

# RECORD OF DECISION

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Northrop Grumman - Bethpage Facility  
Operable Unit Number: 03  
State Superfund Project  
Bethpage, Nassau County  
Site No. 130003A  
March 2013



Prepared by  
Division of Environmental Remediation  
New York State Department of Environmental Conservation

# **DECLARATION STATEMENT - RECORD OF DECISION**

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Northrop Grumman - Bethpage Facility  
Operable Unit Number: 03  
State Superfund Project  
Bethpage, Nassau County  
Site No. 130003A  
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## **Statement of Purpose and Basis**

This document presents the remedy for Operable Unit Number: 03, Bethpage Park-Former Grumman Settling Ponds and Adjacent Areas of the Northrop Grumman - Bethpage Facility site, a Class 2 inactive hazardous waste disposal site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375, and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for Operable Unit Number: 03 of the Northrop Grumman - Bethpage Facility site and the public's input to the proposed remedy presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

## **Description of Selected Remedy**

The elements of the selected remedy are as follows:

As detailed below, the Department has selected a remedy to address source areas in the OU3 area and the capture and treatment of off-site groundwater hotspot in the OU3 plume. The estimated present worth cost to implement the remedy is \$81,000,000. The cost to construct the remedy is estimated to be \$61,500,000 and the estimated average annual cost is \$1,250,000. The basis for the Department's selected remedy is set forth at Exhibit E.

The elements of the selected remedy for the areas shown on Figure 2 are as follows:

1. Implementation of a remedial design program to provide the details necessary for the construction, maintenance and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site

management of the remedy as per NYSDEC Division of Environmental Remediation (DER) Guidance-31. The major green remediation components are as follows:

- considering the environmental impacts of remedy stewardship over the long term;
- reducing direct and indirect greenhouse gas and other emissions;
- increasing energy efficiency and minimizing use of non-renewable energy;
- conserving and efficiently managing resources and materials;
- reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- maximizing habitat value and creating habitat when possible
- fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- maximizing the reuse of the treated groundwater, such as for irrigation of the golf courses at Bethpage State Park.

2. The Former Grumman Settling Ponds area, located in the ball fields and areas adjacent to the ball fields, in the Bethpage Community Park will be excavated to remove PCB contaminated fill from an approximately three acre area. In this area, all soil exceeding 50 ppm for PCBs (approximately 25,000 cubic yards) will be excavated and disposed off-site at a permitted disposal facility. The soil exceeding 50 ppm PCBs is predominantly present between 10 to 20 feet below ground surface (bgs) and the excavation limits will be extended, as necessary to attain the 50 ppm level. Chromium sludge co-located with the PCB impacted soil will be removed to the extent necessary to achieve the PCB removal goals.

The soil from the surface to 10 feet bgs, will be excavated either to achieve the Commissioner Policy (CP 51) oil cleanup approach for PCBs, or as necessary to access the deeper PCB contaminated soil. All other contaminated fill and soil which exceeds the restricted residential use soil cleanup objectives for other contaminants to a depth of 10 feet, in the PCB removal area, will be excavated and disposed off-site in a permitted facility. The remaining soil in the upper two feet site-wide will either be excavated, covered or a combination of cut and cover used to achieve the 1 ppm SCO for PCBs and/or the applicable restricted residential SCOs for metals or semi-volatile organic compounds to establish a site cover (see 3 below).

The soil excavated in this area which has less than 50 ppm PCBs (approximately 45,000 cubic yards) may be stockpiled for reuse as backfill in the excavation areas deeper than 10 feet in accordance with a soil reuse plan to be developed during the design. All soil with PCB levels exceeding 50 ppm will be transported off-site to a permitted disposal facility.

3. A site cover will be required to allow for restricted residential use of the Park. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer,

with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). The soil cover will be placed site wide, including in the area of the recharge basins, Town Pool and playground, as needed to assure restricted residential SCOs in the upper two feet of the OU3 area are achieved.

4. The Grumman Access Road right-of-way area will be excavated to remove PCB and chromium contaminated fill from an approximately 1,000 foot long area beneath and adjacent to the access road. Soil will be removed to achieve 1 ppm in the upper two feet and 10 ppm of PCBs below two feet as well as the restricted residential SCO for chromium in the upper two feet. An estimated 6,000 cubic yards of soil will be removed, for the most part to depths from 0 to 3.5 feet bgs. The soil excavated can also be handled in accordance with the on-site soil reuse plan, as per Item 2 above.

5. The approximately one acre VOC rag pit area source area(s) in a low permeability zone present approximately 40 feet bgs in the Former Grumman Settling Pond Area, will be remediated using an in-situ thermal desorption and soil vapor extraction technology, or an alternate in-situ treatment technology capable of achieving comparable removals may be proposed for approval by the Department. The area to be addressed will be treated to attain the protection of groundwater SCOs for the VOCs present.

6. Residential yards located between Sycamore Avenue and the Grumman Access Road, where design sampling identifies PCB impacts greater than 1 ppm and chromium in excess of the residential SCO, will be excavated followed by restoration of the yards. The soil excavated can also be handled in accordance with the soil reuse plan, in Item 2 above.

7. The areas to be excavated and backfilled, with the exception of the Grumman Settling Pond Area subject to the on-site soil management plan, will be backfilled with fill material brought to the site which meets the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). Excavated areas will be graded and restored to pre-excavation conditions, unless an alternative restoration is agreed to with the property owner.

8. The existing groundwater extraction and treatment interim remedial measure (IRM) will continue to be operated and upgraded as necessary, based on a review of its effectiveness, to assure the capture/containment of the full depth and area of contaminated groundwater leaving the Site. Additional extraction wells will be installed as needed to ensure the containment of the full depth of the area of contaminated groundwater leaving the site. The treatment capacity will be upgraded as needed to treat any increased ground water extracted to ensure that the discharge meets applicable standards, criteria and guidance (SCGs).

9. Operation of the existing IRM soil vapor extraction and treatment system in place along the Grumman Access Road will continue, to prevent migration of contaminated soil vapor.

10. One or more groundwater extraction well(s) along with the necessary treatment will be installed in the groundwater plume emanating from OU3 (the exact number to be determined during the design phase). The wells will be located downgradient of the area(s) of elevated contaminant levels identified upgradient of Bethpage Water District Plant 4. This system will be

designed to capture and treat the “hot spot” area of the plume to the maximum extent practicable, at a minimum capturing and treating 90 percent of the mass of groundwater migrating from the elevated "hotspot area” (the recommendation by the Technical Team for Optimization of the Bethpage Plume Remedy in their June 15, 20 report prepared for the U.S. Navy). Considerations may be given to the use of Bethpage Water District facilities for all or part of treatment system. Additional monitoring wells will also be installed and monitored to allow completion of a three dimensional delineation of the leading edge of the OU3 plume and an assessment as to whether the remedy for the contaminated groundwater in this area needs to be further evaluated. This delineation and any subsequent evaluation to determine whether further remedial actions are needed are expected to be conducted in approximately 18-24 months

11. The Wellhead Treatment Contingency Plan put in place as a requirement of the OU2 ROD will remain in place. Nothing in this decision should be considered as affecting any review of the Wellhead Treatment Contingency Plan that may be conducted by the Department or other interested agencies and parties.

12. Imposition of an institutional control in the form of an environmental easement for the OU3 area that will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential, as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or County DOH;
- prohibit the raising of dairy cattle as per 6 NYCRR Part 375 or vegetable gardens on the controlled property; and
- require compliance with the Department approved Site Management Plan;

13. A Site Management Plan is required, which includes the following:

(a) An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 12 above.

Engineering Controls: The site cover discussed in paragraph 3, the continued operation of the on-site ground water containment pump and treat system and the soil vapor extraction (SVS) system described in paragraphs 8 & 9 and treatment of the elevated groundwater hot spot off-site described in paragraph 10.

This site management plan includes, but may not be limited to:

- an excavation plan which details, if necessary, the provisions for management of future excavations in areas of remaining contamination;
- a description of the provisions of the environmental easement including any land use,

- groundwater and/or surface water use restrictions;
- provision for evaluation of the potential for soil vapor intrusion, if necessary once remediation is complete, for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls;

(b) A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- the on-site pump and treat system, off-site pump and treat system, the SVE system and any plume migration beyond the off-site treatment area that becomes part of the OU2 plume;
- monitoring of groundwater and soil vapor to assess the performance and effectiveness of the remedy. Sampling and analysis for PCBs and chromium will be added to the groundwater monitoring program;
- monitoring for vapor intrusion for any buildings occupied or developed on the site, as may be required pursuant to the site management plan; and
- additional sampling and/or monitoring well installation, as necessary, along the eastern boundary to better define the lateral extent of groundwater contamination.

(c) An Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting with respect to any mechanical or physical components of the remedy. The plan will include, but will not be limited to:

- the on-site and off-site pump and treat systems;
- the SVE system;
- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting; maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

### **New York State Department of Health Acceptance**

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

**Declaration**

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

March 29, 2013

Date



Robert W. Schick, P.E., Director  
Division of Environmental Remediation

# RECORD OF DECISION

Northrop Grumman - Bethpage Facility  
Bethpage, Nassau County  
Site No. 130003A  
March 2013

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## **SECTION 1: SUMMARY AND PURPOSE**

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of hazardous wastes at this site, as more fully described in this document, has contaminated various environmental media. The remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This Record of Decision (ROD) identifies the selected remedy, summarizes the other alternatives considered, and discusses the reasons for selecting the remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

## **SECTION 2: CITIZEN PARTICIPATION**

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repository:

Bethpage Public Library  
Attn: Ms. Lois Lovisolo  
Powell Avenue  
Bethpage, NY 11714  
Phone: 516) 931-3907

A public meeting and three public availability sessions were also conducted. At the meeting, the



findings of the remedial investigation (RI) and the feasibility study (FS) were presented along with a summary of the proposed remedy. After the presentation, verbal or written comments were accepted on the proposed remedy.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary section of the ROD.

### **Receive Site Citizen Participation Information by Email**

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at <http://www.dec.ny.gov/chemical/61092.html>

### **SECTION 3: SITE DESCRIPTION AND HISTORY**

**Location:** The Northrop Grumman - Bethpage Facility is a part of the former Grumman Aerospace complex. It is located on Hicksville Road in an urbanized area of Bethpage. Operable Unit 3 (OU3) is off-site from, but associated with, the Northrop Grumman-Bethpage Facility Site (Site No.130003A). The OU3 area includes the Former Grumman Settling Ponds, adjacent areas of the Bethpage Community Park and the Grumman Access Road. Unless otherwise stated, the term "site" in this document will refer to this OU3 area. The Former Grumman Settling Ponds represent approximately 3.75 acres located within the 18 acre Bethpage Community Park (the Park). The Park is located at the intersection of Stewart Avenue and Cherry Avenue, in Bethpage, New York.

**Site Features:** The Park was donated to the Town of Oyster Bay by Grumman Aircraft Engineering Corporation in October 1962. The ball field area of the Park is built over the location of the Former Grumman Settling Ponds. Northrop Grumman Systems retains ownership of the Grumman Access Road which is a closed private road associated with the former plant.

**Current Zoning/Use:** Although zoned for light industrial use, the Town of Oyster Bay has utilized the Former Grumman Settling Ponds area as part of the Bethpage Community Park since the mid-1960s. The remainder of the Park includes an active storm water recharge basin, a parking area, the Town Ice Skating Rink, and the Town Pool. The surrounding land use is a combination of industrial, commercial, residential, a school and recreational uses.

**Historic Uses:** From circa 1949 to 1962, the Former Grumman Settling Ponds area was used for dewatering of sludge, including neutralized chromic acid waste, from the waste water treatment facility which was located within the Grumman Aerospace Bethpage complex. This complex included both Grumman owned and operated plants, and government owned (United States Navy) and contractor (Grumman) operated plants. Grumman's operations started at the Bethpage

location in 1937 and the Naval Weapons Industrial Reserve Plant (NWIRP) operations started in 1942. All manufacturing ceased at the Grumman and NWIRP facilities in 1996.

Formerly known as the Grumman Aerospace-Bethpage Facility Site (Site No.130003), this facility consisted of some 600 acres was listed in the *Registry of Inactive Hazardous Waste Disposal Sites in New York State* in 1983. (Site No. 130003 as defined, did not include the Bethpage Community Park). Subsequently on March 10, 1993, the Grumman Aerospace-Bethpage Facility Site (130003) was divided into the Northrop Grumman-Bethpage Facility Site (130003A) and the Naval Weapons Industrial Reserve Plant Site (130003B) consisting of 105 acres. During the early 1990s many portions of the Northrop Grumman-Bethpage Facility Site (130003A) were delisted as the investigation of areas was completed. The Northrop Grumman-Bethpage Facility Site (130003A) was further divided on March 13, 2000 with 26 acres becoming the Northrop Grumman-Steel Los Plant 2 Site (130003C). Currently the Northrop Grumman-Bethpage Facility Site (130003A) is 9 acres. In June 2004, a portion of the Naval Weapons Industrial Reserve Plant Site (130003B) was delisted reducing the NWIRP site to 8.7 acres.

The operation of the former Town ice rinks (since replaced by a new rink) were identified as the source of some of the Freon contamination in the area. The Town of Oyster Bay (TOB) was approved for participation in the Brownfield Cleanup Program for the Ice Rink portion of the Park. This agreement will address Freon contamination related to the Ice Rink area. The boundaries of OU3 have been adjusted and the area of the TOB IRM is no longer part of OU3.

**Operable Units:** An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. The Grumman Aerospace Bethpage facility site is divided into three operable units. The former manufacturing plant area is designated as Operable Unit 1 (OU1), and Operable Unit 2 (OU2) consists of the groundwater contamination plume and is a joint operable unit for both the Grumman and NWIRP sites. Operable Unit 3 (OU3) consists of the Former Grumman Settling Ponds, adjacent areas of the Bethpage Community Park and the Grumman Access Road. The disposal at OU3 has also resulted in impacts to some adjacent off-site properties as well as the downgradient groundwater. The Town of Oyster Bay also completed an Interim Remedial Measure (IRM) on an area within the Bethpage Community Park, which was originally, but is not currently, included in the OU3 area.

The following Records of Decision (RODs) have been issued by the Department for the Northrop Grumman-Bethpage Facility Site and the Naval Weapons Industrial Reserve Plant Site:

- 130003A, Operable Unit 1 on-site soils source area, March 1995;
- 130003A and 130003B, Operable Unit 2 groundwater, March 2001; and
- 130003B, Operable Unit 1 on-site soils source areas, May 1995.

**Site Geology and Hydrogeology:** OU3 is located on the Long Island glacial sand deposits which have been designated as a sole source aquifer. Depth to groundwater (to the Upper Glacial aquifer) is 50 to 55 feet and flow is generally southward. The upper glacial aquifer is underlain by the Magothy aquifer which is the primary source of drinking water. Periodic lower

permeability silty-sand and clay lenses exist throughout the area. Most of these confining layers are not continuous in the area of study.

A site location map is attached as Figure 1.

#### **SECTION 4: LAND USE AND PHYSICAL SETTING**

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to restricted-residential use (which allows for commercial, industrial and active park recreation use) as described in Part 375-1.8(g) are/is being evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

#### **SECTION 5: ENFORCEMENT STATUS**

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Northrop Grumman Systems Corporation  
Department of the Navy  
Town of Oyster Bay

Northrop Grumman Systems (Grumman) signed a Remedial Investigation and Feasibility Study (RI/FS) Order on Consent in July 2005 for the Former Grumman Settling Ponds, or Operable Unit 3 (OU3). Northrop Grumman also signed an RI/FS order on consent for Operable Unit 1 and Operable Unit 2 (OU1 and OU2) in 1989. To date, Grumman has not signed a Remedial Design and Remedial Action (RD/RA) order on consent for OU1 and OU2. The Navy signed a Federal Facilities Site Remediation Agreement in 2005 for implementation of the OU2 remedy. The Town of Oyster Bay is a responsible party for this site as they are the property owner of the Bethpage Community Park. The Town of Oyster Bay did enter into an order for an IRM in July 2005 to investigate and remediate 7 acres of the Bethpage Community Park.

#### **SECTION 6: SITE CONTAMINATION**

##### **6.1: Summary of the Remedial Investigation**

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- air
- groundwater
- soil
- soil vapor; and
- indoor air

#### **6.1.1: Standards, Criteria, and Guidance (SCGs)**

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: [www.dec.ny.gov/regulations/61794.html](http://www.dec.ny.gov/regulations/61794.html).

#### **6.1.2: RI Information**

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified for this Operable Unit at this site is/are:

Trichlorethylene	Tetrachloroethene
1,1,1 Trichloroethane	Toluene
Aviation engine oil	Chlorodifluoromethane (Freon 21)
Chrome Etchant	Dichlorodifluoromethane (Freon 12)
Machine Oil	Chromium
Paint	Cadmium
Paint Solvents	Arsenic
Polychlorinated Biphenyl oil	Freon 113

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- soil

## 6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

The following IRMs were completed at this site during the RI.

### Soil Excavation IRM

The Town of Oyster Bay (TOB) completed the investigation and remediation IRM for 7 of the 12 acres comprising the OU3, or Bethpage Community Park Site. The Town of Oyster Bay addressed soils contamination in those seven acres. This TOB IRM included the excavation and off-site disposal of approximately 175,000 cubic yards of soil contaminated with the chlorinated solvents, PCBs, metals and Freon compounds dichlorodifluoromethane (R-12) and chlorodifluoromethane (R-21) from this area. The excavated materials were replaced with clean soil.

### Grumman Soil Vapor Extraction (SVE) IRM

A SVE system was installed along the southern and western boundary of the site to intercept/contain contamination in the soil vapor emanating from the on-site source areas before they could potentially impact off-site structures. Construction started in November of 2007 and was complete by the end of February 2008. The system went online shortly afterward and has been operating continuously since then.

### Groundwater Pump and Treat/On-site Groundwater Containment System IRM

Grumman installed a groundwater extraction and treatment system along the southern boundary of the Grumman access road to address the off-site migration of contaminated groundwater. This consists of four groundwater extraction wells and treatment on the adjacent McKay Field. The system collects and treats approximately 250 gpm of groundwater extracted from depths between 50 and 75 feet using air stripping as treatment. Construction started in late 2008 and the

system went online in July 2009. This on-site groundwater treatment system has been fully operational since that time.

### **6.3: Summary of Human Exposure Pathways**

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure*.

Since the site is fenced and/or covered by asphalt, concrete or clean fill, people will not come into contact with site-related contaminants in soil unless they dig below the surface. The potential exists for contact with contaminants in soil in limited off-site residential areas. People are not drinking the contaminated groundwater because the area is served by a public water supply that is treated to remove this contamination. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Because there are no on-site buildings, inhalation of site contaminants in indoor air due to soil vapor intrusion does not represent a concern for the site in its current condition. However, the potential exists for the inhalation of site contaminants due to soil vapor intrusion for any future on-site development. Sampling indicates soil vapor intrusion is not a concern for off-site buildings.

### **6.4: Summary of Environmental Assessment**

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water. The OU3 investigation found significant soil, soil vapor, and groundwater contamination at the Site.

Nature and Extent of Contamination: The contaminants of concern in the areas of concern identified in OU3 are as follows:

- PCB Fill Material - PCBs
- Low Permeability Zone - Volatile Organic Compounds (VOCs)
- Rag Pit Disposal Area - VOCs
- Former Grumman Settling Ponds - Chromium and PCBs
- Grumman Access Road - PCBs, chromium and cadmium
- On-site and Off-site Groundwater - VOCs
- Off-site Residential Soil - PCBs and Chromium

Soil: The primary soil contaminants in soil are TCE and its breakdown products, toluene, PCBs, chromium and cadmium. The Sludge Dewatering/Buried Settling Ponds contain chromium and PCB impacted fill materials. The Rag Pit Disposal Area contains chlorinated and non-chlorinated VOCs. The Low Permeability Zone above the water table is impacted mainly with chlorinated

VOCs. The Grumman Access Road soils are impacted with PCBs, chromium, and to a lesser extent, cadmium.

Groundwater: The primary site-related groundwater and soil vapor contaminants is TCE and its breakdown products. The continued off-site migration of impacted groundwater has largely been addressed by the on-site groundwater pump and treatment system IRM. There are also Freon compounds in the groundwater which are not a result of Grumman's historic operations, but attributable to the Park ice rinks. Groundwater migration from the OU3 area has resulted in a significant off-site groundwater plume which has impacted both the Upper Glacial and Magothy Formations. As the OU3 groundwater plume leaves the site, as a distinct plume, it becomes comingled with the larger OU2 Northrop Grumman/NWIRP groundwater plume. While generally comingled at depths of less than 400 feet, the OU3 plume continues deeper than the OU2 plume, extending to a depth of at least 550 feet below ground surface. Within the OU3 plume an area of elevated concentrations, or a "hotspot" plume of VOCs, has been identified approaching the Bethpage Water District No. 4 well field.

Soil Vapor: The on-site soil vapor and associated potential migration of soil vapor impacts to adjacent residences has already been addressed by Grumman through the implementation of the soil vapor extraction (SVE) Interim Remedial Measure (IRM). There are also Freon compounds in the soil vapor which are not a result of Grumman's historic operations.

Residential soils: Several properties just to the south of the Grumman Access Road parcel have also had soil samples taken from the yard areas. These analytical results have identified several homes with soils impacted with PCBs and chromium. Note that these contaminants were also found under the Grumman Access Road and in the Sludge Dewatering/Buried Settling Ponds.

Special Resources Impacted/Threatened: The Long Island Sole Source Aquifer has been impacted with site-related contamination.

## **6.5: Summary of the Remediation Objectives**

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

## **SECTION 7: SUMMARY OF THE SELECTED REMEDY**

To be selected the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the feasibility study (FS) report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The selected remedy is referred to as the remedy. As detailed below, the Department has selected a remedy to address source areas in the OU3 area and the capture and treatment of off-site groundwater hotspot in the OU3 plume. The estimated present worth cost to implement the remedy is \$81,000,000. The cost to construct the remedy is estimated to be \$61,500,000 and the estimated average annual cost is \$1,250,000. The basis for the Department's proposed remedy is set forth at Exhibit D.

The elements of the selected remedy, for the areas shown on Figure 2, are as follows:

1. Implementation of a remedial design program to provide the details necessary for the construction, maintenance and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per NYSDEC Division of Environmental Remediation (DER) Guidance-31. The major green remediation components are as follows:

- considering the environmental impacts of remedy stewardship over the long term;
- reducing direct and indirect greenhouse gas and other emissions;
- increasing energy efficiency and minimizing use of non-renewable energy;
- conserving and efficiently managing resources and materials;
- reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- maximizing habitat value and creating habitat when possible
- fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- preference for the disposition of the treated groundwater will be given for a reuse, such as irrigation of the golf courses at Bethpage State Park.

2. The Former Grumman Settling Ponds area, located in the ball fields and areas adjacent to the ball fields, in the Bethpage Community Park will be excavated to remove PCB contaminated fill from an approximately three acre area. In this area, all soil exceeding 50 ppm for PCBs (approximately 25,000 cubic yards) will be excavated and disposed off-site at a permitted disposal facility. The soil exceeding 50 ppm PCBs is predominantly present between 10 to 20 feet below ground surface (bgs) and the excavation limits will be extended as necessary to attain



the 50 ppm level. Chromium sludge co-located with the PCB impacted soil will be removed to the extent necessary to achieve the PCB removal goals.

The soil from the surface to 10 feet bgs, will be excavated either to achieve the Commissioners Policy (CP 51) on soil cleanup approach for PCBs or as necessary to access the deeper PCB contaminated soil. All other contaminated fill and soil which exceeds the restricted residential use soil cleanup objectives for other contaminants to a depth of 10 feet in the PCB removal area will be excavated and disposed off-site in a permitted facility. The remaining soil in the upper two feet site-wide will either be excavated, covered or a combination of cut and cover used to achieve the 1 ppm SCO for PCBs and/or the applicable restricted residential SCOs for metals or semi-volatile organic compounds to establish a site cover (see 3 below).

The soil excavated in this area which has less than 50 ppm PCBs (approximately 45,000 cubic yards) may be stockpiled for reuse as backfill in the excavation areas deeper than 10 feet in accordance with a plan to be developed during the design. All soil with PCB levels exceeding 50 ppm will be transported off-site to a permitted disposal facility.

3. A site cover will be required to allow for restricted residential use of the Park. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). The soil cover will be placed site wide, including in the area of the recharge basin, Town Pool and playground, as needed to assure restricted residential SCOs in the upper two feet of the OU3 area are achieved.

4. The Grumman Access Road right-of-way area will be excavated to remove PCB and chromium contaminated fill from an approximately 1,000 foot long area beneath and adjacent to the access road. Soil will be removed to achieve 1 ppm in the upper two feet and 10 ppm of PCBs below two feet as well as the restricted residential SCO for chromium in the upper two feet. An estimated 6,000 cubic yards of soil will be removed, for the most part to depths from 0 to 3.5 feet bgs. The soil excavated can also be handled in accordance with the on-site soil reuse plan, as per Item 2 above.

5. The approximately one acre VOC rag pit area source area(s) in a low permeability zone present approximately 40 feet bgs in the Former Grumman Settling Pond Area, will be remediated using an in-situ thermal desorption and soil vapor extraction technology, or an alternate in-situ treatment technology capable of achieving comparable removals may be proposed for approval by the Department. The area to be addressed will be treated to attain the protection of groundwater SCOs for the VOCs present.

6. Residential yards located between Sycamore Avenue and the Grumman Access Road, where design sampling identifies PCB impacts greater than 1 ppm and chromium in excess of the

residential SCO, will be excavated followed by restoration of the yards. The soil excavated can also be handled in accordance with the soil reuse plan, in Item 2 above.

7. The areas to be excavated and backfilled, with the exception of the Grumman Settling Pond Area subject to the on-site soil management plan, will be backfilled with fill material brought to the site which meets the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). Excavated areas will be graded and restored to pre-excavation conditions, unless an alternative restoration is agreed to with the property owner.

8. The existing groundwater extraction and treatment interim remedial measure (IRM) will continue to be operated and upgraded as necessary, based on a review of its effectiveness, to assure the capture/containment of the full depth and area of contaminated groundwater leaving the Site. Additional extraction wells will be installed as needed to ensure the containment of the full depth of the area of contaminated groundwater leaving the site. The treatment capacity will be upgraded as needed to treat any increased ground water extracted to ensure that the discharge meets applicable standards, criteria and guidance (SCGs).

9. Operation of the existing IRM soil vapor extraction and treatment system in place along the Grumman Access Road will continue, to prevent migration of contaminated soil vapor.

10. One or more groundwater extraction well(s) along with the necessary treatment will be installed in the groundwater plume emanating from OU3 (the exact number to be determined during the design phase). The wells will be located downgradient of the area(s) of elevated contaminant levels identified upgradient of Bethpage Water District Plant 4. This system will be designed to capture and treat the "hot spot" area of the plume to the extent practicable, at a minimum, capturing and treating 90 percent of the mass of groundwater migrating from the elevated "hotspot area" (the recommendation by the Technical Team for Optimization of the Bethpage Plume Remedy in their June 15, 20 report prepared for the U.S. Navy). Considerations may be given to the use of Bethpage Water District facilities for all or part of treatment system. Additional monitoring wells will also be installed and monitored to allow completion of a three dimensional delineation of the leading edge of the OU3 plume and an assessment as to whether the remedy for the contaminated groundwater in this area needs to be further evaluated. This delineation and any subsequent evaluation to determine whether further remedial actions are needed are expected to be conducted in approximately 18-24 months.

11. The Wellhead Treatment Contingency Plan put in place as a requirement of the OU2 ROD will remain in place. Nothing in this decision should be considered as affecting any review of the Wellhead Treatment Contingency Plan that may be conducted by the Department or other interested agencies and parties.

12. Imposition of an institutional control in the form of an environmental easement for the OU3 area that will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential, as

- defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or County DOH;
- prohibit the raising of dairy cattle as per 6 NYCRR Part 375 or vegetable gardens on the controlled property; and
- require compliance with the Department approved Site Management Plan;

13. A Site Management Plan is required, which includes the following:

(a) An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 12 above.

Engineering Controls: The site cover discussed in paragraph 3, the continued operation of the on-site ground water containment pump and treat system and the soil vapor extraction (SVS) system described in paragraphs 8 & 9 and treatment of the elevated groundwater hot spot off-site described in paragraph 10.

This site management plan includes, but may not be limited to:

- an excavation plan which details, if necessary, the provisions for management of future excavations in areas of remaining contamination;
- a description of the provisions of the environmental easement including any land use, groundwater and/or surface water use restrictions;
- provision for evaluation of the potential for soil vapor intrusion, if necessary once remediation is complete, for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls;

(b) A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- the on-site pump and treat system, off-site pump and treat system, the SVE system and any plume migration beyond the off-site treatment area that becomes part of the OU2 plume;
- monitoring of groundwater and soil vapor to assess the performance and effectiveness of the remedy. Sampling and analysis for PCBs and chromium will be added to the groundwater monitoring program;
- monitoring for vapor intrusion for any buildings occupied or developed on the site, as may be required pursuant to the site management plan;
- additional sampling and/or monitoring well installation, as necessary, along the eastern boundary to better define the lateral extent of groundwater contamination.

(c) An Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting with respect to any mechanical or physical components of the remedy. The plan will include, but will not be limited to:

- the on-site and off-site pump and treat systems;
- the SVE system;
- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting; maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

## **Exhibit A**

### **Nature and Extent of Contamination**

This exhibit describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1.2, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable standards, criteria, and guidance values (SCGs) for the site. The contaminants are arranged into five categories; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals and cyanide. For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the appropriate restricted use SCGs identified in Section 6.1.1 are also presented.

This exhibit identifies the wastes found in OU3 and is followed by environmental media, the individual contaminants in each environmental media that are associated with the disposal and/or operations identified at the site. Each media discussion includes a table that compares the site data to the appropriate Unrestricted SCGs for that medium. In addition, the soil tables include a comparison of the analytical data to the appropriate Restricted SCO found in Part 375-6.8(b) for each individual contaminant.

### **Waste and/or Source Areas**

As described in the RI report, waste disposal and/or source areas were identified at the Former Grumman Settling Ponds, Operable Unit No. 3 (OU3), (hereafter the "site" for purposes of this document) that are impacting soil, groundwater and soil vapor. Wastes are defined in 6 NYCRR Part 375-1.2 and include solid, industrial and/or hazardous wastes. Source areas are also defined in 6 NYCRR Part 375. Source areas are locations of concern at a site where substantial quantities of contaminants are found which can migrate in that medium and/or release significant levels of contaminants to another environmental medium. Both waste/source materials and source areas are present on OU3 (see Figure 2). The wastes disposed at this site include:

- paint, coating materials and oily wastes;
- PCBs and/or PCB impacted soils;
- chromium laden sludge;
- cadmium and, to a lesser extent, arsenic;
- chlorinated and non-chlorinated solvents; and
- semi-volatile organic compounds.

The waste disposal in OU3 has resulted in the identification of eight areas of concern (AOC), related to waste disposal or soil contamination:

- PCB Fill Material
- Low Permeability Zone (LPZ)
- Rag Pit Disposal
- Former Grumman Settling Ponds
- Grumman Access Road

- On-site Groundwater
- Off-site Groundwater
- Off-site Residential Soil-PCBs

The following areas of concern are the primary source areas to the on and off-site groundwater plume:

- the former solvent soaked rag disposal pit area;
- the lower permeability zone (LPZ) located on-site, approximately 45 feet below ground surface (bgs), which has collected solvents on their downward migration and is now acting as a continuing source of VOCs to the aquifer;
- the waste disposal in OU3 has resulted in the identification of two areas of concern (AOC), related to groundwater contamination: on-site groundwater and off-site groundwater.

Some of the impacts to soil vapor and groundwater from the former rag pit disposal area and the lower permeability zone have been addressed by the IRM(s) described in Section 6.2 of this document. The remaining waste/source area(s) identified during the RI for OU3 are addressed in the remedy selection process. The on-site source areas impacts to the groundwater, soil and soil vapor are described below.

### **Groundwater**

On- Site Groundwater: The groundwater table at the site is located at a depth ranging from 50 to 55 feet below ground surface (bgs) in the Upper Glacial Formation. The groundwater flow direction is primarily horizontal with a downward component to the south-southeast in and around OU3. Contamination in the on-site groundwater exceeds SCGs for the chlorinated VOCs: trichloroethene (TCE), cis-1, 2 dichloroethene (cis-1, 2-DCE), dichloroethane (DCA), vinyl chloride; as well as aromatic hydrocarbon VOCs such as toluene, and to a lesser extent xylene, ethyl benzene and benzene (see Figure 3). In addition, a source of dichlorofluoromethane (Freon-22) and dichlorodifluoromethane (Freon-12), not attributable to operations at the Northrop Grumman facility but resulting from the operation of the two former Town of Oyster Bay ice skating rinks located east of OU3, is contributing to the groundwater contamination at the site. The Freon plume emanating from the ice rinks is comingled with OU3 related VOCs. This contamination is anticipated to be addressed by the Town of Oyster Bay under the Brownfield Cleanup Program. The on-site groundwater just south of the Former Grumman Settling Ponds also exceeds the SCG for total chromium. Impacted on-site groundwater is found as deep as 150 feet bgs. All of the shallow groundwater, and a majority of the deeper VOC-contaminated groundwater, is being captured by the existing groundwater pump and treat system IRM (see Figure 4), described in more detail in Section 6.2.

A highly contaminated area of perched groundwater which lies above a zone of low permeability soil has been delineated as an area of concern beneath a portion of OU3. This lower permeability zone soil and the perched groundwater above it come in contact with, and add to the contamination in, the shallow groundwater due in part to seasonal variation in the water table. As groundwater flows south-southeast past and beyond the Park boundary, the OU3 plume becomes commingled with the area-wide groundwater solvent plume from the OU2 portion of the Northrop Grumman Systems and Naval Weapons Industrial Reserve Plant sites.

**Table 1 – On-Site Groundwater**

<b>Detected Constituents</b>	<b>Concentration Range Detected<sup>a</sup></b>	<b>SCG<sup>b</sup></b>	<b>Frequency Exceeding SCG /Total Number of Samples</b>
<b>VOCs</b>			
1,1,1 Trichloroethane	BD-5	1	4 / 296
1,1,2-Trichloroethane	BD-4	5	45 / 296
1,1,-Dichloroethane	BD-110	5	24 / 296
1,1,Dichloroethene	BD- 83	0.6	24 / 296
1,2-Dichloroethane	BD-8.8	1	12 / 96
1,2-Dichloropropane	BD-14	50	13 / 296
Acetone	BD- 52	1	1 / 296
Benzene	BD-5	1	4 / 296
Chlorodifluoromethane (Freon-21)	BD-220	5	10 / 296
Carbon Tetrachloride	BD-8	5	1 / 296
Chloroform	BD-110	7	48 / 296
Chlorimethane	BD-240	5	1 / 296
Cis-1,2-Dichloroethene	BD- 83	5	162 / 296
Ethylbenzene	BD-510	5	5 / 296
Methylene Chloride	BD-8	5	1 / 296
Styrene	BD- 6	5	1 / 296
Toluene	BD-84,000	5	25 / 296
Trans-1,2-dichloroethene	BD-95	5	12 / 296
Trans- 1,3-dichloropropene	BD- 2	0.4	1 / 296
Trichloroethelyene	BD- 2,700	5	182 / 296
Vinyl Chloride	BD- 5,900	5	28 / 296
Xylenes, m,p	BD-300	10	3 / 33
<b>SVOCs</b>			
4-Methyl-Phenol	BD- 120		2 / 64
Bis(2-chloroethyl)ether	BD- 2	1	1 / 64
Bis(2-ethylhexyl)phalate	BD-100	5	2 / 64
Napthalene	BD-13	10	1 / 66
Phenol	BD-66	1	14 / 64
<b>Metals</b>			
Arsenic	BD- 49.2	25	2 / 64
Beryllium	BD- 5.9	3	1 / 40
Chromium	BD-729	50	5 / 40
Iron	28.8- 37,000	300	25 / 38
Lead	BD- 111	25	1 / 40
Manganese	BD-782	300	3 / 38

a –All values in parts per billion (ppb), which is equivalent to micrograms per liter, (ug/L), in water.

b- SCG: Standard Criteria or Guidance – Based on Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

BD = below detection

**Off-Site Groundwater:** Groundwater migration from OU3 has resulted in a significant and discernible off-site groundwater plume, which has impacted both the Upper Glacial and Magothy Formations. While the OU3 groundwater plume leaves the site as a distinct plume it soon becomes comingled with the OU2 groundwater plume, as shown on Figures 5 and 6. While generally comingled at depths of less than 400 feet bgs, the OU3 plume continues deeper than the OU2 plume, extending to a depth of at least 550 feet bgs. The OU3 plume, within the area-wide OU2 plume, is deeper, narrower, varied in width and is more concentrated. This plume has VOC levels ranging from 5 ppb to 10 ppm, and extends approximately 5,400 feet downgradient of the Park boundary. Within the off-site OU3 plume an elevated, or “hot spot” area of VOCs, has been identified which is characterized by elevated levels of TCE (9,100 ug/l) and the breakdown product DCE (3,400 ug/l). This hot spot is presently located approximately 2,500 feet upgradient of, and approaching, the Bethpage Water District No. 4 well field. In addition, the off-site groundwater is impacted by the Freon plume from the former Town of Oyster Bay ice skating rinks.

**Table 2 - Off-site Groundwater**

Detected Constituents	Concentration Range Detected <sup>a</sup>	SCG <sup>b</sup>	# of Samples Exceeding SCG/ Total # of Samples
<b>VOCs</b>			
1,1,1-Trichloroethane	BD - 110	10	10 / 822
1,1,2-Trichloroethane	BD - 5	1	3 / 822
1,1-Dichloroethane	BD - 64	5	74 / 819
1,1-Dichloroethene	BD - 110	5	38 / 822
1,2-Dichloroethane	BD - 27	0.6	42 / 822
1,2-Dichloropropane	BD - 5	1	7 / 822
Chloroform	BD - 45	7	30 / 822
cis-1,2-dichloroethene	BD - 3,400		177 / 779
Dichlorofluoromethane (Freon 21)	BD - 9.6	5	20 / 179
Dichlorodifluoromethane (Freon 12)	BD - 13	5	4 / 647
Tetrachloroethene	BD - 620	0.7	106 / 822
Toluene	BD - 21	5	11 / 779
trans-1,2-dichloroethene	BD - 43	5	11 / 779
Trichloroethylene	BD - 9,100	5	363 / 822
Trichlorotrifluoroethane (Freon 113)	BD - 10	5	14 / 806
Vinyl Chloride	BD - 55	0.3	37 / 822
<b>Metals</b>			
Chromium	BD - 875	50	29 / 57
Iron	BD - 3,440	300	2 / 3
Nickel	BD - 442	100	1 / 2

a -All values in parts per billion (ppb), which is equivalent to micrograms per liter,( ug/L), in water.

b - SCG: Standard Criteria or Guidance – Based on Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).  
BD = below detection



Based on the findings of the RI, the disposal of hazardous waste has resulted in the contamination of on-site and off-site groundwater. The VOCs and inorganic site contaminants that are considered to be the primary contaminants of concern that will drive the remediation of on- and off-site groundwater to be addressed by the remedy selection process are: tetrachloroethene, trichloroethene, cis-1,2 dichloroethene, vinyl chloride, dichlorodifluoromethane (R-12), dichlorofluoromethane (R-22), as well as the aromatic hydrocarbon VOCs such as toluene, and to a lesser extent xylene, ethyl benzene and benzene and chromium.

## Soil

Subsurface soil in the PCB Fill Material, Low Permeability Zone, Rag Pit Disposal and Sludge Dewatering/Buried Settling Ponds AOCs identified above (also see Figure 2) have been impacted with TCE, PCE, DCE, toluene, xylene, and Freon. The former sludge drying beds are located mainly in the ball-field area in the southwest corner of the Park. The unsaturated zone subsurface deposits in this area consist mostly of PCB contaminated mixed fill materials underlain primarily by glacial sand deposits. The nature and extent of these contaminants for on-site soils is the PCB-contaminated fill along with chromium in the former settling ponds and the surrounding area.

The former rag pit area (see Figure 2) is highly impacted with chlorinated and non-chlorinated solvents. Spent paint, coating materials, waste rags and machine oil were buried in this area. Additionally, the low permeability zone that contains silts and clays has also been highly impacted with site-related VOC contamination including TCE, PCE, DCE, toluene and xylene.

Surface and subsurface soil in the Grumman Access Road located to the south and west of the Bethpage Community Park has been impacted mainly with PCBs, chromium and, to a less extent, cadmium. A number of rounds of sampling have delineated the extent of this contamination on the access road parcels.

Additionally, soil samples from private properties located to the south of the Grumman Access Road AOC have identified several properties (the Off-site Residential Soil-PCBs AOC) with PCB levels greater than 1 ppm in surface and subsurface soil. Results were also compared to the 6 NYCRR Part 375 unrestricted use soil clean up criteria which indicated low level chromium impacts.

Based on the findings of the Remedial Investigation, six site-related contaminant areas of concern in soil have been identified. Site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are: chlorinated and non-chlorinated solvents, chromium, cadmium, semi-volatile organic compounds and PCBs. The majority of soil contamination is in the area of the former settling ponds and the former rag pit disposal area found under the ball-field, with the former rag pit disposal area impacted with chlorinated and non-chlorinated solvents and highly impacted fill materials containing mainly PCBs and chromium. A large volume of soil contamination including TCE, DCE, toluene, xylene, Freon, SVOCs, inorganics and PCBs, was identified during the RI, primarily in the parking lot located to the east of the ball fields, was addressed by the IRM described in Section 6.2.

**Table - 3 Soil Sample Results**

<b>Detected Constituents</b>	<b>Concentration Range Detected <sup>a</sup></b>	<b>SCG<sup>b,d</sup> Unrestricted Use</b>	<b>SCG<sup>c</sup> Restricted Residential</b>	<b>Frequency Exceeding SCG/ Total Number of Samples</b>
<b>VOCs</b>				
Cis 1,2-Dichloroethene	BD-,300,000	270	100,000	6 / 866
Ethylbenzene	BD- 220,000	1,000	41,000	23 / 866
Toluene	BD- 8,200,000	700	100,000	23 / 866
Trichloroethene	BD- 8, 200,000	470	21,000	11 / 866
Vinyl Chloride	BD- 30,000	20	900	5 / 866
Xylene (Total)	BD-230,000	260	100,000	8 / 551
p-Xylene	BD- 110,000	260	100,000	1 / 234
o-Xylene	BD-140,000	260	100,000	2 / 620
Xylene-m,p	BD- 350,000	260	100,000	5 / 386
<b>SVOCs</b>				
Benzo(a)anthracene	BD-30, 000	N/A	1,000	57 / 492
Benzo(a)pyrene	BD- 23,000	N/A	1,000	13 / 492
Benzo(b)fluoranthene	BD- 32,000	N/A	1,000	70 / 492
Benzo(k)fluoranthene	BD- 15,000	N/A	3,900	7 / 492
Chrysene	BD-35,000	N/A	3,900	13 / 492
Dibenzo(a,h)anthracene	BD- 6,200	N/A	330	17 / 492
Indeno(1,2,3-cd)pyrene	BD- 9,500	N/A	500	43 / 492
Pentachlorophenol	BD- 11,500	N/A	6,700	2 / 405
<b>Metals</b>				
Arsenic	BD-1,000,000	N/A	16,000	12 / 338
Barium	BD-735,000	N/A	400,000	1 / 338
Cadmium	BD-2,400,000	N/A	4,300	157 / 642
Chromium	BD- 50,400,000	30,000	110,000	187 / 830
Copper	BD- 1,420,000	N/A	270,000	3 / 69
<b>Pesticides/PCBs</b>				
PCBs (Total)	BD- 3,400,000	N/A	1,000	36 / 1,345

a - All concentrations are in parts per billion (ppb), which can be converted to milligrams per kilogram (mg/kg) in soil by dividing by 1,000;

b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.

c - SCG: Part 375-6.8(b), Restricted Residential Use Soil Cleanup Objectives for the Protection of Public Health, unless otherwise noted.

d - SCG: Part 375-6.8(b), Unrestricted Use Soil Cleanup Objectives for the Protection of Groundwater.

## Soil Vapor

The potential for soil vapor intrusion resulting from the presence of site-related soil or groundwater volatile organic compound contamination was evaluated during the RI. Soil vapor sampling was initially conducted to determine the nature and extent of soil vapor contamination on-site, along the Grumman Access Road, Sycamore Avenue and adjacent numbered side streets. The results of these soil vapor samples for field screening (see Figure 7) then led to the collection of sub-slab soil vapor, indoor air and outdoor air samples used to evaluate the potential for soil vapor intrusion to impact indoor air. Based on the sampling results, in comparison with the NYSDOH Soil Vapor Intrusion Guidance, no site-related soil vapor contamination of concern was identified in the off-site areas evaluated, and impacts to indoor air are not occurring. Therefore, no further action was necessary for off-site residential properties.

Based on the findings of the RI, the soil gas analytical results indicated trichloroethylene (TCE), dichlorethene and toluene were present in soil gas at elevated levels on-site. Soil vapor contamination on the site identified during the RI was addressed during the IRM described in Section 6.2 (see Figure 8).

## Exhibit B

### Description of Remedial Alternatives

The alternatives described in this proposed plan were assembled to address the various media impacted by the site-related contamination identified for OU3. Each of the five alternatives presented include one option from the remedial technologies evaluated for each media.

The remedial technologies evaluated in the On-site (Site Area) and Off-site (Study Area) Feasibility Studies were assembled by the Department into five alternatives, based on the results from the On-site and Off-site RIs, information generated during the IRMs, technical review by the Department, and the screening and detailed analysis of remedial technologies described in the FS reports. The soil and groundwater alternatives will address the eight AOCs which are the PCB Fill Materials, low permeability zone, Rag Pit Disposal Area, Sludge Dewatering/Buried Settling Ponds, Grumman Access Road, properties south of the Grumman Access Road, on-site groundwater and off-site groundwater, as set forth in the table below.

	Soil Remedial Alternatives	No Further Action	Capping	Partial Excavation	Substantial Excavation	Complete Excavation	Thermal Desorption w/ Soil Vapor Extraction
	<b>Soil Areas of Concern (AOCs)</b>						
<b>Areas of Concern</b>	<b>PCB Fill Material</b>	Alternatives 1 & 2	Alternative 4	Alternative 4	Alternative 5	Alternative 3	NA
	<b>Low Permeability Zone</b>	Alternatives 1 & 2	NA	NA	NA	NA	Alternative 3,4 & 5
	<b>Rag Pit Disposal</b>	Alternatives 1 & 2	NA	NA	NA	NA	Alternative 3,4 & 5
	<b>Former Grumman Settling Ponds</b>	Alternatives 1 & 2	Alternative 4	NA	Alternative 5	Alternative 3	NA
	<b>Grumman Access Road</b>	Alternatives 1 & 2	Alternative 4	Alternative 4	Alternative 5	Alternative 3	NA
	<b>Adjacent Properties</b>	Alternatives 1 & 2	NA	NA	NA	Alternatives 3,4 & 5	NA
	<b>Groundwater Remedial Alternatives</b>	<b>No Further Action</b>	<b>Partial Removal</b>	<b>Substantial Removal<sup>1</sup></b>	<b>Substantial Containment<sup>2</sup></b>	<b>Complete Containment</b>	<b>Wellhead Treatment Upgrades<sup>3</sup></b>
	<b>Groundwater AOCs</b>						
	<b>On-site (Site Area) Groundwater</b>	Alternatives 1 & 2	NA	N/A	N/A	Alternative 3, 4 & 5	Alternatives 3, 4 & 5
	<b>Off-site (Study Area) Groundwater</b>	Alternatives 1 & 2	Alternative 4	Alternatives 5	Alternative 3	N/A	Alternatives 3, 4 & 5

NA = Not Applicable

<sup>1</sup>Substantial Removal: Highly Impacted Off-site Groundwater Removal and Treatment with a minimum 90 Percent Mass Removal Goal from the hot spot (greater to the extent practicable)

<sup>2</sup>Substantial Containment: Goal, to the extent practicable, of preventing off-site migration of 100 Percent of Groundwater Contamination

<sup>3</sup>Wellhead Treatment Upgrades Acknowledges the Wellhead Treatment Contingency Plan of Operable Unit 2.

<sup>4</sup>Excavation if required based on sampling

### Common Elements

With the exception of Alternatives 1 and 2, the following common elements are included in all of the other alternatives being evaluated:

- evaluate and upgrade, if necessary, the current on-site pump and treat system to achieve complete containment at the downgradient edge of the site of all impacted groundwater above groundwater standards;
- maintain the soil vapor extraction IRM on-site and in the Grumman Access Road along the south and west sides of the Park;
- remove, as required based on sampling, site-related contamination from the recharge basin in the Park;
- excavate and/or apply a soil cover as necessary such that the top two feet of all areas of the Park will meet restricted residential Soil Cleanup Objectives;
- excavation, based on sampling, of PCBs present above 1 ppm in the soil of the adjacent properties. All other Park contaminated fill and soils above restricted residential use to 10 feet shall be excavated or restricted, depending on concentrations;
- areas exceeding the restricted residential SCOs will have a site cover. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed site wide, including in the area of the recharge basins, Town Pool and playground, as needed to assure restricted residential SCOs in the upper two feet of the OU3 area are achieved;
- the Wellhead Treatment Contingency Plan put in place as a requirement of the OU2 ROD will remain in place and will be applicable for any impacts attributable, in whole or in part, to the OU3 off-site groundwater plume. This includes continued implementation of the wellhead treatment upgrades, as necessary, for Bethpage Water District Plants 4, 5 and 6;
- treatment of the VOCs in the LPZ and Rag Pit AOC(s) with in-situ thermal desorption and soil vapor extraction to prevent further impacts to the groundwater;
- additional wells will be installed and monitored to complete a three dimensional delineation of the leading edge of the OU3 plume. This information will be utilized to assess whether the remedy for the contaminated groundwater in this area needs to be re-evaluated. It is anticipated that this delineation would be completed within approximately 18 months. If re-evaluation is needed, it will be completed and a revised remedy proposed within an estimated 12 months.
- require a Site Management Plan (SMP) for management of the on- and off- site elements of the remedy; and
- an institutional control (IC) in the form of an environmental easement placed on the site to restrict use of the site and groundwater under the site and to implement the Site Management Plan (SMP).

### Description of Common Element Technologies

Soil vapor extraction (SVE) is an in-situ technology used to treat volatile organic compounds (VOCs) in the soil. The process physically removes contaminants from the soil by applying a vacuum to a well that has been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells is then treated by activated carbon or other air treatment process, as applicable, to remove the VOCs before the air before discharge to the atmosphere.

In-situ thermal desorption (ISTD) uses various approaches to heat the subsurface soil to remove VOCs. The VOCs are forced into the vapor phase and then removed by the SVE described above.

A pump and treat system involves the installation of groundwater extraction wells to prevent migration and remove contaminated groundwater and the associated piping, groundwater pumps as well as treatment system for the extracted water and, if necessary, for the air stream. The design of a pump and treatment system must incorporate the geology and aquifer hydrology in order to optimize the pump and treat system as well as identify a point of discharge for the treated water.

### **Remedial Alternatives for OU3**

#### **Alternative 1: No Further Action**

The No Further Action Alternative recognizes the remediation of the site completed to date by the IRM(s) described in Section 6.2 of the ROD. This alternative leaves the site in its present condition, turns off the pump and treat and SVE systems that were installed as IRMs and does not provide any additional protection of the environment and public health. No additional capital costs are associated with this alternative.

#### **Alternative 2: Site Management**

The Site Management Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 6.2 with continued operation of the groundwater pump and treat and SVE system IRMs. Site management, engineering and institutional controls are necessary to continue the effectiveness of the IRM. This alternative maintains engineering controls which were part of the IRMs and includes institutional controls, in the form of an environmental easement and site management plan, as part of the objective to protect public health and the environment from contamination remaining at the site after the IRMs.

Present Worth Total: \$10,450,000  
Capital Cost: None  
Annual Costs Total: \$650,000

#### **Alternative 3: Restoration to Pre-Disposal Conditions, to the Extent Practicable**

Alternative 3 would achieve all of the SCGs discussed in Section 6.1.1 and Exhibit A, with soil meeting the restricted residential use soil cleanup objectives listed in Part 375-6.8 (b). This alternative would include:

- complete excavation of all contaminated fill soils in OU3 on-site AOCs and in the AOCs for Properties south of the Grumman Access Road above unrestricted use SCOs;
- removal of PCB impacted soil from the Grumman Access Road as per NYSDEC Commissioner Policy 51;
- maximization of off-site groundwater pump and treat system, to the extent practicable to all areas of the OU3 plume above groundwater standards; and
- the common elements.

This remedy will have an annual cost to continue to operate the groundwater remedial systems. The time to implement this remedy would be approximately 24 months.

Present Worth: \$194,000,000  
Capital Cost: \$189,500,000  
Annual Costs: \$ 3,500,000

**Alternative 4: Capping OU3 and Grumman Access Road Soils, Off-site Elevated Groundwater Collection and treatment.**

This alternative includes:

- a soil cap of all contaminated fill soils for OU3 on-site;
- a single recovery well with treatment at the off-site hot spot area for elevated groundwater contamination removal;
- a cap on soils in the Grumman Access Road above unrestricted residential use; and
- the common elements.

The time to implement this remedy would be about 18 months.

Present Worth:       \$ 58,000,000  
Capital Cost:         \$ 40,250,000  
Annual Costs:         \$ 1,100,000

**Alternative 5: Excavation and Off-site Disposal of OU3 On-site Soils, Removal of Hazardous Waste Levels of PCB impacted soils, Excavation of Grumman Access Road Soils and Off-site Hot Spot Mass Removal Groundwater Collection and Treatment.**

This alternative would include:

- excavation of all contaminated fill and soils in the OU3 On-site AOCs above restricted residential use to 10 feet to allow for utility installation, potential future use and other types of construction, removal of soil with PCBs concentrations of 50 ppm or greater, which are located primarily in the OU3 On-site AOCs (see Figure 2);
- removal of PCB impacted soil from the Grumman Access Road to achieve PCB levels of 1 ppm in the upper two feet and 10 ppm at depth;
- maximize the off-site hot spot (see Figure 10) groundwater pump and treatment system to the extent practicable, per the recommendation by the Technical Team for the Optimization of the Bethpage Plume Remedy in their June 15, 2011 report entitled “Remedy Optimization Team Report for the Bethpage Groundwater Plume” remedy that 90 percent mass removal be applied to the hot spot;
- consideration will be given to utilizing the Bethpage Water District Plant 4 wells and treatment system should a replacement public water supply be available to the District; preference will also be given for green use disposition of the treated water such as golf course irrigation at the Bethpage State Park; and
- the common elements.

The time to implement this remedy would be about 24 months.

Present Worth:       \$81,000,000  
Capital Cost:         \$61,500,000  
Annual Costs:         \$ 1,250,000

## Exhibit C

### Remedial Alternative Costs

<b>Remedial Alternative</b>	<b>Capital Cost (\$)</b>	<b>Annual Costs (\$)</b>	<b>Total Present Worth (\$)</b>
Alternative 1	\$0	\$0	\$0
Alternative 2	\$0	\$ 650,000	\$10,450,000
Alternative 3	\$189,000,000	\$3,500,000	\$194,000,000
Alternative 4	\$40,250,000	\$1,100,000	\$58,000,000
Alternative 5	\$61,500,000	\$1,250,000	\$81,000,000



## Exhibit D

### SUMMARY OF THE SELECTED REMEDY

Basis for Selection: The selected remedy, Alternative 5, is based on the results of the RI and the evaluation of alternatives. Alternative 5 has been selected because, as described below, it satisfies the threshold criteria and provides the best overall response to achieving the primary balancing criteria. Implementation of this remedy will achieve the remediation goals for the site by:

- restoring soils of OU3 and adjacent areas contained within the Bethpage Community Park to restricted residential use to a minimum of 10 feet;
- removing the soil where levels of PCBs exceed 50 ppm within all AOCs;
- removing chromium sludge source areas are co-located with the PCB impacted soils;
- removing all other contaminated fill and soils above restricted residential use to 10 feet in the PCB removal area;
- implementation of an institutional control in the form of an environmental easement;
- treatment of soils above the Low Permeability Zone (LPZ) and former rag pit source area(s);
- achieving the restricted residential SCOs in the upper two feet of soil in the OU3 area by installation of a cover, by removal, or a combination of removal or cover for the soil that exceeds the SCOs.
- elimination the off-site migration of contaminated groundwater;
- continuing the Wellhead Treatment Contingency Plan significantly remove site source areas; and
- allowing for the attainment of remedial goals for this site in a cost effective manner.

The elements of this remedy are described in Section 7. The selected remedy is depicted in Figures 9 and 10.

Protection of Public Health and the Environment: Alternative 1, the “No Further Action” Alternative, is not protective of public health or the environment since it would discontinue the existing controls on groundwater and soil vapor migration thus decreasing, rather than achieving, protection of public health and the environment. Accordingly, Alternative 1 has been dropped from further consideration as it makes the current situation worse. Alternative 2 would not address the plume of contaminated groundwater downgradient of the Park and the AOCs which are the source of the groundwater contamination. This alternative would also leave PCB contaminated soil accessible to the public and the environment both on and off the OU3 area. Alternative 3 would offer the greatest protection of public health and the environment based on restoration of the site to predisposal conditions. Alternatives 4 and 5 are protective of public health and the environment since they prevent exposure by a combination of providing clean soil cover, removing contaminated soil and addressing impacts to the groundwater. Alternative 5 has the best balance of protection of public health with substantial site restoration and off-site remediation, consistent with the OU2 remedy. Alternative 4 is somewhat less protective than Alternative 5 since it leaves more contaminants in place and thus relies more on institutional and engineering controls. Alternative 2 offers the least protection of public health and the environment with no site restoration, only continued operation of the on-site IRMs.

Compliance with New York State Standards, Criteria, and Guidance (SCGs): The SCGs that were used to evaluate the alternatives are those related to soil, groundwater and soil vapor intrusion. Alternative 2 includes the continued operation of the previously installed SVE and on-site groundwater extraction and treatment systems, but calls for no additional actions to address hazardous waste impacts to the soil and groundwater on or off the site. Alternative 3, by completely removing soil contaminated above the unrestricted soil cleanup objectives, meets the threshold criteria compliance with SCGs. Alternatives 3, 4 and 5 also comply with these

criteria, but to a lesser degree as all three would require permanent restrictions. Alternatives 3, 4 and 5 will not reduce groundwater contamination to groundwater standards immediately but by addressing the sources of the contamination will allow eventual compliance, with the use of institutional controls limiting the use of groundwater in the interim, unless properly treated. Since Alternative 2 will do nothing further for off-site groundwater to achieve compliance with SCGs it will not be carried forward. Since Alternatives 3, 4, and 5 satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the site.

Short-term Impacts and Effectiveness: Alternatives 3 through 5 all would have short-term impacts which could be readily controlled with available technology(s) or engineering controls. However, Alternative 4 would have the least short-term impact(s) as it involves the least amount of excavation and less off-site groundwater remediation system construction, that would involve short-term impacts to local residents. Alternative 3 would have the most potential for short-term impact due to the much larger volumes of material to be excavated, resulting in additional time during which needed engineering controls or control technologies would be required, as well as the significant increase in truck traffic to and from the site. f

There are increased short-term impacts due to the greater difficulty of constructing the ull containment groundwater system which would be located in a densely populated area with significant short-term impacts. This includes the number of groundwater extraction wells, pipelines, treatment system(s) and points of discharge. All this would be occurring within highly developed residential areas which would present a number of short term impact issues.

The potential risks to the community, workers, and environment that would result from carrying out of the excavation options and soil removal in Alternatives 3, 4 and 5. These risks would be controlled with the appropriate health and safety measures and proper engineering controls. Regarding the short-term impacts for soils remediation, Alternative 3 has the highest potential short-term impacts and would take the longest to implement, followed by Alternatives 5 and 4.

Long-term Effectiveness and Permanence: Long-term effectiveness and permanence are best accomplished by those alternatives involving excavation of the contaminated soils, and restoration of the aquifer, to the extent practicable. Among these alternatives, the time needed to achieve the remediation goals is the shortest for Alternative 4 and longest for Alternative 3. Alternatives 3, 4 and 5 rely upon containment at the site with the solvent source area removal via in-situ thermal desorption in order to restore groundwater immediately down gradient to pre-disposal conditions. Therefore, for on-site groundwater, alternatives 3, 4 and 5 all offer the same degree of permanence.

For off-site groundwater, Alternative 3 offers the closest to complete groundwater remediation. However, it is not possible to contain completely the OU3 plume that lies within the overall OU2 plume boundary. Alternative 3 is followed by Alternative 5 and then Alternative 4 for permanence for off-site groundwater.

Reduction of Toxicity, Mobility or Volume: Alternative 3, which includes complete excavation and off-site disposal, would reduce the toxicity, mobility and volume of on-site contaminated soil to the greatest degree, followed closely by Alternative 5 with a removal of between 65,000 to 70,000 cubic yards of contaminated soil, with a significantly lesser degree by Alternative 4 where only about 3,000 cubic yards of contaminated soil would be removed. Alternative 4 relies on a cover for the majority of the contamination on-site, thus not significantly reducing the toxicity or volume of contamination, but controlling the mobility at the surface. Only Alternative 3 permanently and completely eliminates the toxicity of the contaminated site soils. Alternative 5 removes less volume than Alternative 3 but more than Alternative 4. Alternative 3 removes significant volumes of hazardous waste in the form of PCBs from the site.

Alternatives 3, 4 and 5 all address the on-site VOC source area(s) and thus reduce the toxicity, mobility of contaminants to the on-site and off-site groundwater. Alternative 3 would reduce the toxicity, mobility and volume more than Alternative 5, which would do so more than Alternative 4. However, the off-site groundwater component under Alternative 3, as discussed in the next section, is not readily implementable. Alternative 5 would remove most of the significant off-site groundwater contamination.

Implementability: For the site area soils remedial work, Alternative 4 is the most implementable based on the least amount of remedial construction, followed by Alternative 5. Alternative 3 would be least implementable as this alternative requires substantially more remedial construction within residential areas. Alternative 3 also requires the most time to implement for the site area remedial work.

The groundwater remedies offer similar degrees of implementability for the on-site groundwater and differing degrees of implementability for the off-site groundwater. The on-site portion of groundwater is mostly in place for Alternatives 3, 4 and 5. Alternatives 3, 4 and 5 all pose a similar degree of difficulty for the on-site groundwater to implement due to the same LPZ component and scope of work. Regarding the off-site groundwater component, Alternative 4 (with only one recovery well to address the off-site hot spot area to address the off-site hot spot area) is most implementable, followed by Alternative 5 which includes additional recovery wells, the exact number to be determined during design with a goal to remove all of the contaminant mass from the off-site hot spot area to the extent practicable. Alternative 3 would attempt to completely remediate the entire OU3 groundwater plume. Since most of the OU3 plume is enveloped in the greater OU2 groundwater plume, this may not be feasible to measure.

There is a greater degree of difficulty of implementation for the off-site groundwater remedial program the larger the given pump and treatment system is. This includes the number of groundwater extraction wells, pipelines, treatment system(s) and points of discharge. The off-site full containment groundwater system would be constructed in a densely populated area with significant implementability due to the greater difficulty of siting and constructing the off-site groundwater remedial elements for this huge pump and treatment system. All this construction would be occurring within highly developed residential areas or highway rights of way both of which will present significant implementability issues associated with the access and siting of the large pump stations, treatment systems and required pipe lines connecting all the facilities.

Alternative 3 was not selected as the proposed remedy for this Operable Unit. For the on-site work, Alternative 3, with the complete excavation of the on-site area, represented too great a task for implement ability and cost. The depth of the impacted soils would require a massive sheet piling effort with too great a cost (see below) for the physical removing and disposing of all that material.

Cost-Effectiveness: The costs of the alternatives vary significantly. Alternative 3 is the most costly because it completely removes all the impacted soils on-site and strives to address the entire groundwater plume off-site. Given the volume of soil to be handled by Alternative 5, consolidation and capping (Alternative 4) would be much less expensive than Alternative 3. The present worth costs of Alternatives 4 and 5 are closer to each other, although the capital cost for Alternative 5 would be higher than that of Alternative 4. The long-term maintenance cost of the capped area with Alternative 4 would be higher than the long-term maintenance under Alternative 5. Alternative 5 overall is the most cost effective approach as Alternative 5 restores all the OU3 and adjacent areas to a reasonable depth for to allow for most future construction prevents any further off-site migration of contaminated groundwater and prevents exposure to public health at the public water supplies within a reasonably cost effective framework.

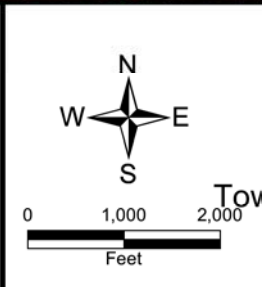
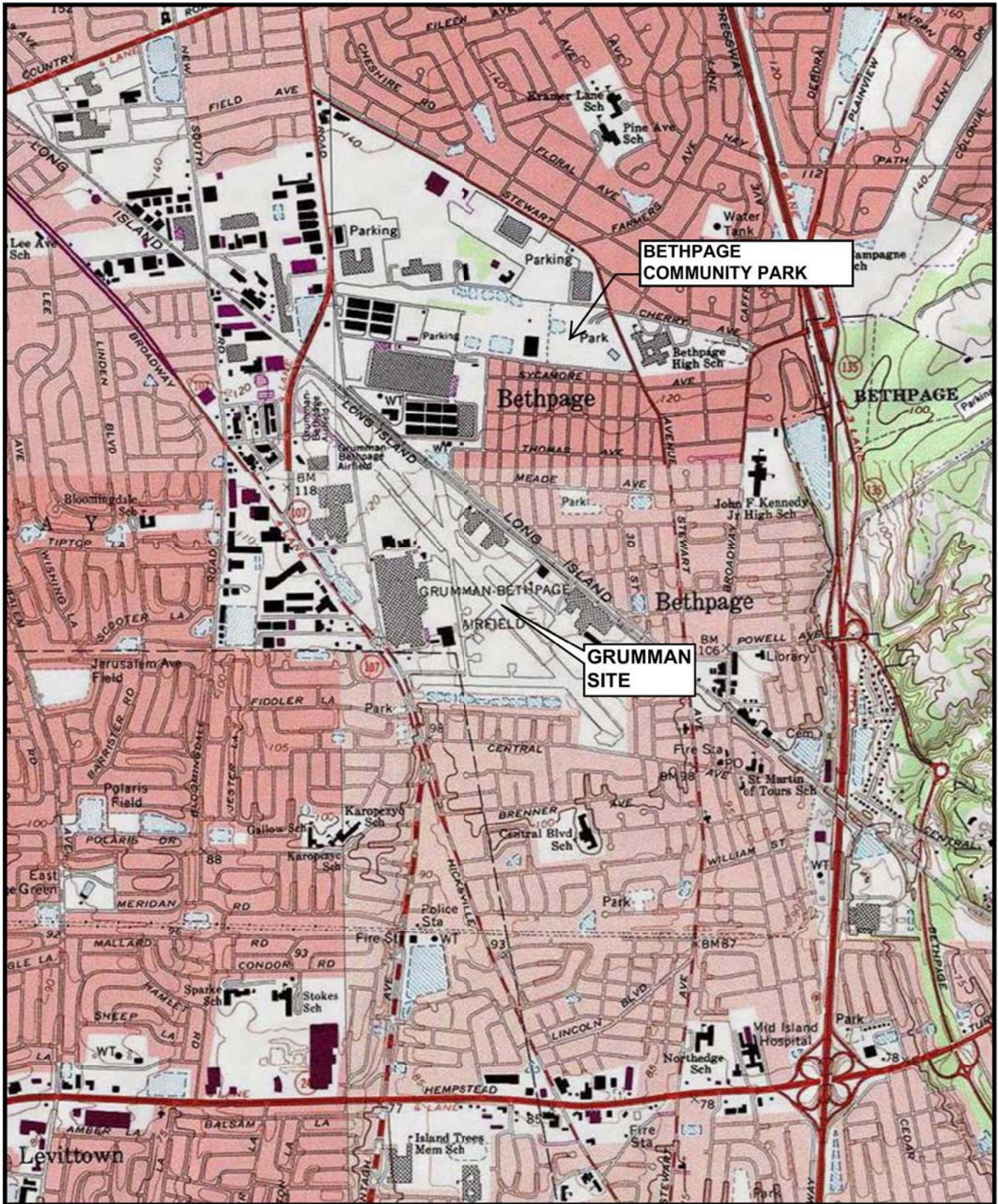
Land Use: It is anticipated that OU3 will continue to serve as part of the Bethpage Community Park.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

Community Acceptance: Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. There was much discussion at the OU3 public meeting and in the written comments received relative to the public's concerns regarding the ongoing remedial program associated with the OU2 plume, beyond the site-related contamination attributable to the OU3 area. Chief among these concerns was the need for full containment of the OU2 plume. Comments relative to the OU3 remedy were generally supportive of the measures to remove and contain the sources attributable to OU3. A responsiveness summary has been prepared that describes public comments received and the manner in which the Department will address the concerns raised with the OU3 remedy.

Alternative 5 has been selected because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

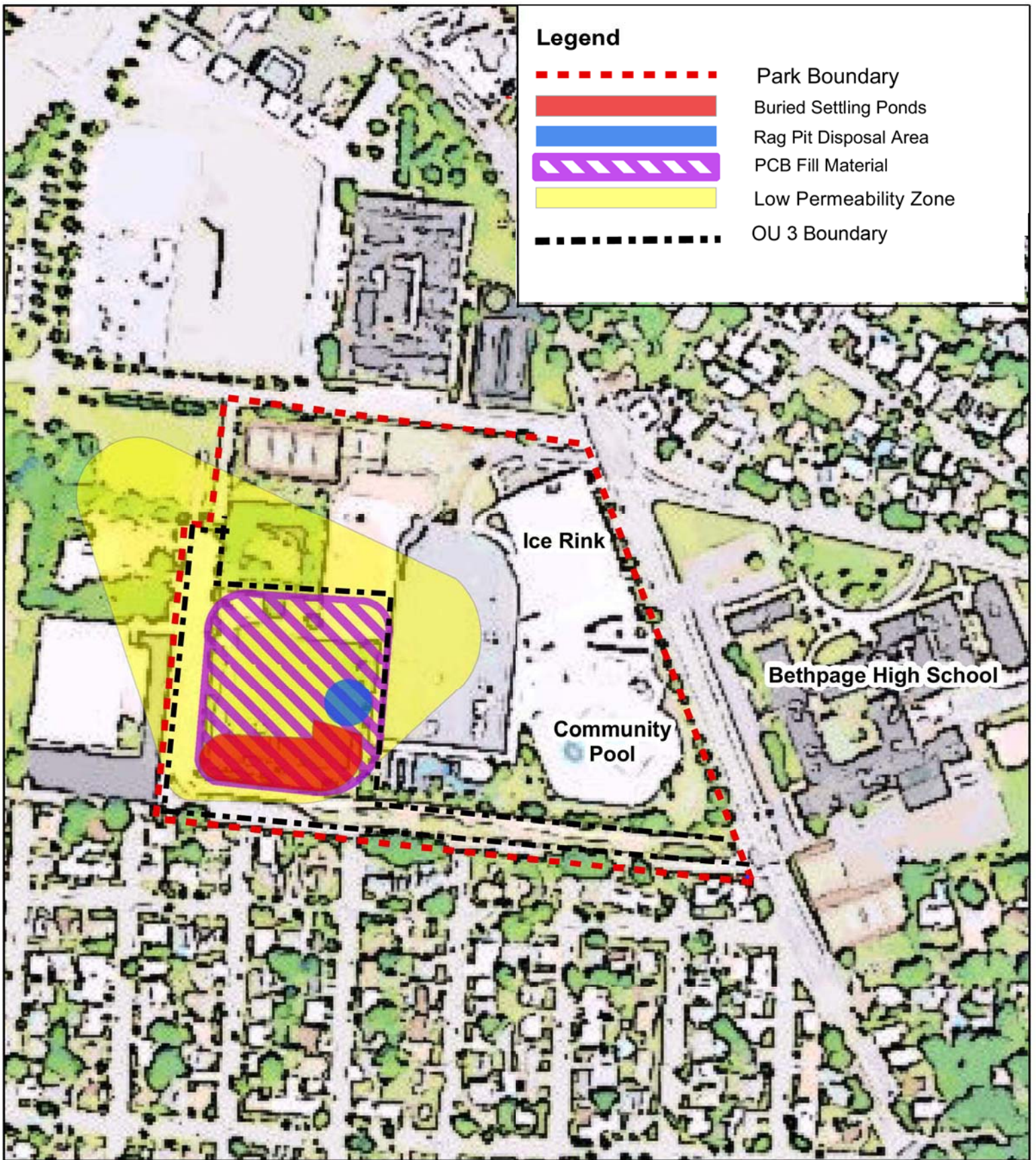




**Figure 1**  
 Site Location Map  
 Grumman  
 Town of Oyster Bay, Nassau County  
 Site No. 130003A-OU3







**WASTE DISPOSAL AND SOURCE AREAS**  
 New York State Department of Environmental Conservation  
 Grumman Aerospace-Bethpage Facility  
 Bethpage, Nassau County, New York



**Figure 2**

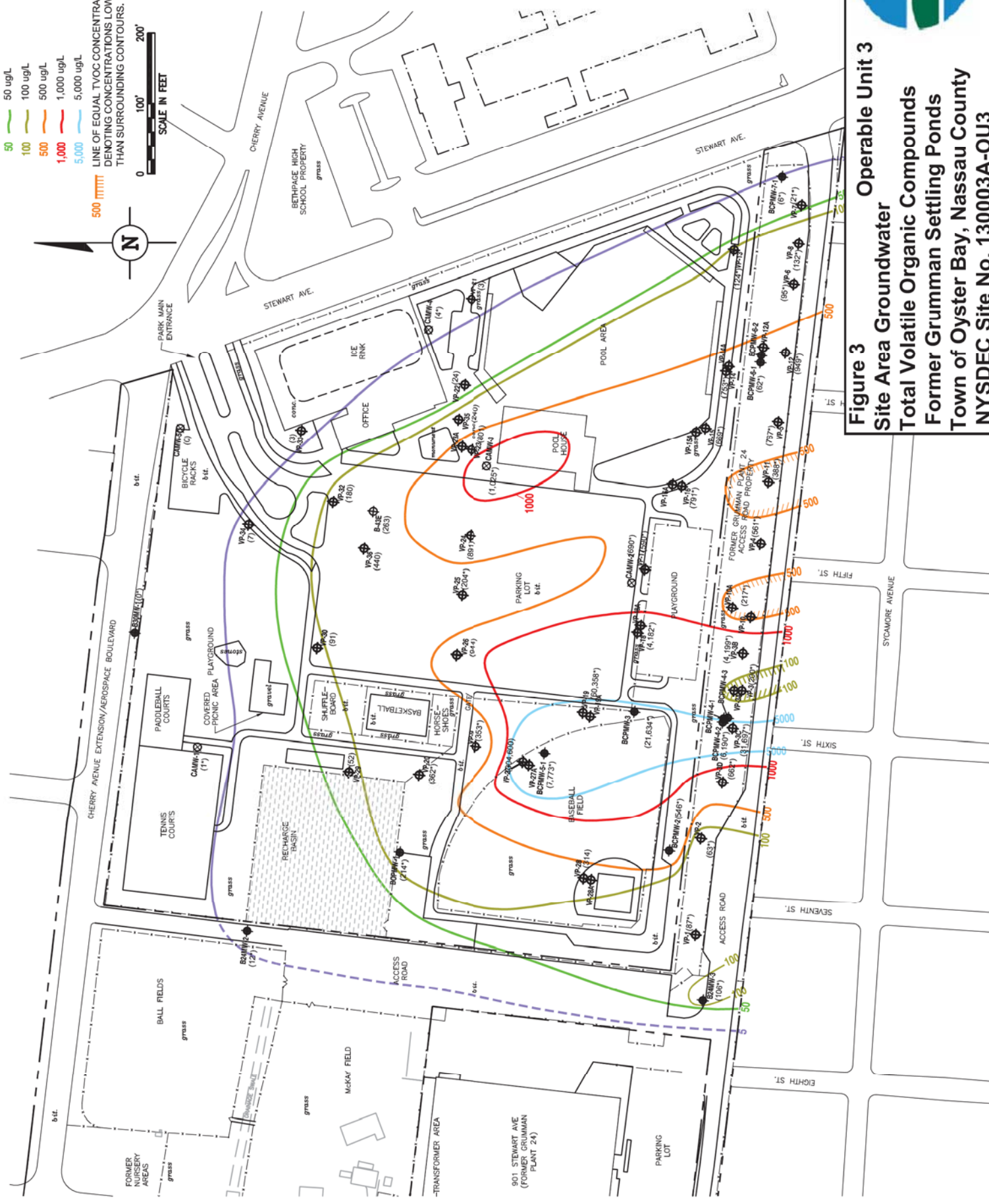




DEFINITION OF ISOCONCENTRATION CONTOURS

- 5 ug/L
- 50 ug/L
- 100 ug/L
- 500 ug/L
- 1,000 ug/L
- 5,000 ug/L

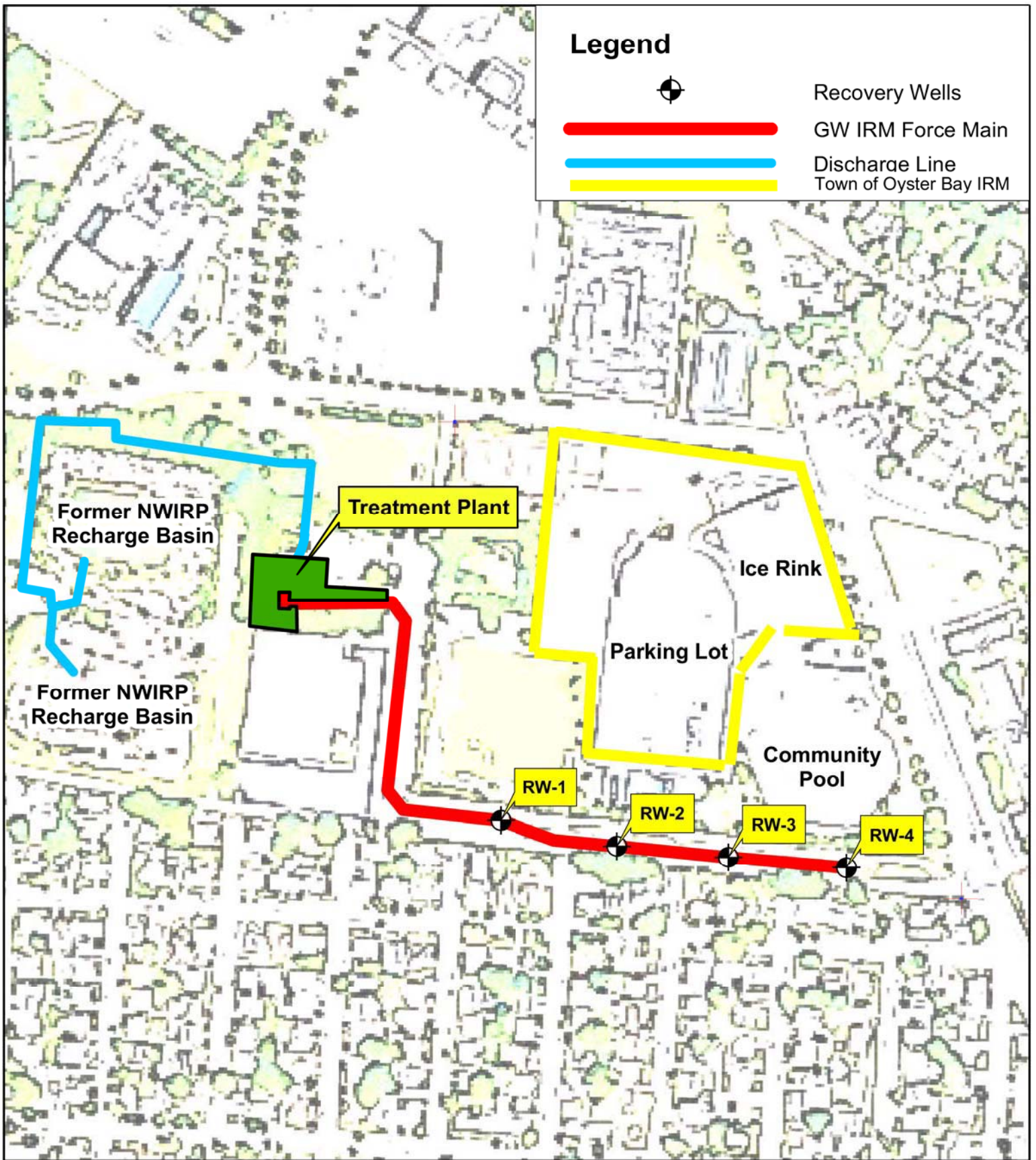
LINE OF EQUAL TVOC CONCENTRATION DENOTING CONCENTRATIONS LOWER THAN SURROUNDING CONTOURS.



**Figure 3 Operable Unit 3**  
**Site Area Groundwater**  
**Total Volatile Organic Compounds**  
**Former Grumman Settling Ponds**  
**Town of Oyster Bay, Nassau County**  
**NYSDEC Site No. 130003A-OU3**





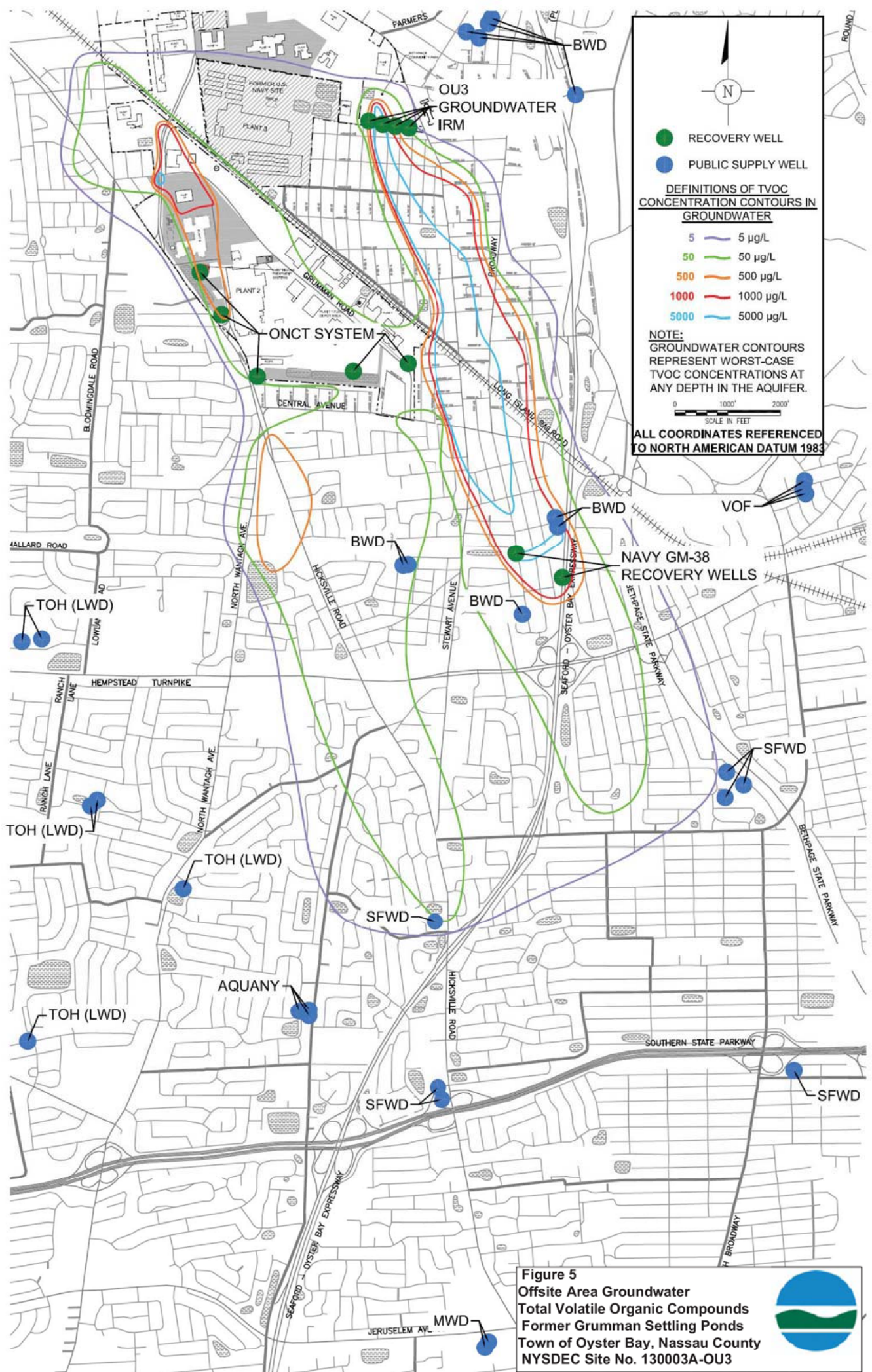


**GROUNDWATER INTERIM REMEDIAL MEASURE**  
 New York State Department of Environmental Conservation  
 Grumman Aerospace-Bethpage Facility  
 Bethpage, Nassau County, New York

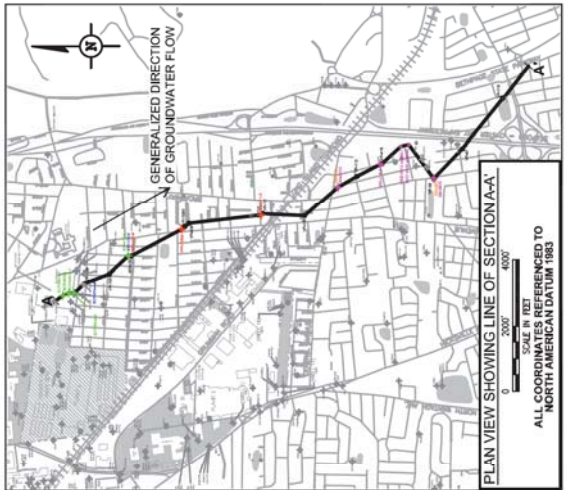
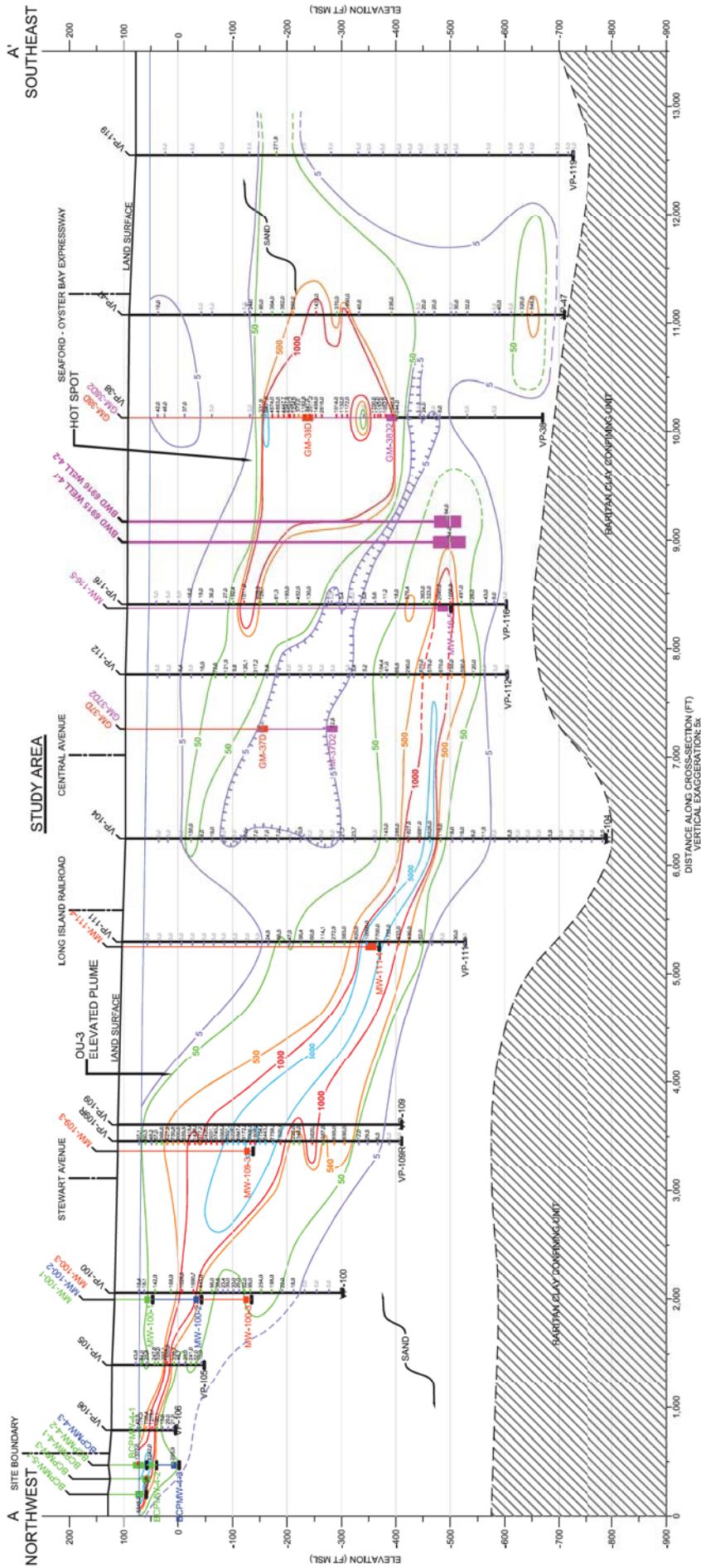


**Figure 4**

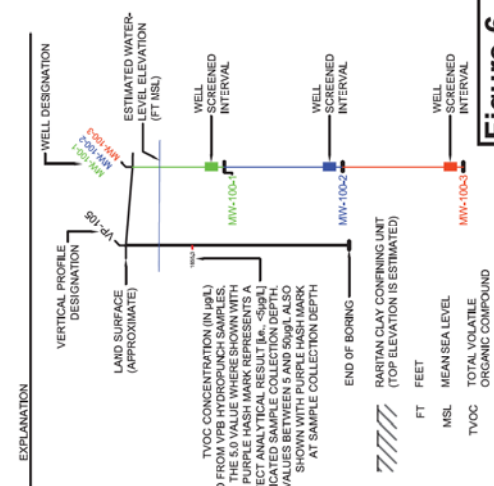








- NOTES:**
1. HYDROGEOLOGIC ZONE BASED ON MODEL LAYER ELEVATIONS PRESENTED IN COMPREHENSIVE GROUNDWATER MODEL (ARCADIS 2003).
  2. VERTICAL PROFILE BORING LOCATIONS ARE BASED ON FIELD MEASUREMENTS.
  3. MONITORING WELLS SURVEYED TO MAD 1983.
  4. LAND SURFACE ESTIMATED FROM USGS QUADRANGLES (AMITYVILLE, HUNTINGTON, FREEPORT, AND HICKSVILLE).
  5. THE GEOLOGICAL TERM "SAND" REFERENCED ABOVE IS DEFINED IN DETAIL IN THE STUDY AREA REMEDIAL INVESTIGATION REPORT, LOCALIZED LENSES OF LOWER PERMEABILITY NOT SHOWN, REFER TO STUDY AREA REMEDIAL INVESTIGATION REPORT FOR THIS INFORMATION (ARCADIS 2009).
  6. CONTOURS DERIVED WITH HASH MARKS DENOTE LINES OF EQUAL TVOC CONCENTRATION (5 µg/L) WHERE VALUES WITHIN THE BOUNDARY AREA ARE LESS THAN THE VALUES SHOWN ON THE ISOPLETH.

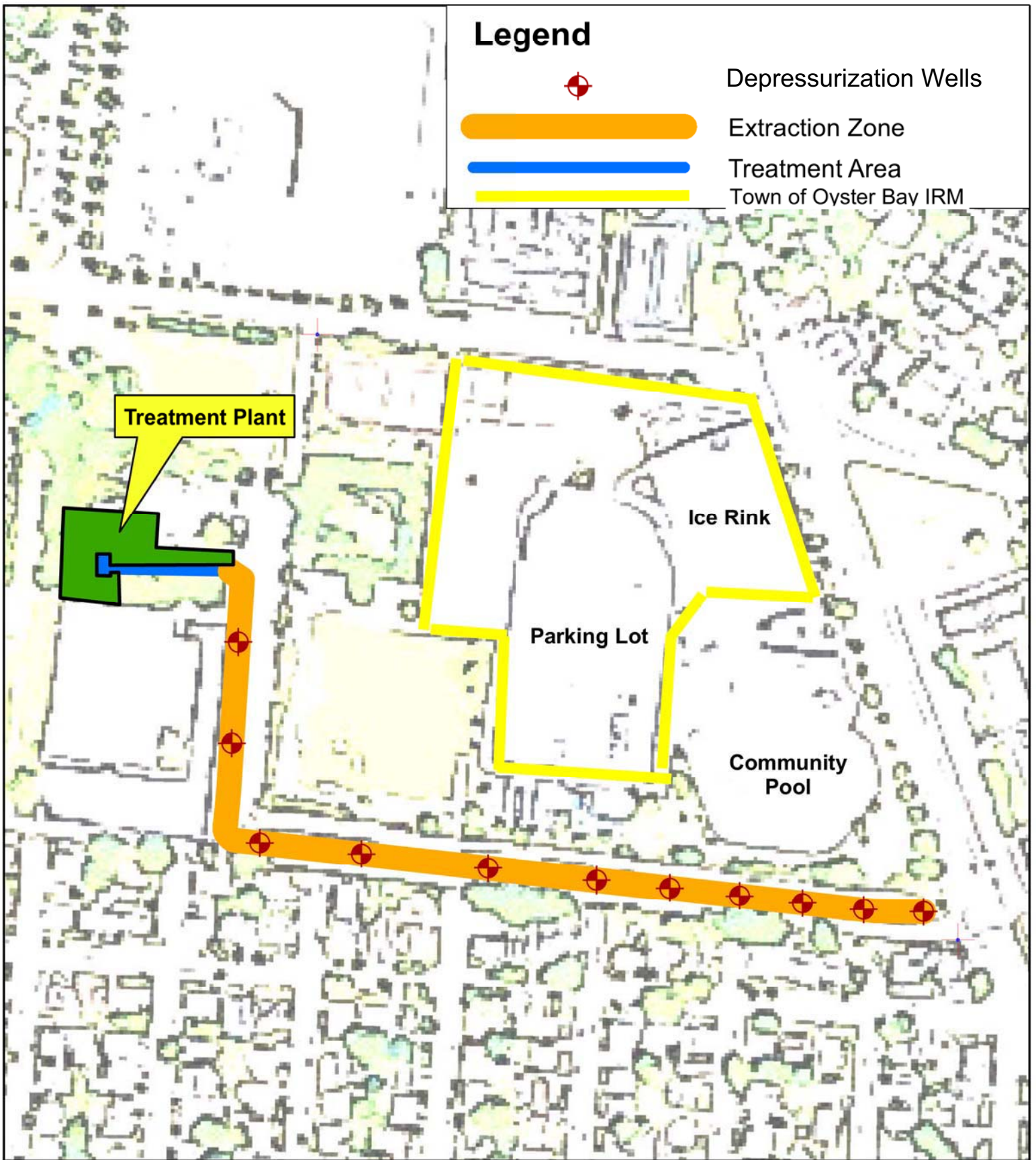


**Figure 6**  
**Offsite Area Groundwater Cross-Section**  
**Total Volatile Organic Compounds**  
**NYSDEC Site No. 130003A-OU3**









**SOIL GAS INTERIM REMEDIAL MEASURE**  
 New York State Department of Environmental Conservation  
 Grumman Aerospace-Bethpage Facility  
 Bethpage, Nassau County, New York

**Figure 8**





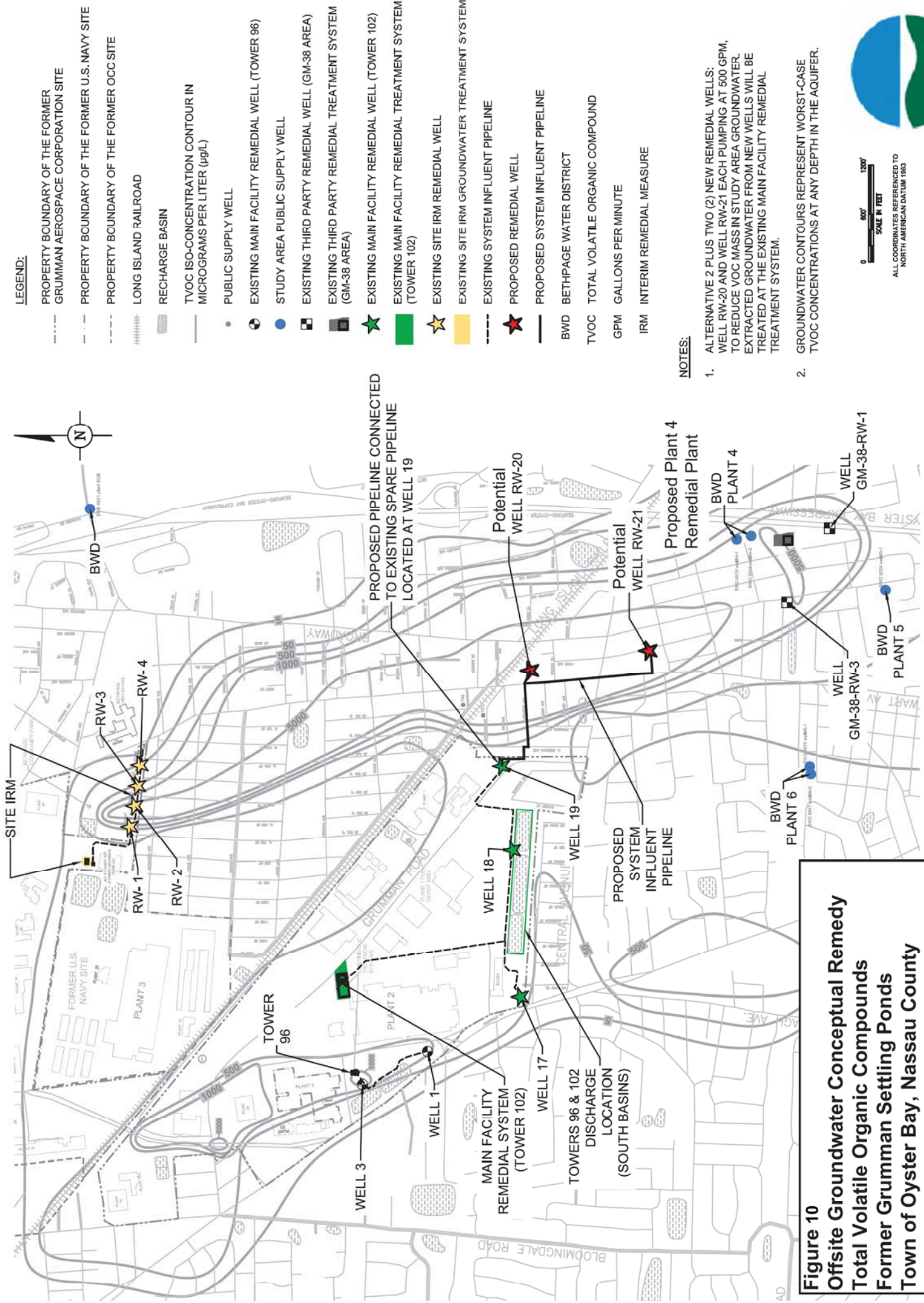


**ESTIMATED EXCAVATION AND THERMAL DESORPTION AREAS**  
 New York State Department of Environmental Conservation  
 Grumman Aerospace-Bethpage Facility  
 Bethpage, Nassau County, New York



**FIGURE 9**





0 600' 1200'  
 SCALE IN FEET  
 ALL COORDINATES REFERENCED TO  
 NORTH AMERICAN DATUM 1983

# **APPENDIX A**

## **Responsiveness Summary**

# RESPONSIVENESS SUMMARY

**Northrop Grumman-Bethpage Facility  
State Superfund Project  
Site No. 130003A  
Operable Unit No. 3**

The Proposed Remedial Action Plan (PRAP) for Operable Unit 3 (OU3), developed as part of the New York State Superfund program, was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on May 30, 2012. The PRAP outlined the remedial measures proposed for the contamination remaining at the Bethpage Community Park, the surrounding area and the on-site and off-site groundwater at the Former Grumman Settling Ponds, identified as OU3.

A public meeting was held on June 12, 2012, which included a presentation of the remedial investigation, feasibility study as well as a discussion of the proposed OU3 remedy. Three availability sessions were also held on June 11, June 12 and June 21, 2012. Questions were accepted at the June public meeting or submitted in writing, either by mail or electronically. The meeting provided an opportunity for citizens to state their concerns, ask questions and comment on the proposed remedy. These comments are a part of the Administrative Record for OU3 of this site. The public comment period was extended to July 31, 2012, based on requests from the public.

This responsiveness summary responds to all questions and comments that were raised during the public comment period for the OU3 proposed plan. However, many of the comments provided at the public meeting, as well as many of those submitted in writing during the OU3 PRAP comment period, were not related to OU3. Rather they were related to the overall groundwater plume remedy selected by the Record of Decision (ROD) for Operable Unit 2 (OU2) issued in 2001. The OU2 ROD addresses the larger downgradient groundwater plume attributable to the former manufacturing area of this site as well as the Naval Weapons Industrial Reserve Plant (NWIRP) site and is a separate remedial action not the subject of this PRAP.

There was much discussion at the OU3 public meeting and in the written comments regarding public concerns relative to the ongoing remedial program associated with the OU2 plume, beyond the site-related contamination attributable to the OU3 area. Chief among these concerns was the need for full containment of this OU2 plume. Full containment of the OU2 groundwater contamination plume was evaluated as part of the OU2 remedy and was not selected. This decision, set forth in the OU2 ROD, has recently been reviewed independently by a number of organizations including the United States Environmental Protection Agency (USEPA), the United States Geological Survey (USGS), the United States Army Corps of Engineers (USACOE) and the Battelle Institute. The Naval Facilities Engineering Command (NAVFAC) finalized this review into the Remedy Optimization Team Report (06/2011). While these four reviewing groups have offered suggestions regarding the need for further evaluation, none have suggested that the selected remedy for OU2 was not appropriate. The Department is continuing to work with the USEPA and the Potential Responsible Parties to determine if there are additional appropriate actions to augment the selected OU2 remedy. A large number of comments from the general public, representatives of the local water districts and local



elected officials were received relative to the OU2 remedy. These comments are not included in this responsiveness summary.

The release of the OU3 PRAP was announced by sending a notice to the public contact list and by issuing a press release. This notice informed the public of the opportunity to comment on the proposed remedy. The public notice also referenced the Department's "LISTSERV" initiative that now directs the public to the Department website for site related information and public notices. Interested parties must now subscribe to LISERSERV in order to receive e-mailed notifications from the Department.

Important documents and public notices are available the Department website at: <http://www.dec.ny.gov/chemical/35727.html> This ROD represents a remedy decision for OU3, a portion of the overall Northrop Grumman – Bethpage Facility Site.

### **The Following Comments are from the Public Meeting and/or Availability Sessions**

**Comment 1:** Is the OU3 containment system capturing the contamination leaving the Bethpage Community Park site?

**Response 1:** The Bethpage Community Park groundwater containment system is intended to capture the contaminated groundwater leaving the OU3 area. The OU3 selected remedy, however, includes provision for an evaluation of the effectiveness of the containment of the deeper groundwater leaving the OU3 area to assure it is being fully captured and requires enhancement of the containment system, as needed, to fully contain the contaminated groundwater migrating from this area.

**Comment 2:** What if the Bethpage Water District impacted wells have to shut down?

**Response 2:** The Bethpage Water District (BWD) public water supply wells located downgradient of this site that have been impacted by site-related contamination have treatment systems in place that ensure delivery of water to customers that meets NYSDOH Drinking Water Standards. BWD recently upgraded the treatment systems for Plants 4 and 6, so that higher concentrations of contaminants can be treated to ensure the water meeting standards is delivered to customers.

**Comment 3:** What about the cost recovery for BWD Plants 4 and 6 upgrades and potential upgrades for BWD Plant 5.

**Response 3:** Cost recovery negotiations are ongoing between the BWD and Northrop Grumman and the Department of the Navy.

**Comment 4:** Not enough sampling, test pits and monitoring wells were installed to adequately characterize the Bethpage Community Park.

**Response 4:** The Department, along with the NYSDOH, is confident that the nature and extent of contamination at OU3 has been fully characterized to allow the selection of this remedy. As part of the remedial investigation for the Bethpage Community Park, more than 30 test pits and 7 on-site and 11 off-site monitoring wells were installed, in addition to 17 monitoring wells installed for the groundwater IRM.

These monitoring wells and the vertical profile borings associated with the OU2 plume were used to characterize the on-site and off-site groundwater conditions. Soil vapor sampling was also conducted in the residential area adjacent to the site to complete the soil vapor investigation. The test pit operations were focused on the ball field area as the larger portion of the park was investigated and remediated by the Town of Oyster Bay under an Interim Remedial Measure order on consent.

**Comment 5:** There is concern about exposure to trichlorethene (TCE) and perchlorethene (PCE) found in the groundwater and the impact of these compounds on the public water supply.

**Response 5:** Preventing exposure to the site-related contaminants TCE and PCE is the primary remedial action objective which must be addressed for a remedy to be selected. The New York State Department of Health has reviewed all aspects of this project to assure that the remedial program for this site is protective of public health. Also, all public water suppliers are required to independently monitor the water that is delivered to customers to ensure that it meets NYSDOH drinking water standards, no one is consuming water that has contaminant levels above standards.

**Comment 6:** Why are the cost estimates from the OU3 feasibility studies (FS) different than that of the PRAP? Also, why aren't the alternatives found in the site area and study area feasibility studies listed in the Proposed Remedial Action Plan?

**Response 6:** The cost estimates for the alternatives in the PRAP differ from those presented in the On-site and Off-site Feasibility Study because the Department reassembled elements from both the on-site and off-site FS alternatives in order to develop comprehensive remedial alternatives for the PRAP. The PRAP evaluated a number of common elements and a variety of alternatives for each specific media. The cost estimates were modified to accommodate this new approach to the remedial alternatives.

**Comment 7:** The OU3 PRAP Alternative 5 fails to address leaching that will result from simply "capping" the site. Commenter refers to the Liberty Industrial Finishing Site in Farmingdale where the USEPA demanded that the PRPs remove all the contaminated soils.

**Response 7:** The OU3 selected remedy includes much more than "simply" capping of the site. The ROD requires substantial excavation of the ball field and surrounding area to achieve restricted residential use soil cleanup objectives for any contaminant present to a depth of 10 feet and removal of all PCB contaminated soil that exceed 50 ppm to whatever depth is necessary. Also, the volatile organic compound (VOC) source(s) will be removed from the Rag Pit area using an in-situ thermal desorption or similar technology.

**Comment 8:** The groundwater supply on Long Island has been designated as "sole source" in nature and the entire plume must be cleaned up.

**Response 8:** Because the Long Island groundwater system has been designated by the USEPA as a sole source aquifer, the selected remedy is remediating the identified on-site source areas and will continue to require that contaminated groundwater does not leave the site. To the extent feasible, the entire OU3 groundwater hot spot plume will also be remediated.

**Comment 9:** The groundwater plume from the park should be captured 100 percent.

**Response 9:** The remedy is intended to capture 100 percent of the plume leaving the Bethpage Community Park and has established a goal for the OU3 off-site groundwater remedy to capture as much as practicable, but at a minimum 90 percent, of the site-related contamination in the identified groundwater hot spot area identified in the OU3 plume. The ROD states that the number of recovery wells to be installed for this purpose will be determined during the design phase. The hot spot removal will also meet the goal of the OU3 plume remediation described in the Department of the Navy's June 2011 OU3 Optimization Report and along with the full containment at the source protect the aquifer from additional contamination

**Comment 10:** How are the green remediation principles going to be applied on this project? It doesn't appear that green remediation is being considered for this project.

**Response 10:** The green remediation principles will be applied, to the extent possible, during the remedial design phase and to the remedy. Green remediation principles to be considered can include, but are not limited to:

- considering the environmental impacts of remedy stewardship over the long term;
- reducing direct and indirect greenhouse gas and other emissions;
- increasing energy efficiency and minimizing use of non-renewable energy;
- conserving and efficiently managing resources and materials;
- reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- maximizing habitat value and creating habitat when possible
- fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- a preference for reuse of the treated groundwater, such as irrigation of the golf courses at the Bethpage State Park.

**Comment 11:** How will the NYSDEC check on the effectiveness of the ongoing remedy at this site?

**Response 11:** A Site Management Plan (SMP) will be developed which identifies all use restrictions and engineering controls for the site. The SMP also details the steps and media-specific requirements necessary to ensure the institutional and/or engineering controls remain in place and effective. It will also include provisions for the operation, maintenance and monitoring portion of the treatment systems and other engineering controls as well the periodic evaluation of the effectiveness of the ongoing remediation.

**Comment 12:** How does the NYSDEC expect to mitigate the impacts of and prevent exposure to the Bethpage Community Park plume on the groundwater?

**Response 12:** Remediating the groundwater impacts from the Bethpage Community Park OU3 plume is consistent with the overall groundwater remediation strategy for this site. The OU3 RI identified the on-site source areas as well as the overall extent of off-site groundwater contamination

attributable to these sources. In this ROD, the Department has established, as a goal, the remediation of the OU3 Plume as it passes a particular location. This ROD, along the OU2 groundwater remedy already in place, and ongoing efforts to optimize the OU2 groundwater remedy, as well as the Wellhead Treatment Contingency Plan (WHTCP) will mitigate the impacts of and prevent exposure to the contaminated groundwater plume. Also see Response 9.

**Comment 13:** This project should have been broken out into on-site and off-site components to expedite this project.

**Response 13:** The Department determined that sufficient investigation had been conducted for both the on and off-site components of OU3 to enable selection of a comprehensive remedy.

**Comment 14:** What is the regulatory framework that the NYSDEC is required to follow?

**Response 14:** The Department's statutory authority is found in the Environmental Conservation Law and the regulations promulgated, specifically 6 NYCRR Part 375. The Department also has to comply with all applicable federal laws.

**Comment 15:** The PRAP does not list all the contaminants from the site as contaminants of concern.

**Response 15:** The PRAP, and now the ROD, identified the contaminants found at the site that have the greatest potential to adversely impact public health and/or the environment or are the most prevalent. Other site-related contaminants that are not the most prevalent but present at levels exceeding SCGs will still be addressed by the selected remedial actions.

**Comment 16:** Why wasn't bioremediation looked at as a potential remedy for this project?

**Response 16:** Bioremediation is a technology that would not be expected to be effective for this site given the complexity of the confining layers in the plume area, the source areas and the depth and extent of groundwater contamination. Bioremediation is not effective on PCBs.

**Comment 17:** The Department does not have any idea as to the extent of the OU3 groundwater plume or what it would take to clean the groundwater up?

**Response 17:** The nature and extent of the OU3 plume has been defined by the OU3 RI sampling program sufficient to allow this remedy selection. Some additional delineation of the leading edge of the plume is called for by the ROD.

**Comment 18:** The groundwater system at the Bethpage Community Park was not properly designed.

**Response 18:** The design of the Interim Remedial Measure (IRM) on-site containment system for the Bethpage Park was based on vertical profile borings and monitoring well groundwater sampling results. Also see Response 1.

**Comment 19:** How does this remedial program address Dense Non-Aqueous Phase Liquids, or

DNAPL?

**Response 19:** DNAPL has not been observed at this site. However, if DNAPL is detected during design sampling, the in-situ thermal desorption system and/or IRM groundwater collection system can be modified to address the DNAPL.

**Comment 20:** Given the location of the Bethpage Community Park, impacts from remedial construction are a big concern. The community at large is concerned about impacts from dust generated during the remedial construction.

**Response 20:** A Community Air Monitoring Plan (CAMP) will be developed during the remedial design for the project. The Department and the NYSDOH will review the CAMP in conjunction with the remedial design plans to assure adequate provisions are in place to provide a measure of protection to the downwind community from potential airborne contaminant releases as a direct result of remedial work. The CAMP is a standard component of all remedial projects in the State, and requires that real time air monitoring be conducted during ground intrusive activities. This air monitoring is intended to notify site personnel of elevated concentrations of volatile organic chemicals or dust occurrences so that appropriate actions, such as wetting of the soils, can be taken to ensure that work activities do not spread contamination off-site through the air.

**Comment 21:** The Polychlorinated Biphenyls, or PCBs left in the soil will leach into the groundwater.

**Response 21:** PCBs generally adhere to the soils rather than migrate through the groundwater, unless a solvent present at the site causes them to do so. Groundwater sampling identified only two PCB detections at very low levels beneath the Park area. Although it does not appear that PCBs are migrating into the groundwater, the source removal program required for the PCB impacted soil and the solvent impacted areas will ensure that this is the case. With the removal of the solvent source areas, the ongoing vapor removal by the SVE system and the PCB soil removal, it is not anticipated that PCBs will elute into the shallow groundwater below the site. However, sampling for PCBs will be included in the monitoring program for the groundwater.

**Comment 22:** Why excavate the materials buried in the ball field area when capping will suffice and also prevent a number of short term impacts?

**Response 22:** The overall goal of this remedial program is to return the site to predisposal conditions, to the extent feasible. To achieve this goal, the hierarchy of alternatives set forth in 6NYCRR Part 375 calls for source removal as the primary remedial objective. Taking the limited action of capping the site would not remove any of the hazardous waste present. Capping would also leave the VOC solvent source areas at the site that could continue to impact groundwater.

Leaving levels of hazardous waste just below the surface would restrict allowable uses of this area for an indefinite period of time, require additional long-term maintenance and, in essence, create a hazardous waste landfill in the middle of a residential area. The remedial alternatives were compared to each other for the balancing criteria that have been established by 6 NYCRR Part 375. The

balancing criteria include: long term effectiveness and permanence; reduction of toxicity, mobility and volume; short-term effectiveness; implementability, and cost. The Department, in consultation with the NYSDOH, has determined the outcome of the evaluation of the balancing criteria to be the selected remedy.

**Comment 23:** Where is the Freon coming from?

**Response 23:** The Freon 12 and Freon 22 in the soil gas, and Freon 22 in the groundwater have been linked to the two former Ice Rinks, since demolished, which were owned by the Town of Oyster Bay. The Freon 12 and 22 associated with the former rink area will be addressed by the Town of Oyster Bay under the Brownfield Cleanup Program. Freon 113 has been identified as a contaminant from the Northrop Grumman and NWIRP Bethpage facility but has not been identified at the OU3 area.

**Comment 24:** Concern was raised about the potential impact(s) from soil vapor intrusion to the Bethpage High School and the Central Avenue Elementary School. As part of this concern, the Bethpage School district tested the High School and wants to be reimbursed for this testing.

**Response 24:** The Department completed soil vapor sampling at the Bethpage High School property and in areas adjacent to Stewart Avenue in 2007 and 2008. The Department and NYSDOH have determined, based on the evaluation of soil vapor, indoor air, and outdoor air data collected from the Bethpage High School property that the levels detected are not likely to impact indoor air quality at levels that would pose a health concern. Hence, there is no reason to regularly evaluate the Bethpage High School buildings for soil vapor intrusion.

**Comment 25:** Has soil vapor intrusion impacted the Buildings associated with the Bethpage Community Park Pool?

**Response 25:** Significant excavation of contaminated soil took place in the area of the pool prior to construction. Further, the pool buildings were designed and constructed with soil vapor intrusion (SVI) mitigation components, including a vapor membrane beneath the slab, and a sub-slab ventilation system. These actions will address any potential for soil vapor intrusion into the buildings.

**Comment 26:** Should we be concerned about shallow groundwater contamination impacting our homes?

**Response 26:** Off-site groundwater contamination associated with OU3 is at significant depth below the water table and is covered with clean water that infiltrates from the surface. This isolates the structures located over areas with impacted groundwater from conditions that could result in SVI from deeper groundwater contamination. SVI evaluations conducted near the OU3 site have shown that SVI is not occurring in buildings close to the site. The soil vapor extraction system currently in operation prevents contaminated soil vapor from migrating off the site as well.

**Comment 27:** What are the potential health risks for people living in the area due to the presence of site related groundwater contamination and the length of time it will take to remediate the plume? The drinking water supply(s) have been impacted and citizens feel that they are being exposed to site

related contamination.

**Response 27:** NYSDOH evaluation of data shows that that people in the Bethpage area are not currently being exposed to site related contamination at levels that are expected to result in adverse health effects through the public water supply, and therefore there is no increase health risk.

For over 25 years, NYSDOH regulations have required public water suppliers to test the water from their wells for man-made and naturally occurring compounds, physical characteristics and microbial pathogens at a specified frequency. The NYSDOH has established maximum contaminant levels (MCL) for these compounds, and if a water supply is found to exceed an MCL, the well must be taken out of service, or treated to remove the compound before the water is distributed to customers. All OU3 related contaminants in the groundwater have a corresponding MCL.

**Comment 28:** The cancer rate in the Bethpage area is much higher than in other areas of Long Island.

**Response 28:** Cancer is not a single disease, but a collection of over 100 different diseases, each with its own risk factors. When talking about possible reasons for high cancer rates, it is more informative to look at different types of cancer separately, rather than grouped together.

The NYSDOH keeps track of all cases of cancer diagnosed in the state. All hospitals, physicians, laboratories and other health care providers are required by law to report all cases of cancer that come under their care to the New York State Cancer Registry, and the Registry meets standards of completeness set by a national credentialing organization.

The New York State Cancer Registry routinely tabulates newly diagnosed (incident) cases of the four most frequently diagnosed types of cancer (colorectal, female breast, lung and bronchus, and prostate) on the ZIP Code level. These four cancers together, account for just over half of all cancers that are diagnosed in New York. For the Bethpage ZIP Code (11714), during the period 2005-2009 the numbers of cases of these cancers that were actually diagnosed in the ZIP Code was either within 15 percent of the numbers expected, or between 15 and 50% less than the number expected. (The numbers expected were calculated based on the numbers of males and females of different ages living in the ZIP Code area, and cancer rates for all of New York State. Rates of these cancers in Nassau County are generally similar to the rates statewide, with the exception of lung cancer in males, which is lower in Nassau County, and female breast cancer, which is higher in Nassau.) More information on cancer rates in different areas of the state may be found at <http://www.health.ny.gov/statistics/cancer/registry>.

More recently, NYSDOH conducted an analysis of cancer data at a smaller geographic level to identify areas of higher incidence for six cancers: bladder, brain, breast, colorectal, lung, and thyroid. The Bethpage area is within areas of higher than expected incidence for bladder and thyroid cancers. Bladder cancer is a cancer that has been associated with exposure to PCE. There are two other areas of higher than expected bladder cancer incidence on the south shore of Long Island. There are several other areas of elevated thyroid cancer incidence on Long Island, in New York City, and in the northern suburbs of New York City. The Bethpage area is also on the border (partially in and partially out) of an area of higher than expected breast cancer incidence that is centered around Old Bethpage. The Bethpage area is not within areas of higher than expected incidence for any other of the six cancers mapped. Maps showing areas throughout New York State that have higher incidence

for 17 other cancers are to be posted by the end of 2012.

NYSDOH has also engaged in a very limited study of cancers occurring in an area affected by, or potentially affected by soil vapor intrusion in the areas just adjacent to the Naval Weapons Industrial Reserve Plant (NWIRP) site and the Bethpage Community Park section of the Northrop Grumman site. This study will investigate whether there are any unusual patterns among the cancers diagnosed there, and whether the numbers of cancers in that area are in line with the approximate numbers expected. Results of this study were made available in January 2013 and are available at: <http://www.health.ny.gov/environmental/investigations/bethpage/>

**Comment 29:** Several individuals spoke of their own cancer cases, cancer cases in family members and neighbors, cancer related deaths in the community, and of the number of cancers contracted by relatively young people.

**Response 29:** While cancer can take a tremendous toll on a family, and on a community, it is important to put these concerns in perspective. Cancer is a common disease, more common than many people realize. It is estimated that almost 1 in every 2 men and over 1 in 3 women will be diagnosed with cancer at some time in their lives. Cancer is also the second leading cause of death in New York (and nationally), accounting for about 1 in 5 deaths. Although cancer is primarily a disease of the middle-aged and elderly, it can affect people of any age, particularly if there is a family history. The cancers that the commenter's remarked on may, unfortunately, be typical of those seen in many communities.

**Comment 30:** Several individuals stated that people are being exposed to site related contamination and that this is the cause for the elevated cancer rates in the area. Statements that site related chemicals of concern (COC) (TCE, PCE, CIS- and TRANS-DCE and Freon 113 are known and/or probable human carcinogens, and have a variety of documented adverse health effects. The commenter referencing that the International Agency for Research on Cancer, a branch of the World Health Organization, has classified the TCE and PCE as definite carcinogens to animals.

**Response 30:** NYSDOH evaluation of data shows that that people in the Bethpage area are not currently being exposed to site related contamination at levels that are expected to result in adverse health effects. Even if elevated cancer rates could be substantiated for this area, the rates may not be related to any exposures to site-related contamination that may have occurred. Research suggests that at least 40% of all cancers are due to lifestyle factors such as tobacco use, diet, physical inactivity and alcohol use. Individual factors such as family history, prior medical history (including infections and exposure to radiation), and exposures in the workplace are also important. In addition, regional medical care practices (such as the use of screening methods like mammography or the PSA test) can affect cancer rates in a community. It is important to consider all of these when trying to account for variations in cancer rates.

If there is an environmental exposure of concern, the issue of cancer latency must also be taken into account. Latency refers to the often extended period of time between first exposure to a cancer-causing substance and the recognition of the disease. For most cancers in adults, this latency period may be on the order of 10 years or more. Cancers developing in people who recently moved to an area may not be related to any environmental exposures unique to that area. For these reasons, it is usually not possible to link elevated cancer rates in a particular community with a particular



environmental cause.

As noted above, NYSDOH has completed a study of cancers occurring in an area affected by, or potentially affected by, soil vapor intrusion from the Naval Weapons Industrial Reserve Plant (NWIRP) site and the Northrop Grumman site. Results of this study were made available in January 2013. There are a number of factors we consider when determining whether a cancer study may be indicated for an area. These include questions related to what is known about cancer in the community, what is known about the community's exposures to environmental contaminants, whether a study is feasible, and whether there is interest and support in the community. For the recently completed study of the vicinity of the NWIRP and Grumman sites, it was decided that a study was indicated because of documented exposures to site-related contaminants in homes in a one-block area bordering the NWIRP site.

As noted previously, there are currently no known exposure pathways to site related contaminants, however, it is possible that exposures to contaminated groundwater may have occurred in the past. The Agency for Toxic Substances and Disease Registry (ATSDR) recently received a request for a public health assessment to determine if there are currently exposures to contaminated groundwater by people using private wells for potable or irrigation uses, and whether there have been exposures prior to the State's implementation of public water supply regulations that required public water supplies to be sampled for contamination, and for contaminated water supplies to be taken out of service, or to be treated to remove contamination. This public health assessment to be undertaken by NYSDOH, under a cooperative agreement with ATSDR, will contribute to what is known about the characteristics of exposures, if any, to contaminants in the public water supply, helping us to determine whether an additional cancer study may be indicated.

**Comment 31:** Commenter stated "I'm afraid to drink my water. I'm afraid to bathe in my water. I'm afraid of what I am getting when I shower, what is being absorbed into my skin".

**Response 31:** Public water suppliers that have wells impacted by site related groundwater contamination have instituted provisions to remove COCs from the water before distribution to customers, therefore, customers of impacted water districts are not drinking, or coming into contact with water that has detectable levels of site related COC which exceed NYSDOH Drinking Water Standards. The only situation that could currently result in exposure to contaminated groundwater would be for someone using a private well for potable or irrigation uses, if the well was drawing water from a contaminated layer of the aquifer. However, there currently is no system in place to register or track the use of private wells at homes in Nassau County. Therefore, the State is not currently aware of any residential homes that are using a private well for potable purposes in the area of groundwater contamination.

**Comment 32:** Commenter stated the DOH "has forced the Bethpage water supply to become chlorinated" and "that's going to keep all this other stuff from harming us somehow."

**Response 32:** Chlorination of a public water supply is required to address potential bacterial impacts from the water supply. This chlorination process does not address the site-related contamination in the water supply.

**Comment 33:** There is major concern about the safety of the drinking water supply.

**Response 33:** The water is routinely tested by each water district prior to distribution for a host of parameters as required by the NYSDOH. The requirements of what to test for in the drinking water supply can be found in the NYSDOH regulations. As the question does not distinguish the type of contaminant (e.g., volatile, semi-volatile), the total number of parameters analyzed for exceeds 100 compounds. The water served must meet State and Federal drinking water standards.

**Comment 34:** A number of comments were raised rejecting the continued use, as covered in the OU3 PRAP, of the Public Water Supply Contingency Plan (PWSCP) that was instituted as part of the OU2 ROD.

**Response 34:** The rationale for wellhead treatment that is part of the PWSCP is as a contingency program to ensure safe water supplies. The primary reason for wellhead treatment is to “eliminate a completed exposure pathway to humans” from contaminated groundwater that is ultimately used for drinking water. This is solely used to mitigate or eliminate a potential or completed exposure pathway and is not characterized as being “remedial” in nature. PWSCP can, as necessary, be upgraded to incorporate changes necessary to ensure that the public water supplies are treated to meet existing and future Maximum Contaminant Levels (MCLs) promulgated by the NYSDOH.

**Comment 35:** Wellhead treatment is not acceptable, that it does not provide complete protection against transmission of contaminants to water district customers, and that “secondary and tertiary problems” are created such as "system vulnerability" and increased energy consumption.

**Response 35:** The NYSDOH Bureau of Water Supply Protection advocates for a multiple barrier approach (e.g., source water protection, treatment, monitoring) for assuring the quality of potable water served by public water systems. The best scenario (first barrier) is to start with water that already meets standards, but that is not always feasible and is sometimes impossible. Consequently, water treatment is often required even for highly productive groundwater sources. This principle is envisioned in the NYS Sanitary Code requirements for wells serving public water systems which states (ref. Appendix 5-D Section 5-D.3 (a)):

“A well shall be constructed to preclude and prevent entry of all known sources of contamination into the well to the extent reasonably achievable. Where the only viable source of water supply available is contaminated and alternative water sources have been considered, the local health department having jurisdiction may allow construction and use of a well in contaminated groundwater with such additional measures (e.g., treatment and monitoring) as needed to ensure provision of potable water.”

The NYS Sanitary Code requires water treatment processes and equipment to be designed and constructed to meet the applicable provisions of Recommended Standards for Water Works and standards of the American Water Works Association. These standards encompass treatment for removal of organic contamination from source water.

Ultimately the test of acceptability is whether the potable water quality served meets the standards and MCLs contained in Subpart 5-1. Therefore, although not optimum for reasons including those provided in the comment (potential increased system vulnerability and increased energy consumption), wellhead treatment of a contaminated source is acceptable.

**Comment 36:** Comment was raised that “ever changing, more stringent DOH requirements have

supported the fact that wellhead treatment is a potential health risk and the DEC wellhead treatment approach has proven to be ineffective and costly to implement for this particular plume.”

**Response 36:** The development of more stringent standards does not support the claim that wellhead treatment is a potential health risk. As more stringent standards are developed, there are corresponding changes to the treatment and monitoring required, demonstrating that the finished water quality meets the new standards.

**Comment 37:** The DOH code mandates that wellhead treatment be used as a measure of last resort when dealing with contaminated water sources.

**Response 37:** See Response 35.

**Comment 38:** Concern was raised that the PRAP does not adequately address the potential for soil vapor intrusion (SVI) to impact buildings in the Town of Oyster Bay (TOB) park and in the Bethpage High School and Central Boulevard Elementary School, and that many homes have been impacted by SVI.

**Response 38:** The current TOB Ice Rink building was designed and constructed with SVI mitigation components such as a vapor membrane installed throughout the slab of the building, and a sub-slab ventilation system thus minimizing the potential for soil vapor intrusion into the building. The buildings associated with the pool area were not evaluated because their method of construction, manner of use, and seasonality of use indicates that SVI does not represent an exposure pathway of concern for users of the pool.

Data evaluated by the NYSDOH has shown that SVI by site related volatile organic compounds is not impacting the indoor air of residential or school buildings located near OU3. Additionally, the operation of the soil vapor extraction (SVE) interim remedial measure at OU3 has served to move contaminated soil vapor away from buildings, capture the contaminated vapor, and remove it from the ground. The contaminated vapors are removed from the SVE system before the exhaust is discharged to the atmosphere.

**Comment 39:** The TOB park buildings and the Bethpage High School (BHS) buildings should be regularly evaluated for SVI.

**Response 39:** See Responses 24 and 25.

**Comment 40:** A request was made that the Community Air Monitoring stations be placed at the entrances to Bethpage High School on both Stewart and Cherry Avenues.

**Response 40:** A community air monitoring program, will be developed during the remedial design phase. Location of monitors will be selected at that time. Also see Response 20.

**Comment 41:** The Government has a lack of consideration for human life.

**Response 41:** Comment noted.

**Comment 42:** A question was raised regarding the origin of the standards, criteria and guidance that will be used to guide remediation and the relevancy of DOH maximum contaminant levels for public water supplies.

**Response 42:** All Public Water Systems (PWS) are required to do routine monitoring according to schedules outlined in Sub-Part 5-1 to show they are serving water in compliance with NYSDOH standards (MCLs). The analytical list and frequency of monitoring required by Sub-Part 5-1 maybe amended by the local or state health department to address water system specific concerns. Additionally, some PWSs are monitoring above and beyond that which is required. PWSs downgradient of the Northrop Grumman/Navy sites report that they sample for over 135 different parameters several times during the year. All of the identified OU3 related contaminants in off-site groundwater, except sodium, have a corresponding MCL. If sampling shows that an MCL for a particular compound is exceeded, action (e.g., water treatment, well taken off-line, blending) must be taken to bring the finished water levels back to below the MCL. The NCHD begins targeted action when they receive data indicating that a certain well or well field may be impacted in the future. Monitoring of the PWSs for these compounds will last for the duration of the remediation and no one should be served water not meeting standards regardless of the time it takes to implement OU3 and remediate the groundwater.

**Comment 43:** Concern was expressed that the contaminated groundwater was getting into the vegetables being grown in their yard, and that the contaminants had gotten into their body through ingestion of these vegetables.

**Response 43:** The depth of off-site groundwater contamination associated with the OU3 plume is such that there is no feasible way for contaminants to come in contact with the roots of vegetable plants grown in a yard located over the OU3 plume, and no potential exposure to site-related contaminants by eating vegetables grown in such a backyard garden. The only possible scenario for vegetables in a garden to potentially uptake site-related contaminants would be if a resident was using a private well for irrigation, and that well was drawing contaminated water from the aquifer. Private well surveys have been done and the Department and NYSDOH are unaware of any such irrigation wells.

**Comment 44:** The NYSDEC banned shellfish harvesting in Seaford, because the “water is not safe.” Therefore, the site-related groundwater contamination is already affecting the Great South Bay.

**Response 44:** The closure of any shellfish beds is unrelated to this project as the plume is not currently discharging to the Great South Bay.

**Comment 45:** The ROD should describe the potential for adverse short-term health effects on the community during implementation of the proposed remedy.

**Response 45:** This was part of the evaluation of alternatives included as Exhibit D of the PRAP and now the ROD. The potential for any emissions associated with this remedy will be addressed during the remedial design phase. Remediation will include a Community Air Monitoring Plan (CAMP). Also see Response 20.

**The following written comments were received during the Public Comment Period.**

**A letter dated July 30, 2012 was received from Forchelli, Curto, Deegan, Schwartz, Mineo, Cohn & Terrana, LLP, on behalf of the Northrop Grumman Systems Corporation (NGC), which included the following comments:**

**Comment 46:** The DEC should have proposed the capping remedy for soils because the capping remedy meets the Department's threshold criteria and is preferable to the excavation in terms of the Department's balancing criteria.

**Response 46:** While the potential for short-term impacts is less with the capping alternative, these impacts are easily addressed with proper engineering controls. However, the overall effectiveness of the excavation and off-site disposal alternative far outweighs simply capping the site by permanently removing soils above standards, criteria and guidance to ten feet, and all hazardous waste from the Park and other areas.

**Comment 47:** DEC should have capped soils because capping remedy meets DEC threshold criteria and is preferable to excavation in terms of balancing criteria.

**Response 47:** See Response 22.

**Comment 48:** The short term impacts make excavation much less favorable.

**Response 48:** See Response 22.

**Comment 49:** PCBs have been there for 50 years without any apparent problem, therefore long term effectiveness for capping is not a problem either.

**Response 49:** With respect to long-term effectiveness, simply capping these areas impacted with hazardous waste levels of PCBs would, for an indefinite period of time, completely restrict the future use. Further, capping would allow VOC contaminated soil to remain which is a continuing threat to groundwater.

**Comment 50:** The NYSDEC proposed groundwater remedy is appropriate with some minor modifications.

**Response 50:** Comment noted.

**Comment 51:** There should be continued operation of the groundwater containment without any modification. The system is adequately designed as is.

**Response 51:** The Bethpage Park groundwater Interim Remedial Measure, or IRM, may not completely capture the deeper groundwater which may be above groundwater standards. The ROD requires that a review of the effectiveness of the system in capturing the contaminated groundwater leaving the Park area be undertaken. If based on this review the system is achieving full containment, modifications will not be needed.

**Comment 52:** The performance standard for the off-site groundwater remedy is generally

appropriate, but should be flexible as remediation progresses.

**Response 52:** Comment noted.

**Comment 53:** The NYSDEC soil vapor extraction remedy, with operation, maintenance and monitoring, is an appropriate remedy.

**Response 53:** Comment noted.

**Comment 54:** Well head treatment should be deleted from remedy.

**Response 54:** Given the nature and extent of the OU3 off-site plume and the need to assure an uncontaminated water supply, this cannot be considered.

**Comment 55:** The NYSDEC should remove the in-situ thermal desorption and associated soil vapor extraction remedy is unnecessary.

**Response 55:** Source removal is an integral part of the selected remedy. Northrop Grumman first presented this concept to the Department as the appropriate remedy for the VOC source(s) during the preliminary stages of the Site Area Feasibility Study development, and the Department believes it to be an effective means of dealing with this deeper, highly contaminated area. However, the ROD now states that in-situ thermal desorption and associated soil vapor extraction will be employed, or an in-situ treatment capable of achieving comparable removals may be proposed for approval by the Department.

**Comment 56:** Reference to the shallow plume should be deleted from the PRAP because the shallow plume is not related to OU3.

**Response 56:** This comment on Section 7, Page 13, item 10 of the PRAP and is referring to off-site groundwater remediation in the hot spot area. We agree that the downgradient contaminated groundwater in the hot spot area is not appropriately characterized as shallow and have reworded the ROD accordingly.

**Comment 57:** Restricting the use of the site and the groundwater is appropriate.

**Response 57:** Comment noted.

**Comment 58:** A site management plan for the management for the onsite and offsite elements of the remedy is appropriate.

**Response 58:** Comment noted.

**Comment 59:** The DEC web site refers to the wrong feasibility study versions.

**Response 59:** This correction has been made to the web site.

**Comment 60:** Remedial alternative costs listed in the PRAP differ from those of the NGC FS.

**Response 60:** See Response 6.

**Comment 61:** The PRAP needs to correct several statements including:

- a. The purpose of the geophysical survey is to determine the presence of buried anomalies, not the lateral extent of wastes;
- b. The SVE was installed along the southern and western boundaries of the site, not just the southern boundary;
- c. The wording “and PCBs” in the 5<sup>th</sup> bullet appears to belong to the 4<sup>th</sup> bullet and in bullet 4, chrome should be chromium.

**Response 61:**

- a. The geophysical survey was conducted during RI utilizing ground penetrating radar, magnetometer and resistivity testing of site soils. Ground penetrating radar was used to locate the depth of buried objects and to investigate the presence and continuity of natural subsurface versus fill conditions. The electromagnetic, or EM conductivity testing, was used to locate buried metal objects and for locating plumes from waste pits. Resistivity was used to study lateral changes and vertical cross sections of the natural hydro-geologic setting. Surface resistivity was used to study contamination of soil and groundwater and to locate buried objects. Overall, this geophysical survey attempted to locate buried metallic objects and distinguish, to the extent possible, between native and fill material soils.
- b. The ROD has been modified accordingly to reflect the southern and western sides of the site for the OU3 SVE IRM.
- c. The ROD bullets have been modified to reflect the corrections for PCBs and “Chrome.”

**Comment 62:** Several figures titles should be revised according to bullets.

**Response 62:** The Department reviewed these comments on the PRAP figures and revised the titles in the ROD as appropriate.

**Comment 63:** DEC's Examination of Soil Remedies is incomplete. The PRAP should have included the uses of In-situ Thermal Desorption (ISTD) to remove PCBs from the soil. Also, the soil remediation should be based on a performance standard and not on a particular remedial technology.

**Response 63:** The on-site, or site area FS, submitted by Northrop Grumman, reviewed ISTD Technology for solvent removal as per table 6-2 of the Site Area Feasibility Study. The ISTD technology was not reviewed for PCBs in soils. This technology can be applied to removing PCBs, but would require a much higher operating temperature over a much larger area of that section of the Bethpage Community Park. The Department could consider using such an alternative technology to treat source areas should new information be identified during the remedial design to justify such consideration(s).

**Comment 64:** The NYSDEC references to soil cleanup objectives are inconsistent.

**Response 64:** The soil clean-up objectives are those set forth in 6 NYCRR Part 375 and are not inconsistent.

**Comment 65:** The NYSDEC states that capping and excavation with offsite disposal pass the threshold criteria of protection of human health and the environment and is compliant with standards, criteria and guidance and Northrop Grumman agrees.

**Response 65:** Comment noted.

**Comment 66:** Capping the ball field area has least short term impacts and is a superior approach to meet the NYSDEC Green Remediation.

**Response 66:** While the use of green remediation is a goal, the overall reduction in mobility and the long-term effectiveness are the overriding factors in the final soils remediation remedy selection. See also comment 10.

**Comment 67:** Northrop Grumman does not agree with the NYSDEC that excavation and offsite disposal offers a better reduction of toxicity, mobility and volume as opposed to capping the ball field area.

**Response 67:** See Response 22.

**Comment 69:** The NYSDEC description of the current land use is incorrect. The Grumman Access road is not residential.

**Response 68:** Remediation of the access road is based on Commissioner Policy 51 on Soil Cleanup Objectives (SCOs) which coincidentally corresponds with restricted residential use.

**Comment 69:** The NYSDEC applied the incorrect performance standard to the remediation of volatile organic compounds, or VOCs in soils.

**Response 69:** The application of 6 NYCRR Part 375 Standards, Criteria and Guidance (SCOs) for the protection of groundwater is the correct performance standards for remediation of VOCs in soils.

**Comment 70:** Significant portions of the PRAP result from DEC Decisions that are not in accord with the Environmental Conservation Law.

**Response 70:** The Department disagrees and maintains that its process and its decisions were made in accordance with the requirements of law.

**Comment 71:** Significant portions of the PRAP reflects DEC decisions that are not in accord with the Environmental Conservation Law (“ECL”) or the regulations codified at 6 NYCRR Part 375. These decisions include: (1) designating OU-3 as an area of off-site contamination from the Bethpage Facility; (2) erroneously concluding that certain soil at the site is “hazardous waste;” (3) failing to consider site-specific risk-related information, as required by §375-2.8(b)(1)(iii); (4) selecting a remedy that is “inconsistent with the national oil and hazardous substances contingency plan” (“NCP”), in violation of §375-2.8(a); (5) including in the PRAP the remediation of



neighboring properties that have no demonstrated connection to OU-3; and (6) modifying the site boundaries without notice to the potentially responsible parties (“PRP”).

**Response 71:** The Department disagrees and maintains that its process and its decisions with respect to enumerated items 1 through 6 in the above comment are in accord with ECL Article 27, Title 13 and the corresponding regulations codified at 6 NYCRR Part 375, and are not inconsistent with the NCP.

**Comment 72:** DEC's designation of OU-3 as an area of off-site contamination from the Bethpage Facility did not comply with the Environmental Conservation Law (ECL) and the Part 375 regulations.

**Response 72:** The Department disagrees. Its decision with respect to the designation of OU3 is in accord with the ECL Article 27 Title 13 and the corresponding regulations codified at 6 NYCRR Part 375.

**Comment 73:** The Department's remedial requirement for PCBs (50 ppm) is arbitrary and capricious because it is based on two errors of law: (1) the Department's incorrect conclusion that soil in situ contaminated with PCBs at 50 ppm is hazardous waste; and (2) the Department's incorrect conclusion that removal is necessary to advance the ECL's remedial goals.

**Response 73:** The Department disagrees and maintains its decision is not arbitrary and capricious and its decisions are not based on errors of law.

**Comment 74:** The Department's refusal to consider site-specific risk is inconsistent with the Environmental Conservation Law (ECL) and the 6 NYCRR Part 375 regulations.

**Response 74:** The Department disagrees and maintains its decision is in accord with the ECL and 6 NYCRR Part 375 regulations.

**Comment 75:** The PRAP is inconsistent with the National Contingency Plan (NCP).

**Response 75:** The Department disagrees and maintains that the PRAP is not inconsistent with the NCP.

**Comment 76:** The requirement to remediate off-site properties should be deleted from the PRAP because there is no demonstrated connection between those properties and the Bethpage Facility.

**Response 76:** The Department disagrees. The presence of elevated levels of PCBs in the surface soil in the access road area immediately adjacent to the residential properties demonstrates the connection of the residential contamination to the OU3 property.

**Comment 77:** The State modified the site boundaries in the registry of inactive hazardous waste sites in violation of ECL 27-1305.

**Response 77:** The Department disagrees. Its actions with respect to OU3 are in compliance with ECL 27-1305 and 6 NYCRR Part 375.

**A letter dated July 30, 2012 was received from the Department of the Navy (DON) Office of General Counsel - Navy Litigation Office, which provided the following comments.**

**Comment 78:** The administrative record does not support a finding that the Bethpage Community Park (BCP) property was within the fence line of the “Grumman Aerospace Bethpage complex”.

**Response 78:** The BCP property was utilized in the operation of the “Grumman Aerospace Bethpage complex” prior to 1962.

**Comment 79:** The administrative record does not support a finding that the DON ever owned the BCP property or ever had an option to purchase the BCP property.

**Response 79:** Comment noted. Ownership or potential ownership of the BCP property is not a determinative factor as to whether DON is potentially responsible for remediation of the BCP property.

**Comment 80:** The administrative record does not contain reliable evidence regarding the nature of the historical activities on the BCP property.

**Response 80:** The Department disagrees. The administrative record contains reliable evidence regarding hazardous waste disposal on the BCP property.

**Comment 81:** The PRAP references Site No. 130003A, which is a registry number specific to the Northrop Grumman owned property. The PRAP should have stated that the OU3 property that comprises Site 130003A, was never owned or operated by the Navy, but rather independently owned and operated by Northrop Grumman.

**Response 81:** The property which now comprises the Bethpage Community Park (BCP) was donated to the Town of Oyster Bay in October of 1962 by Grumman Aircraft Engineering Corporation which operated the Grumman Aerospace-Bethpage Facility. The Grumman Aerospace-Bethpage Facility was listed in the *Registry of Inactive Hazardous Waste Disposal Sites in New York State* as Site No. 130003 with a Classification “2” in December of 1987. At the time of listing, the Department was not aware that the Bethpage Community Park had been part of the Bethpage Facility and had been utilized (in part) for the Grumman Aerospace-Bethpage Facility operations. Therefore, the BCP was not included in the original listing of Site # 130003. In March of 1993, Site No.130003 was split into Site No. 130003A known as Northrop Grumman-Bethpage Facility (Grumman owned) and Site No. 130003B know as Naval Weapons Industrial Reserve Plant (Navy owned).

**Comment 82:** The OU3 Plume may go beyond boundaries of the PRAP figure to the south and west and a bigger OU3 plume may cost more to remediate.

**Response 82:** The off-site remedial investigation generated the information necessary to quantify the overall extent of the OU3 groundwater plume. This information was used to make an appropriate estimate for the scope of the groundwater remedial alternatives. Also see Response 12

**Comment 83:** Contaminated groundwater on-site may be deeper than 150 feet. As a result in an upgrade to the on-site pump and treat system and a much larger than anticipated off-site system may be necessary and more costly.

**Response 83:** Containment of the on-site area is a fundamental component of the remedy and while the Department is confident that the investigation has defined the nature and extent of contamination, it will be confirmed during the remedial design. Should the design investigation reveal conditions to be significantly different, some additional cost may be necessary to implement this fundamental component of the remedy.

**Comment 84:** According to the Navy's technical review, the extent of PCB and Chromium (Cr)-contaminated soils is not adequately delineated both horizontally and vertically. This could result in allowing additional volumes of PCB and or chromium contaminated deeper soils to remain in place and/or significantly higher cost to soils that need to be removed than the PRAP/FS cost estimate.

**Response 84:** Comment noted.

**Comment 85:** PCBs could be eluting into the groundwater and potentially off-site. Also, contaminated soil vapor could migrate off-property unmonitored and result in excessive risk to residents.

**Response 85:** While PCBs were detected in only two samples at very low levels in groundwater during the RI phase, this is one reason the ROD calls for their removal. Sampling for PCBs in the groundwater will be included in the Site Management Plan to confirm that the soil removal did not result in groundwater contamination. Since PCBs are a semi-volatile compound, soil vapor is not a concern.

**Comment 86:** NWIRP manufacturing began at Bethpage in 1942 not 1933 and Grumman Bethpage started in 1937, not 1933 at the Bethpage location.

**Response 86:** The ROD has been modified accordingly.

**Comment 88:** Aviation and machine oils and waste paint materials should not be presumed to be hazardous until specific testing exhibits hazardous waste characteristics. Analytical methods would need to be established accordingly.

**Response 88:** The remedial program at the Bethpage Community Park will include characterizing materials before they are sent off-site for disposal. Appropriate analytical testing and methodology will be specified in the remedial design work plan.

**Comment 89:** The PRAP indicates that the OU3 groundwater plume leaves the BCP/OU3 Site as a distinct plume and then becomes co-mingled with the OU2 groundwater plume. The OU3 ROD needs to clearly define the characteristics of the OU3 plume and how it is different from the OU2 groundwater plume.

**Response 89:** The Department believes it does, the Remedial Investigation has defined the nature

and extent of the contamination emanating from OU3 and the remedy will address that contamination. In areas where the OU3 plume is co-mingled with the OU2 plume, the remedy will address both.

**Comment 90:** If dense, non-aqueous phase liquid (DNAPL) were present, then a deeper plume migrating off-site might be undetected.

**Response 90:** See Response 19.

**Comment 91:** The PRAP and FS cost estimates are different. This should be justified.

**Response 91:** See Response 6.

**Comment 92:** The OU3 groundwater plume might impact OU2 GM 38 ongoing remediation.

**Response 92:** The remedial design will evaluate this.

**Comment 93:** 50 ppm PCB excavation is potentially larger due to less RI sampling at depth.

**Response 93:** See Response 4.

**Comment 94:** Risks of Low Temp Thermal Desorption should be given a detailed evaluation prior to using the technology.

**Response 94:** This technology has been successfully deployed at sites in New York and around the United State and Canada, and it is not considered a high risk technology. A review to confirm that it will be protective of human health and the environment as well as existing remedial infrastructure can be incorporated into the remedial design.

**Comment 95:** Leaving PCBs less than 50 ppm and greater than 10 ppm might result in groundwater impacts.

**Response 95:** See Response 21.

**Comment 96:** The ROD should address potential short term impacts due to the excavation program project selected in the ROD.

**Response 96:** See Response 20.

**Comment 97:** The depth and areal extent of the OU3 groundwater contamination is not adequately characterized and it is therefore premature to select an OU3 off-site groundwater remedy.

**Response 97:** See Response 4.

**Comment 98:** The Department of the Navy (“DON”) objects to its designation by NYSDEC as a potentially responsible party (“PRP”) for OU-3. DON states that based upon its review of the administrative record for the Bethpage OU-3, the record does not support the designation of DON as

a PRP and that there appears to be no reliable evidence to designate the DON as a PRP. Further, DON states that “Congress has not waived sovereign immunity of the United States from regulation under state removal and remedial action laws, where the United States is neither a present owner nor a present operator of the facility, such as the Bethpage OU-3 Site.”

**Response 98:** While the Department acknowledges the DON’s objection to being named as a PRP, the Department’s position remains unchanged. The Department maintains that there is sufficient information to name DON as a PRP. Waiver of sovereign immunity is not a consideration in identifying PRPs.

**Comment 99:** In support of its assertion that the administrative record for Bethpage OU-3 does not support the designation of DON as a PRP, DON submitted a number of comments alleging that the administrative record contains “un-reliable evidence”, “unsupported speculation” and “no reliable support” with regard to various items related to DON being designated as a PRP.

**Response 99:** The Department generally disagrees with such characterization. See Response 98. Further, the Administrative Record (AR) for this OU was not included in the PRAP. The AR is however included in this ROD as Appendix B. While some of the documents included in the AR include material relate to the nature of the historical activities at this OU, the AR is the supporting documentation on which the selection of this remedy is based. Appendix B is not intended as the complete record relative to historic evidence regarding disposal for the purpose of negotiation of responsibility for the disposal.

**Comment 100:** The administrative record does not contain reliable evidence regarding the alleged transport of wastewater treatment sludge, the alleged source of chromic acid contamination from Plant to and its alleged connection to the NWIRP Plant 3. Nor does it contain reliable evidence concerning the source of PCB contamination. And the Navy doubts the “rag pit disposal” and fire training by Grumman as Navy directed.

**Response 100:** Comment noted. The Department disagrees.

**A letter dated July 30, 2012, was received from Cashin, Spinelli & Ferretti, LLC on behalf of the Town of Oyster Bay, which included the following comments.**

**Comment 101:** The proposed remedial action lists this project as a "State Superfund Project". This appears to contradict the information previously provided by NYSDEC that no portion of Bethpage Community Park was or is classified as a State Superfund site. Clarification should be provided regarding the use of the term "State Superfund Project" in this context, and it should be expressly reasserted that no part of Bethpage Community Park is or ever has been classified as a Superfund site or an inactive hazardous waste disposal site?

**Response 101:** A portion of the Bethpage Community Park property is designated as an off-site area (Operable Unit 3) of the Grumman Aerospace-Bethpage Facility Site, a Class 2 site listed on the Registry of Inactive Hazardous Waste Disposal Sites in New York State. While the investigation and remediation of this OU is being done under the Department’s Inactive Hazardous Waste Disposal Site Remedial Program, the Bethpage Community Park is not listed as an Inactive Hazardous Waste Site.

**Comment 102:** The PRAP states that the OU3 RI identified that operation of the former Town ice rinks as the source of the Freon contamination and there are also Freon compounds in the groundwater which are not a result of Grumman's historic operations, but attributable to the Park ice rinks." It should be clarified that the former ice skating rinks were not the only source of Freon in this vicinity. Data indicates Freon-12 and Freon-22 (and many other Freon compounds) in the groundwater at locations outside of the area associated with the former rinks. Furthermore, Freon-113, which is a compound identified as having been used by Grumman but has never been identified in relation to the operation of the former ice skating rinks.

**Response 102:** See Response 23.

**Comment 103:** The PRAP states that the on-site soil vapor and associated potential migration of soil vapor impacts to adjacent residences has been addressed by Grumman through the implementation of the soil vapor extraction (SVE) IRM (IRM). The PRAP also states that there are also Freon compounds in the soil vapor which are not a result of Grumman's historic operations. It should be made clear that there is Freon contamination in the area attributable to Grumman's historic operations; and it should be emphasized that the SVE IRM is effectively preventing the offsite migration of all volatile vapors to adjacent residences regardless of the specific compounds or their source.

**Response 103:** The Department agrees that the SVE IRM is effectively preventing the off-site migration of all volatile vapors to adjacent residences regardless of the specific compound or its source.

**Comment 104:** Remedial element No. 12 states the NYSDEC will require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375.1.8 (h)(3)". However, the Town (the site owner) will not commit to implementing engineering controls to be included in the ultimate remedy and would not be in a position to certify their effectiveness

**Response 104:** Remedial element No. 12 is a restatement of 6 NYCRR 375-1.8(h)(3). The PRAP, and now this Record of Decision, simply identify that site management and the attendant periodic certification of institutional and engineering controls are a necessary activity required for this remedy, it does not assign responsibility for this requirement. Responsibility for implementation of this and the other obligations of this ROD will be determined during the upcoming negotiation of an order on consent with the identified PRPs for this Operable Unit. The Town of Oyster Bay (TOB) has been identified as a PRP for this Operable Unit.

**Comment 105:** Exhibit A in the PRAP states offsite groundwater is also impacted by the Freon plume from the former Town of Oyster Bay Ice Skating Rinks." This assertion is not supported by the data, which show that the groundwater IRM is effectively capturing Freon before it leaves the confines of Bethpage Community Park; with off-site areas having low concentrations of Freon-113 micrograms per liter or less.

**Response 105:** Freon compounds associated with the former TOB Ice Skating rinks have migrated off-site and beyond the current groundwater IRM containment system. The full extent of this TOB

off-site Freon migration has yet to be determined. The additional groundwater testing for the OU3 remedial design program and the investigation required by the TOB's Brownfield Cleanup Agreement will be used to determine the extent of the Freon plume.

**A letter dated July 30, 2012 was received from the Town of Oyster Bay's environmental consultant H2M, which included the following comments.**

**Comment 106:** The Bethpage Community Park is 18 acres, not 12 acres as listed in the PRAP.

**Response 106:** According to the Nassau County Tax Maps, the Bethpage Community Park is 17.82 acres in area the ROD has been modified to reflect 18 acres.

**Comment 107:** Statements in the PRAP would indicate that the ice rinks were the source of all Freon impacts to groundwater, which is incorrect. Many Freon compounds have been identified in the OU2 and OU3 plumes which are not associated with the now defunct former ice rink(s).

**Response 107:** See Response 23.

**Comment 108:** Under the Soil Excavation IRM section of the PRAP (Page 71, the text indicates that soil excavated and removed from the site included Freon-12 and Freon-22 impacts. Neither of these compounds were detected in soil during the IRM investigation and remediation activity.

**Response 108:** That is correct. Freon compounds were detected in the soil gas and the groundwater samples. Also see Response 23.

**Comment 109:** Section 7.2, Subsection 2 indicates that the proposed remedy will remediate soils in the upper two feet to achieve compliance with restricted residential criteria for all contaminants of concern, and that PCBs will be remediated (to 10 ppm) to a depth of 10 feet. This seems to contradict the proposed remedy description (Alternative 5) in Exhibit B, which indicates that the remedy will include "excavation of all contaminated fill and soils for OU3 on-site where "COCs above restricted residential use and/or CP-51 to a depth of 10 feet..." It is therefore unclear as to whether all COCs will be remediated to a depth 10 feet, or only PCBs to 10 feet with the balance of COCs remediated to a depth of 2 feet.

**Response 109:** All contaminants above the established cleanup criteria for the park will be included in the delineation of the removal area. The two-foot cover area site wide is based 6 NYCRR Part 375 requirements and on the information presented by earlier reports generated by Northrop Grumman and the Town of Oyster Bay. There are select areas within the park external to the ball field area where shallow soils, in excess of soil cleanup objectives, exist. The two-foot soil cover language is required if an area has elevated levels of site-related chemical concentrations. Most if not all of the impacted areas referenced are shallow and two feet minimum would have to be excavated to achieve the SCOs to a depth of two feet. Therefore, most, if not all these outlying areas will be addressed by excavation and off-site disposal. The referenced Alternative 5 (the selected remedy) and Exhibits summary call for all contaminant to be addressed that exceed restricted residential to 10 feet. The ROD will clarify these points.

**Comment 110:** Section 7.2 (Elements of Proposed Remedy) does not address soil impacts on Park

property that exist beyond the limits of the OU3 boundary identified in the PRAP. This would include elevated concentrations of constituents of concern, including PCBs above restricted residential SCOs. Areas that should be addressed include perimeter soils around the pool, playground and tennis courts. Furthermore, the recharge basin is not addressed in the PRAP. H2M has previously commented on the lack of remedial investigation work conducted in the recharge basin area and the fact that impacts to this area have not been appropriately delineated. The lack of data should not be used as a basis for excluding the recharge basin area from the remedial action plan. We suggest revisiting the recharge basin area soils and conducting further investigation work to support an appropriate remedial strategy.

**Response 110:** The recharge basin and miscellaneous area adjacent to the town pool and beneath the playground area will be addressed by the site cover requirement. Appropriate changes to the ROD have been made to address this issue. Also see Response 112 for more detail on the cleanup criteria.

**Comment 111:** Table 1 and Table 2 in Exhibit A include references to "Dichlorofluoromethane R-22" as detected constituents. Please clarify these line items. Dichlorofluoromethane is known to be synonymous with Freon R-21.

**Response 111:** Table 1 and Table 2 in Exhibit A have been revised in the ROD.

**Comment 112:** The data show the presence of Freon 22 but not Freon 12 in on-site groundwater.

**Response 112:** That is correct. Freon 12 and Freon 22 have both been detected in the soil gas, however, to date, only Freon 22 has been detected in the groundwater. The ROD has been modified to reflect this comment. Also see Response 28.

**Comment 113:** Page 4 of Exhibit A states that "...the off-site groundwater is also impacted by the Freon plume from the former Town of Oyster Bay Ice Skating Rinks." This statement does not appear to be supported by the data. As indicated in comment 2 above, there have been many Freon™ compounds identified in the OU2 and OU3 plumes. Most of these compounds were not utilized at the Town ice rink facilities. In addition, the coolant that was historically utilized (Freon-22™) is only identified off-site in relatively minor concentrations (i.e. typically less than 10 ppm).

**Response 113:** See Response 111.

**Comment 114:** Exhibit A indicates that on-site soils have been impacted with Freon. Please clarify which Freon compounds have been identified in soil.

**Response 114:** Freon compounds have been identified in the groundwater and the soil gas, not in the site soils.

**A letter dated July 27, 2012 was received from New York American Water, which included the following comments:**

**Comment 115:** It is unacceptable to select a remedy that only provides 90 percent hot spot removal rather than stopping 100 percent of the plume. The failure to properly remediate the OU-3 plume under this PRAP will add to the mass of the overall plume. This will increase the current impact to



the Seaman Neck Road supply well facility and escalate the threat to our DeMott Avenue and Sunrise Mall Plants.

**Response 115:** See Response 9.

**Comment 116:** The PRAP has selected Alternative 5 in which your Department states that it would eliminate the most significant amount of offsite groundwater contamination. We do not understand the basis of this selection since the PRAP lacks important plume delineation data and specific remediation well design parameters. Therefore we request that detailed information be furnished in order to provide a better understanding of the remedy selection. It appears that at the very least Alternative 3 should have been the selected remedy since it would maximize off-site groundwater pumping and treatment when compared to the other alternatives presented in the PRAP. We understand that this Alternative was not selected since your Department stated that Alternative 3 would attempt to completely remediate the OU3 groundwater plume. Since most of the OU3 plume is enveloped in the greater OU2 groundwater plume, this may not be feasible to measure: We do not understand why it would be detrimental to capture the OU-2 plume since this would protect down gradient supply wells such as ours. Please explain why your Department does not support a more comprehensive and integrated plume management and containment approach. We look forward to your response.

**Response 116:** See Response 9.

**A letter dated July 16, 2012 was received from the Bethpage Water District (BWD), which included the following comments:**

**Comment 117:** The first few pages of the PRAP present a confused description that introduces the "Park" site, then subtracts portions, then adds the NGC access road, and then subtracts the Town of Oyster Bay remaining parkland. If the site is the "OU3 Boundary" depicted in Figure 2 of the PRAP, please refer to that Figure when describing the site. More importantly, the site description is further confused by the designation of the site as "Site No. 130003A" (see title page of the PRAP). My understanding is that Site 130003A is the remaining 9 acres of the NGC property which has absolutely nothing to do with the OU-3 Park property. If the OU3 site is different than the 130003A site, the title page of the PRAP should not list a site number that refers to another site.

**Response 117:** OU3 is and has been considered an off-site property to Site 130003A and the PRAP and ROD reflect this.

**Comment 118:** Page 5 of the PRAP states: "To date, Grumman has not signed a Remedial Design and Remedial Action (RD/RA) order on consent for OUI and OU2". Does this mean that NGC is not legally bound by the OUI and OU2 RODS and the Public Water Supply Contingency Plan (PWSCP) that are continually referred to in this PRAP and RI/FS? If they are bound, what document or rule of law makes them bound to honor the terms and conditions outlined in either ROD or the PWSCP? Why has the DEC not commenced an enforcement action to make NGC sign the RODs?

**Response 118:** The Public Water Supply Contingency Plan (PWSCP) is contained in the ROD for OU2 which covers groundwater contamination emanating from the Northrop Grumman site (Site No. 130003A) and the Naval Weapons Industrial Reserve Plant site (Site No. 130003B). Unlike the

United States Environmental Protection Agency, the Department does not have statutory authority to issue unilateral orders for investigation and/or remediation of hazardous waste/contaminants. The Department has a Federal Facility Site Remediation Agreement (FFSRA) with the U. S. Department of the Navy covering the OU2 ROD. While the Department does not have a RD/RA Order on Consent with Northrop Grumman Systems Corporation covering the OU2 ROD, the Department continues to pursue negotiations to obtain such Order on Consent. Nevertheless, to date, Grumman continues to operate the On-Site Containment System and both the Navy and Grumman have entered into various private party agreements with various local water districts to provide for well head treatment for affected water supply wells as required under the PWSCP. Additionally, the Navy and Grumman continue the groundwater sampling required by the PWSCP. Should the PWSCP require future additional wellhead treatment, if the responsible parties fail to act, the Department will in accordance with applicable State law arrange for State Superfund monies to provide same and then seek cost recovery.

**Comment 119:** At page 6, paragraph 6.1.2 of the PRAP, the "contaminates of concern" fail to mention perchlorate. Why is perchlorate not a contaminant of concern? Is the DEC prepared to state that jet fuel or munitions were never disposed of at the site?

**Response 119:** Perchlorate has not been identified as a contaminant of concern for this site. There is a jet fuel spill behind the former Grumman Plant 1 that is being successfully remediated by the Department's Region 1 Spill Response Section.

**Comment 120:** At page 7 of the PRAP, it is reported that "approximately 250 gallons per minute (gpm) of groundwater [is extracted from depths of 50 to 75 feet" by the on-site pump and treat IRM. What evidence does the DEC have to suggest that this small amount groundwater of extraction justifies the statement at Exhibit A, page 2 that "Migration of the on-site groundwater is prevented by the existing groundwater pump and treat system IRM?" What empirical data justifies the statement regarding full on-site containment?

**Response 120:** Quarterly sampling confirms that this system is effective in capturing the shallow groundwater plume where concentrations exceed 5 ug/l.

**Comment 121:** Page 7 and 8 of the PRAP state that "soil vapor intrusion does not represent a concern" due to the fact that there are no on-site buildings. There are no on-site buildings only because the DEC has eliminated the Town of Oyster Bay portion of the Park properly from site. The ice rink and pool facility buildings (which are public facilities) that were formerly part of the site must be included in periodic, ongoing, indoor air testing protocol to insure that the formerly on-site buildings remain safe for the public. Further, the Bethpage High School, directly across the street from the site, shows low levels of TCE in soil vapor on the school property. Has the DEC tested the school buildings for vapor intrusion?

**Response 121:** The Town of Oyster Bay excavated contaminated soil in areas where the facilities have been constructed thereby removing any concern relative to vapor intrusion. The Department and the school district have conducted vapor intrusion studies on the school property and concluded that there were no levels of concern. Also see Response.

**Comment 122:** Page 9, Section 7.1 discusses the criteria for evaluation of the remedial alternatives.

Collectively, no alternative, 1 through 5 can claim that it protects the public health without the acknowledgement that this would not be the case absent the BWD's installation of water treatment facilities at Plant 4 and 6. Exposure via groundwater ingestion would have occurred but for the enhanced treatment facilities installed by the BWD.

**Response 122:** The Department acknowledges that that the public water supply treatment systems are effective in ensuring that the public receives clean drinking water and that the upgrades to BWD Plants Nos. 4 and 6 were necessary to assure acceptable treatment of the levels of contamination currently being received. It should be noted that this is required of public water suppliers notwithstanding any remedial efforts.

**Comment 123:** The current PRAP has no community acceptance. The communities of Bethpage, South Farmingdale, Massapequa, and Aqua New York (Seaford and Levittown) have unanimously rejected any alternative that does not provide the highest level of soil and groundwater remediation.

**Response 123:** The public review process is intended to gauge public acceptance of the proposed remedy and this Responsiveness Summary addresses those comments. This Record of Decision is being issued after considering those comments along with the other remedy selection criteria specified in 6 NYCRR Part375-1.8.

**Comment 124:** Page 13, paragraph 10 states that the "performance standard for groundwater extraction will be 90 percent mass removal for groundwater migrating down gradient from the elevated "hotspot areas". Will this 90 percent removal be achieved prior to the leading edge of the plume impacting the BWD Plant-4 facility? What arrangements has the DEC made for the protection of public health in the event the leading edge of the plume reaches the BWD facility reaches Plant 4 and Plant 5? What is the estimated time frame for the installation and operation of an off-site recovery well?

**Response 124:** The leading edge of the OU3 plume has already reached BWD Plant 4. The hot spot remediation area is upgradient of BWD Plant 4 and will reduce the impact on the plant. As BWD Plant 4 has already been upgraded with controls adequate to treat the levels present in the hot spot, water supplies to ensure the water supplied meets drinking water standards, The Department is supportive of the responsible parties reimbursing the water districts for the costs incurred.

**Comment 125:** The PRAP continually refers to a report entitled Remedy Optimization Team Report/or the Bethpage Groundwater Plume Remedy (Optimization Report). That report states that the OU-3 Plume ... hot spot needs to be effectively contained to reduce future impacts to the down gradient aquifer". One recovery well could not possibly reduce the hot spot contaminate mass by 90 percent.

**Response 125:** The OU3 PRAP requires one or more wells to capture and treat the shallow and deep components of the hot spot identified by the remedial investigation. The ROD has been modified to indicate that the number of recovery wells will be determined during the remedial design.

**Comment 126:** I suggest that the DEC implement the recommendation at page 6 of the Optimization Report that calls for a standardization and synchronization of data collection and sampling of test results. All data so collected should be shared by the responsible parties and down gradient water suppliers, and used collectively to better delineate the plume and its potential impacts.

**Response 126:** All data collected is public information. The Department continues to work with the water districts and the responsible parties to facilitate the sharing of data.

**Comment 127:** Will the PRAP be modified to correct its current deficiencies and inaccuracies?

**Response 127:** The ROD has corrected any deficiencies and inaccuracies identified by the comments received which the Department agreed needed to be made.

**A letter dated July 30, 2012 was received from H2M on behalf of the South Farmingdale Water District (SFWD), which included the following comments:**

**Comment 128:** Page 2 of the PRAP indicates that the "Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments." We truly hope that this is the case since the selected Alternative 5 is inadequate and allows the continued migration of the OU3 plume further jeopardizing the water quality of the sole source aquifer that downgradient water suppliers and their residents depend upon.

**Response 128:** This remedy was selected after evaluation of the remedy selection criteria specified in 6 NYCRR Part 375-1.8.

**Comment 129:** The report refers to the installation and operation of a groundwater pump and treat/on-site Groundwater Containment System IRM. We previously commented on the lack of data to substantiate the conclusion that the groundwater extraction and treatment system has eliminated the migration of additional groundwater contamination off-site at the southern property line. This information should be provided to document the conclusions drawn in the PRAP relative to the effectiveness of the IRM.

Also the PRAP indicates that the "The continued off-site migration of impacted groundwater has largely been addressed by the on-site groundwater pump and treatment system IRM". The data should be provided to substantiate what is being captured and what contamination is continuing to flow off-site. What is the time frame for implementing a capture system to eliminate any further migration of contaminated groundwater from the site?

**Response 129:** See Response No. 120

**Comment 130:** The PRAP states "Within the OU3 plume an area of elevated concentrations, or "hot spot. The groundwater plume of OU3 has been identified approaching the Bethpage Water District No.4 well field." This statement implies that the hot spot is different than the plume. The "Remedy Optimization Team Report for the Bethpage Groundwater Plume Remedy" (prepared at the request of the Naval Facilities Engineering Command Mid-Atlantic (dated June 15, 2011) defined the hot spot as the vertical and horizontal cross-section of the OU-3 plume. Please clarify.

**Response 130:** The OU3 hot spot is defined in the ROD as the area where the concentration of total volatile organic compounds has been detected as high as 5,000 ppb. The hot spot is not the entire length and width of the OU3 plume.

**Comment 131:** There are frequent references in the PRAP to the "Remedy Optimization Report". This Optimization report was commissioned through the OU-2 ROD and prepared in conjunction

with the overall Bethpage plume, not just OU-3. Some of the recommendations of the report as it related to OU3 were either omitted or require clarification in the PRAP. We cite the following from Section 5, Evaluation of Remedy for Off-Site Hot Spot and Plume of the report for your consideration.

"Within the composite plume, reference is made in this report to a "hot spot", which is the portion of the OU3 Plume down-gradient of the Interim Remedial measure and upgradient of Bethpage Water District Plants 4, 5, and 6. This hot spot has elevated VOC levels reaching more than 10,000 parts per billion (ppb) in some places.

"The hot spot in the OU3 Plume is a relatively higher concentration portion of the off-site plume that the Technical Team believes should be prevented from moving further south, as it represents substantially higher concentrations of VOCs than in the rest of the plume. Reduction in VOC mass discharge by at least 90 percent should be a functional goal of the hot spot containment. Mass discharge is the mass (in grams per day) of VOCs moving with groundwater through a vertical cross-section of the aquifer proximally upgradient of the Bethpage Water District Plants 4, 5, and 6 and spanning the OU-3 Plume."

"Demonstrate in a detailed report that the proposed new extraction well (R W-21) or wells will substantially contain the OU-3 plume hot spot and reduce mass discharge across vertical cross section at this location by at least 90 percent. If the current solute transport model is employed for this task, the model must first be calibrated to historical plume concentration data (see Recommendation 5 in Section 7). An alternative and recommended approach is quantifying mass discharge reduction using a well-calibrated groundwater flow model and particle tracking to demonstrate that the capture zone would extend horizontally and vertically across the portion of a well-characterized plume cross-section that represents 90 percent of the mass discharge through this cross-section" And "would capture at least 90 percent of the VOC mass discharge from a vertical cross-section proximally upgradient of the three supply wells and spanning the width and depth of the OU3 plume at this location."

The PRAP should be clear in defining the OU3 hot spot, as it was defined in the Optimization Report. The hot spot is defined as the length and width of the OU3 plume. Additionally, the report called for the prevention of further migration of the OU3 plume, which implies hydraulic containment of the plume.

**Response 131:** See Response 130.

**Comment 132:** Section 7.2: Page 9 indicates that the costs associated with each of the alternatives are presented based on a present worth analysis utilizing a 30 year timeframe. While the cost of Alternative 5 is indicated as \$81,000,000, there is no schedule or summary included to support this cost opinion. The report references Exhibit E, but Exhibit E was not provided with the report. Have all prior capital, operation and maintenance costs that were previously incurred eliminated from the cost analysis?

**Response 132:** All capital, operation and maintenance costs that were previously incurred are not reflected in the cost analysis of the alternatives. Additional detail on the costs is available in the Feasibility Studies which are in the document repository.

**Comment 133:** Section 7.2.8: As evidenced by our (SFWD) comments indicated above, we are encouraged to see that item 8 indicates that the IRM will continue to be operated to assure capture /containment of the full depth and area of contaminated groundwater leaving the site. What is the time frame for implementing this commitment?

**Response 133:** The estimated time frame is 18 to 24 months after an order is in place.

**Comment 134:** Section 7.2.10: According to the PRAP:

"This extraction well, or wells, will be designed to capture and treat the shallow and deep components of this hot spot area of the plume as recommended by the Technical Team for Optimization of the Bethpage Plume Remedy in their June 15, 2011 report prepared for the U. S. Navy. The performance standard for groundwater extraction will be 90 percent mass removal for groundwater migrating downgradient from the elevated hot spot area(s)."

This reference from the report is taken out of context. The optimization report calls for preventing further migration and 90 percent removal of the OU3 plume, not just shallow and deep components. The PRAP must provide for full containment and a minimum of 90 percent mass removal of the plume.

**Response 134:** The ROD provides for a minimum of 90 percent mass removal of the OU3 hot spot.

**Comment 135:** Section 7.2.10: The report indicates "Considerations may be given to the use of BWD facilities for all or part of treatment system." Have the NYSDEC and Bethpage Water District reached an agreement and if so, why isn't that being incorporated into the selected remedy? If not, why isn't this alternative being pursued prior to the PRAP being finalized?

**Response 135:** The Department is aware that the Responsible Parties and the Bethpage Water District have begun discussions relative to the use of some or all of their system as part of the remedial action. We are not aware that any agreement has been reached. However, this provision is acknowledged by the ROD to facilitate implementation of such an agreement should it occur.

**Comment 136:** Exhibit A: The PRAP states that "Within the off-site OU3 plume an elevated, or "hot spot", area of VOCs has been identified that is characterized by elevated levels of TCE (9,100 ug/l) and the breakdown product DCE (3,400 ug/l). Please be consistent with the use of the term "hot spot" as it dictates the basis of groundwater treatment.

**Response 136:** Comment noted. Also see Response 131.

**Comment 137:** Exhibit B: Description of Common Element Technologies - "A pump and treat system involves the installation of groundwater extraction wells to prevent migration and remove contaminated groundwater..." We agree that preventing migration is required, which implies hydraulic containment of the plume. This requirement should be the objective of the remedy that is selected in the PRAP.

**Response 137:** Preventing migration does not imply complete hydraulic containment.

**Comment 138:** Exhibit B, Alternative 3: Restoration to Pre-Disposal Conditions, to the Extent Practicable - This remedy includes a groundwater pump and treat description consistent with what was recommended in the optimization report. The basis for the capital and O&M costs should be provided. What is the cost associated with the groundwater pump and treat aspect of this alternative? What is the basis for stating that this alternative can be implemented in 24 months?

**Response No. 138:** The basis for the costs in the PRAP and, ultimately this ROD, were from the Feasibility Study. The time frame of 24 months is an estimate that is based on the PRPs engineer's estimate of similar projects.

**Comment 139:** Exhibit B, Alternative 5: To clarify, the hot spot as defined in the optimization report is the vertical and horizontal span of the OU-3 plume, which in essence call for 90 percent removal of the OU-3 plume. The recommendation of the optimization report is better characterized by the groundwater remedy identified under Alternative 3: "maximization or off-site groundwater pump and treat system, to the extent practicable, to all areas of the OU-3 plume above groundwater standards." The selected alternative must also include the prevention of further plume migration as recommended in the optimization report. The basis for the capital and O&M costs should be provided. What is the cost associated with the groundwater pump and treat aspect of this alternative?

Does the cost summary include the costs incurred by Bethpage Water District in modifying, operating and maintaining water treatments systems at plants 4, 5 and 6? What is the basis for stating this alternative can be implemented in 24 months?

**Response 139:** The OU3 contaminated groundwater hot spot is not defined as the entire length and width of the OU3 plume. Also see Response Nos. 134, 135, 137, 140 and 141.

**Comment 140:** Exhibit D: Please clarify that the term hot spot is defined as the vertical and horizontal extent of the OU-3 plume.

**Response 140:** See Responses 131, 134 and 137.

**Comment 141:** The PRAP indicates "For on-site groundwater, Alternative 3 offers the closest to complete groundwater remediation. However, it is not possible to contain completely the OU3 plume that lies mostly within the OU2 plume. There was no information provided in the PRAP that would provide the basis for this statement. What was the technical basis for this statement - how many extractions wells, what are their depths, where would they be located. what would their pump age be to provide hydraulic containment of the OU-3 plume? The PRAP also states that "Alternative 3 would attempt to completely remediate the OU-3 groundwater plume. Since most of the OU-3 plume is enveloped in the greater OU-2 groundwater plume. This may not be feasible to measure."

Since the description of the alternative is to "maximize" remediation, why would it matter that the OU3 plume also lies partially within OU-2? The purpose of creating operable unit 3 (OU-3) was so that the DEC could address OU-3 and not defer to the difficulties they have in addressing the plume from OU-2. The plume has enough definition to it, although not complete, to implement a comprehensive pump and treat system to contain the plume.

**Response 141:** See Responses 131, 134 and 137.

**Comment 142:** Exhibit D: There are statements in the PRAP that infer or state that the timeframes

for implementation and effectiveness vary significantly, yet the time frames indicated in Exhibit B for Alternatives 3, 4 and 5 only vary from 18 to 24 months. Further, from a groundwater treatment perspective, Alternative 3 is the most effective of the alternatives evaluated because it will remove the highest mass of VOCs and be implemented in a timeframe fairly consistent with alternatives 4 and 5.

**Response 142:** The implementation time frame is for all five alternatives. Also see Response 138.

**Comment 143:** Figure 10: The width of the groundwater plume is about 1,000 feet. It appears feasible to install a series of wells to provide hydraulic control of the OU 3 plume near its leading edge and upgradient of Bethpage Plant 4. Hydraulic control will maximize plume capture and remediation over time.

**Response 143:** This suggests acceptance of Alternative 3 which was evaluated and determined not to be the selected remedy. Significant implementability issues were identified with the use of collection wells to capture the entire downgradient plume.

**Comment 144:** The SFWD disagrees with the conclusion of the PRAP and finds Alternative 5 as unacceptable, since it does not prevent the further migration of the plume and allows the plume to continue to threaten public water supply wells. Further, there has not been sufficient evaluation to properly evaluate the true potential for hydraulic containment. For the OU-3 plume, it appears that the potential for hydraulic containment was eliminated without "adequate analysis. Implementation of a hydraulic containment option, as soon as possible, will maximize plume remediation and minimize the potential of having to install multiple extraction wells throughout the entire body of the plume at some time in the future. The selected option, Alternative 5, does not provide sufficient extraction wells to maximize plume remediation and prevent further migration.

**Response 144:** See Responses 131, 134, and 137.

**A Letter Dated July 27, 2012 was received from the Massapequa Water District (MWD), which included the following comments:**

**Comment 145:** The PRAP for Site No. 130003A repeats the same mistakes of the past 25 years by failing to focus on the removal and extraction of the contamination in the sole source aquifer so that down-gradient public water supplies are not forced to adopt well-head treatment as the primary engineering solution to eliminate the risk of exposure to contamination that is migrating in the aquifer. Furthermore the PRAP is unnecessarily vague and lacks specific information with regard to necessary upgrades to extraction systems, what performance standards will be imposed and what will define remedy effectiveness.

**Response 145:** Comment noted.

**Comment 146:** The present OU 3 PRAP has again selected a remediation measure that does not provide specific details on the boundary conditions of the plume hot spot. However MWD's position is that the entire comingled plume must be contained and the OU-3 hot spot is merely part of the plume. This information is critical for determining the location and design of remediation wells. Therefore there is no assurance that the proposed remedy will properly protect vital public water



supply wells from initial or continued contamination. The selected remediation alternative in the PRAP does not require comprehensive groundwater clean-up. The selected remedy has not been justified based on engineering predicated on obtaining basic and fundamental information needed to design a permanent remedy. The selection of a permanent remedial approach requires defining and delineating the plume hot spot, a striking omission in the PRAP. The NYS DEC acknowledges this serious omission by resort to vague future outcomes, including, but not limited to: (i) existing groundwater extraction and treatment will continue to be "upgraded as necessary" [without defining what "as necessary" means; and (ii) monitoring of groundwater quality will be undertaken to "accesses the performance and effectiveness of the remedy" [without defining what performance and effectiveness" are to mean; while consistently relying on a "Wellhead Treatment Contingency Plan" which authorizes the expansion of the plume as long as treatment is implemented once the well head is contaminated.

**Response 146:** See Response 130.

**Comment 147:** The OU-3 PRAP is not consistent with the approach recommended in the FS. The FS consisted of two volumes that detailed the recommended remedy for Operable Unit 3 (OU3). This included identifying and screening remedial technologies and evaluating remedial alternatives for the Site Area portion of OU3 (Volume I) and for the Study Area portion of OU3 (Volume 2). Under Volume 2 of the FS, the consultant identified and screened remedial technologies and evaluated six (6) remedial alternatives for Contaminants in groundwater in the Study Area. Unfortunately the PRAP does not adequately segregate and address the off-site groundwater remedy when performing a financial analysis. Therefore the PRAP is a convoluted document that inappropriately commingles on-site and off site activities, ultimately relying on wellhead treatment that permits the continued expansion of the contaminant plume. The approach skews the economic analysis by ignoring the costs of treatment at all of the wellheads impacted by the Grumman-Navy Site, and does not properly segregate and evaluate off site groundwater contamination alternatives.

**Response 147:** See Response 6.

**Comment 148:** On October 19, 2011, MWD jointly communicated concerns and comments with American Water, BWD, and SFWD to the NYSDEC when the draft Comprehensive Feasibility Study (FS) was issued. The FS is the basis for the development of the PRAP. The following specific OU-3 FS Study area concerns are detailed in the referenced letter that included the following:

**a.** The FS needs to assess the impact to the supply wells in the path of the comingled plume. Wellhead treatment and associated cost must be considered.

**b.** All viable alternatives have not been evaluated. It should be noted that the FS alternatives are not the same as the PRAP alternatives. The FS, as with the PRAP, has failed to assess the impact to the supply wells in the path of the comingled plume. Therefore wellhead treatment and associated costs have not been evaluated (in the PRAP). Furthermore, the FS has failed to evaluate alternatives for plume containment and hot spot treatment (other than FS Alternative 6). Therefore the FS and PRAP cannot be deemed to be comprehensive.

**c.** The hot spot in the OU3 Plume contains much higher VOC concentrations than the rest of the off-Site plume. This hot spot needs to be effectively contained to reduce future impacts to the down

gradient aquifer.

**Response 148:** The Feasibility Studies, or FS reports for OU3, are the basis for the development of alternatives in the OU3 PRAP and subsequently this ROD. Also see Response 6.

The costs of wellhead treatment are included in the OU2 ROD and are not presented in this document. The full range of alternatives was evaluated and was presented to the public with the release of the PRAP. Full plume containment, an alternative for groundwater in OU2, was deemed not feasible. This is discussed in more detail in the preamble to this Responsiveness Summary.

**Comment 149:** A more technically integrated approach among various stakeholders for managing groundwater impacts in OU-2 and OU3 would provide many advantages at this site. The NYSDEC must consider plume containment of the entire plume caused by the Grumman-Navy Industrial Facility plume; what the NYS DEC labels as the comingled OU-2 and OU-3 plume. There is no comingled plume, there is simply a plume arising from the Industrial Facility Site that needs to be comprehensively addressed. A preliminary concept is illustrated on the attached map. Given an average horizontal groundwater flow rate of 1 foot per day, a conceptual hydraulic barrier of 12,000 feet wide by 600 feet deep by 1 foot thick, and an average porosity of 25 to 40 percent, a preliminary theoretical withdrawal rate of approximately 20 million gallons per day (MGD) would be needed in the identified zone. This conceptual approach will protect the non-impacted South Farmingdale, American Water and MWD supply wells.

**Response 149:** The OU2 and OU3 groundwater remedies, when fully implemented, will represent a comprehensive groundwater remedy approach for treatment, monitoring and wellhead protection. Also see the preamble to the Responsiveness Summary.

**Comment 150:** To the extent that the NYS DEC defaults to wellhead treatment, the PRAP should make clear and unambiguous that Grumman and the Navy are liable and must pay for all wellhead treatment costs for the supply wells that are presently impacted and that may become impacted. To the extent that the NYS DEC PRAP fails to make this explicit, it leaves open the possibility that the public will end up subsidizing the PRPs, an outcome that ignores the polluter pays enforcement principle that has been the policy at the NYS DEC.

**Response 150:** The Department does not agree that the remedy defaults to wellhead treatment. Wellhead treatment is a necessary component of the overall remedial approach. Also see Responses 35 and 118.

**Comment 151:** The Bethpage Water District (BWD) has immediate needs regarding the impact of this latest contamination, and ongoing contamination of its drinking water supply from the Grumman/Navy plume. H2M which individually and separately represents the BWD, the SFWD the MWD, presented a new approach to the alternatives for the most immediate and critical needs at BWD Plant 4 site that must be recognized by the NYSDEC. In addition to being innovative, this approach represents a cost savings to the overall cleanup process as it relates to the VOC contamination impacting Plant 4 as well as an identified hot spot in the OU-3 study area. BWD presented a cost effective and environmentally progressive solution for addressing disposal of treated groundwater through water re-use at the Bethpage golf course that is in close proximity to BWD Plant 4. Since the level of threat by the excessive concentrations of contamination surrounding

Plant 4 will result in the long term loss of the plant as a public drinking water facility, that resulting impact necessitates the replacement of lost pumping capacity. The BWD has commenced a study for the replacement of Plant 4 that could be achieved by locating supply wells and storage facilities outside of the plume area, northeast of the plume.

**Response 151:** The Department is aware that the Responsible Parties and the Bethpage Water District have begun discussions relative to the use of some or all of their system as part of the remedial action. However, we are not aware of any agreement that has been reached.

**Comment 152:** Section I: The PRAP states "The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment." The Massapequa Water District ("MWD") notes that the remedy proposed in the PRAP does not meet this objective from a drinking water public health protection perspective in that the PRAP authorizes the expansion of the contaminant plume, tolerates the migration of the plume to down-gradient water supplies and ultimately relies upon wellhead treatment thereby permitting the pollution of the sole source aquifer. The MWD suggests that this outcome is bad public policy and inconsistent with the applicable regulations that seek permanent remedial measures that are directed to achieving pre-disposal conditions. The Magothy Aquifer is the sole source for many water supplies on Long Island. The pre-disposal condition goal is rendered meaningless if the NYSDEC allows this contaminant plume to continue to expand because the NYSDEC has decided to rely upon wellhead treatment as its default remedy.

**Response 152:** The Department does not agree that the selected remedy relies on wellhead treatment as a default remedy.

**Comment 153:** The NYSDEC fails to acknowledge in the PRAP the importance of protecting sole source aquifer supply wells from current and future water source contamination. According to the EPA, "Sole source water is untreated water from streams, Rivers, lakes and underground aquifers used to provide public drinking water, as well to supply private wells used for human consumption. Some water treatment is usually necessary, so public utilities treat most of the drinking water before it enters the home. However, the cost of this treatment, as well as the risks to public health can be reduced by protecting source water from contamination. EPA. Other federal agencies State and local communities, businesses and citizens, all play role in ensuring that drinking water is protected."

This importance was underscored by the federal Safe Drinking Water Act (SDWA) Amendments of 1996 that created a Source Water Assessment Program (SWAP) to evaluate existing and potential threats to the quality of public drinking water supplies throughout the U.S. The foundation of SWAP is to ensure safe drinking water through the multiple-barrier approach. To carry out this program in New York, the Bureau of Water Supply Protection of the New York State Department of Health (NYSDOH) developed the Long Island SWAP Plan. Simply relying on wellhead treatment when there is time and available measures to undertake action for plume containment and protection of non-impacted supply wells is inconsistent with the SDWA Amendments of 1996.

**Response 153:** See Response 128.

**Comment 154:** Section 3: This section describes the overall plume management approach based on employing three operable units. Unfortunately the PRAP does not address or acknowledge an

important plume management recommendation formulated in the June 15, 2011 Remedy Optimization Team Report for the Bethpage Groundwater Plume Remedy" (Optimization Report). The report succinctly recommends that "Given the relative proximity of OU-2 and OU-3 and the possible intermingling of the OU-2 and OU-3 Plumes down-gradient. A more technically integrated approach among various stakeholders for managing groundwater impacts in OU-2 and OU-3 could provide many advantages for this site." MWD expected that the PRAP, which was significantly delayed for over seven months by the NYSDEC, would have incorporated the important recommendations formulated in the Optimization Report. Unfortunately, the NYSDEC, despite an unexplained 7 month delay, did not adopt any of the recommendations presented in the report in the preparation of the PRAP or the demands of the regional water suppliers impacted and located in the path of the plume. The NYSDEC should fully explain its rejection of plume containment and set forth a full financial assessment of its cost analysis if plume containment was rejected based upon, in whole or in part, the costs associated with such containment.

**Response 154:** This remedy addresses OU3. The Department has considered the Department of the Navy's Optimization Report and the PRAP, and now the ROD, has incorporated the remediation of the OU3 off-site plume hot spot in the remedy. The preamble of this Responsiveness Summary covers the comment regarding full plume containment of the overall OU2 groundwater impacts.

**Comment 155:** Section 3, Site Geology and Hydrogeology: The PRAP correctly identifies the water bearing strata beneath OU3 to be designated as a sole source aquifer but fails to acknowledge the significance of the designation. The NYSDEC should explain for the public what it views as the meaning and importance of a sole source aquifer and explain whether a sole source aquifer is given any particular increased protection by the NYSDEC in remedy decision making.

**Response 155:** See Response 128.

**Comment 156:** Section 5: The PRAP fails to acknowledge the past Grumman-NASA Connection. From 1963 to 1972 (approx) at its Bethpage, N.Y. facility, Grumman Corporation, now part of the Northrop Grumman Aerospace Systems sector, designed, assembled, integrated and tested the Lunar Module of the Apollo Space program. Therefore NASA is another potentially responsible party (PRP) that should be added to the PRAP. The Department should respond as to why NASA is not a PRP for the contamination.

**Response 156:** Section 5 identifies Potentially Responsible Parties identified at this time, but is not a final determination.

**Comment 157:** Section 6, Groundwater: The PRAP states that "The continued off-site migration of impacted groundwater has largely been addressed by the on-site groundwater pump and treatment system IRM". How has this been validated? The PRAP does not provide supporting data to support this statement. Please fully set forth the technical basis for this conclusion, including all sampling data relied upon in reaching this conclusion.

**Response 157:** See Response 120.

**Comment 158:** Section 7.2: The PRAP discusses the use of "Green remediation principals and techniques will be implemented to the extent feasible as per NYSDEC DER Guidance 31". The

document significantly lacks review of green remediation principals and techniques from a drinking water perspective. The failure to properly contain the OU3 plume and reliance on the Wellhead Treatment Contingency Plan does not embrace green remediation principals and techniques since potable water treatment facilities require significant energy and chemicals to operate; particularly on an in-perpetuity basis. Using properly designed containment wells and remediation systems will require less energy and treatment chemicals when compared to a potable water application. The PRAP failed to include this information and the Department is requested to include this analysis for public review and comment. Absent any support for its recitation of green remediation, the PRAP should delete the language and the Department should acknowledge that green remediation principles were ignored.

**Response 158:** The comment asks for information related to green remediation that will be developed as part of the design of the remedy.

**Comment 159:** Section 7.2: The PRAP mentions that "The existing groundwater and treatment IRM will continue to be operated and upgraded as necessary, based on a review of its effectiveness " The PRAP fails to describe the methods to be employed and criteria to be used to determine effectiveness. This statement is meaningless unless specific criteria and methods are clearly established in the document. Fully describe what upgrades would be considered and what criteria will be used to make a decision to upgrade the system.

**Response 159:** See Response 130.

**Comment 160:** Section 7.2: The PRAP makes a determination that at least one groundwater extraction well with necessary treatment (the exact number to be determined during the design phase) will be installed. The document also cites the Optimization Report by stating that the performance standard for groundwater extraction will be 90 percent mass removal for groundwater migrating down gradient from the elevated "hotspot area(s)". The 90 percent mass removal is a gross miss-characterization of the Optimization Report and is an extremely poor attempt to implement only one of the many recommendations formulated in the report. Page 10 of the report recommended "Reduction in VOC mass discharge by at least 90 percent should be a functional goal of the off-site containment." This does not set the bar at 90 percent but rather at 100 percent with the minimum performance of 90 percent removal.

**Response 160:** See Response 9.

**Comment 161:** The recommendation to install and operate one new remedial well to reduce VOCs is highly inadequate for optimizing VOC mass removal in groundwater. Furthermore, this option does not provide a high degree of scientific confidence that it will prevent plume migration. This recommendation relies on existing public water supply wells utilizing wellhead treatment. Public water supply wells operate based on potable water demand conditions and are not operated to facilitate proper groundwater remediation. The responsible parties must employ proper remediation measures that rely on remediation wells that are designed and operated to facilitate optimum plume clean-up. The Department should fully describe what it expects one well will accomplish, including the pumping rate, the cone of influence, the horizontal and vertical scope of extraction. etc. The PRAP fails to define the "hot spot" in terms of location, depth and magnitude. This data is vital for determining the potential effectiveness of the off-site groundwater remedy. Furthermore, MWD does

not understand how the NYSDEC can formulate cost projections without having the critical yet basic data required to define the scope of the "hot spot" clean up. The PRAP must be revised to correctly state the recommendations of the Optimization Report. Furthermore the PRAP must address and consider all of the recommendations formulated in the report. The PRAP is clearly deficient in this area.

**Response 161:** The OU3 PRAP, and now the ROD, requires one or more wells with treatment to contain at a minimum 90% of the shallow and deep components of the hot spot identified by the remedial investigation.

**Comment 162:** Exhibit A, Groundwater: This section of the PRAP acknowledges the comingling of OU3 and OU2 plumes but fails to discuss the Optimization Report recommendation for adopting a more technically integrated approach to address the intermingled plume. This will include modifying the operation, maintenance and monitoring as necessary to meet these revised goals for this project.

**Response 162:** The applicable recommendations sections of the Navy Optimization report have been incorporated into this ROD. Also see the Preamble of this Responsiveness Summary.

**Comment 163:** Exhibit A, Tables 1 and 2: MWD is having difficulty understanding how the Standard Criteria or Guidance (SCGs) are set in Tables 1 and 2. Typos appear to be unlikely, given that of the thirteen VOCs listed in both tables, two are higher in Table 2 (off-site); 3 are lower, which for a class GA water means meeting the drinking water standards; and 7 are the same in both tables. One has no SCG listed in Table 2 but has one in Table 1. Offsite groundwater SCGs one (1,1,1 trichloroethane) exceeds the NYS Drinking Water POC MCL, and is higher than the Ambient Standard of 5. One on-site SCG 1,2 dichloropropane exceeds the POC MCL dramatically - 50 ppb is the listed SCG, and a Standard of 1 ppb is listed in the TOGS and in Table 2.

Focusing further on Table 2 the off-site groundwater SCGs MWD found two listed guidance values that are actually lower in the 1998 NYSDEC 1.1.1 TOGS (Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations) 0.7 ppb is listed for tetrachloroethene, and 0.3 ppb is listed for vinyl chloride. Instead Table 2 uses the current NYS MCLs for the respective contaminants (5 and 2 ppb respectively).

**Response 163:** The tables in the ROD have been corrected in response to this comment.

**Comment 164:** Exhibit B: MWD does not understand the rationale for combining on site and off site remedial technologies into five alternatives in the "Description of Remedial Alternatives" section of the PRAP. It is nonsensical to comingling the off-site groundwater remedial alternatives with soil remediation measures. In particular the off-site groundwater concerns must be segregated and assessed on a stand-alone basis based on drinking water supply well impacts. Combining on-site measures with off-site measures will distort the public health assessment and cost analysis when comparing alternatives. The PRAP must clearly separate the evaluation and selection of alternatives on an "on-site" and "offsite" basis as evaluated in the Feasibility Studies (FS). The PRAP is not a consistent with the approach used in the prior FS.

**Response 164:** See Response 6.



**Comment 165:** Exhibit B, Common Elements: The following comment elements are problematic to MWD:

a. Evaluate and upgrade, if necessary, the current on-site pump and treat system, to achieve complete containment at the down gradient edge of the site, of all impacted groundwater above groundwater standards; The PRAP fails to describe the methods to be employed and criteria to be used to determine effectiveness. This statement is meaningless unless specific criteria and methods are clearly established in the document.

b. The Wellhead Treatment Contingency Plan put in place as a requirement of the OU2 ROD will remain in place and will be applicable for any impacts attributable, in whole or in part, to the OU3 off-site groundwater plume. MWD strongly disagrees with the mindset that wellhead treatment to meet drinking water standards is being used as a primary means to protect public health. This should only be a measure of last resort. It should be noted that EPA has established Maximum Contaminant level Goal (MCLG) of zeros for Tetrachloroethylene (PCE) and trichloroethylene (TCE). An MCLG is the contaminant level in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals (2). It should be further noted that the EPA is providing serious consideration to lower MCLs over the next few years for PCE and TCE. It appears highly likely that EPA can lower the MCL to something closer to the current reliable detection limit of 0.5 ppb and this decision would be highly defensible in the context of the SFWD requirement that the MCL must be as close to the MCLG "as feasible". 80th are common solvents and are found quite often in concentrations below the current MCLs of 5 ppb. The lowering of the MCLs will result in far higher wellhead treatment costs. The DEC has neither demonstrated the risk analysis to support a public health concern nor a valid detailed estimate of costs that could allow industry wide acceptable comparison between or wellhead treatment and the plume migration stoppage and cleanup over the life cycle of the contamination.

**Response 165:** See Response 130.

**Comment 166:** Exhibit B, Alternative 5: The section repeats the mischaracterization of the Optimization Report as it relates to hot spot treatment system performance (refer to MWD Comment 8). A detailed report, as recommended in the Optimization Report to assess the proposed remedy, has not been prepared and the, criteria for defining the "hot spot" has not been defined in the PRAP. Figure to is referenced to depict the "hot spot" and proposed remediation wells. Based on the location of the proposed remediation wells we do not understand how one to two wells will remove contamination to below detection limits at depths 10,600 feet or greater. The figure also fails to disclose the date that the TVOC iso-concentration contours were developed. Therefore it cannot be determined if the data depicted is considered to be reflective of current conditions.

MWD does not understand how costs estimates can be prepared when critical data and design attributes are lacking. The values developed have no credible basis. Therefore, using economic factors in selecting Alternative 5 as the remedy is clearly inapplicable. Furthermore, co-mingling the soil remediation alternatives distorts the economic comparisons. The off-site groundwater remediation must be separated in order to provide an objective assessment of alternatives.

**Response 166:** The costs are considered to be accurate within minus 30 and plus 50 percent based on

National Contingency Plan and USEPA guidance.

**Comment 167:** Exhibit C, Remedial Alternative Costs: The PRAP fails to provide data to support the cost estimates provided in the Exhibit C table.

**Response 167:** Supporting information for the cost estimates are in the Feasibility Studies which are available in the document repositories.

**Comment 168:** Exhibit D: The offsite groundwater hot spot has not been defined.

**Response 168:** The Department considers the investigation data to adequately identify this area, however, further delineation will be undertaken as part of the design.

**Comment 169:** Exhibit D, Compliance with SCGs: The narrative relative to groundwater contamination and standards requires significant clarification based on the concerns provided under MWD Comment 10. The section also fails to address the current EPA proposal to lower drinking water MCLs for TCE and PCE.

**Response 169:** The Department does not agree that further clarification is needed. This remedy is based on existing standards. If standards change in the future, the remedy may need to be re-evaluated.

**Comment 170:** Exhibit D, Short-term Impacts and Effectiveness: This section of the PRAP states that the "installation of an offsite maximized groundwater extraction and treatment system in a densely populated area would have Significant short term impacts. There are increased short-term impacts due to the degree of difficulty of constructing larger offsite groundwater pump and treatment system. This includes a larger number of groundwater extraction wells, pipelines, treatment system(s), and points of discharge." MWD strongly disagrees with this statement. The groundwater extraction portion of the system will be underground and would not adversely impact densely populated areas with the exception of the short duration of construction. Given the relative close proximity of the Grumman-Navy site and Seaford- Oyster Bay Expressway right of way, there is adequate land available to construct a treatment system. These are non-residential areas. Perhaps expansion of the GM-38 facility could also be considered. The GM-38 system demonstrates that an offsite treatment system can be constructed without impacting densely populated areas. The PRAP also fails to consider the short and long term impacts of constructing wellhead treatment systems on existing drinking water wells located in residential communities. Wellhead treatment construction for existing supply wells in residential areas has a higher degree of difficulty when compared to proactive plume containment and remediation. The supply wells operated by MWD are located in such areas.

Therefore the evaluation of "Short term Impacts and Effectiveness" is incomplete and inaccurate.

**Response 170:** The Department agrees with the commentator that the short and long-term impacts of each of the alternatives can be managed.

**Comment 171:** Exhibit B, Long-term Effectiveness and Permanence: The statement made in the last paragraph of the Long-term Effectiveness and Permanence section dismisses Alternative 3 without a scientific basis. This paragraph states the following:

"For offsite groundwater, Alternative 3 offers the closest to complete groundwater remediation. However, it is not possible to contain completely the OU 3 plume that lies mostly within the OU2 plume. Alternative 3 is followed by alternatives 4 and 5 for permanence for offsite groundwater."

The Optimization Report recommended that a comprehensive conceptual site model needs to be developed based on an integrated analysis of all available OU-2 Plume and OU-3 Plume information, kept updated, and used as a dynamic tool to guide each successive monitoring, modeling, and treatment step. No such model or study has been conducted at this time. Accordingly MWD does not understand the basis for stating that, it is not possible to contain completely the OU 3 plume. The report also stated the hot spot needs to be effectively contained to reduce future impacts to the down-gradient aquifer. Therefore the selection of Alternative 3, which calls for the maximization of the on-site groundwater pump and treatment system, would confirm to the objective stated in the Optimization Report and be at a minimum the appropriate remedy.

**Response 171:** The selected remedy was based on the evaluation of all of the remedy selection criteria. The implementability issues associated with Alternative 3 were not the only reason that Alternative was not selected.

**Comment 172:** Exhibit D, Reduction of Toxicity, Mobility or Volume: What is the scientific basis of the statement that "Alternative 5 would eliminate the most significant amount of offsite groundwater contamination. "This is particularly confusing and conflicts with the description of Alternative 3 which would afford for the maximization of the offsite groundwater pump and treatment system and provide for more remediation of the plume than Alternative 5.

**Response 172:** Alternative 5 will remove the most significant contamination within the OU3 "hot spot."

**Comment 173:** Exhibit D, Implementability: This section of the PRAP places the implementability of Alternative 3 behind Alternatives 4 and 5. According to the PRAP, the reason is that" Alternative 3 would attempt to completely remediate the OU3 groundwater plume. Since most of the OU2 plume is enveloped in the greater groundwater plume, this may not be feasible to measure. MWD questions the merits of this statement particularly since the Optimization Report strongly recommended a more technically integrated approach among various stakeholders for managing groundwater impacts in OU2 and OU3. Furthermore why would the capture of the OU-2 be detrimental to protecting down gradient public supply wells? The management approach previously and currently employed by the NYSDEC for administering this large plume is insane and has been ineffective for protecting supply wells. The same management mistakes have been repeated and have resulted in continued and new impacts to drinking water supply wells within and downgradient of the plume. The PRAP also discusses the purported greater difficulty of implementing larger pump and treat systems. Refer to MWD Comment 17 as it relates to our strong disagreement with the statement.

**Response 173:** See Response 151.

**Comment 174:** Exhibit D, Cost-Effectiveness: This section provides the erroneous rationale for the selection of Alternative 5.

**Response 174:** See Response 171.

**A letter dated July 30, 2012 was received from Citizens Campaign for the Environment (CCE), which included the following comments:**

**Comment 175:** The DEC's proposed remedial action plan (PRAP) for the Grumman OU3 groundwater plume, Alternative 5, is inadequate, and does not consider the long-term consequences of leaving contaminants to travel further through groundwater.

**Response 175:** See Response 171.

**Comment 176:** The CCE urges the DEC to change the preferred method from Alternative 5 to a more aggressive remediation plan of Alternative 3.

**Response 176:** See Response 171.

**Comment 177:** The DEC, EPA, USGS and the U.S. Navy have been studying and characterizing this site for decades. Meanwhile, the plume traveled farther. It is imperative that the plume accurately be delineated and prevented from further migration throughout south shore communities.

**Response 177:** The remedy requires further delineation of the downgradient edge of the plume and will also control further migration of the hot spot area.

**Comment 178:** The cost of remediation for the plume should not rely on Town of Hempstead, Town of Oyster Bay, water customers, or New York State Taxpayers. The U.S. Navy and Grumman are solely responsible for the identified contamination and therefore be 100 percent responsible for all associated costs of remediation and ensuring safe drinking water to the public.

**Response 178:** The Department will pursue all responsible parties to implement the remedy and reimburse the Water Districts for all eligible costs.

**Comment 179:** CCE supports Alternative 3 with specification about including a hydraulic containment component.

**Response 179:** Comment noted.

**A letter dated July 23, 2012 was received from the Bethpage Union Free School District, which included the following comments:**

**Comment 180:** The installation and operation of Community Air Monitors stationed by the NYSDEC at the entrances to Bethpage High School on both Stewart and Cherty Avenues. As you know, contaminated soil was removed from the Bethpage Community Park several years ago. At that time residents expressed concern about dust they felt posed a danger. We are now facing the same situation with the excavation of soil proposed in the Plan.

**Response 180:** A community air monitoring plan will be developed and implemented to ensure that

dust is not a problem during the remediation. Also see Response 20.

**Comment 181:** We must receive a written schedule detailing the timing of the remediation and the truck routes you are proposing to use.

**Response 181:** The schedule will be developed during the remedial design and will be provided at that time. Public outreach will occur during the design to share that information with all involved.

**Comment 187:** Our consultants have recommended immediate testing for possible contamination at both the Bethpage High School and Central Boulevard Elementary School. In order to ensure the testing is conducted as soon as possible, the District will utilize an independent testing company and submit our invoice for reimbursement from the NYSDEC.

**Response 188:** See Response 24.

**Comment 189:** Since the extent of the plume at this point is so large, our consultants have also recommended that permanent groundwater monitoring wells and soil vapor points be installed at both Bethpage High School and Central Boulevard Elementary School. This will provide for periodic testing of groundwater and soil vapors that may be impacting our schools. We request that these wells and sampling points be installed by the NYSDEC as soon as possible at no cost to the District.

**Response 189:** The Department considers the groundwater plume (at least in the area near the site) to be fully characterized. The data is available in the document repositories and will be made available to your consultants, if it has not already been. Additional groundwater characterization associated with the groundwater plume from the Town Ice Rink is expected to result from the Town's ongoing Brownfield Cleanup Program project to study the ice rink area. Also see Response 24.

## **APPENDIX B**

### **Administrative Record**



# **Administrative Record**

**Northrop Grumman-Bethpage Facility  
State Superfund Project  
Site No. 130003A  
Operable Unit No. 3**

1. Order on Consent, Index No.W1-0018-04-01, between the Department and Northrop Grumman Systems Inc., executed on June 28, 2005.
2. Public Meeting Transcript – June 12, 2012, Veritext Reporting Company

## **Reports**

3. Study Area Feasibility Study Report, ARCADIS Inc for Northrop Grumman Corp (NGC), April 7, 2011.
4. Site Area Feasibility Study Report, ARCADIS Inc. for NGC, March 4, 2011.
5. Supplement to the Site Area Remedial Investigation Report ARCADIS Inc. for NGC, January 8, 2009.
6. NGC Report entitled "Navy Responsibility for OU3 and Bethpage Community Park, April 6, 2011".
7. Study Area Remedial Investigation Report, ARCADIS Inc for NGC, February 7, 2011.
8. Site Area Remedial Investigation Report, ARCADIS Inc. for NGC, February 7, 2011.
9. Town of Oyster Bay Interim Remedial Measure Final Engineering Report, H2M Inc. for The Town of Oyster Bay, March 2009.
10. NYSDEC- EA Engineering Summary Report for Supplemental Soil Vapor Investigation of the Former Grumman Settling Ponds, June 2008.
11. NYSDEC-EA Engineering Summary Report for an Immediate Soil Vapor Intrusion Investigation at Former Grumman Settling Ponds, December 2007.
12. Town of Oyster Bay Addendum to the remedial Action Plan Report, Town of Oyster Bay, March 2006.
13. Town of Oyster Bay (TOB) Supplemental Investigation Report, December, 2005.

14. Town of Oyster Bay Investigation Report and Remedial Action Plan, November 2005.
15. Grumman (by Dvirka & Bartelucci) Report of Findings - Bethpage Community Park  
December 2002.
16. Plant 24 Access Road Area Investigation Report, Dvirka & Bartilucci, April 2002.
17. NYSDEC & NYSDOH Residential Yard Sampling, 2002.

**Correspondence during PRAP Comment Period**

18. Congressman King to NYSDEC Commissioner, July 31, 2012.
19. Department of the Navy-Sobel to NYSDEC, July 30, 2012.
20. South Farmingdale Water District (SFWD) to NYSDEC, July 30, 2012.
21. Town of Oyster Bay ( by Cashin-Spinelli-Ferratti) to NYSDEC, July 30, 2012.
22. TOB-H2M to NYSDEC, July 30, 2012.
23. Citizens Campaign for the Environment to NYSDEC, July 30, 2012.
24. NGC-Gershonowitz to NYSDEC, July 27, 2012.
25. American Water (AQUA-NY) to NYSDEC, July 27, 2012.
26. South Farmingdale Water District (SFWD), Massapequa Water District (MWD) &  
Bethpage Water District (BWD) to Gov. Cuomo, July 24, 2012.
27. Bethpage School District to NYSDEC, July 24, 2012.
28. Schmitt, Nassau County Legislature, July 24, 2012.
29. Executive Mangano, Nassau County to NYSDEC Commissioner, July 24, 2012.
30. MWD to DOH Commissioner, July 24, 2012.
31. Bethpage School District to NYSDEC, July 23, 2012.
32. Biltmore shores Civic Assn to NYSDEC, July 19, 2012.
33. Nassau County Coalition for Civic Assns to Governor Cuomo, July 18, 2012.

34. BWD to NYSDEC, July 16, 2012.
35. SFWD, MWD, BWD & American Water Works (American) to NYSDEC, July 24, 2012.
36. NYS Assemblyman McDonough to NYSDEC Commissioner, July 11, 2012.
37. Denenberg, Nassau County Legislature to NYSDEC Commissioner, July 9, 2012.
38. MWD to NYSDEC Commissioner, June 27, 2012.
39. MWD to NYSDEC Deputy Commissioner Leff, June 27, 2012.
40. MWD to NYSDEC, June 27, 2012.
41. MWD to NYSDEC, June 12, 2012.
42. NYS Senator Marcellino to NYSDEC Commissioner, June 20, 2012.
43. NYS Senate Marcellino, Hannon, Fuchillo to NYSDEC Commissioner.
44. NYS Assemblyman Saladino to NYSDEC Commissioner, June 12, 2012.
45. MWD to NYSDEC Commissioner, June 6, 2012.
46. BWD, SFWD & MWD to Governor Cuomo, June 6, 2012.
47. NGC-Gershonowitz to NYSDEC Commissioner Martens, June 6, 2012.
48. Senator Schumer to NYSDEC Commissioner, June 6, 2012.
49. MWD to NYSDEC Deputy Commissioner Leff, June 5, 2012.