged on a data logger such as an In-Situ Company, Inc. Hermit, Model SE1000B Data Logger with appropriate pressure transducer, or by hand, depending on the nature of the test to be performed.

Procedure:

1) Measure dimensions of the slug to be used to displace water in the monitor and predetermine the volume of water which will be displaced and corresponding initial water level change which will occur by adding or removing the slug. A bailer with a known volume may be used if a slug is unavailable.

2) Record appropriate initial site specific data into the data logger.

3) Clean the water level meter probe, cable, pressure transducer, and the slug following the standard decontamination procedures.

4) Measure the static water level in the monitor and record in the field log book (only monitors which have fully recovered to static level conditions should be tested). Determine the initial-response water level based on Step 1 and record it in the field log book.

5) Set up the data logger with a pre-cleaned (decontaminated) pressure transducer and cable. Insert the transducer and allow static level to stabilize. Input necessary functions on the data logger including monitoring well identification, data, static level, etc. The pressure transducer should be placed in the screened portion of the well and should not be resting on the bottom of the well.

6) Insert or withdraw the slug and activate the data logger using the log scale measurement function. Continue test until the static water level returns to the pre-test value.

7) Stop the data acquisition program, disassemble, and decontaminate the testing equipment following the standard decontamination procedures.

Surface Water Sampling Procedures

Surface waters may be sampled by direct submersion of the sample container. If, however, the sample location does not lend itself to easy access, then an extendable pond sampler may be used to collect samples using the procedures outlined below. Volatile samples should be collected by submerging the VOA vial and capping underwater, if possible. Otherwise, care must be taken when using a separate container for collection so as not to agitate the water during collection or transfer into the VOA vials.

Procedure:

1. Assemble the pond sampler. Make sure that the sampling pole is tightened properly.

2. With proper protective garment and gear, take grab samples by slowly submerging the pre-cleaned sampler with minimal surface disturbance.

3. Retrieve the pond sampler from the surface water with minimal disturbance.

4. Remove the cap from the sample bottles and slightly tilt the mouth of the bottle below the dipper/device edge.

5. Empty the sampler slowly, allowing the sample stream to flow gently down the side of the bottle with minimal entry turbulence.

6. Continue delivery of the sample until the bottle is almost completely filled.

7. In the same manner, fill all required sample bottles and preserve the sample as required.

8. Secure the appropriately lined (Teflon and polyethylene) cap tightly. The sample jars used for volatile organics analysis (VOA) should contain no void spaces after the lid is secured.

9. Decontaminate equipment according to the standard procedures before moving to the next sampling location. Alternatively, equipment may be decontaminated by steam cleaning or hot water power wash.

10. Label all sample containers with permanent marker using proper procedures. Record all field data in the field notebook.

Kemmerer Bottle Surface Water Sampling Procedures

The Kemmerer bottle allows for the collection of a specific, at depth, sample without contact (i.e., cross-contamination) with the water column. It has the ability to collect sample at depths that exceed the lift capacity of pumps. The procedures described below will be followed when collecting samples with a Kemmerer bottle. Bottle labels should be completed prior to sampling and filled according to the volatility of the contaminants to be analyzed (VOCs first, semi-VOCs second, PCBs/pesticides third, etc.)

Procedure:

1) Check the attachment of Kemmerer bottle to the rope and the rope to the boat or other object.

2) Mark the rope for the desired sampling depth(s).

3) Attach the messenger to the rope and set the trip mechanism on the Kemmerer bottle being careful not to place fingers or hands into any pinch points.

4) Lower Kemmerer to the sampling depth. With the rope taut, drop or slide the messenger towards the Kemmerer.

5) Bring the Kemmerer to the surface, and hold it by the lower stopper, center rod, or by the rope. Do not hold the body or by the upper stopper since they are held together onto the lower stopper by gravity.

6) Fill the bottles using the drain valve on the lower stopper. You may want to "crack" the upper stopper as you are filling bottles since sometimes a vacuum is built up as the Kemmerer is emptied. Fill the VOA vials with a gentle stream of water (do not aerate the sample). If air bubble(s) are present, re-sample using a new VOA vial. Fill the other bottles to the desired volume (to the shoulder for most bottles to allow for expansion).

7) Clean the outside of the bottle with water and/or a paper towel. Attach sample tags when needed.

8) Preserve the sample as soon as possible after filling. Fifteen minutes after placing on ice, check and re-tighten the caps on VOA vials to prevent the infiltration of air and contaminants.

9) Chain of custody forms must be completed by the samplers before leaving the site.

10) Samples must be packaged and shipped according to the United State Department of Transportation (USDOT) and the International Air Transportation Association (IATA) regulations when applicable. At a minimum, samples must be packaged to prevent breakage.

11) Sampling equipment must be decontaminated between each unique sample and before leaving the site.

Reference: Standard Operating Procedure, No./ FWD16A, USEPA

Sediment Sampling Procedures Using a Bucket Auger

The following procedures will be used when collecting sediment samples with a bucket auger:

1. Advance a pre-cleaned stainless steel bucket auger into the surface of the creek bed until the bucket is full (approximately six inches).

2. Using a pre-cleaned stainless steel scoop, remove the contents from the bottom of the auger and place the contents into a pre-cleaned stainless steel mixing bowl.

3. Reinsert the bucket into the open hole and repeat the above procedure until the predetermined termination depth is reached.

4. Collect the sample for VOC analysis, then composite the remaining contents of the bowl and fill the appropriate sample containers. Secure a Teflon-lined cap onto each bottle and place the sample on ice in a cooler for transport to the laboratory.

5. Label the sample bottles with the standard information, complete chain-of-custody documents, and decontaminate equipment before moving to the next location.

Sediment Sampling with a Scoop

Collection of a sediment sample may be performed with a stainless-steel scoop. Stainless steel is preferred over chrome-plated scoops or trowels. Chrome-plated equipment should be avoided where chromium contamination is suspected. This method is most appropriate for shallow samples to a depth of 1 foot or less. If a subsurface sample is desired, a garden shovel may be used to remove the upper sediments to the desired depth and the sample then can be collected with a stainless-steel lab spoon or equivalent. The location and frequency of the samples will be documented in the site-specific work plan.

Procedure:

1) Using a pre-cleaned stainless-steel scoop, collect a sediment sample (to desired depth) and place into required jars.

2) If a subsurface sample is desired, remove sediment to the desired depth with a garden shovel. Then use a pre-cleaned stainless-steel lab spoon or equivalent to collect the required samples.

3) Secure a Teflon-lined cap onto the container and place the sample on ice in a cooler for shipment to the laboratory.

4) Label the sample bottle with the appropriate sample tag. Be sure to label the tag carefully and clearly, addressing all the categories or parameters. Complete all chain of custody documents and record in the field log book.

5) Decontaminate equipment after use and between sample locations using the standard procedure.

6) Record all field data in the field log book.

Sediment Sampling with a Bottom Dredge

When sediment characteristics and conditions warrant, a bottom dredge sampler can be used. A larger heavier dredge can be used in heavily compacted sediments or when sediments contain rocks, gravel, and woody debris. In addition, the heavier dredge can be used in stronger stream currents and enable deeper penetration into the sediment.

Procedure:

1) Attach the necessary length of rope (a bowline knot is best) to the dredge. Attach the rope to the boat.

2) Set the trip mechanism on the dredge. Be careful not to place fingers or hands on or into any pinch points.

3) Lower dredge to the sediment gently lowering through the final 1 to 2 feet of water. Trip the dredge by dropping a messenger or allowing the line to slacken (depending on the type of dredge used).

4) Lift the dredge to the surface with a smooth, even motion.

5) Tilt the dredge to pour off water. Take care to distinguish between water and sediment.

6) Empty the contents of the dredge into a clean stainless-steel bowl.

7) Sediment for volatile organic analyses should be placed directly into the bottle to minimize disturbance. Sediment for other analyses are homogenized in a clean stainless-steel bowl with a clean stainless-steel spoon or equivalent. When necessary, protect the samples from wind blow dust, rain, etc., and from warming, especially samples for organic analyses. Cover the pan with aluminum foil for protection, but avoid contact with the sample, especially samples to be analyzed for metals.

8) Complete the bottle label before filling it with sediment. Bottles for volatile organic analysis should be filled to the very top. Exclude air pockets by taping or gently compacting the soil as the bottle is filled. Do not agitate the sediment or expose to aeration by the wind.

9) Clean the threads and lip of the bottle with a paper towel. Do not touch the sample with the paper towel or gloves. Check the liner in the bottle cap before tightening the cap onto the bottle.

10) Clean the outside of the bottle with water and/or a paper towel. Attach sample tags when needed.

11) Place the sample on ice as soon as possible after filling the sample bottles. Some samples for organic analyses need to be protected from light by using amber bottles and/or by putting in the cooler.

12) Label all sample containers with permanent marker using the standard procedures. Record all field data in the field log book.

All samples will be shipped to the laboratory at the end of each work day using the standard packing, shipping, and chain-of-custody procedures.

13) Decontaminate equipment according to standard procedures before moving to the next sampling location. Alternatively, equipment may be decontaminated by steam cleaning or hot water power wash. Dunk the dredge in the water to wash off some of the sediment prior to the decontamination procedure.

Reference: Standard Operating Procedures, MO.2334.8A, USEPA

NYSDOT Soil Gas Survey Procedures Using a Geoprobe™

The soil gas survey will be conducted to ascertain the presence of volatile organic compounds in the soil, if any, due to petroleum or solvent contamination within the area of proposed construction.

The soil gas survey will consist of advancing a small diameter hole in the soil to various depths using the hydraulic direct push method (Geoprobe™). At each location, volatile organic vapor concentrations will be measured to the depth of excavation with the appropriate field monitoring equipment. Testing locations are tentative and subject to accessibility and the location of USTs, underground utility lines, and other site specific concerns.

The results of the soil gas survey indicate whether soil sampling is warranted at the site and the best location for a soil sample. If organic vapor readings are 10 parts per million (ppm) above background at a site, a soil sample is collected at the location exhibiting the highest reading. If no organic vapor readings greater than 10 ppm are encountered at a site, one soil core is obtained from the soil gas survey point with the highest organic vapor reading and examined for staining or other visual evidence of petroleum contamination. (Soil cores will be extruded according to standard Geoprobe™ soil sampling procedures.) If visual contamination is observed in the soil core, a sample from the soil core is taken for laboratory analysis. If no signs of petroleum contamination are encountered, no soil samples will be taken for analysis from the site. This procedure provides an effective method of finding the location most likely to contain petroleum or solvent contaminated soil if it exists at a site of environmental concern.

All soil gas survey points will be advanced at a minimum distance of 0.75 m (2.5 ft.) away from marked utilities or USTs to reduce the possibility of accidentally damaging an underground line or tank.

A truck-mounted or ATV-mounted direct push sampling system will be operated by a selected Geoprobe™ subcontractor for the soil gas survey. The equipment will be set up and operated in accordance with standard drilling practices, and in a manner that will ensure safe and efficient operation.

Procedure:

1. Inspect the sampling equipment to ensure proper working condition.

2. Set-up probing machine at designated location.

3. A clean drive point adaptor and new expendable point will be driven to the appropriate depth. The drive point adapters and stainless steel tubing connectors will be cleaned with Alconox or equivalent and double rinsed between each use.

The expendable drive point will be sacrificed at each soil gas sampling location and a new point provided for the next location.

4. After the drive point has reached the desired depth, the probe rod will be retracted approximately 8-12 inches to create a void which will allow the migration of soil gas sample into the bottom of the drive point adaptor.

5. A clean, unused piece of 1/4" poly tubing will then be attached to the stainless steel adaptor. The tubing is inserted into the probe rod and extended to the bottom of the probe rod. Using a counter-clockwise circular motion, the tubing is threaded to the drive point adaptor and tightened to compress the "O" ring seal.

6. After connecting the poly tubing to the "down-hole" drive point adaptor, the line is purged by drawing a measured volume of soil gas/vapor through the tubing using the vacuum/volume system mounted in the vehicle or a hand pump.

7. The tubing connected to the drive point adaptor is then disconnected from the vacuum system and will be attached directly to the appropriate organic vapor monitor. The highest reading obtained, usually within the first 20 seconds, is recorded in the field book.

8. After the Geoprobe™ sampling tools are removed from the hole, take an organic vapor reading directly from the unlined hole and record in the field book.

9. After removing the organic vapor monitor from the hole, the instrument is allowed to continue running until readings return to background levels, indicating the instrument has been totally flushed.

10. The hole opening will be closed by filling with ready-mix concrete or asphalt patch in paved areas. In unpaved areas, the opening will be repaired with adjacent native soil.

11. All field equipment must be decontaminated when leaving the work zone. The instruments should be cleaned by wiping with a damp cloth (water only). During days of precipitation, the instruments will be wrapped in a plastic bag to protect the electronics from moisture and to help the decontamination procedure.

Soil Boring and Sampling Procedures Using a Geoprobe™

Soil samples will be collected from the depth interval starting directly below the pavement, where it exists, and its underlying subbase to project specific depths. Samples collected will be composited along the depth of a noted interval, except for samples collected for volatile organics analysis, which must be grab samples.

Procedure:

1. Inspect the sampling equipment to ensure proper working condition.

2. In areas of paved surfaces, bore through pavement until subsurface soil is reached.

3. Select additional components for the sampler as required by site-specific conditions (e.g. Macro-core sampler, or Large-bore sampler for borehole cave-in conditions).

4. Lower the sampler to the ground surface, or bottom of hole previously made by the sampler, and check the depth against the length of the rods and sampler.

5. Attach the drive head assembly to the sample rods.

6. Push sampler into subsurface with hydraulic press to the desired depth above the sampling interval.

7. After penetration is complete, rotate the sampling rods to remove the sampler.

8. Extrude the sample and provide description of the soil in field log book.

9. Attach pre-cleaned sampling rods (or decontaminate), and repeat Steps 6, 7, and 8 for collection of deeper samples.

10. Screen the open soil core with the appropriate site specific monitors, describe the soil, and record all findings.

11. Collect the sample for volatile organics analysis (VOA) directly from the core in the sampler and place it into the appropriate laboratory-cleaned VOA vials. This will be the sample fraction with obvious soil staining or with the highest organic vapor reading. If no distinctions are observed, collect the deepest fraction for VOA, thereby minimizing any loss of potential volatile organic compounds.

12. Pack sample tightly into bottles so that no void space remains. Secure a teflon-lined cap onto each bottle, label with the sample ID, and place the sample on ice.

13. Deposit the remainder of the sample into a precleaned stainless steel bowl. Thoroughly mix (homogenize) the remaining contents of sampler in the stainless steel bowl. Place sample material into the laboratory-cleaned bottles for the appropriate laboratory analysis.

14. Label all sample containers with permanent marker using the standard procedures. Record all field data in the field log book.

    All samples will be shipped to the laboratory at the end of each work day using the standard packing, shipping, and chain-of-custody procedures.

15. Decontaminate equipment according to standard procedures before moving to the next sampling location. Alternatively, equipment may be decontaminated by steam cleaning or hot water power wash.

NYSDOT Soil Gas Survey Procedures Using Hand Tools

The soil gas survey will be conducted to ascertain the presence of volatile organic compounds in the soil, if any, due to petroleum or solvent contamination within the area of proposed construction.

The soil gas survey will consist of advancing a small diameter hole in the soil to various depths using manual hand tools. At each location, volatile organic vapor concentrations will be measured to the depth of excavation with the appropriate field monitoring equipment. Testing locations are tentative and subject to accessibility and the location of USTs, underground utility lines, and other site specific concerns.

The results of the soil gas survey indicate whether soil sampling is warranted at the site and the best location for a soil sample. If organic vapor readings are 5 parts per million (ppm) above background at a site, a soil sample is collected at the location exhibiting the highest reading. If no organic vapor readings greater than 5 ppm are encountered at a site, one soil core is obtained from the soil gas survey point with the highest organic vapor reading and examined for staining or other visual evidence of petroleum contamination. (Soil cores will be extruded according to standard soil sampling procedures using hand tools.) If visual contamination is observed in the soil core, a sample from the soil core is taken for laboratory analysis. If no signs of petroleum contamination are encountered, no soil samples will be taken for analysis from the site. This procedure provides an effective method of finding the location most likely to contain petroleum or solvent contaminated soil if it exists at a site of environmental concern.

All soil gas survey points will be advanced at a minimum distance of 0.75 m (2.5 ft.) away from marked utilities or USTs to reduce the possibility of accidentally damaging an underground line or tank.

Procedure:

1. At each sample location, an organic vapor reading will be taken just above the ground surface and recorded in the field notes as the background concentration.

2. Using a portable generator and a rotary hammer power drill equipped with a 12 in. by 1.25 in. steel drill bit, a hole will be advanced through paved areas to the top of the soil surface. In unpaved areas drilling will not be necessary.

3. Using a steel rod and a hand operated slide hammer, a 0.75 in. diameter hole will be advanced from the top of the soil to the required depth.

4. Immediately after removal of the steel bar from the hole, an organic vapor reading will be taken from the unlined hole. The highest reading, which generally occurs within 20 seconds of monitoring, will be recorded in the field notes.

   In the event that the organic vapor reading is not taken immediately after the steel rod has been removed from the hole, a plastic bag filled with water will be placed over the opening of the hole to provide an air-tight seal until the reading can be taken. In no case will the organic vapor reading be taken more than two minutes after the steel rod has been removed from the hole.

5. When it is determined that the peak reading has been obtained, the probe will be removed from the hole. After removing the organic vapor monitor from the hole, the instrument is allowed to continue running until readings return to background levels, indicating the instrument has been totally flushed.

6. Prior to using the steel rod for the next sample location, the rod will be decontaminated using a brush and soap (Alconox) and water solution. The rod will then be rinsed with water and wiped dry.

7. All holes in the pavement will be repaired by filling with Sakrete (or approved equal) and water.

8. The organic vapor detector must be decontaminated when leaving the work zone. The instrument should be cleaned by wiping with a damp cloth (water only). During days of precipitation, the instrument will be wrapped in a plastic bag to protect the electronics from moisture and to help the decontamination procedure.

Soil Boring and Sampling Procedures Using Hand Tools

Soil samples will be collected from the depth interval starting directly below the pavement, where it exists, and its underlying subbase to project specific depths. Samples collected will be composited along the depth of a noted interval, except for samples collected for volatile organics analysis, which must be grab samples.

Procedure:

1. In paved areas, a portable generator and hammer drill will be used to cut a 4-inch diameter hole through the pavement. All gravel will then be removed from the hole prior to sampling. In grass areas, the grass layer will be removed prior to sampling using a pre-cleaned stainless steel trowel.

2. A pre-cleaned stainless steel hand bucket auger will be advanced through the soil until the bucket is full (approximately 6 in.).

3. A pre-cleaned stainless steel spoon or spatula will be used to place the soil from the bucket into a pre-cleaned stainless steel mixing bowl.

4. Screen the soil core with the appropriate site specific monitors, describe the soil, and record all findings.

5. The hand bucket auger will then be reinserted into the sampling hole and advanced through the soil. Steps two and three will be repeated as many times as necessary to reach the required depth.

6. Collect the sample for volatile organics analysis (VOA) into appropriate laboratory-cleaned VOA vials. This will be the sample fraction with visible soil staining, odor or highest organic vapor reading. If no distinctions are observed, collect the deepest fraction for VOA, thereby minimizing loss of potential volatile organic compounds.

7. Pack the VOA sample tightly into bottles so that no void space remains. Secure a teflon-lined cap onto each bottle, label with the sample ID, and place the sample on ice.

8. Thoroughly mix (homogenize) the remaining contents of sampler in the stainless steel bowl. Place sample material into the laboratory-cleaned bottles for the appropriate laboratory analysis.

9. Label all sample containers with permanent marker using standard procedures. Record all field data in the field log book.

   All samples will be shipped to the laboratory at the end of each work day using standard shipping and chain-of-custody procedures.

10. Repair sample holes by backfilling with native soil. Paved areas will be repaired using Sakrete and water.

11. Decontaminate equipment according to the standard procedures before moving to the next sampling location. Alternatively, equipment may be decontaminated by steam cleaning or hot water power wash.

Sampling Transformers & Other Oil Filled Electrical Equipment

The peculiarities that are associated with transformers and other oil filled electrical equipment warrant that these containers be considered separate from drums and tanks. Because transformers are often located in secured, out-of-the-way locations, access may present a problem. For pole mounted transformers, a power-operated scissor lift or cherry picker will be needed.

The toxic nature and degree of hazard posed by polychlorinated biphenyls (PCBs), which may be present in a transformer, dictate that a high level of caution be used. Appropriate protection will be worn by sampling and support personnel. Spill prevention and control must be planned; plastic sheeting and sorbent pads will be employed. Most importantly, the transformer must be certified as "off-line" and de-energized by an electrician or other responsible person prior to sampling.

Once the power source to the transformer is cut and spill control measures (plastic sheeting on ground and/or floor surface of lift) are in place, the cover of the transformer can be removed with hand tools. A sample of the dielectric fluid will be collected in accordance with ASTM Standard D923, "Standard Methods of Sampling Electrical Insulating Liquids".

In order to obtain a representative sample, a disposable glass Coliwasa, or equivalent, will be lowered into the transformer at a rate that allows the levels of the fluid intake inside and outside the sampler to remain the same. When the sampler reaches the bottom of the transformer, the sampler will be closed. As the sampler is withdrawn, it will be wiped with a disposable absorbent pad. Transfer the sample directly into the sample bottle. If a disposable sampling device is used, and if the transformer is out of service, it may be possible to leave the used sampler in the sampled materials. However, this will only be done after consultation with the responsible authorities. Otherwise the sampler will be placed in a USDOT-approved 1A2 drum along with protective clothing, sheeting and absorbent pads, and disposed by the Client.

The transformer drain valve should never be utilized for sample collection for several reasons. The integrity of these valves cannot be assured. The valve may be rusty, may break or may become jammed in the open position resulting in the uncontrolled release of the transformer's contents. Secondly, it is likely that transformer contents may have stratified. Since PCBs are heavier than other insulating oils, this stratification may prevent the collection of representative samples. Samples obtained from the valve near the bottom of the transformer might reveal higher PCB concentrations than the true concentration of the total dielectric fluid.

Coliwasa Drum Sampling Procedure

Primarily used for drums and similarly constructed containers, the Coliwasa tube sampler allows for the collection of multi-phase liquid waste. Its basic construction consists of an inner (rod) and outer tube fabricated of a variety of materials including glass, Teflon, or PVC. The inner tube is sealed with a round stop on one end which, when raised, allows liquid to enter the annulus between the tubes. When pushed down, the stop seals the hole in the outer tube and allows for sample extraction.

Procedure:

1) After inspecting the drum, carefully open the drum or remove the lid. Some drums may be under pressure. If under pressure, carefully and slowly vent. If opened quickly, there is a possibility that the liquid in the drum will spray out.

2) Slowly insert the coliwasa in the open position to the bottom of the drum, allowing it to fill as it is lowered. The level of liquid inside the coliwasa should be about the same as the level on the outside.

3) Lock the sampler in the closed position.

4) Complete the bottle label before filling with liquid. Bottles should be filled according to the volatility of the contaminants to be analyzed (VOA first, semi-VOAs second, PCBs/Pesticides third, etc.). Avoid getting liquid on the outside of the bottle.

5) Slowly raise the coliwasa out of the drum or container. Place the lower end of the coliwasa into the sample bottle (a wide-mouth bottle is necessary) and slowly release the liquid into the bottle. Make certain that the volume in the coliwasa will not over fill the bottle. Repeat these procedures until each bottle is filled to the desired volume.

6) Fill the VOA vials until there is an inverted meniscus (convex) over the top. Place the septum cap on the vial at an angle over the meniscus, straighten the cap, then tighten onto the vial. Invert the vial and gently tap to verify that there are no bubbles entrapped in the sample. If air bubbles are present, resample using a new VOA vial. If VOA vials are to be filled, it is helpful to use a transfer device such as a clean stainless steel or glass breaker. Fill the other bottles to the desired volume. Assuming that the liquid is concentration waste, small volumes of sample should be sufficient for an analyses. Wide-mouth bottles should be used to ease the transfer of the liquid from the coliwasa.

7) Clean the outside of the bottle or vial with water and/or paper towels. Check the legibility of the label (solvents often solubilize the ink on the label). Attach sample tags when needed.

8) Preserve the sample as soon as possible after filling. Fifteen minutes after placing the VOA vials on ice check and retighten caps to prevent the infiltration of air and other contaminants.

9) Chain-of-Custody forms must be completed by the samplers before leaving the site.

10) Samples must be packaged and shipping according to USDOT and IATA regulations when applicable. At a minimum, samples must be packaged to prevent breakage.

11) Sampling equipment may be decontaminated, but because of the difficulty in cleaning the coliwasa, disposable samplers will most likely be used.

Reference: Test Methods for Evaluating Solid Waste, SW-846, USEPA, November 1986

Soil Headspace Screening Procedures

Headspace screening involves using a field instrument, such as a photoionization detector (PID), a flame ionization detector (FID), a combustible gas indicator (CGI), or a field gas chromatograph (GC) to screen samples for volatile organic compounds found in petroleum.

To perform headspace screening, investigative personnel collect two soil samples at the same depth in a test boring, test pit, or soil pile. The soil sample to be submitted for laboratory analysis *is not* screened but instead quickly placed into a container that is tightly sealed and set aside. A second container is partially filled with the second soil sample, the opening covered with aluminum foil or plastic wrap, and the lid tightly sealed. If soil samples are to be screened with a field GC the lid should be equipped with a septum through which a needle can pass. In the event soil samples are not being submitted for laboratory analysis and a container with a screw-on lid is not available, soil may be placed into a plastic freezer bag and sealed.

The sample designated for headspace screening should be allowed to sit in the sun or other warm place for at least 15 minutes but for no longer than eight hours. For screening with a field instrument, such as a PID or FID, the container lid is unscrewed and the probe of the screening instrument is inserted through the aluminum foil or plastic wrap into the headspace above the soil. Care must be taken to make sure the probe does not come into contact with the soil. Soil samples corresponding to "screening samples" that show the highest needle deflection on the screening instrument are commonly chosen for laboratory analysis. This method is only helpful if certain volatile organic compounds, such as those found in petroleum, are present in the soil.

Equipment Calibration and Start-Up Procedures

All environmental monitoring equipment capable of field calibration will be field calibrated at the start of each day of use. Refer to the manufacturers operations manual for the calibration and startup procedures for each piece of field equipment. Field technicians will be thoroughly familiar with the operation and calibration procedures of all site equipment prior to arrival on site.

NYSDOT Ground Penetrating Radar Procedure

The GPR survey will be conducted by a NYSDOT-approved contractor in the existing and proposed ROW to the edge of pavement. A 1.5 m (5 foot) grid will be established on portions of the survey area that are accessible during the time of the field work. If surficial items on the properties need to be moved temporarily to facilitate the survey, we will notify the private property owners with a letter prepared by NYSDOT. If a suspect UST is discovered, the orientation and dimensions of the suspect UST will be obtained by establishing a grid of 0.3 to 0.6 m (1 to 2 feet) to determine the dimensions and orientation of the UST.

The ground penetrating radar (GPR) system consists of an electronics unit, power supply, graphic recorder, video display unit, and transmitting/receiving antenna. The system radiates electromagnetic (EM) pulses from a band antenna coupled to the ground surface. It functions as an echo sounding system utilizing the EM impulses to detect the location and measure the approximate depth of underground objects. The pulses are transmitted into the subsurface and are reflected by buried objects and/or other subsurface conditions. The result of the survey is a continuous profile of the subsurface with underground objects appearing as distinct shapes or anomalies. The maximum depth of penetration is dependent on the antenna frequency and electrical properties of the subsurface, but may be expected to reach 1.5 m (5 feet) below the ground surface in this project corridor.

Characteristics that are considered in the interpretation of GPR data from a given site include the size, shape, and amplitude of the anomalies. Metal USTs, utilities, and conduits have electrical properties different from the soils in which they are buried. As a result, GPR anomalies from these objects usually have high amplitudes and distinct shapes. Profiles perpendicular to the long axis of a tank yield a parabola shaped anomaly. Profiles oriented parallel to the long axis of a tank yield a set of parallel, high amplitude reflections that terminate sharply at the ends of the tank. Therefore, GPR is a useful tool in outlining the exact location, dimensions, and orientation of USTs.

Equipment Decontamination Procedures

All equipment coming in contact with the sampling media must be cleaned to prevent introducing outside contamination into samples, thereby preserving data validity. The following procedures must be used if steam cleaning or hot water power wash is not available.

Procedure:

1. Thoroughly clean equipment with soap (Alconox or equivalent) and water, until all visible contamination is removed.
2. Rinse with tap water until all visible evidence of soap is removed.
3. Rinse with deionized water.
4. Rinse stainless steel equipment with methanol.
5. Air dry before using.

Sample Labeling

All samples must be properly labeled using the following procedures to prevent misidentification of samples and to aid in the handling of samples during field work, thereby preserving data accuracy. Write the following information on sample labels before attaching to the sample bottle.

- Sample identification
- Site name
- Project number
- Date and time of collection
- Sampler's initials
- Analysis required

Affix to each sample container a non-removable label. The sample container will then be wrapped with 2-inch cellophane tape covering the label and the lid.

Each sample will be assigned a unique identifying alpha-numeric code. Unless otherwise noted in the site specific Work Plan, an example of this code and its components follows:

???-A-SB1-0-1.5m

Project code:	???	Three digit project specific identification code.
Site code:	A	Site A (if the project contains multiple sites)
Sample type:	SB	Soil Boring (SED= Sediment; GW= Groundwater; SW= Surface Water)
Location number:	1	First sample at site
Depth:	0-1.5m	Sample taken from depth interval of 0 to 1.5 m below ground surface.

Sample Shipping and Chain-of-Custody

Proper documentation of sample collection and the methods used to control those documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The following procedures are outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

1. The chain-of-custody record should be completed in ball point pen with all relevant information.

2. The white original accompanies the samples. It should be placed in a sealed plastic bag and taped to the inside lid of the sample cooler. The yellow copy is retained.

3. Place about three inches of inert cushioning material such as vermiculite or zonolite in bottom of cooler.

4. Place sample containers in cooler in such a way that they do not touch. Use cardboard dividers or bubble wrap.

5. Put VOA vials in a sealed plastic bag and place them in the center of the cooler.

6. Pack cooler with ice.

7. Pack cooler with cushioning material.

8. Tape cooler drain shut.

9. Wrap cooler completely with strapping tape at two locations. Secure lid by taping. Do not cover any labels.

10. Place laboratory address on top of cooler.

11. Affix custody seals on front right of cooler. Cover seals with wide, clear tape.

12. Transport cooler to the laboratory.

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APPENDIX D - NYSOPRHP
BUFFALO HARBOR STATE PARK AND MARINA
INTERIM MANAGEMENT GUIDE

BUFFALO HARBOR STATE PARK AND MARINA

INTERIM MANAGEMENT GUIDE

April 21, 2004

State of New York
George E. Pataki, Governor

Office of Parks, Recreation and Historic Preservation
Bernadette Castro, Commissioner

Table of Contents

I.
Statement of Purpose

The purpose of the Buffalo Harbor State Park and Marina Interim Management Guide is to provide direction for the continued operation of recreational opportunities and increase public access to greenspace and patron amenities with an emphasis on the safety of park patrons. The guide provides for continuation of boating related recreational activities and concession operations that have been traditionally allowed in the park. The primary use of the park is a marina, however, it will also offer expanded day uses and related facilities.

The guide provides direction for managers and staff for the day to day protection, maintenance, and improvements of the park to ensure the safety of patrons and staff and the appropriate use and stewardship of the park. The interim guide will provide a foundation for a future master planning process that will consider all compatible uses, activities and alternatives. The master plan will identify long term uses and include a broad public participation process, consideration of alternatives, and a comprehensive evaluation of potential environmental impacts.

II.
Park Profile

Region: Niagara Frontier
County(s): Erie
Park Manager: Sarah Cannon
Address: 1111 Furhmann Blvd.
Buffalo, NY 14203
Telephone: (716) 828-0027
Accessibility: NYS Route 5/Furhmann Boulevard
Operating Season: May 15 – Oct. 15

Nearest Municipality: City of Buffalo
Senate District: 58 – William T. Stachowski
Assembly District: 145 – Brian M. Higgins

Park Classification: Marine Park (Proposed)
Established: 2004
Master Plan Completed: To be determined

Waterbodies: Lake Erie,Buffalo Harbor

Recreation Resources:
12 Boat launch ramps, 1008 docking slips, 2 emergency moorings, bikeway

Historic Resources: None

Natural Resources:
Underwater lands, Lake Erie surface waters

Archeological Resources:
None

Scenic Resources: Lake Erie

Physical Characteristics:

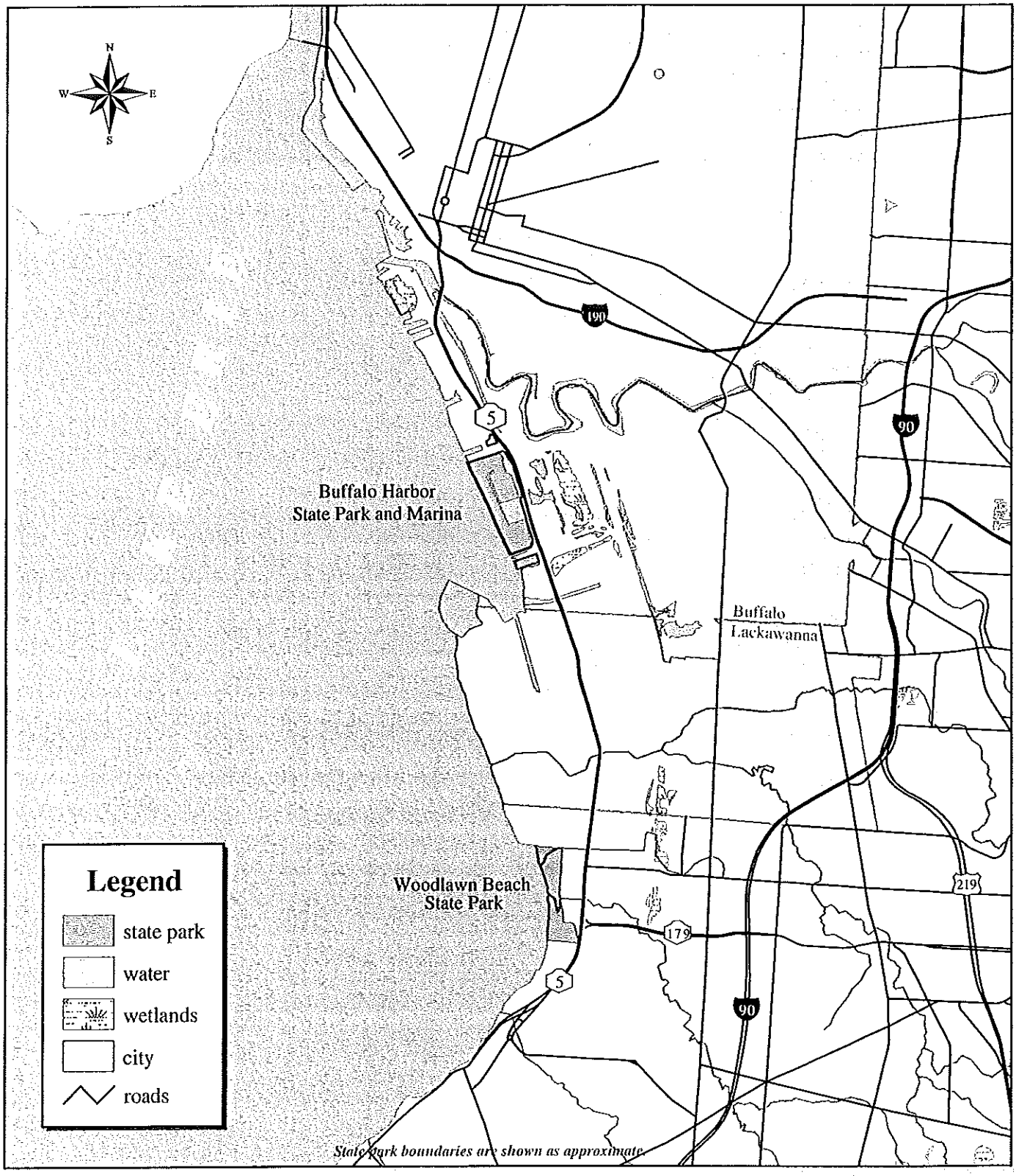
Type	Acres	Percent
Managed	10.4	5%
Developed	39.52	19%
Natural*	158.08	66%
TOTAL	208	100%

* Note that most of this acreage consists of lands underwater.

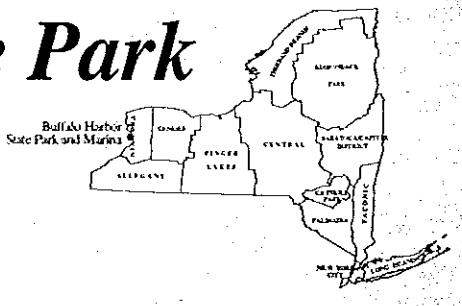
Major Attractions:
Lake Erie, marina

Yearly Attendance*:
2001 – 2002 9,181
2002 – 2003 7,175
2003 – 2004 8,776
* *Comprised of slip rentals and daily launches*

Latest Acquisitions: none



Buffalo Harbor State Park and Marina



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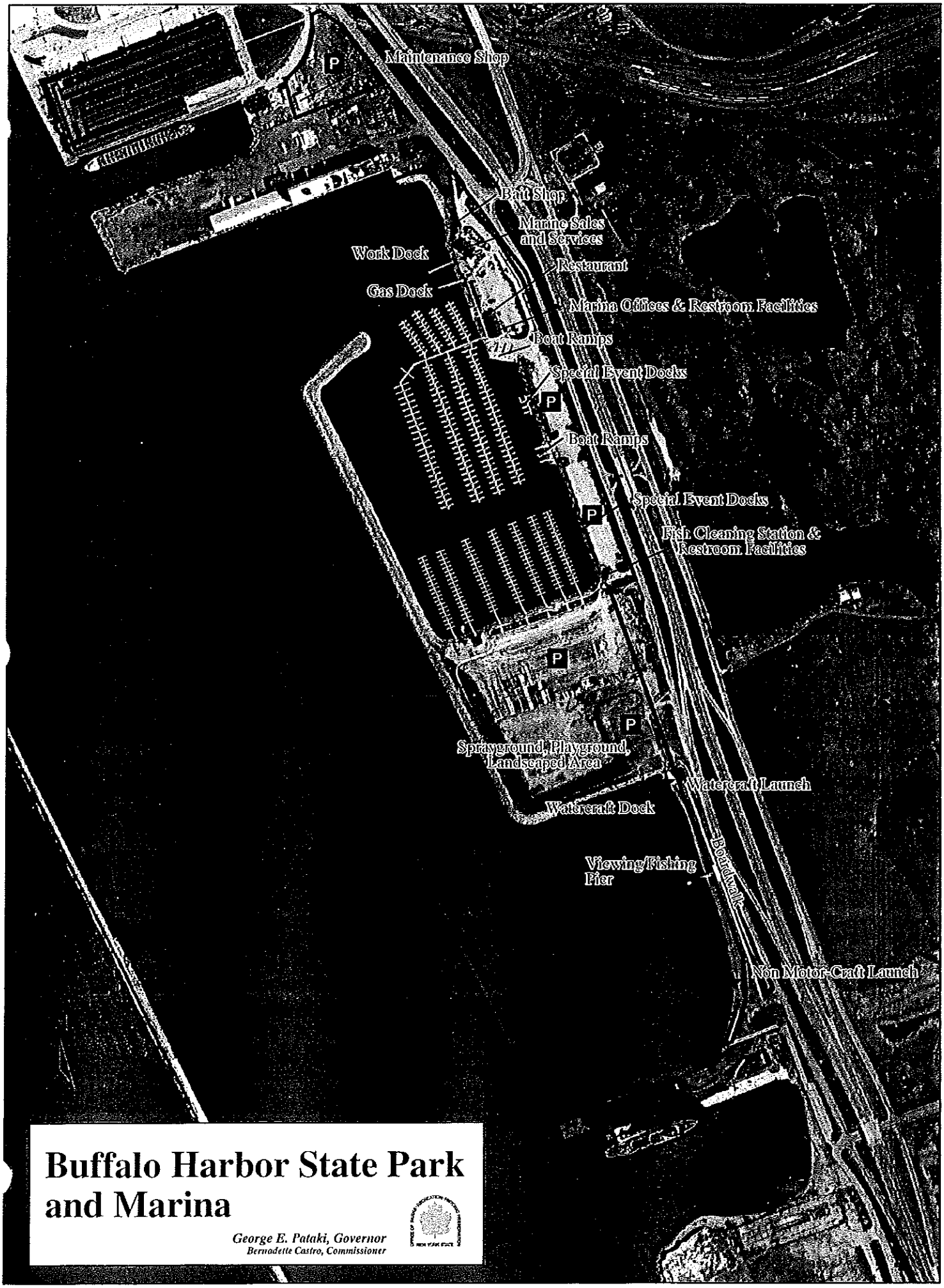
Berndatte Castro, Commissioner

Map produced by NYS OPRHP GIS unit, January 2004.



Buffalo Harbor State Park and Marina

George E. Pataki, Governor
Bernadette Castro, Commissioner

III.
Resource Management

A. Resource Management Areas

The park will be considered as a single resource management area. This will provide the framework for conducting inventories and analysis of the natural, cultural and recreational resources of the park.

B. Resource Management Strategies

1. Natural Resources

Natural resources include geology, topography and soils; terrestrial and aquatic ecology; and water and hydrology.

a. Geology, Topography and Soils

Buffalo Harbor State Park and Marina is located along the shores of Lake Erie within the Great Lakes Basin.

The northern half of the county, in which the park lies, is in the Erie-Ontario lake plain physiographic province. This province is characterized as being relatively level which typifies the topography of an abandoned lakebed.

The bedrock of the City of Buffalo is Onondaga Limestone. In the area of the park however, the Onondaga Limestone may be overlain by the Marcellus Shales. The Onondaga Limestone is the lowest formation of the Devonian Period. It is dark, bluish gray limestone that was often used as building material or in the production of quicklime. The Marcellus Shales are the series of black and dark blue shales which lie immediately on the Onondaga Limestone and transition into the lighter colored Hamilton Shales.

The park's topography is generally level and at an elevation of approximately 580 feet above mean sea level (msl) (Ecosystem Strategies, Inc., 2003).

The primary soil unit identified on park property is classified as Urban Land within the Soil Survey of Erie County, New York (December 1986). This soil type is described as an area where 80% or more of the soil surface is covered by an impervious structure such as asphalt, concrete or buildings. However, this site can be described as fill with a broken up hard surface. The Soil Survey identifies areas with this soil type as having the potential for recreational purposes such as asphalt covered playgrounds.

An approximately 23 acre parcel in the center of the park was used by the US Army Corps of Engineers during the 1950s through 70's to dispose of materials dredged from area shipping channels. NYS DEC records document that many of the materials disposed of at this site were contaminated with several priority pollutants. The site was originally included on the NYS DEC's Registry of Inactive Hazardous Waste Disposal Sites. The site was filled with 5-6 feet of construction and demolition debris and clean fill in 1987. In 1991, the site was removed from the Registry of inactive hazardous waste disposal sites because samples submitted for analysis did not meet the criteria for hazardous waste according to 6NYCRR part 371. However, both the NYS Department of Health and NYS DEC have expressed concerns regarding contaminated materials at the site and the potential for impacts on public health and surface waters. (Ecosystem Strategies, Inc. 2003 - Phase I - ESA). A 1991 memo from DOH to DEC states that any plans for change in the use of the site or adjacent properties should be reviewed by NYS and Erie County Health Departments and if the site is ever to be considered for use as a public beach an extensive study would be required to assure no exposure to hazardous or toxic chemicals would occur in the area.

This site is important as it is the largest developable open land area available within the park boundaries. The NFTA has developed portions of this area as a parking lot and winter storage area for docks. Other improvements such as paved trails, lighting and benches have also been constructed by NFTA in this area.

b. Terrestrial and Aquatic Ecology

The terrestrial ecology of the park is limited due to the highly developed nature of the area. Expected fauna would be shore birds, rodents and small mammals typical of an urban setting. Flora of the park consists primarily of lawn and landscaped areas.

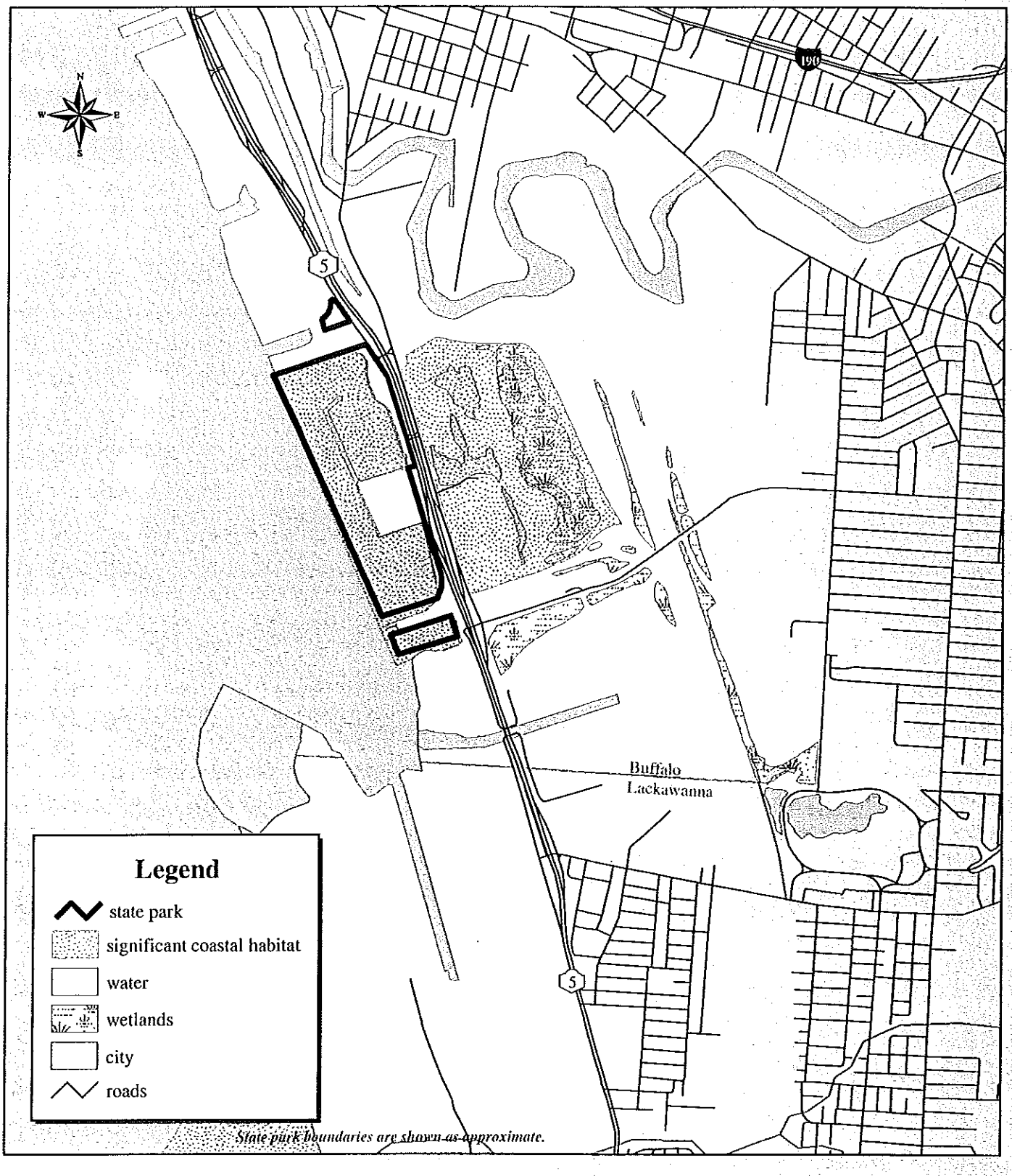
The area known as the Small Boat Harbor, which includes the entire park, has been designated as a significant coastal fish and wildlife habitat by the Department of State Coastal Management Program (see map on page 11). This is the only large shallow water embayment on Lake Erie in Erie County and is one of the most important fish and wildlife habitat areas in the Buffalo Metropolitan Area. Due to its protection from wave action, the harbor supports a highly productive and diverse littoral community, with concentrations of many fish and wildlife species occurring in the area.

Studies of the Small Boat Harbor in 1981 identified this area as an important fish habitat. Major adult fish include: pumpkinseed, yellow

perch, brown bullhead, largemouth bass, muskellunge, carp and freshwater drum. The harbor provides an important spawning and nursery area for many species of fish. The harbor also supports a productive macro benthic community dominated by snails and clams. Submerged, rooted macrophytes and their associated invertebrates and fish provide valuable food resources for many species of waterfowl and other migratory birds. Large concentrations of these birds are observed during both spring and fall migratory periods and during the early winter before the harbor freezes. The most abundant waterfowl species are canvasback, scaups, mergansers, common goldeneye, scoters, mallards, black ducks, Canada geese, loons, grebes and gulls. The harbor area serves as a refuge for large concentrations of waterfowl, especially during rough conditions on Lake Erie.

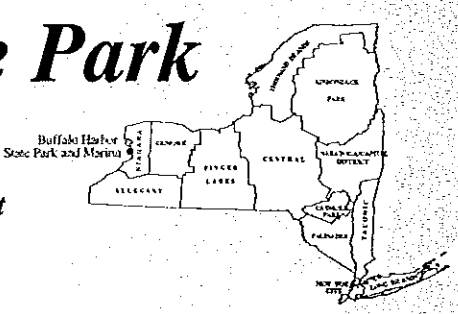
Due to these abundant fish and wildlife populations, the harbor is very a popular location for recreational fishing throughout the year including ice fishing. Birdwatching is also a popular activity in the harbor area, especially during migration periods and in early winter.

As a result of this designation, a habitat impairment test must be met for any activity proposed in this area (Article 42, Policy #7). Land and water uses and development should not be undertaken if they will destroy the habitat or significantly impair its viability. The Coastal Fish and Wildlife Habitat Rating Form (DEC, 1987) for this area states that maintenance dredging or other bottom disturbing activities should be minimized. The form also states, however, that because the existing conditions in the area are largely the result of human activities, considerable allowance should be made for construction and maintenance of harbor structures and that public access to the area should be maintained and enhanced.



Buffalo Harbor State Park and Marina

Significant Coastal Fish and Wildlife Habitat



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Map produced by NYS OPRHP GIS unit, January 2004.

c. **Water and Hydrology**
The main body of water within the park is Lake Erie. Approximately two-thirds of the park acreage is comprised of lands underwater.

DEC regulated wetlands (BU-7 and BU-15) are located approximately 300 feet east of the park (Ecosystem Strategies, Inc., 2003). These wetlands are not within the park boundaries.

d. **Considerations:**

- There are some concerns in the marina area regarding sedimentation and future dredging needs. There is also a need for continual weed harvesting in the marina area during the summer months. These issues will require further study especially with respect to impacts on the significant coastal fish and wildlife habitat area.

e. **Management Strategies**
An initial inventory and analysis of the natural resources of the park has been conducted. The park's primary focus is water-dependent activities such as boating, fishing, windsurfing, birdwatching and scenic viewing. These activities currently take place and will continue. The park has been developed for these purposes and no additional environmental impacts are anticipated.

Recommendations include:

- Further investigations into soil use suitability and contamination in the area previously used for dredge spoil disposal.
- Updated inventory of aquatic flora and fauna including rare, threatened and endangered species.
- Water quality testing may also be necessary.

2. **Cultural Resources**
Cultural resources include the built environment and the archeological resources.

a. **Built Environment**
Construction dates for the structures in the park date from the late 1970's through 2003, thus they are not considered historically significant.

b. **Archeological Resources**
A portion of the park has been identified as a former U. S. Army Corps of Engineers confined dredged material disposal facility (CDF). This CDF was used to contain contaminated dredged material from area shipping

channels and was covered with 5-6 feet of fill. This 23 acre area is currently used as a parking area, dock storage area, and also contains a bike path and other passive recreational areas. The Agency's Field Services Bureau has indicated that work in this area will not impact archeological resources.

c. **Management Strategies**

Since much of the land area of the park can be considered lands previously underwater and created as a result of the Army Corps' filling activity, there is no archeological significance to this area. Any ground disturbing activities in other land areas of the park will be subject to further review by the Field Services Bureau.

IV.
Recreation Resources

The recreation management strategies provide guidance for managing recreation activities until a Master Plan/EIS is completed. The activities primarily involve existing activities and other low-impact activities that are compatible with the environmental resources and provide a safe environment for the user. The Master Plan/EIS will consider these and other compatible use activities and facilities.

The area known locally as "Gallagher Beach" is located in the southern portion of the park. It is an approximately 500 foot shoreline area bordered on the north by the 23-acre land area and on the south by an old grain elevator. It has a gravel beach. During the past several years, NFTA has installed various facilities in this area. A boardwalk and paved bike path run the entire length of the beach. At the north end, near the 23-acre land area, a personal water craft (PWC) launch ramp has been installed, including several docks for temporary tie ups. This facility is heavily used during the summer. Parking for the PWC launch is provided in a lot on the 23-acre land area. In the center of the beach area, NFTA has constructed a 144 ft. pier that is used for fishing, bird watching and viewing Lake Erie. At the south end of the beach, NFTA has constructed a ramp for the launching of non-motorized craft such as windsurfers. There is also a small parking area. Within the 23-acre land area, NFTA has recently made improvements to drainage, landscaping, sidewalks, park, benches and lighting as well as the entrance and parking.

A. Boating/Marina

1. **Existing Conditions:**
   - 1008 seasonal slips. 2 moorings for refuge and 20 moorings for rent.
   - 12 concrete boat launch ramps with parking for 1000 car/trailers.
   - Buffalo Harbor (the outer harbor) is recognized as a Harbor of Refuge.

2. **Considerations:**
   - The 1008 slips are 1/5 of the Buffalo Market. Due to the size of the marina, it establishes market rates on slip rental and launch fees that are followed locally.
   - In 2002, slips had 86% occupancy.
   - The current rate for slip rentals and launch fees are at market. The last rate increase was 3 years ago.
   - Marina can comfortably accommodate up to 40 ft. boats. Of the seasonally occupied slips, 47% are taken by 18-20 ft. boats, 46% are occupied by 30 ft. boats, and 7% are taken by 40 ft. boats. There are a few boats over 40 ft. that need to be more easily accommodated.
   - 36% of the slips have electric service and water, 11% of those have 20 amp electric service and 89% have 30 amp electric service.

3. **Management Strategies:**
   - Continue management and operation of boat launches through concession agreements.
   - Maintain and/or upgrade docks/slips to improve services and increase revenue.
   - Study relocation of Marina Services (Repairs) to expand visitor services on site.

B. Environmental Interpretation

1. **Existing Conditions**
   - No environmental interpretation takes place at the park.
   - The Tifft Farm nature preserve is located just to the east of the park across Fuhrmann Blvd.
   - The upland areas of the park are mostly landscaped and lawn areas with buildings and infrastructure that supports the marina operation.

2. **Considerations**
   - Opportunities to interpret the aquatic fauna and flora of the lake exist.
   - Opportunities to interpret the significant coastal fish and wildlife habitat provided within the small boat harbor exist.
   - No environmental information is provided for the park users.

3. **Management Strategies**
   - Brochures and informational panels/kiosks should be developed that provide information regarding such things as sport fish species, migratory waterfowl, significant habitat and rare, threatened and endangered fish and bird species.

C. Swimming

1. **Existing Conditions**
   A gravel area, known locally as Gallagher Beach, exists south of the small boat harbor. Swimming is not permitted in this area.

2. **Considerations**
   - Water quality of the area may not meet Department of Health standards for a swimming beach.
   - The beach area is used by wind surfers and personal water craft users.
   - Swimming is offered 4.5 miles south of Buffalo Harbor State Park and Marina at Woodlawn Beach State Park.

3. **Management Strategies**
   - Continue to enforce no swimming at the beach area.

- Consider providing other types of water related facilities.
- With regard to any future proposal to create a bathing facility at Buffalo Harbor, there are significant concerns over 1) impacts on the quality of water by past practices in the immediate area, 2) impacts on wildlife resulting from necessary disturbances to the aquatic vegetation used by migratory birds, 3) substantial (potential) use conflicts among windsurfers, jet skiers and bathers, 4) additional resources for recreational management and enforcement, and 5) the substantial costs associated with the feasibility studies for the site proposed for bathing. Moreover, there have been significant advancements in providing recreational opportunity in the vicinity of Buffalo Harbor, most notably the opening of Woodlawn Beach State Park for swimming which is located only a few miles to the south.

  Based on all these factors, it is recommended that a swimming opportunity not be provided at Buffalo Harbor and that alternative recreational uses in other areas be identified and evaluated. Alternatives will include (1) improvements to the Park such as a sprayground, (2) enhancements of the swimming facilities at Woodlawn Beach and (3) better transportation linkages (e.g. shuttle) between these two recreational complexes.

D. Day use/Picnic Areas

1. Existing Conditions

- Walkways/foot paths and landscaping have been installed
- Parking is available for both marina and day users.

2. Considerations

- Space is available to create other day use facilities.

3. Management Strategies

- Develop a picnic area, playground and sprayground.

E. Bike/Pedestrian Path

1. Existing Conditions

There is a bike/pedestrian path along the perimeter of the park. In the area of the beach it takes the form of a boardwalk. Once on the marina land of the park, the bike path becomes a stone dust path. The bike path has recently been improved (surfacing, signing, landscaping, etc.).

2. Considerations

- Use of the bike path will continue.
- Current use levels are unknown.

3. Management Strategies

- Sign and mark path for multiple uses (bike and pedestrian).
- Create additional foot paths.

F. Concessions and Services

1. Existing Conditions

- Fuel and pump out facilities.
  - Were operated by NFTA and not a concessionaire.
  - Fuel pumps and dispenser were replaced in 2003 and are in good working order.
- Slip Aweigh Restaurant (Restaurant/Office)
  - Base rent is $10,000 per year.
  - Percent rent is 10% of gross over $200,000-230,000 and 30% of gross over $230,000.
  - Lease agreement expired 3/31/03. A one year extension was approved.
- Worms N Things (Bait Shop)
  - 484 Sq. Ft. building
  - Sells primarily bait and tackle. They are allowed to sell food only when the restaurant is closed.
  - The bait shop operates from May 1-October 1.
  - Base rent is $1,348.12 per month (during operating season).
  - Percent rent increases from 2% of gross revenue over $10,000 up to 7% of gross revenue over $50,000.
  - Current lease agreement is through 4/3/06.
- Marine Sales and Service (Olson Brothers)
  - Marine Sales and Service Building is used for pleasure boat sales, service and youth boating instruction programs. No fishing charters are sold by this concession.
  - Base rent is $1,500 per month; plus 10% of gross revenues for winter boat storage.
  - Current lease agreement expires July 31, 2006.

- Underwater Land Lease for Boat Mooring (M. Bouquard)
  - The land underwater is leased for the anchorage of boats.
  - Twenty moorings are available for rent.
  - Concessionaire's rent is $420 per year.
  - The lease agreement is renewed automatically each year from May 1 to November 1. Either party may terminate the lease with 30 days prior written notice.

2. Considerations

- Current concessions and services are adequate to serve public but should be reviewed to capture the full market potential with improved services.
- Fuel pumps replaced with charge card capable pumps in 2003.
- Future operation and maintenance responsibilities of fuel and pump-out facilities.
- Parking is limited due to the location and configuration of the buildings.

3. Management Strategies

- Maintain fuel and pump out facilities in good working order.
- Combine fuel and pump-out facility operation will continue to be provided whether through a concession agreement or directly through Parks.
- In the short term, extend lease agreements with concession operators.
- Future concession contracts will be awarded through the Agency's RFP process.
- Adjust fees to be in accordance with State Park policies.
- Evaluate the relocation/reconfiguration of structures and concession functions to provide additional parking and enhance and expand services for the park patrons.

V.
Capital Projects

This Interim Management Guide provides direction for the daily management of Buffalo Harbor State Park to ensure the safety of patrons and staff and the appropriate use and stewardship of the park's resources. This section outlines the type and extent of projects that will be undertaken at the park. As these projects are advanced, a determination will be made as to whether they will require additional review under the State Environmental Quality Review Act (SEQR). These actions fall into two main categories. The first category of actions consists of those actions which are maintenance, rehabilitative, or ancillary to the traditional or existing uses at the park. These exempt actions have been determined not to have a significant impact on the environment or are otherwise precluded from environmental review. The second category of actions comprises those that are new or represent significant change or alteration of existing conditions at the park. These types of actions are subject to environmental review under SEQR, either on a project specific basis, or through the preparation of a master plan. As individual proposals are advanced for consideration, a determination also will be made as to whether they will be addressed under a project-specific environmental review.

The following projects are recommended for consideration:

- Construct and install a Contact Station for Vehicle Use Fee collection at a location along the Park entrance road.
- Install a Park Sign at proposed entrance and other appropriate signage throughout the park.
- Install traffic signs and line striping at proposed entrance.
- Comfort Stations – up grades and maintenance will be performed as needed.
- Install and upgrade utilities or facilities as necessary.
- Install a playground

Long term Capital Projects that may need to be considered before the development of the Master Plan and require site specific environmental review or permits from other agencies include:

- Intermediate breakwater design – will require Army Corps approvals and permits, but will ultimately produce a safer, more protected harbor and shoreline.

- North End Steel Dock System (500 slips total) -- provides a permanently moored floating dock system reducing staff and work time required to remove docks at the end of the season. Appropriate designs that provide wider walk ways and power towers would improve services to patrons.

- Permanently Moored Floating Dock System – Permanently mooring all the docks within the harbor would provide the greatest savings in initial installation costs and annual costs in removal of the docks at the end of the season.

- Purchase of a hydraulic trailer for boat storage – this equipment purchase would allow the park to generate additional revenue.

- Inner Breakwater Stabilization & North End Bank Erosion – Repairs are necessary to maintain public access. Army Corps approvals or permits may be necessary or the Corps may wish to complete this project themselves.

- Ice Boom for the Harbor Entrance – Ice flows into the Harbor prohibiting permanent mooring of docks. An ice boom would prevent ice flows into the harbor.

- Sprayground – Water recreation facilities such as a sprayground will be developed within this park along with ancillary comfort station and changing areas.

- Comfort Station/Shelters - As conditions warrant additional shelters and comfort stations may be necessary.

BOAT HARBOR DEVELOPMENT
PHASE 2
Buffalo, New York
N
SITE PLAN

VI.
Utilities

A. Existing Conditions:

1. Existing Structures

- A bait shop, a boat repair shop, a gas shed/gas dock, a restaurant and office, a storage shed and a fish cleaning station exist on the park.
- Also within the park are a rip-rap dike, paved and unpaved parking areas, sand shoreline areas, lawns and landscaping.
- The southern parcel of the park is surface waters of Lake Erie and is used for boat moorings.
- A maintenance building and parking lot are located in the northern parcel of the park.

2. Water

- The park is serviced by the municipal water supply. No wells are known of on the property.

3. Electricity

- Electric service is provided to the park by the local power company.
- Electricity is provided to all buildings and light fixtures within the harbor.
- Electric service is also available at 36 % of the boat slips.

4. Heating System

- Heat and hot water for the restaurant/office building, marine maintenance facility and maintenance shop are supplied by natural-gas appliances. There are no heating or cooling systems in the other park buildings.

5. Sanitary

- The marine maintenance facility, maintenance building, fish cleaning station, bait-shop and restaurant/office building are connected to the City of Buffalo's municipal sewer system.
- Pump out facilities for boats are provided and are connected to the City of Buffalo's municipal sewer system. This service is provided to boaters at no charge.
- Stormwater/run-off drains are located through out the park, especially within the hardened parking areas. These drains collect surface water run-off (rain, run-off of lake water from retrieved vessels) and discharge into the surface waters of Lake Erie. A SPDES permit for the discharge of stormwater is held by the current marina operators.

B. Management Strategy

Utility and services for the park will continue to be maintained.

VII.
Park Management

A. Overview

Public contact and orientation, and the base for park operations, security and maintenance will be provided near or in the park.

Park management will establish guidelines in accordance with OPRHP rules and regulations and provide public information through signs, brochures, informational kiosks and other appropriate means; collect fees; respond to public concerns; develop and coordinate with constituency organizations; coordinate with municipalities and government agencies; utilize volunteers; identify and conserve environmentally sensitive areas; designate parking areas and comfort stations; and provide basic support for the master plan process.

The New York State Park Police will have primary responsibility for all law enforcement activities, including patrol of park lands, enforcement of all laws, statutes, rules and regulations as well as coordination of activities with federal, state and local law enforcement agencies. The NYS Park Police will take the lead in conducting all search and rescue operations.

The maintenance force will post boundaries and special activity areas; survey the park to identify safety hazards and initiate corrective measures; provide parking areas with minimal support facilities; construct and install signs; remove and dispose of solid waste; maintain park trails and roads; and, construct and install gates and guide rails. Weed harvesting will be conducted during the operating season, as needed.

B. Management Strategies

- Park and Regional Staff will coordinate with the Army Corps of Engineers regarding all water related projects that may affect the outer harbor.
- Park and Regional Staff will coordinate with the Department of State and the City of Buffalo during the development of the City's Local Waterfront Revitalization Plan and during the development of the Park's Master Plan.

VIII.
Security Management Plan

The New York State Park Police-Niagara Region will have lead responsibility for ensuring the safety and security of the park. The Park Police will patrol and respond to all requests for emergency service involving law enforcement, safety, and security matters.

A. Public Notification

- The property will be posted as OPRHP property with areas marked "closed to the public" as needed.
- Signs to identify:
  - Park Rules and Regulations
  - Maps identifying park service roads and buildings.
  - Identify NYS Park Police with contact information as the 24-hour emergency contact point for the facility (for emergency service response: Police, Fire, and Ambulance).
- Public notice will be given that the property is now a State Park, with contact information (via: media, local posting, etc.).

B. Property Patrol

- Uniform Patrols will be provided as part of a zone patrol concept.
- Additional manpower and equipment will be required to enable 24-hour patrol coverage of the park roadway, and special use paths and trails.
- A State Park Police boat will be docked at the Park.

C. Coordination with Other Agencies

- State Park Police supervisory staff will meet with local law enforcement officials, to coordinate matters of mutual concern.
- State Park Operations and Police staff will confer with the City of Buffalo Fire Department on matters of mutual concern.
- State Park Operations and Police will meet with staff from the local Ambulance Service and Emergency Medical Responders regarding EMS service to the facility.

D. Safety & Logistical Concerns

- The regional engineering staff will develop a set of quality maps of the buildings, roads and trails.
- Maintenance staff will provide easy identification of all buildings, roadways and trails.
- The region will establish an adequate secure area for police to use with telephone service etc.

- Operations will secure additional police manpower and equipment to properly patrol the area.

IX.
Public Safety Management Plan

A. Signage

- **Contact Station:**
  - Contact station sign at park entrance that will identify park rules and regulations for items such as:
    - Park Hours of Operation
    - Dogs
    - Fishing
    - Speed Limit 5 mph
    - Barbecue/Picnicking
    - Boat Launching
    - Special Permits
    - Personal Water Craft
    - Others…
  - These will be clearly stated to alert the public as they enter and to help park police and staff maintain control at the facility.

B. Buildings

- All buildings will be named and signed

C. Road Names:

- Roads and paths will be named and signed. This information along with the building numbers will be identified on a park map.

D. Fencing:

- Fencing will be used to protect the public from unsafe conditions and as a control mechanism for secured areas that are not open to public use.
- Entrances to docks and slips are gated to provide security and safety for the slip holders and their vessels. Slip holders are issued key cards to access their slips. The general public does not have access to these areas.

E. Traffic/Parking

- The speed limit is currently posted at 5 mph on park roads. The facility is intended as a marine park with uses such as walking, bird watching, biking and fishing. Park users will be walking along the park roads and crossing them at points of intersection with walking trails. The speed limit should be designated by new signage as 5 mph.

F. Pedestrian Crossings

- Pedestrian crossings will be signed.

G. Trip/Fall Hazards

- Periodic inspections will be conducted to identify and correct potential trip and fall hazards.

X.
Future Planning

The Interim Management Guide provides direction for the daily management decisions of Buffalo Harbor State Park and Marina to ensure the safety of patrons and staff and the appropriate use and stewardship of the park's resources. The information gathered for the preparation of the Guide will assist in the preparation of the master plan/environmental impact statement. Within the future master plan, specific policies are identified; park use, natural, cultural and recreational resources are analyzed; alternative management strategies and development initiatives evaluated; and a preferred alternative selected. The preferred alternative will provide both short and long term direction for the park as well as providing a classification of the park within the State Park system. A significant component of the master planning and environmental review process will be public input. This will include information/scoping meetings and public hearings.