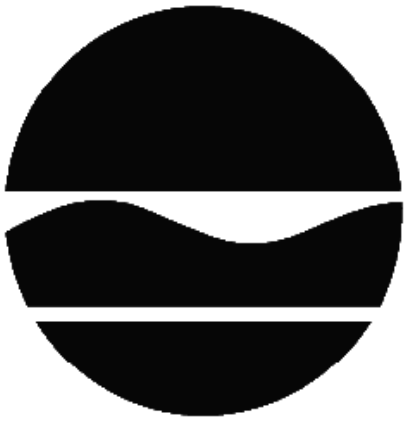
PROPOSED REMEDIAL ACTION PLAN

Pall Corporation
Operable Unit Number 02: Deep On-site and Off-site Groundwater
State Superfund Project
Glen Cove, Nassau County
Site No. 130053B
January 2013



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

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing 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 proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred 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 Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York; (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repositories identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repositories:

New York State Dept. of Envionmental Conservation
Attn: Region 1 Office
SUNY @ Stony Brook
Stony Brook, NY 11790
Phone: 516-444-0240

Glen Cove Public Library
Attn: Librarian
4 Glen Cove Avenue
Glen Cove, NY 11542
Phone: 516-676-2130

NYS Department of Environmental Conservation
Attn: Joseph Jones
625 Broadway, 12th floor
Albany, NY 12233
Phone: 518-402-9621

A public comment period has been set from:

2/7/2013 to 3/14/2013

A public meeting is scheduled for the following date:

2/28/2013 at 7:00 PM

Public meeting location:

Glen Cove City Hall, 9-13 Glen Street, Glen Cove, New York 11542

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent through 3/14/2013 to:

Joseph Jones
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
jgjones@gw.dec.state.ny.us

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

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 Pall site is located in the Sea Cliff Avenue Industrial Area at 30 to 36 Sea Cliff Avenue and includes both the Pall Corporation and August Thomsen facilities. The site is bounded by Sea Cliff Avenue to the south, the Glen Cove Creek to the west, and an arterial highway to the east. The Carney Street well field is located north (downgradient) of the site. Photocircuits Corporation, Site No. 130009, is located south of the Pall site directly across Sea Cliff Avenue.

Site Features:

The site, about 4.6 acres in size, is mostly paved with several industrial buildings. It consists of one large abandoned building (the Pall facility), one currently used building (the August Thomsen facility), storage sheds and parking areas. The Glen Cove Creek bounds the property on the west side.

Current Zoning/Uses:

The site is zoned for commercial use. Currently, the August Thomsen property at 36 Sea Cliff Avenue is used for the manufacture of pastry bags and tubes. The Pall property at 30 Sea Cliff Avenue is unoccupied.

Historic Uses:

Pall Corporation was founded in 1946 and manufactured filtration products at the site in the past. Nassau County industrial chemical profiles indicate that Pall Corporation used tetrachloroethylene (PCE) and trichloroethylene (TCE) at the site. The building at 30 Sea Cliff Avenue was constructed in 1918 and was used as an ice house. In 1953, Pall Corporation purchased and occupied that building until 1999. In 1958, Pall Corporation constructed the building at 36 Sea Cliff Avenue and occupied it until 1971, when Pall Corporation sold the building to August Thomsen. Pall Corporation used both industrial buildings to manufacture filtration products. Pall stored solvents on both of these properties in the past. Spent solvents were released to the ground.

Operable Units:

The Site is divided into two 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. Operable Unit 1 (OU1) addresses both on-site soils, and on-site and off-site groundwater, to a depth of 60 ft bgs. Operable Unit 2 (OU2) addresses on- and off-site groundwater at depths of greater than 60 ft bgs.

Site Geology and Hydrogeology:

The Pall site is underlain by the following soil layers in descending order: the Upper Glacial Aquifer, the Port Washington confining unit, the Port Washington aquifer, the Lloyd Aquifer and bedrock. The Upper Glacial aquifer is composed of stratified beds of fine to coarse sand and gravel with some lenses of silt and clay and extends to a depth of about 200 ft bgs. The Port Washington confining unit, which extends about 100 ft below the Upper Glacial Aquifer, consists of silt and clay with some sand and gravel lenses. The Port Washington aquifer is composed of sand and gravel with variable amounts of clay and silt, and is about 50 ft thick. The Lloyd Aquifer, which is about 200 ft thick, consists of discontinuous layers of gravel, sand, sandy clay, silt and clay. It roughly parallels the crystalline bedrock, which is present at a depth of about 550 ft bgs. Groundwater is present at 4 to 10 ft bgs and generally the groundwater flow is north-northwest.

Operable Unit (OU) Number 02 is the subject of this document.

A Record of Decision was issued previously for OU 01.

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 commercial use (which allows for industrial 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:

Pall Corporation

The PRPs for the site declined to implement a remedial program when requested by the Department. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

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:

- groundwater
- soil

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: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

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:

1,1,1 TCA	TRICHLOROETHENE (TCE)
TETRACHLOROETHYLENE (PCE)	1,1-DICHLOROETHANE
DICHLOROETHYLENE	1,2-DICHLOROETHANE
VINYL CHLORIDE	

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

- groundwater

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.

There were no IRMs performed at this site during the RI.

6.3: 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.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU 02.

Nature and Extent of Contamination:

Operable Unit 01: The VOCs of concern for OU1 are the chlorinated solvents tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE), vinyl chloride (VC), trichloroethane (TCA) and dichloroethane (DCA. TCE, DCE and VC are breakdown products of PCE. DCA is a breakdown product of TCA. 1,1,2-trichlorotrifluoroethane (Freon-113) is also a VOC of concern. Other VOCs of concern are acetone, 2-pentanone, bromoform and gasoline constituents

such as benzene, toluene, ethylbenzene and xylene. The surface water and sediments in the Glen Cove Creek, showed no contamination both upgradient and at the mid-point of the site but did show contamination with VOCs at the downstream end of the site. Although PCE and TCE exceeded their SCGs for sediments, and PCE exceeded its SCG in surface water, these SCGs are based on human consumption of fish. There are no SCGs for aquatic life for the VOCs detected in the creek. As the creek is shallow, becomes an underground storm sewer downstream of the contaminated sample, and is in an industrial area, human consumption of fish is unlikely. Although the contamination in Glen Cove Creek is not a completed pathway, site contamination has impacted the groundwater resource in the upper glacial aquifer, which is designated a sole source aquifer in Nassau County. While there are no known exposure pathways, the contaminated groundwater at the site presents a potential exposure pathway to the environment.

Operable Unit 02: Based upon investigations conducted to date, the primary contaminants of concern for OU2 are VOCs including tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-Trichloroethane (TCA), 1,1-Dichloroethane (DCA), 1,2-Dichloroethylene (DCE) and Vinyl Chloride (VC). On-site soils have been contaminated with VOCs, and this contamination has spread to the underlying sole-source aquifer. Exceedances of standards, criteria, and guidance indicate that PCE, TCA and several breakdown products including those listed above exceed standards in groundwater. The approximate areal (horizontal) extent of contamination (areas in which the groundwater criteria were exceeded by one or more contaminants) lies beneath both the Pall and neighboring Photocircuits site. Contaminant concentrations trend lower toward the west; however, concentrations of site-related VOCs were detected in the westernmost of the three Sea Cliff Avenue wells. The vertical extent of contamination is well-defined. Chlorinated VOC contamination extends from the groundwater table down to about 130 ft bgs with little or no contamination detected in samples from monitoring wells at greater depths. The highest concentrations for individual contaminants were reached in the northeast portion of the site, including 10,000 ppb of TCE, 5,900 ppb of DCE and 5,700 ppb of DCA.

6.4: 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.*

People are not drinking the contaminated groundwater because the area is served by a public water supply that is not affected by this contamination. People may come into contact with contaminated groundwater that occasionally flows from existing site monitoring wells due to artesian pressure. Contact with contaminants in shallow creek sediments is unlikely to present an exposure concern. Access to the site is partially limited by a fence, however direct contact with contaminants in the soil is unlikely because the majority of the site is covered with buildings and pavement. Volatile organic compounds in the groundwater or soil 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. Inhalation of site contaminants in indoor air due to soil vapor intrusion is possible at on-site buildings. A ventilation system has been installed in the crawlspace at one off-site structure to prevent the

indoor air quality from being affected by the contamination in soil vapor beneath the building. The potential exists for the inhalation of site contaminants in indoor air through soil vapor intrusion in other off-site structures.

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.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

SECTION 7: SUMMARY OF THE PROPOSED 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 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 basis for the Department's proposed remedy is set forth at Exhibit D.

The proposed remedy is referred to as the ISCO and Groundwater Recirculation remedy.

The estimated present worth cost to implement the remedy is $4,900,000. The cost to construct the remedy is estimated to be $4,024,000 and the estimated average annual cost is $99,000.

The elements of the proposed remedy are as follows:

The proposed Operable Unit 2 remedy for the Pall Corporation site is identical to the proposed Operable Unit 2 remedy for the Photocircuits Corporation site since they were developed together because the sites are contiguous to each other and the contamination emanating from each site is commingled. Separate remedies were considered for each site to ensure the remedy selection process was consistent with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable. Because the contamination emanating from each site is commingled, the proposed remedy for each site will mitigate the aggregate threat to human health or environment from both sites. This means the proposed remedies for the two contiguous sites will be satisfied by the installation of one shared In-Situ Chemical Oxidation/Groundwater Extraction and Recirculation system. The proposed remedy will be protective of human health and the environment and would comply with New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

1. Remedial Design
A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and 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; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. In-Situ Chemical Oxidation/Groundwater Extraction and Recirculation
In-Situ Chemical Oxidation will be used with Groundwater Extraction downgradient of the treatment area and Re-injection upgradient of the treatment area.

In-situ chemical oxidation is a technology used to treat volatile organic compounds in the soil and groundwater. The process injects a chemical oxidant into the subsurface via injection wells or an infiltration gallery. The method of injection and depth of injection is determined by location of the contamination. As the chemical oxidant comes into contact with the contaminant,

an oxidation reaction occurs that breaks down the contaminant into relatively benign compounds such as carbon dioxide and water. Several chemical oxidants are commercially available. For the purpose of this discussion, Sodium Permanganate will be the chemical oxidant evaluated. At this site, the chemical oxidant will be applied through injection wells screened from 60 ft bgs to about 130 ft bgs to target the contaminants of concern. Contaminants at shallower depths at both the Pall and Photocircuits sites are being addressed through the Operable Unit 01 remedies for each site.

Groundwater extraction creates a depression of the water table so that contaminated groundwater is directed toward pumping wells within the plume area. The groundwater extraction system is designed so that the capture zone is sufficient to cover the lateral extent of the area of concern. The total number of extraction wells will be determined during the pilot test and the design. For this site, groundwater is collected during recovery operations, and the recovered groundwater will be re-injected upgradient of the chemical oxidation injection wells, re-circulating the groundwater through the treatment area.

Prior to the implementation of these technologies, laboratory and pilot scale studies will be conducted to more clearly define design parameters.

3. Institutional Control
Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires 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);
- allows the use and development of the controlled property for commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH;
- prohibits agriculture or vegetable gardens on the controlled property; and
- requires compliance with the Department-approved Site Management Plan.

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

- 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 above.

Engineering Controls: The In-situ Chemical Oxidation and Groundwater Extraction and Recirculation systems as described above.

This plan includes, but may not be limited to:

- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;

- a provision for evaluation of the potential for soil vapor intrusion 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.

- A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
- monitoring of groundwater to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department;
- monitoring for vapor intrusion for any buildings occupied or developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

- An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible. The plan includes, but is not limited to:
- 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 section describes the findings of the Remedial Investigation (RI) for all environmental media that were evaluated. As described in Section 6.1, samples were collected from groundwater to characterize the nature and extent of contamination.

Table 1 in Exhibit A summarizes the findings of the investigation. The table presents the range of contamination found at the site during the groundwater monitoring well sampling events and compares the data with the applicable SCGs for the site. For comparison purposes, the SCGs are provided that allow for unrestricted use.

Because the Pall Corporation and Photocircuits Corporation sites are contiguous to each other and the deep groundwater contamination emanating from each site is commingled, a joint deep groundwater RI was conducted. As described in the joint OU2 RI report for both the Pall Corporation and Photocircuits Corporation sites, waste/source materials that are impacting groundwater were identified in the OU1 RI reports for the Photocircuits and Pall sites. During the joint OU2 RI, 19 new groundwater monitoring wells were installed in total on the Photocircuits and Pall sites, and these, along with 51 existing monitoring wells, were sampled. Two sampling rounds were conducted, in April through June of 2008, and then between October and November 2008. In addition, hydropunch samples were taken on the Photocircuits site during the April 2008 sampling event. While the joint OU2 RI for the Pall and Photocircuits sites focused on deep and off-site groundwater, shallow and intermediate depth groundwater sampling were also carried out during the joint OU2 investigation because contaminants at these levels impact deep groundwater. Previous investigations on both sites have closely examined both on-site soils and shallow groundwater contamination.

Historical data collected at various times for more than thirty years have identified volatile organic compounds (VOCs) as the primary contaminants of concern in groundwater at both the Photocircuits and Pall Corporation sites, as well as in groundwater downgradient of the sites (e.g., the Carney Street Wellfield). Data collected during this RI are consistent with previous data with regard to the nature of contamination found.

GROUNDWATER

This section discusses the distribution of groundwater contamination on all properties from which samples were collected and data are available. Inspection of the data and associated figures shows that the distribution is affected by two factors:

- Location (areal) – Certain contaminant types (or specific compounds) are limited, or largely so, to specific areas within the overall study area; and
- Depth – At any specific location (well cluster), the contamination varies with depth; however, the concentrations do not show a simple decrease with depth, i.e., it is not generally the case that the shallowest well is the most contaminated with gradually decreasing concentrations with greater depth.

For the RI/FS, the wells and associated groundwater data have been assigned to one of four depth intervals, shallow, intermediate, deep and very deep. While the deep and very deep intervals are the subject of this operable unit, the first two intervals are discussed to increase the understanding of the contaminated groundwater flow as there is only one groundwater regime, the Upper Glacial Aquifer, associated with the two Operable Units.

Contaminant distribution maps (by contaminant location and by depth interval) were developed to interpret the data. See Figures 3-9 for the contaminant maps.

Contaminant Distribution in the Shallow Interval

The shallow interval is defined as samples collected from wells with top screen interval depths from about 3 to 15 ft bgs. The shallow interval is not explicitly included in the scope of OU2 which is defined as groundwater at depths greater than 60 ft bgs. However, as there is not a separate "shallow" aquifer, it is not possible to address deeper contamination without some understanding of the shallow zone. Additionally, contamination in shallower zones has the potential to migrate to, and impact, groundwater in deeper zones. Therefore, shallow wells were sampled and the data plotted, although not to the same degree that wells from the deeper intervals were sampled.

Review of the Round 1 data showed that there was a lack of data points in the shallow interval on the Photocircuits property (i.e., south of Sea Cliff Avenue). Therefore, it was decided to include on the Round 2 isopleths data for two shallow monitoring wells (MW-3S and MW-4S) which Photocircuits' consultant sampled in June 2008. This decision was made after qualitative comparison of the Photocircuits data for other wells that were sampled in common and a determination that the Photocircuits data were comparable to the data generated for this RI. Use of this data enables better definition of the contaminant distribution on the west side of Photocircuits and provides better definition in the area of Sea Cliff Avenue west of Glen Cove Creek, near the Sea Cliff Avenue well MW-16PCI.

Figures 3 and 4 show the distribution of total contaminants of concern (COCs) in the shallow zone wells. Concentrations from about 100 to 800 µg/L were observed in the wells on the Photocircuits property (MW-3S, MW-9) and in Sea Cliff Avenue (MW-14PCS); concentrations were lower in wells on the Pall Corporation site just north of Sea Cliff Avenue (MW-19PS, MW-8PS, MW-17PS, and MW7P) although concentrations were somewhat higher in the October (Round 2) event in these same Pall Corporation wells. Shallow zone concentrations ranging from Not Detected to less than 100 µg/L were found in the monitoring wells on the east side of Pall Corporation and off-site (i.e., wells near the Glen Cove Arterial Highway); total COCs concentrations increase toward the center of the Pall Corporation site (e.g., MW-4PS), the northwest corner of August Thomsen, and the western edge of the Glen Cove property (MW-2A, MW2GS).

Contaminant Distribution in the Intermediate Interval

The intermediate interval is defined as samples from wells with the top of screen elevations ranging from about 45 to 60 ft bgs. The intermediate interval is also not explicitly included in the scope of OU2 which is defined as groundwater at depths greater than 60 ft bgs but needs to be discussed to gain an understanding of the deep groundwater contamination. Figures 5 and 6 shows the distribution of total COCs in the intermediate zone wells. High concentrations (greater than 100 µg/L) were observed in almost every intermediate zone well; with concentrations over 10,000 µg/L in the wells near a suspected source area on the Photocircuits property (MW-13, MW-14). High concentrations (over 5,000 µg/L) were detected in 04-MW102S in the southeast corner of the Pall Corporation property in both rounds of sampling with another hot spot (5,462 µg/L) at MW-2GI downgradient of the Pall site. Concentrations greater than 1,000 µg/L were also detected in intermediate zone wells in the center of the Pall Corporation property (MW-4PI and MW-12PI) and Pall Corporation wells near the southeast part of the Pall Corporation site (MW-18PI, MW6P, and MW-17PI) as well as in MW-14PCI in Sea Cliff Avenue.

Contaminant Distribution in the Deep Interval

The deep interval is included in the scope of OU2 and is defined as samples collected from wells with top of screen intervals about 80 to 130 ft bgs. In addition, data from the upgradient well 01-MW-101D was assigned to the both the deep interval and very deep interval for plotting purposes.

Figures 7 and 8 show the distribution of total VOCs in the deep zone wells. Data for both rounds are consistent in that the high concentrations (greater than 5,000 µg/L) were observed in the deep wells in the center and eastern part of the Pall Corporation site (greater than 10,000 µg/L in MW-13PD and MW-11PD, and greater than 5,000 µg/L in MW-4PD). Deep zone concentrations generally decreased radially away from this area, despite some inconsistency between Round 1 and Round 2 at Photocircuits source area well 01MW-104I (1,238 µg/L in Round 1 but only 145 µg/L in Round 2).

Contaminant Distribution in the Very Deep Interval

The very deep interval is included in the scope of OU2 and is defined as wells with top of screen depths below 140 ft bgs. As shown on Figure 9, most of the samples in this interval did not have contaminant concentrations exceeding SCGs. The one exception is the Round 1 samples from (Glen Cove) wells 06MW-103D and 06MW-103D2, in which TCE and cis-1,2-DCE were detected at concentrations near or slightly greater than the SCG (e.g., TCE at 5.5 µg/L in 06MW-103D and 3.3 µg/L in 06MW-103D2). In Round 2, TCE was detected at a concentration of 1.8 µg/L in 06MW-103D2, and no other VOCs were detected in either 06MW-103D or 06MW-103D2.

Contamination Distribution Summary

The nature and extent of contaminant distribution is summarized below. The approximate areal (horizontal) extent of contamination (areas in which the groundwater criteria were exceeded by one or more contaminants) is shown on Figures 3-9; and the estimated volume of contaminated groundwater is 11,000,000 gallons.

Contaminants Detected

The primary contaminants of concern detected were VOCs. Primary VOCs include PCE and its degradation products (TCE, cis-1,2-DCE and vinyl chloride, although vinyl chloride concentrations were generally low relative to cis-1,2-DCE); and 1,1,1-TCA and its degradation products (1,1-DCA and chloroethane).

Horizontal Extent of Contamination

VOCs were not detected in background wells which suggest that these compounds are not migrating into the study area from an upgradient source. However, due to lack of data points, it cannot be accurately determined how far south, i.e., upgradient, on the Photocircuits property the contamination extends. At Photocircuits and Sea Cliff Avenue, contaminant concentrations trend lower toward the west; however, detectable concentrations of site-related VOCs were detected in the northwest corner of the Photocircuits site and the westernmost of the three Sea Cliff Avenue wells.

Vertical Extent of Contamination

VOC contamination extends from the groundwater table down to about 130 ft bgs; little or no contamination was detected in samples from monitoring wells at greater depths. Only minimal data was generated from shallow wells

south of Sea Cliff Avenue during the RI, as the focus of the RI was OU2 (deep groundwater contamination); however, ample data has been generated under previous investigations and ongoing monitoring to characterize the contamination in the shallow zone.

Table 1 - Groundwater			
Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b](ppb)	Frequency Exceeding SCG
1,1,1-Trichloroethane	ND - 2000	5	24/143
1,1,2-Trichloroethane	ND - 3.1	1	41/143
1,1-Dichloroethane	ND - 5700	5	79/143
1,1-Dichloroethene	ND - 780	5	74/143
1,2-Dichloroethane	ND - 57	0.6	20/143
1,2-Dichloropropane	ND - 4.1	1	1/143
2-Butanone	ND - 100	50	2/143
2-Chlorotoluene	ND - 2100	5	13/143
4-Chlorotoluene	ND - 32	5	5/143
Chloroethane	ND - 6700	5	11/136
Cis 1,2-Dichloroethene	ND - 5900	5	89/143
Methylene Chloride	ND - 51	5	6/143
Methyl-tert-butyl Ether	ND - 210	10	12/143
Tetrachloroethylene	ND - 2000	5	77/143
Trans 1,2-Dichloroethene	ND - 23	5	23/143
Trichloroethene	ND - 10,000	5	91/143
Vinyl Chloride	ND - 1200	2	57/143
Xylene	ND - 9.9	5	1/143

[a] - ppb: parts per billion, which is equivalent to micrograms per liter, µg/L, in water.
[b]- SCG: Standard Criteria or Guidance - 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).

The primary groundwater contaminants are Tetrachloroethylene and its breakdown products Trichloroethene, cis-1,2-Dichloroethene, 1,1-Dichloroethene, and Vinyl Chloride; 1,1,1-Trichloroethane and its breakdown products; 1,1-Dichloroethane and Chloroethane. The most highly contaminated area for OU2 is to the north of Sea Cliff Avenue.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are: Tetrachloroethylene and 1,1,1-Trichloroethane; and their breakdown products.

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A. Six remedial alternatives have been developed after consideration of core technologies as outlined in the FS. These remedial alternatives are compatible with the OU1 remedy for Pall Corporation as specified in that ROD (NYSDEC, 2004). An alternative providing complete restoration to pre-disposal conditions was considered impractical due to the extent and depth of the groundwater contamination at the sites.

Alternative No. 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Present Worth: $0
Capital Cost: $0
Annual Costs: $0

Alternative No. 2: Groundwater Monitoring

This alternative assumes that bi-annual groundwater monitoring will be conducted for 30 years. The proposed monitoring wells have been selected to monitor VOC concentrations at the edges of plume (within the limits of existing wells) and to provide some data regarding contamination within or near suspected source or high concentration areas. During each monitoring event, 21 existing wells will be purged and sampled for VOCs by EPA method 8260, and water levels in the wells will be measured. A subset of the groundwater samples will also be analyzed for monitored natural attenuation parameters.

This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site. The environmental easement will include provisions both limiting the use and development of the controlled property for commercial uses, as defined by Part 375-1.8(g), although land use is subject to local zoning laws, and restricting the use of groundwater as a source of potable or process water.

Present Worth: $620,000
Capital Cost: $29,000
Annual Costs: $39,000

Alternative No. 3: Groundwater Extraction and Treatment by Air Stripping

Groundwater extraction and *ex-situ* treatment are components of this alternative. Locations of extraction wells will be determined during the design phase after the completion of a pump test. The wells will be screened within the impacted OU2 aquifer about 60 to 130 feet bgs. An additional extraction well will be operated along the leading edge of the plume to both treat and contain impacted OU2 groundwater.

Extraction wells will be installed along the plume axis (i.e., north-south direction) and for hydraulic control along the northern border of the site. Operation of this remedy will be coordinated with remedial activities for OU1 at the Pall Corporation site. This alternative targets the more highly contaminated portion of the deep groundwater plume; specifically, areas with total chlorinated aliphatic concentrations greater than about 1,000 µg/L. With this constraint, the preliminary layout for this alternative suggests that all the extraction wells can be located on the north side of Sea Cliff Avenue. The extraction system will consist of between eight and ten extraction wells and be operated for long-term groundwater control (i.e., 30 years). A groundwater treatment system will be installed either in a new treatment building or existing structures on the Pall Corporation site could be evaluated for use. Groundwater monitoring will be performed to evaluate the extent to which the remedial action objectives are being met.

This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site. The environmental easement will include provisions both limiting the use and development of the controlled property for commercial uses, as defined by Part 375-1.8(g), although land use is subject to local zoning laws, and restricting the use of groundwater as a source of potable or process water.

Present Worth: $4,243,000
Capital Cost: $644,000
Annual Costs: $234,000

Alternative No. 4 – *In-Situ* Chemical Oxidation (ISCO)

In-situ chemical oxidation is a technology used to treat chlorinated organic compounds in the soil and groundwater. The process injects a chemical oxidant into the subsurface via injection wells or an infiltration gallery. The method of injection and depth of injection is determined by location of the contamination. As the chemical oxidant comes into contact with the contaminant, an oxidation reaction occurs that breaks down the contaminant into relatively benign compounds such as carbon dioxide and water. Several chemical oxidants are commercially available. For the purpose of this discussion, potassium permanganate will be the chemical oxidant evaluated. At this site, the chemical oxidant will be applied through injection wells screened from 60 to 130 feet bgs.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to more clearly define design parameters.

This alternative employs *in-situ* chemical oxidation to address the contaminated groundwater with total VOC concentrations greater than 1,000 µg/L. Injection of a chemical oxidant, potassium permanganate, provides an aggressive approach to treatment of impacted OU2 groundwater. The targeted approach will allow for aggressive treatment for areas of higher concentrations while allowing the lesser contamination to diminish by natural attenuation. Additional monitoring wells will be installed to monitor the effectiveness of the *in-situ* treatment and to monitor the natural attenuation at the fringe of the plume.

Injection wells will be installed with an equal spacing between wells though spacing may be affected by on site structures. For this alternative, the injection well spacing is estimated to be 50 ft. The injections will be performed in the areas of higher VOC concentrations which are located on the Pall Corporation property.

One chemical oxidation technology was selected for detailed analysis. Although both chemical oxidants (permanganate and Fenton's Reagent) are considered effective at reducing VOC concentrations at the source area,

permanganate is considered and evaluated herein for *in-situ* groundwater treatment, as discussed in the FS. Groundwater monitoring will be performed to evaluate the extent to which the remedial action objectives are being met.

This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site. The environmental easement will include provisions both limiting the use and development of the controlled property for commercial uses, as defined by Part 375-1.8(g), although land use is subject to local zoning laws, and restricting the use of groundwater as a source of potable or process water.

Present Worth:	$4,130,000
Capital Cost:	$3,578,000
Annual Costs Year 1-3:	$94,000
Annual Costs Year 4-15:	$38,500

Alternative No. 5 - ISCO Injection and Pump and Treat

This alternative is a combination of Alternatives 3 and 4 and will include the injection of permanganate, groundwater extraction at the northern edge of the Pall Corporation property and upgradient reinjection of treated water. The extraction system will consist of several pumping wells operated for long-term groundwater control. A groundwater treatment system will be installed either in a new treatment building or existing structures on the Pall Corporation site could be evaluated for use. The groundwater treatment system is expected to consist of an equalization tank, bag filters, an air stripper, a granular activated carbon system (for groundwater effluent polishing), and an effluent holding tank. A vapor phase carbon adsorption system will be used for removal of organic air emissions from the air stripper; however, the carbon systems could eventually be removed when contaminant concentration levels are below applicable NYSDEC criteria. Conceptually, treated groundwater will be injected through a gallery of infiltration wells screened in OU2 near the upgradient edge of the plume on the Pall Corporation property. Groundwater monitoring will be performed to evaluate the extent to which the remedial action objectives are being met. Operation and maintenance activities are necessary for the extraction and treatment systems (e.g., equipment maintenance, monitoring effluent air and water, vapor and liquid-phase carbon replacement). This work is necessary to maintain treatment performance and life span.

This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site. The environmental easement will include provisions both limiting the use and development of the controlled property for commercial uses, as defined by Part 375-1.8(g), although land use is subject to local zoning laws, and restricting the use of groundwater as a source of potable or process water.

Present Worth:	$5,057,000
Capital Cost:	$3,866,500
Annual Costs Year 1-3:	$188,000
Annual Costs Year 4-10:	$132,500

Alternative No. 6 - ISCO Injection and Groundwater Extraction (Recirculation) without *Ex-Situ* Treatment

This alternative is a combination of Alternatives 3 and 4 and will include the injection of permanganate, groundwater extraction at the northern edge of the Pall Corporation property, and upgradient reinjection of extracted groundwater without *ex-situ* treatment. Figure 10 presents the conceptual layout for Alternative 6.

The extraction system will consist of several pumping wells and will be operated for long-term groundwater control. Conceptually, untreated (i.e., no *ex- situ* treatment) extracted groundwater will be re-injected through a gallery of six infiltration wells screened in OU-2 near the upgradient edge of the plume on the Pall Corporation property. Potassium Permanganate will be injected to reduce the volume of highly contaminated groundwater associated with the source area. The reagent will be applied through deep injection wells screened with in OU-2 groundwater to target groundwater with VOC concentrations greater than 1,000 µg/L. Groundwater monitoring will be performed to evaluate the extent to which the remedial action objectives are being met. Operation and maintenance activities are necessary for the extraction and reinjection systems (e.g., equipment maintenance, monitoring effluent water). This work is necessary to maintain treatment performance and life span.

Prior to full-scale implementation, a pilot study will be performed to assess the feasibility of the process at the site and to design the injection volumes of permanganate. The pilot study will include first a laboratory treatability study to further evaluate the efficiency of permanganate with site groundwater samples. If the results of the pilot study are favorable, a full-scale/phased application of the technology will be implemented.

This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site. The environmental easement will include provisions both limiting the use and development of the controlled property for commercial uses, as defined by Part 375-1.8(g), although land use is subject to local zoning laws, and restricting the use of groundwater as a source of potable or process water.

Present Worth:	$4,901,000
Capital Costs:	$4,024,000
Annual Costs Year 1-3:	$176,000
Annual Costs Year 4-12:	$82,000

Exhibit C

Remedial Alternative Costs

REMEDIAL ALTERNATIVE	CAPITAL COST ($)	ANNUAL COSTS ($)	TOTAL PRESENT WORTH COST ($)
No Action	0	0	0
Groundwater Monitoring	29,000	39,000	620,000
Groundwater Extraction and Treatment by Air Stripping	644,000	234,000	4,243,000
In-situ Chemical Oxidation (ISCO)	3,578,000	94,000 yrs 1-3 38,500 yrs 4-15	4,130,000
ISCO, Groundwater Extraction and *Ex-Situ* Treatment by Air Stripping, Groundwater Reinjection	3,866,000	188,000 yrs 1-3 132,500 yrs 4-10	5,057,000
ISCO Injection and Groundwater Extraction (Recirculation) without *Ex-Situ* Treatment	4,024,000	176,000 yrs 1-3 82,000 yrs 4-12	4,901,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 6, ISCO injection and Groundwater Extraction (recirculation) without *Ex-Situ* Treatment as the remedy for this site. Alternative 6 would achieve the remediation goals for the site by providing treatment to the contaminated groundwater using chemical oxidation, combined with groundwater extraction followed by re-injection of the groundwater. The elements of this remedy are described in Section 7.2 of the PRAP. The proposed remedy is depicted in Figure 10.

The Department acknowledges that the proposed remedy for Operable Unit 2 for both the Photocircuits and Pall Corporation sites are identical. Separate remedies for each site were considered to ensure that the remedy selection process was consistent with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable. Because the sites are contiguous to each other and the contamination emanating from each site is commingled, the selected remedy for each site will mitigate the aggregate threat to human health or the environment from both sites. This means, for all intents and purposes, the selected remedies for the two contiguous sites will be satisfied by the installation of only one shared remedy. The proposed remedy will be protective of human health and the environment and would comply with New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

Basis for Selection

The proposed remedy is based upon the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The proposed remedy (Alternative 6) would satisfy this criterion by treating the groundwater. Alternative 1 (No Action) does not involve removal or treatment of contaminated groundwater, is not protective of human health and the environment, and does not achieve the goals stated in Exhibit B. Therefore, Alternative 1 is eliminated from further evaluation. Alternative 2 (Groundwater Monitoring) does not provide substantial protection to human health and the environment, and cannot meet the remedial goals within a reasonable timeframe (due to no active groundwater treatment), and will not be evaluated further. Alternatives 2, 3, 4, 5 and 6 restrict the use of groundwater as a source of potable or process water to provide protection of human health but no protection of the environment. Alternatives 3, 4, 5 and 6 actively treat VOC contamination in the aquifer resulting in reduced levels of contamination, and therefore are protective of human health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternative 3 is expected to meet SCGs throughout most of the site by extraction and treatment by air stripping and off-site discharge of treated groundwater, but some areas in non-compliance are likely to persist. Alternative 4 is also expected to meet SCGs throughout most of the site by *in-situ* chemical oxidation treatment of contaminated groundwater. Alternative 5 is also expected to meet SCGs throughout more of the site. This alternative, while some areas of non-compliance are likely to persist, is estimated to provide the most complete treatment of contaminated groundwater. Alternative 6 is expected to meet SCGs throughout most of the site. Because Alternatives 3, 4, 5 and 6 all comply with the threshold criteria, the remaining criteria are important in selecting a final remedy for the site.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternatives No. 3, 4, 5 and 6, involve intrusive work which could cause releases of contamination during installation of the remedial systems. The implementation of a Health and Safety Plan and a Community Air Monitoring Plan at the site limits the potential for exposure through engineering controls, monitoring, and personal protective equipment. These alternatives may also pose disruptions to current site operations although the disruptions are limited due to the fact that neither the Pall nor Photocircuits properties are currently fully in use. Alternative 3 is not expected to achieve the remedial action objectives for OU2 groundwater in a 30-year timeframe. Alternatives No. 4, 5, and 6 are more aggressive treatments and will allow for achieving remedial action objectives in 15, 10 and 12 years, respectively.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternatives No. 3, 4, 5 and 6 are considered to be adequate, reliable and permanent remedies for the remediation of groundwater as they use presumptive/proven technologies to treat the contaminated groundwater. Alternatives No. 3, 5 and 6, in addition to providing treatment for contaminated groundwater, exert hydraulic control using extraction wells to prevent further off-site migration of the OU2 plume. Alternative 6 is less complex than Alternative 5 as it omits vapor stripping of the extracted groundwater before reinjection making it a ‘greener’ remedy providing long-term effectiveness.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternatives No. 3, 4, 5 and 6 provide for the reduction of the volume of impacted OU2 groundwater. Alternatives No. 3, 5 and 6 exert hydraulic control of the plume, restricting the plume’s mobility. Based on the effectiveness of the chemical oxidant approach, Alternative Nos. 4, 5 and 6 reduce contaminant levels in the highly contaminated groundwater. The FS shows that Alternatives No. 4, 5 and 6 provide for a significant reduction of the subsurface VOC mass, such that a greater reduction of toxicity, mobility and volume is achieved in a shorter timeframe (about

10 – 15 years) than in Alternative No. 3. By recirculating the groundwater through extraction and reinjection, Alternatives No. 5 and 6 can provide the greatest reduction of the time required for remediation of the plume.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Alternatives No. 3, 4, 5 and 6 are technically implementable with readily available methods, equipment, materials and services. Alternatives No. 3, 4, 5 and 6 are also administratively implementable. Alternative 4 requires the least amount of intrusive work and has minimal impact on site use and operation. Alternatives No. 3, 5 and 6 require the installation of both underground piping and above-ground treatment units. Alternative 6 is less complex than Alternative 5 as it omits vapor stripping of the extracted groundwater before reinjection making it less difficult to implement.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The present worth cost to implement:

- Alternative 3 is about 4.24 million dollars
- Alternative 4 is about 4.13 million dollars
- Alternative 5 is about 5.06 million dollars
- Alternative 6 is about 4.90 million dollars

Given the similar costs of the four remedies under consideration, cost should not be the deciding factor in remedy choice.

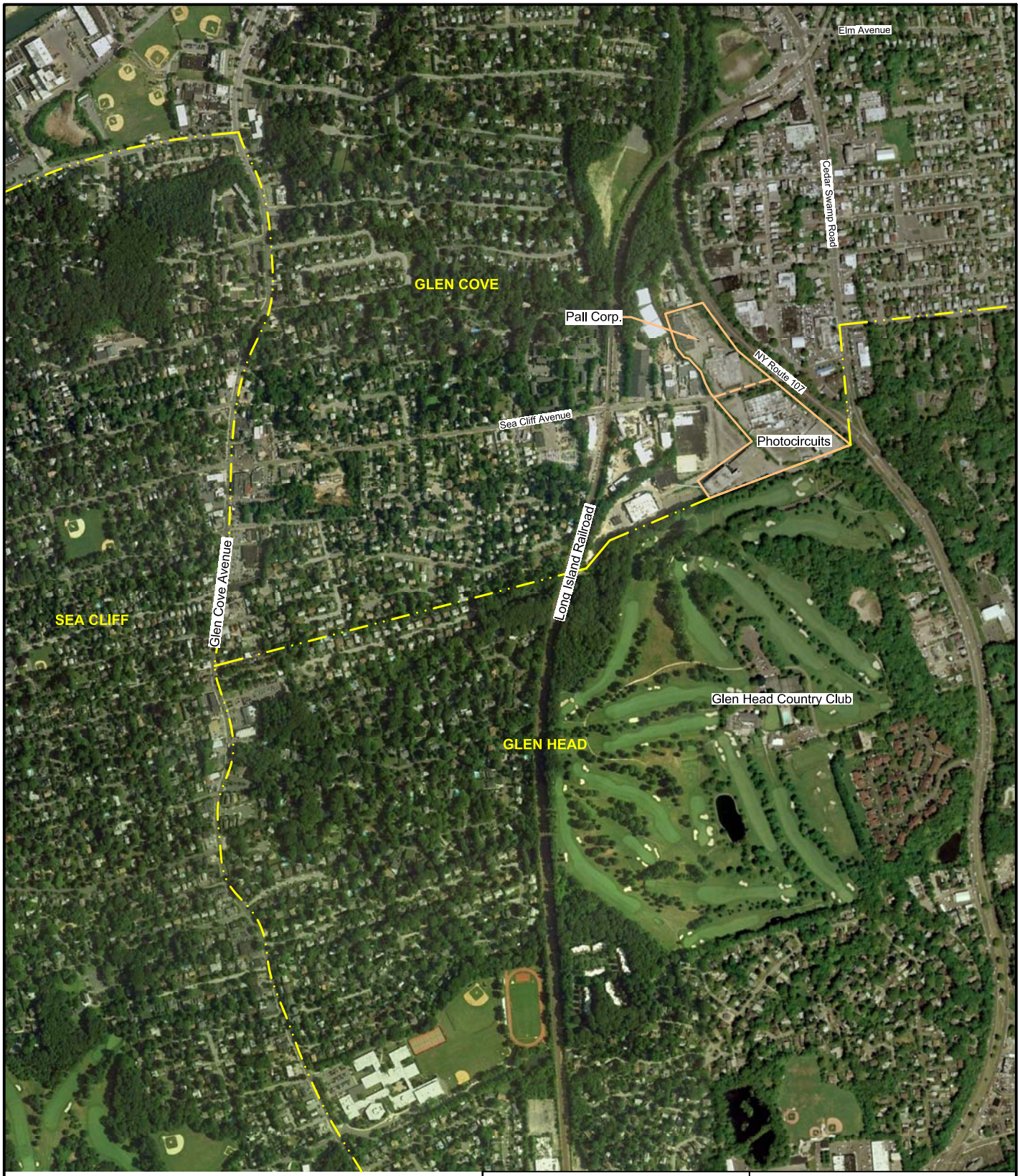
8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Alternatives 3, 4, 5 and 6 will meet the commercial land use restrictions identified in the Operable Unit 1 Record of Decisions issued for both the Pall and Photocircuits sites.

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.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Alternative 6 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.



0 1000 2000 4000

SCALE IN FEET

N

SOURCE: IMAGERY USDA FARM SERVICE AGENCY; PROVIDED BY GOOGLE EARTH 2010

AECOM

40 British American Blvd.
Latham, NY 12110
www.aecom.com

FIGURE 1
SITE LOCATION

PHOTOCIRCUITS AND PALL CORPORATION
GLEN COVE, NEW YORK
NYSDEC SITES 1-30-009 & 1-30-053B

JANUARY 2012

60135725

L:\work\earth\Latham NY Work\NYSDEC - Photocircuits\95636_014 Site Location Map.dwg, 1/25/2012 3:20:21 PM, splawnm

COPOBIANCO ST
CARNEY ST
HAZEL AVE
SEA CLIFF AVE
WILLOW AVE
GLEN COVE ARTERIAL HWY (NY Route 107)
PHOTOCIRCUITS CORPORATION SITE LIMIT
PALL CORPORATION SITE LIMIT
PHOTOCIRCUITS BUTLER NO. 1
PHOTOCIRCUITS BUTLER NO. 2
PHOTOCIRCUITS MAIN BUILDING
PHOTOCIRCUITS BUTLER NO. 3
PALL CORPORATION
GLEN COVE DAY CARE CENTER
AUGUST THOMSEN
ASSOCIATED DRAPERIES
FORMER SLATER ELECTRIC PASS & SEYMOUR
GLEN COVE CREEK
MW-GC2S MW-GC2D
MW-2
01MW-104S 01MW-104D 01MW-104I
MW-13 MW-14 MW-7
MW-14PCS MW-14PCI MW-14PCD
MW-12
MW-3
MW-8
04MW-102D 04MW-102I 04MW-102S
MW-17PS MW-17PI
MW-6PD 04MW-6PD2
MW-6P MW-7P
MW-13PI MW-13PD MW-13PS
MW-18PI MW-18PS
01MW-101S
01MW-101D
MW-4
MW-8PS MW-8PI
MW-19PI MW-15PCD 04MW-19PD2 MW-19PS
MW-1GI MW-1GD MW-1GS
MW-11PS MW-11PI MW-11PD
MW-3P
MW-4PS MW-4PI MW-4PD
MW-5PS MW-5PI MW-5PD
MW-GC3S MW-GC3M MW-GC3D
MW-12PS MW-12PI MW-12PD
MW-10PS MW-10PI MW-10PD
MW-1A
MW-2P
MW-9 MW-10 MW-11
MW-1P
MW-1PD MW-1PI
06MW-103S 06MW-103D 06MW-103I
MW-2A MW-2AI MW-2AD
MW-2GS MW-2GD MW-2GI
MW-1H
MW-16PCD MW-16PCI
MW-2H
MW-3S

LEGEND:

- MW-2GD — MONITORING WELL LOCATION
- BUILDING
- ESTIMATED GROUNDWATER FLOW DIRECTION

NOTE:

1. GROUNDWATER FLOW DIRECTION BASED ON GROUNDWATER ELEVATION MEASUREMENTS COLLECTED IN OCTOBER 2008.

N

0 60 120 240

SCALE IN FEET

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40 British American Blvd.
Latham, NY 12110
www.aecom.com

FIGURE 2
PHOTOCIRCUITS AND PALL CORPORATION SITE PLAN

PHOTOCIRCUITS AND PALL CORPORATION
GLEN COVE, NEW YORK
NYSDEC SITES 1-30-009 & 1-30-053B

JANUARY 2012 60135725

L:\work\earth\Latham NY Work\NYSDEC - Photocircuits\95636_030 Site Plan.dwg, 1/25/2012 3:13:12 PM, splawnm

COPOBIANCO ST
CARNEY ST
HAZEL AVE
SEA CLIFF AVE
WILLOW AVE
GLEN COVE ARTERIAL HWY (NY Route 107)
N
MW-GC2S [0.0]
PHOTOCIRCUITS CORPORATION SITE LIMIT
PHOTOCIRCUITS BUTLER NO. 1
PHOTOCIRCUITS BUTLER NO. 2
PHOTOCIRCUITS MAIN BUILDING
01MW-101S [0.0]
MW-17PS [0.0]
MW-13PS [0.0]
MW-7P [12.0]
MW-18PS [1.8]
MW-8PS [1.4]
MW-19PS [34.0]
MW-9 [97.0]
PALL CORPORATION SITE LIMIT
0.005
0.5
1
MW-1GS [57.0]
MW-GC3S [298.0]
MW-11PS [17.0]
MW-5PS [78.0]
MW-4PS [1306.0]
GLEN COVE DAY CARE CENTER
MW-10PS [460.0]
MW-12PS [186.0]
PALL CORPORATION
AUGUST THOMSEN
MW-2GS [681.0]
MW-2A [545.0]
GLEN COVE CREEK
ASSOCIATED DRAPERIES
SEA CLIFF AVE
FORMER SLATER ELECTRIC PASS & SEYMOUR
PHOTOCIRCUITS BUTLER NO. 3

LEGEND:

- MW-GC3S — MONITORING WELL LOCATION
- [298.0] — CONTAMINANTS OF CONCERN CONCENTRATION IN µg/L
- ISOCONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
- BUILDING
- CONTAMINANTS OF CONCERN 0.005 TO 0.5 mg/L
- CONTAMINANTS OF CONCERN 0.5 TO 1 mg/L
- CONTAMINANTS OF CONCERN >1 mg/L
- ESTIMATED GROUNDWATER FLOW DIRECTION

NOTES:

1. CONTOURS ARE APPROXIMATE BASED ON THE AVAILABLE LABORATORY DATA.
2. GROUNDWATER FLOW DIRECTION BASED ON GROUNDWATER ELEVATION MEASUREMENTS COLLECTED IN OCTOBER 2008.
3. CONTAMINANTS OF CONCERN ARE A SUITE OF CHLORINATED VOLATILE ORGANIC COMPOUNDS (VOCs), INCLUDING TETRACHLOROETHENE, TRICHLOROETHENE, AND cis-1,2-DICHLOROETHENE. SEE FS REPORT SECTION 4.3.1 FOR DETAILS.

0 60 120 240
SCALE IN FEET

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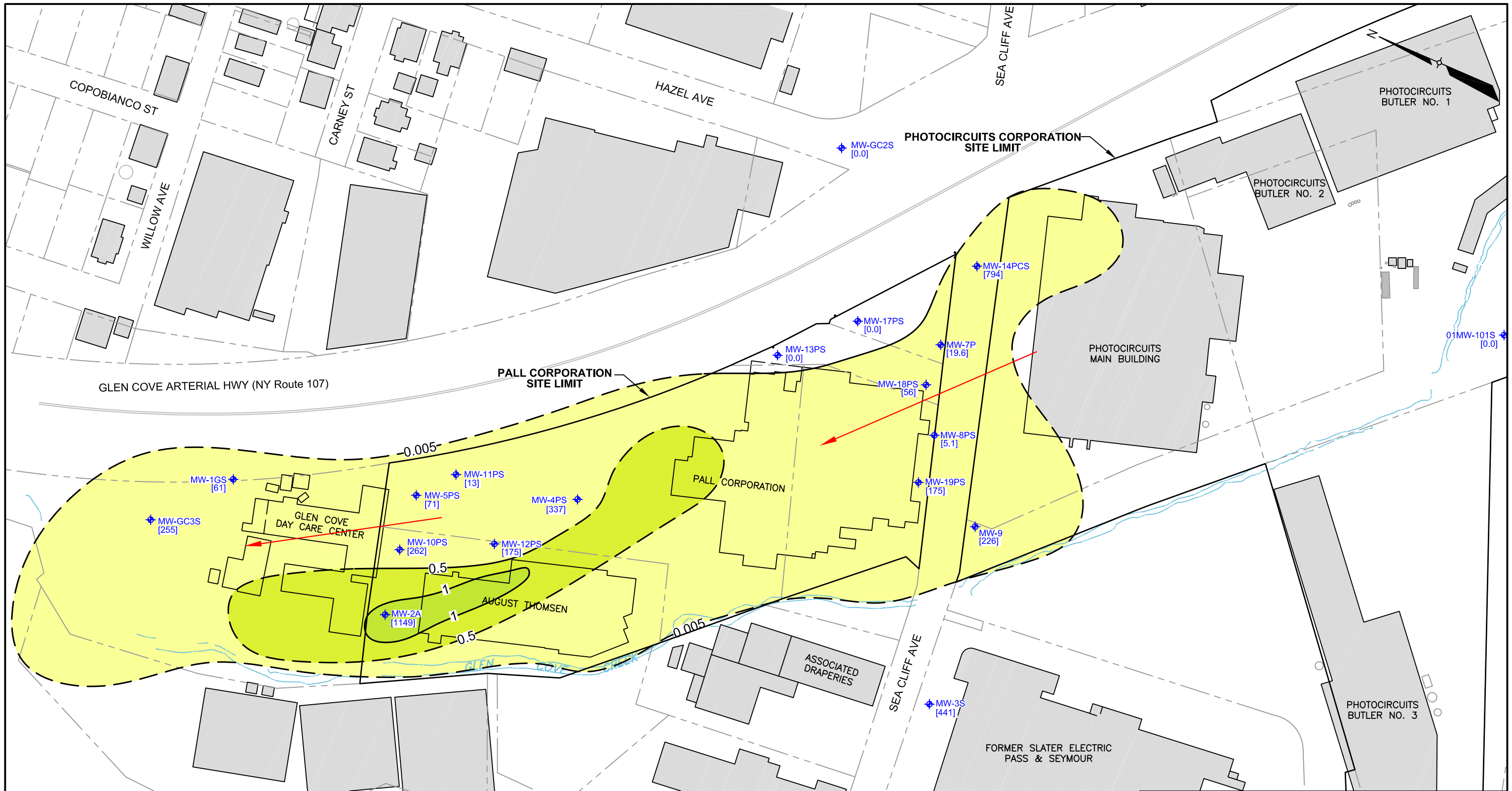
FIGURE 3
CONTAMINANTS OF CONCERN SHALLOW WELLS - APRIL 2008 DATA

PHOTOCIRCUITS AND PALL CORPORATION
GLEN COVE, NEW YORK
NYSDEC SITES 1-30-009 & 1-30-053B

JANUARY 2012 60135725



LEGEND:

- MW-GC3S — MONITORING WELL LOCATION
- [255] — CONTAMINANTS OF CONCERN CONCENTRATION IN µg/L
- ISOCONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
- BUILDING
- CONTAMINANTS OF CONCERN 0.005 TO 0.5 mg/L
- CONTAMINANTS OF CONCERN 0.5 TO 1 mg/L
- CONTAMINANTS OF CONCERN >1 mg/L
- ESTIMATED GROUNDWATER FLOW DIRECTION

NOTES:

1. CONTOURS ARE APPROXIMATE BASED ON THE AVAILABLE LABORATORY DATA.
2. GROUNDWATER FLOW DIRECTION BASED ON GROUNDWATER ELEVATION MEASUREMENTS COLLECTED IN OCTOBER 2008.
3. CONTAMINANTS OF CONCERN ARE A SUITE OF CHLORINATED VOLATILE ORGANIC COMPOUNDS (VOCs), INCLUDING TETRACHLOROETHENE, TRICHLOROETHENE, AND cis-1,2-DICHLOROETHENE. SEE FS REPORT SECTION 4.3.1 FOR DETAILS.

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FIGURE 4
CONTAMINANTS OF CONCERN SHALLOW WELLS - OCTOBER 2008 DATA

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NYSDEC SITES 1-30-009 & 1-30-053B

JANUARY 2012 60135725

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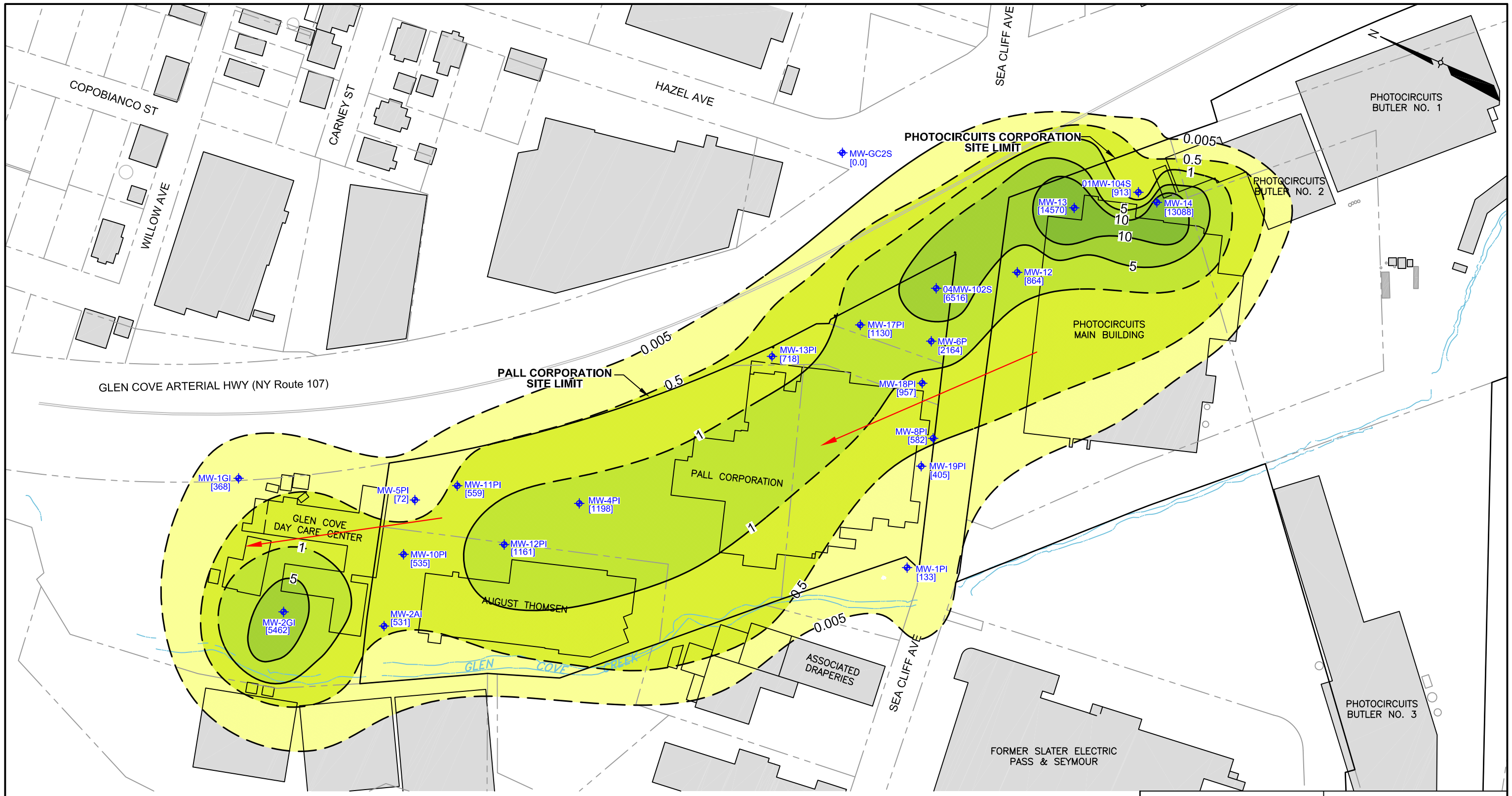

LEGEND:

MW-1GI	MONITORING WELL LOCATION
[368]	CONTAMINANTS OF CONCERN CONCENTRATION IN µg/L
	ISOCONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
	BUILDING
	CONTAMINANTS OF CONCERN 0.005 TO 0.5 mg/L
	CONTAMINANTS OF CONCERN 0.5 TO 1 mg/L
	CONTAMINANTS OF CONCERN 1 TO 5 mg/L
	CONTAMINANTS OF CONCERN 5 TO 10 mg/L
	CONTAMINANTS OF CONCERN >10 mg/L
	ESTIMATED GROUNDWATER FLOW DIRECTION

NOTES:

1. CONTOURS ARE APPROXIMATE BASED ON THE AVAILABLE LABORATORY DATA.
2. GROUNDWATER FLOW DIRECTION BASED ON GROUNDWATER ELEVATION MEASUREMENTS COLLECTED IN OCTOBER 2008.
3. CONTAMINANTS OF CONCERN ARE A SUITE OF CHLORINATED VOLATILE ORGANIC COMPOUNDS (VOCs), INCLUDING TETRACHLOROETHENE, TRICHLOROETHENE, AND cis-1,2-DICHLOROETHENE. SEE FS REPORT SECTION 4.3.1 FOR DETAILS.

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FIGURE 5
CONTAMINANTS OF CONCERN INTERMEDIATE WELLS - APRIL 2008 DATA

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NYSDEC SITES 1-30-009 & 1-30-053B

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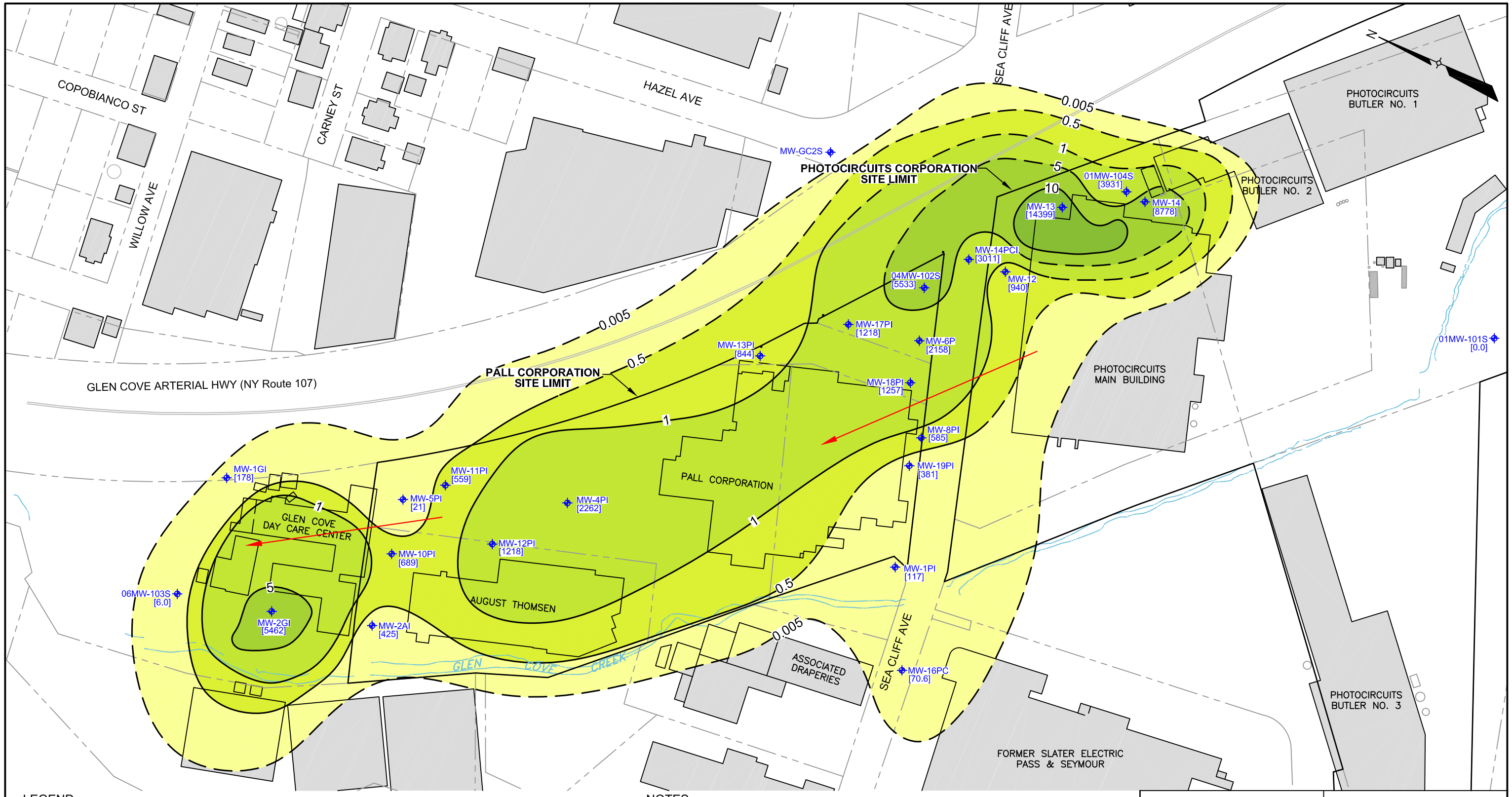

LEGEND:

MW-2AI	MONITORING WELL LOCATION
[425]	CONTAMINANTS OF CONCERN CONCENTRATION IN µg/L
	ISOCONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
	BUILDING
	CONTAMINANTS OF CONCERN 0.005 TO 0.5 mg/L
	CONTAMINANTS OF CONCERN 0.5 TO 1 mg/L
	CONTAMINANTS OF CONCERN 1 TO 5 mg/L
	CONTAMINANTS OF CONCERN 5 TO 10 mg/L
	CONTAMINANTS OF CONCERN >10 mg/L
	ESTIMATED GROUNDWATER FLOW DIRECTION

NOTES:

1. CONTOURS ARE APPROXIMATE BASED ON THE AVAILABLE LABORATORY DATA.
2. GROUNDWATER FLOW DIRECTION BASED ON GROUNDWATER ELEVATION MEASUREMENTS COLLECTED IN OCTOBER 2008.
3. CONTAMINANTS OF CONCERN ARE A SUITE OF CHLORINATED VOLATILE ORGANIC COMPOUNDS (VOCs), INCLUDING TETRACHLOROETHENE, TRICHLOROETHENE, AND cis-1,2-DICHLOROETHENE. SEE FS REPORT SECTION 4.3.1 FOR DETAILS.

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FIGURE 6
CONTAMINANTS OF CONCERN INTERMEDIATE WELLS - OCTOBER 2008 DATA

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LEGEND:

- MW-2GD — MONITORING WELL LOCATION
- [120] — CONTAMINANTS OF CONCERN CONCENTRATION IN µg/L
- ISOCONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
- BUILDING
- ESTIMATED GROUNDWATER FLOW DIRECTION
- CONTAMINANTS OF CONCERN 0.005 TO 0.5 mg/L
- CONTAMINANTS OF CONCERN 0.5 TO 1 mg/L
- CONTAMINANTS OF CONCERN 1 TO 5 mg/L
- CONTAMINANTS OF CONCERN 5 TO 10 mg/L
- CONTAMINANTS OF CONCERN 10 TO 13 mg/L
- CONTAMINANTS OF CONCERN >13 mg/L

NOTES:

1. CONTOURS ARE APPROXIMATE BASED ON THE AVAILABLE LABORATORY DATA.
2. 04MW-18PD2 AND 04MW-6PD2 NOT CONSIDERED FOR ISOCONCENTRATION CONTOURS.
3. GROUNDWATER FLOW DIRECTION BASED ON GROUNDWATER ELEVATION MEASUREMENTS COLLECTED IN OCTOBER 2008.
4. CONTAMINANTS OF CONCERN ARE A SUITE OF CHLORINATED VOLATILE ORGANIC COMPOUNDS (VOCs), INCLUDING TETRACHLOROETHENE, TRICHLOROETHENE, AND cis-1,2-DICHLOROETHENE. SEE FS REPORT SECTION 4.3.1 FOR DETAILS.

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FIGURE 7
CONTAMINANTS OF CONCERN DEEP WELLS - APRIL 2008 DATA

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LEGEND:

- MW-2GD — MONITORING WELL LOCATION
- [120] — CONTAMINANTS OF CONCERN CONCENTRATION IN µg/L
- ISOCONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
- BUILDING
- ESTIMATED GROUNDWATER FLOW DIRECTION
- CONTAMINANTS OF CONCERN 0.005 TO 0.5 mg/L
- CONTAMINANTS OF CONCERN 0.5 TO 1 mg/L
- CONTAMINANTS OF CONCERN 1 TO 5 mg/L
- CONTAMINANTS OF CONCERN 5 TO 10 mg/L
- CONTAMINANTS OF CONCERN 10 TO 13 mg/L
- CONTAMINANTS OF CONCERN >13 mg/L

NOTES:

1. CONTOURS ARE APPROXIMATE BASED ON THE AVAILABLE LABORATORY DATA.
2. 04MW-19PD2 AND 04MW-6PD2 NOT CONSIDERED FOR ISOCONCENTRATION CONTOURS.
3. GROUNDWATER FLOW DIRECTION BASED ON GROUNDWATER ELEVATION MEASUREMENTS COLLECTED IN OCTOBER 2008.
4. CONTAMINANTS OF CONCERN ARE A SUITE OF CHLORINATED VOLATILE ORGANIC COMPOUNDS (VOCs), INCLUDING TETRACHLOROETHENE, TRICHLOROETHENE, AND cis-1,2-DICHLOROETHENE. SEE FS REPORT SECTION 4.3.1 FOR DETAILS.

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FIGURE 8
CONTAMINANTS OF CONCERN DEEP WELLS - OCTOBER 2008 DATA

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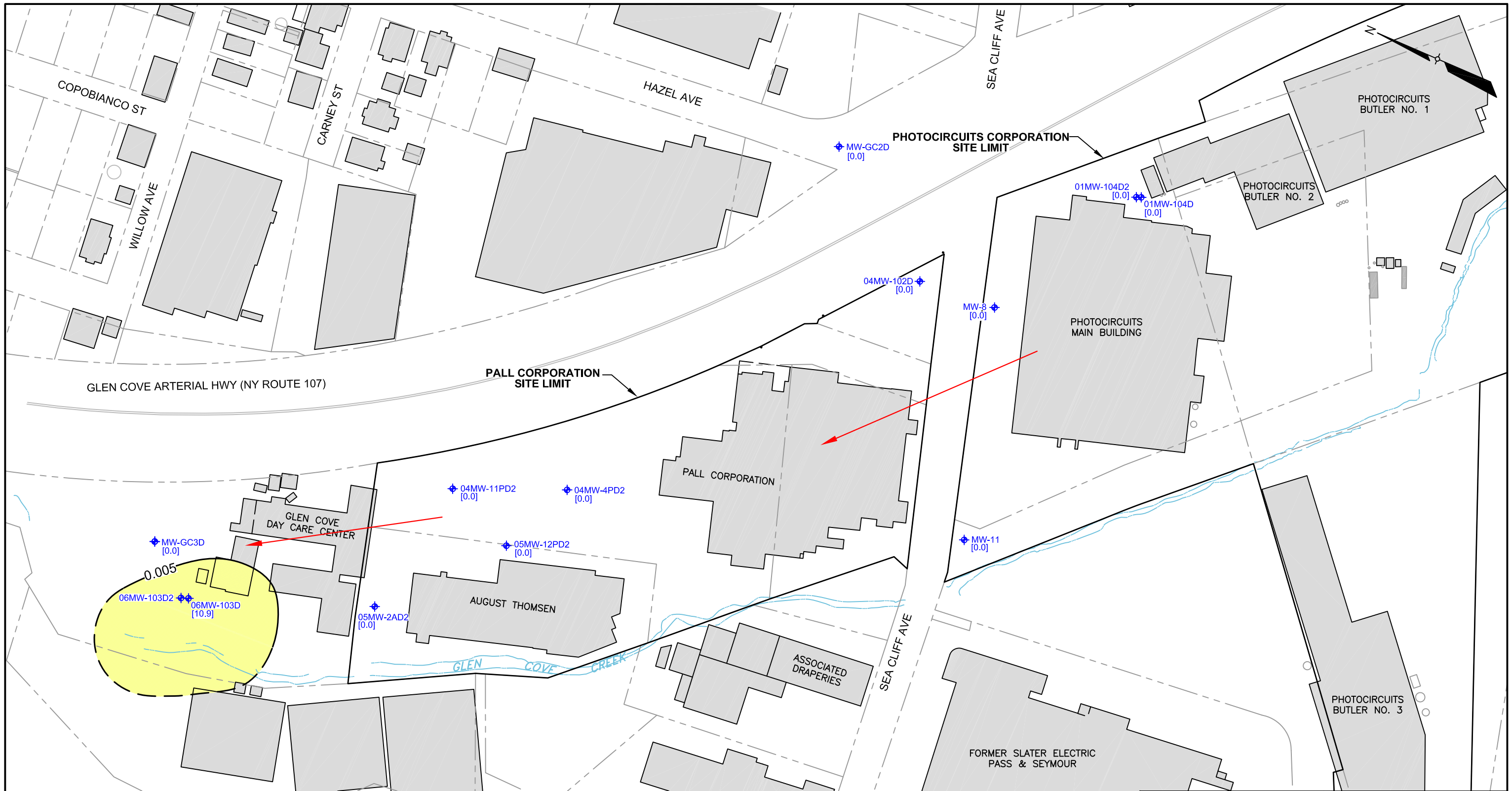

LEGEND:

- 06MW-103D — MONITORING WELL LOCATION
- [10.9] — CONTAMINANTS OF CONCERN CONCENTRATION IN µg/L
- ISOCONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
- BUILDING
- CONTAMINANTS OF CONCERN >0.005
- ESTIMATED GROUNDWATER FLOW DIRECTION

NOTES:

1. CONTOURS ARE APPROXIMATE BASED ON THE AVAILABLE LABORATORY DATA.
2. GROUNDWATER FLOW DIRECTION BASED ON GROUNDWATER ELEVATION MEASUREMENTS COLLECTED IN OCTOBER 2008.
3. CONTAMINANTS OF CONCERN ARE A SUITE OF CHLORINATED VOLATILE ORGANIC COMPOUNDS (VOCs), INCLUDING TETRACHLOROETHENE, TRICHLOROETHENE, AND cis-1,2-DICHLOROETHENE. SEE FS REPORT SECTION 4.3.1 FOR DETAILS.

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FIGURE 9
CONTAMINANTS OF CONCERN
EXTRA DEEP WELLS - APRIL 2008 DATA

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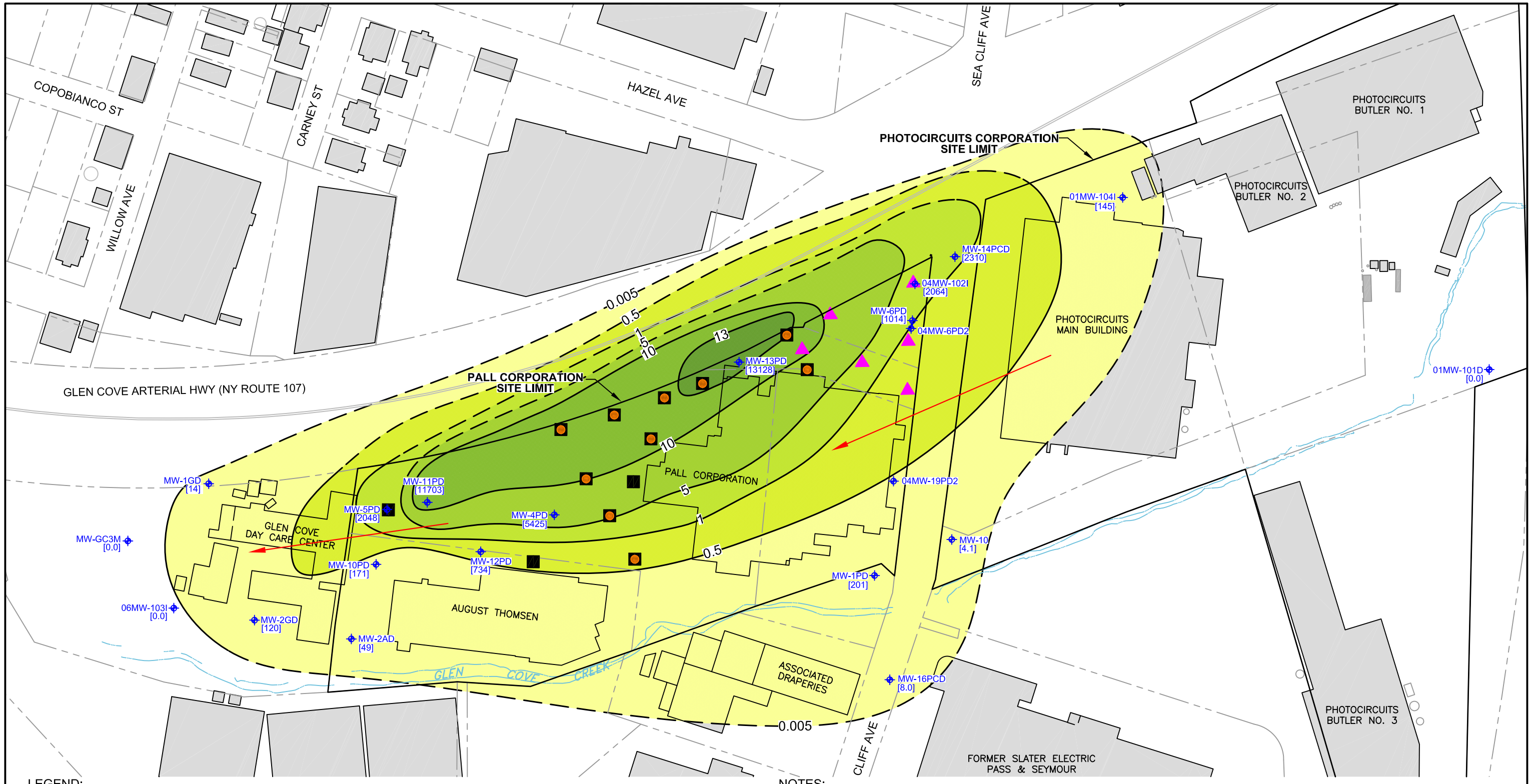

LEGEND:

- PROPOSED INJECTION WELL LOCATION
- PROPOSED EXTRACTION WELL LOCATION
- PROPOSED ISCO INJECTION WELL LOCATION
- MW-2GD — MONITORING WELL LOCATION
- [120] — CONTAMINANTS OF CONCERN CONCENTRATION IN µg/L
- ISOCONCENTRATION CONTOUR LINE (DASHED WHERE INFERRED)
- ESTIMATED GROUNDWATER FLOW DIRECTION
- CONTAMINANTS OF CONCERN 0.005 TO 0.5 mg/L
- CONTAMINANTS OF CONCERN 0.5 TO 1 mg/L
- CONTAMINANTS OF CONCERN 1 TO 5 mg/L
- CONTAMINANTS OF CONCERN 5 TO 10 mg/L
- CONTAMINANTS OF CONCERN 10 TO 13 mg/L
- CONTAMINANTS OF CONCERN >13 mg/L
- BUILDING

NOTES:

1. CONTOURS ARE APPROXIMATE BASED ON THE AVAILABLE LABORATORY DATA.
2. 04MW-19PD2 AND 04MW-6PD2 NOT CONSIDERED FOR ISOCONCENTRATION CONTOURS.
3. GROUNDWATER FLOW DIRECTION BASED ON GROUNDWATER ELEVATION MEASUREMENTS COLLECTED IN OCTOBER 2008.

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FIGURE 10
ALTERNATIVE 6
ISCO INJECTION AND GROUNDWATER EXTRACTION (RECIRCULATION) WITHOUT EX SITU TREATMENT

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