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Transmittal Letter

To:
Steve M. Scharf
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233

Copies:
Walter Parish, NYSDEC
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John Cofman, Northrop Grumman
File

From:
William S. Wittek, PE WSW

Date:
March 21, 2008

Subject:
Basis-of-Design Letter, Groundwater Interim Remedial Measure, Operable Unit 3, Former Grumman Settling Ponds, Bethpage, New York

ARCADIS Project No.:
NY001464.1407.00004

We are sending you:
X **Attached** ☐ **Under Separate Cover Via ________ the Following Items:**

☐ Shop Drawings ☐ Plans ☐ Specifications ☐ Change Order
☐ Prints ☐ Samples X Copy of Letter Reports
Other: ________

Copies	Date	Drawing No.	Rev.	Description	Action*
1	3/21/08			Basis-of-Design Letter	FA

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Comments: Please contact me or one of the project team members with questions or comments.

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ENVIRONMENT

Steve Scharf
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233

Subject:
Basis of Design Letter
Groundwater Interim Remedial Measure
Operable Unit 3
Former Grumman Settling Ponds
Bethpage, New York

Date:
March 21, 2008

Contact:
William S. Wittek, PE

Phone:
631-391-5270

Email:
william.wittek@arcadis-us.com

Our ref:
NY001464.1807.00003

Dear Mr. Scharf:

This Operable Unit 3 (OU3) Groundwater Interim Remedial Measure (Groundwater IRM) Basis of Design Letter (BOD Letter) was prepared by ARCADIS of New York, Inc. (ARCADIS) on behalf of Northrop Grumman Systems Corporation (Northrop Grumman), and is being submitted pursuant to the Order On Consent (Consent Order or CO) Index # W1-0018-04-01 that was executed by the New York State Department of Environmental Conservation (NYSDEC) and Northrop Grumman, effective July 4, 2005 (NYSDEC 2005). The present day Bethpage Community Park property (Park), has been termed the "Former Grumman Settling Ponds Area" and designated as OU3, by the NYSDEC. The Park has been owned and operated by the Town of Oyster Bay since 1962. The term Site refers to the Park and the former Grumman Plant 24 Access Road (which is located south and west of the Park).

To help ensure start-up of the Groundwater IRM in 2008, ARCADIS proposes the following accelerated design process:

- Submittal of this BOD Letter in lieu of a 50-75% Design.
- Completion of a Pumping Test, per the OU3 Groundwater IRM Work Plan revised December 12, 2007, to confirm key design parameters prior to finalizing the design.
- Preparation of a Construction/Final Design Package, which will begin after the BOD Letter has been completed and will be modified, as needed, after the pumping test is completed.

This BOD Letter provides the following information associated with the proposed Groundwater IRM:

- Remedial Objectives and Treatment System Overview
- Basis of Design Information
- Process Description and Major Equipment Specifications
- Utilities
- Permitting
- Selected Drawings
- Operation, Maintenance, and Monitoring (OM&M) Requirements
- Schedule

Additional project information, such as the site locus and total volatile organic compound (TVOC) concentrations in both plan, and cross-sectional, views are provided in Appendix A.

Please Note: The information provided herein should be considered preliminary and may change in later design phases.

REMEDIAL OBJECTIVES AND TREATMENT SYSTEM OVERVIEW

This section presents the remedial objectives and an overview of the proposed treatment system.

Remedial Objectives

The specific remedial objectives of the Groundwater IRM are:

- To mitigate the off-Site migration of dissolved-phase volatile organic compounds (VOCs) through the implementation of a groundwater pump-and-treat system that will extract groundwater along the former Plant 24 Access Road property, south of the Park. Specifically the Groundwater IRM will address: a) groundwater that has TVOC concentrations greater than 5 micrograms per liter (ug/L) in the upper twenty feet of the surficial aquifer across the 1,200-foot wide lateral extent of the Site boundary and b) groundwater below the upper 20 feet of the surficial aquifer that has TVOC concentrations above 50 ug/L.

- To comply with applicable NYSDEC Standards, Criteria, and Guidelines (SCGs) for the various effluents (i.e. treated water and the air stripper off-gas).

A secondary benefit of the Groundwater IRM will be to create a clean-water front atop the downgradient groundwater, thereby minimizing the potential for vapor intrusion issues associated with groundwater downgradient of the site.

Treatment System Overview

The Groundwater IRM will consist of a groundwater pump-and-treat system to create a hydraulic barrier across the downgradient Site boundary and to meet the other project requirements. To create the hydraulic containment barrier, groundwater will be extracted at specific pumping rates from four, strategically located recovery wells (i.e. Recovery Wells RW-1 through RW-4) that will be installed on the Former Plant 24 Access Road. The extracted groundwater will be conveyed to the treatment plant located on McKay Field via subsurface pipelines for treatment. Specifically, an air stripper will be used to reduce the VOC concentrations in the extracted groundwater prior to discharge to a recharge basin(s) located on the neighboring NWIRP property. The air stripper off-gas will be pre-treated using a duct heater and then treated using emission control units (ECUs) filled with vapor phase granular activated carbon (VPGAC) and potassium permanganate-impregnated zeolite ($KMnO_4$) media to reduce concentrations of VOCs prior to discharge to the atmosphere via the existing Soil Gas IRM stack. The layout of the proposed Groundwater IRM, the preliminary process control and flow diagram, and a typical recovery well detail are provided in Figures 1, 2, and 3, respectively.

BASIS OF DESIGN INFORMATION

This section presents the basis of design for the proposed Groundwater IRM. The major components of that form the basis of design include pumping rates, predicted influent groundwater concentrations, treated water effluent requirements, predicted air stripper off-gas concentrations, and air effluent requirements.

Pumping Rates

A comprehensive groundwater flow and contaminant transport model for the site was developed by ARCADIS. The model is based on data collected for Operable Unit 2 (OU2) and OU3. Based on a series of model simulations run for the GW IRM, , a total system flow rate of 210 gallons per minute (gpm) from four recovery wells is predicted to be needed to achieve the hydraulic containment objective. However, the individual system components will be designed with a safety factor of an additional 10 gpm per well, resulting in a design flow rate of 250 gpm. The approximate locations of the recovery wells are shown on Figure 1.

Currently, Recovery Well RW-2 is being installed and a pumping test is scheduled for the middle of March 2008. The results of the pumping test will be used to confirm/finalize the following:

- Number, location, and sizing of the groundwater recovery wells,
- Recovery well pumping rates, and
- Proper sizing of piping, pumps, ECUs, and the air stripper.

Predicted Influent Groundwater Concentrations

The predicted Groundwater IRM influent groundwater concentrations for the project compounds are provided in Table 1. The predicted influent concentrations; (a) are based on results of sampling and modeling activities performed by ARCADIS during the OU3 remedial investigations, (b) include a 50% safety factor for each of the project VOCs, and (c) will be used to design system components.

During the Recovery Well RW-2 pumping test, two samples will be collected and analyzed to help characterize the Groundwater IRM influent groundwater quality.

Treated Water Effluent Requirements

Prior to discharge to the NWIRP recharge basins, the treated water needs to comply with applicable regulatory requirements, specifically the "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, per Division of Water Technical and Operation Guidance Series (1.1.1), reissued June 1998 for ambient water classification "GA – Source of Drinking Water (groundwater)". The applicable, regulatory discharge limit for the project compounds are provided in Table 1. As shown in Table 1, VOC concentrations in the extracted groundwater need to be reduced prior to discharge.

An air stripper will be used to reduce the concentration of VOCs to meet the regulatory limits. Specifically, the air stripper will be designed to reduce the influent design concentration of individual VOCs to one-half its regulatory limit. The design discharge values for the individual VOCs are also provided in Table 1.

Predicted Air Stripper Off-gas Concentrations

The predicted air stripper off-gas concentrations for the project compounds are provided in Table 2. The predicted influent vapor concentrations were calculated assuming that 100% of the VOCs in the influent groundwater are transferred from the groundwater to the air stripper off-gas. Also shown in Table 2, are the potential annual mass emissions, which are the amounts of the project VOCs that would be emitted if there were no treatment of the air stripper off-gas.

Air Discharge Requirements

Prior to discharge to the atmosphere, the system vapor emission needs to comply with the applicable regulatory requirements, per the "Annual Guidance Criteria (AGC) and Short-Term Guidance Criteria (SGC) per the NYSDEC Division of Air Resources-1 (DAR-1) Guidelines for the Control of Toxic Ambient Air Contaminants dated 1991, and the AGC/SGC Tables dated December 22, 2003." The AGCs and SGCs for the project VOCs are presented in Table 2.

As shown in Table 2, vapor phase treatment is required since the potential annual emission of vinyl chloride (161 lbs) exceeds the allowable annual emission rate (122 lbs). However, since the predicted emissions include a 50% safety factor, as discussed above in the Predicted Groundwater influent concentration sub-section, treatment of the air stripper off-gas may not be needed to meet applicable SGCs or the AGCs. An emission control system will be constructed and operated to ensure compliance with applicable regulatory requirements but, in the future, depending on what the actual emissions are, Northrop Grumman may petition to eliminate or reduce the amount of vapor phase treatment. Initially, a series of ECUs will be used to reduce the VOC concentrations in the air stripper off-gas prior to discharge. The ECUs will be designed to meet applicable discharge requirements.

MAJOR EQUIPMENT

This section presents a description of the major equipment that will be used in the Groundwater IRM.

Groundwater Recovery Wells

To develop and maintain the desired hydraulic containment along the Former Plant 24 access road, groundwater will be extracted from four (4), six-inch diameter, 105-feet deep, steel-cased, recovery wells (Recovery Wells RW-1 through RW-4). The proposed well locations are shown on Figure 1.

Each well will be flush mounted, have a pitless adaptor located 3.5-feet below grade, and be completed with 20-feet of continuous slot, stainless steel screen. An example of a typical recovery well detail is provided in Figure 3.

Groundwater Extraction Pumps and Subsurface Conveyance Pipelines

Submersible groundwater pumps, one in each of the four recovery wells, will be used to extract and convey the groundwater from the wells to the treatment plant. Based on groundwater modeling, the following pumping scenario was developed to achieve the desired hydraulic containment:

- 30 gpm @ Recovery Wells RW-1 and RW-4
- 75 gpm @ Recovery Wells RW-2 and RW-3

However, the pumps and ancillary equipment will be sized to pump an additional 10 gpm per well in case higher pumping rates are needed in the future. Pump specifications are provided in Table 3.

Each well has a dedicated, subsurface, high-density polyethylene (HDPE) pipeline to convey extracted groundwater to the treatment plant. Specifically:

- Recovery Wells RW-1 and RW-4 have 3-inch diameter, SDR 17 HDPE pipelines
- Recovery Wells RW-2 and RW-3 have 4-inch diameter, SDR 17 HDPE pipelines.

Figure 1 shows the approximate layout of the conveyance pipelines.

Air Stripper

The extracted groundwater will be pumped to a low-profile air stripper located inside the treatment building. The low-flow air stripper is designed for a maximum flow rate of 250 gpm and will consist of six aeration trays, an induced draft blower, a discharge pump, and associated controls. The low-profile air stripper will use an induced-draft blower to provide counter current air stripping through the six baffled aeration trays to remove VOCs from the groundwater. The air stripper off-gas will be forced through a duct heater, treated via the ECUs and ultimately discharged to the atmosphere via the existing Soil Gas IRM stack. Specifications for the air stripper, blower, and discharge pump are provided in Table 3.

Duct Heater

Upon exiting the air stripper, the air stripper off-gas will pass through the duct heater to reduce the relative humidity of the off-gas from 100 percent to less than 50 percent by heating the air stream to approximately 98 degrees Fahrenheit. Pre-treatment of the air stripper off-gas, specifically reducing the relative humidity, is required for effective, efficient VOC removal in the subsequent VPGAC and $KMnO_4$ ECUs. Specifications for the duct heater are provided in Table 3.

Emission Control Units

To reduce the concentration of project-related VOCs in the air stripper off-gas prior to discharge, two types of vapor phase media will be used. VPGAC will be used to remove non-vinyl chloride VOCs via concentration-based, equilibrium transfer kinetics (sorption) and once the other VOCs are removed, $KMnO_4$ will be used to reduce Vinyl Chloride concentrations by oxidation. There will be four ECUs total, two VPGAC and two $KMnO_4$ ECUs. To improve overall treatment effectiveness, both sets of VPGAC and $KMnO_4$ ECUs will be operated in lead/lag process trains. Specifications for the ECUs are provided in Table 3.

The ECUs and ancillary duct work will be insulated to reduce cooling of the vapor stream as it passes through the beds and duct work, which would result in an increase in relative humidity and could even cause condensation in the beds.

Discharge Pipeline

Treated groundwater from the low-profile air stripper will be discharged to a NWIRP recharge basin via a subsurface, 6-inch diameter, scheduled 80 PVC pipe.

Treatment Building

A pre-engineered, metal building located near the Soil Gas IRM treatment equipment in McKay Field will be used to house the Groundwater IRM air stripper, blower, and the majority of the instrumentation, controls, and electrical components. The treatment building will be installed on concrete slab. The treatment building has not been specified yet.

Process Controls and Operations

The process control system will be designed to provide the necessary safeties and interlocks to ensure that the recovery wells, piping, and treatment system operate smoothly, efficiently, and as one unit.

Controls and instrumentation will be interconnected via a serial network. The main control panel (MCP) includes a programmable logic controller (PLC) which will monitor and integrate the operation of the recovery wells, the air stripping system, the emission control system, the treated water discharge system, and all the treatment system interlocks. The MCP will serve as the node through which communication with the control system will take place. The PLC will be integrated with the supervisory control and data acquisition (SCADA) system, including an operator interface station. The PLC will also use fail-safe logic to automatically and immediately shut down the entire treatment system in the event of a critical alarm input.

The power supplies for the PLC, system instrumentation, and process control devices will be protected with transient voltage surge suppression (TVSS) systems to limit voltage spikes to the system. The PLC, system instrumentation ,and process control devices will be protected by separate uninterrupted power supplies (UPS) which maintain power to these devices in case of a power outage.

Alarms, Interlocks, and Advisories

The recovery wells, air stripping system, emission control systems, and the treated water discharge system will be interlocked and alarmed to ensure the water and air are properly treated, and for efficient system operation. There are three types of interlocks and alarms that will be incorporated; primary alarms, secondary alarms, including fail-safe circuitry, and advisories. A list of all the proposed alarms and advisories is provided in Table 4.

Primary alarms are alarms that will be processed by the PLC to shut the system down. The PLC will constantly be receiving signals from the instrumentation listed in Table 4. When the PLC detects an alarm condition from one of these instruments, the PLC automatically and immediately sends a signal to relays that cause the starter coils for all the process equipment (pumps, blower, and duct heater) to open, thus causing the equipment to shut-down.

Secondary, or critical, alarms will be used to back-up key primary alarms or to shut the system down if either the PLC or the blower VFD fail. If a primary alarm instrument fails to appropriately respond to an alarm condition, a hard-wired switch will then open a remote relay contact, thus shutting down the process equipment automatically and immediately.

Fail-safe circuitry means that the normal condition of a circuit is energized. If for some reason (e.g., loss of power, a broken wire, or a relay burn out) the “switch” becomes de-energized and opens, the circuit is broken, which will immediately cut power to the other devices on the circuit. For the Groundwater IRM, this system is useful for the following reasons: (a) shuts the treatment processes down once the circuit is broken by any of the hard-wired switches (the secondary alarms), and (b) ensures that if there is a power failure or a key system component losses power, a switch/contact will open causing the entire system to shut down.

Advisories conditions occur when process variables are outside their desired range, but do not require immediate shut down of the treatment plant. Select instrumentation will continually feed signals to the PLC and if a variable is out of its desired range, the operator will be notified.

SITE WORK/UTILITIES

The former bathroom facility for McKay Field may need to be decommissioned and removed as part of the site work portion of the Groundwater IRM.

The Groundwater IRM will require electrical and telephone utility connections. Cable and natural gas utilities may also be used.

PERMITTING

Pursuant to Article 27 of The New York Environmental Conservation Law (ECL), Title 6, Section 375-1.12 of Subpart 375-1 "General Remedial Program Requirements", revised June 14, 2006 (27 ECL Title 6 Part 375-1.12), the NYSDEC has determined that the Groundwater IRM is exempt from obtaining (NYSDEC) Department issued permits. Therefore, no operational permits are required for this project, but rather, the substantive requirements of the permits must be met. Specifically, State Pollutant Discharge Elimination Permit (SPDES) and air discharge permit applications will be completed and submitted with the construction/final design package. Permit compliance monitoring and reporting will be performed as specified in the permit applications and incorporated into the Sampling and Analysis Plan (SAP), which will be provided to the NYSDEC prior to system start-up for review and approval.

In addition, the NYSDEC has determined that State and local permits, such as: building and electrical permits, will not be required, but rather, the substantive requirements of the permits must be met, pursuant to 27 ECL Title 6 Part 375-1.12

SELECTED DRAWINGS

Three figures are included. Figure 1 presents the preliminary layout of the proposed Groundwater IRM. Figure 2 is a process flow diagram that also shows the majority of the process controls that will be included in the design. Figure 3 shows construction details of a typical recovery well.

OPERATION, MAINTENANCE, AND MONITORING (OM&M) REQUIREMENTS

An OM&M Manual will be prepared prior to system start-up. The OM&M Manual will include the following information:

- Equipment manufacturer's O&M information and spare parts list;
- System start-up and shut-down procedures;
- Emergency response procedures;
- Treatment system monitoring, sampling, and reporting requirements;
- Documentation and recordkeeping requirements;
- Groundwater IRM closure strategy; and
- Treatment system record drawings.

SCHEDULE

A schedule for the project is provided in Appendix B.

Sincerely,

ARCADIS

William S. Wittek, PE
Project Engineer

Copies:
John Cofman, Northrop Grumman
Walter Parish, NYSDEC
Abdur Rahman, NYSDEC
File

Enclosures

Table 1. Predicted influent,regulatory discharge, and design discharge water concentrations, Groundwater IRM, Operable Unit 3, Former Grumman Settling Ponds, Bethpage, New York.

PARAMETER (1)	BASIS OF DESIGN CONCENTRATIONS - WATER (ug/L)		
	Predicted Influent (2)	Regulatory Standard (3)	Design Effluent (4)
Trichloroethene	46	5	<2.5
cis-1,2 Dichloroethene	780	5	<2.5
Vinyl Chloride	147	2	<1

NOTES

1. The three primary project compounds; Trichloroethene, cis 1,2 Dichloroethene, and vinyl chloride are listed.
2. Predicted influent concentrations are based on data collected during the remedial investigation, projected pumping rates, and include a 50% factor of safety.
3. Regulatory concentration per "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, per Division of Water Technical and Operational Guidance Series (1.1.1), reissued June 1998 for ambient water classification 'GA - Source Drinking Water (groundwater)'".
4. The design effluent concentrations calculated by dividing the regulatory levels of VOCs by 2 for a safety factor.

Table 2. Predicted influent, regulatory discharge, and design discharge vapor concentrations, Groundwater IRM, Operable Unit 3, Former Grumman Settling Ponds, Bethpage, New York.

PARAMETER (1)	BASIS OF DESIGN CONCENTRATIONS - VAPOR (ug/m3)			MASS EMISSIONS - VAPOR	
	Predicted Influent (2)	Regulatory Standards (3,4)		Potential Annual Emission (lbs)	
		AGC	SGC	Predicted (5)	Allowable (6)
Trichloroethene	1,184	0.5	54,000	51	555
cis-1,2 Dichloroethene	20,074	1,900	190,000	854	2,107,273
Vinyl Chloride	3,783	0.11	180,000	161	122

NOTES

1. There are three primary project compounds: Trichloroethene, cis 1,2 Dichloroethene, and vinyl chloride.
2. Predicted vapor influent concentrations calculated by multiplying the design influent (water) concentration by the design pumping rate (250 gpm) and dividing by the projected air flow rate (1,300 CFM).
3. Regulatory concentration per "New York State DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants, 1991 Edition and DAR-1 AGC/SGC Tables, dated December 22, 2003".
4. AGC refers to Annual Guidance Concentration.
   SGC refers to Short-term Guidance Concentration.
5. The predicted potential (untreated) annual mass emissions were calculated by multiplying the influent (vapor) concentrations by the expected flow rate of 1,300 CFM and assuming a continuous discharge for the entire year.
6. The allowable mass that can be emitted by the system was calculated using the Standard Point Source Method; per Appendix B, Section III of the New York State DAR-1, Guidelines for the Control of Toxic Ambient Air Contaminants, Appendix B, which is the recommended first screening method to determine whether the discharge meets the AGC requirements.

Table 3. Major Equipment List, Groundwater IRM, Operable Unit 3, Former Grumman Settling Ponds, Bethpage, New York.

ITEM	QUANTITY	DESIGN	DESCRIPTION
Groundwater Recovery Pumps			
RW-1 and RW-4	2	40 gpm @ 200 ft TDH	Grundfos: Model 40S30-9, 3 hp, 460 V, three-phase, teflon trim
RW-2 and RW-3	2	85 gpm @ 220 ft TDH	Grundfos: Model 85S75-6, 7.5 hp, 460 V, three-phase, teflon trim
Low-Profile Air Stripper	1	250 gpm, see Table 1 for design information	QED Model: EZ Tray 24.6SS, 304L stainless steel, 6-tray
Air Stripper Blower	1	1,300 CFM @ 24" inches water gauge	American Fan: backward inclined/induced draft, 30 hp, 460V, three phase - note: blower will be between the air stripper and the emission control units
Duct Heater	1	Increase temperature of 1,300 CFM by 42 degrees	Reznor: Model RP125, 125,000 BTUH, electronically modulated w/duct probe, 409L stainless steel
Emission Control Units			
granular activated carbon	2	4,400 lb units	TIGG: Model N5000 PDBs w/4,400 lbs of 5CC 0408 Virgin Coconut VPGAC
potasium permanganate	2	8,400 lb units	TIGG: Model N5000 PDBs w/8,400 lbs of Hydrosil KMnO4
Discharge Pump	1	250 gpm @ 10 ft TDH	Goulds (or equivilent) 5 hp, 460V, three-phase, self priming

TDH - total dynamic head
hp - horsepower
V - volts
BTUH - british thermal units per hour
VPGAC - vapor phase granular activated carbon
KMnO4 - potasium permangate impregnated zeolite

Table 4. Alarm and Advisory List, Groundwater IRM, Operable Unit 3, Former Grumman Settling Ponds, Bethpage, New York.

PRIMARY (PLC) ALARMS

ALARM	DEVICE	LOCATION
Emergency/All Stop	Push Button/Touch Screen	1 on MCP and 1 on Touch Screen
Influent line Low Pressure	Pressure transmitter	4, one for each influent line
Blower Low Pressure	Pressure transmitter	Between blower and air stripper
Blower Low Flow	Flow Transmitter	Air Duct Line
Blower High Pressure	Pressure transmitter	Between blower and air stripper
Air Stripper High-High Level	Level Transmitter	Air strippрer sump
Off-gas Low Temperature	Temperature Transmitter	between duct heater and VPGAC ECU
Off-gas High Temperature	Temperature Transmitter	between duct heater and VPGAC ECU
Blower VFD Fault	VFD Fault Contact	Blower VFD
Discharge Pump High Pressure	Pressure Transmitter	Discharge Pump Effluent
Building Flood Alarm	Level Switch	Berm around Stripper

SECONDARY ALARMS

ALARM	DEVICE	LOCATION
Air Stripper High-High	Level Switch	Air Stripper sump
Influent Line Low Pressure	Pressure Switch	4, one for each influent line
Blower Low Flow/Low Pressure	Pressure/Flow Switch	Between blower and air stripper
PLC Failure	Relay Contact	PLC

ADVISORIES

ADVISORIES	DEVICE	LOCATION
Low Pumping Rate	Flow Meter	4, one on each influent line
Influent Line High Pressure	Pressure transmitter	4, one for each influent line
Low Air Flow Rate	Flow Meter	Air Duct Line
Low Air Pressure	Pressure Transmitter	Blower Dishcarge
Air Stripper High Level	Level Transmitter	Air strippрer sump
Air Stripper Low Level	Level Transmitter	Air strippрer sump
Off-gas Low Temperature	Temperature Transmitter	between duct heater and VPGAC ECU

OPERATIONAL CONTROLS

OPERATIONAL CONTROLS	DEVICE	LOCATION
Air Stripper High Level	Level Transmitter	Air strippрer sump
Air Stripper Low Level	Level Transmitter	Air strippрer sump

Acad Version : R17.0s (LMS Tech) Date\Time : Fri, 21 Mar 2008 - 3:18pm
User Name : absanchez Path\Name : G:\APROJECT\Northrop Grumman\Superfund\2007\OU3\NY001464.1807 GW IRM\Work Plan\DRAFT Work Plan to NGC\Design_Layout.dwg
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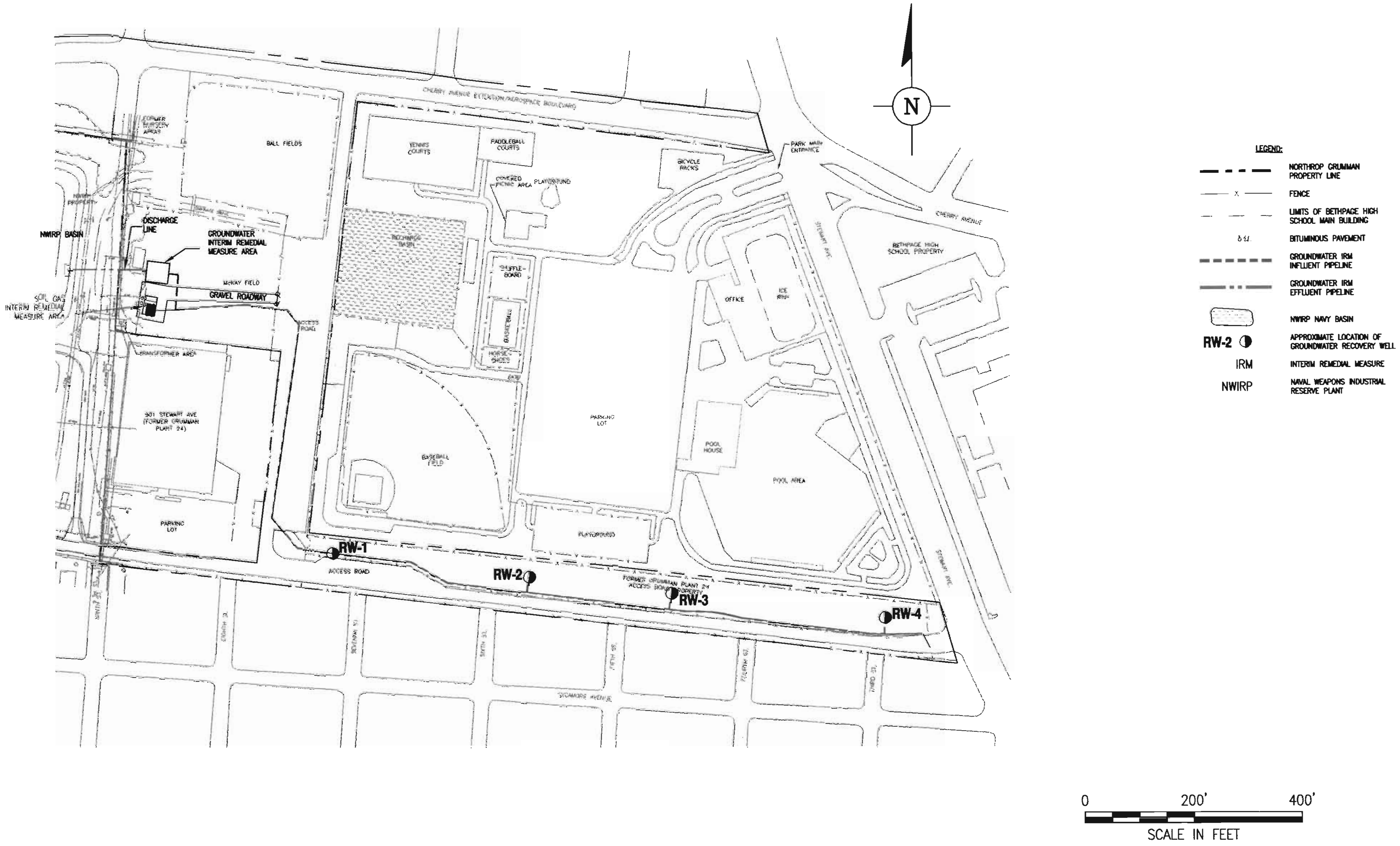
Layout Tab: FIG



NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD

KEYPLAN

SEAL

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PROJECT TITLE

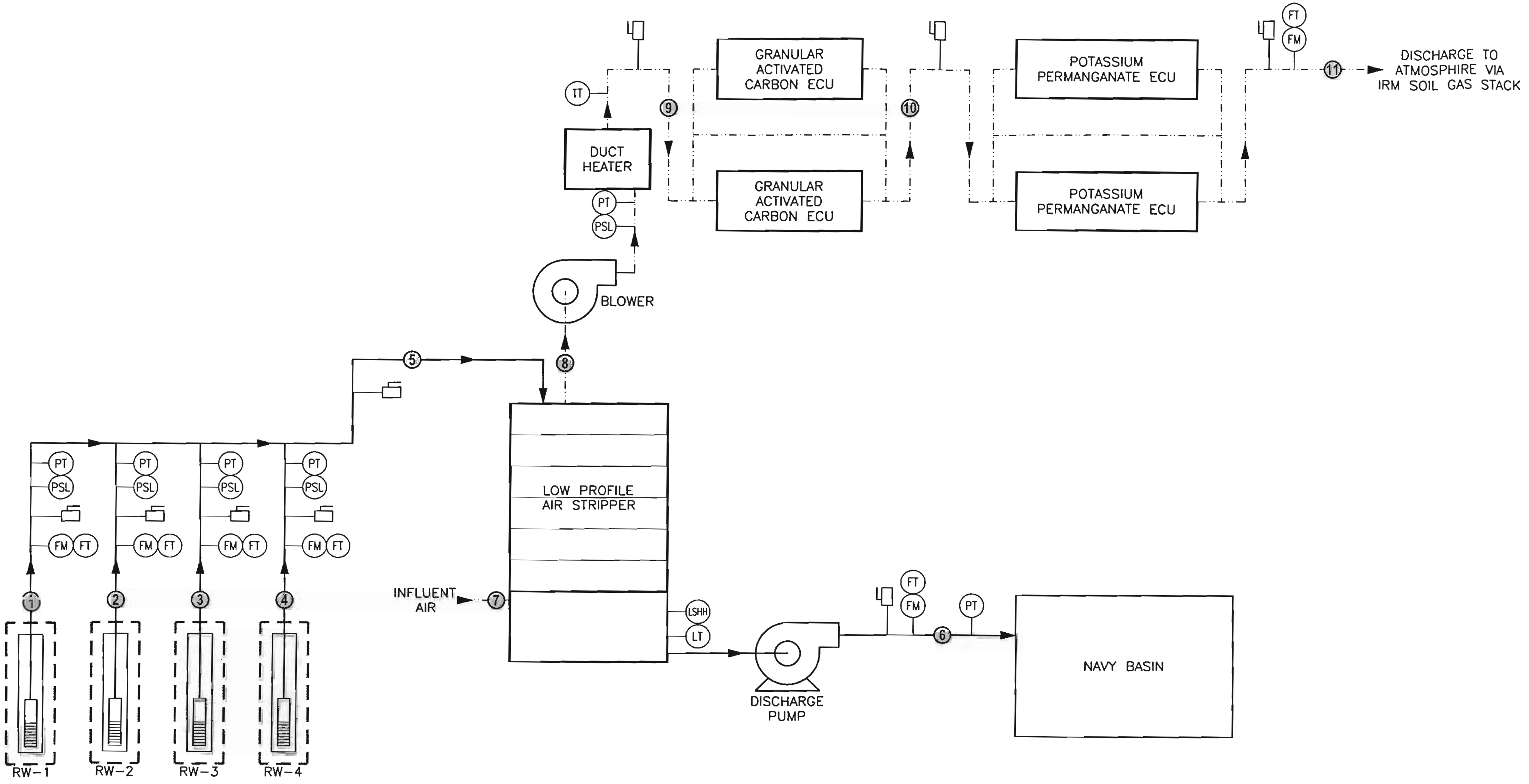
BASIS-OF-DESIGN LETTER
GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3-FORMER GRUMMAN SETTLING PONDS
BETHPAGE, NEW YORK

PROJECT MANAGER: C. SAN GIOVANNI
DEPARTMENT MANAGER: M. WOLFERT
LEAD DESIGN PROF.: W. WITTEK
CHECKED BY: W. WITTEK

SHEET TITLE

PRELIMINARY LAYOUT
OF GROUNDWATER INTERIM
REMEDIAL MEASURE

TASK/PHASE NUMBER: 00003
DRAWN BY: A. SANCHEZ
PROJECT NUMBER: NY001464.1807
DRAWING NUMBER: 1



LEGEND:

———	PROCESS WATER
-·-·-	PROCESS AIR
(FM)—	INSTRUMENT
⊐—	SAMPLE PORT
►	FLOW ARROW
FM	FLOW METER
FT	FLOW RATE TRANSMITTER
PSL	PRESSURE VACUUM LOW
PT	PRESSURE TRANSMITTER
LSHH	LEVEL SWITCH HIGH HIGH
LT	LEVEL TRANSMITTER
TT	TEMPERATURE
⑧	PROCESS DESIGNATION

PROCESS	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Mass Loading (lbs/day)											
Trichloroethene	0.009	0.041	0.082	0.008	0.140	<0.008	0.000	0.140	0.140	<0.014	<0.014
cis -1,2 Dichloroethene	0.007	1.877	0.431	0.030	2.346	<0.008	0.000	2.346	2.346	<0.235	<0.235
Vinyl Chloride	0.000	0.443	0.001	0.000	0.444	<0.003	0.000	0.444	0.444	0.444	<0.044
Flow Rate (gpm)	40	85	85	40	250	250	---	—	—	—	—
Flow Rate (CFM)	—	---	—	—	---	—	1,300 - 1,600	1,300	1,535	1,557	1,581
Pressure (feet of water)	10	10	10	10	8	15	—	—	—	—	—
Pressure (inches of water)	—	—	—	—	---	—	0	- 28 to - 38	12	6	0
pH	6.4	6.4	6.4	6.4	6.4	6.2	---	—	—	—	---
Temperature	55	55	55	55	55	55	10	55	97	95	95
Relative Humidity	—	---	—	—	---	—	20 - 80	100	<50	<50	<50

NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD

KEYPLAN

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www.arcadis-us.com

PROJECT TITLE

BASIS-OF-DESIGN LETTER
GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3-FORMER GRUMMAN SETTLING PONDS
BETHPAGE, NEW YORK

PROJECT MANAGER C. SAN GIOVANNI	DEPARTMENT MANAGER M. WOLFERT	LEAD DESIGN PROF. K. PIERIDES	CHECKED BY W. WITTEK
SHEET TITLE PROCESS FLOW AND CONTROL DIAGRAM		TASK/PHASE NUMBER 00003	DRAWN BY A. SANCHEZ
		PROJECT NUMBER NY001464.1807	DRAWING NUMBER 2

Acad Version : R17.0s (LMS Tech)
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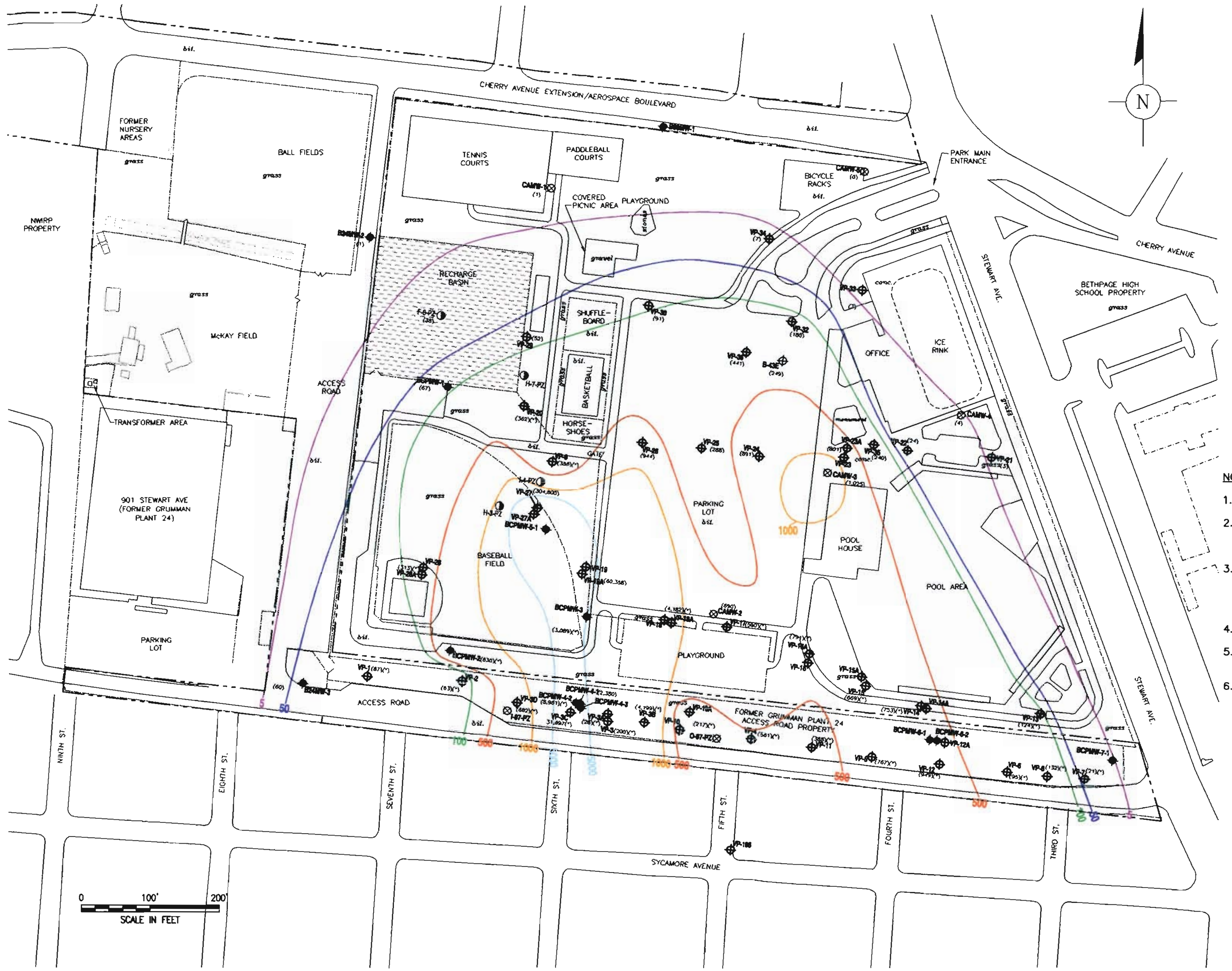

EXPLANATION

— · · —	NORTHROP GRUMMAN CORPORATION PROPERTY LINE
———	FENCE
— · — · —	LIMITS OF BETHPAGE HIGH SCHOOL MAIN BUILDING
▨	BASIN
bit.	BITUMINOUS PAVEMENT
BCP-MW-3 ◆	EXISTING MONITORING WELL
VP-1 ⊕	COMPLETED VERTICAL PROFILE BORING (BY ARCADIS)
F-8-PZ ◐	COMPLETED PIEZOMETER (BY ARCADIS)
(288)	SAMPLE CONCENTRATION
VPB AND B-43E	VERTICAL PROFILE BORINGS

NOTES:

1. MONITORING WELL LOCATIONS ARE APPROXIMATE.
2. VPBs VP-1 TO VP-20 SURVEYED TO NAD 27. VPBs VP-21 TO VP-36 AND B-43E ARE APPROXIMATE.
3. MAXIMUM CONCENTRATION IS SHOWN FOR EACH VP LOCATION (INCLUDES COLOCATED VPBs); SAMPLE WAS COLLECTED AT THE WATER TABLE UNLESS OTHERWISE NOTED.
4. (*) SAMPLE NOT COLLECTED AT WATER TABLE.
5. MOST RECENT SAMPLE CONCENTRATION IS SHOWN FOR EACH MONITORING WELL.
6. APPROXIMATE LOCATIONS OF BETHPAGE PARK MONITORING WELLS INSTALLED BY THE TOWN OF OYSTER BAY ARE BASED ON THE 2005 REPORTS (H2M 2005a;b).

DEFINITION OF ISOCONCENTRATION CONTOURS

5	5 ug/L
50	50 ug/L
100	100 ug/L
500	500 ug/L
1000	1000 ug/L
5000	5000 ug/L

NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD
2	1-15-07	FINAL O/C	DZ
1	1-11-07	UPDATED	JC
0	1-9-07	O/C CONCENTRATIONS AS OF 12/06	DZ

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PROJECT TITLE

WORKPLAN
GROUNDWATER INTERIM REMEDIAL MEASURES
OPERABLE UNIT 3-FORMER GRUMMAN SETTLING PONDS
BETHPAGE, NEW YORK

PROJECT MANAGER: C. SAN GIOVANNI
DEPARTMENT MANAGER: M. WOLFERT
LEAD DESIGN PROF.: W. WITTEK
CHECKED BY: W. WITTEK

SHEET TITLE

SITE PLAN/TOTAL VOLATILE
ORGANIC COMPOUND
CONCENTRATIONS IN
GROUNDWATER

TASK/PHASE NUMBER: 00001
DRAWN BY: A. SANCHEZ
PROJECT NUMBER: NY001464.1807
FIGURE NUMBER: 2-2

Acad Version : R17.0s (LMS Tech) Time : Fri, 21 Mar 2008 - 3:04pm
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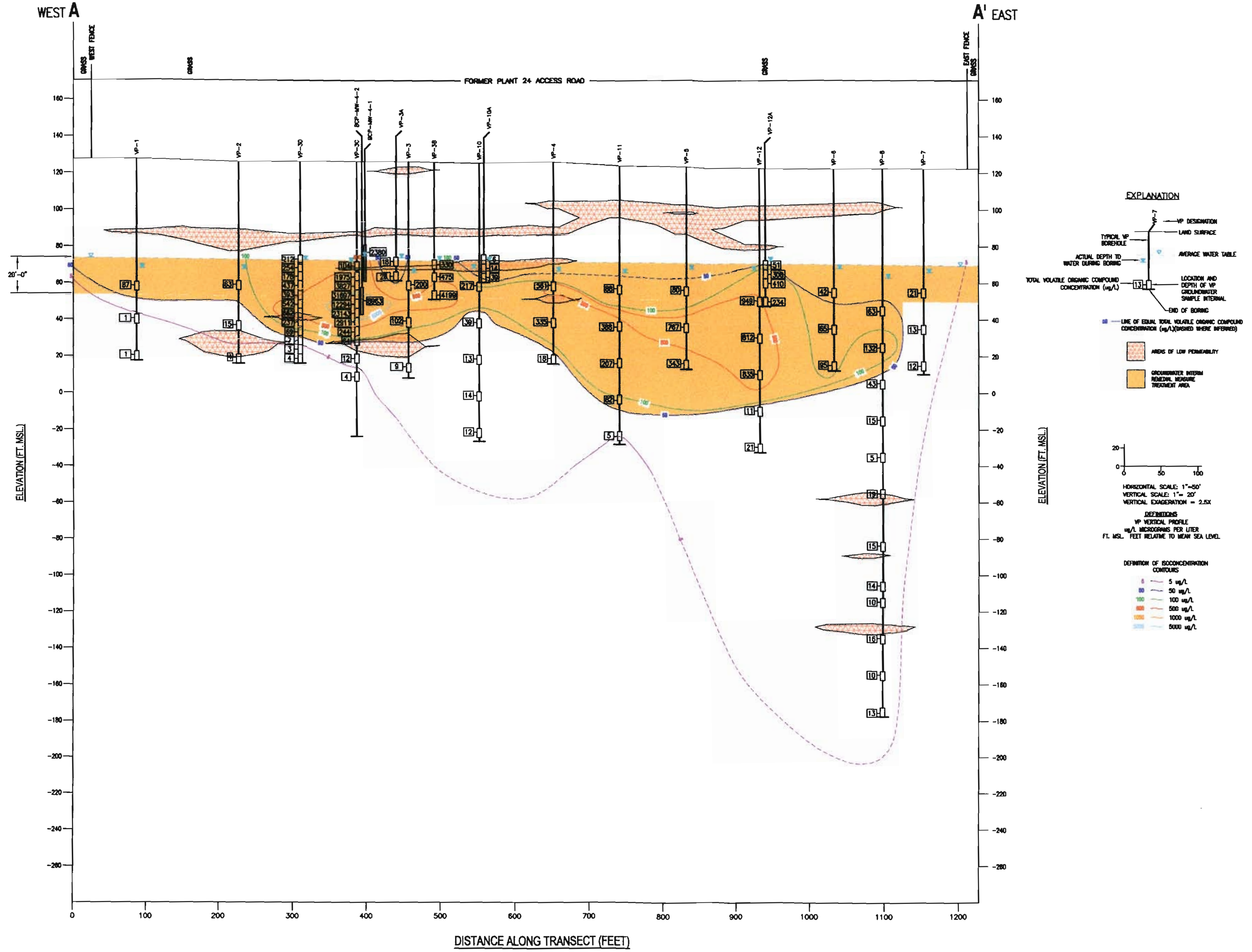

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NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD
1	1-16-07	C/C CONTOURS	DZ
0	1-9-07	UPDATE	JC

KEYPLAN

PROJECT TITLE

WORK PLAN
GROUNDWATER INTERIM REMEDIAL MEASURE
OPERABLE UNIT 3-FORMER GRUMMAN SETTLING PONDS
BETHPAGE, NEW YORK

SHEET TITLE

CROSS-SECTION/TOTAL VOLATILE
ORGANIC COMPOUND
CONCENTRATION IN GROUNDWATER

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PROJECT MANAGER C. SAN GIOVANNI	DEPARTMENT MANAGER M. WOLFERT
LEAD DESIGN PROF. W. WITTEK	CHECKED BY W. WITTEK
TASK/PHASE NUMBER 001CW	DRAWN BY A. SANCHEZ
PROJECT NUMBER NY001464.1807	FIGURE NUMBER 2-3

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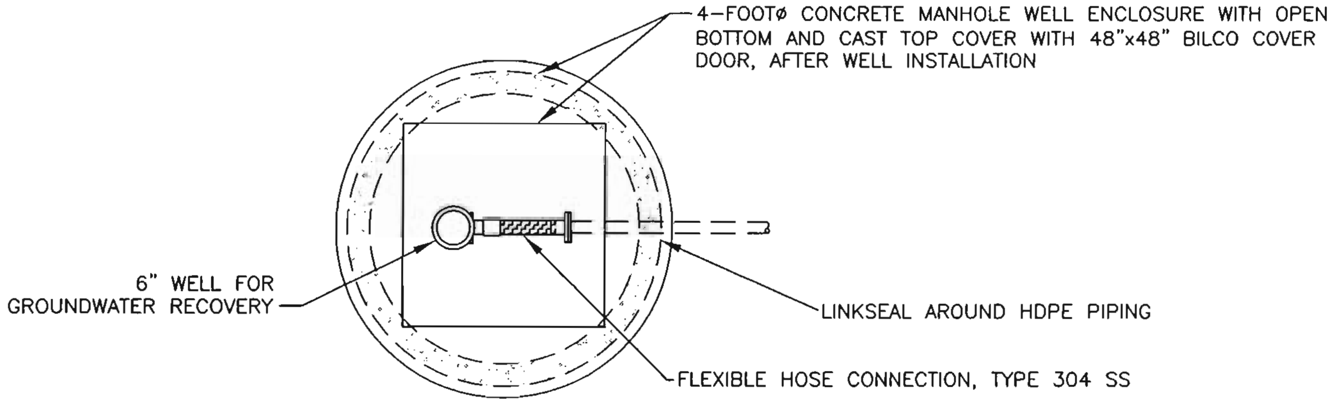
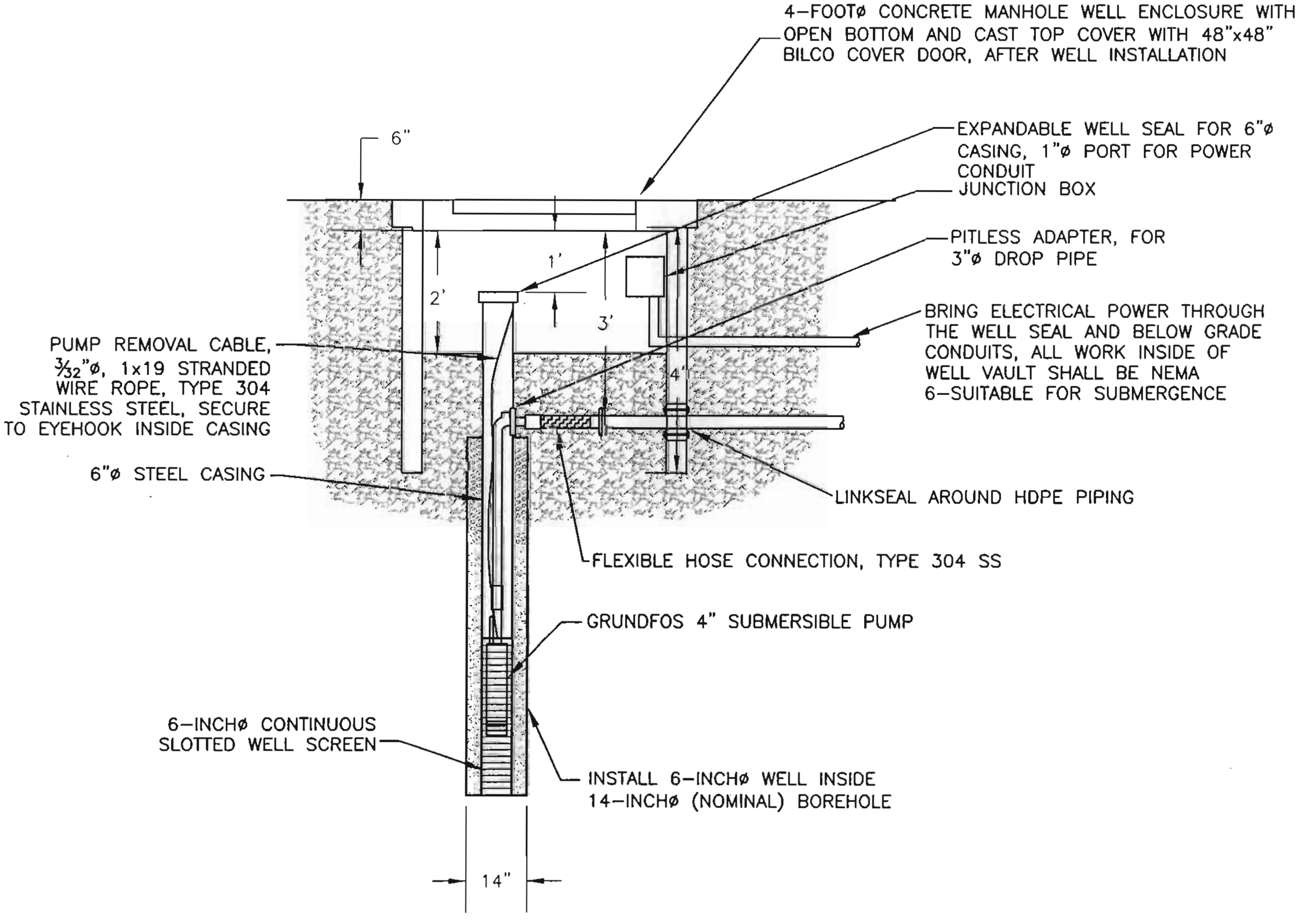


PLAN

NOT TO SCALE



TYPICAL RECOVERY WELL DETAIL

NOT TO SCALE

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PROJECT MANAGER C. SAN GIOVANNI	DEPARTMENT MANAGER M. WOLFERT	LEAD DESIGN PROF. K. PIERIDES	CHECKED BY W. WITTEK

SHEET TITLE
TYPICAL DETAIL
BASIS-OF-DESIGN LETTER
FORMER GRUMMAN SETTLING PONDS
BETHPAGE, NEW YORK

TASK/PHASE NUMBER
00003

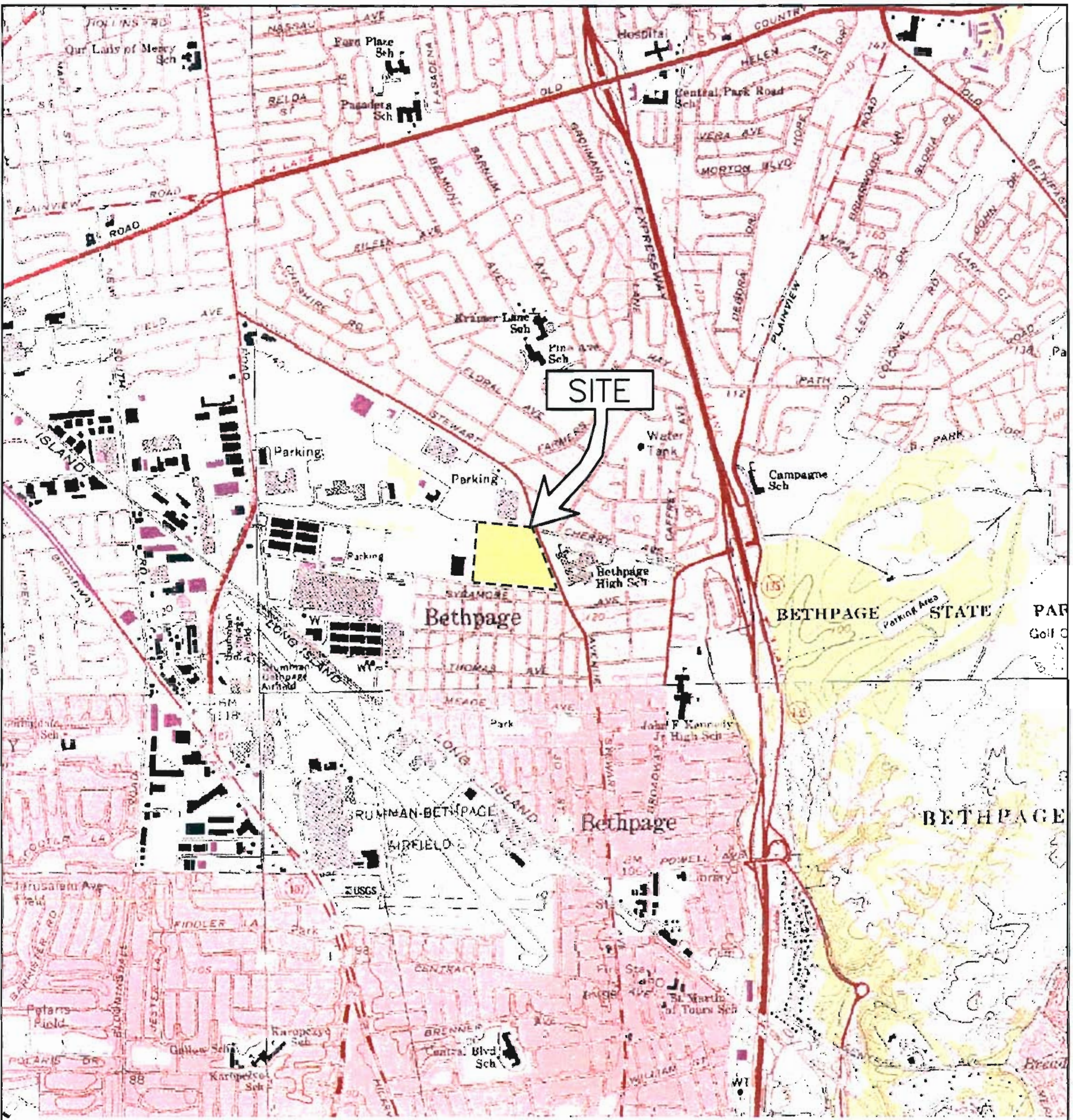
DRAWN BY
A. SANCHEZ

PROJECT NUMBER
NY001464.1807

DRAWING NUMBER
3

Appendix A

Selected Site Information



0 2000' 4000'

SCALE IN FEET

EXPLANATION

– – – PROPERTY BOUNDARY

QUADRANGLE LOCATION

SITE LOCATION

SOURCE: USGS 7.5 MIN. AMITYVILLE QUADRANGLE, AMITYVILLE, NY. 1994
USGS 7.5 MIN. FREEPORT QUADRANGLE, FREEPORT, NY., 1994
USGS 7.5 MIN. HICKSVILLE QUADRANGLE, HICKSVILLE, NY., 1967, PHOTOREVISED 1979
USGS 7.5 MIN. HUNTINGTON QUADRANGLE, HUNTINGTON, NY. 1967, PHOTOREVISED 1979

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PROJECT MANAGER C. SAN GIOVANNI	DEPARTMENT MANAGER M. WOLFERT	LEAD DESIGN PROF. W. WITTEK	CHECKED BY D. STERN
SHEET TITLE SITE LOCATION FORMER GRUMMAN SETTLING PONDS OPERABLE UNIT 3 BETHPAGE, NEW YORK		TASK/PHASE NUMBER 00001	DRAWN BY A. SANCHEZ
		PROJECT NUMBER NY001464.1807	FIGURE 2-1

Acad Version : R17.0s (LMS Tech) Time : Wed, 14 Nov 2007 – 4:43pm Current Plotstyle : ByColor
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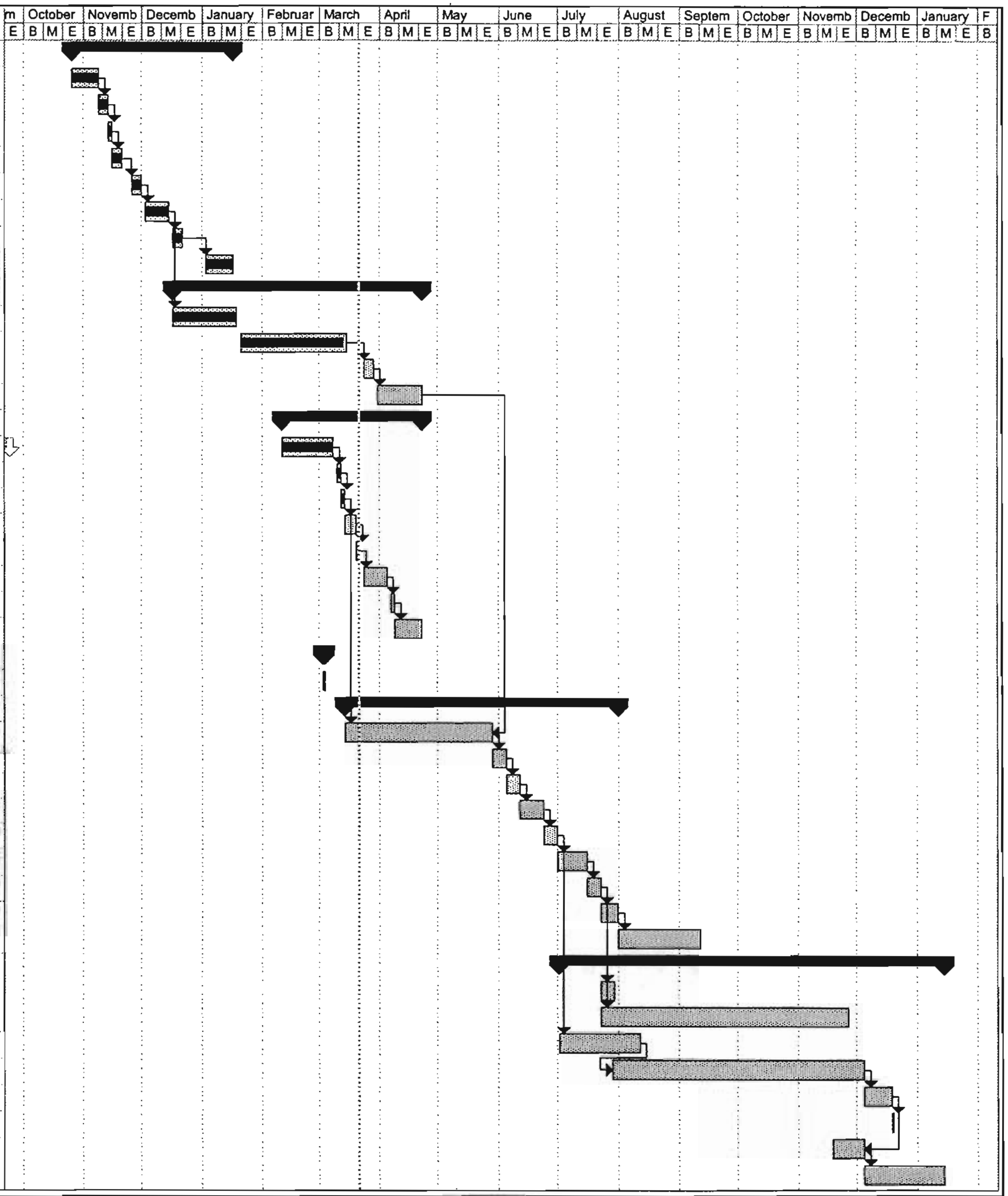
Appendix B

Project Schedule

ID	❶	Task Name	Duration	Start	Finish
1	✓	**IRM Work Plan**	**48 days**	**Fri 10/26/07**	**Wed 1/16/08**
2	✓	Prepare Work Plan	10 days	Fri 10/26/07	Thu 11/8/07
3	✓	ARCADIS review	3 days	Fri 11/9/07	Tue 11/13/07
4	✓	Revise and Submit to Client	2 days	Wed 11/14/07	Thu 11/15/07
5	✓	Client Review and Comment	3 days	Fri 11/16/07	Tue 11/20/07
6	✓	Revise and Submit to State	5 days	Mon 11/26/07	Fri 11/30/07
7	✓	State & Town Review and Comment	10 days	Mon 12/3/07	Fri 12/14/07
8	✓	Revise and Submit Final	5 days	Mon 12/17/07	Fri 12/21/07
9	✓	State Approval	10 days	Thu 1/3/08	Wed 1/16/08
10		**Pilot Tests**	**84 days**	**Mon 12/17/07**	**Tue 4/22/08**
11	✓	Contact/Schedule Driller	17 days	Mon 12/17/07	Fri 1/18/08
12	▦	Install Wells	40 days	Mon 1/21/08	Fri 3/14/08
13		Perform Pump Test	5 days	Mon 3/24/08	Fri 3/28/08
14		Analyze Results	17 days	Mon 3/31/08	Tue 4/22/08
15		**Basis Of Design Letter**	**52 days**	**Mon 2/11/08**	**Tue 4/22/08**
16	✓	Prepare BOD Letter	20 days	Mon 2/11/08	Fri 3/7/08
17	✓	ARCADIS review	2 days	Mon 3/10/08	Tue 3/11/08
18	✓	Revise and Submit to Client	2 days	Wed 3/12/08	Thu 3/13/08
19		Client Review and Comment	4 days	Fri 3/14/08	Wed 3/19/08
20		Revise and Submit to State	2 days	Thu 3/20/08	Fri 3/21/08
21		State Review and Comment	10 days	Mon 3/24/08	Fri 4/4/08
22		Revise and Submit Final	2 days	Mon 4/7/08	Tue 4/8/08
23		State Approval	10 days	Wed 4/9/08	Tue 4/22/08
24	✓	**Design Decisions**	**1 day**	**Mon 3/3/08**	**Mon 3/3/08**
25	✓	Treated Water Discharge Location	1 day	Mon 3/3/08	Mon 3/3/08
26		**Construction Package (95% Design)**	**99 days**	**Fri 3/14/08**	**Thu 7/31/08**
27		Prepare Design	54 days	Fri 3/14/08	Wed 5/28/08
28		ARCADIS review	5 days	Thu 5/29/08	Wed 6/4/08
29		Revise and Submit to Client	5 days	Thu 6/5/08	Wed 6/11/08
30		Client Review and Comment	8 days	Thu 6/12/08	Mon 6/23/08
31		Revise and Submit to State	5 days	Tue 6/24/08	Mon 6/30/08
32		State Review and Comment	10 days	Tue 7/1/08	Tue 7/15/08
33		Revise and Submit Final	5 days	Wed 7/16/08	Tue 7/22/08
34		State Approval	7 days	Wed 7/23/08	Thu 7/31/08
35		Public Meeting, Review and Commnet	29 days	Fri 8/1/08	Thu 9/11/08
36		**Construct/Start-up**	**135 days**	**Wed 7/2/08**	**Wed 1/14/09**
37		Finalize Equipment List	5 days	Wed 7/23/08	Tue 7/29/08
38		Order/Procure Long Lead Items	90 days	Wed 7/23/08	Wed 11/26/08
39		Install wells	28 days	Wed 7/2/08	Mon 8/11/08
40		Construct System	90 days	Tue 7/29/08	Thu 12/4/08
41		System Shakedown/Troubleshooting	10 days	Fri 12/5/08	Thu 12/18/08
42		System Start-up	1 day	Fri 12/19/08	Fri 12/19/08
43		Prepare Sampling and Analysis Plan	10 days	Wed 11/19/08	Thu 12/4/08
44		Prepare OM&M Manual	27 days	Fri 12/5/08	Wed 1/14/09



Project: schedule 03_18_08_NYSDEC
Date: Fri 3/21/08

Task	▨	Progress	▬	Summary	▬	External Tasks	▨	Deadline	⇩
Split	....	Milestone	◆	Project Summary	▬	External Milestone	◆		

Figure 12-1: Project Schedule, Groundwater IRM Work Plan, OU-3, Former Grumman Settling Ponds, Bethpage, New York