Robinson Duck Farm County Park
Habitat Restoration Feasibility Study

Steve Levy
Suffolk County Executive

Park Management and Habitat Restoration Report

June 2010

Suffolk County Department of Planning
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This publication is available on the WEB at:
http://www.suffolkcountyny.gov/Home/departments/planning/RobinsonDuckFarm.aspx

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Chapter 1 – Introduction

I. Regional Setting

Duck farms abounded on Long Island during the majority of the 20th century, and Long Island ducks were among the most famous of the world's regionally named products. During the peak production years of the Long Island duck industry, which spanned the 1940s, 1950s and early 1960s, duck farms could be found on almost all the freshwater streams in the Riverhead, Eastport and Moriches areas. By the end of the 1930s, about six million ducks were produced on approximately 90 farms located in Suffolk County. By the late 1940s and early 1950s, the approximately 70 duck farms located in Suffolk County produced about two-thirds of all the ducks eaten in the United States. Although production peaked around the late 1950s and early 1960s with the production of 7.5 million ducks per year, the number of active farms declined to 48 by 1963.

Approximately 2,000 acres and nearly 20 miles of shoreline have been utilized for the commercial production of ducks in Suffolk County during the last century. More than a dozen former duck farms are now publicly owned by the U.S. Fish and Wildlife Service, New York State, Suffolk County, and the Towns of Brookhaven, Southampton and Riverhead. Suffolk County has sole or joint ownership interests in eight former duck farms that are located on the Peconic River, Mud Creek, Forge River, Carmans River and Terrell River. Several additional former duck farm sites are proposed for open space acquisition by Suffolk County. Many other former duck farms have been developed for private residential use. However, a significant amount of former duck farm acreage remains underutilized and available for development. The use of these properties in the future poses a unique planning challenge. The duck farm legacy has important ramifications for coastal development, open space acquisition, stream corridor/wetland habitat restoration, and marine resource management.

This study deals with one former duck farm that is owned by Suffolk County – the Robinson Duck Farm County Park. The lessons learned from this project on how various habitat restoration options can be developed for this site to support future parkland use

and management goals can be transferred to other publicly owned former duck farms where restoration projects are targeted in the future. In this sense, the Robinson Duck Farm County Park Habitat Restoration Feasibility Study is a case study whose results will be applicable to other locations in Suffolk County.

II. Project Overview

The goals of this project are: 1. to assess the potential for restoring freshwater wetland, riparian and upland habitats that were extensively degraded by the operation of a former duck farm located on an 87-acre site in The Hamlet of South Haven, Town of Brookhaven, Suffolk County, New York that is now the Robinson Duck Farm County Park; and 2. prepare a restoration plan for this park, which is surrounded by the 2,550-acre Wertheim National Wildlife Refuge (NWR). This plan, produced with input from stakeholders, considered structure demolition and debris clean-up, landform alteration, restoration of hydrological connections and invasive vegetation control for the 1,500 feet of riparian transition zone habitat along the Carmans River in the eastern portion of the park, as well as management strategies for the old farm fields found in the central and western sections. It includes discussion of park management objectives, and preliminary designs and costs for physical restoration activities. As such, the plan provides policymakers with technical guidance on recommendations for future park use and the implementation of habitat restoration actions over short- and long-term periods.

III. Site Description and Intended Use

The former Robinson Duck Farm, located south of Montauk Highway, west of the Carmans River and north of the MTA LIRR right-of-way in South Haven, consists of the following three parcels:

SCRPTM 0200-84900-0300-004002 (0.6 acres)
SCRPTM 0200-84900-0300-011000 (24.1 acres)
SCRPTM 0200-87800-0100-001005 (62.2 acres)

These areas are shown on Figure 2-1

This Suffolk County parkland holding totals 86.9 acres. The deed conveying these parcels to Suffolk County states that the Robinson Duck Farm was acquired under the 1986 Open Space Preservation Program on April 19, 1991 at a cost of $1,590,780. The initial legislation for this program – Resolution No. 762-1986 - authorized acquisition of properties "to preserve our precious water supply, wetlands and woodlands."

This parkland consists of woodland/shrubland, old fields and disturbed areas formerly used for intensive duck farm operations. The duck farm area and old fields are surrounded by federal properties in the 2,550-acre Wertheim National Wildlife Refuge (NWR), which is administered by the United States Fish & Wildlife Service ("Fish and Wildlife Service"). The Wertheim NWR is managed to protect the Carmans River estuary for use by migratory waterfowl and other water birds. Wetlands and forests are managed to maintain and enhance habitat, wildlife diversity and productivity. The Robinson Duck Farm has about 1,500 feet of frontage along the wetland shoreline of the Carmans River.

In accord with Resolution No. 762-1986 and the intent of the Open Space Preservation Program, passive recreation and habitat restoration/protection are the best uses of this parkland given its location in respect to the Wertheim NWR, and the need to protect natural resources in the Carmans River corridor. These uses should be compatible with the natural resource goals and management objectives for the corridor.

The Carmans River is a New York State-designated Scenic River. The portion of the parkland nearest to the west shoreline of the Carmans River is sensitive, given the freshwater wetlands found there and continuing need to protect water quality. The river is on the New York State Department of Environmental Conservation's impaired waterbody list. The Robinson Duck Farm County Park is not located within the Central Pine Barrens Core Preservation Area or the Compatible Growth Area.

IV. Site History and Current Condition

The Robinson Duck Farm (sometimes referred to as the "Carman River Duck Farm") produced many millions of ducks during the period from about 1923 until its closure in 1984. Two hundred thousand ducks per year were produced during the mid-1960s. On the order of 40 structures were located on the farm during the peak of its operation. The environmental impacts of duck farm operation at the site were significant (woodland converted into pens and open feedlots; land surface elevation and hydrological modifications for water flow/control in the riparian transition zone to create swim pond areas for duck use, and to convey duck effluent to waste disposal lagoons; surface water quality degradation). Adverse offsite impacts on water quality in the Carmans River were also present due to the discharge of duck wastes.

Characteristics and conditions at the site today include: remains of dilapidated buildings; piles of debris; old equipment and machinery; duck pen fencing; earthen embankments/waste disposal lagoons, associated structures and piping; dense stands of invasive *Phragmites* in former swim ponds and waste disposal lagoons adjacent to the Carmans River; potential stagnant water; and old field type vegetation. There is an opportunity to restore the environmental attributes of this degraded/disturbed area, an opportunity that is even more significant given the fact the County property is surrounded on three sides by the Wertheim NWR. It is envisioned that restoration activities could involve grading, re-establishment of river hydrological connections, placement of clean fill or removal of fill material, removal of invasive plant material, removal of pipes and other farm structures, and planting of native vegetation to restore wetland, aquatic and grassland habitats in the area.

V. Capital Project 8710.113

Resolution No. 951-2006, which was adopted by the County Legislature on August 8, 2006 and signed by the County Executive on September 5, 2006, amended the 2006 Operating Budget and appropriated $85,000 for Capital Project No. 8710.113: Robinson Duck Farm County Park Habitat Restoration Feasibility Study. This funding, allocated

from the Suffolk County Water Quality Protection and Restoration Program, enabled Suffolk County to conduct the necessary work to inventory site conditions, assess restoration opportunities and develop a recommended habitat restoration plan as documented in this study report. The Suffolk County Department of Planning was assigned the responsibility to execute Capital Project No. 8710.113. The feasiblity study was prepared by Greenman-Pedersen, Inc., 325 West Main Street, Babylon, New York 11207, the environmental consulting firm that was selected by the County as the successful proposer in response to RFP # 08/80012. The project contract with Greenman-Pedersen, Inc. was fully executed by Suffolk County on January 27, 2009. Throughout the conduct of this feasibility study, the Commissioner and staff of the Suffolk County Department of Parks, Recreation and Conservation provided extensive review, comment and support for completion of all work on the site, which is under the jurisdiction of this department.

VI. Robinson Duck Farm County Park Habitat Restoration Work Group

The Suffolk County Department of Planning established the Robinson Duck Farm County Park Habitat Restoration Work Group as a vehicle to provide input from various interested parties on the design, conduct and review of the feasibility study prepared under Capital Project No 8710.113. This work group, which is chaired by the Department, includes representation from the following entities:

- Suffolk County Department of Planning;
- Suffolk County Department of Parks, Recreation and Conservation;
- Suffolk County Department of Health Services;
- Suffolk County Department of Public Works;
- Suffolk County Department of Environment and Energy;
- Suffolk County Legislature;
- U.S. Fish & Wildlife Service, Long Island National Wildlife Refuge Complex
- New York State Department of Environmental Conservation, Region I.
- Town of Brookhaven, Department of Planning, Environment and Land Management;
- Friends of Wertheim National Wildlife Refuge; and

- Post-Morrow Foundation.

Four meetings of the work group were convened by the Department of Planning during the conduct of work on the feasibility study. Meeting summaries, project interim reports and other sources of information on the Robinson Duck Farm, including this feasibility study, are available at http://www.suffolkcountyny.gov/Home/departments/planning/RobinsonDuckFarm.aspx

Chapter 2 – Inventory and Map of Site Conditions

I. Introduction

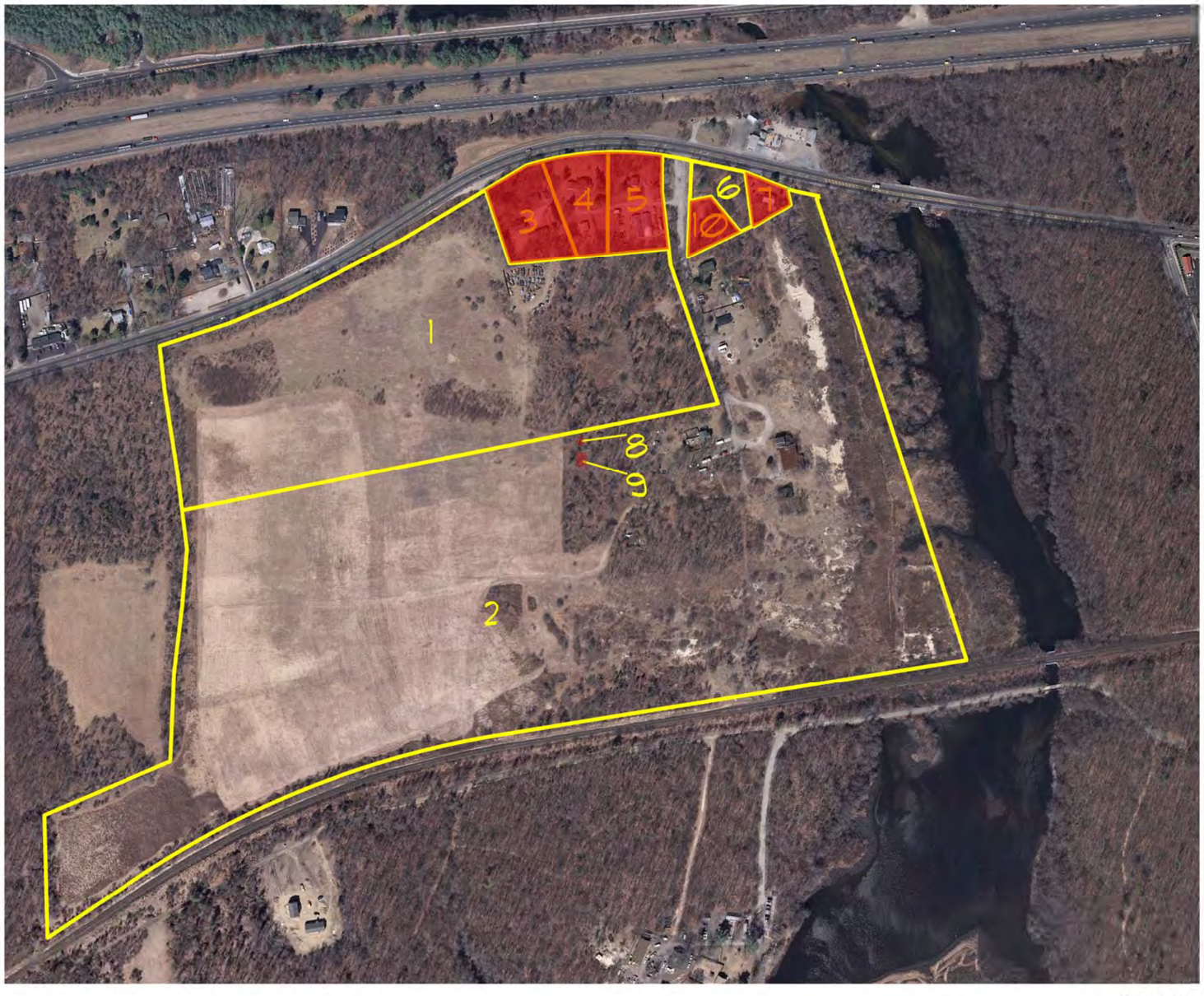
The first task in the Robinson Duck Farm County Park Habitat Restoration Feasibility Study was to inventory and map site conditions. Through many different means of evaluation, discussed in this chapter, a site map of the existing habitats was established. The inventory did not include a complete species listing, however, a list of plant species identified on various site visits is provided in the Appendix 1.

II. Inventory and Base Map Elements

The various relevant characteristics of the property have been incorporated into the base map (Figure 2-1) in the form of "layers" so that any combination of these features can be displayed. The various base map layers are described in the subsections to follow. The Robinson Duck Farm County Park includes three individual parcels. Two large parcels comprise the bulk of the former duck farm property, and a third, small parcel, is located east of the entrance road, which was the site of a former church. The park is approximately 87 acres. There are also seven out-parcels which need to be considered, although they are not County-owned. Three of these are cemetery parcels and are completely landlocked within the County property. One, (#10) nearest the entrance, is privately owned by the former church congregation. The other two (#8 and #9), which are very small and landlocked, are considered abandoned, and thus ownership has reverted to the Town of Brookhaven. The County has agreed, however, to maintain the two town-owned parcels as historic cemeteries, and so the feasibility study will take this into consideration. Four other out-parcels (#3, #4, #5, and #7), along Montauk Highway, are privately owned, and contain many of the buildings and artifacts formerly attached to the duck farm. These are currently maintained as a private residence and museum, and the County recognizes their cultural and historic importance.

A. Aerial Photograph

A 2007 high resolution, CADD suitable, vertical aerial photograph was the starting point of the project base map. It was imported from the NYS Department



200 0 200 400

SCALE 1" = 400'

NYSGIS 2007 AERIAL PHOTOGRAMMETRY

GPI
Greenman-Pedersen, Inc.
Engineers, Architects, Planners
Construction Engineers & Inspectors
325 West Main Street, Babylon, NY 11702
Tel: (631) 587-5060 Fax: (631) 422-3479

- OUTPARCELS
- PROPERTY LINE

#	TAX MAP #	ACRES
1	0200-84900-0300-011000	24.1
2	0200-87800-0100-001005	62.2
3	0200-84900-0300-008000	1.4
4	0200-84900-0300-010004	1.2
5	0200-84900-0300-010003	1.3
6	0200-84900-0300-004002	0.6
7	0200-84900-0300-007002	0.3
8	0200-87800-0100-001003	0.01
9	0200-87800-0100-001004	0.04
10	0200-84900-0300-005000	0.4

Client:
Suffolk County Department of Planning

Project:
ROBINSON DUCK FARM
COUNTY PARK
HABITAT RESTORATION
FEASIBILITY STUDY

No.	Date	Revision	Aprvd.

Drawing Title:
BASE MAP

Date:	Drawn By:
OCT. 12, 2009	KAH
Scale:	Checked By:
AS SHOWN	JRG

Drawing Number:
FIGURE 2-1

Project Number: 2009011

of Transportation Aerial Index. The ability to bring this aerial photo into the CADD system ensures that it is accurate for the purpose of measurements.

B. Topography

A topographic survey, compiled with the use of LIDAR, was supplied by the Suffolk County Department of Planning, for importation to the base map. Like the aerial photograph, this topographic survey is suitable for manipulation in the CADD system, to ensure that it accurately overlays the aerial photo.

C. Property Lines

Property lines were taken from the Suffolk County Tax Maps, provided for the project under license from the Suffolk County Real Property Tax Service Agency. The County has also provided an old survey of the property. Since an actual survey is not necessary for a feasibility study, this was not imported to the base map. During the subsequent design studies, this survey will be evaluated to determine if it needs to be updated.

D. Cultural and Historic Features

Cultural features consist of buildings and structures, some of which have historic significance as discussed above, roadways, well-traveled dirt roads and some limited lawn areas. They were located using a portable GPS survey locator. Historic features include the three houses on the property, which are designated as historic by the County, and the remaining masonry steps of a former church, which have not received a historic designation, but which should be considered an historic feature. The historic houses are indentified on the inventory with the numbers 1 thru 3, and the approximate location of the church stairs in marked with the number 4 (Figure 2-2).

E. Tidal Wetlands/Freshwater Wetlands

In 1974 the New York State Department of Environmental Conservation (NYSDEC), under the landmark Tidal Wetlands Act, conducted a tidal wetlands

200 0 200 400

SCALE 1" = 400'

NYSGIS 2007 AERIAL PHOTOGRAMMETRY

GPI
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Tel: (631) 587-5060 Fax: (631) 422-3479

LINE LEGEND
- PROPERTY LINE
- HABITAT BOUNDARIES
- BUILDINGS

FEATURE LEGEND
C - CULTURAL FEATURES
F - FRESHWATER WETLAND
S - SUCCESSIONAL OLD FIELD
H - HEATHLAND
P - OAK-PITCH PINE FOREST
W - TIDAL WETLAND
- HISTORICAL STRUCTURE
* - BUILDING TO BE PARTIALLY DEMOLISHED
X - BUILDING TO BE DEMOLISHED
1-3 HISTORIC HOUSES
4 APPROXIMATE LOCATION OF CHURCH STAIRS

Client:
Suffolk County Department of Planning

Project:
ROBINSON DUCK FARM
COUNTY PARK
HABITAT RESTORATION
FEASIBILITY STUDY

No.	Date	Revision	Aprvd.

Drawing Title:
HABITAT MAP

Date:	Drawn By:
OCT. 12, 2009	KAH
Scale:	Checked By:
AS SHOWN	JRG

Drawing Number:
FIGURE 2-2

Project Number: 2009011

inventory, utilizing low-altitude multi-spectral aerial photography to interpret vegetation types. This proved to be a very accurate tidal wetland delineation methodology. Although some boundaries have changed since 1974 due to sea-level rise, erosion, land alteration, and tidal hydraulic modification, the boundaries appear to be sufficiently accurate in this location. In 1984 the NYSDEC under the Freshwater Wetlands Act, compiled a freshwater wetlands inventory, using the United States Geologic Survey 7.5 minute quadrangle maps as the base. These have likewise been imported onto the project base map. Freshwater Wetlands have been identified along a wide area located adjacent to and west of the tidal wetlands predominantly located off site on property owned by the USF&WS. The Freshwater Wetland Area consists almost exclusively of *Phragmites*, a serious invasive species in wetlands and adjacent areas.

F. Upland Habitats

The Ecological Communities of New York State (Edinger, et al., 2002) was consulted for the purpose of formulating a habitat classification scheme for the property. Although an excellent resource, it does not handle communities well that have been heavily invaded by non-native species. On the subject property, most of the ecological communities are heavily invaded, as will be discussed in Chapter 3.

Given the existing conditions of the habitats on the property, classifications were assigned on the basis of best possible fit, with some consideration to what community was present before the non-native invasive species incursion. This should not be construed as a pre-judgment of what native plant community a particular portion of the property should be restored to, but certainly such restorations must be considered strong candidates as the feasibility study develops.

The following communities are delineated on the base map:

- Oak-Pitch Pine Forest
- Heathland

- Successional Old Field
- Tidal Wetland
- Freshwater Wetland
- Cultural

The communities were delineated by a combination of photointerpretation and field verification, on March 12, 2009, using a Trimble Pro XR GPS receiver and submeter data collector, digitally corrected using the Coast Guard Beacon.

III. Habitat Condition Assessment

In accordance with the project Work Plan and Scope of Services, the inventory report is required to include an assessment of the condition of the existing habitats found on the site. Through site visits and evaluation of these on-site habitats, we have sufficient observations on species composition and native/invasive species to assess habitat conditions, which overall, could be called poor.

Following is an assessment of the individual ecological communities on the property.

A. Oak-Pitch Pine Forest

It should be noted that the New York State ecological community classified as Pitch Pine - Oak Forest includes a range of sub-communities which collectively comprise the Long Island Pine Barrens. At one extreme, some areas within this community are comprised almost exclusively of pitch pine, with the oaks such as scrub oak found in the understory. At the pitch pine dominated end of the spectrum, forest fires, a natural phenomenon, are most frequent. At the other extreme, some forests are dominated by oaks, with very few pines. This is the case at neighboring Wertheim National Wildlife Refuge and on the Robinson Duck Farm. Oak-dominated forests have a lower frequency of forest fires.

The Oak-Pitch Pine Forest community on the subject property consists mostly of forest fragments, which makes it especially vulnerable to degradation. And, indeed, it is degraded, having been invaded by a host of non-native trees, woody

vines, and herbs. Little or no recruitment of young native trees is evident. It is questionable whether these fragments can feasibly be saved as native woodlands.

B. Heathland

A heathland habitat occupies a portion of the property between the main entrance road, which continues as a dirt road, and the Carmans River wetlands fringe. Despite the fact that its existence is due to soil alterations that resulted from the duck farming operation. This is the healthiest and best functioning community on the property. There is abundant growth of beach heather interspersed with open sandy areas, lichens, toadflax, and small red cedars. There is evident incursion of invasive mugwort, russian olive, and mullein, but it has not yet reached a critical stage. The eastern most portion of this area is invaded by *Phragmites* near to the freshwater wetland habitat.

C. Successional Old Field

The successional old field occupies the western portion of the property, and was formerly farmed to grow corn to feed the ducks. Some time after the cessation of farming activities, this field developed into a successional old field. Sometime during the late 1990s there was a very rapid invasion of exotic mugwort, which outcompeted the native grasses. Within several years, the mugwort became a virtual monoculture, and the high quality native grassland habitat was lost. Over the past several years, Suffolk County Parks has been mowing the mugwort, in an effort to provide possible opportunities for native species to regain a foothold. This habitat also includes a stand of young cherry trees in the northwest corner that is starting to be taken over by *Ailanthus*, a highly invasive species known as tree-of-heaven.

D. Tidal Wetlands

Since the Robinson Duck Farm County Park's easterly property line is greater than 150 feet from the Carmans River, most of the associated tidal wetlands are

east of the property. There is one small exception, consisting of a lagoon with limited open water and a heavily invaded *Phragmites* fringe, which is part of the wetland.

E. Freshwater Wetlands

The freshwater wetland consists of a monoculture of *Phragmites*, undoubtedly the invasive Asian genotype. This area is a wetland by virtue of soil and hydrophytic vegetation, but it functions poorly due to the *Phragmites* dominance. Other than a visual screen and a place for various wildlife species to hide, this freshwater wetland represents a highly degraded, non-native plant community, with very little habitat value.

F. Cultural and Historic Features

Cultural and historic features, interspersed throughout the property, are essentially insignificant in terms of habitat. However, the County has been removing dilapidated structures, and plans to eliminate others, which may provide more area for native habitat restoration. The structures which have been removed (with, however, foundations remaining) and those to be demolished, are marked in the inventory map. The historic structures located on-site will be retained and preserved by the County.

Chapter 3 – Past and Current Management Activities at Robinson Duck Farm County Park and Wertheim National Wildlife Refuge

I. Introduction

The following pages summarize management activities that have been conducted on the Robinson Duck Farm (RDF) property and at the Wertheim National Wildlife Refuge that are of direct relevance to the RDF property and the Robinson Duck Farm Habitat Restoration Feasibility Study. Information collected here is from conversations with Diana Sanford, Environmental Analyst with the Suffolk County Department of Parks, Recreation and Conservation; Tom Williams of the Post-Morrow Foundation; Susi Ponce and Michelle Williams of the Long Island National Wildlife Refuge Complex; and Mark Maghini and Robert Parris of the U. S. Fish & Wildlife Service and former staff at Wertheim National Wildlife Refuge. Additional information was gathered from historical files from the Suffolk County Parks Department and from the U.S. Fish & Wildlife Service at Wertheim National Wildlife Refuge; from previous presentations made by County Planning staff entitled "Robinson Duck Farm County Park Habitat Restoration Feasibility Study Work Group Meeting" from both the March 12, 2009 and June 25, 2007 working group meetings; from the report by the Army Corps of Engineers entitled "Long Island Duck Farm History and Ecosystem Restoration Opportunities" (February 2009); from the 2008 Water Quality Trends at Selected Streams Impacted by Duck Farm Operations report by the Suffolk County Department of Health Services; and from the United States Fish & Wildlife Service (USFWS) Long Island National Wildlife Refuge Complex Comprehensive Conservation Plan (September 2006).

II. Background Information for Robinson Duck Farm

The Robinson Duck Farm County Park property consists of 87 acres located in the Hamlet of South Haven in the Town of Brookhaven, Suffolk County. In 1991, Suffolk County purchased the property under its Open Space Preservation Program in order to preserve the County's water supply, wetlands, and woodlands with passive recreational use as the main goal (Suffolk County Department of Planning 2007, 2009).

A. Water Quality

Water samples were collected from a few sites along the Carmans River and were analyzed by the Suffolk County Department of Health Services (SCDHS). Sampling station 240-15 was located south of the railroad tracks and presumably would receive downstream runoff from the duck farm. This station was sampled once in 1968 and five other times between 1987 and 1999. Samples from monitoring stations north (stations 240-28, 240-30) of the Robinson Duck Farm property off of Old River Rd. and off of Rt. 27 were taken eight times between 1974 and 1999. Samples were analyzed for inorganic nitrogen, orthophosphate, and coliform bacteria. Results were averaged over all the years. Some results are briefly presented here. The downstream site (240-15) had 0.018 mg/L ammonia, 0.856 mg/L nitrite/nitrate, 0.874 dissolved inorganic nitrogen, 0.012 mg/L orthophosphate, and 250/100 mL fecal coliform. The upstream sites (stations 240-28, 240-30) contained 0.167 mg/L ammonia, 0.689 mg/L nitrite/nitrate, 0.836 dissolved inorganic nitrogen, 0.012 mg/L orthophosphate, 214/100 mL fecal coliform. SCDHS reports that levels of the above listed pollutants have been decreasing over time since monitoring began in the late 60s. Fecal colifrom levels, however, are slightly higher than the 200/100 mL total maximum daily load (TMDLs) allowed for most stream classes. Sources of fecal coliform could be from a variety of sources unrelated to the RDF property, such as faulty septic systems, waterfowl, or higher water temperatures (Suffolk County Department of Health Services, 2008). Although these results have been averaged over all years of sampling, they will be useful for comparison with samples taken in the future.

B. Soil Quality

Sediment sampling was done in swim ponds and waste lagoons by the Army Corps of Engineers (Army Corps of Engineers, 2009). Two samples were analyzed from RDF (Figure 3-1). One (1) surface grab composite sample was taken from a downstream location in the former settling lagoon, and one (1) core was taken from upstream sediment. Samples were collected using a hand auger depth-to-sand or at a depth of 4-6 feet. Samples were analyzed at Fort Monmouth

Environmental Laboratory, NJ for volatile organics, semi-volatile organics, pesticides, PCBs, priority pollutant metals, Kjeldahl nitrogen, total phosphorus (P), total organic carbon (C), and total percent solids (Army Corps of Engineers 2009).

Fig. 3-1. Location where soil samples were collected (Army Corps of Engineers, 2009, Appendix 3).

Below is a summary of the soil quality results (Army Corps of Engineers, 2009, Appendix 2).

- *Volatile Organics*: Acetone concentration was found to exceed Technical Assistance Guidance Memorandum (TAGM) threshold but the source of acetone was determined not to be a result of duck farming practices.
- *Semi-Volatile Organics:* Di-n-butylphthalate and Bis(2-ethylhexy)phthalate were found to exceed TAGM threshold. These organics are components of latex gloves. A possible source is cross contamination by the technician wearing latex gloves.
- *Priority Pollutant Metals:* arsenic, chromium, copper, lead, nickel, and zinc were detected.

  Arsenic--did not exceed TAGM threshold

  Chromium--did not exceed TAGM threshold

  Copper--did not exceed TAGM threshold

  Lead--in sediment sample highest level detected at 20.7 ppm, but presence of lead can be attributed to natural deposits.

  Nickel--did not exceed TAGM threshold however, presence of nickel may be due to duck farming activities

  Zinc--levels exceeded TAGM limit of 20 ppm. The core sample contained 41.2 ppm and the composite sample contained 31.6 ppm, but it was not determined that the source of zinc could be attributed to duck farming activities.
- *Nutrients*:

  Kjeldahl nitrogen--levels were considered higher than standard laboratory reporting limits in both samples (Army Corps of Engineers, 2009). The upstream core sample contained 198 ppm and the downstream composite sample contained 419 ppm.

  Total phosphorus--levels exceeded what is considered “normal” at 1450 ppm in the upstream core and 275 ppm in the composite downstream sample.

Total organic carbon--levels exceeded what is considered "normal" at 2480 ppm in the upstream core and 18700 ppm in the composite downstream sample indicating high organic soils.

Total percent solids--both samples had greater than 80% solids (*i.e.,* percent moisture would be 20% or less).

Most striking from these soil analyses is the high levels of nitrogen and phosphorus indicating the legacy effects duck farming agriculture can have on the landscape. It should be noted that photos taken of the sampling process provided in the Army Corps report indicate that soil samples were taken during the dormant season before most vegetation was active. This might have affected levels of nitrogen and possibly phosphorus found in soils. Nitrogen and phosphorus levels in soils are known to vary widely with season, amount of precipitation, soil texture, and vegetation type.

C. Biodiversity Surveys

Information on the floral and faunal biodiversity occupying the RDF property since its acquisition by Suffolk County is very limited. Occasional surveys were conducted for small mammals, herbaceous plants, and birds. None of these surveys were comprehensive or done consistently through time.

- *Small mammals:*

  Small mammals were trapped on RDF property by USFWS staff for 4 days each month from May to September in 2001. The dominant species trapped were white-footed mouse (*Peromyscus leucopus*, 72) meadow vole (*Microtus pennsylvanicus*, 58), and meadow jumping mouse (*Zapus hudsonius*, 55). A few eastern cottontails (*Sylvilagus floridanus*, 2) were also trapped (M. Williams, personal communication, USFWS documents).

- *Herbaceous plants*:

  Table 3-1 provides a list of the herbaceous species observed on the RDF property near areas where small mammals were trapped (M. Williams, personal communication, USFWS documents).

Table 3-1. Herbaceous plants listed from most abundant to uncommon. Asterisks indicate non-native species.

Species Common Name	**Scientific Name**	**Abundance**
Switch Grass	*Panicum virgatum*	Abundant
Mugwort*	*Artemisia vulgaris*	Common
Daisy Fleabane	*Erigeron annuus*	Common
Sweet Vernal Grass	*Anthoxanthum odoratum*	Occasional
Timothy*	*Phleum pratense*	Occasional
Bluegrass	*Poa pratensis*	Occasional
Red Fescue	*Festuca rubra*	Occasional
Perennial Ryegrass*	*Lolium perenne*	Occasional
Dandelion*	*Taraxacum officinale*	Occasional
Bugle*	*Ajuga reptans*	Occasional
Shepherd's Purse*	*Capsella bursa-pastoris*	Occasional
Field Pennycress*	*Thlaspi arvense*	Occasional
Lyre-Leaved Rock Cress	*Arabis lyrata*	Occasional
Garlic Mustard*	*Alliaria officinalis*	Occasional
Spring Vetch*	*Vicia sativa*	Occasional
Goat's Rue	*Tephrosia virginiana*	Occasional
Pansy*	*Viola tricolor*	Occasional
Mayweed*	*Anthemis cotula*	Occasional
Yellow Wood Sorrel	*Oxalis stricta*	Occasional
Venus Looking-glass	*Specularia perfoliata (Triodanis perfoliata)*	Occasional
Rabbit's Foot Clover*	*Trifolium arvense*	Occasional
Hairy Crab Grass*	*Digitaria sanguinalis*	Rare
Azure Bluet	*Houstonia caerulea*	Rare
White Clover*	*Trifolium repens*	Rare
Bladder Campion*	*Silene cucubalus (Silene vulgaris)*	Rare
Smaller Hop Clover*	*Trifolium procumbens*	Rare
Celandine*	*Chelidonium*	Rare
Downy Chess*	*Bromus tectorum*	Uncommon

Species Common Name	Scientific Name	Abundance
Orchard Grass*	*Dactylis glomerata*	Uncommon
Quackgrass*	*Elymus repens (Elytrigia repens)*	Uncommon
Winter Cress*	*Barbarea vulgaris*	Uncommon
Common Milkweed	*Asclepias syriaca*	Uncommon
Long Bristled Smartweed*	*Polygonum cespitosum*	Uncommon
Queen Anne's Lace*	*Daucus carota*	Uncommon
Little Bluestem	*Schizachyrium scoparium*	
Broomsedge	*Andropogon virginicus*	
Big Bluestem	*Andropogon gerardia*	
Indian Grass	*Sorghastrum nutans*	
Deer Tongue Grass	*Dichanthelium clandestinum (Panicum clandestinum)*	
Hair Grass	*Deschampsia flexuosa*	
Yellow Foxtail*	*Setaria lutescens*	
* indicates non-native		

- *Birds*:

  Table 3-2 provides a list of bird species heard or observed at the RDF property from a site visit done in early May 2009 or during annual Christmas Bird Counts sponsored by the Audubon Society (B. Grover, personal communication).

  Table 3-2. Birds Observed or Heard at the RDF Property.

Species Common Name	Scientific Name
American Woodcock	*Scolopax minor*
Baltimore Oriole	*Icterus galbula*
Barn Swallow	*Hirundo rustica*
Black-capped Chickadee	*Poecile atricapillus*
Blue Jay	*Cyanocitta cristata*
Bluebird	*Sialia sialis*
Blue-winged Warbler	*Vermivora pinus*
Brown Thrasher	*Toxostoma rufum*
Brown-headed Cowbird	*Molothrus ater*
Cardinal	*Cardinalis cardinalis*
Carolina Wren	*Thryothorus ludovicianus*
Cedar Waxwing	*Bombycilla cedrorum*
Chipping Sparrow	*Spizella passerina*
Common Grackle	*Quiscalus quiscula*
Common Yellowthroat	*Geothlypis trichas*

Table 3-2. Continued

Species Common Name	**Scientific Name**
Crow	*Corvus brachyrhynchos*
Eastern Kingbird	*Tyrannus tyrannus*
Eastern Phoebe	*Sayornis phoebe*
Eastern Towhee	*Pipilo erythrophthalmus*
Field Sparrow	*Spizella pusilla*
Goldfinch	*Carduelis tristis*
Grey Catbird	*Dumetella carolinensis*
*House Finch	*Carpodacus mexicanus*
House Wren	*Troglodytes aedon*
Indigo Bunting	*Passerina cyanea*
Mourning Dove	*Zenaida macroura*
Northern Mockingbird	*Mimus polyglottos*
Osprey	*Pandion haliaetus*
Red-eyed Vireo	*Vireo olivaceus*
Red-tailed Hawk	*Buteo jamaicensis*
Redwing Blackbird	*Agelaius phoeniceus*
Robin	*Turdus migratorius*
Tree Swallow	*Tachycineta bicolor*
White-throated Sparrow	*Zonotrichia albicollis*
Yellow Warbler	*Dendroica petechia*
* indicates non-native	

- *Reptiles*:

  In addition to the species listed above two Eastern Box Turtles (*Terrapene carolina*) were observed on the RDF property during a site visit in early May 2009 (K. Ross, personal communication).

D. Historic Structures/Residences

There are three historic structures/residences on the RDF property. One residence is currently occupied by a park police officer who provides on-site supervision. The other two structures may be renovated and rented to tenants who will provide security for the RDF property. Suffolk County has plans to restore a portion of the Northern Farm Building to utilize it for future site activities. Three historical Cemeteries are also located on RDF property. One cemetery located near the current entrance of the RDF property off of Montauk Highway is maintained by the Town of Brookhaven. The other two cemeteries will be maintained in part by

the Post-Morrow Foundation. The County will be providing fencing and assisting in the clearing of brush.

III. Habitat Restoration Efforts at Robinson Duck Farm

Some habitat improvements have been attempted on the RDF property. The community type referred to as the successional old field in Chapter 2 occupies the western portion of the property, and was formerly farmed to grow corn to feed the ducks. Once farming activities were abandoned, this field developed into a successional old field. Currently, this former agricultural field is densely invaded by mugwort (*Artemisia vulgaris*).

In 2000 and 2001, restoration attempts were made by Suffolk County in collaboration with the USFWS to promote grassland bird habitat. The grassland restoration goal was to increase animal species such as grasshopper sparrow (*Ammodramus savannarum*) bobolink (*Dolichonyx oryzivorus*), bobwhite (*Colinus virginianus*), wild turkey (*Meleagris gallopavo*), box turtle (*Terrapene carolina*), meadow vole (*Microtus pennsylvanicus*), red fox (*Vulpes vulpes*), eastern bluebird (*Sialia sialis*), and meadowlark (*Sturnella magna*). Prior to treatment of the old field, mugwort (*Artemisia vulgaris*) was dominant in many areas on this site (R. Parris, personal communication). Grassland restoration was attempted in two consecutive years. In 2000, the old field was burned, plowed, disked, and rolled before seeding with native warm season grasses (see below) (M. Maghini, personal communication). In 2001, additional acreage of the old field was burned and drill seeded with native warm season grass species (see below). Due to the abundance of invasive species such as Asiatic bittersweet (*Celastrus orbiculatus*) that have high moisture content, burning at the proper intensity proved difficult (M. Maghini, personal communication). Treatments in both years were done in collaboration with USFWS (Suffolk County Parks' documents).

A. <u>Grassland Restoration in 2000</u>

In 2000, the first phase of restoration included burning 40 acres to restore native grassland. The burn was done in the last two weeks of April. At the time of the burn the field contained goldenrod (*Solidago* sp.) and invasive herbaceous plants such as mugwort (*Artemisia vulgaris*). The USFWS prepared the fire line and the

equipment was provided by USFWS and New York State Department of Environmental Conservation (NYSDEC). The burn permit was issued by the local fire marshal, NYSDEC, and the Suffolk County Council on Environmental Quality (D. Sanford and T. Williams, personal communications, Suffolk County Parks' documents).

The second phase included plowing, disking, rolling, and seeding the burned field with the following warm season grasses: little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), switch grass (*Panicum virgatum*), and sideoats grama (*Bouteloua curtipendula*). The USFWS provided the seed, tractor, operator, and the seed drill. The field was seeded the second week of June (R. Parris, personal communication, Suffolk County Parks' documents).

Monitoring of this area was to be conducted by USFWS staff during the first growing season. Switch grass (*Panicum virgatum*) and big bluestem (*Andropogon gerardii*) were most successful after the first year. Switch grass (*Panicum virgatum*) seemed to have dominated the seed mix that was purchased for the site (M. Maghini, personal communication). Some mugwort (*Artemisia vulgaris*) did return, but staff conducted targeted mowing to control it. No herbicides were used (R. Parris, personal communication). In addition mowing with a brush hog prevented woody species such as multiflora rose (*Rosa multiflora*) from invading into the site and promoted warm season grass establishment (D. Sanford, personal communications, Suffolk County Parks' documents).

B. Grassland Restoration in 2001

In 2001, the first phase of restoration included burning 15 acres to the east of the 40 acres that were burned in April 2000 to restore native grassland. At the time of the burn, goldenrod (*Solidago* sp.), mugwort (*Artemisia vulgaris*), ragweed (*Ambrosia* sp.) and a mix of warm (examples listed below) and cool season grasses such as perennial ryegrass (*Lolium* sp.) and fescues (*Festuca* sp.)

inhabited the field. The second phase included seeding the burned field in June. The seed mix included 5 lbs. sideoats grama (*Bouteloua curtipendula*), 3 lbs. switch grass (*Panicum virgatum*), 8 lbs. little bluestem (*Schizachyrium scoparium*), 5 lbs. big bluestem (*Andropogon gerardii*), 4 lbs Indian grass (*Sorghastrum nutans*), 3 lbs. sand lovegrass (*Eragrostis trichodes*) for a total of 28 lbs./acre, although 30 lbs./acres was reported as the targeted quantity of seed mix. After 2001, the County was to continue monitoring (D. Sanford personal communication, documents from Suffolk County Parks' documents).

C. Current Successional Old Field Management

Since the initial seeding of the grass species (listed above), personnel from the Suffolk County Parks Department have been mowing the field in an effort to provide possible opportunities for native species to regain a foothold. Although this field is mowed to a low level once a year in late fall, the field is now densely invaded by mugwort (*Artemisia vulgaris*). A few native perennials (*Solidago* sp., *Asclepias syriaca*), weedy perennials (*Alliaria petiolata*), and some grasses such as little bluestem (*Schizachyrium scoparium*) and big bluestem (*Andropogon gerardii*) are uncommon and intermingled with the mugwort, but mugwort (*Artemisia vulgaris*) dominates the entire field and infiltrates the landscape surrounding the field.

IV. Invasive Plant Management at Robinson Duck Farm

The following exotic, invasive species are either currently being managed or should be a management priority to insure successful native plant restoration. Details on each species' biology and management will be described in the Appendix 2.

A. Common Reed (*Phragmites australis*)

Common reed (*Phragmites australis*) is a widespread invasive reed from Europe and Asia. It grows in tidal and non-tidal marshes in most soil textures and is found alongside railroads, in ditches, and wherever standing water occurs. *Phragmites* poses the greatest challenge for restoring the tidal and freshwater wetlands and

riparian zone along the eastern boundary of the RDF property. It has invaded the former duck ponds and waste settling lagoons and represents a highly degraded, non-native plant community with little habitat value. The eastern boundary of the property borders the tidal and freshwater wetlands along the Carmans River that is owned by the USFWS. *Phragmites* has not been controlled along this fringe or within the former duck ponds and waste settling lagoons, but USFWS staff reported some success with *Phragmites australis* control on their property to the south (see below).

B. Mile-A-Minute Weed (*Persicaria perfoliata*)

Mile-a-minute (*Persicaria perfoliata*) weed is an herbaceous, annual, trailing vine, native to India and eastern Asia believed to be introduced to the US in the 1890s. It generally grows in moist, disturbed areas. Mile-a-minute weed control was done in the summer of 2007 and 2008 through volunteer efforts. Volunteers hand-pulled mile-a-minute weed along the wooded edge of Montauk Highway and north of the field of mugwort. This weed is spreading across Long Island and elsewhere in New York State and will continue to be a threat. Currently, a growing population of mile-a-minute is spreading in the open woods directly behind the cemetery and one of the currently unoccupied, old houses.

C. Mugwort (*Artemisia vulgaris*)

Mugwort (*Artemisia vulgaris*) is a clonal, perennial weed with known long-term persistence in degraded habitats. It can grow 6-8 feet tall and has the ability to inhibit all other plant species. It is native to Europe, Asia, and Northern Africa and is commonly found in nitrogen-rich soils. Mugwort has invaded the entire grassland area on the western portion of the RDF site. Once in the late fall, County staff mows the mugwort to keep it low and to encourage native grassland species to regenerate. Since mugwort has already set seed before it is mowed each year, the severity of the invasion will require more intensive control methods before native grassland species can be restored.

V. Background Information for Wertheim National Wildlife Refuge

The United States Fish & Wildlife Service (USFWS) is the land owner of adjacent property to the Robinson Duck Farm. Land management goals of the property to the east, west, and south of the RDF are set by the Wertheim National Wildlife Refuge staff who are part of the greater Long Island National Wildlife Refuge Complex. These goals are described in the 2006 Comprehensive Conservation Plan (United States Fish & Wildlife Service 2006) and are specific to the mission of the USFWS. This section of the report describes the past and current management actions and plans of Wertheim National Wildlife Refuge that are of direct relevance to the RDF due to the adjacency of the Wildlife Refuge property to RDF, and to inform any future management decisions that might be made for the RDF property. Although, the management practices described in this section will not necessarily be those practiced by Suffolk County staff, a concerted effort should be made to coordinate future activities between federal and county staff if management goals are congruent for these adjacent lands. Since Wertheim National Wildlife Refuge is actively being managed, this section of the report contains a more in-depth outline of management priorities regarding native and invasive vegetation and wildlife concerns than what has previously been described for the RDF property.

Wertheim National Wildlife Refuge is a 2,550 acre refuge managed to protect the Carmans River estuary for migratory waterfowl and other waterbirds. Streams, bays, fresh, brackish, and salt water wetlands, oak-pine forests, and some grasslands are the primary managed habitat types. A diversity of other wildlife are supported in the refuge such as white-tailed deer (*Odocoileus virginianus*), fox (*Vulpes vulpes*), osprey (*Pandion haliaetus*), eagles (*Haliaeetus leucocephalus*), wild turkey (*Meleagris gallopavo*), turtles (various species), frogs (various species), and many others (United States Fish & Wildlife Service 2006). For a comprehensive description of the USFWS management strategies please refer to the Fish & Wildlife Service Long Island National Wildlife Refuge

Complex Comprehensive Conservation Plan. Priority areas for conservation and management are described below (United States Fish & Wildlife Service 2006).

VI. Habitat Restoration Efforts at Wertheim National Wildlife Refuge

A. Fire Dependent Communities

The goal is to restore and maintain fire dependent native plant communities such as grasslands and pine/oak (*Pinus rigida*/*Quercus* sp.) forests characteristic of Long Island Pine Barrens. Prescribed burns are used to maintain and enhance woodlands, grasslands, and marshlands, including endangered fire dependent plant communities.

B. Grasslands

The goal of the grassland habitat restoration effort is to maintain interspersion of successional stages and plant diversity within grasslands to enhance habitat for rare plants, grassland birds, and lepidopterans.

In 2006, Friends of Wertheim helped to rehabilitate a small grassland on 5-8 acres adjacent to and west of Old Stump Road. They received $5,000 from the United States Department of Agriculture (USDA) to burn and seed the site with warm season grasses (T. Williams, personal communication). This treatment seems to have been successful; mugwort (*Artemisia vulgaris*) is present along a nearby roadside but has not been observed in the grassland. To date this grassland has not been mowed but there is a plan to do so in the near future (T. Williams, personal communication). This grassland was observed on May 22, 2009. Some woody invasives, such as multiflora rose (*Rosa multiflora*), and native plants, such as Eastern red cedar (*Juniperus virginiana*), are beginning to become established. Bluebird boxes are present, but no bluebirds were observed during this site visit. Some grasses growing here included poverty grass (*Danthonia spicata*), little bluestem (*Schizachyrium scoparium*), and orchard grass (*Dactylis glomerata*) (K. Ross, personal observation).

VII. Invasive Plant Management at Wertheim National Wildlife Refuge

Wertheim National Wildlife Refuge has prioritized the control of a few invasive plant species that pose problems for preserving native biodiversity. Section A lists the species that are actively managed when labor and financing are available. Section B lists invasive species that have been observed on the Wertheim property and could therefore be a threat to the nearby RDF vegetation communities (United States Fish & Wildlife Service 2006, S. Ponce, personal communication).

A. Invasive Plants Currently Managed

1. Common Reed (*Phragmites australis*)

As of 2000, *Phragmites* dominated roughly 335 acres of coastal marsh at Wertheim. *Phragmites* has little food value and does not provide sufficient habitat for many marsh birds. USFWS staff works with NYSDEC to control *Phragmites* with herbicides, mowing, burning, and manipulating water levels in impoundments. The goal is to eradicate at least 25 acres/year of both upland and wetland populations. *Phragmites* is being controlled using chemical and burning techniques. Planting of native species and controlling *Phragmites* will enhance black duck (*Anas rubripes*) and other waterfowl and wading bird habitat (United States Fish & Wildlife Service 2006).

As part of Open Marsh Water Management (OMWM) geared toward vector control and marsh restoration, *Phragmites* was treated in September 2006 with aerial and ground spraying of AquaMaster™ (glyphosate isopropylamine, salt, and water, a non-selective aquatic herbicide that controls emergent vegetation). The quantity of 40.1 gallons of the herbicide AquaMaster™ was applied to 54 acres of *Phragmites*

monoculture beginning in fall 2006. In September 2007, *Phragmites* received a second treatment with another round of spraying. It was mowed and burned, and then native brackish marsh plants returned naturally. No seeding was done. Photo points were taken to document change over time (S. Ponce, personal communication).

2. Asiatic Bittersweet (*Celastrus orbiculatus*) and Black Locust (*Robinia pseudoacacia*)

   Funding for the control of 12 acres of Asiatic bittersweet and black locust was granted in 2003 by the Challenge Cost Share Program (United States Fish & Wildlife Service 2006).

3. Mile-A-Minute Weed (*Persicaria perfoliata*)

   Hand pulling effort using Student Conservation Association crews occurred during summer of 2007 and 2008. Most pulling occurred along road and forest edges (S. Ponce, personal communication).

4. Black Swallow-wort (*Vincetoxicum nigrum* or *Cynanchum louiseae*)

   There is a population by Meadow Lane. Student Conservation Association crews attempted hand pulling. Possibly it was sprayed (S. Ponce, personal communication).

B. Invasive Plants Present But Not Managed

1. Japanese Barberry (*Berberis thunbergii*)

   This species is currently present but uncommon. Hand removal has been the primary method of control. If the population becomes more dense, it could interfere with native vegetation and alter soil properties (S. Ponce, personal communication).

2. Russian Olive (*Elaeagnus angustifolia*)

Russian olive occurs on the property and is becoming more common. It can also quickly expand into degraded habitats.

3. Garlic Mustard (*Alliaria petiolata*)

This species was observed during site visits to Wertheim on 5/13/08 and 5/22/09. It is known to spread rapidly in the forest understory and along degraded edges (K. Ross, personal observation).

VIII. Wildlife Conservation at Wertheim National Wildlife Refuge

Many of the wildlife species found at Wertheim have the potential to occur on the RDF property due to the similarity of habitat types. Although a wildlife inventory has not been conducted at RDF, the species listed here can also be potentially found on the RDF property due to its adjacency to Wertheim. For a complete list of species that might be found on the RDF property after wetland and habitat restoration has occurred please refer to Appendix A of the Comprehensive Conservation Plan September 2006 (United States Fish & Wildlife Service 2006).

A. Eastern Mud Turtle

The mud turtle is endangered in New York. Long Island is its northernmost range. Mud turtles occur in fresh or brackish water, including marshes, small ponds, wet ditches and fields, and offshore islands. They prefer shallow, soft-bottomed, slow-moving water with abundant vegetation. Protection of nesting sites is key for conservation of this species.

B. American Woodcock

Woodcock tend to live in young upland forests and shrublands near rivers or streams. As human development grows and the maturing of forests the habitat of the woodcock has diminished across Long Island, these habitats are diminishing. As such, the enhancement of the woodcock habitat at the duck farm is key to the survival of this species in this area. Habitat enhancement requires increasing

cover along forest edges near grasslands, while maintaining shrubland and forest thicket areas.

C. White-tailed Deer Population Density Monitoring and Population Control

Currently the deer population is about 50/square mile (personal communication, S. Ponce). Deer density estimates are based on aerial and on-the-ground counts. Deer hunts began at Wertheim in the fall of 2005. Hunting programs are expected to continue. The goal is that within 10 years deer densities will be reduced to no greater than 20-30 deer/square mile. Ground-nesting bird species will be monitored to assess their response to deer management.

D. Breeding and Non-breeding Bird Populations

Management focus is to enhance breeding and non-breeding habitat community functions for migratory birds in forest, grassland, and beach strand communities. Surveys will be focused in salt/brackish marsh and pitch pine-scrub oak communities. Baseline surveys will be conducted by FWS staff and will continue at appropriate intervals to assess response of migratory birds to management strategies.

E. Salt Marsh Sharp-tailed Sparrow and Seaside Sparrow

The goal is to enhance habitat conditions for salt marsh sharp-tailed sparrow and seaside sparrow. Mosquito control techniques that eliminated shallow ponds or other areas of standing water through ditching resulted in the creation of conditions that promote invasion by common reed (*Phragmites australis*). The salt marsh sharp-tailed sparrow and seaside sparrow require high salt marsh habitat which has been reduced through historic mosquito control techniques. Wertheim will implement a salt/brackish marsh restoration plan with the goal of restoring 600 acres by 2020.

F. Brook Trout

The goal is to enhance existing brook trout populations. Continued monitoring of native populations of sea-run brook trout in the Yaphank Creek and control of common reed (*Phragmites australis*) and mute swans along the shore will help restore habitat for brook trout.

Chapter 4 – Management Goals and Restoration Priorities

I. Site Management Goals

A. Introduction

The overall goal of the ecological restoration of the Robinson Duck Farm (RDF) Property is to create a sustainable preserve containing high diversity of native wildlife and vegetation that will sustain the local landscape ecology. The people of Suffolk County will have a place to enjoy their natural heritage and to gain a deeper understanding of local biodiversity, natural processes, and the ecosystem services inherent to healthy landscapes. This requires that the habitat of RDF will function as an ecologically cohesive whole, with each habitat serving as a critical element in the productivity of the site. The restoration activities proposed will incorporate ecological processes such as natural seed dispersal and vegetative growth, successional processes, and small-scale land modification (grades, surficial features) to achieve the restoration goals. Some sections of the property are being reserved for cultural features (cemeteries, former farm buildings) and presently for a public dog park adjacent to Montauk Highway (Figure 4-2).

The Robinson Duck Farm Habitat Restoration Feasibility Study includes enhancement of existing habitat and reestablishment of several habitat types to increase the ecological value of this site. Management goals for the following five habitat types will be described in this report: 1) grassland/meadow, 2) oak-pitch pine forest, 3) heathland, 4) tidal/freshwater wetlands, and 5) shrubland. Transforming these degraded, species-poor remnants of RDF into a beautiful, natural habitat will contribute to many public needs (such as ecological services, cultural opportunities, and educational value) and the value of the landscape. This natural habitat complex will add serene vistas, passive recreation, and cultural opportunities for visitors. The restored and enhanced habitats will complement the existing mature woodlands and riverine habitats of the surrounding Wertheim National Wildlife Refuge. Specifically, the management options outlined in this

report will create physical links for the public to go to and from RDF property and Wertheim, to the extent allowed by the U.S. Fish and Wildlife Service, and provide ecological links such as wildlife corridors and networks necessary for sustainable habitats and enhancement of ecosystem services important for Suffolk County.

Currently the condition of the property is highly degraded biologically due to a land use legacy of intensive agriculture and duck farming that changed the natural landscape and hydrology of the site and created consistent disturbance that altered soils and habitats. The potential to restore the current modified plant community types to provide high quality habitat for wildlife and an enjoyable natural experience for park visitors does exist, however, given the soils, the presence of native plant communities on the surrounding property, and the availability of native species to re-inhabit the five focal habitat types. If the current landscape is left alone, however, the successional trajectory will result in increased invasive species cover and restoration goals will not naturally occur. Consequently, the proposed ecological restoration activities are necessary to move from degraded habitats to healthy, ecologically viable communities.

B. Restoration Goals

1. Future Use Priorities

a. Provide passive recreational opportunities for visitors to view plants and wildlife, including invertebrates, in upland and wetland habitats. Hiking trails with interpretive points will lead visitors through examples of each habitat type, and create scenic vistas with landscape vantage points for wildlife viewing. Trail links between RDF and Wertheim National Wildlife Refuge may also be created. Improvements of this habitat will also provide new access to the Carmans River for nature study and passive recreation. Such access would be subject to the review and approval by the U.S. Fish and Wildlife Service.

b. Highlight the cultural significance of the duck farming industry to the Long Island economy through the renovation and restoration of some existing structures on-site. There are also several historic cemeteries here. The historic value of these features helps illustrate ways that people have used this land over the decades.

2. Increase Ecological Value of the Site

a. Enhance the ecological health and ecosystem services found on the RDF site. Restoration of the grassland/meadow will increase diversity of plant species and subsequently the species of pollinators important for crop production and habitat seed production throughout Suffolk County. Also, grassland bird communities will be enhanced. Restoration of historic oak-pitch pine forest will contribute to filtration of the overland flow of freshwater and aid in limiting runoff of wastewater and pollution entering local streams. Managing for different age-classes of forest stands here will increase habitat value for wildlife. Restoration of heathland will enhance a rare community type promoting conservation of specific species found only here, such as beach heather (*Hudsonia tomentosa*). Restoration of the freshwater/tidal wetlands will provide a natural pollutant filter and flood control, crucial habitat for estuarine fish, resting areas for waterfowl, and food and shelter for other wildlife.

b. Increase the ecological processes that will enhance existing remnant natural habitats resulting in minimal long-term costs for land management and invasive species control. These processes include increasing habitat complexity through small-scale land-forming (Fig. 4-1 & 4-3), enhancing ecological succession, installing native plants that provide important food sources for many species of wildlife, and restoring natural hydrological and fire regimes crucial for maintaining high species diversity.

3. Restore/Recreate Five Priority Habitat Types

The restoration of the Robinson Duck Farm property will include enhancement and creation of five target habitat types: 1) grassland/meadow, 2) oak-pitch pine forest, 3) heathland, 4) tidal/freshwater wetlands (Fig. 4-2 & 4-3), and 5) shrubland. Transitional zones consisting of successional open woodlands, shrublands, and grasslands could be created around the edges of the habitat types to ecologically link these diverse natural communities which will provide invaluable habitat complexity for wildlife, such as amphibians (grey tree frog (*Hyla versicolor*), Fowler's toad (*Bufo fowleri*)) and birds (tree swallow (*Iridoprocne bicolor*) and short-eared owl (*Asio flammeus*)) who require multiple habitat types to complete their life cycles or to forage. Encouraging creation of transitional zones among habitat types builds a healthy and more sustainable landscape mosaic. The proposed habitat enhancements could highlight much of the south shore of Long Island's natural heritage and serve as a demonstration of the potentially successful interaction between people and nature for the future.

a. Grassland/Meadow

Grasslands are one of the most uncommon habitat conditions in the Northeast due to human disturbance through agriculture and development as well as a result of the natural process of ecological succession,whereby, grassland birds have been declining faster than any other habitat-species suite in the northeastern United States (Morgan and Burger 2008). The main goal for restoration of the grassland/meadow is to provide more than 40 acres of attractive habitat to grassland bird species. The colorful and diverse grassland meadow will be visited by birds and other pollinators, such as butterflies and moths searching for seeds or nectar. The ecological interaction between pollinators, seed dispersers, and plants will create new populations of plant species that will be distributed in a natural spatial

pattern appropriate for an ecologically important mosaic and increase the attractiveness of this site to a higher diversity of wildlife, adding to the sustainability of this habitat. Bird species, such as the Eastern bluebird (*Sialia sialis*), the Eastern meadowlark (*Sturnella magna*), and the grasshopper sparrow (*Ammodramus savannarum*) rely on large portions of grassland meadows for nesting and foraging. Many birds, such as the tree swallow (*Iridoprocne bicolor*) and short-eared owl (*Asio flammeus*), also require adjacent woodlands or transitional shrublands with young trees as refuge from storms and as an alternative food source during less productive months. Examples of species representing different taxa that should be targeted by restoration activities are listed below. Although not native to Long Island, some major conservation agencies (NYS Audubon) recommend cool season grasses for bird habitat in the spring. The use of cool season grasses at the Robinson Duck Farm will be determined during the design phase of this project.

i. Plants (see Appendix 2 for plant and seed sources)

Native Warm-season grasses: switchgrass (*Panicum virgatum*), eastern gamagrass (*Tripsacum dactyloides*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), deer tongue (*Panicum clandestinum*)

Native Cool-season grasses: Canada wild rye (*Elymus canadensis*), Indiangrass (*Sorghastrum nutans),* Virginia wildrye (*Elymus virginicus*), fringed bromegrass (*Bromus ciliatus*), riverbank wildrye *(Elymus riparius)*, bottlebrush (*Elymus hystrix*)

Wildflowers/forbs: Canada goldenrod (*Solidago canadensis*), grass-leaved goldenrod (*Euthamia graminifolia*), butterfly milkweed (*Asclepias tuberosa*), wild bergamot (*Monarda fistulosa*), white vervain (*Verbena urticifolia*), white heath aster (*Aster ericoides*)

Shrubs*: lowbush blueberry (Vaccinium angustifolium), winged sumac (Rhus copallinum)*

Small trees*: black cherry (Prunus serotina), sassafras (Sassafras albidum)*

ii. Birds

Short-eared owl (Asio flammeus) (seasonal), eastern bluebird (Sialia sialis) (year round), tree swallow (Tachycineta bicolor) (breeding), eastern meadowlark (Sturnella magna) (breeding), grasshopper sparrow (Ammodramus savannarum) (breeding), American woodcock (Scolopax minor).

iii. Insects

Spicebush swallowtail (Papilio troilus), cobweb skipper (Hesperia metea), monarch (Danaus plexippus), diverse grasshoppers, beetles, ants, bees

iv. Other wildlife

*Eastern box turtle (Terrapene carolina), Fowler's toad (Bufo fowleri), red fox (Vulpes vulpes), bats (various species), meadow jumping mouse (*Zapus hudsonius), *meadow vole (*Microtus pennsylvanicus), white footed mouse (Peromyscus *leucopus).*

b. Oak-pitch pine forest

Oak-pitch pine forests are found on sandy soils of Coastal Plains. On Long Island these forests are characterized by pitch pine (*Pinus rigida*) and several different species of oaks including white oak (*Quercus alba*), post oak (*Quercus stellata)*, and blackjack oak (*Quercus marilandica*). The understory is mainly composed of plants in the heath family (Ericaceae) such as blueberries (*Vaccinium* spp.). The native shrub layer of an oak-pitch pine forest provides habitat for many types of wildlife. Ericaceous shrubs attract bees with their appealing flowers and their fruit is an important food source for deer and small mammals. The main restoration goal for the oak-pitch pine forest is to establish healthy native, multi-layered forest stands of different age classes. Increasing the habitat complexity of the forests on the RDF property will attract a wider

diversity of wildlife. Oak-pitch pine forest is a fire-adapted and nutrient-poor environment and is not easily susceptible to invasion by non-native species. Unfortunately with the long-term cessation of fire regimes, and high populations of deer, the current state of this habitat is lacking a native shrub layer. Fencing areas to be re-planted with native species to exclude the white-tailed deer (*Odocoileus virginianus*) and removing invasive species will enhance ecological succession to native woodlands. Many native forest species are present in the adjacent Wertheim National Wildlife Refuge and will serve as seed sources for RDF. Examples of species representing different taxa that should be targeted by restoration activities are listed below.

i. Plants (see Appendix 2 for plant and seed sources)

Trees: pitch pine (*Pinus rigida*), red oak (*Quercus rubra*), white oak (*Quercus alba*), black jack oak (*Quercus marilandica*), post oak (*Quercus stellata*), chestnut oak (*Quercus prinus* (recently changed to *Q. montana*)), black cherry (*Prunus serotina*), sassafras (*Sassafras albidum*)

Shrubs: mountain laurel (*Kalmia latifolia*), black huckleberry (*Gaylusaccia baccata*), lowbush blueberry (*Vaccinium angustifolium*), sweetfern (*Comptonia peregrina*), wintergreen (*Gaultheria procumbens*)

Sedge: Pennsylvania sedge (*Carex pensylvanica*)

ii. Birds

Black-capped chickadee (*Peocile atricapillus*), brown creeper (*Certhia americana*), nuthatches (*Sitta* spp.) woodpeckers (*Melanerpes* spp., *Picoides* spp.), warblers of various species, vireos (*Vireo* spp.), wrens (*Thryothorus* spp.), flycatchers (*Empidonax* spp.), owls (*Asio* spp.) and other raptors

iii. Insects

Red-spotted purple butterfly (*Limenitis arthemis*), sleepy duskywing (*Erynnis brizo*), eastern pine elfin (*Callophrys niphon*), and cobweb skipper (*Hesperia metea*)

iv. Other wildlife

Flying squirrels (*Glaucomys volans*), black racer (*Coluber constrictor*), eastern box turtle (*Terrapene carolina*), and grey treefrog (*Hyla versicolor*)

c. Heathland

On the eastern edge of the RDF property an interesting dune-like community has developed on the former "duck beaches." This habitat, or heathland, is usually found on sandy, acidic soils with bare patches of ground colonized by lichens and cryptobiotic crusts. Beach heather (*Hudsonia tomentosa*) is interspersed with lichens, blue toadflax (*Linaria canadensis*), little blue stem (*Schizachyrium scoparium*), small shrubs such as winged sumac (*Rhus copallinum*), and small black cherry trees (*Prunus serotina*). These dune-like communities are rare as shoreline development destroys successional dune habitat. Heathlands are susceptible to disturbance and need to be managed carefully to provide habitat for insects including ants, moths, butterflies, wasps, and bird species dependent on sandy soils. Examples of species representing different taxa that should be targeted by restoration activities are listed below.

i. Plants: (see Appendix 2 for plant and seed sources)

Small trees: eastern red cedar (*Juniperus virginiana*), black cherry (*Prunus serotina*), shadblow (*Amelanchier canadensis*)

Shrubs: lowbush blueberry (*Vaccinium angustifolium*), bayberrry (*Myrica pensylvanica*), winged sumac (*Rhus copallinum*)

Herbaceous: beach heather (*Hudsonia tomentosa*), blue toadflax (*Linaria canadensis),* big bluestem (Andropogon gerardii), poverty rush (*Juncus tenuis*), switchgrass (*Panicum virgatum*), seaside goldenrod (*Solidago sempervirens*), prickly pear (Opuntia humifusa)

ii. Birds

Shorebirds (various species), waterfowl (various species)

iii. Insects

Ants, moths, butterflies, wasps (various species), bees (various species)

d. Tidal/freshwater wetlands

Tidal and freshwater wetlands of the Carmans River border the eastern edge of the RDF property and were modified to create swim ponds for ducks. The main restoration goal for these wetlands is to recreate the natural hydrology that originally promoted a diversity of wetland plants, such as sedges, rushes, ferns, shrubs; and trees such as swamp azalea, sweet pepper bush, alders, and willows (*Rhododendron viscosum*, *Clethra alnifolia*, *Alnus* spp., *Salix* spp.). Remnants of this community remain on Wertheim property along the western shore of the Carmans River to the east of RDF. The restoration of the natural hydrology and management of the invasive common reed (*Phragmites australis*) will promote the use of marshes and open water areas for resident and migrating waterfowl, reptiles, amphibians, and fish, and as a source of insects such as dragonflies and damselflies to support the food web. Pond edges planted with emergent vegetation provide nesting, feeding, and perching habitat, and protect waterfowl from disturbance by park visitors. A small blind may be included to allow visitors to safely observe waterfowl and shorebirds, and limited access to the shoreline for passive recreation may also be added for visitors to enjoy the diversity along the Carmans River. Examples of species representing different taxa that should be targeted by

restoration activities are listed below. Further study into the impacts of work in the existing duck pond areas will be done during the design and implementation phases of the project.

i. Plants (see Appendix 2 for plant and seed sources)

Salt tolerant: groundsel bush (*Baccharis halimifolia*), marsh elder (*Iva annua or frutescens*), swamp rose mallow (*Hibiscus moscheutos*), Saltmeadow Cordgrass (*Spartina patens*), Smooth Cordgrass (*Spartina alterniflora*), Saltgrass (*Distichlis spicata*)

Freshwater: red maple (*Acer rubrum*), black willow (Salix nigra), sweet pepperbush (*Clethra alnifolia*), swamp azalea (*Rhododendron viscosum*), swamp loosestrife (*Decodon verticillatus*), turtlehead (*Chelone spp*.), Jack-in-the-pulpit (*Arisaema triphyllum*), cardinal flower (Lobelia cardinalis), skunk cabbage (*Symplocarpus foetidus*), and marsh marigold (*Caltha palustris*)

ii. Birds

Great blue heron (*Ardea herodias*), red-winged blackbird (*Agelaius phoeniceus*), marsh wren (Cistothorus palustris), and Virginia rail (*Rallus limicola*)

iii. Insects/Invertebrates

Tadpole snail (*Physa heterostropha*), tree zonite snail (*Zonitoides arboreus*), eastern white slipper shell (*Crepidula plana*), dragonflies (*Odonata*), damselflies (*Odonata*), mayflies (*Ephemeroptera*), eastern tiger swallowtail (Papilio glaucus)

iv. Other wildlife

Eastern garter and ribbon snakes (*Thamnophis spp*.), spotted turtle (*Clemmys guttata*), eastern box turtle (*Terrapene carolina*), eastern mud turtle (*Kinosternon subrubrum*), diamondback terrapin (*Malaclemys*

terrapin), eastern spadefoot toad (*Scaphiopus holbrookii*), Fowler's toad (*Bufo fowleri*), grey treefrog (*Hyla versicolor*), southern leopard frog (*Rana sphenocephalon*), pickerel frog (*Rana palustris*)

e. Shrubland

Little early successional habitat remains here or on the adjacent federal land. This habitat type is very valuable for wildlife and harbors many plant species. Addition of this habitat around the woodlands adds diversity, interest, and a more naturalistic landscape. Among the species to be added could include: sumacs (*Rhus spp*.), wild roses Rosa spp.), grey dogwood (*Cornus racemosa*), and eastern red cedar (*Juniperus virginiana*). The fleshy fruit supplied by these species are forage for many perching birds. Insects attracted to these plants support other bird species. Many birds nest and find protection in the low, densely branched shrub layer.

II. Site Habitat Restoration and Management Options

A. Introduction

To achieve the restoration goals listed in Chapter 4.1, the following options are described below for each priority habitat type (Fig. 4-2). The options are explained with suggested management techniques. The pre- and post-construction monitoring activities, permitting requirements, and the first order costs are also listed. We describe the option that is the preferred alternative that we recommend the County staff pursue to achieve the goals of the restoration plan. Generally, the preferred options provide the greatest biodiversity, and are feasible given existing and past disturbances, and are practical to manage in this suburban setting. The options proposed in this report should not contradict the restoration goals. In addition to a program designed to pursue the management options proposed below, a long term management plan is needed to control invasive species whenever they threaten the habitats.

B. Site Management Options for Future Use Priorities

1. Option 1 (Preferred Alternative)

A system of trails could be designed to provide passive recreational opportunities for visitors to view wildlife and plants and to introduce visitors to all of the newly designed habitat types. The trails could provide visitors with several vantage points across the landscape for wildlife viewing (Fig. 4-3) and provide a connection among the ecosystems. The trails in Figure 4-3 are conceptual but give a view of what could be accomplished. However, with the design of such extensive and permanent pedestrian trails the impacts on the wildlife of the area would need to be considered in terms of fragmentation of their habitat. Also, Suffolk County Parks would need to look at the trails in terms of maintenance and the availability of time and crew for such maintenance. Interpretive stops could be established to highlight the natural history of the RDF property specific to that habitat types and species visible from the trails. Trails could include areas for rest with benches and shelters from the sun or rain. A few of the stops could be designed on small berms or rises in the landscape so that visitors will enjoy a complete view of the landscape useful for bird watching and viewing wildlife while limiting disturbance. Proper trail design that clearly directs and constrains the visitor's movement will especially be important in areas highly sensitive to human disturbance such as the heathlands or during breeding season of ground nesting birds. Trails could also be connections to cultural opportunities.

a. Explanation/Rationale

Trail construction and subsequent maintenance is important for continued use and enjoyment by visitors. Additional non-intrusive support and accessory infrastructure may also be installed and maintained by County staff.

b. Management Techniques:

- Regular clearance of brush and debris from trails
- Seasonal mowing to maintain trails through the Grassland/meadow, timed to avoid breeding season of ground nesting birds
- Seasonal application of woodchips or any other materials or wayfaring aids used to designate trails so that visitor pathways are clearly defined, especially through the heathland habitat.
- Installation of interpretive and wayfaring signs to guide visitors through the RDF experience.

2. Option 2

A few trails would provide limited passive recreational opportunities for visitors to view wildlife and plants and to introduce visitors to a limited section of the RDF property. Selectively placed trails close to the proposed parking areas will allow visitors with several vantage points across the grassland/meadow, the heathland, or the freshwater/tidal wetlands. No other facilities would be established at this site and easy access to experience the wildlife and plants of RDF would be limited.

a. Explanation/Rationale

Very little management is needed for option 2. The design and construction of a few trails will be necessary for limited access to the site. A few wayfaring signs will be installed to guide visitors to parking and cultural areas. Option 1 is preferred as it allows people more exposure and opportunities to learn from these habitats. Of course, trails must be placed properly so that animal life is not significantly impacted.

b. Management Techniques:

- Regular clearance of brush and debris from trails

- Seasonal application of woodchips or other materials or wayfaring aids used to designate trails so that visitor pathways are clearly defined
- Installation of wayfaring signs to guide visitors through the RDF experience

C. Site Management and Restoration Options for Target Habitat Types

The sections below describe management options for each habitat type and proposed methods to achieve the management goals of each option.

1 Grassland/Meadow

a. Option 1 (Preferred Alternative)

- Mow, treat, burn, and seed successional old field to remove invasive plants such as mugwort (Artemisia vulgaris) and restore native meadow vegetation appropriate for grassland bird habitat. Removal of topsoil containing high nitrate concentrations and mugwort rhizomes may also be necessary.
- Create a very small swale in accordance with the natural contour and drainage of the land south toward the railroad tracks (see Fig 4-3) to create appropriate habitat conditions for seasonal wet meadow within this habitat type to increase biodiversity and complexity of the landscape.
- Select areas near eastern edges of the successional old field (near middle of the RDF property) to establish shrublands with species such as blackberries (Rubus sp.), blueberries (Vaccinium corymbosum); early successional tree species such as eastern red cedar (Juniperus virginiana), black cherry (Prunus serotina), and sassafras (Sassafras albidum).
- Select areas at the edges of the meadow along the transitional zones or along hiking trails to add dead wood, rock piles, and other

microtopographic features to the landscape (Fig. 4-3) to enhance habitat options and complexity for small mammals and other animals (turtles, salamanders, wood-inhabiting insects, etc.). Placement of these features should not interfere with management of the grassland vegetation.

b. Option 2

- Continue mowing, but change the mowing schedule to the late summer which will negatively impact mugwort (Artemisia vulgaris) populations.
- Add grassland seed mixes to enhance native meadow vegetation.

This option is not preferred, as it will not provide the microhabitat resources to maximize biodiversity in the areas.

c. Explanation/Rationale

Invasive Species Removal

Removal of invasive forbs, such as mugwort (*Artemisia vulgaris*), is imperative for successful restoration. Native wildflowers and grasses are present but the current mowing regime does not limit the reproductive capability of the mugwort. Methods to control mugwort usually involve mowing and herbicide treatments. Hand-pulling has not been shown to be effective because rhizomes that are not removed from the soil will resprout (Kaufman and Kaufman 2007). Mowing repeatedly on a monthly basis for the first 2-3 years will help to reduce biomass and prevent seed production. Mowing at this frequency, however, is not recommended if ground-nesting birds are present. Therefore, we recommend that a bird survey be conducted to determine which species may actually be currently breeding in the successional old field before management techniques are employed. Clopyralid (3,6-dichloropicolinic acid; made by Dow AgroSciences;

see www.mindfully.org/Pesticide/Clopyralid.htm) and glyphosate (RoundUp®) are two recommended herbicides that have been shown to effectively kill mugwort (Kaufman and Kaufman 2007). The Nature Conservancy has experimented with using glyphosate at 6 oz/gallon at 0.10 oz/m^2 (1 m^2 =0.000247 acres) and mowing for 2-3 years and successfully controlled regrowth of mugwort on Long Island (Jordan et al. 2002). Any consideration of the application of pesticides is subject to strict county guidelines and must be reviewed and considered by the appropriate county board. For more detailed information on herbicides useful for mugwort control please refer to Appendix 2.

High nitrate levels in the soil from past farming may interfere with native herb communities. This old fertilization favors weeds and crops over native grassland habitat. High nitrate, when found, can be removed by stripping the top soil horizons or by planting a remediation crop (corn is often used, ironically) that is not fertilized. The crop can pull the nitrate out from the soil, and then the crop (seeds and stems) is harvested and removed. This leaves a soil less contaminated by nitrate and more favorable to the native community that is the new ecological target.

Seeding and Species Mixes

The New York Audubon Society recently has produced a white paper that specifically outlines the proper management techniques and plant species recommended to develop grassland bird habitat (Morgan and Burger 2008). This report highlights the importance of utilizing a variety of management techniques to produce the best quality habitat. Planting warm-season grasses only will achieve peak growth during the warmest summer months producing very dense, tall stands which may have limited appeal to grassland birds. Traditionally warm-season

grasses have been preferred for grassland bird habitat because they are native, easier to acquire, and their growth phenology lends itself well to prescribed burns in the late spring. The warm-season grasses will not have reached their peak height and will tolerate fire better than forbs that may be competing with the native grasses in the late spring (Morgan and Burger 2008). Native warm-season grasses are deep rooted, more stress-tolerant, and overall require less maintenance than cool-season grasses (Miller and Dickerson 1999). Root biomass of warm-season grasses contributes greater organic matter to soils than non-native cool-season grasses which helps to increase infiltration rates. The warm-season species are bunch grasses that allow space for establishment of native forbs, including legumes, contributing to higher diversity and habitat quality (Miller and Dickerson 1999). On-going research is being conducted comparing habitats with warm-season vs. cool-season grasses in New York State (Morgan and Burger 2008). The RDF property may be an ideal place to conduct experimental work due to the large extent of the successional old field that currently exists. The County may be interested in working with NY Audubon and Wertheim staff to conduct studies and long-term monitoring that will improve best management practices for grassland bird habitat in the future.

Miller and Dickerson (1999) recommend creating a seed mix that suits the desired species ratios appropriate for the community type that previously exists on the site instead of purchasing a mix that is not specific for the restoration target. Herb species of special interest to the County may need a contract seed collection and growing arrangement. This should be initiated 1-2 years before seeding the site.

Prescribed Burn

A well-timed prescribed burn of the grassland/meadow will reduce thatch which can be unappealing to some grassland bird species, and will inhibit invasive plants from spreading further. Ideally, the burn should be done in the late spring depending on funding and weather conditions, but care must be taken not to disrupt ground nesting birds that may be nesting at this time. Before a burn is scheduled, a detailed survey must be done in the successional old field to assess what species are currently using this habitat.

Land Transformations of Grade

Creating a small swale that follows the contour of the drainage in the grassland/meadow will create greater diversity in the plant and animal community. Wet meadow vegetation will result in a greater variety of insects and amphibians utilizing this habitat type. Small changes in microtopography could be designed through minimal land forming, and any small amount of soil that is excavated can be used to make rises or overlook areas along the trails providing a view of the entire habitat. Addition of dead wood piles and rocks in strategic areas along the edges of the forest and grassland will also create additional ideal habitat for invertebrates, small mammals, and amphibians (Fig. 4-1). This advances the overall biodiversity and sustainability of the site.

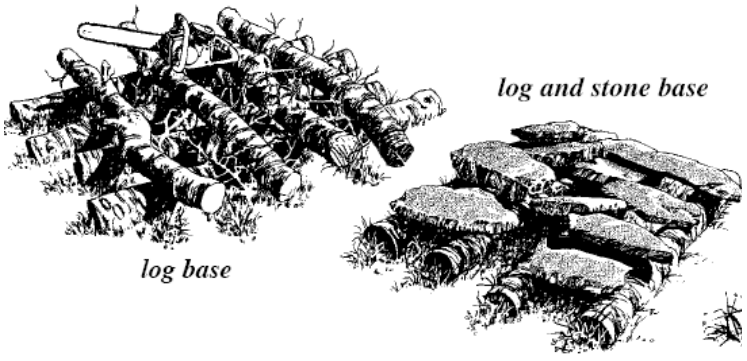

Figure 4-1. Brush and stone piles provide greater habitat complexity for small mammals and invertebrates. Taken from http://www.dnr.state.oh.us/portals/9/PDF/pub393.pdf

2. Oak-Pitch Pine Forest

a. Option 1 (Preferred Alternative)

- Facilitate further establishment of oak-pitch pine forest vegetation by removing invasive species (vines, shrubs, herbs, canopy trees, including Acer platanoides and Ailanthus altissima)
- Plant shrubs and canopy trees native to oak-pitch pine forest
- Protect new plantings with deer fencing where necessary.

This option is preferred to speed the restoration of a native, diverse stand, and to minimize damage by deer during the grow-in period.

b. Option 2

- Remove invasive species in degraded forests and promote forest successional processes.

c. Option 3

- Remove the entire degraded forests that are interspersed at edges of the current successional old field as there are few native species and return theses areas to grassland/meadow habitat (for example, along western edge of RDF property where there is a hedgerow dividing a successional old field on the federal land adjacent to the old field on county property). Forestry techniques utilizing selective cutting, fire, herbiciding would be required.
- Along border areas on the southwestern edge of RDF that are adjacent to federal land, remove invasive species and install native shrubs and tree seedlings along the degraded edges.

d. Explanation/Rationale

Invasive Species Removal

Removal of invasive species will promote the establishment and spread of native species that arrive to the forest through natural dispersal mechanisms in addition to those that are planted. Depending on the invasive species, many different types of methods and herbicides can be used for control (Appendix 2). However, any consideration of the application of herbicides is subject to strict county guidelines and must be reviewed and considered by the appropriate county board. Several species such as mile-a-minute weed (*Persicaria perfoliata*) and garlic mustard (*Alliaria petiolata*) can quickly dominate and smother other vegetation. These fast-spreading species must be prioritized and eliminated from the property for successful restoration of oak-pitch pine forest.

Establishment of Native Species.

Establishing forest stands of early successional stages or various age classes will increase habitat diversity and will result in differing levels of multi-layered forest. Deer fencing will also be required to protect new plantings until a deer management plan can be enacted for RDF property.

3. Heathland

a. Option 1 (Preferred Alternative)

- Gently re-grade area to slope into the riparian zone for the freshwater wetlands where appropriate, by removal of sandy beaches.
- Facilitate further establishment of beach heather (Hudsonia tomentosa) and other heathland vegetation by limiting disturbance by people and vehicles in the sandy berm and planting more beach heather if it is commercially available. If beach heather is not available, limit disturbance and competition from other species in the

areas where it has established so that the current population will expand.

- Remove encroaching invasive species, such as mugwort (Artemisia vulgaris), Japanese knotweed (Polygonum cuspidatum), and common reed (Phragmites australis) in the surrounding areas.
- Plant surrounding areas with bunch grasses such as big bluestem (Andropogon gerardii) and shrubs, such as northern bayberrry (*Myrica pensylvanica*) and sumacs (*Rhus spp.).*

This option is preferred to increase biodiversity and make a habitat more typical of historic plant communities. Removal of the scattered invasives will secure the future health of this area.

b. Option 2
   - Leave area as is and limit disturbance so that heathland can better persist.

c. Option 3
   - Remove artificially filled areas of sand as they were created for duck farming practices.
   - Gently re-grade area to slope into the riparian zone for additional freshwater wetlands.
   - Restore riparian zone vegetation once heathland has been re-graded.

d. Explanation/Rationale

   Depending on the commercial availability of beach heather (*Hudsonia tomentosa*), additional establishment of this species may be difficult. The restoration process will most likely take many years since this is a slow growing species. Beach heather is highly susceptible to over-shading and trampling (Skog and Nickerson 1972, Morse 1979). If this habitat is preserved, every effort should be made to limit disturbance

and encroachment by other species (native or non-native). Typical co-occurring species, such as bayberry (*Myrica pensylvanica*), will add character and ecological value.

4. Tidal/Freshwater Wetlands

a. Option 1 (Preferred Alternative)

- Remove dikes that created the former duck ponds.
- Excavate bottom of former ponds to remove common reed (Phragmites australis) rhizomes and alter hydrology so that common reed will not re-establish easily.
- Cut and treat remaining common reed with wetland-appropriate herbicide (see Appendix 2) and use small scale or controlled burns to regularly control its re-growth until native wetland emergent vegetation can be established.
- Restore native wetland vegetation and stabilize banks so that common reed cannot re-invade.

This option is preferred as it increases the floodplain of the Carmans River, and provides more habitat for species (plant and animal) using the river environment. However, due to concerns about the introduction of duck waste and sludge and other associated nutrients to the Carmans River further studies would need to be conducted prior to this option being implemented. The levels of contaminants in the ponds will be investigated further during the implementation phase of the project prior to any work connecting the river to the ponds.

b. Option 2

- Maintain and restore dikes that created the former duck ponds to establish resting ponds adjacent to the tidal zones.
- Create connections among the smaller ponds so that waterfowl and other wildlife can better move among them.

- Cut and treat remaining common reed (Phragmites australis) with wetland-appropriate herbicide (see Appendix 2) and use small scale and controlled burns to regularly control its re-growth until native wetland emergent vegetation can be established.
- Restore native vegetation and stabilize banks of the dikes so that common reed cannot re- invade into the resting ponds.

c. Option 3

- Removal of common reed (Phragmites australis) by excavation. Follow steps in Option 1 or Option 2 but instead of treating common reed with herbicide, it could be cut and then rhizomes could be eliminated mechanically through the removal of topsoil/sediment.

d. Option 4

- Removal of common reed (*Phragmites australis*) by repeat harvesting. Follow steps in Option 1 or Option 2 but instead of treating common reed with herbicide, it could be mowed repeatedly throughout the growing season as new leaves appear. This requires mowing equipment that can work in these wetlands even when water levels are high. The re-growth of common reed must be continually monitored so that it can be mowed immediately to prevent green tissue from photosynthesizing which supplements the starch in the root stock. Mowing should continue for a <u>minimum</u> of 2 growing seasons (see Appendix 2).

e. Explanation/Rationale

Common reed (*Phragmites australis*) is an aggressive invader of slightly elevated, disturbed, nutrient rich sediments. It can produce up to 2,000 seeds annually and quickly dominate an area with a small amount of standing water (MDEQ fact sheet). It is less tolerant of standing water greater than 20 inches in depth. Reintroduction of tidal

flow by removing the berms created from duck pond construction is a common way to reduce the spread of common reed (Northeast Environmental Management Systems fact sheet). Herbicides, such as glyphosate in the form of Rodeo®, have proven to be very effective.

AquaMaster™

(Monsanto www.monsanto.com/ito/pdfs/aquaFactSheet.pdf)

is a non-selective aquatic herbicide that controls emergent vegetation in and around bodies of fresh and salt water (Northeast Environmental Management Systems fact sheet). AquaMaster™ has been used at Wertheim National Wildlife Refuge for common reed control (S. Ponce, personal communication).

*NOTE: all common reed (*Phragmites australis*) control and management must be closely coordinated with Federal land management staff due to the shared border by USFWS and Suffolk County along the Carmans River. To limit re-invasion, congruent control of common reed on both sides of the border is recommended

5. Shrubland

a. Option 1 (Preferred Alternative)

Transitional zones consisting of various stages of ecological succession can be established between the grassland/meadow, oak-pitch pine forest, and the heathland habitat types. These zones should be planted with grasses, shrubs, and small trees in densities depending on the current characteristics of the landscape. Having habitats at various stages of succession will maximize the level of overall species diversity at the site. Among the species that can be added are sumacs (*Rhus spp.),* wild roses *Rosa spp.*), grey dogwood (*Cornus racemosa)*, and native pinkster azalea (*Rhododendron periclymenoides*).

This option is preferred as there are few seed sources of these native species in the vicinity. Many invasive species could get established if just barren land is left between woodlands and meadow.

b. Option 2.

Leave boundary zones between woodlands and meadows unplanted, to allow unassisted dispersal of plant species to arrive and establish.

D. Overall RDF Property Recommendations

- Create an on-site plant nursery or refuge zone for native plant collection that could be used for future on-site or off-site restoration projects by the County or other partners. For example, allow seed collection for native plants that could be grown by local growers. An alternative to the establishment of a native plant nursery on the RDF property would be to allow partners or other growers to collect from seed sources on the RDF property for propagation and future restoration.
- Create on-site storage for dead wood that will be salvaged as forest restoration occurs. This dead wood can serve to create habitat complexity across the RDF property important for small mammals, amphibians, reptiles, and insects, and other macroinvertebrates.

E. Pre-Construction Monitoring Activities

1. Conduct in-depth surveys of vegetation, wildlife, invertebrate diversity and assessments of soil and water quality.

2. Maintaining records of management strategies, techniques, timing, and costs prior to construction will inform future decision-making for RDF and for other restoration efforts taken on by Suffolk County staff.

3. Regular meetings and communication with Wertheim staff will contribute to successful restoration of boundary areas, especially the tidal/freshwater wetlands along the eastern edge of RDF and when combating invasive species or if

utilizing controlled burns to manage forests or grasslands becomes a future management technique.

4. Further soil testing both in the upland grassland/meadow habitat and the areas that were former duck ponds will better inform planting locations and species palettes chosen for transplanting.

5. Conducting water quality sampling will inform future management decisions as to whether restoration of the coastal areas has improved local water quality conditions. Sampling must be done pre- and post-construction for comparative purposes.

F. Pre-Construction Permits Required

The following permits may be required:

NYSDEC Tidal Wetlands Permit for work within 300 feet of tidal wetlands

NYSDEC Freshwater Wetlands permit for work within 100 feet of freshwater wetlands

NYSDEC Protection of Waters Permit

NYSDEC Wild, Scenic and Recreational River Permit

NYSDOS Coastal Consistency Certification

US Army Corps of Engineers permit for work within wetlands

G. Post-Construction Monitoring Activities

Post monitoring surveys should be conducted to document extent of any reinvasion of exotic plants and to document success rates of habitat use by targeted species.

H. First Order Costs

The estimated cost of restoration was prepared based on a combination of bid prices on recent local projects (shrublands and woodlands) and rough price quotes from native plant restoration contractors in the tri-state region (wetlands, heathlands and grasslands). They are presented as follows:

Table 4-1 Estimated Cost of Restoration

Habitat	Acres	Control Cost	Disposal Cost	Planting Cost	Total Cost
Pine/ Oak Forest	17.5	24,285/ac	Lump Sum	1,500/ac	
		$424,987.00	$3,250.00	$26,250.00	$454,487.00
Shrubland	16.5	24,285/ac	Lump Sum	1,500/ac	
		$400,702.00	$3,250.00	$24,750.00	$428,702.00
Grassland	29	1200/ac	NA	1,500/ac	
		$34,800.00	-	$43,500.00	$78,300.00
Heathland	6.5	400/ac	NA	1,000/ac	
		$2,600.00	-	$6,500.00	$9,100.00
Wetland	4.5	2400/ac	NA	2,000/ac	
		$10,800.00	-	$9,000.00	$19,800.00
Subtotal					$990,389.00
Incidentals					$99,038.00
Contingencies					$99,038.00
Design, Surveys, Inspection					$148,560.00
Total					$1,337,025.00
Say					$1,400,000.00

The values presented in Table 4-1 are first order cost estimates for the preferred restoration alternative and are preliminary in nature. They will need to be updated and refined during the preliminary design phase of this project. In particular, when restoring the wetland habitat, it will be necessary to undertake geotechnical investigations in order to determine if material will have to be removed and if so, how much and what would the options be for its disposal. Consideration must also be given to additional post-restoration maintenance expenses which will be necessary until such time that the desired habitat type is firmly established and self-sustaining.

RESTING SHELTER LOCATION
PLACED AT VISTA LOCATIONS. MAY CONTAIN SEATING & INTERPRETIVE/ KIOSK INFORMATION

PERMANENT PEDESTRIAN TRAIL

SEASONAL PEDESTRIAN TRAIL

ENHANCED SWALE AREA
ALLOWS FOR PERIODIC VARIANCE OF SOIL MOISTURE CONDITIONS & SURVIVAL OF RELATED MEADOW VEGETATION

ADJUSTED LANDFORM
ENHANCES HABITAT DIVERSITY & PROVIDES OVERLOOK OPPORTUNITIES

GATHERED ROCK/WOOD PILES
ENHANCES HABITAT DIVERSITY

PLACED ADJACENT TO TRAIL TO AVOID INTERFERENCE WITH SITE MAINTENANCE ACTIVITIES

NOTE; PRELIMINARY DESIGN IS CONCEPTUAL AND SUBJECT TO CHANGE

200 0 200 400

SCALE 1" = 400'

GPI
Greenman-Pedersen, Inc.
Engineers, Architects, Planners
Construction Engineers & Inspectors
325 West Main Street, Babylon, NY 11702
Tel: (631) 587-5060 Fax: (631) 422-3479

Client:
Suffolk County Department of Planning

Project:
ROBINSON DUCK FARM
COUNTY PARK
HABITAT RESTORATION
FEASIBILITY STUDY

No.	Date	Revision	Aprvd.

Drawing Title:
PROPOSED VISITOR FACILITIES CONCEPT PLAN

Date:	Drawn By:
JANUARY, 2010	KAH
Scale:	Checked By:
AS SHOWN	JRG

Drawing Number:
FIGURE 4-3

Project Number: 2009011

RESTING SHELTER LOCATION
PLACED AT VISTA LOCATIONS. MAY CONTAIN SEATING & INTERPRETIVE/ KIOSK INFORMATION

PERMANENT PEDESTRIAN TRAIL

SEASONAL PEDESTRIAN TRAIL

ENHANCED SWALE AREA
ALLOWS FOR PERIODIC VARIANCE OF SOIL MOISTURE CONDITIONS & SURVIVAL OF RELATED MEADOW VEGETATION

ADJUSTED LANDFORM
ENHANCES HABITAT DIVERSITY & PROVIDES OVERLOOK OPPORTUNITIES

GATHERED ROCK/WOOD PILES
ENHANCES HABITAT DIVERSITY

PLACED ADJACENT TO TRAIL TO AVOID INTERFERENCE WITH SITE MAINTENANCE ACTIVITIES

NOTE; PRELIMINARY DESIGN IS CONCEPTUAL AND SUBJECT TO CHANGE

200 0 200 400

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GPI
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COUNTY PARK
HABITAT RESTORATION
FEASIBILITY STUDY

No.	Date	Revision	Aprvd.

Drawing Title:
PROPOSED VISITOR FACILITIES CONCEPT PLAN

Date:	Drawn By:
JANUARY, 2010	KAH
Scale:	Checked By:
AS SHOWN	JRG

Drawing Number:
FIGURE 4-3

Project Number: 2009011

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Morse, L.E. 1979. Systematics and ecological biogeography of the genus *Hudsonia* (Cistaceae), the sand heathers. Ph.D. Thesis. Harvard University, Cambridge, MA.

Northeast Environmental Management Systems fact sheet. Control of Common Reed. Lodi, NJ.

Skog, J.T. and N.H. Nickerson. 1972. Variation and speciation in the genus *Hudsonia*. *Annals of the Missouri Botanical Gardens*. 59:454-464.

Suffolk County Department of Health Services. 2008. *Water Quality Trends at Selected Streams Impacted by Duck Farm Operations*. Office of Ecology, Suffolk County, NY.

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Suffolk County Department of Planning. 2007. Robinson Duck Farm County Park Habitat Restoration Feasibility Study Work Group Meeting Notes. June 25, 2007. www.co.suffolk.ny.us/upload/planning/pdfs/robinson_overview_ppt.pdf. Control+Click to follow link

United States Fish & Wildlife Service. 2006. *Long Island National Wildlife Refuge Complex Comprehensive Conservation Plan*. Long Island National Wildlife Refuge ComplexSuffolk and Nassau Counties, New York.

USDA NRCS Plant Materials Program. 2007. Plant Materials Technical Note No. NY-36, April.

APPENDIX 1

Dominant Plant Species by Habitat Type (2009)

Dominant Plant Species by Habitat Type (2009)

[E] = exotic species but not invasive; * = invasive species

Successional Old Field

Current Dominant Plant Species:
*Mugwort (*Artemisia vulgaris*)
Goldenrod species (*Solidago rugosa, S. canadensis, Euthamia tenuifolia*)
Common milkweed (*Asclepias syriaca*)
Big bluestem (*Andropogon gerardii*)
Little bluestem (*Schizachyrium scoparium*)
Dogbane (*Apocynum cannabinum*)

Tidal and Freshwater Wetlands

Current Dominant Plant Species:
*Common reed (*Phragmites australis*)
[E]Goat willow (*Salix caprea*)
*Mugwort (*Artemisia vulgaris*)
Skunk cabbage (*Symplocarpus foetidus*)
Jewelweed (*Impatiens capensis*)
*Garlic mustard (*Alliaria petiolata*)

Oak-Pitch Pine Forest

Current Dominant Plant Species:
Black cherry (*Prunus serotina*)
[E]Black locust (*Robinia pseudoacacia*)
*Norway maple (*Acer platanoides*)
*Tree-of-heaven (*Ailanthus altissima*)
White oak (*Quercus alba)*
*Mugwort (*Artemisia vulgaris*)
*Garlic mustard (*Alliaria petiolata*)
*Oriental bittersweet (*Celastrus orbiculatus*)
Goldenrod species (*Solidago rugosa, S. canadensis, Euthamia tenuifolia*)

Heathland

Current Dominant Plant Species:
Beach heather (*Hudsonia tomentosa*)
Blackberry species (*Rubus* sp.)
Eastern red cedar (*Juniperus virginiana*)
*Mugwort (*Artemisia vulgaris*)
Poverty rush (*Juncus tenuis*)
Toadflax (*Linaria canadensis*)

Black cherry (*Prunus serotina*)
Bayberrry (*Morella pensylvanica*)
Blueberry (*Vaccinium corymbosum*)
mosses, lichens, soil crust

APPENDIX 2

Nurseries and Suppliers for Plant Materials and Their Contact Information

APPENDIX 2-1

Nurseries and Suppliers for Plant Materials and Their Contact Information

Grassland/meadow vegetation can be found at the following sources:
- Pinelands Nursery
- Greenbelt Nursery
- USDA seed mix (USDA NRCS 2007)

Oak-pine forest vegetation can be found at the following sources:
- Pinelands Nursery
- Greenbelt Nursery
- Rare Find Nursery (for *Gaylusaccia frondosa*)

Heathland vegetation can be found at the following sources:
- Pinelands Nursery
- Greenbelt Nursery
- Fort Pond Native Plants
- Talmage Farms (White Flower Farm)

Tidal/freshwater wetland vegetation can be found at the following sources:
- Pinelands Nursery
- Fort Pond Native Plants (for *Decodon verticullatus, Arisaema triphyllum*)
- White Flower Farm (for *Cyprepedium*)
- Catskill Native Nursery (for *Symplocarpus foetidus*)

Contact Information

Catskill Native Nursery
607 Samsonville Road
Kerhonkson NY 12446
845-626-2758
info@catskillnativenursery.com
www.catskillnativenursery.com

Fort Pond Native Plants
26 South Embassy Street
Montauk, New York 11954
Call: (631) 668 6452
Fax: (631) 668 643
info@nativeplants.net
www.nativeplants.net

Greenbelt Nursery
3808 Victory Blvd.
Staten Island, New York 10314
(718) 370-9044
Fax (718) 370-0932

To Order Call: 718-370-9044
http://www.nycgovparks.org/sub_about/parks_divisions/gnpc/index.html

Pinelands Nursery
323 Island Rd
Columbus, NJ 08022
Phone # - (609) 291-9486 or 800-667-2729
Fax - (609) 298-8939
www.pinelandsnursery.com
sales@pinelandsnursery.com

Rare Find Nursery
957 Patterson Road
Jackson, NJ 08527
732-833-0613
www.rarefindnursery.com

Talmage Farms
2975 Sound Avenue
Riverhead, NY 11901-9879
(631) 727-0124
www.talmagefarm.com/index.php?option=com_frontpage&Itemid=1

White Flower Farm (supplier to Talmage Farms)
P.O. Box 50, Route 63
Litchfield, Connecticut 06759
800-503-9624
www.whiteflowerfarm.com/27270-product.html

SCCC Native Plant Species
Suffolk County Community College
Eastern Campus Greenhouse, Riverhead NY

APPENDIX 2-2

Resources to Guide Managing of Grassland Bird Habitat

Morgan, M. and M. Burger. 2008. A Plan for Conserving Grassland Birds in New York: Final Report to the New York State Department of Environmental Conservation under contract #C005137. Audubon New York. Ithaca, NY. ny.audubon.org/PDFs/ConservationPlan-GrasslandBirds-NY.pdf Control+Click to follow link

Miller, C. F. and J. A. Dickerson. 1999. The Use of Native Warm Season Grasses for Critical Area Stabilization. Proceedings of the 2nd Eastern Native Grass Symposium, Baltimore, MD. November.

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USDA NRCS Plant Materials Program. 2007. Plant Materials Technical Note No. NY-36, April.

APPENDIX 2-3

INVASIVE SPECIES FOUND IN ROBINSON DUCK FARM: BIOLOGY & CONTROLS

I. Common Reed*: Phragmites australis*

Biology:

Common reed (*Phragmites australis*) is a warm season, perennial grass that can grow up to about 20 feet high. It has a similar appearance to the corn plant, with long (8 – 20 inches), thin (0.4-1.75 inches) leaves sticking straight out of its stems. Dense, fluffy plumes of flowers/seed heads are held above stems, which turn gray and remain throughout the winter. Although common reed (*Phragmites australis*) does produce an abundance of seeds, it reproduces mostly by vegetative means, as germination is uncommon. Following establishment of the grass, stands are maintained and expanded by an extensive network of underground rhizomes and surface stolons. The spread of the common reed (*Phragmites australis*) stands due to rhizomes can average from 1 foot to over 6 feet per year while the stolons commonly grow over 15 feet in length during a growing season (NEMS, 2004; Kaufman, 2007; TNC, 2009).

The preferred habitat of the common reed (*Phragmites australis*) is elevated, drained, or otherwise disturbed freshwater or brackish marshes, ditches, swales, banks and backwater areas of rivers and streams. It is somewhat tolerant of saline or alkaline soils, and grows well on most soils, with textures ranging from fine clays to sandy loams. It is less tolerant of salt water, permanently standing water greater than 20 inches deep, strong wave action, or running water. Common reed (*Phragmites australis*) can clog waterways, shade out native plants, decrease the extent of wetlands, create a fire hazard, and reduce duration of tidal inundation and hence reducing the ability of the marsh to provide habitat for juvenile fish and filtration. The stands of

the grass become so aggressive that they can consume shallow ponds in a few years (NEMS, 2004; Kaufman, 2007; TNC, 2009).

Control Solutions/Suggestions:

Small stands can be controlled through repeated cutting or by cutting and dripping glyphosate (Roundup®) formulated for use near water into the cut stems; usually application in late summer to early fall is best. If cutting is used, in order to be effective the cut shoots must be removed. It has been shown that if cut just before the end of July or the beginning of August, most of the food reserves produced that season are removed as well, reducing the plant's vigor. This control, if done each year for several years, may eliminate a colony of the grass (NEMS, 2004; Kaufman, 2007; TNC, 2009).

For large stands burning, flooding, disking, aerial spraying of herbicides have been used. Some studies show mowing regimes of several year duration during the summer (August and September) and disking in summer or fall to be successful. Reintroduction of tidal flow to coastal marshes (sometimes preceded by one or more applications of chemical control) is the most successful method. This is usually accomplished by removal of barriers to tidal flow, excavation of soil materials, or through a technique known as Open Marsh Water Management (OMWM). Upland restoration projects in close proximity to common reed should be hydrologically isolated from any remaining stands to prevent re-colonization by rhizomes or stolons. Development of biological controls has begun including herbivorous insect species which infest the shoots and or rhizomes (NEMS, 2004; Kaufman, 2007; TNC, 2009).

II. Multiflora Rose: *Rosa multiflora*

Biology:

Multiflora rose (*Rosa multiflora*) is a perennial shrub with 9-12 foot long arching stems (canes) rising directly from the ground and are generously studded with stiff thorns. The leaves, which are broadly oval, less than 1-1 ½ inches long and sharply toothed, are usually made up of 7 or 9 leaflets. This shrub flowers in May or June. The fragrant white or pink flowers are in clusters, and are about ¾-1 ½ inches across with 25-100 stamens found in long or oval panicle. The fruit, which develops in late summer, are red rose hips, globular to ovoid, and somewhat fleshy. Multiflora rose (*Rosa multiflora*) endures a wide range of soil and environmental conditions, yet prefers sunny areas and well-drained soils. It reproduces by seed as well as by rooting at the tips of drooping canes. The great majority of plants develop from seeds, which

remain viable in the soil for 10-20 years. Leaves fall off each fall, but the stems persist through winter and releaf in spring (Eckardt, 2004).

Control Solutions/Suggestions:

A combination of cutting and herbicide treatment of Multiflora rose (*Rosa multiflora*) is suggested. This should be done 3-6 times per growing season for several years. Herbicide is particularly important on regrowth of cut material and should be applied in the fall to kill the root and stem. The application of glyphosate (Roundup) has been successful when used as a 1% volume/volume (v/v) solution or as a 0.5% v/v with the addition of a surfactant (soap) (Eckardt, 2004).

III. Mile-A-Minute Weed: *Persicaria perfoliata*

Biology:

Mile-a-minute weed (*Persicaria perfoliata*) is an annual herbaceous, trailing vine. The stems are armed with recurved barbs which are also present on the underside of the leaf blades. Its leaves are light green in color, shaped like an equilateral (equal-sided) triangle and alternate along the narrow, delicate stems. Distinctive circular, cup-shaped leafy structures, called ocreae, surround the stem at nodes, thus the name 'perfoliatum.' Flower buds, and later flowers and fruits, emerge from within the ocreae. Flowers are small, white and generally inconspicuous. Fruits are attractive, deep blue and arranged in clusters at terminals. Each berry-like fruit contains a single glossy, black or reddish-black hard seed called an achene (NPS, 2009).

Primarily, mile-a-minute weed (*Persicaria perfoliata*) is a self-pollinating plant with occasional out-crossing. Fruits and viable seeds are produced without assistance from pollinators. Mile-a-minute is a prolific seeder, producing many seeds on a single plant over a long season, from about June until October, and seeds persist in the soil for as long as 7 years, with staggered germination over the years. Birds, ants, mammals, and water all play a role in dispersing the vine's seeds (NPS, 2009).

Mile-A-Minute Weed (*Persicaria perfoliata*) generally colonizes open and disturbed areas, such as along the edges of woods, fence lines, wetlands, stream banks, and roadsides, and uncultivated open fields, resulting from both natural and human causes. It tends to occur in environments that are extremely wet with poor soil structure, but can survive in areas with low soil moisture. The vine will tolerate shade for a part of the day, but needs a good percentage, 63-100%, of the available light. The ability of mile-a-minute weed (*Persicaria perfoliata*) to attach

to other plants with its recurved barbs and climb over the plants to reach an area of high light intensity is a key to its survival (NPS, 2009).

Control Solutions/Suggestions:

Glyphosate applied at a low rate (2-3%) will probably be effective in killing mile-a-minute weed. Manual hand pulling of seedlings can be done. It is best done before the recurved barbs on the stem and leaves harden, but may be done afterwards with the help of thick gloves. Manual removal of vines may be conducted throughout the summer. Try to pull up the whole plant including its roots. Previously infested sites need to be rechecked several times each year, and new plants removed until the seed germination period is complete (roughly early April until early July in the Middle Atlantic States). For low growing infestations that cover the ground, repeated mowing or weed whipping of vines will reduce the plants reserves and prevent or reduce flowering, which in turn reduces fruit and seed production (NPS, 2009).

Discourage the introduction of mile-a-minute to an area. It is important to maintain vegetative community stability and to avoid creating gaps or openings in existing vegetation. Maintaining broad vegetative buffers along streams and forest edges will help to shade out and prevent establishment of mile-a-minute weed. This will also help to reduce the dispersal of fruits by water (NPS, 2009).

IV. Mugwort: *Artemisia vulgaris*

Biology:

Mugwort (*Artemisia vulgaris*) is a European weed that can grow up to 5 feet in height. Its leaves are heavily lobed, pointed, and alternately arranged along the stem. They are 2-4 inches long and 1-3 inches wide with dark green upper and covered with white hairs underneath. Flowers, which bloom in summer, are greenish, inconspicuous clusters at the ends of the stems on a spike. Mugwort is wind pollinated, but seeds are seldom viable in the Northeastern US. Reproduction also occurs by clonal growth: long white and tan roots spread out to form colonies. It usually grows in meadows, along roadsides, and in agricultural fields in open to partly shady areas (Kaufman, 2007; Bradley and Hagood, 2009).

Control Solutions/Suggestions:

Hand pulling can be done in smaller populations, but root fragments will resprout. Repeated monthly mowing for several years will control spread. Herbicides such as clopyralid, glyphosate, and picloram applied several times during the growing season will control mugwort at varying rates dependent on the herbicide. It can be selectively removed, for example, from grass pastures and hayfields, with either Stinger® or Banvel®. However, extremely high rates of Banvel® will be required to provide greater than 80% mugwort control at 1 year after treatment (YAT), whereas Stinger® will provide equivalent or higher levels of mugwort control at much lower application rates. According to Bradley and Hagood, a combination of herbicide application and mowing two times before herbicide application also eradicates mugwort.

Some experiments have shown that overall there was no significant difference in mugwort control when herbicides were applied to vegetative-vs. flowering-stage mugwort (Kaufman, 2007; Bradley and Hagood, 2009).

Review of Articles Pertaining to the Control of Mugwort *(Artemisia vulgaris)*

Bradley, K.W. & E.S. Hagood, Jr. 2009. Identification and Control of Mugwort (Artemisia vulgaris) in Virginia. Department of Plant Pathology, Physiology and Weed Science, Virginia Tech. *http://www.ppws.vt.edu/scott/weed_id/mugwort.PDF*. Accessed December 17, 2009.

In this study, Bradley and Hagood looked at the effects of different selective herbicides for control of Mugwort. This was done in several different types of field in three sequential herbicidal treatments. In a no-till cornfield Stinger® demonstrated greater than 70% control of mugwort when applied to both early and late postemergence plants. The highest level of mugwort control achieved was when Stinger® was applied to mugwort that was 8 to 10 inches tall. In soybean fields the best result was achieved when Roundup Ultra® was applied to Roundup Ready® soybeans. In pastures and hayfields, Stinger® and Banvel both were effective, however, higher rates of Banvel must be used to get greater than 80% mugwort control one year after treatment. If a selective herbicide is unnecessary the authors suggest using Roundup Ultra® at high rates.

Bradley, K.W., & Hagood, Jr. , E.S. (2002). Evaluations of selected herbicides and rates for mugwort (*Artemisia vulgaris*) control. *Weed Technology*, 16, 164-170.

This article examines the effectiveness of picloram, clopyralic, dicamba, 2,4-D amine, 2,4-D ester, triclopyr, glyphosate, and Glyfosinate for mugwort control. The sites that were used for the experiments in this article had mugwort covering 80-100% of the ground and the mugwort was on average 38 cm in height. Bradley and Hagood set up two separate sets of experiments, one to test the general effectiveness of all of the herbicidal treatments, and the other to specifically test the effectiveness of picloram at low rates.

Bradley and Hagood found that picloram demonstrated 100% mugwort control at rates high than .28 kg/ha. clopyralid also demonstrated 100% control at 4.4 and 8.9 kg/ha and 80% control at all rates higher than .28 kg/ha. They found 95% control of mugwort using dicamba at 8.9 kg/ha but less than 60% control at any lower rate. 2,4-D amine, 2,4-D ester, triclopyr, glyfosinate and metasulfuron had extremely low control percentages (<45%). Glyphosate at rates

of 4.4 and 8.9 kg/ha had success of 82 and 100%. The authors also did a separate experiment to determine the effectiveness of different rates of picloram, which was 98% effective at rates of .14 kg/ha or greater.

Based on this study the two most effective herbicidal treatments for use on mugwort are picloram and glyphosate, which would both result in percent control of greater than 80% at several concentrations. There are several issues with using both of these herbicides. Picloram is known to be extremely persistent in soils which may become an issue after replanting. There are also concerns with using glyphosate. Glyphosate is non-selective, so in fields where mugwort infestation is lower use of glyphosate would damage existing populations of native plants. Use of wick applicators instead of broadcast spraying would lessen this problem.

Bradley, K.W., & Hagood, Jr. , E.S. (2002). Influence of sequential herbicide treatment, herbicide application timing, and mowing on mugwort (*Artemisia vulgaris*) control. *Weed Technology*, 16, 346-352.

In this study Bradley and Hagood examined the effect of timing and mowing on mugwort control as well as the effect of repeated herbicidal treatments. This study consisted of 3 field trials. The first tested the effectiveness of dicamba, triclopyr, clopyralid, picloram, metasulfuron, glufosinate, glyphosate and the dimethyl salt and icostyl ester of 2,4-D. These were all applied at 7 week intervals 3 times. All of the herbicides tested except for triclopyr, metasulfuron, and glufosinate demonstrated 70% control 1 year after treatment.

The second field trial examined the influence of timing on mugwort control. Treatments were done when the plant was in its vegetative stage as well as its flowering/reproductive stage and there was no significant difference between the effectiveness of the herbicidal treatments.

A third field trial was done to look at the effect of mowing on mugwort control when used in conjunction with herbicidal treatment. One or two mowings were done prior to herbicidal application. Two different results were found. After one mowing herbicidal application was less effective for all of the herbicides except picloram; after 2 mowings the effectiveness of herbicidal application was increased.

Jordan, M.J., Lund, B., & Jacobs, W. (2002). Effects of mowing, herbicide and fire on *Artemisia vulgaris, Lespedeza cuneata and Euphoria cyparissias* at the Hempstead Plains grassland, Long Island, New York. *Proceedings of the Northeast natural history conference,* Albany, NY

This poster presented at the Northeast Natural History Conference looked at the effectiveness of several different treatments for the control of mugwort, lespedeza (*Lespedeza cuneata)* and cypress spurge (*Euphoria cyparissias)* at the Hempstead Plains grassland on Long Island. The treatments examined were: mowing one, two or three times a year over three years, one herbicide application of Round-up® at a rate of 10 oz/m^2 in July, 1992, July, 1993, or both years, one or two prescribed burns (spring or fall) in 1991-1995, or a combination of burning and herbicide. According to this study, mugwort was nearly eliminated by either repeated mowing or herbicide for two to three years. The plant was not affected by dormant season burning. As this study was on grasslands on Long Island, it is particularly relevant to the Robinson Duck Farm Infestation. The authors have much experience in managing Nature Conservancy lands on Long Island.

V. Garlic Mustard: *Alliaria petiolata*

Biology:

Garlic mustard (*Alliaria petiolata*) is a cool season biennial herb with stalked, triangular to heart-shaped, coarsely toothed leaves that give off an odor of garlic when crushed. It can reach from 2 to 3-½ feet in height. Its flowers are button like clusters of small white flowers, each with four petals in the shape of a cross. First-year plants appear as a rosette of green leaves close to the ground. Rosettes remain green through the winter and develop into mature flowering plants the following spring. After spending the first half of its two-year life cycle as a rosette of leaves, the plants develop rapidly the following spring into mature plants that flower, produce seed and die by late June. Depending upon conditions, the flowers either self-fertilize or are cross-pollinated by a variety of insects. A single plant can produce thousands of seeds, which scatter as much as several meters from the parent plant. Seeds can remain viable in the soil for five years or more (NPS, 2009).

Although water may transport seeds of garlic mustard, they do not float well and are probably not carried far by wind. Long distance dispersal is most likely aided by human activities and wildlife. Additionally, because white-tailed deer prefer native plants to garlic mustard, large deer populations may help to expand it by removing competing native plants and exposing the soil and seedbed through trampling (NPS, 2009).

Garlic mustard (*Alliaria petiolata*) frequently occurs in moist, shaded soil of river floodplains, forests, roadsides, edges of woods and trails edges and forest openings. Disturbed areas are most susceptible to rapid invasion and dominance. It grows in a wide range of light and soil conditions, but is associated with calcareous soils and does not tolerate high acidity (NPS, 2009).

Control Solutions/Suggestions:

The control goal is to prevent seed production until the stored seed is exhausted. Regardless of the control method employed, annual monitoring is necessary for a period of at least five years to ensure that seed stores of garlic mustard have been exhausted (NPS, 2009).

Hand removal is possible for light infestations and when desirable native species co-occur. Care must be taken to remove the plant with its entire root system because new plants can sprout from root fragments. For larger infestations of garlic mustard (*Alliaria petiolata*), or when hand-pulling is not practical, flowering stems can be cut at ground level or within several inches of the ground, to prevent seed production. If stems are cut too high, the plant may produce additional flowers at leaf axils. Once seedpods are present, but before the seeds have matured or

scattered, the stalks can be clipped, bagged and removed from the site to help prevent continued buildup of seed stores. This can be done through much of the summer (NPS, 2009).

Herbicide such as glyphosate (e.g., Roundup®) is also effective. It may be applied at any time of year, including winter (to kill overwintering rosettes), as long as the temperature is above 50 degrees F. and rain is not expected for about 8 hours (NPS, 2009).

Fire has been used to control garlic mustard in some large natural settings but, because burning opens the understory, it can encourage germination of stored seeds and promote growth of emerging garlic mustard (*Alliaria petiolata*) seedlings. For this reason, burns must be conducted for three to five consecutive years (NPS, 2009).

VI. Japanese Barberry: *Berberis thunbergii*

Biology:

Japanese barberry (*Berberis thunbergii*) is a dense, deciduous, spiny shrub that grows 2 to 8 feet high. Its branches are brown, deeply grooved, somewhat zig-zag in form and bear a single very sharp spine at each node. The leaves are small (½ to 1 ½ inches long), oval to spatula-shaped, green, bluish-green, or dark reddish purple. Flowering occurs from mid-April to May in the northeastern U.S. Pale yellow flowers are about ¼ in (0.6 cm) across, and hang in umbrella-shaped clusters of 2-4 flowers each along the length of the stem. The fruits are bright red berries about 1/3 in (1 cm) long that are borne on narrow stalks. They mature during late summer and fall and persist through the winter (NPS, 2009).

Japanese barberry (*Berberis thunbergii*) spreads by seed and by vegetative expansion. It produces large numbers of seeds which have a high germination rate, estimated as high as 90%. Seed is transported to new locations with the help of birds and small mammals. It can form dense stands in natural habitats including canopy forests, open woodlands, wetlands, pastures, and meadows, and it can alter soil pH, nitrogen levels, and biological activity in the soil (NPS, 2009).

Control Solutions/Suggestions:

Herbicides such as glyphosate (e.g., Roundup®) and triclopyr (e.g., Garlon) can be used. For whole plant treatment, apply a 2% solution of glyphosate mixed with water and a surfactant. Application in the season before native vegetation has matured may minimize non-target impacts. However, application in late summer during fruiting may be most effective. Triclopyr or

glyphosate also may be used on cut stumps or as a basal bark application in a 25% solution with water, covering the outer 20% of the stump (NPS, 2009).

Because this plant leafs out early, it is easy to identify and manual removal efforts can begin in early spring. Small plants can be pulled by hand, using thick gloves to avoid injury from the spines. The root system is shallow making it easy to pull plants from the ground, and it is important to get the entire root system. Hand pulling and using a shovel to remove plants up to about 3 ft high is effective if the root system is loosened up around the primary tap root first before digging out the whole plant (NPS, 2009).

Mechanical removal using a hoe or Weed Wrench ® can be very effective and may pose the least threat to non-target species and the general environment at the site. Tools like the Weed Wrench ® are helpful for uprooting larger or older shrubs. Shrubs can also be mowed or cut repeatedly. If time does not allow for complete removal of barberry plants at a site, mowing or cutting in late summer prior to seed production is advisable (NPS, 2009).

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APPENDIX 2-4

Considerations for Dog Park Installation at Robinson Duck Farm

Benefits of Dog Parks

- Serves recreational purpose for visitors
- Build sense of community
- Opportunity to increase public awareness about responsible pet ownership in public parks and the effects pets can have on wildlife.
- Might make owners less likely to bring dogs into or let dogs off leash in areas where prohibited (Foster 2006)

Risks to Ecology and Wildlife from Dog Parks

Individual Dog Effects:

- High potential for dogs to be off-leash unless leash-on policy enforcement is strict and regular. Some may then run away.
- Radius of human recreational influence in the landscape is extended when dogs are off-leash (Sime 1999) which has ramifications for wildlife, disturbance of native vegetation, and the spread of invasive plants.
- Presence of dogs interacting with wildlife while off-leash may introduce or pick up diseases (distemper, rabies, parvovirus) or parasites to/from small mammals and other carnivores.
- Birds incubating on nests can be disturbed or flushed out (Sime 1999).
- Dog walking on-leash has been shown to reduce bird diversity by 35% and abundance by 41% in woodlands where dog walking is common compared to where dog walking is prohibited (Banks and Bryant 2007).
- Digging by dogs can damage vegetation and disturb soils which can lead to facilitation of invasive plants.
- Small mammal burrows and dens can be damaged (Sime 1999).
- Off-leash dogs can transport weedy seeds further from trails and roads than regular human foot traffic might (Sime 1999).
- Dogs are more likely to cause mass flushes of birds than native predators like foxes (Knight and Cole 1995).

Cumulative Dog Effects:

- Disturbance of waterfowl and wading birds:
  Shorebirds have been observed to be especially sensitive to disturbances from dogs in that they often do not return to a shoreline to predisturbance levels once a dog has scared them away (Burger et al. 2007).
  Piping plovers: pets within 50m of bird caused them to stop feeding 52% of the time (Hoopes 1993).
  Eiders: human-related activities on shore including presence of dogs caused greater disturbance than activities in the water. Eiders were disturbed while roosting and feeding (cited in Sime 1999).

- Repeated exposure to stress from dog conflicts can cause wildlife to expend energy to escape (Chester 2005, Forest and Cassidy St. Clair 2006). This is especially important during the winter when energy is most precious.
- The scent of dogs may affect the presence of certain species of wildlife (ungulates, carnivores, small mammals). Small mammal and ungulate populations are lower where there are more dogs and where dogs are allowed off-leash (Lenth and Knight 2004). Carnivore populations are higher where there are more dogs and dogs are allowed off leash (Lenth and Knight 2004).
- Cumulative effect of dog feces can increase input of nitrogen into the soil which could run-off into waterways. This increase in nitrogen could also facilitate growth of weedy plants (Chester 2005, NPS 2009).
- Increase the presence of ticks that may carry Lyme disease.
- During cleaning of dog park facilities excess cleaning chemical can run off into surround soil and waterways (Broward County Audubon Society 2008).

Recommendations/Requirements:

- Insure that dog park is fully fenced with latching gate (Broward County Audubon Society 2008).
- Provide parking (Broward County Audubon Society 2008)
- Provide restrooms (Broward County Audubon Society 2008)
- Rules and regulations must be clearly posted and enforced
- Requires staff for maintenance and cleaning
- Disinfectants for cleaning dog park should be used so that feces/urine will not spread disease (Broward County Audubon Society 2008)
- Locate park away from areas used for other types of recreation, endangered species, or habitats that are used by wildlife for foraging/feeding/nesting (Broward County Audubon Society 2008).
- Evaluate current migrations or movements of wildlife currently using the site.
- Consider seasonal closures for the maintenance of turf and soil
- Dog parks and dog training areas should not be located closer than 150 feet from the nearest residence to create a buffer effect. Additionally, if practical, every effort should be made to locate enclosed areas adjacent to tree lines or hillsides to buffer noise (Missoula Regulations).

Resources

See the following resources for more information on existing Dog Park Regulations:

Mount Laurel, NJ rules for dog park
http://www.mountlaurel.com/recreation/dogrun.php
Rocky Top Dog Park, near Kingston, NJ
http://www.rockytopdogpark.com/rules.htm

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APPENDIX 3

Inventory of Environmental Conditions

For Appendix A
See

Appendix 3 - Inventory of Environmental Conditions

APPENDIX 4

Phase II Environmental Site Analysis

APPENDIX 3

Inventory of Environmental Conditions

ROBINSON DUCK FARM COUNTY PARK
HABITAT RESTORATION FEASIBILITY STUDY

TASK 2 REPORT
INVENTORY OF ENVIRONMENTAL CONDITIONS

September 8, 2009

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FOR THE
SUFFOLK COUNTY DEPARTMENT OF PLANNING

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I Introduction

As per Task 2 specified in the December 2, 2008 draft of "Description of Services and Specific Payment Terms," P.W. Grosser Consulting Inc. (PWGC) has prepared the following memorandum which describes the recognized environmental conditions at the Robinson Duck Farm property (subject site).

II Methodology

Identification of recognized environmental conditions at the subject site was conducted in two phases. The first phase consisted of a review of readily available public documents. The reviewed documents included the following:

- "Long Island Duck Farm History and Ecosystem Restoration Opportunities Suffolk County, Long Island, New York," February 2009, Army Corp of Engineers (ACoE)
- Site Survey located at Suffolk County web site (http://www.suffolkcountyny.gov/upload/planning/pdfs/robinson_survey.pdf)
- Historical site photographs and aerial photos from various sources

The second phase consisted of a site walk through which was conducted on April 17, 2009. The purpose of the walk through was to observe evidence of environmental conditions including, but not limited to:

- Prior chemical spills and stained soil;
- Materials storage, scrap piles, drum storage, aboveground tanks;
- Underground tanks;
- Hazardous waste storage;
- Floor drains or machinery pits.

The site inspection also included a re-inspection of the following previously identified environmental concerns which were noted during the May 2008 bid walk.

- A former vehicle storage area;
- An onsite sanitary system associated with the northern historic farm building;
- Oil staining associated with the southern farm building;
- Potential underground storage tanks associated with the residential buildings.

III Findings

A. Historical Document Review

The historical document review revealed a past agricultural use of the property which was consistent with the known site use. The historical site survey revealed the location of former site structures beyond the three residential structures and two former farm buildings which are currently present. The additional structures were largely located in the south east corner of the property. The historic photos indicated that the large field located on the western portion of the subject site was historically utilized for farming.

A review of the ACoE report revealed a similar site history. The ACoE report did include results of a core sample collected from a former swim pond area (located east of the farm buildings) and a composite soil sample collected from the former waste lagoon (southeast corner of the subject site). The following relevant analytical findings were noted:

- The Semi-Volatile Organic Compound (SVOC) Bis(2-ethylhexyl)phthalate was detected in the swim pond sediment sample at a concentration of 88,790 ppb, which exceeds its respective New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM) recommended soil cleanup objective of 50,000 ppb. The ACoE identified additional SVOC compounds which were reported to exceed their respective New York State Recommended Soil Cleanup Objectives (RSCO), however the improper guidance values were used and therefore no additional exceedances were noted. Bis(2-ethylhexy)phthalate is typically used in the manufacture of plastics and also has been used in hydraulic fluid and in the transformers. The ACoE attributed the detections to the use of latex sampling gloves by the sampler. In PWGC's experience, the detected concentrations are too high to attribute to the gloves. Bis(2-ethylhexy)phthalate is a widely used chemical and therefore its source currently remains unclear.

- Zinc was identified in both samples at concentrations exceeding their TAGM guidance value of 20 ppm, however the detected concentrations were within the eastern USA background range of 9-50 ppb.
- Analytical results for total nitrogen and phosphorus indicated that above normal concentrations were present. The presence of these elevated levels is likely related to the former duck farming activities.

B. Site Walkthrough

In order to assess the current site conditions, PWGC conducted a walkthrough of the property on April 17th, 2009. The inspection focused on previously identified areas of concern as well as areas of concern identified in the historical document review. A summary of the identified areas of concern are as follows:

- Three residential buildings: Based upon the site inspection and information provided to PWGC, each of the buildings utilizes fuel oil for heating. The tanks are reported to be aboveground storage tanks (ASTs) located in the basement of each building. Leaks from such tanks can cause impact to the subsurface. Access to the buildings to inspect the tanks was not obtained during the initial inspection. PWGC recommends inspecting each of the tank areas for signs of leaks/spills. If evidence of spills or leaks is encountered, further testing may be required, otherwise no sampling is recommended at this time.
- Northern Farm Building: This building was in poor condition and the northern portion of the roof had collapsed. An inspection in the building revealed evidence of a bathroom, trench drains, and sump pits. A previous inspection of the building revealed the presence of a sanitary system cover west of the building. This cover was not identified during the April 2008 site visit. The inspection also revealed that the floor drainage system appears to discharge to the eastern side of the building. A chimney related to a former heating system was present on the south side of the building. PWGC also observed old 55 gallon oil drums in the building. Due to the potential for improper discharges in the building to impact the subsurface through the sanitary and floor drain systems, PWGC recommends that the sanitary system and floor drain discharge locations be exposed with a backhoe. Once exposed, a sample should be collected from the base of the

primary leaching structures. Samples should be analyzed for Volatile Organic Compounds (VOCs), SVOCs, and metals as per Suffolk County Department of Health Services (SCHDS) SOP 9-95. SOP 9-95 is the SCDHS document which governs the assessment and remediation requirements for Underground Injection Control (UIC) structures, which include stormdrains, cesspools, and drywells. Analytical results will be compared to the action levels contained within SOP 9-95 to determine if remediation of the structures is required prior to backfilling and closing the structures.

- Southern Farm Building: This building is in poor condition and contains a partial basement. The western portion of the building appears to have been used to perform vehicle and equipment repairs, based on the presence of automotive parts and used oil filters. There is some potential evidence of runoff from inside the building affecting the soils along the perimeter of the building. PWGC recommends hand excavating the areas of potential soil staining in order to determine if the staining is superficial or indicative of a notable spill. If the oil staining is found to be significant, additional excavation / soil borings will be required to sample and assess the extent of impact. In addition, if such a spill is present, the NYSDEC spills unit will be notified and a spill number will be associated with the site. PWGC also observed piping on the west side of the building which may be indicative of an underground storage tank. A test pit should be conducted to determine the nature of the piping and if a tank is present. If a tank is present the tank should be removed and the excavation properly assessed / sampled as per NYSDEC regulations.
- Suspected Leaching Structures, Northwest of North Farm Building: During the site inspection several large holes / depressions were located approximately 90 feet northwest of the northern farm building. The holes appear to be former leaching structures which are collapsing. Since such structures could potentially pose a safety concern, they should be properly closed. However, since the structures could have acted as a conduit for surface impacts to have reached the subsurface PWGC recommends that the structures be exposed so that a sample can be collected from the base of each structure for VOCs, SVOCs, and metals as

per SOP 9-95 prior closure. If the structures have collapsed significantly, a Geoprobe may be required to collect the samples. Upon receipt of the laboratory results, the data will be evaluated to determine if the structures require remediation before they are properly closed.

- Former Aircraft Hanger: During the 2008 walkthrough of the property, a building identified as a former aircraft hanger was identified. On the April 2009 inspection, the building was found to have been demolished. All that remained of the building was the concrete block footings. This area was previously noted as a concern due to the potential for oil / fuel spills associated with the former building. A visual inspection of the area revealed no signs of stained soils or chemical spills. Based upon the lack of observed impacts, PWGC does not recommend any sampling of the former hangar area at this time.
- Former Leaching Structures, East of Former Hangar: Approximately 50' east of the former hangar building, PWGC identified two former leaching pools. Both structures appeared partially backfilled. The former use of the structures is unknown. Since such structures could have acted as conduit for surface discharges to reach the subsurface, PWGC recommends performing soil borings through both structures to identify the former base of the structure. Samples of the former base material will be collected and submitted for laboratory analysis for VOCs, SVOCs, and metals as per SOP 9-95. Upon receipt of the laboratory results, the data will be evaluated to determine if the structures require remediation before they are properly closed.
- Former Vehicle Storage Area: At the northeast corner of the large clearing, a vehicle / farm equipment storage area was present. Historically, approximately 30-40 vehicles were present. At the time of the April 2009 inspection, no vehicles were present. This area was previously noted as a concern due to the potential for oil / fuel spills associated with the former vehicles. A visual inspection of the area revealed no signs of stained soils or chemical spills. Based upon the lack of observed impacts, PWGC does not recommend any sampling of the former vehicle storage area at this time.

- Former Coal Storage Area: Approximately 150' southwest of the northern residential home, a clearing is present. Several small (approximately 1 cubic yard) piles were noted. In addition, coal was noted to make up a significant portion of the surface soils over an approximately 0.1 acre area in the clearing. The presence of the coal doesn't pose a significant environmental concern; however, the presence of the coal could effect the growth of plants and redevelopment of the area. PWGC recommends that the coal and shallow surface soils be removed and properly disposed of.
- Former Agricultural Field: Based upon historical records the large field located on the western portion of the property was used for agricultural purposes. Currently the field is largely populated by the invasive weed mugwort. As a result of the former agricultural use, the soils in the field area could contain elevated levels of pesticides and heavy metals (typically arsenic). Where the contaminate levels are not likely to be sufficiently high to impact the health of the general public visiting the site, the levels could be high enough to pose a concern during restoration or preparation of the site for alternative uses. In addition, duck waste may have also been utilized as a fertilizer within the fields which could raise nitrate and phosphorus levels in the soils. The presence of elevated levels of pesticides, metals, nitrogen, and phosphorus could effect the growth of native plant species. PWGC recommends conducting representative soil borings to two feet below grade utilizing a hand auger. Soil samples will be analyzed, at a minimum, for pesticides, metals, nitrogen, and phosphorus.
- Former Duck Swim Pond / Waste Lagoon: Based upon historical records, the eastern portion of the property had historically been utilized as swim ponds for the domestic ducks. At the south end of the swim pond was a waste lagoon which was used to separate duck waste solids from the water prior to the water being re-introduced to the Carmans River. Currently the former swim pond / waste lagoon area is vegetated by invasive *Phragmites sp*. Based upon results of sampling performed by the ACoE, the former swim pond sediments contain elevated levels of phosphorus and nitrogen as a result of the former duck pond operations. In addition, the swim ponds represented a topographic low at the site

and any improper discharges as a result of historic site operations could accumulate at such a low spot. The ACoE data reflected such potential contamination with the detection of one SVOC compound over its respective NYSDEC soil cleanup objective. In addition, the presence of the duck waste will have a significant impact on restoration plans including the following:

- Impact of duck pond waste on growth of native species;
- Sediment removal or disturbance could potentially impact the Carmans River;
- Duck waste removal may require special handling due to contaminate levels;
- Removal of duck waste may not be financially feasible if it is determined that a large volume of duck waste is present.

In order to assess the extent of duck waste in the former swim pond area and assess the associated soil conditions, PWGC recommends that several representative soil borings be performed to assess the vertical extent of duck waste. Samples should also be collected and analyzed at a minimum for VOCs, SVOCs, pesticides, PCBs, metals, nitrogen, phosphorus, and coliform bacteria. This is the same suite of analysis performed by the ACoE.

- Trash Debris Pile: Approximately 250' northwest of the southern residential building, PWGC observed a large trash and debris pile. The debris area covered approximately 0.1 acre. The debris area consists of two portions. The western portion consists of trash dumped at grade. The eastern portion consists of a large excavation which was partially backfilled with debris. The debris consisted largely of residential debris (cans, bottles, and appliances) as well as some farm related debris (farm equipment and potato sacks). Based upon the nature of the disposed items, the debris appeared to have been generated during the 1970's to early 1980's. PWGC's inspection of the debris pile did observe the presence of several metal 5 gallon pails and at least one 55 gallon drum. One of the pails was marked "Kendall," which is a brand of oil products. PWGC recommends that the debris be removed for proper disposal. During the removal, the debris should be evaluated for potential contamination sources such as pails,

drums, and pesticide containers. Following the removal, the soils beneath the debris should be inspected for signs of impact. Based upon the soil inspection and the nature of the debris, soil sampling should be performed to determine if the site has been impacted by the debris which was present.

Relevant site photos and detailed aerials are attached as Appendix A.

IV Conclusions

Based upon the above findings, Phase II activities will be required to assess environmental concerns at the former Robinson Duck Farm property. The site investigation will require additional investigation beyond the issues identified during the bid walkthrough.

APPENDIX A
SITE PHOTOS

Location of the three residential homes. Only the central one is currently occupied.

View of fuel oil tank fill and vent, typical of each of the three homes.

Location of northern farm building

Interior view of northern farm building showing trench drains which appear to have discharged to the east.

Location of the southern farm building

View of automotive parts and oil staining present within the southern farm building.

Location of suspected collapsing leaching structures located northwest of the northern farm building.

View of one of the collapsing structure which is causing a large sinkhole to form.

Location of the former aircraft hangar (aerial photo taken prior to demolition of the building).

View of the former aircraft hangar area following removal of the building.

Location of the leaching pools identified east of the former hangar building.

View of one of the two identified leaching pools located east of the former hangar. The other structure was of similar construction.

Location of the former vehicle storage area. Vehicles have since been removed.

View of the former vehicle storage area. No signs of impact or soil staining were noted.

Location of former coal storage area.

View of coal piles observed in an apparent former coal storage area.

Location of former agricultural fields

View of the former agricultural fields (summer 2008 photo)

Location of the former swim ponds and waste lagoon (south end)

View of the former duck yard area looking northward.

Location of the debris / trash dumping area.

View of the western portion of the debris / trash dumping area

APPENDIX 4

Phase II Environmental Site Analysis

ROBINSON DUCK FARM COUNTY PARK
HABITAT RESTORATION FEASIBILITY STUDY

FINAL TASK 3 REPORT
PHASE II ENVIRONMENTAL SITE ANALYSIS

NOVEMBER 2009

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FOR THE
SUFFOLK COUNTY DEPARTMENT OF PLANNING

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I Introduction

As per Task 3 specified in the December 2, 2008 draft of "Description of Services and Specific Payment Terms", P.W. Grosser Consulting Inc. (PWGC) has prepared the following Phase II report which summarizes the findings of the investigation conducted by PWGC.

II Identification of Environmental Issues

As a preliminary phase of this project, PWGC reviewed historical documents and conducted a site walkthrough in order to identify environmental concerns at the property. PWGC prepared a June 2009 technical memorandum which summarized the findings of the historical review and site investigation. A copy of this document is attached as Appendix A. A summary of the indentified issues was as follows:

- Sampling of the former duck pond area sediments revealed elevated levels of Semi-Volatile Organic Compounds (SVOCs), metals, nitrogen, and phosphorus;
- The three residential buildings have fuel oil aboveground storage tanks (ASTs) located in the basement;
- The northern farm building was identified to potentially have an onsite sanitary system;
- The southern farm building was identified to potentially have a former garage / maintenance use. Potential underground storage tank (UST) piping was also identified;
- Suspected leaching structures were identified northwest of the north farm building. These structures appeared partially collapsed and pose a potential safety hazard;
- Former leaching structures were identified east of the former aircraft hangar. These structures are open and pose a potential safety hazard;
- A former coal storage area was identified;
- The field located on the western portion of the subject historically was used as a farm field;
- A trash / debris pile was located in the wooded area between the residential homes and the former farm field;

PWGC evaluated the identified environmental issues with respect to the site restoration options when finalizing the Phase II scope. Based upon this review, it was determined that the following issues would not require assessment at this time as they will not effect the Habitat Restoration Feasibility Study and would be addressed during the site development phase:

- The potential onsite sanitary system associated with the northern farm building;
- The former coal storage area;
- The trash / debris pile located in the wooded area between the residential homes and the former farm field.

III Site Investigation

On August 5th and 6th 2009, PWGC conducted Phase II activities at the subject site. Contractor services, consisting of a backhoe, were conducted by Eastern Environmental Services of Manorville, New York. A summary of the findings by environmental issue identified in Task 2 is as follows:

A. Suspected Leaching Pools – Northwest of the Northern Farm Building

Northwest of the northern farm building, PWGC identified several sinkholes in the ground that appeared to potentially be collapsed leaching pools. Given that such leaching structures could act as conduit for surface impacts to reach the subsurface, investigation of the structures was warranted. In addition, the open holes posed a hazard to the general public and needed to be properly secured. PWGC investigated the area by conducting a test pit with a backhoe. Excavation of the area revealed the remnants of former building foundation. Based upon the presence of significant piping, a portion of a pump and a potential wellhead, the building appeared to have been a former pumphouse. The excavation did not reveal any issues of environmental concern; therefore no samples were collected from the area. No further investigation of this area is warranted at this time. Following the investigation, the test pit was backfilled and rendered safe.

B. Southern Farm Building

The southern farm building was identified as potentially being used as a garage and maintenance area. There was a concern that oils and petroleum used in the garage could have been improperly handled and impacted the soils beneath the building and / or adjacent to the building. PWGC inspected the building and the floor appeared to be in good condition. No cracks or holes were noted in the floor which could allow petroleum products in the building to impact the soils beneath the building. PWGC inspected the soils outside the building to assess whether petroleum products used within the building impacted the surround soils as a result improper chemical

handling. In the vicinity of the doorway, PWGC observed potential de-minimus oil staining on the soil. Further assessment of the area revealed that an asphalt "apron" which extends 10 to 15 around the perimeter of the building was present. The asphalt is located between zero and two inches below grade. Based upon the presence of the asphalt around the building, it is unlikely that the soils surround the building have been impacted.

PWGC also conducted a test pit in the vicinity of galvanized steel piping observed along the western portion of the building in order to determine if the piping was associated with a UST. Excavation of the piping revealed no indication of a UST. Based upon the configuration of the piping, the pipes were likely used to water supply lines.

Based upon the observed site conditions, no sampling was required for the southern farm building. No further investigation for this area is warranted at this time.

C. Three Residential Buildings

The three residential buildings identified on the property were each reported to have 275 gallon aboveground storage tanks (ASTs) in the basement. Spills or leaks from such tanks can potential impact the subsurface soils. In order to assess the potential for such leaks, PWGC performed a visual inspection of each of the tank areas. The visual inspection revealed no signs of leaks or spills. Each of the tanks appeared to be good condition. Based upon the lack of spills or leaks, no sampling was required. No further investigation with regards to the residential ASTs is warranted at this time.

D. Former Leaching Structures – East of the Former Hangar

Approximately fifty feet east of the former aircraft hangar building, PWGC identified two former leaching pools (LP-North and LP-South). Given that the structures could potentially have been associated with the former hangar building where fueling of aircraft may have occurred, investigation of the structures was warranted. These structures were open and posed a fall hazard to the general public. Using the backhoe, the domed lids of the structures were removed to expose the interior of the structures. The bottom of both structures prior to excavation was approximately three feet below grade. Both structures showed evidence of being partially backfilled by soil which entered through the uncovered manhole opening at the top of the structure. A 4" diameter cast iron pipe was observed to exit LP-North and connect to LP-South. No additional piping was observed in LP-South. A pipe was observed entering LP-North

from the east. Based upon this configuration, LP-North was the primary structure and received a discharge from an unknown location east of the leaching pools rather than the hangar building located west of the structures as was suspected. Based upon site conditions during the 2008 bid walk, building foundations and a former duck coop were present to the east of LP-North.

PWGC excavated the topsoil out of both structures. Approximately two feet topsoil / backfill material was encountered. Beneath those soils, native sands were encountered. PWGC did not encounter evidence of a sludge / sediment layer associated with the former operation of such structures. Based upon these findings, either the structures were never functional or sediments were cleaned from the structures prior to them being taken out of service. Since the native sands could have been impacted by the potential operation of the structures, PWGC collected a soil sample of the native sands immediately below the topsoil layer (approximately five feet below grade). The soil sample was submitted to the laboratory to be analyzed for Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), and metals. These methods are specified in the Suffolk County Department of Health (SCDHS) SOP 9-95. SOP 9-95 is the document which summarizes the proper procedures to assess underground injection control (UIC) structures such as cesspools, stormdrains, and drywells in Suffolk County. Following collection of the samples, excavated sediments were returned to both structures and the excavations were sloped with a minimum 1: 1 ½ slope so it no longer poses a collapse / entrapment hazard.

Analytical results of the samples from LP-North and LP-South are summarized in Tables 1, 2, and 3. Analytical results were compared to the action levels specified in SOP 9-95. Structures which contain compounds which exceed SOP 9-95 action levels will require remediation. An evaluation of the data from LP-North and LP-South reveals that no elevated levels of VOCs, SVOCs, and Metals were encountered which exceeded SOP 9-95 action levels. Based upon these findings no further investigation or remediation will be required for LP-North and LP-South. PWGC does recommend that the remaining depressions be fully backfilled during site redevelopment activities.

E. Former Agricultural Fields

A majority of the western portion of the property has historically been used as agricultural fields. The reported predominant use was to grow feed corn for the ducks. Based upon such use, it is likely that pesticides and fertilizers (including duck manure) were applied to the field. Such uses could have potentially impacted the former farm field soils or altered the soil chemistry in a way which would hinder the growth of native plants / grasses. Both of these issues could affect habitat restoration for the property.

As a screening measure to assess the soils conditions in the former farm field, two test pits (Field-TP-1 and Field TP-2 as shown on Figure 1) were conducted in the field as shown on the attached figure utilizing a backhoe. At both locations, soil conditions were as follows:

0"-6" Organic rich root with soil.
6"-24" Brown silty medium grained sand with some gravel.
24"+ Orange / brown sand with some gravel.

Based upon the above findings, the topsoil layer appears to be two feet thick. PWGC collected a soil sample from Field-TP-1 and 2 from a depth of approximately 6" below grade. The samples were submitted for the following parameters:

- Pesticides
- PCBs (PCBs were historically used as pesticide carrier / extender)
- Metals (some historic pesticides utilized metals based compounds, predominantly arsenic)
- Nitrogen, nitrate, nitrite, ammonia, total organic carbon, phosphorus (to assess soil chemistry)

Analytical results for pesticides, PCBs, and metals are summarized in Tables 4 and 5. Copies of the lab data sheets are included in Appendix B. Analytical results for these compounds were compared to the Recommended Soil Cleanup Objectives (RSCOs) contained within the New York State Department of Environmental Conservation (NYSDEC) Technical Administrative Guidance Memorandum (TAGM) #4046. This document specifies the cleanup objectives to be used at inactive hazardous waste

sites, however the TAGM RSCOs are widely applied to non hazardous waste sites as well. Analytical results for the soil chemistry testing is summarized in Table 6.

Pesticide and PCB concentrations were below method detection limits. Based upon these results, Pesticides and PCBs do not appear to be a concern for the former farm field soils. Metals analysis revealed the following:

- Levels of mercury which exceeded its respective TAGM RSCO in both samples, however, the detected levels were less than the eastern USA background levels.
- Arsenic was detected below its respective TAGM RSCO in both samples, however, the levels were approaching / equal to the SCDHS determined Suffolk County background level of 4mg/kg for non-agriculture sites. Since arsenic levels typically decrease with depth, higher concentrations of arsenic may be present in the soils located above the 6" below grade sampling depth.

The presence of mercury and arsenic in the soil is likely attributable to the historical use of pesticides and herbicides on the former farm field as both of those compounds have historically been associated with such uses.

There are no soil cleanup objectives / standards for which to compare the soil chemistry parameters the two samples from the field were analyzed for. Based upon a comparison to typical background levels, analytical results of the soil chemistry parameters revealed that levels of nitrate, nitrogen, and phosphorus were elevated. These results are consistent with the use of the land as a farm field and the application of fertilizer. These results will be considered in the evaluation of habitat restoration options.

F. Former Duck Ponds

The eastern property line of the duck farm property was historically used as a swim pond for the ducks. This pond was separate from, but fed by, the Carmans River. At the south end of the swim pond was a bermed area which was utilized as a waste lagoon to collect duck waste prior to the water re-entering the Carmans River. This area was a concern based upon: the location being a low lying area where contamination could accumulate; the presence of contaminates being noted in earlier

sampling conducted by the Army Corp of Engineers (ACoE); the presence of duck waste which can alter the soil chemistry and prevent growth of plants during redevelopment; and the potential for such soils to enter the Carmans River during redevelopment activities.

As a screening measure to assess the soils conditions in the former swim pond area, three test pits (DP-TP-1, DP-TP-2, and DP TP-3) were conducted in the former duck pond area as shown on the attached figure utilizing a backhoe. In addition, a fourth sample (DP-TP-4) was conducted north of the former waste lagoon (see figure) utilizing a hand auger. At each location, soil conditions were as follows:

0'-1' Dark brown organic rich silt with some sand and gravel. Material contains a large amount of roots and emits a strong sulfur type odor.

1'+ Tan course sand and gravel.

Based upon the above findings the layer of organic silts / historic duck waste is approximately one foot thick. PWGC collected a soil sample from each of the four former duck pond locations from the organic silt layer. The samples were submitted for the following parameters:

- Volatile Organic Compounds (VOCs) due to their presence in automotive fuels which were likely used at the farm.
- Semi-VOCs (SVOCs) due to these compounds being detected in earlier sampling at the site.
- Pesticides
- PCBs
- Metals
- Nitrogen, nitrate, nitrite, ammonia, total organic carbon, phosphorus (to assess soil chemistry)

Analytical results for the above compounds are summarized in Tables 4 through 8. Analytical results for these compounds were compared to the RSCOs) contained within the NYSDEC TAGM #4046 as was done for the farm field samples. Analytical results for the soil chemistry testing are summarized in Table 6. Copies of the lab data sheets are included in Appendix B.

In general, concentrations of VOCs were below their respective method detection limits with the exception of three compounds (methyl ethyl ketone, toluene, and 2-Propanone (acetone)) which were each detected below their respective TAGM RSCOs. Analytical results for SVOC, PCBs, and pesticides revealed that each compound analyzed for was detected below their respective method detection limit. Based upon these results VOCS, SVOCs, PCBs, and pesticides do not appear to be a concern for the former duck ponds.

Metals analysis revealed the following:

- Levels of mercury exceeded its respective TAGM RSCO in each of the four samples. In sample DP-TP-4, the detected level also exceeded its eastern USA background level.
- Cadmium was detected above its respective RSCO in DP-TP-4.
- Copper was detected above its respective RSCO in samples DP-TP-1 and 4. The copper concentrations during this sampling round exceeded the concentrations previously detected by the ACoE.
- Zinc was detected in excess of their respective RSCOs in each of the four samples. The zinc concentrations were higher than those documented by the ACoE.

Based upon the historical use of the area as a duck swim pond, the presence of metals was not anticipated. However, an evaluation of each of the metals compounds detected at elevated concentrations (mercury, cadmium, copper, and zinc) revealed that such metals have been used as wood preservatives and metal anti-corrosives. Therefore, it is likely that the metals compounds originated from the use treated wood and metals to fabricate the duck pens over the extended history of the property operating as a duck farm.

Analytical results of the soil chemistry parameters revealed elevated levels of nitrate, nitrogen, and phosphorus in the each of the former duck pond sediment sample locations compared to typical background levels. The location DP-TP-1 had considerably higher levels than the other three locations. These results are consent

earlier samples collected by the ACoE and the presence of duck waste. These results will be considered in the evaluation of habitat restoration options.

IV Conclusions

Based upon the findings of this Phase II investigation, no further investigation is warranted for: the suspected leaching pools located northwest of the farm building, the south farm building, the ASTs associated with the three residential buildings, and the leaching pools located east of the former hanger.

The Phase II did reveal the following concerns:

The limited sampling of the farm field did reveal the potential for elevated levels of arsenic to be present in the surface soils. PWGC recommends that further sampling of the farm field be performed to determine the extent of arsenic impact which may be present. These samples should be performed at varying depths in order to assess the vertical extent of the impact. Of specific concern should be samples from an approximate depth of 0"-2" below grade since arsenic levels are typically highest in the surface soils. The presence of elevated levels of arsenic levels in the soil could impact how the former farm field is redeveloped. In addition, elevated levels of nitrate, nitrogen, and phosphorus were also detected in the soils from the farm field. These results will need to be considered / further evaluated when evaluating options to redevelop the farm field area.

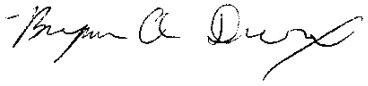
Elevated levels of several metals compounds were detected in the sediment samples collected from the former duck swim pond. In addition, elevated levels of nitrate, nitrogen, and phosphorus were also detected in the sediments. Based upon these analytical results, should redevelopment of the property include activities which will disturb the soils from the former swim ponds, the following will need to be considered:

- Due to the proximity of the soils to the Carmans River, special care should be taken to prevent sediments from the former duck pond area from being mobilized and entering the river.
- Should site restoration activities require the removal of former duck pond soils, the soils will require proper disposal.

Based upon these requirements, a soil management plan for the former duck pond soils may be warranted.

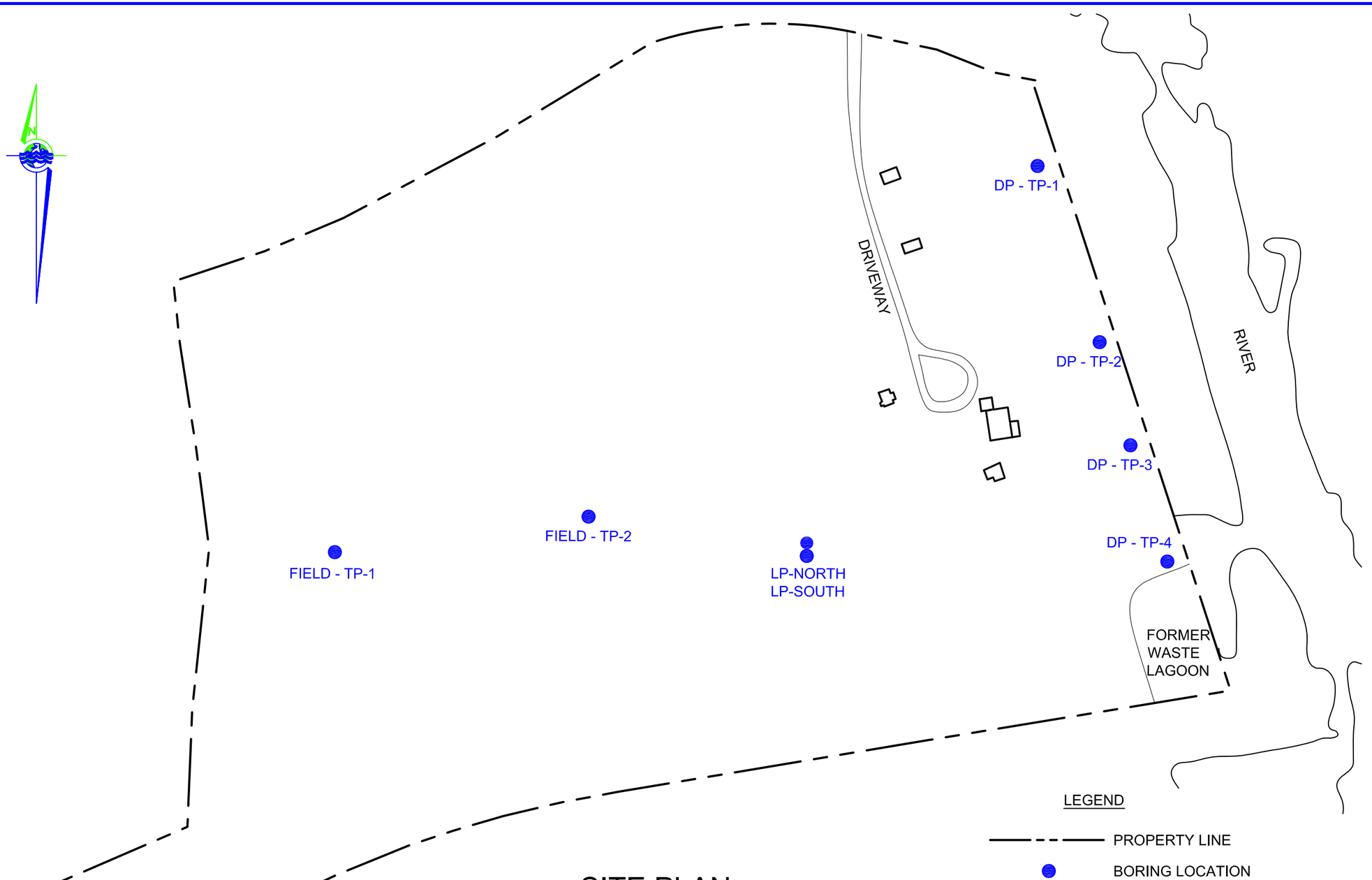
Should you have any questions regarding this memorandum, please do not hesitate to contact me at 631.589.6353 or via bryand@pwgrosser.com.

Sincerely yours,
P.W. Grosser Consulting



Bryan A. Devaux
Sr Project Manager

FIGURES



SITE PLAN

NOT TO SCALE

Test Pit Locations	DP-TP-1	DP-TP-2	DP-TP-3	DP-TP-4	LP-North	LP-South	Field-TP-1	Field-TP-2
Datum = WGS								
Latitude:	40°48'0.83"N	40°47'56.96"N	40°47'55.02"N	40°47'52.26"N	40°47'53.45"N	40°47'53.35"N	40°47'53.60"N	40°47'52.55"N
Longitude:	72°53'4.98"W	72°53'4.31"W	72°53'3.75"W	72°53'3.33"W	72°53'12.22"W	72°53'12.19"W	72°53'28.20"W	72°53'16.71"W

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CONSULTANTS

DRAWINGS PREPARED FOR

REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION

PROJECT:	KSD0901	APPROVED BY:	PWG
DESIGNED BY:	DE	DATE:	9/2/09
DRAWN BY:	LLG	SCALE:	AS SHOWN

SHEET TITLE

SITE PLAN

ROBINSON DUCK FARM

FIGURE NO 1

SHEET 1 OF 1

J:\Projects E-L\GPI - Greenman Pedersen Inc\0901 - Robbins Duck Farm\cad\Site Plan 10-22-09.dwg (11x17H) Oct 22,2009-10:48am By: guzman

Table 1
Robinson Duck Farm County Park
Volatile Organics (SCHDS)

Compound	SCHDS Action Levels	LP-North 8/5/09	LP-South 8/5/09
Volatile Organics by 8260 (SCHDS) (ug/Kg)			
2-Propanone	NS	<2.78	<2.76
Benzene	120	<0.57	<0.56
Bromobenzene	1,600	<0.55	<0.54
Bromochloromethane	400	<0.62	<0.61
Bromodichloromethane	600	<0.50	<0.50
Bromoform	1000	<0.51	<0.51
n-Butylbenzene	6,800	<0.51	<0.51
sec-Butylbenzene	10,000	<0.48	<0.48
tert-Butylbenzene	6,800	<0.57	<0.56
Carbon tetrachloride	1,200	<0.60	<0.59
Chlorobenzene	3,400	<0.65	<0.65
Chloroethane	400	<0.75	<0.74
Chloroform	600	<0.63	<0.63
2-Chlorotoluene	3,600	<0.57	<0.56
4-Chlorotoluene	3,600	<0.54	<0.53
Dibromochloromethane	600	<0.49	<0.49
1,2-Dibromo-3-chloropropane	1,000	<0.49	<0.49
1,2-Dibromoethane	600	<0.63	<0.63
Dibromomethane	400	<0.85	<0.84
1,2-Dichlorobenzene	15,000	<0.50	<0.50
1,3-Dichlorobenzene	3,200	<0.57	<0.56
1,4-Dichlorobenzene	15,000	<0.51	<0.51
Dichlorodifluoromethane	600	<0.40	<0.39
1,1-Dichloroethane	400	<0.61	<0.60
1,2-Dichloroethane	200	<0.62	<0.61
1,1-Dichloroethylene	800	<0.40	<0.39
cis-1,2-Dichloroethylene	600	<0.48	<0.48
trans-1,2-Dichloroethylene	600	<0.49	<0.49
1,2-Dichloropropane	600	<0.63	<0.63
1,3-Dichloropropane	600	<0.56	<0.55
2,2-Dichloropropane	600	<0.63	<0.63
1,1-Dichlorpropene	600	<0.57	<0.56
cis-1,3-Dichloropropene	600	<0.55	<0.54
trans-1,3-Dichloropropene	600	<0.45	<0.45
p-Diethylbenzene	7,600	<0.49	<0.49
Ethylbenzene	11,000	<0.56	<0.55
p-Ethyltoluene	3,600	<0.45	<0.45
Freon 113	12,000	<0.56	<0.55
Hexachlorobutadiene	15,000	<0.51	<0.51
Cumene	5,200	<0.47	<0.47
4-Isopropyltoluene	7,800	<0.50	<0.50
Methylene Chloride	200	<1.01	<1.00
Methyl tertiary butyl ether	1,200	<0.56	<0.55
Methyl ethyl ketone (2-Butanone)	600	<2.38	<2.35
4-Methyl-2-pentanone (MIBK)	NS	<2.30	<2.28
Naphthalene	15,000	<0.48	<0.48
n-Propylbenzene	5,000	<0.49	<0.49
Styrene	2,000	<0.46	<0.46
1,1,1,2-Tetrachloroethane	600	<0.49	<0.49
1,1,2,2-Tetrachloroethane	1,200	<0.64	<0.64
Tetrachloroethylene	2800	<0.48	<0.48
1,2,4,5-Tetramethylbenzene	15,000	<0.43	<0.42
Toluene	3,000	<0.51	<0.51
1,2,3-Trichlorobenzene	6,800	<0.51	<0.51
1,2,4-Trichlorobenzene	6,800	<0.36	<0.36
1,1,1-Trichloroethane	1,600	<0.56	<0.55
1,1,2-Trichloroethane	600	<0.67	<0.67
TCE	1,400	<0.52	<0.52
Freon 11	NS	<0.60	<0.59
1,2,3-Trichloropropane	800	<0.76	<0.75
1,2,4-Trimethylbenzene	4,800	<0.40	<0.39
1,3,5-Trimethylbenzene	5,200	<0.47	<0.47
Vinyl Chloride	400	<0.73	<0.72
Xylenes (Total)	2,400	<0.96	<0.95
m,p-Xylene	NS	<0.96	<0.95
o-Xylene	NS	<0.42	<0.41

Notes:
NS - No Standard
< - Less than detection limit

Table 2
Robinson Duck Farm County Park
Semi-Volatile Organics (SCHDS)

Compounds	SCHDS Action Levels	LP-North 8/5/09	LP-South 8/5/09
Semi-Volatile Organics by 8270 (SCHDS) (ug/Kg)			
Acenaphthene	75,000	<45.2	<44.6
Anthracene	75,000	<47.7	<47.1
Benzo[a]anthracene	6,000	67.5	<44.8
Benzo[a]pyrene	22,000	74.5	<55.1
3,4-Benzofluoranthene	2,200	90.7	<43.9
Benzo[g,h,i]perylene	75,000	<82.0	<80.8
Benzo[k]fluoranthene	2,200	<81.7	<80.5
Chrysene	800	94.6	<56.0
Dibenzo[a,h]anthracene	75,000	<59.9	<59.0
Fluoranthene	75,000	113	<58.3
Fluorene	75,000	<43.1	<42.5
Indeno[1,2,3-cd]pyrene	6,400	55.8	<48.9
Phenanthrene	75,000	50	<48.1
Pyrene	75,000	89.3	<39.2

Notes:

< - Less than detection limit

Table 3
Robinson Duck Farm County Park
Metals (SCHDS)

Compound	SCHDS Action Levels	LP-North 8/5/09	LP-South 8/5/09
Metals by 6010 (SCHDS)			
Mercury	2	0.39	0.23
Arsenic	25	1.9	2.4
Beryllium	8	0.72	<0.021
Cadmium	10	0.56	<0.032
Chromium	100	6.27	8.43
Copper	500	29.9	6.57
Lead	400	116	39.5
Nickel	1000	4.58	<0.053
Silver	100	<0.11	<0.11

Notes:

< - Less than detection limit

Table 4
Robinson Duck Farm County Park
Pesticide and PCB's

Compound	Rec. Soil Cleanup Objective	Field-TP-1 8/5/09	Field-TP-2 8/5/09	DP-TP-1 8/5/09	DP-TP-2 8/5/09	DP-TP-3 8/5/09	DP-TP-4 8/6/09
PCB Aroclors by 8082 (ug/Kg)							
Aroclor 1016	1000 Surface*	<17.2	<14.0	<48.1	<20.9	<23.9	<27.4
Aroclor 1221	1000 Surface*	<17.2	<14.0	<48.1	<20.9	<23.9	<27.4
Aroclor 1232	1000 Surface*	<17.2	<14.0	<48.1	<20.9	<23.9	<27.4
Aroclor 1242	1000 Surface*	<17.2	<14.0	<48.1	<20.9	<23.9	<27.4
Aroclor 1248	1000 Surface*	<17.2	<14.0	<48.1	<20.9	<23.9	<27.4
Aroclor 1254	1000 Surface*	<17.2	<14.0	<48.1	<20.9	<23.9	<27.4
Aroclor 1260	1000 Surface*	<17.4	<14.1	<48.5	<21.0	<24.1	<27.6
Pesticide by 8081 (ug/Kg)							
alpha-BHC	110	<0.91	<0.74	<2.54	<1.10	<1.26	<1.44
gamma-BHC (Lindane)	60	<1.14	<0.93	<3.19	<1.39	<1.59	<1.82
beta-BHC	200	<0.74	<0.60	<2.08	<0.90	<1.03	<1.18
delta-BHC	300	<1.56	<1.27	<4.35	<1.89	<2.16	<2.47
Heptachlor	100	<1.28	<1.04	<3.58	<1.55	<1.78	<2.04
Aldrin	41	<1.45	<1.18	<4.04	<1.75	<2.01	<2.30
Heptachlor epoxide	20	<1.37	<1.11	<3.81	<1.65	<1.89	<2.17
gamma-chlordane	540	<1.46	<1.19	<4.08	<1.77	<2.03	<2.32
alpha-Chlordane	NS	<1.23	<1.00	<3.42	<1.49	<1.70	<1.95
4,4'-DDE	2100	<1.48	<1.20	<4.12	<1.79	<2.05	<2.34
Endosulfan I (alpha-Endosulfan)	900	<1.41	<1.14	<3.92	<1.70	<1.95	<2.23
Dieldrin	44	<1.57	<1.28	<4.38	<1.90	<2.18	<2.49
Endrin	100	<1.42	<1.15	<3.96	<1.72	<1.97	<2.25
4,4'-DDD	2900	<0.62	<0.50	<1.73	<0.75	<0.86	<0.98
Endosulfan II (beta-Endosulfan)	900	<1.12	<0.91	<3.12	<1.35	<1.55	<1.77
4,4'-DDT	2100	<0.74	<0.60	<2.08	<0.90	<1.03	<1.18
Endosulfan Sulfate	1000	<0.99	<0.81	<2.77	<1.20	<1.38	<1.58
Endrin Aldehyde	NS	<1.03	<0.84	<2.88	<1.25	<1.43	<1.64
Methoxychlor	**	<1.21	<0.99	<3.38	<1.47	<1.68	<1.93
Endrin ketone	N/A	<1.31	<1.06	<3.65	<1.59	<1.82	<2.08
Toxaphene	NS	<50.3	<40.9	<140	<60.9	<69.8	<79.9
Chlordane	540	<9.60	<7.79	<26.8	<11.6	<13.3	<15.2

Notes:

* As per TAGM 4046, PCB's 1000 Surface / 10,000 Sub-surface.

** As per TAGM 4046, Total VOC's <10ppm.

< - Less than detection limit

NS - No Standard

Table 5
Robinson Duck Farm County Park
Metals

Compound	Rec. Soil Cleanup Objective	Eastern USA Background	Field-TP-1 8/5/09	Field-TP-2 8/5/09	DP-TP-1 8/5/09	DP-TP-2 8/5/09	DP-TP-3 8/5/09	DP-TP-4 8/6/09
Metals by 6010 (mg/Kg)								
Calcium	SB	130-35,000	2400	3180	7460	5440	3430	12300
Mercury	0.1	0.001-0.2	**0.13**	**0.12**	**0.11**	**0.19**	**0.16**	**0.24**
Antimony	SB	N/A	<0.28	<0.23	<0.77	<0.34	<0.38	<0.44
Arsenic	7.5 or SB	3-12	4	2.43	<1.31	<0.57	<0.65	<0.75
Beryllium	0.16 or SB	0-1.75	<0.028	<0.023	<0.077	<0.034	<0.038	<0.044
Cadmium	1 or SB	0.1-1	0.65	0.47	<0.12	<0.051	<0.058	**1.32**
Chromium	10 or SB	1.5-40	9.4	4.89	11.6	6.14	6.18	8.34
Copper	25 or SB	1-50	7.51	6.55	**114**	**33.2**	19.4	**160**
Lead	SB	****	24.5	18.8	193	83.6	50.3	80.5
Nickel	13 or SB	0.5-25	4.12	<0.057	<0.19	<0.084	<0.096	11.2
Selenium	2 or SB	0.1-3.9	<0.60	<0.49	<1.66	<0.73	<0.83	<0.95
Silver	SB	N/A	<0.14	<0.11	<0.39	<0.17	<0.19	<0.22
Thallium	SB	N/A	<0.28	<0.23	<0.77	<0.34	<0.38	<0.44
Zinc	20 or SB	9-50	47.9	41.2	**614**	**381**	**263**	**618**

Notes:

Bold denotes exceedences above the Rec. Soil Cleanup Ojective.

Bold/Highlighted denotes exceedences above the Rec. Soil Cleanup Objective and Eastern USA Background.

SB - Site Background

**** Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4000 to 61,000 ppb. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500ppm.

< - Less than detection limit

Table 6
Robinson Duck Farm County Park
Nitrogen, Phosphorus, pH and TOC

Compound	Field-TP-1 8/5/09	Field-TP-2 8/5/09	DP-TP-1 8/5/09	DP-TP-2 8/5/09	DP-TP-3 8/5/09	DP-TP-4 8/6/09
Nitrate / Nitrite by SM 4500-NO3 E (mg/Kg)						
Nitrate	5.7	5.03	20.1	9.44	8.68	8.88
Nitrite	<12.4	<10.1	<34.6	<15.0	<17.2	<19.7
Total Nitrogen (mg/Kg)						
TKN	8.46	6.87	47.2	10.2	35.2	40.3
Ammonia	8.46	6.86	47.3	10.2	11.7	26.9
Total Organic Nitrogen	NC	NC	NC	NC	NC	NC
Total Nitrogen	NC	NC	NC	NC	NC	NC
pH - Soil @ 25 Degrees C - SW 846 9045C (pH Units)						
pH	5.67	5.74	5.47	5.36	5.71	6.08
Total Phosphorus by SM 4500-P E (mg/Kg)						
Phosphorus (P)	14.9	12.1	86.3	28.1	15.8	19.3
Total Organic Carbon by Loss of Ignition (%)						
TOC	26.5	12.8	23.6	65.3	58.5	55.2
Total Inorganic Nitrogen (mg/Kg)						
Total Nitrogen	14.2	11.9	67.3	19.6	20.4	35.8

Notes:

< - Less than detection limit

Table 7
Robinson Duck Farm County Park
Volatile Organics

Compound	Rec. Soil Cleanup Objective[(1)]	DP-TP-1 8/5/09	DP-TP-2 8/5/09	DP-TP-3 8/5/09	DP-TP-4 8/6/09
Volatile Organics by 8260 (ug/Kg)					
1,1,1,2-Tetrachloroethane	NS	<1.77	<0.77	<0.88	<1.01
1,1,1-Trichloroethane	800	<2.00	<0.87	<0.99	<1.14
1,1,2,2-Tetrachloroethane	600	<2.31	<1.00	<1.15	<1.31
1,1,2-Trichloroethane	NS	<2.43	<1.05	<1.20	<1.38
1,1-Dichloroethane	200	<2.19	<0.95	<1.09	<1.25
1,1-Dichloroethylene	400	<1.42	<0.62	<0.71	<0.81
1,1-Dichlorpropene	NS	<2.04	<0.89	<1.01	<1.16
1,2,3-Trichlorobenzene	NS	<1.85	<0.80	<0.92	<1.05
1,2,3-Trichloropropane	400	<2.73	<1.19	<1.36	<1.55
1,2,4,5-Tetramethylbenzene	NS	<1.54	<0.67	<0.76	<0.88
1,2,4-Trichlorobenzene	3,400	<1.31	<0.57	<0.65	<0.74
1,2,4-Trimethylbenzene	10,000	<1.42	<0.62	<0.71	<0.81
1,2-Dibromo-3-chloropropane	NS	<1.77	<0.77	<0.88	<1.01
1,2-Dibromoethane	NS	<2.27	<0.99	<1.13	<1.29
1,2-Dichlorobenzene	7,900	<1.81	<0.78	<0.90	<1.03
1,2-Dichloroethane	100	<2.23	<0.97	<1.11	<1.27
1,2-Dichloropropane	NS	<2.27	<0.99	<1.13	<1.29
1,3,5-Trimethylbenzene	3,300	<1.69	<0.73	<0.84	<0.96
1,3-Dichlorobenzene	1,600	<2.04	<0.89	<1.01	<1.16
1,3-Dichloropropane	300	<2.00	<0.87	<0.99	<1.14
1,4-Dichlorobenzene	8,500	<1.85	<0.80	<0.92	<1.05
2,2-Dichloropropane	NS	<2.27	<0.99	<1.13	<1.29
2-Chloroethyl vinyl ether	NS	<2.46	<1.07	<1.22	<1.40
2-Chlorotoluene	NS	<2.04	<0.89	<1.01	<1.16
2-Hexanone	NS	<7.62	<3.31	<3.78	<4.34
2-Propanone	200	132	83.7	75.2	80.9
4-Chlorotoluene	NS	<1.92	<0.83	<0.95	<1.10
4-Isopropyltoluene	10,000	<1.81	<0.78	3.84	<1.03
4-Methyl-2-pentanone (MIBK)	1,000	<8.28	<3.59	<4.11	<4.71
Acrylonitrile	NS	<26.9	<11.7	<13.4	<15.3
Benzene	60	<2.04	<0.89	<1.01	<1.16
Bromobenzene	NS	<1.96	<0.85	<0.97	<1.12
Bromochloromethane	NS	<2.23	<0.97	<1.11	<1.27
Bromodichloromethane	NS	<1.81	<0.78	<0.90	<1.03
Bromoform	NS	<1.85	<0.80	<0.92	<1.05
Bromomethane	NS	<1.89	<0.82	<0.94	<1.07
Carbon disulfide	2,700	<1.81	<0.78	<0.90	<1.03
Carbon tetrachloride	600	<2.16	<0.94	<1.07	<1.23
Chlorobenzene	1,700	<2.35	<1.02	<1.17	<1.34
Chlorodifluoromethane	NS	<3.39	<1.47	<1.68	<1.93
Chloroethane	1,900	<2.69	<1.17	<1.34	<1.53
Chloroform	300	<2.27	<0.99	<1.13	<1.29
Chloromethane	NS	<1.92	<0.83	<0.95	<1.10
cis-1,2-Dichloroethylene	NS	<1.73	<0.75	<0.86	<0.99
cis-1,3-Dichloropropene	NS	<1.96	<0.85	<0.97	<1.12
Cumene	NS	<1.69	<0.73	<0.84	<0.96
Dibromochloromethane	NS	<1.77	<0.77	<0.88	<1.01
Dibromomethane	NS	<3.04	<1.32	<1.51	<1.73
Dichlorodifluoromethane	NS	<1.42	<0.62	<0.71	<0.81
Ethylbenzene	5,500	<2.00	<0.87	<0.99	<1.14
Freon 11	NS	<2.16	<0.94	<1.07	<1.23
Freon 113	6,000	<2.00	<0.87	<0.99	<1.14
Hexachlorobutadiene	NS	<1.85	<0.80	<0.92	<1.05
m,p-Xylene	1,200	<3.46	<1.50	<1.72	<1.97
Methyl ethyl ketone (2-Butanone)	300	29.8	22.5	<4.24	16.6
Methyl tertiary butyl ether	120	<2.00	<0.87	<0.99	<1.14
Methylene Chloride	100	<3.62	<1.57	<1.80	<2.06
Naphthalene	13,000	<1.73	<0.75	<0.86	<0.99
n-Butylbenzene	10,000	<1.85	<0.80	<0.92	<1.05
n-Propylbenzene	3,700	<1.77	<0.77	<0.88	<1.01
o-Xylene	1,200	<1.50	<0.65	<0.74	<0.85
p-Diethylbenzene	NS	<1.77	<0.77	<0.88	<1.01
p-Ethyltoluene	NS	<1.62	<0.70	<0.80	<0.92
sec-Butylbenzene	10,000	<1.73	<0.75	<0.86	<0.99
Styrene	NS	<1.66	<0.72	<0.82	<0.94
TAME	NS	<2.43	<1.05	<1.20	<1.38
TCE	700	<1.89	<0.82	<0.94	<1.07
tert-Butylbenzene	10,000	<2.04	<0.89	<1.01	<1.16
Tertiary butyl alcohol	NS	<20.8	<9.00	<10.3	<11.8
Tetrachloroethylene	1,400	<1.73	<0.75	<0.86	<0.99
Toluene	1,500	<1.85	1.9	<0.92	4.72
trans-1,2-Dichloroethylene	300	<1.77	<0.77	<0.88	<1.01
trans-1,3-Dichloropropene	NS	<1.62	<0.70	<0.80	<0.92
Vinyl Chloride	200	<2.62	<1.14	<1.30	<1.49

Notes:
[(1)] NYSDEC Recommended Soil Cleanup Objectives (RSCO), Technical and Administrative Guidance Memorandum (TAGM) #4046, 01/94
< - Less than detection limit
Bold/highlighted - indicated exceedance of the NYSDEC Cleanup Objective

Table 8
Robinson Duck Farm County Park
Semi-Volatile Organics

Compound	Rec. Soil Cleanup Objective[(1)]	DP-TP-1 8/5/09	DP-TP-2 8/5/09	DP-TP-3 8/5/09	DP-TP-4 8/6/09
Semi-Volaitle Organics by 8270 (ug/Kg)					
1,2,4-Trichlorobenzene	NS	<160	<69.4	<79.5	<91.0
1,2-Dichlorobenzene	NS	<119	<51.6	<59.1	<67.6
1,2-Diphenylhydrazine	NS	<116	<50.4	<57.7	<66.1
1,3-Dichlorobenzene	NS	<129	<56.1	<64.2	<73.5
1,4-Dichlorobenzene	NS	<125	<54.4	<62.3	<71.3
2,3,4,6-Tetrachlorophenol	NS	<152	<66.1	<75.7	<86.7
2,4,5-Trichlorophenol	100	<83.5	<36.2	<41.5	<47.5
2,4,6-Trichlorophenol	NS	<145	<62.8	<71.9	<82.3
2,4-Dichlorophenol	400	<126	<54.8	<62.7	<71.8
2,4-Dimethylphenol	NS	<161	<69.8	<79.9	<91.5
2,4-Dinitrophenol	200 or MDL	<1350	<588	<673	<770
2,4-Dinitrotoluene	NS	<231	<100	<115	<131
2,6-Dinitrotoluene	1,000	<158	<68.8	<78.8	<90.2
2-Chloronaphthalene	NS	<185	<80.5	<92.2	<105
2-Chlorophenol	800	<185	<80.5	<92.2	<105
2-Methylnaphthalene	36,400	<153	<66.3	<75.9	143
2-Methylphenol(o-Cresol)	100 or MDL	<138	<59.8	<68.5	<78.3
2-Nitroaniline	430 or MDL	<200	<87.0	<99.6	<114
2-Nitrophenol	330 or MDL	<117	<50.8	<58.1	<66.5
3,3'-Dichlorobenzidine	NS	<185	<80.5	<92.2	<105
Benzo[b]fluoranthene	220 or MDL	<160	<69.3	<79.3	<90.8
3+4-Methylphenol(m,p-Cresol)	NS	<119	<51.6	<59.1	<67.6
3-Nitroaniline	500 or MDL	<66.2	<28.7	<32.9	<37.6
4,6-Dinitro-o-cresol	NS	<1680	<730	<836	<956
4-Bromophenylphenyl ether	NS	<175	<75.8	<86.8	<99.3
4-Chloro-3-methylphenol	240 or MDL	<143	<62.3	<71.3	<81.6
4-Chloroaniline	220 or MDL	<147	<63.6	<72.8	<83.4
4-Chlorophenylphenyl ether	NS	<150	<64.9	<74.4	<85.1
4-Nitroaniline	500 or MDL	<376	<163	<187	<214
4-Nitrophenol	100 or MDL	<2570	<1110	<1280	<1460
Acenaphthene	50,000	<162	<70.3	<80.5	<92.1
Acenaphthylene	41,000	<132	<57.4	<65.8	<75.3
Aniline	100	<120	<51.9	<59.5	<68.1
Anthracene	50,000	<171	<74.3	<85.1	<97.4
Benzidine	NS	<3380	<1470	<1680	<1920
Benzo[a]anthracene	224 or MDL	<163	<70.6	<80.9	<92.6
Benzo[a]pyrene	61 or MDL	<200	<87.0	<99.6	<114
Benzo[g,h,i]perylene	50,000	<294	<128	<146	<167
Benzo[k]fluoranthene	1,100	<293	<127	<146	<167
Benzoic acid	NS	<22500	<9780	<11200	<12800
Benzyl alcohol	NS	<227	<98.5	<113	<129
bis(2-chloroethoxy)methane	NS	<159	<69.1	<79.2	<90.6
bis(2-chloroethyl)ether	NS	<182	<79.0	<90.4	<104
bis(2-chloroisopropyl)ether	NS	<141	<61.3	<70.2	<80.3
bis(2-Ethylhexyl)phthalate	50,000	<252	<109	<125	<143
Butyl benzyl phthalate	50,000	<203	<88.1	<101	<116
Carbazole	NS	<222	<96.2	<110	<126
Chrysene	400	<203	<88.3	<101	<116
Cresol (total)	NS	<257	<111	<128	<146
Dibenzo[a,h]anthracene	14 or MDL	<215	<93.2	<107	<122
Dibenzofuran	6,200	<128	<55.8	<63.9	<73.1
Diethyl phthalate	7,100	<252	<109	<125	<143
Dimethyl phthalate	2,000	<186	<80.6	<92.4	<106
Di-n-butyl phthalate	8,100	<217	<94.0	<108	<123
Di-n-octyl phthalate	50,000	<189	<82.1	<94.1	<108
Di-n-propylnitrosamine	NS	<116	<50.4	<57.7	<66.1
Diphenylnitrosamine	NS	<210	<91.0	<104	<119
Fluoranthene	50,000	<212	<92.0	<105	<121
Fluorene	50,000	<155	<67.1	<76.9	<88.0
Hexachlorobenzene	410	<165	<71.5	<81.8	<93.7
Hexachlorobutadiene	NS	<154	<66.8	<76.5	<87.5
Hexachlorocyclopentadiene	NS	<1190	<516	<591	<676
Hexachloroethane	NS	<171	<74.3	<85.1	<97.4
Indeno[1,2,3-cd]pyrene	3,200	<178	<77.1	<88.3	<101
Isophorone	4,400	<176	<76.3	<87.4	<100
Naphthalene	13,000	<155	<67.1	<76.9	268
Nitrobenzene	200 or MDL	<149	<64.6	<74.0	<84.7
n-Nitrosodimethylamine	NS	<244	<106	<121	<139
Pentachlorophenol	1,000or MDL	<1460	<633	<725	<829
Phenanthrene	50,000	<175	<76.0	<87.0	<99.6
Phenol	30 or MDL	<100	<43.6	<49.9	<57.1
Pyrene	50,000	<142	<61.8	<70.7	<81.0
Pyridine	NS	<220	<95.7	<110	<125

Notes:
[(1)] NYSDEC Recommended Soil Cleanup Objectives (RSCO), Technical and Administrative Guidance Memorandum (TAGM) #4046, 01/94
< - Less than detection limit
Bold/highlighted - indicated exceedance of the NYSDEC Cleanup Objective

APPENDIX A

For Appendix A
See

Appendix 3 - Inventory of Environmental Conditions

APPENDIX B

Environmental Testing Laboratories, Inc.
208 Route 109, Farmingdale NY 11735
Phone - 631-249-1456 Fax - 631-249-8344

09/02/2009

Laboratory Identifier: 0908086

Received: 08/06/2009 12:42
Sampled by: Donna Gorwitz

Client: PW Grosser Consulting Engineers PC

630 Johnson Avenue - Suite 7
Bohemia,
NY 11716-2618

Project: Robinson Duck Farm

South Haven,
NY
Area: GPI0901

Manager: Bryan Devaux

Respectfully submitted,

Technical Director

NYS Lab ID # 10969
NJ Cert. # 73812
CT Cert. # PH0645
PA Cert. #68-00535

Environmental Testing Laboratories, Inc.
208 Route 109, Farmingdale NY 11735
Phone - 631-249-1456 Fax - 631-249-8344

09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-5
Client Sample ID: DP-TP-1
Matrix: Soil Type: Grab Collected: 08/05/2009 11:20
Remarks: See Case Narrative % Solid: 26%
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
67-64-1	2-Propanone	B2919-9735	10.0	**132**	ug/Kg	
56-23-5	Carbon tetrachloride	B2919-9735	2.16	2.16	ug/Kg	U
67-66-3	Chloroform	B2919-9735	2.27	2.27	ug/Kg	U
71-43-2	Benzene	B2919-9735	2.04	2.04	ug/Kg	U
71-55-6	1,1,1-Trichloroethane	B2919-9735	2.00	2.00	ug/Kg	U
74-83-9	Bromomethane	B2919-9735	1.89	1.89	ug/Kg	U
74-87-3	Chloromethane	B2919-9735	1.92	1.92	ug/Kg	U
74-95-3	Dibromomethane	B2919-9735	3.04	3.04	ug/Kg	U
74-97-5	Bromochloromethane	B2919-9735	2.23	2.23	ug/Kg	U
75-00-3	Chloroethane	B2919-9735	2.69	2.69	ug/Kg	U
75-01-4	Vinyl Chloride	B2919-9735	2.62	2.62	ug/Kg	U
75-09-2	Methylene Chloride	B2919-9735	3.62	3.62	ug/Kg	U
75-15-0	Carbon disulfide	B2919-9735	1.81	1.81	ug/Kg	U
75-25-2	Bromoform	B2919-9735	1.85	1.85	ug/Kg	U
75-27-4	Bromodichloromethane	B2919-9735	1.81	1.81	ug/Kg	U
75-34-3	1,1-Dichloroethane	B2919-9735	2.19	2.19	ug/Kg	U
75-35-4	1,1-Dichloroethylene	B2919-9735	1.42	1.42	ug/Kg	U
75-45-6	Chlorodifluoromethane	B2919-9735	3.39	3.39	ug/Kg	U
75-65-0	Tertiary butyl alcohol	B2919-9735	20.8	20.8	ug/Kg	U
75-69-4	Freon 11	B2919-9735	2.16	2.16	ug/Kg	U
75-71-8	Dichlorodifluoromethane	B2919-9735	1.42	1.42	ug/Kg	U
76-13-1	Freon 113	B2919-9735	2.00	2.00	ug/Kg	U
78-87-5	1,2-Dichloropropane	B2919-9735	2.27	2.27	ug/Kg	U
78-93-3	Methyl ethyl ketone (2-Butanone)	B2919-9735	8.55	**29.8**	ug/Kg	J
79-00-5	1,1,2-Trichloroethane	B2919-9735	2.43	2.43	ug/Kg	U
79-01-6	TCE	B2919-9735	1.89	1.89	ug/Kg	U
79-34-5	1,1,2,2-Tetrachloroethane	B2919-9735	2.31	2.31	ug/Kg	U
87-61-6	1,2,3-Trichlorobenzene	B2919-9735	1.85	1.85	ug/Kg	U
87-68-3	Hexachlorobutadiene	B2919-9735	1.85	1.85	ug/Kg	U
91-20-3	Naphthalene	B2919-9735	1.73	1.73	ug/Kg	U
95-47-6	o-Xylene	B2919-9735	1.50	1.50	ug/Kg	U
95-49-8	2-Chlorotoluene	B2919-9735	2.04	2.04	ug/Kg	U

Environmental Testing Laboratories, Inc.
208 Route 109, Farmingdale NY 11735
Phone - 631-249-1456 Fax - 631-249-8344

09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-5
Client Sample ID: DP-TP-1
Matrix: Soil Type: Grab Collected: 08/05/2009 11:20
Remarks: See Case Narrative % Solid: 26%
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
95-50-1	1,2-Dichlorobenzene	B2919-9735	1.81	1.81	ug/Kg	U
95-63-6	1,2,4-Trimethylbenzene	B2919-9735	1.42	1.42	ug/Kg	U
95-93-2	1,2,4,5-Tetramethylbenzene	B2919-9735	1.54	1.54	ug/Kg	U
96-12-8	1,2-Dibromo-3-chloropropane	B2919-9735	1.77	1.77	ug/Kg	U
96-18-4	1,2,3-Trichloropropane	B2919-9735	2.73	2.73	ug/Kg	U
98-06-6	tert-Butylbenzene	B2919-9735	2.04	2.04	ug/Kg	U
98-82-8	Cumene	B2919-9735	1.69	1.69	ug/Kg	U
99-87-6	4-Isopropyltoluene	B2919-9735	1.81	1.81	ug/Kg	U
100-41-4	Ethylbenzene	B2919-9735	2.00	2.00	ug/Kg	U
100-42-5	Styrene	B2919-9735	1.66	1.66	ug/Kg	U
103-65-1	n-Propylbenzene	B2919-9735	1.77	1.77	ug/Kg	U
104-51-8	n-Butylbenzene	B2919-9735	1.85	1.85	ug/Kg	U
105-05-5	p-Diethylbenzene	B2919-9735	1.77	1.77	ug/Kg	U
106-43-4	4-Chlorotoluene	B2919-9735	1.92	1.92	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	B2919-9735	1.85	1.85	ug/Kg	U
106-93-4	1,2-Dibromoethane	B2919-9735	2.27	2.27	ug/Kg	U
107-06-2	1,2-Dichloroethane	B2919-9735	2.23	2.23	ug/Kg	U
107-13-1	Acrylonitrile	B2919-9735	26.9	26.9	ug/Kg	U
108-10-1	4-Methyl-2-pentanone (MIBK)	B2919-9735	8.28	8.28	ug/Kg	U
108-38-3	m,p-Xylene	B2919-9735	3.46	3.46	ug/Kg	U
108-67-8	1,3,5-Trimethylbenzene	B2919-9735	1.69	1.69	ug/Kg	U
108-86-1	Bromobenzene	B2919-9735	1.96	1.96	ug/Kg	U
108-88-3	Toluene	B2919-9735	1.85	1.85	ug/Kg	U
108-90-7	Chlorobenzene	B2919-9735	2.35	2.35	ug/Kg	U
110-75-8	2-Chloroethyl vinyl ether	B2919-9735	2.46	2.46	ug/Kg	U
120-82-1	1,2,4-Trichlorobenzene	B2919-9735	1.31	1.31	ug/Kg	U
124-48-1	Dibromochloromethane	B2919-9735	1.77	1.77	ug/Kg	U
127-18-4	Tetrachloroethylene	B2919-9735	1.73	1.73	ug/Kg	U
135-98-8	sec-Butylbenzene	B2919-9735	1.73	1.73	ug/Kg	U
142-28-9	1,3-Dichloropropane	B2919-9735	2.00	2.00	ug/Kg	U
156-59-2	cis-1,2-Dichloroethylene	B2919-9735	1.73	1.73	ug/Kg	U
156-60-5	trans-1,2-Dichloroethylene	B2919-9735	1.77	1.77	ug/Kg	U

Environmental Testing Laboratories, Inc.
208 Route 109, Farmingdale NY 11735
Phone - 631-249-1456 Fax - 631-249-8344

09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-5
Client Sample ID: DP-TP-1
Matrix: Soil Type: Grab Collected: 08/05/2009 11:20
Remarks: See Case Narrative % Solid: 26%
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
541-73-1	1,3-Dichlorobenzene	B2919-9735	2.04	2.04	ug/Kg	U
563-58-6	1,1-Dichlorpropene	B2919-9735	2.04	2.04	ug/Kg	U
590-20-7	2,2-Dichloropropane	B2919-9735	2.27	2.27	ug/Kg	U
591-78-6	2-Hexanone	B2919-9735	7.62	7.62	ug/Kg	U
622-96-8	p-Ethyltoluene	B2919-9735	1.62	1.62	ug/Kg	U
630-20-6	1,1,1,2-Tetrachloroethane	B2919-9735	1.77	1.77	ug/Kg	U
994-05-8	TAME	B2919-9735	2.43	2.43	ug/Kg	U
1634-04-4	Methyl tertiary butyl ether	B2919-9735	2.00	2.00	ug/Kg	U
10061-01-5	cis-1,3-Dichloropropene	B2919-9735	1.96	1.96	ug/Kg	U
10061-02-6	trans-1,3-Dichloropropene	B2919-9735	1.62	1.62	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
17060-07-0	1,2-DICHLOROETHANE-D4	B2919-9735	106.0 %	(69 - 134)	
460-00-4	4-BROMOFLUOROBENZENE	B2919-9735	89.9 %	(74 - 123)	
4774-33-8	DIBROMOFLUOROMETHANE	B2919-9735	110.0 %	(75 - 136)	
2037-26-5	TOLUENE-D8	B2919-9735	101.0 %	(74 - 125)	

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09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
67-64-1	2-Propanone	B2919-9736	4.34	**83.7**	ug/Kg	
56-23-5	Carbon tetrachloride	B2919-9736	0.94	0.94	ug/Kg	U
67-66-3	Chloroform	B2919-9736	0.99	0.99	ug/Kg	U
71-43-2	Benzene	B2919-9736	0.89	0.89	ug/Kg	U
71-55-6	1,1,1-Trichloroethane	B2919-9736	0.87	0.87	ug/Kg	U
74-83-9	Bromomethane	B2919-9736	0.82	0.82	ug/Kg	U
74-87-3	Chloromethane	B2919-9736	0.83	0.83	ug/Kg	U
74-95-3	Dibromomethane	B2919-9736	1.32	1.32	ug/Kg	U
74-97-5	Bromochloromethane	B2919-9736	0.97	0.97	ug/Kg	U
75-00-3	Chloroethane	B2919-9736	1.17	1.17	ug/Kg	U
75-01-4	Vinyl Chloride	B2919-9736	1.14	1.14	ug/Kg	U
75-09-2	Methylene Chloride	B2919-9736	1.57	1.57	ug/Kg	U
75-15-0	Carbon disulfide	B2919-9736	0.78	0.78	ug/Kg	U
75-25-2	Bromoform	B2919-9736	0.80	0.80	ug/Kg	U
75-27-4	Bromodichloromethane	B2919-9736	0.78	0.78	ug/Kg	U
75-34-3	1,1-Dichloroethane	B2919-9736	0.95	0.95	ug/Kg	U
75-35-4	1,1-Dichloroethylene	B2919-9736	0.62	0.62	ug/Kg	U
75-45-6	Chlorodifluoromethane	B2919-9736	1.47	1.47	ug/Kg	U
75-65-0	Tertiary butyl alcohol	B2919-9736	9.00	9.00	ug/Kg	U
75-69-4	Freon 11	B2919-9736	0.94	0.94	ug/Kg	U
75-71-8	Dichlorodifluoromethane	B2919-9736	0.62	0.62	ug/Kg	U
76-13-1	Freon 113	B2919-9736	0.87	0.87	ug/Kg	U
78-87-5	1,2-Dichloropropane	B2919-9736	0.99	0.99	ug/Kg	U
78-93-3	Methyl ethyl ketone (2-Butanone)	B2919-9736	3.71	**22.5**	ug/Kg	J
79-00-5	1,1,2-Trichloroethane	B2919-9736	1.05	1.05	ug/Kg	U
79-01-6	TCE	B2919-9736	0.82	0.82	ug/Kg	U
79-34-5	1,1,2,2-Tetrachloroethane	B2919-9736	1.00	1.00	ug/Kg	U
87-61-6	1,2,3-Trichlorobenzene	B2919-9736	0.80	0.80	ug/Kg	U
87-68-3	Hexachlorobutadiene	B2919-9736	0.80	0.80	ug/Kg	U
91-20-3	Naphthalene	B2919-9736	0.75	0.75	ug/Kg	U
95-47-6	o-Xylene	B2919-9736	0.65	0.65	ug/Kg	U
95-49-8	2-Chlorotoluene	B2919-9736	0.89	0.89	ug/Kg	U

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09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
541-73-1	1,3-Dichlorobenzene	B2919-9736	0.89	0.89	ug/Kg	U
563-58-6	1,1-Dichlorpropene	B2919-9736	0.89	0.89	ug/Kg	U
590-20-7	2,2-Dichloropropane	B2919-9736	0.99	0.99	ug/Kg	U
591-78-6	2-Hexanone	B2919-9736	3.31	3.31	ug/Kg	U
622-96-8	p-Ethyltoluene	B2919-9736	0.70	0.70	ug/Kg	U
630-20-6	1,1,1,2-Tetrachloroethane	B2919-9736	0.77	0.77	ug/Kg	U
994-05-8	TAME	B2919-9736	1.05	1.05	ug/Kg	U
1634-04-4	Methyl tertiary butyl ether	B2919-9736	0.87	0.87	ug/Kg	U
10061-01-5	cis-1,3-Dichloropropene	B2919-9736	0.85	0.85	ug/Kg	U
10061-02-6	trans-1,3-Dichloropropene	B2919-9736	0.70	0.70	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
17060-07-0	1,2-DICHLOROETHANE-D4	B2919-9736	115.0 %	(69 - 134)	
460-00-4	4-BROMOFLUOROBENZENE	B2919-9736	88.5 %	(74 - 123)	
4774-33-8	DIBROMOFLUOROMETHANE	B2919-9736	111.0 %	(75 - 136)	
2037-26-5	TOLUENE-D8	B2919-9736	99.4 %	(74 - 125)	

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09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
95-50-1	1,2-Dichlorobenzene	B2919-9736	0.78	0.78	ug/Kg	U
95-63-6	1,2,4-Trimethylbenzene	B2919-9736	0.62	0.62	ug/Kg	U
95-93-2	1,2,4,5-Tetramethylbenzene	B2919-9736	0.67	0.67	ug/Kg	U
96-12-8	1,2-Dibromo-3-chloropropane	B2919-9736	0.77	0.77	ug/Kg	U
96-18-4	1,2,3-Trichloropropane	B2919-9736	1.19	1.19	ug/Kg	U
98-06-6	tert-Butylbenzene	B2919-9736	0.89	0.89	ug/Kg	U
98-82-8	Cumene	B2919-9736	0.73	0.73	ug/Kg	U
99-87-6	4-Isopropyltoluene	B2919-9736	0.78	0.78	ug/Kg	U
100-41-4	Ethylbenzene	B2919-9736	0.87	0.87	ug/Kg	U
100-42-5	Styrene	B2919-9736	0.72	0.72	ug/Kg	U
103-65-1	n-Propylbenzene	B2919-9736	0.77	0.77	ug/Kg	U
104-51-8	n-Butylbenzene	B2919-9736	0.80	0.80	ug/Kg	U
105-05-5	p-Diethylbenzene	B2919-9736	0.77	0.77	ug/Kg	U
106-43-4	4-Chlorotoluene	B2919-9736	0.83	0.83	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	B2919-9736	0.80	0.80	ug/Kg	U
106-93-4	1,2-Dibromoethane	B2919-9736	0.99	0.99	ug/Kg	U
107-06-2	1,2-Dichloroethane	B2919-9736	0.97	0.97	ug/Kg	U
107-13-1	Acrylonitrile	B2919-9736	11.7	11.7	ug/Kg	U
108-10-1	4-Methyl-2-pentanone (MIBK)	B2919-9736	3.59	3.59	ug/Kg	U
108-38-3	m,p-Xylene	B2919-9736	1.50	1.50	ug/Kg	U
108-67-8	1,3,5-Trimethylbenzene	B2919-9736	0.73	0.73	ug/Kg	U
108-86-1	Bromobenzene	B2919-9736	0.85	0.85	ug/Kg	U
108-88-3	Toluene	B2919-9736	0.80	**1.90**	ug/Kg	J
108-90-7	Chlorobenzene	B2919-9736	1.02	1.02	ug/Kg	U
110-75-8	2-Chloroethyl vinyl ether	B2919-9736	1.07	1.07	ug/Kg	U
120-82-1	1,2,4-Trichlorobenzene	B2919-9736	0.57	0.57	ug/Kg	U
124-48-1	Dibromochloromethane	B2919-9736	0.77	0.77	ug/Kg	U
127-18-4	Tetrachloroethylene	B2919-9736	0.75	0.75	ug/Kg	U
135-98-8	sec-Butylbenzene	B2919-9736	0.75	0.75	ug/Kg	U
142-28-9	1,3-Dichloropropane	B2919-9736	0.87	0.87	ug/Kg	U
156-59-2	cis-1,2-Dichloroethylene	B2919-9736	0.75	0.75	ug/Kg	U
156-60-5	trans-1,2-Dichloroethylene	B2919-9736	0.77	0.77	ug/Kg	U

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09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
67-64-1	2-Propanone	B2919-9737	4.97	**75.2**	ug/Kg	
56-23-5	Carbon tetrachloride	B2919-9737	1.07	1.07	ug/Kg	U
67-66-3	Chloroform	B2919-9737	1.13	1.13	ug/Kg	U
71-43-2	Benzene	B2919-9737	1.01	1.01	ug/Kg	U
71-55-6	1,1,1-Trichloroethane	B2919-9737	0.99	0.99	ug/Kg	U
74-83-9	Bromomethane	B2919-9737	0.94	0.94	ug/Kg	U
74-87-3	Chloromethane	B2919-9737	0.95	0.95	ug/Kg	U
74-95-3	Dibromomethane	B2919-9737	1.51	1.51	ug/Kg	U
74-97-5	Bromochloromethane	B2919-9737	1.11	1.11	ug/Kg	U
75-00-3	Chloroethane	B2919-9737	1.34	1.34	ug/Kg	U
75-01-4	Vinyl Chloride	B2919-9737	1.30	1.30	ug/Kg	U
75-09-2	Methylene Chloride	B2919-9737	1.80	1.80	ug/Kg	U
75-15-0	Carbon disulfide	B2919-9737	0.90	0.90	ug/Kg	U
75-25-2	Bromoform	B2919-9737	0.92	0.92	ug/Kg	U
75-27-4	Bromodichloromethane	B2919-9737	0.90	0.90	ug/Kg	U
75-34-3	1,1-Dichloroethane	B2919-9737	1.09	1.09	ug/Kg	U
75-35-4	1,1-Dichloroethylene	B2919-9737	0.71	0.71	ug/Kg	U
75-45-6	Chlorodifluoromethane	B2919-9737	1.68	1.68	ug/Kg	U
75-65-0	Tertiary butyl alcohol	B2919-9737	10.3	10.3	ug/Kg	U
75-69-4	Freon 11	B2919-9737	1.07	1.07	ug/Kg	U
75-71-8	Dichlorodifluoromethane	B2919-9737	0.71	0.71	ug/Kg	U
76-13-1	Freon 113	B2919-9737	0.99	0.99	ug/Kg	U
78-87-5	1,2-Dichloropropane	B2919-9737	1.13	1.13	ug/Kg	U
78-93-3	Methyl ethyl ketone (2-Butanone)	B2919-9737	4.24	4.24	ug/Kg	U
79-00-5	1,1,2-Trichloroethane	B2919-9737	1.20	1.20	ug/Kg	U
79-01-6	TCE	B2919-9737	0.94	0.94	ug/Kg	U
79-34-5	1,1,2,2-Tetrachloroethane	B2919-9737	1.15	1.15	ug/Kg	U
87-61-6	1,2,3-Trichlorobenzene	B2919-9737	0.92	0.92	ug/Kg	U
87-68-3	Hexachlorobutadiene	B2919-9737	0.92	0.92	ug/Kg	U
91-20-3	Naphthalene	B2919-9737	0.86	0.86	ug/Kg	U
95-47-6	o-Xylene	B2919-9737	0.74	0.74	ug/Kg	U
95-49-8	2-Chlorotoluene	B2919-9737	1.01	1.01	ug/Kg	U

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09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
95-50-1	1,2-Dichlorobenzene	B2919-9737	0.90	0.90	ug/Kg	U
95-63-6	1,2,4-Trimethylbenzene	B2919-9737	0.71	0.71	ug/Kg	U
95-93-2	1,2,4,5-Tetramethylbenzene	B2919-9737	0.76	0.76	ug/Kg	U
96-12-8	1,2-Dibromo-3-chloropropane	B2919-9737	0.88	0.88	ug/Kg	U
96-18-4	1,2,3-Trichloropropane	B2919-9737	1.36	1.36	ug/Kg	U
98-06-6	tert-Butylbenzene	B2919-9737	1.01	1.01	ug/Kg	U
98-82-8	Cumene	B2919-9737	0.84	0.84	ug/Kg	U
99-87-6	4-Isopropyltoluene	B2919-9737	0.90	**3.84**	ug/Kg	J
100-41-4	Ethylbenzene	B2919-9737	0.99	0.99	ug/Kg	U
100-42-5	Styrene	B2919-9737	0.82	0.82	ug/Kg	U
103-65-1	n-Propylbenzene	B2919-9737	0.88	0.88	ug/Kg	U
104-51-8	n-Butylbenzene	B2919-9737	0.92	0.92	ug/Kg	U
105-05-5	p-Diethylbenzene	B2919-9737	0.88	0.88	ug/Kg	U
106-43-4	4-Chlorotoluene	B2919-9737	0.95	0.95	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	B2919-9737	0.92	0.92	ug/Kg	U
106-93-4	1,2-Dibromoethane	B2919-9737	1.13	1.13	ug/Kg	U
107-06-2	1,2-Dichloroethane	B2919-9737	1.11	1.11	ug/Kg	U
107-13-1	Acrylonitrile	B2919-9737	13.4	13.4	ug/Kg	U
108-10-1	4-Methyl-2-pentanone (MIBK)	B2919-9737	4.11	4.11	ug/Kg	U
108-38-3	m,p-Xylene	B2919-9737	1.72	1.72	ug/Kg	U
108-67-8	1,3,5-Trimethylbenzene	B2919-9737	0.84	0.84	ug/Kg	U
108-86-1	Bromobenzene	B2919-9737	0.97	0.97	ug/Kg	U
108-88-3	Toluene	B2919-9737	0.92	0.92	ug/Kg	U
108-90-7	Chlorobenzene	B2919-9737	1.17	1.17	ug/Kg	U
110-75-8	2-Chloroethyl vinyl ether	B2919-9737	1.22	1.22	ug/Kg	U
120-82-1	1,2,4-Trichlorobenzene	B2919-9737	0.65	0.65	ug/Kg	U
124-48-1	Dibromochloromethane	B2919-9737	0.88	0.88	ug/Kg	U
127-18-4	Tetrachloroethylene	B2919-9737	0.86	0.86	ug/Kg	U
135-98-8	sec-Butylbenzene	B2919-9737	0.86	0.86	ug/Kg	U
142-28-9	1,3-Dichloropropane	B2919-9737	0.99	0.99	ug/Kg	U
156-59-2	cis-1,2-Dichloroethylene	B2919-9737	0.86	0.86	ug/Kg	U
156-60-5	trans-1,2-Dichloroethylene	B2919-9737	0.88	0.88	ug/Kg	U

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09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
67-64-1	2-Propanone	B2919-9738	5.69	**80.9**	ug/Kg	
56-23-5	Carbon tetrachloride	B2919-9738	1.23	1.23	ug/Kg	U
67-66-3	Chloroform	B2919-9738	1.29	1.29	ug/Kg	U
71-43-2	Benzene	B2919-9738	1.16	1.16	ug/Kg	U
71-55-6	1,1,1-Trichloroethane	B2919-9738	1.14	1.14	ug/Kg	U
74-83-9	Bromomethane	B2919-9738	1.07	1.07	ug/Kg	U
74-87-3	Chloromethane	B2919-9738	1.10	1.10	ug/Kg	U
74-95-3	Dibromomethane	B2919-9738	1.73	1.73	ug/Kg	U
74-97-5	Bromochloromethane	B2919-9738	1.27	1.27	ug/Kg	U
75-00-3	Chloroethane	B2919-9738	1.53	1.53	ug/Kg	U
75-01-4	Vinyl Chloride	B2919-9738	1.49	1.49	ug/Kg	U
75-09-2	Methylene Chloride	B2919-9738	2.06	2.06	ug/Kg	U
75-15-0	Carbon disulfide	B2919-9738	1.03	1.03	ug/Kg	U
75-25-2	Bromoform	B2919-9738	1.05	1.05	ug/Kg	U
75-27-4	Bromodichloromethane	B2919-9738	1.03	1.03	ug/Kg	U
75-34-3	1,1-Dichloroethane	B2919-9738	1.25	1.25	ug/Kg	U
75-35-4	1,1-Dichloroethylene	B2919-9738	0.81	0.81	ug/Kg	U
75-45-6	Chlorodifluoromethane	B2919-9738	1.93	1.93	ug/Kg	U
75-65-0	Tertiary butyl alcohol	B2919-9738	11.8	11.8	ug/Kg	U
75-69-4	Freon 11	B2919-9738	1.23	1.23	ug/Kg	U
75-71-8	Dichlorodifluoromethane	B2919-9738	0.81	0.81	ug/Kg	U
76-13-1	Freon 113	B2919-9738	1.14	1.14	ug/Kg	U
78-87-5	1,2-Dichloropropane	B2919-9738	1.29	1.29	ug/Kg	U
78-93-3	Methyl ethyl ketone (2-Butanone)	B2919-9738	4.86	**16.6**	ug/Kg	J
79-00-5	1,1,2-Trichloroethane	B2919-9738	1.38	1.38	ug/Kg	U
79-01-6	TCE	B2919-9738	1.07	1.07	ug/Kg	U
79-34-5	1,1,2,2-Tetrachloroethane	B2919-9738	1.31	1.31	ug/Kg	U
87-61-6	1,2,3-Trichlorobenzene	B2919-9738	1.05	1.05	ug/Kg	U
87-68-3	Hexachlorobutadiene	B2919-9738	1.05	1.05	ug/Kg	U
91-20-3	Naphthalene	B2919-9738	0.99	0.99	ug/Kg	U
95-47-6	o-Xylene	B2919-9738	0.85	0.85	ug/Kg	U
95-49-8	2-Chlorotoluene	B2919-9738	1.16	1.16	ug/Kg	U

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09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
541-73-1	1,3-Dichlorobenzene	B2919-9737	1.01	1.01	ug/Kg	U
563-58-6	1,1-Dichlorpropene	B2919-9737	1.01	1.01	ug/Kg	U
590-20-7	2,2-Dichloropropane	B2919-9737	1.13	1.13	ug/Kg	U
591-78-6	2-Hexanone	B2919-9737	3.78	3.78	ug/Kg	U
622-96-8	p-Ethyltoluene	B2919-9737	0.80	0.80	ug/Kg	U
630-20-6	1,1,1,2-Tetrachloroethane	B2919-9737	0.88	0.88	ug/Kg	U
994-05-8	TAME	B2919-9737	1.20	1.20	ug/Kg	U
1634-04-4	Methyl tertiary butyl ether	B2919-9737	0.99	0.99	ug/Kg	U
10061-01-5	cis-1,3-Dichloropropene	B2919-9737	0.97	0.97	ug/Kg	U
10061-02-6	trans-1,3-Dichloropropene	B2919-9737	0.80	0.80	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
17060-07-0	1,2-DICHLOROETHANE-D4	B2919-9737	114.0 %	(69 - 134)	
460-00-4	4-BROMOFLUOROBENZENE	B2919-9737	94.0 %	(74 - 123)	
4774-33-8	DIBROMOFLUOROMETHANE	B2919-9737	114.0 %	(75 - 136)	
2037-26-5	TOLUENE-D8	B2919-9737	99.2 %	(74 - 125)	

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09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
95-50-1	1,2-Dichlorobenzene	B2919-9738	1.03	1.03	ug/Kg	U
95-63-6	1,2,4-Trimethylbenzene	B2919-9738	0.81	0.81	ug/Kg	U
95-93-2	1,2,4,5-Tetramethylbenzene	B2919-9738	0.88	0.88	ug/Kg	U
96-12-8	1,2-Dibromo-3-chloropropane	B2919-9738	1.01	1.01	ug/Kg	U
96-18-4	1,2,3-Trichloropropane	B2919-9738	1.55	1.55	ug/Kg	U
98-06-6	tert-Butylbenzene	B2919-9738	1.16	1.16	ug/Kg	U
98-82-8	Cumene	B2919-9738	0.96	0.96	ug/Kg	U
99-87-6	4-Isopropyltoluene	B2919-9738	1.03	1.03	ug/Kg	U
100-41-4	Ethylbenzene	B2919-9738	1.14	1.14	ug/Kg	U
100-42-5	Styrene	B2919-9738	0.94	0.94	ug/Kg	U
103-65-1	n-Propylbenzene	B2919-9738	1.01	1.01	ug/Kg	U
104-51-8	n-Butylbenzene	B2919-9738	1.05	1.05	ug/Kg	U
105-05-5	p-Diethylbenzene	B2919-9738	1.01	1.01	ug/Kg	U
106-43-4	4-Chlorotoluene	B2919-9738	1.10	1.10	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	B2919-9738	1.05	1.05	ug/Kg	U
106-93-4	1,2-Dibromoethane	B2919-9738	1.29	1.29	ug/Kg	U
107-06-2	1,2-Dichloroethane	B2919-9738	1.27	1.27	ug/Kg	U
107-13-1	Acrylonitrile	B2919-9738	15.3	15.3	ug/Kg	U
108-10-1	4-Methyl-2-pentanone (MIBK)	B2919-9738	4.71	4.71	ug/Kg	U
108-38-3	m,p-Xylene	B2919-9738	1.97	1.97	ug/Kg	U
108-67-8	1,3,5-Trimethylbenzene	B2919-9738	0.96	0.96	ug/Kg	U
108-86-1	Bromobenzene	B2919-9738	1.12	1.12	ug/Kg	U
108-88-3	Toluene	B2919-9738	1.05	**4.72**	ug/Kg	J
108-90-7	Chlorobenzene	B2919-9738	1.34	1.34	ug/Kg	U
110-75-8	2-Chloroethyl vinyl ether	B2919-9738	1.40	1.40	ug/Kg	U
120-82-1	1,2,4-Trichlorobenzene	B2919-9738	0.74	0.74	ug/Kg	U
124-48-1	Dibromochloromethane	B2919-9738	1.01	1.01	ug/Kg	U
127-18-4	Tetrachloroethylene	B2919-9738	0.99	0.99	ug/Kg	U
135-98-8	sec-Butylbenzene	B2919-9738	0.99	0.99	ug/Kg	U
142-28-9	1,3-Dichloropropane	B2919-9738	1.14	1.14	ug/Kg	U
156-59-2	cis-1,2-Dichloroethylene	B2919-9738	0.99	0.99	ug/Kg	U
156-60-5	trans-1,2-Dichloroethylene	B2919-9738	1.01	1.01	ug/Kg	U

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09/02/2009

Volatiles - EPA 8260B

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
541-73-1	1,3-Dichlorobenzene	B2919-9738	1.16	1.16	ug/Kg	U
563-58-6	1,1-Dichlorpropene	B2919-9738	1.16	1.16	ug/Kg	U
590-20-7	2,2-Dichloropropane	B2919-9738	1.29	1.29	ug/Kg	U
591-78-6	2-Hexanone	B2919-9738	4.34	4.34	ug/Kg	U
622-96-8	p-Ethyltoluene	B2919-9738	0.92	0.92	ug/Kg	U
630-20-6	1,1,1,2-Tetrachloroethane	B2919-9738	1.01	1.01	ug/Kg	U
994-05-8	TAME	B2919-9738	1.38	1.38	ug/Kg	U
1634-04-4	Methyl tertiary butyl ether	B2919-9738	1.14	1.14	ug/Kg	U
10061-01-5	cis-1,3-Dichloropropene	B2919-9738	1.12	1.12	ug/Kg	U
10061-02-6	trans-1,3-Dichloropropene	B2919-9738	0.92	0.92	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
17060-07-0	1,2-DICHLOROETHANE-D4	B2919-9738	108.0 %	(69 - 134)	
460-00-4	4-BROMOFLUOROBENZENE	B2919-9738	90.2 %	(74 - 123)	
4774-33-8	DIBROMOFLUOROMETHANE	B2919-9738	114.0 %	(75 - 136)	
2037-26-5	TOLUENE-D8	B2919-9738	99.8 %	(74 - 125)	

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09/02/2009

SCDOH Volatiles by EPA 8260B

Sample: 0908086-1
Client Sample ID: LP-North Collected: 08/05/2009 10:30
Matrix: Soil Type: Grab % Solid: 93.2%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
10061-01-5	cis-1,3-Dichloropropene	B2919-9733	0.55	0.55	ug/Kg	U
10061-02-6	trans-1,3-Dichloropropene	B2919-9733	0.45	0.45	ug/Kg	U
105-05-5	p-Diethylbenzene	B2919-9733	0.49	0.49	ug/Kg	U
100-41-4	Ethylbenzene	B2919-9733	0.56	0.56	ug/Kg	U
622-96-8	p-Ethyltoluene	B2919-9733	0.45	0.45	ug/Kg	U
76-13-1	Freon 113	B2919-9733	0.56	0.56	ug/Kg	U
87-68-3	Hexachlorobutadiene	B2919-9733	0.51	0.51	ug/Kg	U
98-82-8	Cumene	B2919-9733	0.47	0.47	ug/Kg	U
99-87-6	4-Isopropyltoluene	B2919-9733	0.50	0.50	ug/Kg	U
75-09-2	Methylene Chloride	B2919-9733	1.01	1.01	ug/Kg	U
1634-04-4	Methyl tertiary butyl ether	B2919-9733	0.56	0.56	ug/Kg	U
78-93-3	Methyl ethyl ketone (2-Butanone)	B2919-9733	2.38	2.38	ug/Kg	U
108-10-1	4-Methyl-2-pentanone (MIBK)	B2919-9733	2.30	2.30	ug/Kg	U
91-20-3	Naphthalene	B2919-9733	0.48	0.48	ug/Kg	U
103-65-1	n-Propylbenzene	B2919-9733	0.49	0.49	ug/Kg	U
100-42-5	Styrene	B2919-9733	0.46	0.46	ug/Kg	U
630-20-6	1,1,1,2-Tetrachloroethane	B2919-9733	0.49	0.49	ug/Kg	U
79-34-5	1,1,2,2-Tetrachloroethane	B2919-9733	0.64	0.64	ug/Kg	U
127-18-4	Tetrachloroethylene	B2919-9733	0.48	0.48	ug/Kg	U
95-93-2	1,2,4,5-Tetramethylbenzene	B2919-9733	0.43	0.43	ug/Kg	U
108-88-3	Toluene	B2919-9733	0.51	0.51	ug/Kg	U
87-61-6	1,2,3-Trichlorobenzene	B2919-9733	0.51	0.51	ug/Kg	U
120-82-1	1,2,4-Trichlorobenzene	B2919-9733	0.36	0.36	ug/Kg	U
71-55-6	1,1,1-Trichloroethane	B2919-9733	0.56	0.56	ug/Kg	U
79-00-5	1,1,2-Trichloroethane	B2919-9733	0.67	0.67	ug/Kg	U
79-01-6	TCE	B2919-9733	0.52	0.52	ug/Kg	U
75-69-4	Freon 11	B2919-9733	0.60	0.60	ug/Kg	U
96-18-4	1,2,3-Trichloropropane	B2919-9733	0.76	0.76	ug/Kg	U
95-63-6	1,2,4-Trimethylbenzene	B2919-9733	0.40	0.40	ug/Kg	U
108-67-8	1,3,5-Trimethylbenzene	B2919-9733	0.47	0.47	ug/Kg	U
75-01-4	Vinyl Chloride	B2919-9733	0.73	0.73	ug/Kg	U
1330-20-7	Xylenes (Total)	B2919-9733	0.96	0.96	ug/Kg	U

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09/02/2009

SCDOH Volatiles by EPA 8260B

Sample: 0908086-1
Client Sample ID: LP-North Collected: 08/05/2009 10:30
Matrix: Soil Type: Grab % Solid: 93.2%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
67-64-1	2-Propanone	B2919-9733	2.78	2.78	ug/Kg	U
71-43-2	Benzene	B2919-9733	0.57	0.57	ug/Kg	U
108-86-1	Bromobenzene	B2919-9733	0.55	0.55	ug/Kg	U
74-97-5	Bromochloromethane	B2919-9733	0.62	0.62	ug/Kg	U
75-27-4	Bromodichloromethane	B2919-9733	0.50	0.50	ug/Kg	U
75-25-2	Bromoform	B2919-9733	0.51	0.51	ug/Kg	U
104-51-8	n-Butylbenzene	B2919-9733	0.51	0.51	ug/Kg	U
135-98-8	sec-Butylbenzene	B2919-9733	0.48	0.48	ug/Kg	U
98-06-6	tert-Butylbenzene	B2919-9733	0.57	0.57	ug/Kg	U
56-23-5	Carbon tetrachloride	B2919-9733	0.60	0.60	ug/Kg	U
108-90-7	Chlorobenzene	B2919-9733	0.65	0.65	ug/Kg	U
75-00-3	Chloroethane	B2919-9733	0.75	0.75	ug/Kg	U
67-66-3	Chloroform	B2919-9733	0.63	0.63	ug/Kg	U
95-49-8	2-Chlorotoluene	B2919-9733	0.57	0.57	ug/Kg	U
106-43-4	4-Chlorotoluene	B2919-9733	0.54	0.54	ug/Kg	U
124-48-1	Dibromochloromethane	B2919-9733	0.49	0.49	ug/Kg	U
96-12-8	1,2-Dibromo-3-chloropropane	B2919-9733	0.49	0.49	ug/Kg	U
106-93-4	1,2-Dibromoethane	B2919-9733	0.63	0.63	ug/Kg	U
74-95-3	Dibromomethane	B2919-9733	0.85	0.85	ug/Kg	U
95-50-1	1,2-Dichlorobenzene	B2919-9733	0.50	0.50	ug/Kg	U
541-73-1	1,3-Dichlorobenzene	B2919-9733	0.57	0.57	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	B2919-9733	0.51	0.51	ug/Kg	U
75-71-8	Dichlorodifluoromethane	B2919-9733	0.40	0.40	ug/Kg	U
75-34-3	1,1-Dichloroethane	B2919-9733	0.61	0.61	ug/Kg	U
107-06-2	1,2-Dichloroethane	B2919-9733	0.62	0.62	ug/Kg	U
75-35-4	1,1-Dichloroethylene	B2919-9733	0.40	0.40	ug/Kg	U
156-59-2	cis-1,2-Dichloroethylene	B2919-9733	0.48	0.48	ug/Kg	U
156-60-5	trans-1,2-Dichloroethylene	B2919-9733	0.49	0.49	ug/Kg	U
78-87-5	1,2-Dichloropropane	B2919-9733	0.63	0.63	ug/Kg	U
142-28-9	1,3-Dichloropropane	B2919-9733	0.56	0.56	ug/Kg	U
590-20-7	2,2-Dichloropropane	B2919-9733	0.63	0.63	ug/Kg	U
563-58-6	1,1-Dichlorpropene	B2919-9733	0.57	0.57	ug/Kg	U

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09/02/2009

SCDOH Volatiles by EPA 8260B

Sample: 0908086-1
Client Sample ID: LP-North Collected: 08/05/2009 10:30
Matrix: Soil Type: Grab % Solid: 93.2%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
108-38-3	m,p-Xylene	B2919-9733	0.96	0.96	ug/Kg	U
95-47-6	o-Xylene	B2919-9733	0.42	0.42	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
17060-07-0	1,2-DICHLOROETHANE-D4	B2919-9733	109.0 %	(69 - 134)	
460-00-4	4-BROMOFLUOROBENZENE	B2919-9733	93.3 %	(74 - 123)	
4774-33-8	DIBROMOFLUOROMETHANE	B2919-9733	110.0 %	(75 - 136)	
2037-26-5	TOLUENE-D8	B2919-9733	98.6 %	(74 - 125)	

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09/02/2009

SCDOH Volatiles by EPA 8260B

Sample: 0908086-2
Client Sample ID: LP-South
Matrix: Soil
Type: Grab
Collected: 08/05/2009 10:15
% Solid: 94.5%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
67-64-1	2-Propanone	B2919-9734	2.76	2.76	ug/Kg	U
71-43-2	Benzene	B2919-9734	0.56	0.56	ug/Kg	U
108-86-1	Bromobenzene	B2919-9734	0.54	0.54	ug/Kg	U
74-97-5	Bromochloromethane	B2919-9734	0.61	0.61	ug/Kg	U
75-27-4	Bromodichloromethane	B2919-9734	0.50	0.50	ug/Kg	U
75-25-2	Bromoform	B2919-9734	0.51	0.51	ug/Kg	U
104-51-8	n-Butylbenzene	B2919-9734	0.51	0.51	ug/Kg	U
135-98-8	sec-Butylbenzene	B2919-9734	0.48	0.48	ug/Kg	U
98-06-6	tert-Butylbenzene	B2919-9734	0.56	0.56	ug/Kg	U
56-23-5	Carbon tetrachloride	B2919-9734	0.59	0.59	ug/Kg	U
108-90-7	Chlorobenzene	B2919-9734	0.65	0.65	ug/Kg	U
75-00-3	Chloroethane	B2919-9734	0.74	0.74	ug/Kg	U
67-66-3	Chloroform	B2919-9734	0.63	0.63	ug/Kg	U
95-49-8	2-Chlorotoluene	B2919-9734	0.56	0.56	ug/Kg	U
106-43-4	4-Chlorotoluene	B2919-9734	0.53	0.53	ug/Kg	U
124-48-1	Dibromochloromethane	B2919-9734	0.49	0.49	ug/Kg	U
96-12-8	1,2-Dibromo-3-chloropropane	B2919-9734	0.49	0.49	ug/Kg	U
106-93-4	1,2-Dibromoethane	B2919-9734	0.63	0.63	ug/Kg	U
74-95-3	Dibromomethane	B2919-9734	0.84	0.84	ug/Kg	U
95-50-1	1,2-Dichlorobenzene	B2919-9734	0.50	0.50	ug/Kg	U
541-73-1	1,3-Dichlorobenzene	B2919-9734	0.56	0.56	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	B2919-9734	0.51	0.51	ug/Kg	U
75-71-8	Dichlorodifluoromethane	B2919-9734	0.39	0.39	ug/Kg	U
75-34-3	1,1-Dichloroethane	B2919-9734	0.60	0.60	ug/Kg	U
107-06-2	1,2-Dichloroethane	B2919-9734	0.61	0.61	ug/Kg	U
75-35-4	1,1-Dichloroethylene	B2919-9734	0.39	0.39	ug/Kg	U
156-59-2	cis-1,2-Dichloroethylene	B2919-9734	0.48	0.48	ug/Kg	U
156-60-5	trans-1,2-Dichloroethylene	B2919-9734	0.49	0.49	ug/Kg	U
78-87-5	1,2-Dichloropropane	B2919-9734	0.63	0.63	ug/Kg	U
142-28-9	1,3-Dichloropropane	B2919-9734	0.55	0.55	ug/Kg	U
590-20-7	2,2-Dichloropropane	B2919-9734	0.63	0.63	ug/Kg	U
563-58-6	1,1-Dichlorpropene	B2919-9734	0.56	0.56	ug/Kg	U

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09/02/2009

SCDOH Volatiles by EPA 8260B

Sample: 0908086-2
Client Sample ID: LP-South
Matrix: Soil
Type: Grab
Collected: 08/05/2009 10:15
% Solid: 94.5%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
108-38-3	m,p-Xylene	B2919-9734	0.95	0.95	ug/Kg	U
95-47-6	o-Xylene	B2919-9734	0.41	0.41	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
17060-07-0	1,2-DICHLOROETHANE-D4	B2919-9734	107.0 %	(69 - 134)	
460-00-4	4-BROMOFLUOROBENZENE	B2919-9734	90.4 %	(74 - 123)	
4774-33-8	DIBROMOFLUOROMETHANE	B2919-9734	106.0 %	(75 - 136)	
2037-26-5	TOLUENE-D8	B2919-9734	100.0 %	(74 - 125)	

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09/02/2009

SCDOH Volatiles by EPA 8260B

Sample: 0908086-2
Client Sample ID: LP-South
Matrix: Soil
Type: Grab
Collected: 08/05/2009 10:15
% Solid: 94.5%
Remarks: See Case Narrative
Analyzed Date: 08/06/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
10061-01-5	cis-1,3-Dichloropropene	B2919-9734	0.54	0.54	ug/Kg	U
10061-02-6	trans-1,3-Dichloropropene	B2919-9734	0.45	0.45	ug/Kg	U
105-05-5	p-Diethylbenzene	B2919-9734	0.49	0.49	ug/Kg	U
100-41-4	Ethylbenzene	B2919-9734	0.55	0.55	ug/Kg	U
622-96-8	p-Ethyltoluene	B2919-9734	0.45	0.45	ug/Kg	U
76-13-1	Freon 113	B2919-9734	0.55	0.55	ug/Kg	U
87-68-3	Hexachlorobutadiene	B2919-9734	0.51	0.51	ug/Kg	U
98-82-8	Cumene	B2919-9734	0.47	0.47	ug/Kg	U
99-87-6	4-Isopropyltoluene	B2919-9734	0.50	0.50	ug/Kg	U
75-09-2	Methylene Chloride	B2919-9734	1.00	1.00	ug/Kg	U
1634-04-4	Methyl tertiary butyl ether	B2919-9734	0.55	0.55	ug/Kg	U
78-93-3	Methyl ethyl ketone (2-Butanone)	B2919-9734	2.35	2.35	ug/Kg	U
108-10-1	4-Methyl-2-pentanone (MIBK)	B2919-9734	2.28	2.28	ug/Kg	U
91-20-3	Naphthalene	B2919-9734	0.48	0.48	ug/Kg	U
103-65-1	n-Propylbenzene	B2919-9734	0.49	0.49	ug/Kg	U
100-42-5	Styrene	B2919-9734	0.46	0.46	ug/Kg	U
630-20-6	1,1,1,2-Tetrachloroethane	B2919-9734	0.49	0.49	ug/Kg	U
79-34-5	1,1,2,2-Tetrachloroethane	B2919-9734	0.64	0.64	ug/Kg	U
127-18-4	Tetrachloroethylene	B2919-9734	0.48	0.48	ug/Kg	U
95-93-2	1,2,4,5-Tetramethylbenzene	B2919-9734	0.42	0.42	ug/Kg	U
108-88-3	Toluene	B2919-9734	0.51	0.51	ug/Kg	U
87-61-6	1,2,3-Trichlorobenzene	B2919-9734	0.51	0.51	ug/Kg	U
120-82-1	1,2,4-Trichlorobenzene	B2919-9734	0.36	0.36	ug/Kg	U
71-55-6	1,1,1-Trichloroethane	B2919-9734	0.55	0.55	ug/Kg	U
79-00-5	1,1,2-Trichloroethane	B2919-9734	0.67	0.67	ug/Kg	U
79-01-6	TCE	B2919-9734	0.52	0.52	ug/Kg	U
75-69-4	Freon 11	B2919-9734	0.59	0.59	ug/Kg	U
96-18-4	1,2,3-Trichloropropane	B2919-9734	0.75	0.75	ug/Kg	U
95-63-6	1,2,4-Trimethylbenzene	B2919-9734	0.39	0.39	ug/Kg	U
108-67-8	1,3,5-Trimethylbenzene	B2919-9734	0.47	0.47	ug/Kg	U
75-01-4	Vinyl Chloride	B2919-9734	0.72	0.72	ug/Kg	U
1330-20-7	Xylenes (Total)	B2919-9734	0.95	0.95	ug/Kg	U

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-5
Client Sample ID: DP-TP-1
Matrix: Soil
Type: Grab
Collected: 08/05/2009 11:20
% Solid: 26%
Remarks:
Analyzed Date: 08/07/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
120-82-1	1,2,4-Trichlorobenzene	C2280-1198	160	160	ug/Kg	U
95-50-1	1,2-Dichlorobenzene	C2280-1198	119	119	ug/Kg	U
122-66-7	1,2-Diphenylhydrazine	C2280-1198	116	116	ug/Kg	U
541-73-1	1,3-Dichlorobenzene	C2280-1198	129	129	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	C2280-1198	125	125	ug/Kg	U
58-90-2	2,3,4,6-Tetrachlorophenol	C2280-1198	152	152	ug/Kg	U
95-95-4	2,4,5-Trichlorophenol	C2280-1198	83.5	83.5	ug/Kg	U
88-06-2	2,4,6-Trichlorophenol	C2280-1198	145	145	ug/Kg	U
120-83-2	2,4-Dichlorophenol	C2280-1198	126	126	ug/Kg	U
105-67-9	2,4-Dimethylphenol	C2280-1198	161	161	ug/Kg	U
51-28-5	2,4-Dinitrophenol	C2280-1198	1350	1350	ug/Kg	U
121-14-2	2,4-Dinitrotoluene	C2280-1198	231	231	ug/Kg	U
606-20-2	2,6-Dinitrotoluene	C2280-1198	158	158	ug/Kg	U
91-58-7	2-Chloronaphthalene	C2280-1198	185	185	ug/Kg	U
95-57-8	2-Chlorophenol	C2280-1198	185	185	ug/Kg	U
91-57-6	2-Methylnaphthalene	C2280-1198	153	153	ug/Kg	U
95-48-7	2-Methylphenol(o-Cresol)	C2280-1198	138	138	ug/Kg	U
88-74-4	2-Nitroaniline	C2280-1198	200	200	ug/Kg	U
88-75-5	2-Nitrophenol	C2280-1198	117	117	ug/Kg	U
106-44-5	3+4-Methylphenol(m,p-Cresol)	C2280-1198	119	119	ug/Kg	U
91-94-1	3,3'-Dichlorobenzidine	C2280-1198	185	185	ug/Kg	U
99-09-2	3-Nitroaniline	C2280-1198	66.2	66.2	ug/Kg	U
534-52-1	4,6-Dinitro-o-cresol	C2280-1198	1680	1680	ug/Kg	U
101-55-3	4-Bromophenylphenyl ether	C2280-1198	175	175	ug/Kg	U
59-50-7	4-Chloro-3-methylphenol	C2280-1198	143	143	ug/Kg	U
106-47-8	4-Chloroaniline	C2280-1198	147	147	ug/Kg	U
7005-72-3	4-Chlorophenylphenyl ether	C2280-1198	150	150	ug/Kg	U
100-01-6	4-Nitroaniline	C2280-1198	376	376	ug/Kg	U
100-02-7	4-Nitrophenol	C2280-1198	2570	2570	ug/Kg	U
83-32-9	Acenaphthene	C2280-1198	162	162	ug/Kg	U
208-96-8	Acenaphthylene	C2280-1198	132	132	ug/Kg	U
62-53-3	Aniline	C2280-1198	120	120	ug/Kg	U

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-5
Client Sample ID: DP-TP-1 Collected: 08/05/2009 11:20
Matrix: Soil Type: Grab % Solid: 26%
Remarks:
Analyzed Date: 08/07/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
120-12-7	Anthracene	C2280-1198	171	171	ug/Kg	U
92-87-5	Benzidine	C2280-1198	3380	3380	ug/Kg	U
56-55-3	Benzo[a]anthracene	C2280-1198	163	163	ug/Kg	U
50-32-8	Benzo[a]pyrene	C2280-1198	200	200	ug/Kg	U
205-99-2	3,4-Benzofluoranthene	C2280-1198	160	160	ug/Kg	U
191-24-2	Benzo[g,h,i]perylene	C2280-1198	294	294	ug/Kg	U
207-08-9	Benzo[k]fluoranthene	C2280-1198	293	293	ug/Kg	U
65-85-0	Benzoic acid	C2280-1198	22500	22500	ug/Kg	U
100-51-6	Benzyl alcohol	C2280-1198	227	227	ug/Kg	U
85-68-7	Butyl benzyl phthalate	C2280-1198	203	203	ug/Kg	U
86-74-8	Carbazole	C2280-1198	222	222	ug/Kg	U
218-01-9	Chrysene	C2280-1198	203	203	ug/Kg	U
	Cresol (total)	C2280-1198	257	257	ug/Kg	U
84-74-2	Di-n-butyl phthalate	C2280-1198	217	217	ug/Kg	U
117-84-0	Di-n-octyl phthalate	C2280-1198	189	189	ug/Kg	U
53-70-3	Dibenzo[a,h]anthracene	C2280-1198	215	215	ug/Kg	U
132-64-9	Dibenzofuran	C2280-1198	128	128	ug/Kg	U
84-66-2	Diethyl phthalate	C2280-1198	252	252	ug/Kg	U
131-11-3	Dimethyl phthalate	C2280-1198	186	186	ug/Kg	U
206-44-0	Fluoranthene	C2280-1198	212	212	ug/Kg	U
86-73-7	Fluorene	C2280-1198	155	155	ug/Kg	U
118-74-1	Hexachlorobenzene	C2280-1198	165	165	ug/Kg	U
87-68-3	Hexachlorobutadiene	C2280-1198	154	154	ug/Kg	U
77-47-4	Hexachlorocyclopentadiene	C2280-1198	1190	1190	ug/Kg	U
67-72-1	Hexachloroethane	C2280-1198	171	171	ug/Kg	U
193-39-5	Indeno[1,2,3-cd]pyrene	C2280-1198	178	178	ug/Kg	U
78-59-1	Isophorone	C2280-1198	176	176	ug/Kg	U
621-64-7	Di-n-propylnitrosamine	C2280-1198	116	116	ug/Kg	U
62-75-9	n-Nitrosodimethylamine	C2280-1198	244	244	ug/Kg	U
86-30-6	Diphenylnitrosamine	C2280-1198	210	210	ug/Kg	U
91-20-3	Naphthalene	C2280-1198	155	155	ug/Kg	U
98-95-3	Nitrobenzene	C2280-1198	149	149	ug/Kg	U

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
120-82-1	1,2,4-Trichlorobenzene	C2281-1216	69.4	69.4	ug/Kg	U
95-50-1	1,2-Dichlorobenzene	C2281-1216	51.6	51.6	ug/Kg	U
122-66-7	1,2-Diphenylhydrazine	C2281-1216	50.4	50.4	ug/Kg	U
541-73-1	1,3-Dichlorobenzene	C2281-1216	56.1	56.1	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	C2281-1216	54.4	54.4	ug/Kg	U
58-90-2	2,3,4,6-Tetrachlorophenol	C2281-1216	66.1	66.1	ug/Kg	U
95-95-4	2,4,5-Trichlorophenol	C2281-1216	36.2	36.2	ug/Kg	U
88-06-2	2,4,6-Trichlorophenol	C2281-1216	62.8	62.8	ug/Kg	U
120-83-2	2,4-Dichlorophenol	C2281-1216	54.8	54.8	ug/Kg	U
105-67-9	2,4-Dimethylphenol	C2281-1216	69.8	69.8	ug/Kg	U
51-28-5	2,4-Dinitrophenol	C2281-1216	588	588	ug/Kg	U
121-14-2	2,4-Dinitrotoluene	C2281-1216	100	100	ug/Kg	U
606-20-2	2,6-Dinitrotoluene	C2281-1216	68.8	68.8	ug/Kg	U
91-58-7	2-Chloronaphthalene	C2281-1216	80.5	80.5	ug/Kg	U
95-57-8	2-Chlorophenol	C2281-1216	80.5	80.5	ug/Kg	U
91-57-6	2-Methylnaphthalene	C2281-1216	66.3	66.3	ug/Kg	U
95-48-7	2-Methylphenol(o-Cresol)	C2281-1216	59.8	59.8	ug/Kg	U
88-74-4	2-Nitroaniline	C2281-1216	87.0	87.0	ug/Kg	U
88-75-5	2-Nitrophenol	C2281-1216	50.8	50.8	ug/Kg	U
106-44-5	3+4-Methylphenol(m,p-Cresol)	C2281-1216	51.6	51.6	ug/Kg	U
91-94-1	3,3'-Dichlorobenzidine	C2281-1216	80.5	80.5	ug/Kg	U
99-09-2	3-Nitroaniline	C2281-1216	28.7	28.7	ug/Kg	U
534-52-1	4,6-Dinitro-o-cresol	C2281-1216	730	730	ug/Kg	U
101-55-3	4-Bromophenylphenyl ether	C2281-1216	75.8	75.8	ug/Kg	U
59-50-7	4-Chloro-3-methylphenol	C2281-1216	62.3	62.3	ug/Kg	U
106-47-8	4-Chloroaniline	C2281-1216	63.6	63.6	ug/Kg	U
7005-72-3	4-Chlorophenylphenyl ether	C2281-1216	64.9	64.9	ug/Kg	U
100-01-6	4-Nitroaniline	C2281-1216	163	163	ug/Kg	U
100-02-7	4-Nitrophenol	C2281-1216	1110	1110	ug/Kg	U
83-32-9	Acenaphthene	C2281-1216	70.3	70.3	ug/Kg	U
208-96-8	Acenaphthylene	C2281-1216	57.4	57.4	ug/Kg	U
62-53-3	Aniline	C2281-1216	51.9	51.9	ug/Kg	U

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-5
Client Sample ID: DP-TP-1 Collected: 08/05/2009 11:20
Matrix: Soil Type: Grab % Solid: 26%
Remarks:
Analyzed Date: 08/07/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
87-86-5	Pentachlorophenol	C2280-1198	1460	1460	ug/Kg	U
85-01-8	Phenanthrene	C2280-1198	175	175	ug/Kg	U
108-95-2	Phenol	C2280-1198	100	100	ug/Kg	U
129-00-0	Pyrene	C2280-1198	142	142	ug/Kg	U
110-86-1	Pyridine	C2280-1198	220	220	ug/Kg	U
111-91-1	bis(2-chloroethoxy)methane	C2280-1198	159	159	ug/Kg	U
111-44-4	bis(2-chloroethyl)ether	C2280-1198	182	182	ug/Kg	U
108-60-1	bis(2-chloroisopropyl)ether	C2280-1198	141	141	ug/Kg	U
117-81-7	bis(2-Ethylhexyl)phthalate	C2280-1198	252	252	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
118-76-6	2,4,6-TRIBROMOPHENOL	C2280-1198	98.0 %	(19 - 122)	
321-60-8	2-FLUOROBIPHENYL	C2280-1198	45.1 %	(30 - 115)	
367-12-4	2-FLUOROPHENOL	C2280-1198	55.7 %	(25 - 121)	
4165-60-0	NITROBENZENE-D5	C2280-1198	55.4 %	(23 - 120)	
13127-88-3	PHENOL-D6	C2280-1198	62.4 %	(24 - 113)	
1718-51-0	TERPHENYL-D14	C2280-1198	59.8 %	(18 - 137)	

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
120-12-7	Anthracene	C2281-1216	74.3	74.3	ug/Kg	U
92-87-5	Benzidine	C2281-1216	1470	1470	ug/Kg	U
56-55-3	Benzo[a]anthracene	C2281-1216	70.6	70.6	ug/Kg	U
50-32-8	Benzo[a]pyrene	C2281-1216	87.0	87.0	ug/Kg	U
205-99-2	3,4-Benzofluoranthene	C2281-1216	69.3	69.3	ug/Kg	U
191-24-2	Benzo[g,h,i]perylene	C2281-1216	128	128	ug/Kg	U
207-08-9	Benzo[k]fluoranthene	C2281-1216	127	127	ug/Kg	U
65-85-0	Benzoic acid	C2281-1216	9780	9780	ug/Kg	U
100-51-6	Benzyl alcohol	C2281-1216	98.5	98.5	ug/Kg	U
85-68-7	Butyl benzyl phthalate	C2281-1216	88.1	88.1	ug/Kg	U
86-74-8	Carbazole	C2281-1216	96.2	96.2	ug/Kg	U
218-01-9	Chrysene	C2281-1216	88.3	88.3	ug/Kg	U
	Cresol (total)	C2281-1216	111	111	ug/Kg	U
84-74-2	Di-n-butyl phthalate	C2281-1216	94.0	94.0	ug/Kg	U
117-84-0	Di-n-octyl phthalate	C2281-1216	82.1	82.1	ug/Kg	U
53-70-3	Dibenzo[a,h]anthracene	C2281-1216	93.2	93.2	ug/Kg	U
132-64-9	Dibenzofuran	C2281-1216	55.8	55.8	ug/Kg	U
84-66-2	Diethyl phthalate	C2281-1216	109	109	ug/Kg	U
131-11-3	Dimethyl phthalate	C2281-1216	80.6	80.6	ug/Kg	U
206-44-0	Fluoranthene	C2281-1216	92.0	92.0	ug/Kg	U
86-73-7	Fluorene	C2281-1216	67.1	67.1	ug/Kg	U
118-74-1	Hexachlorobenzene	C2281-1216	71.5	71.5	ug/Kg	U
87-68-3	Hexachlorobutadiene	C2281-1216	66.8	66.8	ug/Kg	U
77-47-4	Hexachlorocyclopentadiene	C2281-1216	516	516	ug/Kg	U
67-72-1	Hexachloroethane	C2281-1216	74.3	74.3	ug/Kg	U
193-39-5	Indeno[1,2,3-cd]pyrene	C2281-1216	77.1	77.1	ug/Kg	U
78-59-1	Isophorone	C2281-1216	76.3	76.3	ug/Kg	U
621-64-7	Di-n-propylnitrosamine	C2281-1216	50.4	50.4	ug/Kg	U
62-75-9	n-Nitrosodimethylamine	C2281-1216	106	106	ug/Kg	U
86-30-6	Diphenylnitrosamine	C2281-1216	91.0	91.0	ug/Kg	U
91-20-3	Naphthalene	C2281-1216	67.1	67.1	ug/Kg	U
98-95-3	Nitrobenzene	C2281-1216	64.6	64.6	ug/Kg	U

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
87-86-5	Pentachlorophenol	C2281-1216	633	633	ug/Kg	U
85-01-8	Phenanthrene	C2281-1216	76.0	76.0	ug/Kg	U
108-95-2	Phenol	C2281-1216	43.6	43.6	ug/Kg	U
129-00-0	Pyrene	C2281-1216	61.8	61.8	ug/Kg	U
110-86-1	Pyridine	C2281-1216	95.7	95.7	ug/Kg	U
111-91-1	bis(2-chloroethoxy)methane	C2281-1216	69.1	69.1	ug/Kg	U
111-44-4	bis(2-chloroethyl)ether	C2281-1216	79.0	79.0	ug/Kg	U
108-60-1	bis(2-chloroisopropyl)ether	C2281-1216	61.3	61.3	ug/Kg	U
117-81-7	bis(2-Ethylhexyl)phthalate	C2281-1216	109	109	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
118-76-6	2,4,6-TRIBROMOPHENOL	C2281-1216	88.3 %	(19 - 122)	
321-60-8	2-FLUOROBIPHENYL	C2281-1216	45.7 %	(30 - 115)	
367-12-4	2-FLUOROPHENOL	C2281-1216	68.1 %	(25 - 121)	
4165-60-0	NITROBENZENE-D5	C2281-1216	65.3 %	(23 - 120)	
13127-88-3	PHENOL-D6	C2281-1216	73.1 %	(24 - 113)	
1718-51-0	TERPHENYL-D14	C2281-1216	72.4 %	(18 - 137)	

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
120-12-7	Anthracene	C2281-1217	85.1	85.1	ug/Kg	U
92-87-5	Benzidine	C2281-1217	1680	1680	ug/Kg	U
56-55-3	Benzo[a]anthracene	C2281-1217	80.9	80.9	ug/Kg	U
50-32-8	Benzo[a]pyrene	C2281-1217	99.6	99.6	ug/Kg	U
205-99-2	3,4-Benzofluoranthene	C2281-1217	79.3	79.3	ug/Kg	U
191-24-2	Benzo[g,h,i]perylene	C2281-1217	146	146	ug/Kg	U
207-08-9	Benzo[k]fluoranthene	C2281-1217	146	146	ug/Kg	U
65-85-0	Benzoic acid	C2281-1217	11200	11200	ug/Kg	U
100-51-6	Benzyl alcohol	C2281-1217	113	113	ug/Kg	U
85-68-7	Butyl benzyl phthalate	C2281-1217	101	101	ug/Kg	U
86-74-8	Carbazole	C2281-1217	110	110	ug/Kg	U
218-01-9	Chrysene	C2281-1217	101	101	ug/Kg	U
	Cresol (total)	C2281-1217	128	128	ug/Kg	U
84-74-2	Di-n-butyl phthalate	C2281-1217	108	108	ug/Kg	U
117-84-0	Di-n-octyl phthalate	C2281-1217	94.1	94.1	ug/Kg	U
53-70-3	Dibenzo[a,h]anthracene	C2281-1217	107	107	ug/Kg	U
132-64-9	Dibenzofuran	C2281-1217	63.9	63.9	ug/Kg	U
84-66-2	Diethyl phthalate	C2281-1217	125	125	ug/Kg	U
131-11-3	Dimethyl phthalate	C2281-1217	92.4	92.4	ug/Kg	U
206-44-0	Fluoranthene	C2281-1217	105	105	ug/Kg	U
86-73-7	Fluorene	C2281-1217	76.9	76.9	ug/Kg	U
118-74-1	Hexachlorobenzene	C2281-1217	81.8	81.8	ug/Kg	U
87-68-3	Hexachlorobutadiene	C2281-1217	76.5	76.5	ug/Kg	U
77-47-4	Hexachlorocyclopentadiene	C2281-1217	591	591	ug/Kg	U
67-72-1	Hexachloroethane	C2281-1217	85.1	85.1	ug/Kg	U
193-39-5	Indeno[1,2,3-cd]pyrene	C2281-1217	88.3	88.3	ug/Kg	U
78-59-1	Isophorone	C2281-1217	87.4	87.4	ug/Kg	U
621-64-7	Di-n-propylnitrosamine	C2281-1217	57.7	57.7	ug/Kg	U
62-75-9	n-Nitrosodimethylamine	C2281-1217	121	121	ug/Kg	U
86-30-6	Diphenylnitrosamine	C2281-1217	104	104	ug/Kg	U
91-20-3	Naphthalene	C2281-1217	76.9	76.9	ug/Kg	U
98-95-3	Nitrobenzene	C2281-1217	74.0	74.0	ug/Kg	U

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
120-82-1	1,2,4-Trichlorobenzene	C2281-1217	79.5	79.5	ug/Kg	U
95-50-1	1,2-Dichlorobenzene	C2281-1217	59.1	59.1	ug/Kg	U
122-66-7	1,2-Diphenylhydrazine	C2281-1217	57.7	57.7	ug/Kg	U
541-73-1	1,3-Dichlorobenzene	C2281-1217	64.2	64.2	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	C2281-1217	62.3	62.3	ug/Kg	U
58-90-2	2,3,4,6-Tetrachlorophenol	C2281-1217	75.7	75.7	ug/Kg	U
95-95-4	2,4,5-Trichlorophenol	C2281-1217	41.5	41.5	ug/Kg	U
88-06-2	2,4,6-Trichlorophenol	C2281-1217	71.9	71.9	ug/Kg	U
120-83-2	2,4-Dichlorophenol	C2281-1217	62.7	62.7	ug/Kg	U
105-67-9	2,4-Dimethylphenol	C2281-1217	79.9	79.9	ug/Kg	U
51-28-5	2,4-Dinitrophenol	C2281-1217	673	673	ug/Kg	U
121-14-2	2,4-Dinitrotoluene	C2281-1217	115	115	ug/Kg	U
606-20-2	2,6-Dinitrotoluene	C2281-1217	78.8	78.8	ug/Kg	U
91-58-7	2-Chloronaphthalene	C2281-1217	92.2	92.2	ug/Kg	U
95-57-8	2-Chlorophenol	C2281-1217	92.2	92.2	ug/Kg	U
91-57-6	2-Methylnaphthalene	C2281-1217	75.9	75.9	ug/Kg	U
95-48-7	2-Methylphenol(o-Cresol)	C2281-1217	68.5	68.5	ug/Kg	U
88-74-4	2-Nitroaniline	C2281-1217	99.6	99.6	ug/Kg	U
88-75-5	2-Nitrophenol	C2281-1217	58.1	58.1	ug/Kg	U
106-44-5	3+4-Methylphenol(m,p-Cresol)	C2281-1217	59.1	59.1	ug/Kg	U
91-94-1	3,3'-Dichlorobenzidine	C2281-1217	92.2	92.2	ug/Kg	U
99-09-2	3-Nitroaniline	C2281-1217	32.9	32.9	ug/Kg	U
534-52-1	4,6-Dinitro-o-cresol	C2281-1217	836	836	ug/Kg	U
101-55-3	4-Bromophenylphenyl ether	C2281-1217	86.8	86.8	ug/Kg	U
59-50-7	4-Chloro-3-methylphenol	C2281-1217	71.3	71.3	ug/Kg	U
106-47-8	4-Chloroaniline	C2281-1217	72.8	72.8	ug/Kg	U
7005-72-3	4-Chlorophenylphenyl ether	C2281-1217	74.4	74.4	ug/Kg	U
100-01-6	4-Nitroaniline	C2281-1217	187	187	ug/Kg	U
100-02-7	4-Nitrophenol	C2281-1217	1280	1280	ug/Kg	U
83-32-9	Acenaphthene	C2281-1217	80.5	80.5	ug/Kg	U
208-96-8	Acenaphthylene	C2281-1217	65.8	65.8	ug/Kg	U
62-53-3	Aniline	C2281-1217	59.5	59.5	ug/Kg	U

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
87-86-5	Pentachlorophenol	C2281-1217	725	725	ug/Kg	U
85-01-8	Phenanthrene	C2281-1217	87.0	87.0	ug/Kg	U
108-95-2	Phenol	C2281-1217	49.9	49.9	ug/Kg	U
129-00-0	Pyrene	C2281-1217	70.7	70.7	ug/Kg	U
110-86-1	Pyridine	C2281-1217	110	110	ug/Kg	U
111-91-1	bis(2-chloroethoxy)methane	C2281-1217	79.2	79.2	ug/Kg	U
111-44-4	bis(2-chloroethyl)ether	C2281-1217	90.4	90.4	ug/Kg	U
108-60-1	bis(2-chloroisopropyl)ether	C2281-1217	70.2	70.2	ug/Kg	U
117-81-7	bis(2-Ethylhexyl)phthalate	C2281-1217	125	125	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
118-76-6	2,4,6-TRIBROMOPHENOL	C2281-1217	92.5 %	(19 - 122)	
321-60-8	2-FLUOROBIPHENYL	C2281-1217	65.6 %	(30 - 115)	
367-12-4	2-FLUOROPHENOL	C2281-1217	63.4 %	(25 - 121)	
4165-60-0	NITROBENZENE-D5	C2281-1217	70.1 %	(23 - 120)	
13127-88-3	PHENOL-D6	C2281-1217	69.8 %	(24 - 113)	
1718-51-0	TERPHENYL-D14	C2281-1217	79.0 %	(18 - 137)	

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
120-82-1	1,2,4-Trichlorobenzene	C2281-1218	91.0	91.0	ug/Kg	U
95-50-1	1,2-Dichlorobenzene	C2281-1218	67.6	67.6	ug/Kg	U
122-66-7	1,2-Diphenylhydrazine	C2281-1218	66.1	66.1	ug/Kg	U
541-73-1	1,3-Dichlorobenzene	C2281-1218	73.5	73.5	ug/Kg	U
106-46-7	1,4-Dichlorobenzene	C2281-1218	71.3	71.3	ug/Kg	U
58-90-2	2,3,4,6-Tetrachlorophenol	C2281-1218	86.7	86.7	ug/Kg	U
95-95-4	2,4,5-Trichlorophenol	C2281-1218	47.5	47.5	ug/Kg	U
88-06-2	2,4,6-Trichlorophenol	C2281-1218	82.3	82.3	ug/Kg	U
120-83-2	2,4-Dichlorophenol	C2281-1218	71.8	71.8	ug/Kg	U
105-67-9	2,4-Dimethylphenol	C2281-1218	91.5	91.5	ug/Kg	U
51-28-5	2,4-Dinitrophenol	C2281-1218	770	770	ug/Kg	U
121-14-2	2,4-Dinitrotoluene	C2281-1218	131	131	ug/Kg	U
606-20-2	2,6-Dinitrotoluene	C2281-1218	90.2	90.2	ug/Kg	U
91-58-7	2-Chloronaphthalene	C2281-1218	105	105	ug/Kg	U
95-57-8	2-Chlorophenol	C2281-1218	105	105	ug/Kg	U
91-57-6	2-Methylnaphthalene	C2281-1218	86.9	**143**	ug/Kg	J
95-48-7	2-Methylphenol(o-Cresol)	C2281-1218	78.3	78.3	ug/Kg	U
88-74-4	2-Nitroaniline	C2281-1218	114	114	ug/Kg	U
88-75-5	2-Nitrophenol	C2281-1218	66.5	66.5	ug/Kg	U
106-44-5	3+4-Methylphenol(m,p-Cresol)	C2281-1218	67.6	67.6	ug/Kg	U
91-94-1	3,3'-Dichlorobenzidine	C2281-1218	105	105	ug/Kg	U
99-09-2	3-Nitroaniline	C2281-1218	37.6	37.6	ug/Kg	U
534-52-1	4,6-Dinitro-o-cresol	C2281-1218	956	956	ug/Kg	U
101-55-3	4-Bromophenylphenyl ether	C2281-1218	99.3	99.3	ug/Kg	U
59-50-7	4-Chloro-3-methylphenol	C2281-1218	81.6	81.6	ug/Kg	U
106-47-8	4-Chloroaniline	C2281-1218	83.4	83.4	ug/Kg	U
7005-72-3	4-Chlorophenylphenyl ether	C2281-1218	85.1	85.1	ug/Kg	U
100-01-6	4-Nitroaniline	C2281-1218	214	214	ug/Kg	U
100-02-7	4-Nitrophenol	C2281-1218	1460	1460	ug/Kg	U
83-32-9	Acenaphthene	C2281-1218	92.1	92.1	ug/Kg	U
208-96-8	Acenaphthylene	C2281-1218	75.3	75.3	ug/Kg	U
62-53-3	Aniline	C2281-1218	68.1	68.1	ug/Kg	U

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
87-86-5	Pentachlorophenol	C2281-1218	829	829	ug/Kg	U
85-01-8	Phenanthrene	C2281-1218	99.6	99.6	ug/Kg	U
108-95-2	Phenol	C2281-1218	57.1	57.1	ug/Kg	U
129-00-0	Pyrene	C2281-1218	81.0	81.0	ug/Kg	U
110-86-1	Pyridine	C2281-1218	125	125	ug/Kg	U
111-91-1	bis(2-chloroethoxy)methane	C2281-1218	90.6	90.6	ug/Kg	U
111-44-4	bis(2-chloroethyl)ether	C2281-1218	104	104	ug/Kg	U
108-60-1	bis(2-chloroisopropyl)ether	C2281-1218	80.3	80.3	ug/Kg	U
117-81-7	bis(2-Ethylhexyl)phthalate	C2281-1218	143	143	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
118-76-6	2,4,6-TRIBROMOPHENOL	C2281-1218	89.0 %	(19 - 122)	
321-60-8	2-FLUOROBIPHENYL	C2281-1218	43.3 %	(30 - 115)	
367-12-4	2-FLUOROPHENOL	C2281-1218	66.9 %	(25 - 121)	
4165-60-0	NITROBENZENE-D5	C2281-1218	64.0 %	(23 - 120)	
13127-88-3	PHENOL-D6	C2281-1218	69.2 %	(24 - 113)	
1718-51-0	TERPHENYL-D14	C2281-1218	60.6 %	(18 - 137)	

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09/02/2009

Semivolatile Compounds - EPA 8270C

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
120-12-7	Anthracene	C2281-1218	97.4	97.4	ug/Kg	U
92-87-5	Benzidine	C2281-1218	1920	1920	ug/Kg	U
56-55-3	Benzo[a]anthracene	C2281-1218	92.6	92.6	ug/Kg	U
50-32-8	Benzo[a]pyrene	C2281-1218	114	114	ug/Kg	U
205-99-2	3,4-Benzofluoranthene	C2281-1218	90.8	90.8	ug/Kg	U
191-24-2	Benzo[g,h,i]perylene	C2281-1218	167	167	ug/Kg	U
207-08-9	Benzo[k]fluoranthene	C2281-1218	167	167	ug/Kg	U
65-85-0	Benzoic acid	C2281-1218	12800	12800	ug/Kg	U
100-51-6	Benzyl alcohol	C2281-1218	129	129	ug/Kg	U
85-68-7	Butyl benzyl phthalate	C2281-1218	116	116	ug/Kg	U
86-74-8	Carbazole	C2281-1218	126	126	ug/Kg	U
218-01-9	Chrysene	C2281-1218	116	116	ug/Kg	U
	Cresol (total)	C2281-1218	146	146	ug/Kg	U
84-74-2	Di-n-butyl phthalate	C2281-1218	123	123	ug/Kg	U
117-84-0	Di-n-octyl phthalate	C2281-1218	108	108	ug/Kg	U
53-70-3	Dibenzo[a,h]anthracene	C2281-1218	122	122	ug/Kg	U
132-64-9	Dibenzofuran	C2281-1218	73.1	73.1	ug/Kg	U
84-66-2	Diethyl phthalate	C2281-1218	143	143	ug/Kg	U
131-11-3	Dimethyl phthalate	C2281-1218	106	106	ug/Kg	U
206-44-0	Fluoranthene	C2281-1218	121	121	ug/Kg	U
86-73-7	Fluorene	C2281-1218	88.0	88.0	ug/Kg	U
118-74-1	Hexachlorobenzene	C2281-1218	93.7	93.7	ug/Kg	U
87-68-3	Hexachlorobutadiene	C2281-1218	87.5	87.5	ug/Kg	U
77-47-4	Hexachlorocyclopentadiene	C2281-1218	676	676	ug/Kg	U
67-72-1	Hexachloroethane	C2281-1218	97.4	97.4	ug/Kg	U
193-39-5	Indeno[1,2,3-cd]pyrene	C2281-1218	101	101	ug/Kg	U
78-59-1	Isophorone	C2281-1218	100	100	ug/Kg	U
621-64-7	Di-n-propylnitrosamine	C2281-1218	66.1	66.1	ug/Kg	U
62-75-9	n-Nitrosodimethylamine	C2281-1218	139	139	ug/Kg	U
86-30-6	Diphenylnitrosamine	C2281-1218	119	119	ug/Kg	U
91-20-3	Naphthalene	C2281-1218	88.0	**268**	ug/Kg	J
98-95-3	Nitrobenzene	C2281-1218	84.7	84.7	ug/Kg	U

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09/02/2009

SCDOH Semivolatile Compounds

Sample: 0908086-1
Client Sample ID: LP-North Collected: 08/05/2009 10:30
Matrix: Soil Type: Grab % Solid: 93.2%
Remarks:
Analyzed Date: 08/07/2009
Preparation Date(s) : 08/07/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
83-32-9	Acenaphthene	C2280-1196	45.2	45.2	ug/Kg	U
120-12-7	Anthracene	C2280-1196	47.7	47.7	ug/Kg	U
56-55-3	Benzo[a]anthracene	C2280-1196	45.4	**67.5**	ug/Kg	J
50-32-8	Benzo[a]pyrene	C2280-1196	55.9	**74.5**	ug/Kg	J
205-99-2	3,4-Benzofluoranthene	C2280-1196	44.5	**90.7**	ug/Kg	J
191-24-2	Benzo[g,h,i]perylene	C2280-1196	82.0	82.0	ug/Kg	U
207-08-9	Benzo[k]fluoranthene	C2280-1196	81.7	81.7	ug/Kg	U
218-01-9	Chrysene	C2280-1196	56.8	**94.6**	ug/Kg	J
53-70-3	Dibenzo[a,h]anthracene	C2280-1196	59.9	59.9	ug/Kg	U
206-44-0	Fluoranthene	C2280-1196	59.1	**113**	ug/Kg	J
86-73-7	Fluorene	C2280-1196	43.1	43.1	ug/Kg	U
193-39-5	Indeno[1,2,3-cd]pyrene	C2280-1196	49.6	**55.8**	ug/Kg	J
85-01-8	Phenanthrene	C2280-1196	48.8	**50.0**	ug/Kg	J
129-00-0	Pyrene	C2280-1196	39.7	**89.3**	ug/Kg	J

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
118-76-6	2,4,6-TRIBROMOPHENOL	C2280-1196	112.0 %	(19 - 122)	
321-60-8	2-FLUOROBIPHENYL	C2280-1196	78.6 %	(30 - 115)	
367-12-4	2-FLUOROPHENOL	C2280-1196	64.6 %	(25 - 121)	
4165-60-0	NITROBENZENE-D5	C2280-1196	63.7 %	(23 - 120)	
13127-88-3	PHENOL-D6	C2280-1196	72.0 %	(24 - 113)	
1718-51-0	TERPHENYL-D14	C2280-1196	108.0 %	(18 - 137)	

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09/02/2009

SCDOH Semivolatile Compounds

Sample: 0908086-2
Client Sample ID: LP-South
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/07/2009
Preparation Date(s) : 08/07/2009
Collected: 08/05/2009 10:15
% Solid: 94.5%

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
83-32-9	Acenaphthene	C2280-1197	44.6	44.6	ug/Kg	U
120-12-7	Anthracene	C2280-1197	47.1	47.1	ug/Kg	U
56-55-3	Benzo[a]anthracene	C2280-1197	44.8	44.8	ug/Kg	U
50-32-8	Benzo[a]pyrene	C2280-1197	55.1	55.1	ug/Kg	U
205-99-2	3,4-Benzofluoranthene	C2280-1197	43.9	43.9	ug/Kg	U
191-24-2	Benzo[g,h,i]perylene	C2280-1197	80.8	80.8	ug/Kg	U
207-08-9	Benzo[k]fluoranthene	C2280-1197	80.5	80.5	ug/Kg	U
218-01-9	Chrysene	C2280-1197	56.0	56.0	ug/Kg	U
53-70-3	Dibenzo[a,h]anthracene	C2280-1197	59.0	59.0	ug/Kg	U
206-44-0	Fluoranthene	C2280-1197	58.3	58.3	ug/Kg	U
86-73-7	Fluorene	C2280-1197	42.5	42.5	ug/Kg	U
193-39-5	Indeno[1,2,3-cd]pyrene	C2280-1197	48.9	48.9	ug/Kg	U
85-01-8	Phenanthrene	C2280-1197	48.1	48.1	ug/Kg	U
129-00-0	Pyrene	C2280-1197	39.2	39.2	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
118-76-6	2,4,6-TRIBROMOPHENOL	C2280-1197	101.0 %	(19 - 122)	
321-60-8	2-FLUOROBIPHENYL	C2280-1197	69.6 %	(30 - 115)	
367-12-4	2-FLUOROPHENOL	C2280-1197	58.3 %	(25 - 121)	
4165-60-0	NITROBENZENE-D5	C2280-1197	57.5 %	(23 - 120)	
13127-88-3	PHENOL-D6	C2280-1197	64.5 %	(24 - 113)	
1718-51-0	TERPHENYL-D14	C2280-1197	106.0 %	(18 - 137)	

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09/02/2009

PCB Aroclors by SW846 8082/EPA 608

Sample: 0908086-3
Client Sample ID: Field-TP-1
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009
Collected: 08/05/2009 10:40
% Solid: 72.5%

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
12674-11-2	Aroclor 1016	G1757-6	17.2	17.2	ug/Kg	U
11104-28-2	Aroclor 1221	G1757-6	17.2	17.2	ug/Kg	U
11141-16-5	Aroclor 1232	G1757-6	17.2	17.2	ug/Kg	U
53469-21-9	Aroclor 1242	G1757-6	17.2	17.2	ug/Kg	U
12672-29-6	Aroclor 1248	G1757-6	17.2	17.2	ug/Kg	U
11097-69-1	Aroclor 1254	G1757-6	17.2	17.2	ug/Kg	U
11096-82-5	Aroclor 1260	G1757-6	17.4	17.4	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	G1757-6	37.5 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	G1757-6	45.0 %	(30 - 150)	

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09/02/2009

PCB Aroclors by SW846 8082/EPA 608

Sample: 0908086-4
Client Sample ID: Field-TP-2
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009
Collected: 08/05/2009 10:50
% Solid: 89.3%

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
12674-11-2	Aroclor 1016	G1757-7	14.0	14.0	ug/Kg	U
11104-28-2	Aroclor 1221	G1757-7	14.0	14.0	ug/Kg	U
11141-16-5	Aroclor 1232	G1757-7	14.0	14.0	ug/Kg	U
53469-21-9	Aroclor 1242	G1757-7	14.0	14.0	ug/Kg	U
12672-29-6	Aroclor 1248	G1757-7	14.0	14.0	ug/Kg	U
11097-69-1	Aroclor 1254	G1757-7	14.0	14.0	ug/Kg	U
11096-82-5	Aroclor 1260	G1757-7	14.1	14.1	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	G1757-7	36.7 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	G1757-7	44.8 %	(30 - 150)	

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09/02/2009

PCB Aroclors by SW846 8082/EPA 608

Sample: 0908086-5
Client Sample ID: DP-TP-1
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009
Collected: 08/05/2009 11:20
% Solid: 26%

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
12674-11-2	Aroclor 1016	G1757-8	48.1	48.1	ug/Kg	U
11104-28-2	Aroclor 1221	G1757-8	48.1	48.1	ug/Kg	U
11141-16-5	Aroclor 1232	G1757-8	48.1	48.1	ug/Kg	U
53469-21-9	Aroclor 1242	G1757-8	48.1	48.1	ug/Kg	U
12672-29-6	Aroclor 1248	G1757-8	48.1	48.1	ug/Kg	U
11097-69-1	Aroclor 1254	G1757-8	48.1	48.1	ug/Kg	U
11096-82-5	Aroclor 1260	G1757-8	48.5	48.5	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	G1757-8	35.3 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	G1757-8	42.6 %	(30 - 150)	

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09/02/2009

PCB Aroclors by SW846 8082/EPA 608

Sample: 0908086-6
Client Sample ID: DP-TP-2 — Collected: 08/05/2009 11:30
Matrix: Soil — Type: Grab — % Solid: 59.9%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
12674-11-2	Aroclor 1016	G1757-9	20.9	20.9	ug/Kg	U
11104-28-2	Aroclor 1221	G1757-9	20.9	20.9	ug/Kg	U
11141-16-5	Aroclor 1232	G1757-9	20.9	20.9	ug/Kg	U
53469-21-9	Aroclor 1242	G1757-9	20.9	20.9	ug/Kg	U
12672-29-6	Aroclor 1248	G1757-9	20.9	20.9	ug/Kg	U
11097-69-1	Aroclor 1254	G1757-9	20.9	20.9	ug/Kg	U
11096-82-5	Aroclor 1260	G1757-9	21.0	21.0	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	G1757-9	38.6 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	G1757-9	46.8 %	(30 - 150)	

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09/02/2009

PCB Aroclors by SW846 8082/EPA 608

Sample: 0908086-8
Client Sample ID: DP-TP-4 — Collected: 08/06/2009 08:55
Matrix: Soil — Type: Grab — % Solid: 45.7%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
12674-11-2	Aroclor 1016	G1757-11	27.4	27.4	ug/Kg	U
11104-28-2	Aroclor 1221	G1757-11	27.4	27.4	ug/Kg	U
11141-16-5	Aroclor 1232	G1757-11	27.4	27.4	ug/Kg	U
53469-21-9	Aroclor 1242	G1757-11	27.4	27.4	ug/Kg	U
12672-29-6	Aroclor 1248	G1757-11	27.4	27.4	ug/Kg	U
11097-69-1	Aroclor 1254	G1757-11	27.4	27.4	ug/Kg	U
11096-82-5	Aroclor 1260	G1757-11	27.6	27.6	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	G1757-11	33.6 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	G1757-11	46.5 %	(30 - 150)	

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09/02/2009

PCB Aroclors by SW846 8082/EPA 608

Sample: 0908086-7
Client Sample ID: DP-TP-3 — Collected: 08/05/2009 11:45
Matrix: Soil — Type: Grab — % Solid: 52.3%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
12674-11-2	Aroclor 1016	G1757-10	23.9	23.9	ug/Kg	U
11104-28-2	Aroclor 1221	G1757-10	23.9	23.9	ug/Kg	U
11141-16-5	Aroclor 1232	G1757-10	23.9	23.9	ug/Kg	U
53469-21-9	Aroclor 1242	G1757-10	23.9	23.9	ug/Kg	U
12672-29-6	Aroclor 1248	G1757-10	23.9	23.9	ug/Kg	U
11097-69-1	Aroclor 1254	G1757-10	23.9	23.9	ug/Kg	U
11096-82-5	Aroclor 1260	G1757-10	24.1	24.1	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	G1757-10	44.0 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	G1757-10	57.2 %	(30 - 150)	

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09/02/2009

Pesticide Compounds -EPA 608/SW846 8081A

Sample: 0908086-3
Client Sample ID: Field-TP-1 — Collected: 08/05/2009 10:40
Matrix: Soil — Type: Grab — % Solid: 72.5%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
319-84-6	alpha-BHC	L1124-15	0.91	0.91	ug/Kg	U
58-89-9	gamma-BHC (Lindane)	L1124-15	1.14	1.14	ug/Kg	U
319-85-7	beta-BHC	L1124-15	0.74	0.74	ug/Kg	U
319-86-8	delta-BHC	L1124-15	1.56	1.56	ug/Kg	U
76-44-8	Heptachlor	L1124-15	1.28	1.28	ug/Kg	U
309-00-2	Aldrin	L1124-15	1.45	1.45	ug/Kg	U
1024-57-3	Heptachlor epoxide	L1124-15	1.37	1.37	ug/Kg	U
5103-74-2	gamma-chlordane	L1124-15	1.46	1.46	ug/Kg	U
5103-71-9	alpha-Chlordane	L1124-15	1.23	1.23	ug/Kg	U
72-55-9	4,4'-DDE	L1124-15	1.48	1.48	ug/Kg	U
959-98-8	Endosulfan I (alpha-Endosulfan)	L1124-15	1.41	1.41	ug/Kg	U
60-57-1	Dieldrin	L1124-15	1.57	1.57	ug/Kg	U
72-20-8	Endrin	L1124-15	1.42	1.42	ug/Kg	U
72-54-8	4,4'-DDD	L1124-15	0.62	0.62	ug/Kg	U
33213-65-9	Endosulfan II (beta-Endosulfan)	L1124-15	1.12	1.12	ug/Kg	U
50-29-3	4,4'-DDT	L1124-15	0.74	0.74	ug/Kg	U
1031-07-8	Endosulfan Sulfate	L1124-15	0.99	0.99	ug/Kg	U
7421-36-3	Endrin Aldehyde	L1124-15	1.03	1.03	ug/Kg	U
72-43-5	Methoxychlor	L1124-15	1.21	1.21	ug/Kg	U
53494-70-5	Endrin ketone	L1124-15	1.31	1.31	ug/Kg	U
8001-35-2	Toxaphene	L1124-15	50.3	50.3	ug/Kg	U
57-74-9	Chlordane	L1124-15	9.60	9.60	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	L1124-15	40.6 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	L1124-15	35.6 %	(30 - 150)	

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09/02/2009

Pesticide Compounds -EPA 608/SW846 8081A

Sample: 0908086-4
Client Sample ID: Field-TP-2 Collected: 08/05/2009 10:50
Matrix: Soil Type: Grab % Solid: 89.3%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
319-84-6	alpha-BHC	L1124-16	0.74	0.74	ug/Kg	U
58-89-9	gamma-BHC (Lindane)	L1124-16	0.93	0.93	ug/Kg	U
319-85-7	beta-BHC	L1124-16	0.60	0.60	ug/Kg	U
319-86-8	delta-BHC	L1124-16	1.27	1.27	ug/Kg	U
76-44-8	Heptachlor	L1124-16	1.04	1.04	ug/Kg	U
309-00-2	Aldrin	L1124-16	1.18	1.18	ug/Kg	U
1024-57-3	Heptachlor epoxide	L1124-16	1.11	1.11	ug/Kg	U
5103-74-2	gamma-chlordane	L1124-16	1.19	1.19	ug/Kg	U
5103-71-9	alpha-Chlordane	L1124-16	1.00	1.00	ug/Kg	U
72-55-9	4,4'-DDE	L1124-16	1.20	1.20	ug/Kg	U
959-98-8	Endosulfan I (alpha-Endosulfan)	L1124-16	1.14	1.14	ug/Kg	U
60-57-1	Dieldrin	L1124-16	1.28	1.28	ug/Kg	U
72-20-8	Endrin	L1124-16	1.15	1.15	ug/Kg	U
72-54-8	4,4'-DDD	L1124-16	0.50	0.50	ug/Kg	U
33213-65-9	Endosulfan II (beta-Endosulfan)	L1124-16	0.91	0.91	ug/Kg	U
50-29-3	4,4'-DDT	L1124-16	0.60	0.60	ug/Kg	U
1031-07-8	Endosulfan Sulfate	L1124-16	0.81	0.81	ug/Kg	U
7421-36-3	Endrin Aldehyde	L1124-16	0.84	0.84	ug/Kg	U
72-43-5	Methoxychlor	L1124-16	0.99	0.99	ug/Kg	U
53494-70-5	Endrin ketone	L1124-16	1.06	1.06	ug/Kg	U
8001-35-2	Toxaphene	L1124-16	40.9	40.9	ug/Kg	U
57-74-9	Chlordane	L1124-16	7.79	7.79	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	L1124-16	42.3 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	L1124-16	33.7 %	(30 - 150)	

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09/02/2009

Pesticide Compounds -EPA 608/SW846 8081A

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
319-84-6	alpha-BHC	L1124-18	1.10	1.10	ug/Kg	U
58-89-9	gamma-BHC (Lindane)	L1124-18	1.39	1.39	ug/Kg	U
319-85-7	beta-BHC	L1124-18	0.90	0.90	ug/Kg	U
319-86-8	delta-BHC	L1124-18	1.89	1.89	ug/Kg	U
76-44-8	Heptachlor	L1124-18	1.55	1.55	ug/Kg	U
309-00-2	Aldrin	L1124-18	1.75	1.75	ug/Kg	U
1024-57-3	Heptachlor epoxide	L1124-18	1.65	1.65	ug/Kg	U
5103-74-2	gamma-chlordane	L1124-18	1.77	1.77	ug/Kg	U
5103-71-9	alpha-Chlordane	L1124-18	1.49	1.49	ug/Kg	U
72-55-9	4,4'-DDE	L1124-18	1.79	1.79	ug/Kg	U
959-98-8	Endosulfan I (alpha-Endosulfan)	L1124-18	1.70	1.70	ug/Kg	U
60-57-1	Dieldrin	L1124-18	1.90	1.90	ug/Kg	U
72-20-8	Endrin	L1124-18	1.72	1.72	ug/Kg	U
72-54-8	4,4'-DDD	L1124-18	0.75	0.75	ug/Kg	U
33213-65-9	Endosulfan II (beta-Endosulfan)	L1124-18	1.35	1.35	ug/Kg	U
50-29-3	4,4'-DDT	L1124-18	0.90	0.90	ug/Kg	U
1031-07-8	Endosulfan Sulfate	L1124-18	1.20	1.20	ug/Kg	U
7421-36-3	Endrin Aldehyde	L1124-18	1.25	1.25	ug/Kg	U
72-43-5	Methoxychlor	L1124-18	1.47	1.47	ug/Kg	U
53494-70-5	Endrin ketone	L1124-18	1.59	1.59	ug/Kg	U
8001-35-2	Toxaphene	L1124-18	60.9	60.9	ug/Kg	U
57-74-9	Chlordane	L1124-18	11.6	11.6	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	L1124-18	50.4 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	L1124-18	43.4 %	(30 - 150)	

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09/02/2009

Pesticide Compounds -EPA 608/SW846 8081A

Sample: 0908086-5
Client Sample ID: DP-TP-1 Collected: 08/05/2009 11:20
Matrix: Soil Type: Grab % Solid: 26%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
319-84-6	alpha-BHC	L1124-17	2.54	2.54	ug/Kg	U
58-89-9	gamma-BHC (Lindane)	L1124-17	3.19	3.19	ug/Kg	U
319-85-7	beta-BHC	L1124-17	2.08	2.08	ug/Kg	U
319-86-8	delta-BHC	L1124-17	4.35	4.35	ug/Kg	U
76-44-8	Heptachlor	L1124-17	3.58	3.58	ug/Kg	U
309-00-2	Aldrin	L1124-17	4.04	4.04	ug/Kg	U
1024-57-3	Heptachlor epoxide	L1124-17	3.81	3.81	ug/Kg	U
5103-74-2	gamma-chlordane	L1124-17	4.08	4.08	ug/Kg	U
5103-71-9	alpha-Chlordane	L1124-17	3.42	3.42	ug/Kg	U
72-55-9	4,4'-DDE	L1124-17	4.12	4.12	ug/Kg	U
959-98-8	Endosulfan I (alpha-Endosulfan)	L1124-17	3.92	3.92	ug/Kg	U
60-57-1	Dieldrin	L1124-17	4.38	4.38	ug/Kg	U
72-20-8	Endrin	L1124-17	3.96	3.96	ug/Kg	U
72-54-8	4,4'-DDD	L1124-17	1.73	1.73	ug/Kg	U
33213-65-9	Endosulfan II (beta-Endosulfan)	L1124-17	3.12	3.12	ug/Kg	U
50-29-3	4,4'-DDT	L1124-17	2.08	2.08	ug/Kg	U
1031-07-8	Endosulfan Sulfate	L1124-17	2.77	2.77	ug/Kg	U
7421-36-3	Endrin Aldehyde	L1124-17	2.88	2.88	ug/Kg	U
72-43-5	Methoxychlor	L1124-17	3.38	3.38	ug/Kg	U
53494-70-5	Endrin ketone	L1124-17	3.65	3.65	ug/Kg	U
8001-35-2	Toxaphene	L1124-17	140	140	ug/Kg	U
57-74-9	Chlordane	L1124-17	26.8	26.8	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	L1124-17	36.6 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	L1124-17	31.4 %	(30 - 150)	

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09/02/2009

Pesticide Compounds -EPA 608/SW846 8081A

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
319-84-6	alpha-BHC	L1124-19	1.26	1.26	ug/Kg	U
58-89-9	gamma-BHC (Lindane)	L1124-19	1.59	1.59	ug/Kg	U
319-85-7	beta-BHC	L1124-19	1.03	1.03	ug/Kg	U
319-86-8	delta-BHC	L1124-19	2.16	2.16	ug/Kg	U
76-44-8	Heptachlor	L1124-19	1.78	1.78	ug/Kg	U
309-00-2	Aldrin	L1124-19	2.01	2.01	ug/Kg	U
1024-57-3	Heptachlor epoxide	L1124-19	1.89	1.89	ug/Kg	U
5103-74-2	gamma-chlordane	L1124-19	2.03	2.03	ug/Kg	U
5103-71-9	alpha-Chlordane	L1124-19	1.70	1.70	ug/Kg	U
72-55-9	4,4'-DDE	L1124-19	2.05	2.05	ug/Kg	U
959-98-8	Endosulfan I (alpha-Endosulfan)	L1124-19	1.95	1.95	ug/Kg	U
60-57-1	Dieldrin	L1124-19	2.18	2.18	ug/Kg	U
72-20-8	Endrin	L1124-19	1.97	1.97	ug/Kg	U
72-54-8	4,4'-DDD	L1124-19	0.86	0.86	ug/Kg	U
33213-65-9	Endosulfan II (beta-Endosulfan)	L1124-19	1.55	1.55	ug/Kg	U
50-29-3	4,4'-DDT	L1124-19	1.03	1.03	ug/Kg	U
1031-07-8	Endosulfan Sulfate	L1124-19	1.38	1.38	ug/Kg	U
7421-36-3	Endrin Aldehyde	L1124-19	1.43	1.43	ug/Kg	U
72-43-5	Methoxychlor	L1124-19	1.68	1.68	ug/Kg	U
53494-70-5	Endrin ketone	L1124-19	1.82	1.82	ug/Kg	U
8001-35-2	Toxaphene	L1124-19	69.8	69.8	ug/Kg	U
57-74-9	Chlordane	L1124-19	13.3	13.3	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	L1124-19	55.2 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	L1124-19	46.4 %	(30 - 150)	

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09/02/2009

Pesticide Compounds -EPA 608/SW846 8081A

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/10/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration*	Units	Q
319-84-6	alpha-BHC	L1124-20	1.44	1.44	ug/Kg	U
58-89-9	gamma-BHC (Lindane)	L1124-20	1.82	1.82	ug/Kg	U
319-85-7	beta-BHC	L1124-20	1.18	1.18	ug/Kg	U
319-86-8	delta-BHC	L1124-20	2.47	2.47	ug/Kg	U
76-44-8	Heptachlor	L1124-20	2.04	2.04	ug/Kg	U
309-00-2	Aldrin	L1124-20	2.30	2.30	ug/Kg	U
1024-57-3	Heptachlor epoxide	L1124-20	2.17	2.17	ug/Kg	U
5103-74-2	gamma-chlordane	L1124-20	2.32	2.32	ug/Kg	U
5103-71-9	alpha-Chlordane	L1124-20	1.95	1.95	ug/Kg	U
72-55-9	4,4'-DDE	L1124-20	2.34	2.34	ug/Kg	U
959-98-8	Endosulfan I (alpha-Endosulfan)	L1124-20	2.23	2.23	ug/Kg	U
60-57-1	Dieldrin	L1124-20	2.49	2.49	ug/Kg	U
72-20-8	Endrin	L1124-20	2.25	2.25	ug/Kg	U
72-54-8	4,4'-DDD	L1124-20	0.98	0.98	ug/Kg	U
33213-65-9	Endosulfan II (beta-Endosulfan)	L1124-20	1.77	1.77	ug/Kg	U
50-29-3	4,4'-DDT	L1124-20	1.18	1.18	ug/Kg	U
1031-07-8	Endosulfan Sulfate	L1124-20	1.58	1.58	ug/Kg	U
7421-36-3	Endrin Aldehyde	L1124-20	1.64	1.64	ug/Kg	U
72-43-5	Methoxychlor	L1124-20	1.93	1.93	ug/Kg	U
53494-70-5	Endrin ketone	L1124-20	2.08	2.08	ug/Kg	U
8001-35-2	Toxaphene	L1124-20	79.9	79.9	ug/Kg	U
57-74-9	Chlordane	L1124-20	15.2	15.2	ug/Kg	U

* Results are reported on a dry weight basis

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
2051-24-3	DECACHLOROBIPHENYL	L1124-20	42.3 %	(30 - 150)	
877-09-8	TETRACHLORO M-XYLENE	L1124-20	34.1 %	(30 - 150)	

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09/02/2009

Calcium by Method SW846 6010

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-70-2	Calcium	4.37	**5440**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-70-2	Calcium	4.97	**3430**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-70-2	Calcium	5.70	**12300**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Calcium by Method SW846 6010

Sample: 0908086-3
Client Sample ID: Field-TP-1 Collected: 08/05/2009 10:40
Matrix: Soil Type: Grab % Solid: 72.5%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-70-2	Calcium	3.61	**2400**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-4
Client Sample ID: Field-TP-2 Collected: 08/05/2009 10:50
Matrix: Soil Type: Grab % Solid: 89.3%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-70-2	Calcium	2.94	**3180**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-5
Client Sample ID: DP-TP-1 Collected: 08/05/2009 11:20
Matrix: Soil Type: Grab % Solid: 26%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-70-2	Calcium	9.98	**7460**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Mercury by SW846 7470/7471/EPA 245.1

Sample: 0908086-1
Client Sample ID: LP-North Collected: 08/05/2009 10:30
Matrix: Soil Type: Grab % Solid: 93.2%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7439-97-6	Mercury	0.014	**0.39**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-2
Client Sample ID: LP-South Collected: 08/05/2009 10:15
Matrix: Soil Type: Grab % Solid: 94.5%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7439-97-6	Mercury	0.013	**0.23**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-3
Client Sample ID: Field-TP-1 Collected: 08/05/2009 10:40
Matrix: Soil Type: Grab % Solid: 72.5%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7439-97-6	Mercury	0.017	**0.13**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Mercury by SW846 7470/7471/EPA 245.1

Sample: 0908086-4
Client Sample ID: Field-TP-2 Collected: 08/05/2009 10:50
Matrix: Soil Type: Grab % Solid: 89.3%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7439-97-6	Mercury	0.015	**0.12**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-5
Client Sample ID: DP-TP-1 Collected: 08/05/2009 11:20
Matrix: Soil Type: Grab % Solid: 26%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7439-97-6	Mercury	0.052	**0.11**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7439-97-6	Mercury	0.021	**0.19**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Priority Pollutant Metals by SW846 6010/EPA 200.7

Sample: 0908086-3
Client Sample ID: Field-TP-1 Collected: 08/05/2009 10:40
Matrix: Soil Type: Grab % Solid: 72.5%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-36-0	Antimony	0.28	0.28	mg/Kg	U
7440-38-2	Arsenic	0.47	**4.00**	mg/Kg	
7440-41-7	Beryllium	0.028	0.028	mg/Kg	U
7440-43-9	Cadmium	0.042	**0.65**	mg/Kg	
7440-47-3	Chromium	0.22	**9.40**	mg/Kg	
7440-50-8	Copper	0.40	**7.51**	mg/Kg	
7439-92-1	Lead	0.24	**24.5**	mg/Kg	
7440-02-0	Nickel	0.070	**4.12**	mg/Kg	
7782-49-2	Selenium	0.60	0.60	mg/Kg	U
7440-22-4	Silver	0.14	0.14	mg/Kg	U
7440-28-0	Thallium	0.28	0.28	mg/Kg	U
7440-66-6	Zinc	0.61	**47.9**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Mercury by SW846 7470/7471/EPA 245.1

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7439-97-6	Mercury	0.024	**0.16**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7439-97-6	Mercury	0.026	**0.24**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Priority Pollutant Metals by SW846 6010/EPA 200.7

Sample: 0908086-4
Client Sample ID: Field-TP-2 Collected: 08/05/2009 10:50
Matrix: Soil Type: Grab % Solid: 89.3%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-36-0	Antimony	0.23	0.23	mg/Kg	U
7440-38-2	Arsenic	0.39	**2.43**	mg/Kg	
7440-41-7	Beryllium	0.023	0.023	mg/Kg	U
7440-43-9	Cadmium	0.034	**0.47**	mg/Kg	
7440-47-3	Chromium	0.18	**4.89**	mg/Kg	
7440-50-8	Copper	0.33	**6.55**	mg/Kg	
7439-92-1	Lead	0.19	**18.8**	mg/Kg	
7440-02-0	Nickel	0.057	0.057	mg/Kg	U
7782-49-2	Selenium	0.49	0.49	mg/Kg	U
7440-22-4	Silver	0.11	0.11	mg/Kg	U
7440-28-0	Thallium	0.23	0.23	mg/Kg	U
7440-66-6	Zinc	0.50	**41.2**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Priority Pollutant Metals by SW846 6010/EPA 200.7

Sample: 0908086-5
Client Sample ID: DP-TP-1 Collected: 08/05/2009 11:20
Matrix: Soil Type: Grab % Solid: 26%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-36-0	Antimony	0.77	0.77	mg/Kg	U
7440-38-2	Arsenic	1.31	1.31	mg/Kg	U
7440-41-7	Beryllium	0.077	0.077	mg/Kg	U
7440-43-9	Cadmium	0.12	0.12	mg/Kg	U
7440-47-3	Chromium	0.62	**11.6**	mg/Kg	
7440-50-8	Copper	1.12	**114**	mg/Kg	
7439-92-1	Lead	0.66	**193**	mg/Kg	
7440-02-0	Nickel	0.19	0.19	mg/Kg	U
7782-49-2	Selenium	1.66	1.66	mg/Kg	U
7440-22-4	Silver	0.39	0.39	mg/Kg	U
7440-28-0	Thallium	0.77	0.77	mg/Kg	U
7440-66-6	Zinc	1.70	**614**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Priority Pollutant Metals by SW846 6010/EPA 200.7

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-36-0	Antimony	0.34	0.34	mg/Kg	U
7440-38-2	Arsenic	0.57	0.57	mg/Kg	U
7440-41-7	Beryllium	0.034	0.034	mg/Kg	U
7440-43-9	Cadmium	0.051	0.051	mg/Kg	U
7440-47-3	Chromium	0.27	**6.14**	mg/Kg	
7440-50-8	Copper	0.49	**33.2**	mg/Kg	
7439-92-1	Lead	0.29	**83.6**	mg/Kg	
7440-02-0	Nickel	0.084	0.084	mg/Kg	U
7782-49-2	Selenium	0.73	0.73	mg/Kg	U
7440-22-4	Silver	0.17	0.17	mg/Kg	U
7440-28-0	Thallium	0.34	0.34	mg/Kg	U
7440-66-6	Zinc	0.74	**381**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Priority Pollutant Metals by SW846 6010/EPA 200.7

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-36-0	Antimony	0.38	0.38	mg/Kg	U
7440-38-2	Arsenic	0.65	0.65	mg/Kg	U
7440-41-7	Beryllium	0.038	0.038	mg/Kg	U
7440-43-9	Cadmium	0.058	0.058	mg/Kg	U
7440-47-3	Chromium	0.31	**6.18**	mg/Kg	
7440-50-8	Copper	0.56	**19.4**	mg/Kg	
7439-92-1	Lead	0.33	**50.3**	mg/Kg	
7440-02-0	Nickel	0.096	0.096	mg/Kg	U
7782-49-2	Selenium	0.83	0.83	mg/Kg	U
7440-22-4	Silver	0.19	0.19	mg/Kg	U
7440-28-0	Thallium	0.38	0.38	mg/Kg	U
7440-66-6	Zinc	0.84	**263**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Priority Pollutant Metals by SW846 6010/EPA 200.7

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009 08/10/2009

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-36-0	Antimony	0.44	0.44	mg/Kg	U
7440-38-2	Arsenic	0.75	0.75	mg/Kg	U
7440-41-7	Beryllium	0.044	0.044	mg/Kg	U
7440-43-9	Cadmium	0.066	**1.32**	mg/Kg	
7440-47-3	Chromium	0.35	**8.34**	mg/Kg	
7440-50-8	Copper	0.64	**160**	mg/Kg	
7439-92-1	Lead	0.37	**80.5**	mg/Kg	
7440-02-0	Nickel	0.11	**11.2**	mg/Kg	
7782-49-2	Selenium	0.95	0.95	mg/Kg	U
7440-22-4	Silver	0.22	0.22	mg/Kg	U
7440-28-0	Thallium	0.44	0.44	mg/Kg	U
7440-66-6	Zinc	0.97	**618**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

SCDOH - RCRA Metals by Method SW846 6010

Sample: 0908086-1
Client Sample ID: LP-North
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009 08/10/2009
Collected: 08/05/2009 10:30
% Solid: 93.2%

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-38-2	Arsenic	0.36	**1.90**	mg/Kg	
7440-41-7	Beryllium	0.021	**0.72**	mg/Kg	
7440-43-9	Cadmium	0.032	**0.56**	mg/Kg	
7440-47-3	Chromium	0.17	**6.27**	mg/Kg	
7440-50-8	Copper	0.31	**29.9**	mg/Kg	
7439-92-1	Lead	0.18	**116**	mg/Kg	
7440-02-0	Nickel	0.053	**4.58**	mg/Kg	
7440-22-4	Silver	0.11	0.11	mg/Kg	U

* Results are reported on a dry weight basis

Sample: 0908086-2
Client Sample ID: LP-South
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/11/2009
Preparation Date(s) : 08/11/2009 08/10/2009
Collected: 08/05/2009 10:15
% Solid: 94.5%

Analytical Results

Cas No	Analyte	MDL	Concentration*	Units	Q
7440-38-2	Arsenic	0.36	**2.40**	mg/Kg	
7440-41-7	Beryllium	0.021	0.021	mg/Kg	U
7440-43-9	Cadmium	0.032	0.032	mg/Kg	U
7440-47-3	Chromium	0.17	**8.43**	mg/Kg	
7440-50-8	Copper	0.31	**6.57**	mg/Kg	
7439-92-1	Lead	0.18	**39.5**	mg/Kg	
7440-02-0	Nickel	0.053	0.053	mg/Kg	U
7440-22-4	Silver	0.11	0.11	mg/Kg	U

* Results are reported on a dry weight basis

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09/02/2009

Nitrogen/Nitrate by SM 4500-NO3 E

Sample: 0908086-3
Client Sample ID: Field-TP-1
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/12/2009
Collected: 08/05/2009 10:40
% Solid: 72.5%

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-55-8	Nitrate	0.025	**5.70**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-4
Client Sample ID: Field-TP-2
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/12/2009
Collected: 08/05/2009 10:50
% Solid: 89.3%

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-55-8	Nitrate	0.025	**5.03**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-5
Client Sample ID: DP-TP-1
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/12/2009
Collected: 08/05/2009 11:20
% Solid: 26%

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-55-8	Nitrate	0.025	**20.1**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Nitrogen/Nitrate by SM 4500-NO3 E

Sample: 0908086-6
Client Sample ID: DP-TP-2
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/12/2009
Collected: 08/05/2009 11:30
% Solid: 59.9%

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-55-8	Nitrate	0.025	**9.44**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-7
Client Sample ID: DP-TP-3
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/12/2009
Collected: 08/05/2009 11:45
% Solid: 52.3%

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-55-8	Nitrate	0.025	**8.68**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-8
Client Sample ID: DP-TP-4
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/12/2009
Collected: 08/06/2009 08:55
% Solid: 45.7%

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-55-8	Nitrate	0.025	**8.88**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Nitrogen/Nitrite by SM 4500-NO3 E

Sample: 0908086-3
Client Sample ID: Field-TP-1
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/13/2009
Collected: 08/05/2009 10:40
% Solid: 72.5%

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-65-0	Nitrite	0	12.4	mg/Kg	U

* Results are reported on a dry weight basis

Sample: 0908086-4
Client Sample ID: Field-TP-2
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/13/2009
Collected: 08/05/2009 10:50
% Solid: 89.3%

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-65-0	Nitrite	0	10.1	mg/Kg	U

* Results are reported on a dry weight basis

Sample: 0908086-5
Client Sample ID: DP-TP-1
Matrix: Soil Type: Grab
Remarks:
Analyzed Date: 08/13/2009
Collected: 08/05/2009 11:20
% Solid: 26%

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-65-0	Nitrite	0	34.6	mg/Kg	U

* Results are reported on a dry weight basis

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09/02/2009

Nitrogen/Nitrite by SM 4500-NO3 E

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/13/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-65-0	Nitrite	0	15.0	mg/Kg	U

* Results are reported on a dry weight basis

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/13/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-65-0	Nitrite	0	17.2	mg/Kg	U

* Results are reported on a dry weight basis

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/13/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
14797-65-0	Nitrite	0	19.7	mg/Kg	U

* Results are reported on a dry weight basis

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09/02/2009

Total Nitrogen

Sample: 0908086-3
Client Sample ID: Field-TP-1 Collected: 08/05/2009 10:40
Matrix: Soil Type: Grab % Solid: 72.5%
Remarks:
Analyzed Date: 08/31/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	TKN	0.59	**8.46**	mg/Kg	
7664-41-7	Ammonia	0.070	**8.46**	mg/Kg	
	Total Organic Nitrogen	0	ND	mg/Kg	
	Total Nitrogen	0.11	ND	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-4
Client Sample ID: Field-TP-2 Collected: 08/05/2009 10:50
Matrix: Soil Type: Grab % Solid: 89.3%
Remarks:
Analyzed Date: 09/01/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	TKN	0.59	**6.87**	mg/Kg	
7664-41-7	Ammonia	0.070	**6.86**	mg/Kg	
	Total Organic Nitrogen	0	ND	mg/Kg	
	Total Nitrogen	0	ND	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Total Nitrogen

Sample: 0908086-5
Client Sample ID: DP-TP-1 Collected: 08/05/2009 11:20
Matrix: Soil Type: Grab % Solid: 26%
Remarks:
Analyzed Date: 08/31/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	TKN	0.59	**47.2**	mg/Kg	
7664-41-7	Ammonia	0.070	**47.3**	mg/Kg	
	Total Organic Nitrogen	0	ND	mg/Kg	
	Total Nitrogen	0.11	ND	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/31/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	TKN	0.59	**10.2**	mg/Kg	
7664-41-7	Ammonia	0.070	**10.2**	mg/Kg	
	Total Organic Nitrogen	0	ND	mg/Kg	
	Total Nitrogen	0.11	ND	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Total Nitrogen

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/31/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	TKN	0.59	**35.2**	mg/Kg	
7664-41-7	Ammonia	0.070	**11.7**	mg/Kg	
	Total Organic Nitrogen	0	ND	mg/Kg	
	Total Nitrogen	0.11	ND	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/31/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	TKN	0.59	**40.3**	mg/Kg	
7664-41-7	Ammonia	0.070	**26.9**	mg/Kg	
	Total Organic Nitrogen	0	ND	mg/Kg	
	Total Nitrogen	0.11	ND	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

pH - Soil @ 25 Degrees C - SW 846 9045C

Sample: 0908086-3
Client Sample ID: Field-TP-1 — Collected: 08/05/2009 10:40
Matrix: Soil — Type: Grab — % Solid: 72.5%
Remarks:
Analyzed Date: 08/12/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	pH	0	**5.67**	pH Units	

Sample: 0908086-4
Client Sample ID: Field-TP-2 — Collected: 08/05/2009 10:50
Matrix: Soil — Type: Grab — % Solid: 89.3%
Remarks:
Analyzed Date: 08/12/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	pH	0	**5.74**	pH Units	

Sample: 0908086-5
Client Sample ID: DP-TP-1 — Collected: 08/05/2009 11:20
Matrix: Soil — Type: Grab — % Solid: 26%
Remarks:
Analyzed Date: 08/12/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	pH	0	**5.47**	pH Units	

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09/02/2009

Total Phosphorus by SM 4500-P E

Sample: 0908086-3
Client Sample ID: Field-TP-1 — Collected: 08/05/2009 10:40
Matrix: Soil — Type: Grab — % Solid: 72.5%
Remarks:
Analyzed Date: 08/19/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
7723-14-0	Phosphorus (P)	0	**14.9**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-4
Client Sample ID: Field-TP-2 — Collected: 08/05/2009 10:50
Matrix: Soil — Type: Grab — % Solid: 89.3%
Remarks:
Analyzed Date: 08/19/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
7723-14-0	Phosphorus (P)	0	**12.1**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-5
Client Sample ID: DP-TP-1 — Collected: 08/05/2009 11:20
Matrix: Soil — Type: Grab — % Solid: 26%
Remarks:
Analyzed Date: 08/19/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
7723-14-0	Phosphorus (P)	0	**86.3**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

pH - Soil @ 25 Degrees C - SW 846 9045C

Sample: 0908086-6
Client Sample ID: DP-TP-2 — Collected: 08/05/2009 11:30
Matrix: Soil — Type: Grab — % Solid: 59.9%
Remarks:
Analyzed Date: 08/12/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	pH	0	**5.36**	pH Units	

Sample: 0908086-7
Client Sample ID: DP-TP-3 — Collected: 08/05/2009 11:45
Matrix: Soil — Type: Grab — % Solid: 52.3%
Remarks:
Analyzed Date: 08/12/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	pH	0	**5.71**	pH Units	

Sample: 0908086-8
Client Sample ID: DP-TP-4 — Collected: 08/06/2009 08:55
Matrix: Soil — Type: Grab — % Solid: 45.7%
Remarks:
Analyzed Date: 08/11/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	pH	0	**6.08**	pH Units	

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09/02/2009

Total Phosphorus by SM 4500-P E

Sample: 0908086-6
Client Sample ID: DP-TP-2 — Collected: 08/05/2009 11:30
Matrix: Soil — Type: Grab — % Solid: 59.9%
Remarks:
Analyzed Date: 08/19/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
7723-14-0	Phosphorus (P)	0	**28.1**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-7
Client Sample ID: DP-TP-3 — Collected: 08/05/2009 11:45
Matrix: Soil — Type: Grab — % Solid: 52.3%
Remarks:
Analyzed Date: 08/19/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
7723-14-0	Phosphorus (P)	0	**15.8**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-8
Client Sample ID: DP-TP-4 — Collected: 08/06/2009 08:55
Matrix: Soil — Type: Grab — % Solid: 45.7%
Remarks:
Analyzed Date: 08/19/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
7723-14-0	Phosphorus (P)	0	**19.3**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Total Organic Carbon by Loss of Ignition

Sample: 0908086-3
Client Sample ID: Field-TP-1 Collected: 08/05/2009 10:40
Matrix: Soil Type: Grab % Solid: 72.5%
Remarks:
Analyzed Date: 08/14/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.050	**26.5**	%	

Sample: 0908086-4
Client Sample ID: Field-TP-2 Collected: 08/05/2009 10:50
Matrix: Soil Type: Grab % Solid: 89.3%
Remarks:
Analyzed Date: 08/14/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.050	**12.8**	%	

Sample: 0908086-5
Client Sample ID: DP-TP-1 Collected: 08/05/2009 11:20
Matrix: Soil Type: Grab % Solid: 26%
Remarks:
Analyzed Date: 08/14/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.050	**23.6**	%	

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09/02/2009

Total Inorganic Nitrogen

Sample: 0908086-3
Client Sample ID: Field-TP-1 Collected: 08/05/2009 10:40
Matrix: Soil Type: Grab % Solid: 72.5%
Remarks:
Analyzed Date: 08/28/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	Total Nitrogen	0.11	**14.2**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-4
Client Sample ID: Field-TP-2 Collected: 08/05/2009 10:50
Matrix: Soil Type: Grab % Solid: 89.3%
Remarks:
Analyzed Date: 08/28/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	Total Nitrogen	0.11	**11.9**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-5
Client Sample ID: DP-TP-1 Collected: 08/05/2009 11:20
Matrix: Soil Type: Grab % Solid: 26%
Remarks:
Analyzed Date: 08/28/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	Total Nitrogen	0.11	**67.3**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Total Organic Carbon by Loss of Ignition

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/14/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.050	**65.3**	%	

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/14/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.050	**58.5**	%	

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/14/2009

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.050	**55.2**	%	

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09/02/2009

Total Inorganic Nitrogen

Sample: 0908086-6
Client Sample ID: DP-TP-2 Collected: 08/05/2009 11:30
Matrix: Soil Type: Grab % Solid: 59.9%
Remarks:
Analyzed Date: 08/28/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	Total Nitrogen	0.11	**19.6**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-7
Client Sample ID: DP-TP-3 Collected: 08/05/2009 11:45
Matrix: Soil Type: Grab % Solid: 52.3%
Remarks:
Analyzed Date: 08/28/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	Total Nitrogen	0.11	**20.4**	mg/Kg	

* Results are reported on a dry weight basis

Sample: 0908086-8
Client Sample ID: DP-TP-4 Collected: 08/06/2009 08:55
Matrix: Soil Type: Grab % Solid: 45.7%
Remarks:
Analyzed Date: 08/28/2009

Analytical Results

Cas No	Analyte	MDL	Result*	Units	Q
	Total Nitrogen	0.11	**35.8**	mg/Kg	

* Results are reported on a dry weight basis

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09/02/2009

Case Narrative

EPA 8260 VOLATILE ANALYSIS:

The following compounds were calibrated at 25, 50, 100,
150 and 200 ppb levels in the initial calibration curve:
Acetone
2-Butanone
4-Methyl-2-pentanone
2-Hexanone

M&P-Xylenes and 2-Chloroethylvinylether were calibrated at 10, 40, 100, 200 and
300 ppb levels.
Acrolein/Acrylonitrile were calibrated at 50,100,150,200 and 250 ppb levels.
Tert Butyl Alcohol (TBA) was calibrated at 50,200,500,1000 and 1500 ppb levels.

All other compounds were calibrated at 5, 20, 50, 100 and 150 ppb levels.

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09/02/2009

ORGANIC METHOD QUALIFIERS

Q - Qualifier - specified entries and their meanings are as follows:

U - The analytical result is not detected above the Method Detection Limit (MDL). All MDL's are lower than the lowest calibration standard concentration.

J - Indicates an estimated value. The concentration reported was between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).

B - The analyte was found in the associated method blank as well as the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

E - The concentration of the analyte exceeded the calibration range of the instrument.

D - This flag indicates a system monitoring compound diluted out.

INORGANIC METHOD QUALIFIERS

C - (Concentration) qualifiers are as follows:

B - Entered if the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Method Detection Limit (MDL).

U - Entered when the analyte was analyzed for, but not detected above the Method Detection Limit (MDL) which is less than the lowest calibration standard concentration.

Q - Qualifier specific entries and their meanings are as follows:

E - Reported value is estimated because of the presence of interferences.

M - (Method) qualifiers are as follows:

A - Flame AA
AS - Semi-automated Spectrophotometric
AV - Automated Cold Vapor AA
C - Manual Spectrophotometric
F - Furnace AA
P - ICP
T - Titrimetric

OTHER QUALIFIERS

ND - Not Detected