Project Review: RI/FS

Former Grumman Settling Ponds (a.k.a. Bethpage Community Park) Site No. 1-30-003A- OU3, Town of Oyster Bay, Nassau County.

Background: The site is a 11-acre park that was formerly a wastewater and processed chromium sludge drying area for Grumman Aerospace. The land was donated to the Town of Oyster Bay in 1962 and the waste water lagoons, rag pits and disposal areas were filled in and made into a ballfield and parking area.

Project Phase and Project Review Objective:
Objective is to review findings of the RI and discuss IRMs and overall remedial alternatives.

A. Finalizing the remedial investigation Report onsite and offsite RI.

Soils: Volatile organic (VOC) contamination mainly with TCE and DCE, vinyl chloride, BTEX, Freon, PCBs and inorganic compounds, mainly chromium sludges, cadmium, lead and to a lessextent arsenic.

Groundwater: Perched groundwater is some areas with solvents and some LNAPL in limited areas.

Offsite Groundwater: Extent and co-mingling with the OU2 Plume, Navy responsibility. A large solvent plume more than a mile long is migrating off -site containing

Soil Vapor: Soil vapor investigation is now complete.

B. The IRMs completed to date:

* The ***Huge*** soil excavation by the Town of Oyster Bay
* SVE by Northrop Grumman
* Groundwater pump and treat by Northrop Grumman.

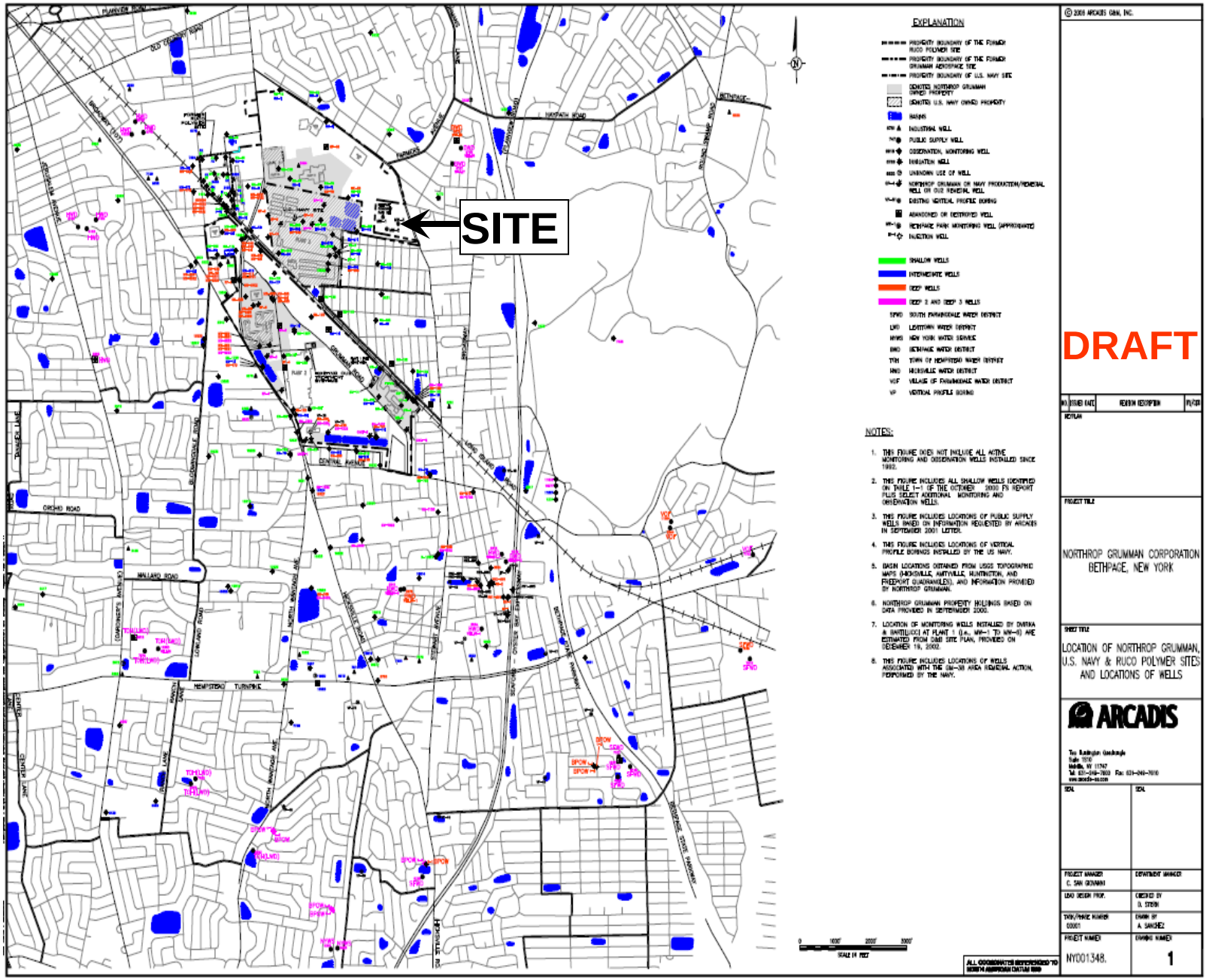
C. Human Health Risk Assessment: The PRP has elected to submit an HHRA. They want this to guide remedial action objectives.

D. The Preliminary Screening of Alternatives.

Project Review NGC Operable Unit 3 RI-FS and IRM's Former Grumman Settling Ponds a.k.a Bethpage Community Park May 21, 2009

NEW YORK STATE DEPARTMENT OF

ENVIRONMENTAL CONSERVATION


SITE
EXPLANATION
NOTES:
DRAFT
NORTHROP GRUMMAN CORPORATION
BETHPAGE, NEW YORK
LOCATION OF NORTHROP GRUMMAN, U.S. NAVY & RUCO POLYMER SITES AND LOCATIONS OF WELLS
ARCADIS
NY001348.
1

Project Area – December 2004

Key Points

•Northrop Grumman signed an Order on Consent (AOC) to investigate environmental conditions related to the Bethpage Community Park.

•The RI/ FS is currently being implemented, as follows:

- RI field work has esentially been completed in the Park.
- Offsite RI work is almost complete south of the Park
- The Onsite RI Report was submitted and comments sent back.

•The NYS-funded offsite vapor intrusion study was completed.

•Northrop Grumman implemented two IRMs for soil gas and groundwater.

•Grumman has submitted HHRA and list of alternatives

NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD
1	12/2008	SUPPLEMENT TO RI REPORT	MR
0	01/2008	REMEDIAL INVESTIGATION REPORT	MR

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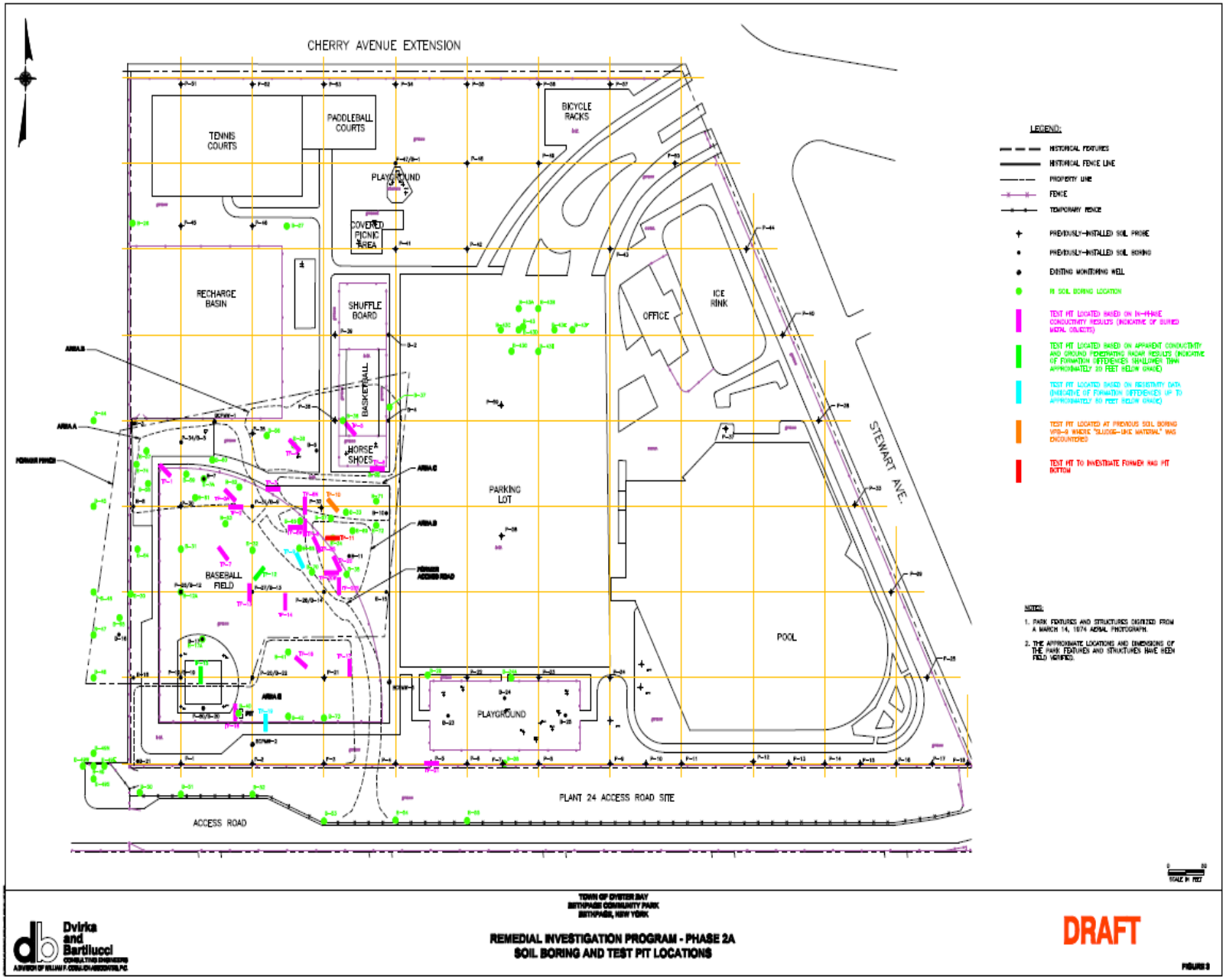
PROJECT TITLE
NORTHROP GRUMMAN SYSTEMS CORPORATION
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
C. SAN GIOVANNI	M. WOLFERT		M. REINDL

SHEET TITLE
SITE AREA CONE PENETROMETER BORING, MEMBRANE INTERFACE PROBE BORING, SOIL BORING, SOIL GAS POINT, VERTICAL PROFILE BORING, PIEZOMETER, AND WELL LOCATIONS

TASK/PHASE NUMBER	DRAWN BY
00007	A. SANCHEZ
PROJECT NUMBER	DRAWING NUMBER
NY001464.0807	3-1



Dvirka and Bartilucci Consulting Engineers

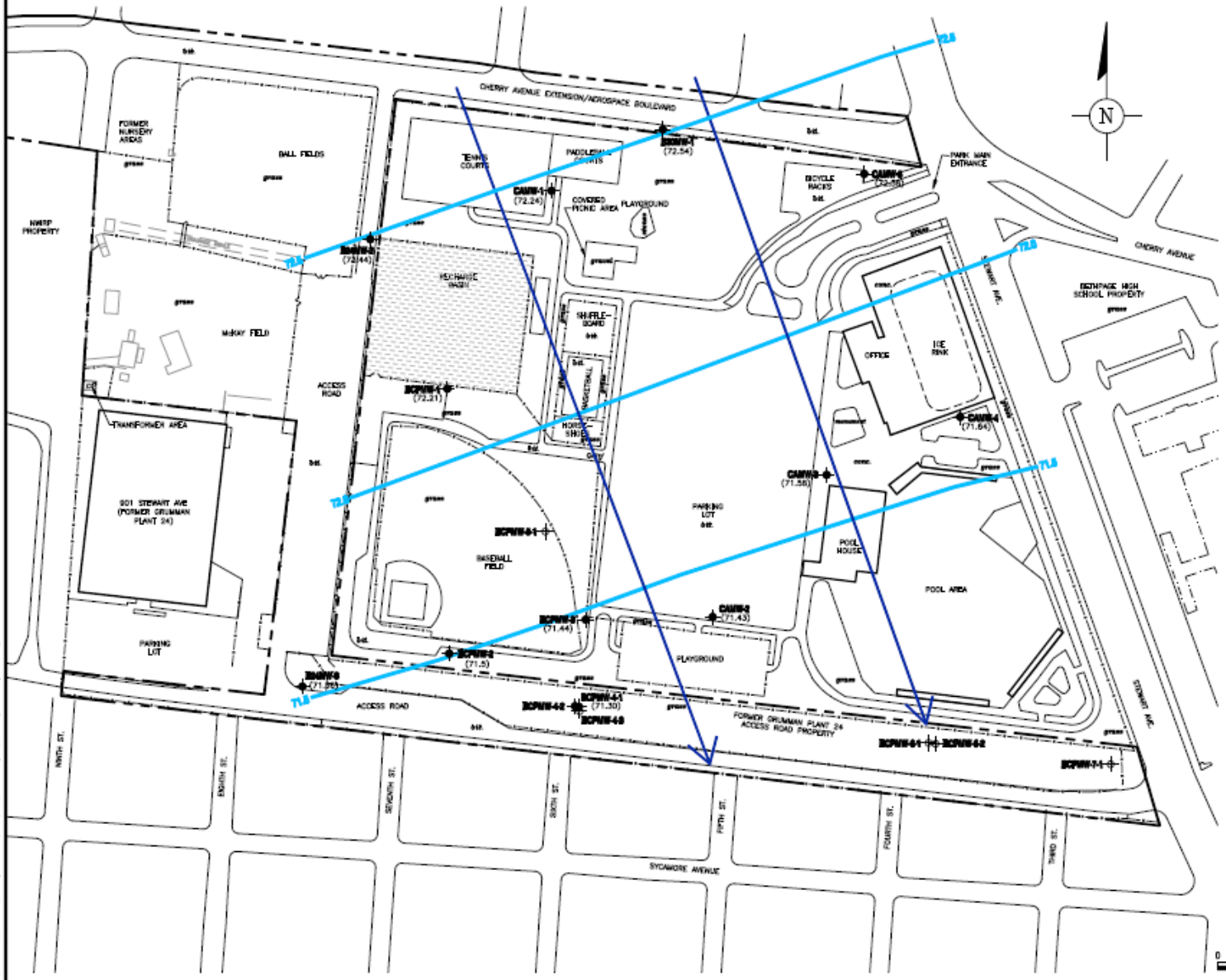
TOWN OF OYSTER BAY
BETHPAGE COMMUNITY PARK
BETHPAGE, NEW YORK

REMEDIAL INVESTIGATION PROGRAM - PHASE 2A
SOIL BORING AND TEST PIT LOCATIONS

DRAFT

FIGURE 2

Typical Test Pit in the Ballfield Area



NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD
0	01/2008	REMEDIAL INVESTIGATION REPORT	MR

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BETHPAGE, NEW YORK

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
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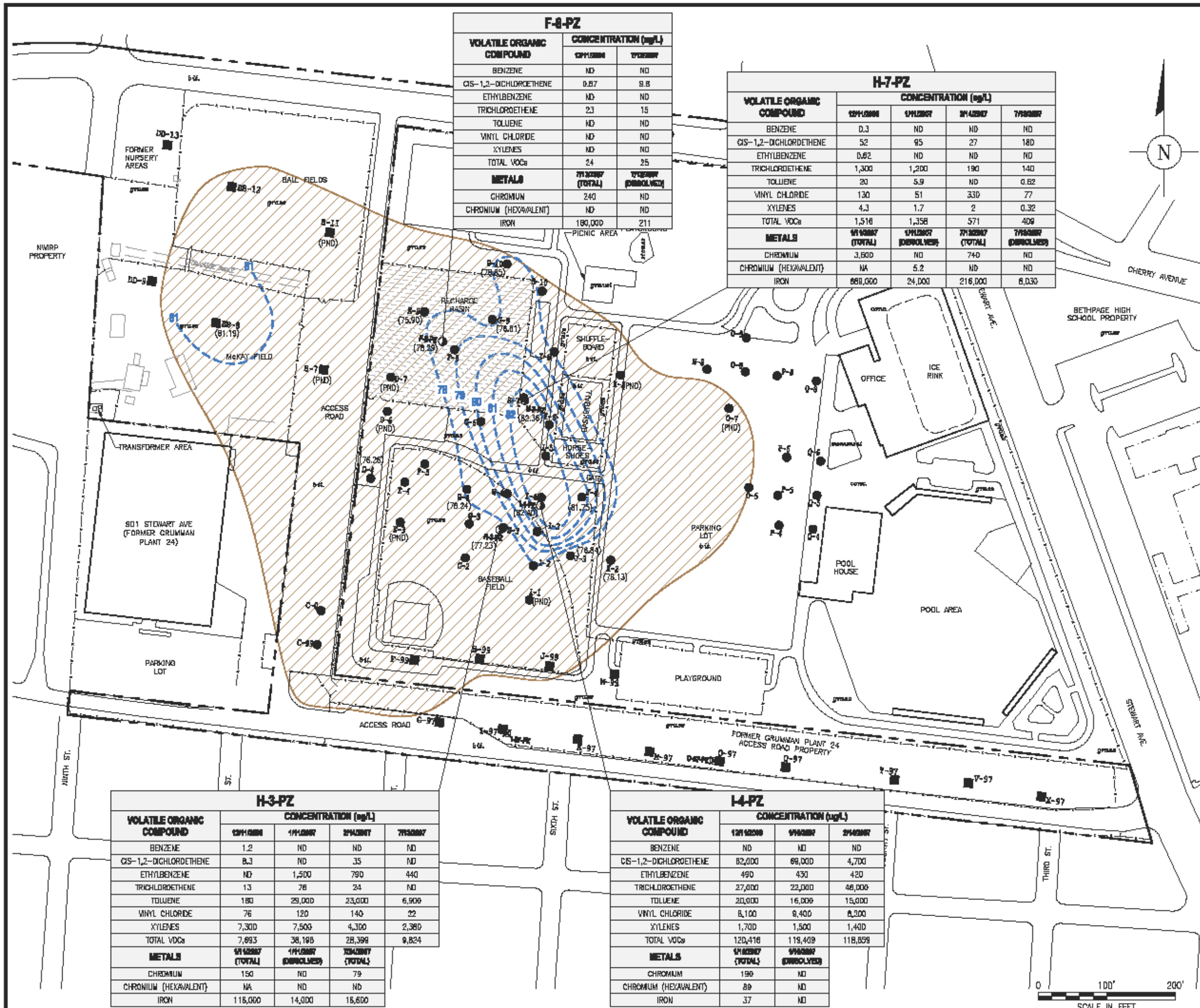
SHEET TITLE
CONFIGURATION OF THE WATER TABLE AND GROUNDWATER FLOW DIRECTION SEPTEMBER 2006

TASK/PHASE NUMBER	DRAWN BY
00007	A. SANCHEZ
PROJECT NUMBER	DRAWING NUMBER
NY001464.0807	4-6



F-6-PZ

VOLATILE ORGANIC COMPOUND	CONCENTRATION (ug/L)	
	12/11/2006	7/13/2007
BENZENE	ND	ND
CIS-1,2-DICHLOROETHENE	0.87	9.8
ETHYLBENZENE	ND	ND
TRICHLOROETHENE	23	15
TOLUENE	ND	ND
VINYL CHLORIDE	ND	ND
XYLENES	ND	ND
TOTAL VOCs	24	25
METALS	7/13/2007 (TOTAL)	7/13/2007 (DISSOLVED)
CHROMIUM	240	ND
CHROMIUM (HEXAVALENT)	ND	ND
IRON	180,000	211

H-7-PZ

VOLATILE ORGANIC COMPOUND	CONCENTRATION (ug/L)			
	12/11/2006	1/11/2007	2/14/2007	7/13/2007
BENZENE	0.3	ND	ND	ND
CIS-1,2-DICHLOROETHENE	52	95	27	180
ETHYLBENZENE	0.62	ND	ND	ND
TRICHLOROETHENE	1,300	1,200	190	140
TOLUENE	20	5.9	ND	0.62
VINYL CHLORIDE	130	51	330	77
XYLENES	4.3	1.7	2	0.32
TOTAL VOCs	1,516	1,358	571	409
METALS	1/11/2007 (TOTAL)	1/11/2007 (DISSOLVED)	7/13/2007 (TOTAL)	7/13/2007 (DISSOLVED)
CHROMIUM	3,600	ND	740	ND
CHROMIUM (HEXAVALENT)	NA	5.2	ND	ND
IRON	688,000	24,000	216,000	8,030

H-3-PZ

VOLATILE ORGANIC COMPOUND	CONCENTRATION (ug/L)			
	12/11/2006	1/11/2007	2/14/2007	7/13/2007
BENZENE	1.2	ND	ND	ND
CIS-1,2-DICHLOROETHENE	8.3	ND	35	ND
ETHYLBENZENE	ND	1,500	790	440
TRICHLOROETHENE	13	78	24	ND
TOLUENE	180	29,000	23,000	6,900
VINYL CHLORIDE	76	120	140	22
XYLENES	7,300	7,500	4,300	2,380
TOTAL VOCs	7,693	38,198	28,399	9,824
METALS	1/11/2007 (TOTAL)	1/11/2007 (DISSOLVED)	7/13/2007 (TOTAL)	
CHROMIUM	150	ND	79	
CHROMIUM (HEXAVALENT)	NA	ND	ND	
IRON	116,000	14,000	16,600	

I-4-PZ

VOLATILE ORGANIC COMPOUND	CONCENTRATION (ug/L)		
	12/11/2006	1/11/2007	2/14/2007
BENZENE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	82,000	69,000	4,700
ETHYLBENZENE	490	430	420
TRICHLOROETHENE	27,000	22,000	48,000
TOLUENE	20,000	16,000	15,000
VINYL CHLORIDE	8,100	9,400	8,200
XYLENES	1,700	1,500	1,400
TOTAL VOCs	120,416	119,409	118,859
METALS	1/11/2007 (TOTAL)	1/11/2007 (DISSOLVED)	
CHROMIUM	190	ND	
CHROMIUM (HEXAVALENT)	89	ND	
IRON	37	ND	

EXPLANATION

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- LIMITS OF BETHPAGE HIGH SCHOOL MAIN BUILDING
- BASIN
- APPROXIMATE AREAL EXTENT OF DEEP LOW PERMEABILITY ZONE, BASED ON CPT SBT LOGS
- b.t. — BITUMINOUS PAVEMENT
- F-6-PZ — PIEZOMETER
- Q-5 — MIP/CPT BORING
- N-99 — CPT BORING
- D-97-PZ — ABANDONED PIEZOMETER
- 80 — LINE OF EQUAL PERCHED-WATER ELEVATION, IN FEET ABOVE MSL
- (77.23) — PERCHED WATER ELEVATION (FT MSL)
- (PND) — PERCHED-WATER NOT DETECTED
- NA — NOT ANALYZED
- ND — CONSTITUENT NOT DETECTED
- NWIRP — NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
- MIP — MEMBRANE INTERFACE PROBE
- CPT — CONE PENETROMETER
- SBT — SOIL BEHAVIOR TYPE
- PDT — PORE DISSIPATION TEST
- FT — FEET
- MSL — MEAN SEA LEVEL
- VOC — VOLATILE ORGANIC COMPOUND
- ug/L — MICROGRAMS PER LITER

NOTES:

1. PIEZOMETERS SURVEYED TO NORTH AMERICAN DATUM (NAD) 83. CPT LOCATIONS ARE APPROXIMATE BASED ON FIELD MEASUREMENTS.
2. PARK FEATURES SHOWN WERE PRESENT PRIOR TO TOWN OF OYSTER BAY REDEVELOPMENT IN 2005.
3. WATER-LEVEL ELEVATIONS IN PIEZOMETERS BASED ON WATER LEVELS RECORDED ON JULY 13, 2007.
4. PORE DISSIPATION TESTS PERFORMED ON CPT BORINGS FROM APRIL 24, TO MAY 12, 2006, JULY 17 TO 20, 2006, AND JANUARY 17 TO 31, 2007.
5. PERCHED WATER ELEVATIONS OBTAINED FROM CPT BORING PORE DISSIPATION TESTS (PDTs) WERE CALCULATED USING ELEVATION OF WATER IN CLOSEST PIEZOMETER.
6. GROUNDWATER ELEVATION IN SOUTHWEST PARK REGION RANGES FROM APPROXIMATELY 73 TO 75 FT MSL, THEREFORE WATER-LEVELS (BASED ON PDTs) LESS THAN 77 FT MSL WERE INTERPRETED TO BE REPRESENTATIVE OF GROUNDWATER, RATHER THAN PERCHED WATER CONDITIONS.
7. BASED ON LOCAL-SCALE LITHOLOGIC HETEROGENEITY, PERCHED WATER MAY NOT BE CONTINUOUSLY PRESENT IN AREA SHOWN.
8. 78-FOOT CONTOUR DEFINES AREAL EXTENT OF PERCHED WATER.
9. ELEVATION OF THE DEEP LOW PERMEABILITY ZONE RANGES FROM A MINIMUM OF 53 FT MSL (BOTTOM) TO A MAXIMUM OF 67 FT MSL (TOP).

0 100' 200'
SCALE IN FEET

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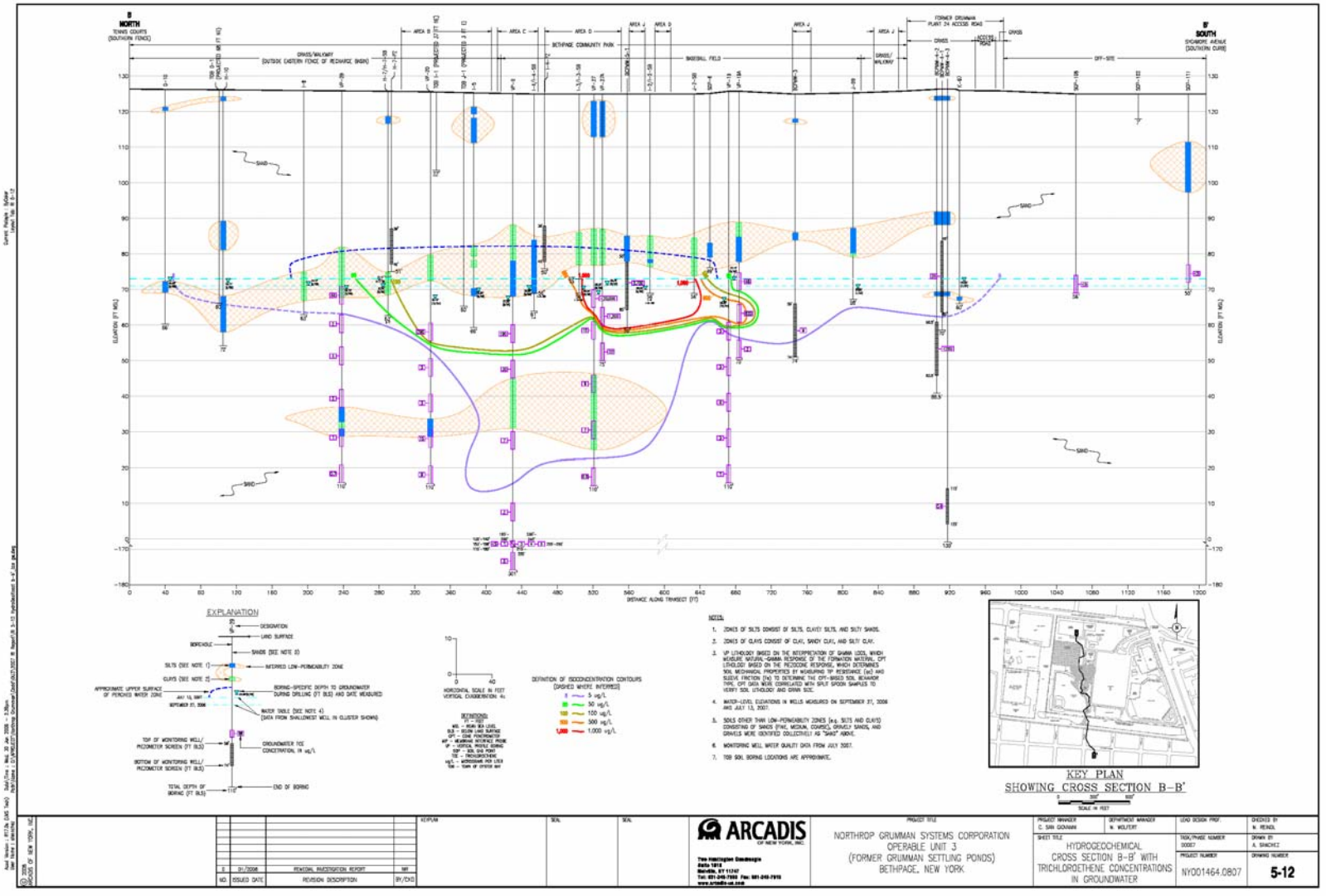
PROJECT TITLE
NORTHROP GRUMMAN SYSTEMS CORPORATION
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

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

SHEET TITLE
AREAL EXTENT OF DEEP LOW PERMEABILITY ZONE AND CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS AND SELECT METALS IN PERCHED WATER

TASK/PHASE NUMBER: 00007
DRAWN BY: A. SANCHEZ
PROJECT NUMBER: NY001464.0807
DRAWING NUMBER: 5-6


B
NORTH
TENNIS COURTS (SOUTHERN FENCE)
GRASS/WALKWAY (OUTSIDE EASTERN FENCE OF RECHARGE BASIN)
AREA B
AREA C
AREA D
BETHPAGE COMMUNITY PARK
AREA J
AREA D
BASEBALL FIELD
AREA J
AREA J
FORMER GRUMMAN PLANT 24 ACCESS ROAD
GRASS
GRASS/WALKWAY
GRASS
OFF-SITE
B'
SOUTH
SYCAMORE AVENUE (SOUTHERN CURB)
SAND
SILT
ELEVATION (FT MSL)
DISTANCE ALONG TRANSECT (FT)
EXPLANATION
DESIGNATION
LAND SURFACE
BENCHMARK
SANDS (SEE NOTE 2)
SILTS (SEE NOTE 1)
INFERRED LOW-PERMEABILITY ZONE
CLAYS (SEE NOTE 2)
APPROXIMATE UPPER SURFACE OF PERCHED WATER ZONE
BORING-SPECIFIC DEPTH TO GROUNDWATER DURING DRILLING (FT BLS) AND DATE MEASURED
WATER TABLE (SEE NOTE 4) (DATA FROM SHALLOWEST WELL IN CLUSTER SHOWN)
TOP OF MONITORING WELL/ PIEZOMETER SCREEN (FT BLS)
GROUNDWATER TCE CONCENTRATION, IN ug/L
BOTTOM OF MONITORING WELL/ PIEZOMETER SCREEN (FT BLS)
TOTAL DEPTH OF BORING (FT BLS)
END OF BORING
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION: 4x
DEFINITION OF ISOCONCENTRATION CONTOURS (DASHED WHERE INFERRED)
5 ug/L
50 ug/L
100 ug/L
500 ug/L
1,000 ug/L
NOTES:
1. ZONES OF SILTS CONSIST OF SILTS, CLAYEY SILTS, AND SILTY SANDS.
2. ZONES OF CLAYS CONSIST OF CLAY, SANDY CLAY, AND SILTY CLAY.
3. VP LITHOLOGY BASED ON THE INTERPRETATION OF GAMMA LOGS, WHICH MEASURE NATURAL-GAMMA RESPONSE OF THE FORMATION MATERIAL. CPT LITHOLOGY BASED ON THE PIEZOCONE RESPONSE, WHICH DETERMINES SOIL MECHANICAL PROPERTIES BY MEASURING TIP RESISTANCE (qc) AND SLEEVE FRICTION (fs) TO DETERMINE THE CPT-BASED SOIL BEHAVIOR TYPE. CPT DATA WERE CORRELATED WITH SPLIT SPOON SAMPLES TO VERIFY SOIL LITHOLOGY AND GRAIN SIZE.
4. WATER-LEVEL ELEVATIONS IN WELLS MEASURED ON SEPTEMBER 27, 2006 AND JULY 13, 2007.
5. SOILS OTHER THAN LOW-PERMEABILITY ZONES (e.g. SILTS AND CLAYS) CONSISTING OF SANDS (FINE, MEDIUM, COARSE), GRAVELLY SANDS, AND GRAVELS WERE IDENTIFIED COLLECTIVELY AS "SAND" ABOVE.
6. MONITORING WELL WATER QUALITY DATA FROM JULY 2007.
7. TOB SOIL BORING LOCATIONS ARE APPROXIMATE.
KEY PLAN
SHOWING CROSS SECTION B-B'
ARCADIS
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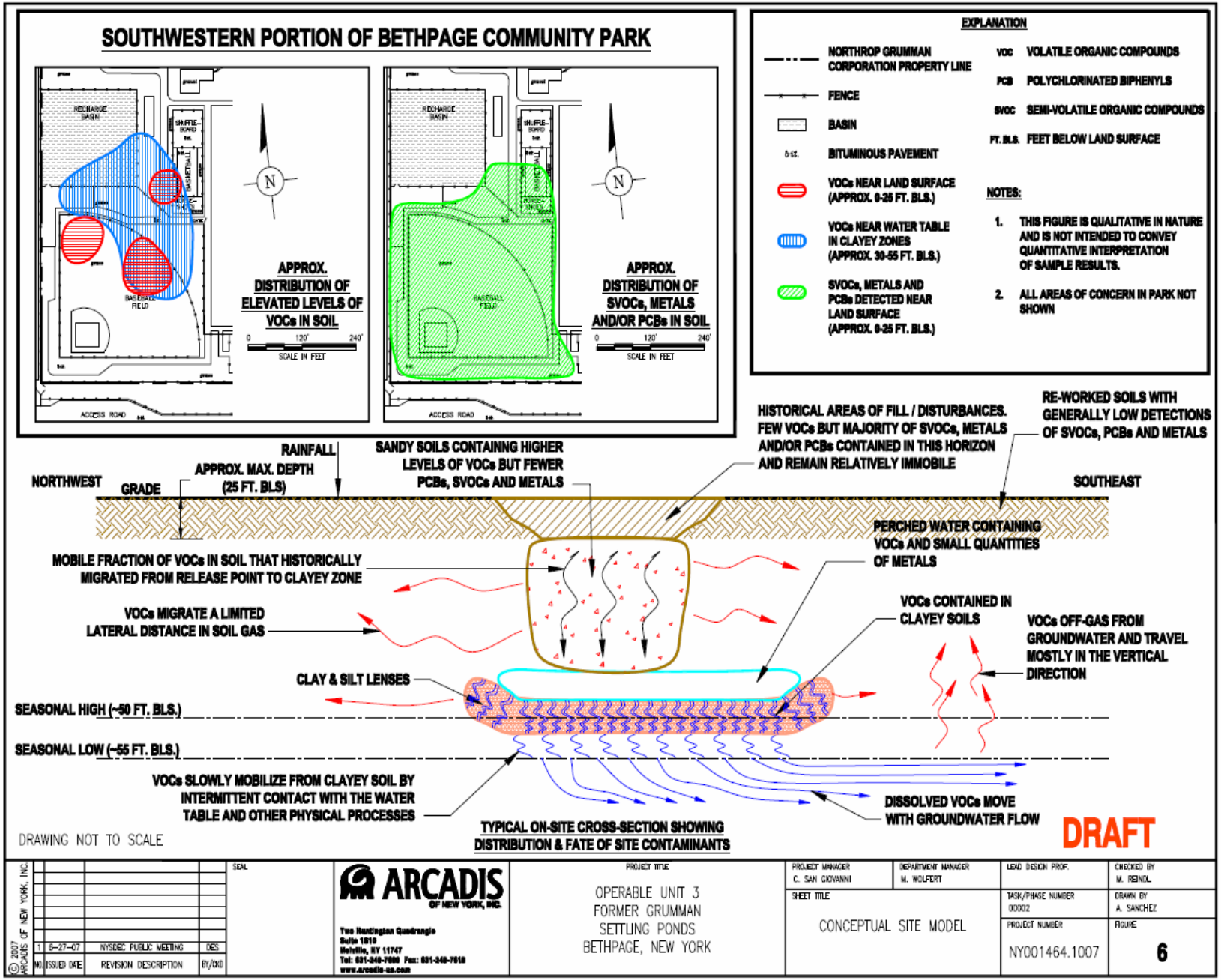
BETHPAGE, NEW YORK
HYDROGEOCHEMICAL CROSS SECTION B-B' WITH TRICHLOROETHENE CONCENTRATIONS IN GROUNDWATER
NY001464.0807
5-12
2 01/2008 REVISED INVESTIGATION REPORT MH
NO. ISSUED DATE REVISION DESCRIPTION BY/CKD


SOUTHWESTERN PORTION OF BETHPAGE COMMUNITY PARK
RECHARGE BASIN
SHUFFLE-BOARD
BASKETBALL
BASEBALL FIELD
ACCESS ROAD
N
APPROX. DISTRIBUTION OF ELEVATED LEVELS OF VOCs IN SOIL
APPROX. DISTRIBUTION OF SVOCs, METALS AND/OR PCBs IN SOIL
0 120' 240'
SCALE IN FEET
EXPLANATION
NORTHROP GRUMMAN CORPORATION PROPERTY LINE
FENCE
BASIN
b.s.t. BITUMINOUS PAVEMENT
VOCs NEAR LAND SURFACE (APPROX. 0-25 FT. BLS.)
VOCs NEAR WATER TABLE IN CLAYEY ZONES (APPROX. 30-55 FT. BLS.)
SVOCs, METALS AND PCBs DETECTED NEAR LAND SURFACE (APPROX. 0-25 FT. BLS.)
VOC VOLATILE ORGANIC COMPOUNDS
PCB POLYCHLORINATED BIPHENYLS
SVOC SEMI-VOLATILE ORGANIC COMPOUNDS
FT. BLS. FEET BELOW LAND SURFACE
NOTES:
1. THIS FIGURE IS QUALITATIVE IN NATURE AND IS NOT INTENDED TO CONVEY QUANTITATIVE INTERPRETATION OF SAMPLE RESULTS.
2. ALL AREAS OF CONCERN IN PARK NOT SHOWN
HISTORICAL AREAS OF FILL / DISTURBANCES. FEW VOCs BUT MAJORITY OF SVOCs, METALS AND/OR PCBs CONTAINED IN THIS HORIZON AND REMAIN RELATIVELY IMMOBILE
RE-WORKED SOILS WITH GENERALLY LOW DETECTIONS OF SVOCs, PCBs AND METALS
NORTHWEST
SOUTHEAST
RAINFALL
APPROX. MAX. DEPTH (25 FT. BLS)
GRADE
SANDY SOILS CONTAINING HIGHER LEVELS OF VOCs BUT FEWER PCBs, SVOCs AND METALS
PERCHED WATER CONTAINING VOCs AND SMALL QUANTITIES OF METALS
MOBILE FRACTION OF VOCs IN SOIL THAT HISTORICALLY MIGRATED FROM RELEASE POINT TO CLAYEY ZONE
VOCs MIGRATE A LIMITED LATERAL DISTANCE IN SOIL GAS
VOCs CONTAINED IN CLAYEY SOILS
VOCs OFF-GAS FROM GROUNDWATER AND TRAVEL MOSTLY IN THE VERTICAL DIRECTION
CLAY & SILT LENSES
SEASONAL HIGH (~50 FT. BLS.)
SEASONAL LOW (~55 FT. BLS.)
VOCs SLOWLY MOBILIZE FROM CLAYEY SOIL BY INTERMITTENT CONTACT WITH THE WATER TABLE AND OTHER PHYSICAL PROCESSES
DISSOLVED VOCs MOVE WITH GROUNDWATER FLOW
DRAWING NOT TO SCALE
TYPICAL ON-SITE CROSS-SECTION SHOWING DISTRIBUTION & FATE OF SITE CONTAMINANTS
DRAFT
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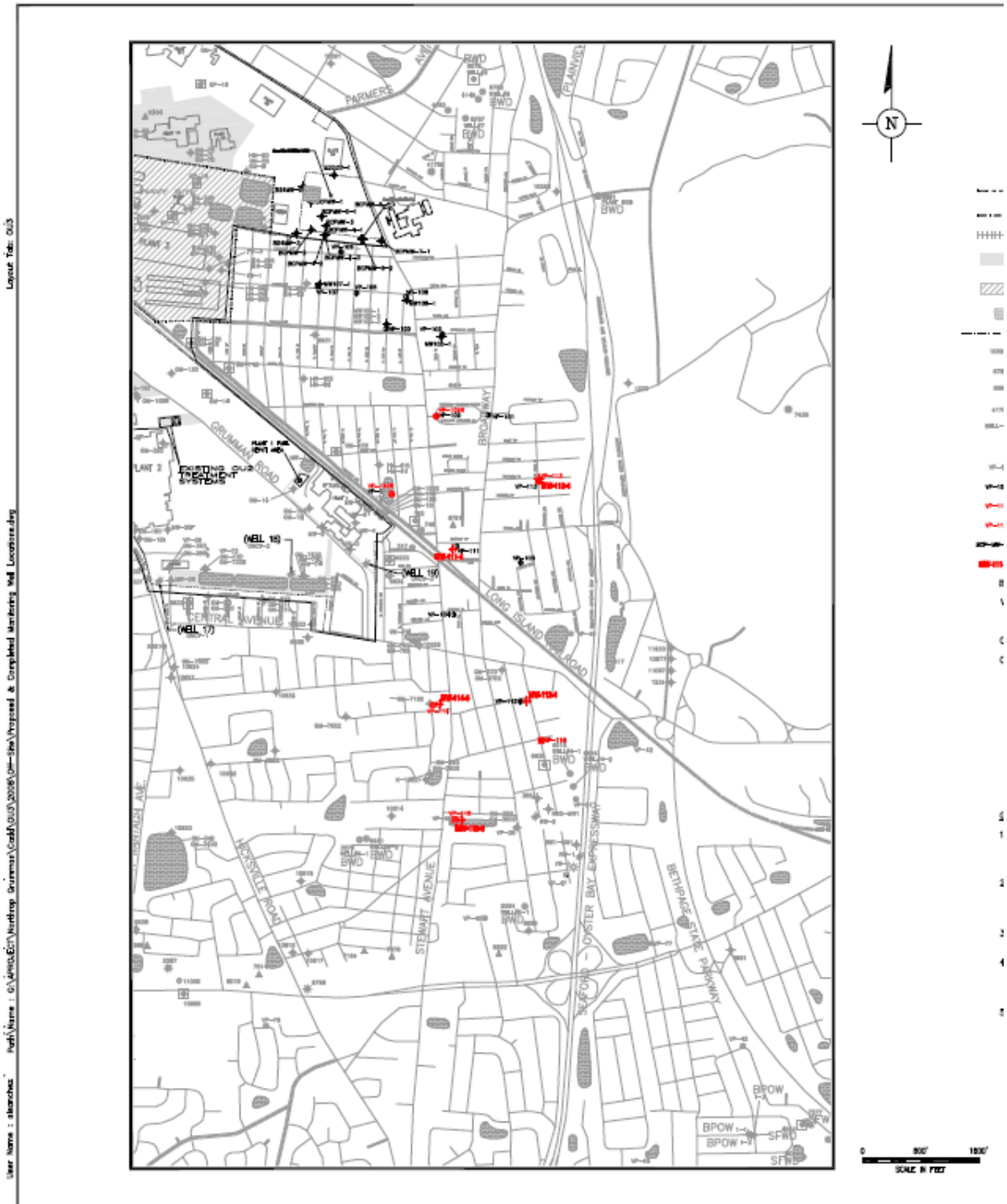
BETHPAGE, NEW YORK
PROJECT MANAGER C. SAN GIOVANNI
DEPARTMENT MANAGER M. WOLFERT
LEAD DESIGN PROF.
CHECKED BY M. REINDL
SHEET TITLE
CONCEPTUAL SITE MODEL
TASK/PHASE NUMBER 00002
DRAWN BY A. SANCHEZ
PROJECT NUMBER NY001464.1007
FIGURE 6


PARMERS AVE
RWD
BWD
PLAINWD
GRUMMAN ROAD
PLANT 2
EXISTING OU2 TREATMENT SYSTEMS
(WELL 18)
(WELL 19)
(WELL 17)
CENTRAL AVENUE
BROADWAY
LONG ISLAND RAILROAD
HOWARD AVE
HICKSVILLE ROAD
STEWART AVENUE
SCHOOL
OYSTER BAY EXPRESSWAY
BETHPAGE STATE PARKWAY
BPOW
SFWD
N
SCALE IN FEET

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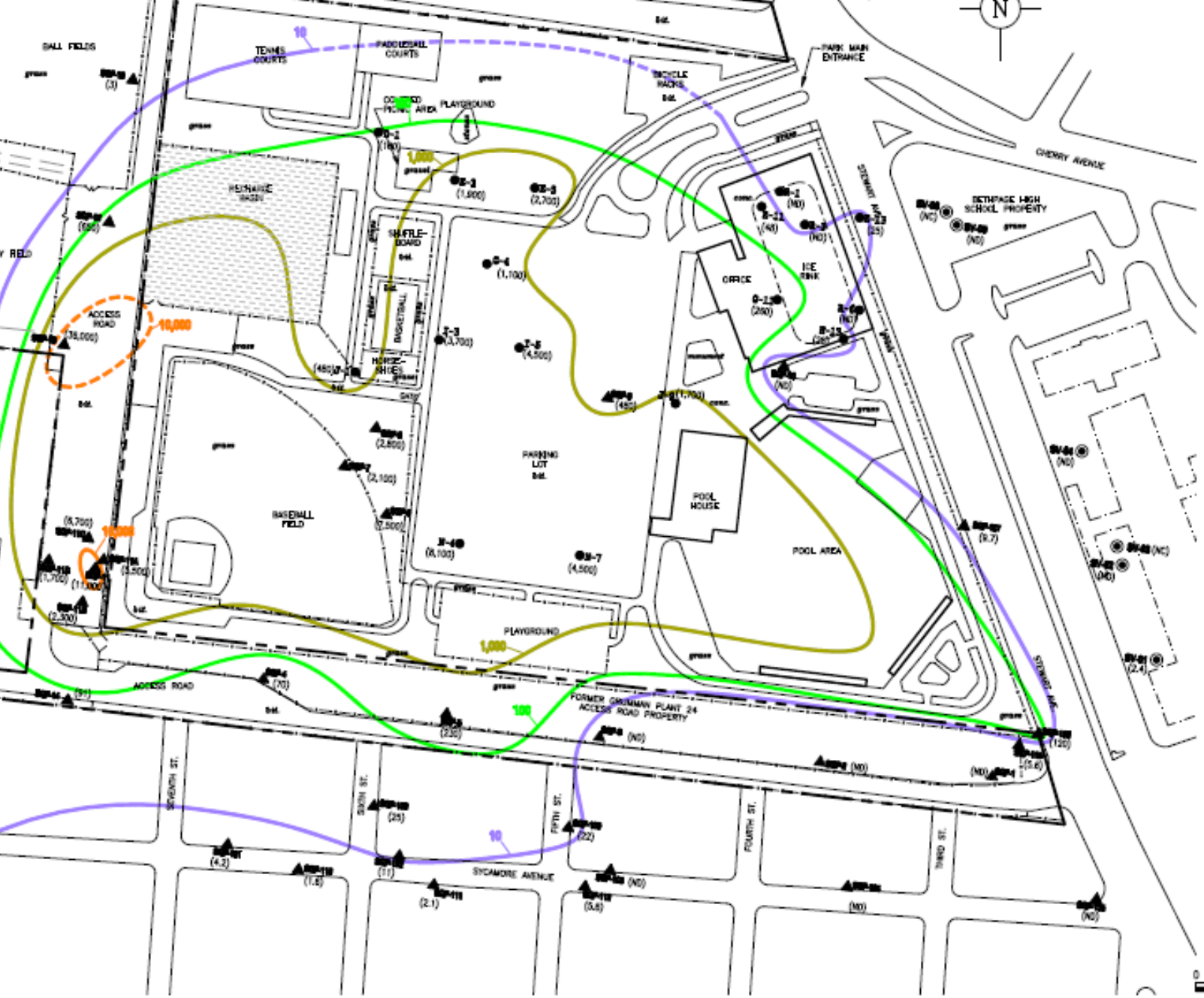
BETHPAGE, NEW YORK

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
C. SAN GIOVANNI	M. WOLFERT		M. REINDL
SHEET TITLE		TASK/PHASE NUMBER	DRAWN BY
TRICHLOROETHENE IN SHALLOW GROUNDWATER		00007	A. SANCHEZ
		PROJECT NUMBER	DRAWING NUMBER
		NY001464.0807	5-8



NOTES:

1. SOIL GAS LOCATIONS ARE APP MEASUREMENTS.
2. PARK FEATURES SHOWN WERE OYSTER BAY REDEVELOPMENT
3. SHALLOW ZONE IS DEFINED A

DEFINITION OF I CON

10
100
1,000
10,000

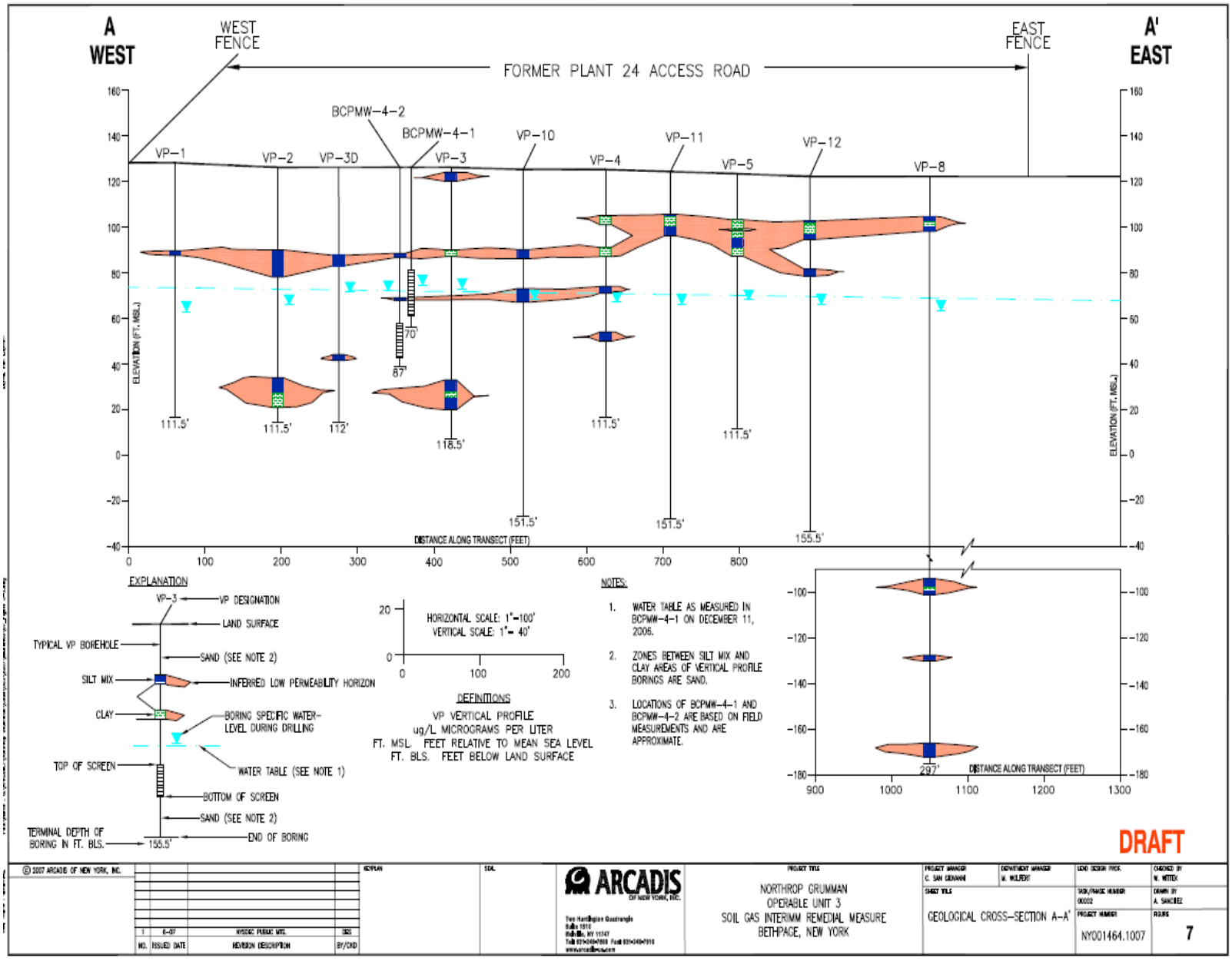
SEAL	ARCADIS	PROJECT TITLE: NORTHROP GRUMMAN SYSTEMS CORPORATION	PROJECT MANAGER: C. SAN GIOVANNI	DEPARTMENT MANAGER: M. WOLFERT	LEAD DESIGN PROF.
		SHEET TITLE			TASK/PHASE NUMBER

Vapor Intrusion Evaluation

Soil Gas Interim Remedial Measure

- Objective:
  - Prevent off-site migration of VOCs in soil gas

- System components:
  - Depressurization/Monitoring Wells
  - Below-Grade Piping
  - Equipment Building (Blower/Electrical Systems)
  - Emissions Control (Vapor Treatment)


A
WEST
WEST FENCE
FORMER PLANT 24 ACCESS ROAD
EAST FENCE
A'
EAST
BCPMW-4-2
BCPMW-4-1
VP-1
VP-2
VP-3D
VP-3
VP-10
VP-4
VP-11
VP-5
VP-12
VP-8
ELEVATION (FT. MSL.)
DISTANCE ALONG TRANSECT (FEET)
111.5'
111.5'
112'
70'
87'
118.5'
151.5'
111.5'
151.5'
111.5'
155.5'
297'
EXPLANATION
VP-3 VP DESIGNATION
LAND SURFACE
TYPICAL VP BOREHOLE
SAND (SEE NOTE 2)
SILT MIX
INFERRED LOW PERMEABILITY HORIZON
CLAY
BORING SPECIFIC WATER-LEVEL DURING DRILLING
TOP OF SCREEN
WATER TABLE (SEE NOTE 1)
BOTTOM OF SCREEN
SAND (SEE NOTE 2)
TERMINAL DEPTH OF BORING IN FT. BLS.
155.5'
END OF BORING
HORIZONTAL SCALE: 1"=100'
VERTICAL SCALE: 1"= 40'
DEFINITIONS
VP VERTICAL PROFILE
ug/L MICROGRAMS PER LITER
FT. MSL. FEET RELATIVE TO MEAN SEA LEVEL
FT. BLS. FEET BELOW LAND SURFACE
NOTES:
1. WATER TABLE AS MEASURED IN BCPMW-4-1 ON DECEMBER 11, 2006.
2. ZONES BETWEEN SILT MIX AND CLAY AREAS OF VERTICAL PROFILE BORINGS ARE SAND.
3. LOCATIONS OF BCPMW-4-1 AND BCPMW-4-2 ARE BASED ON FIELD MEASUREMENTS AND ARE APPROXIMATE.
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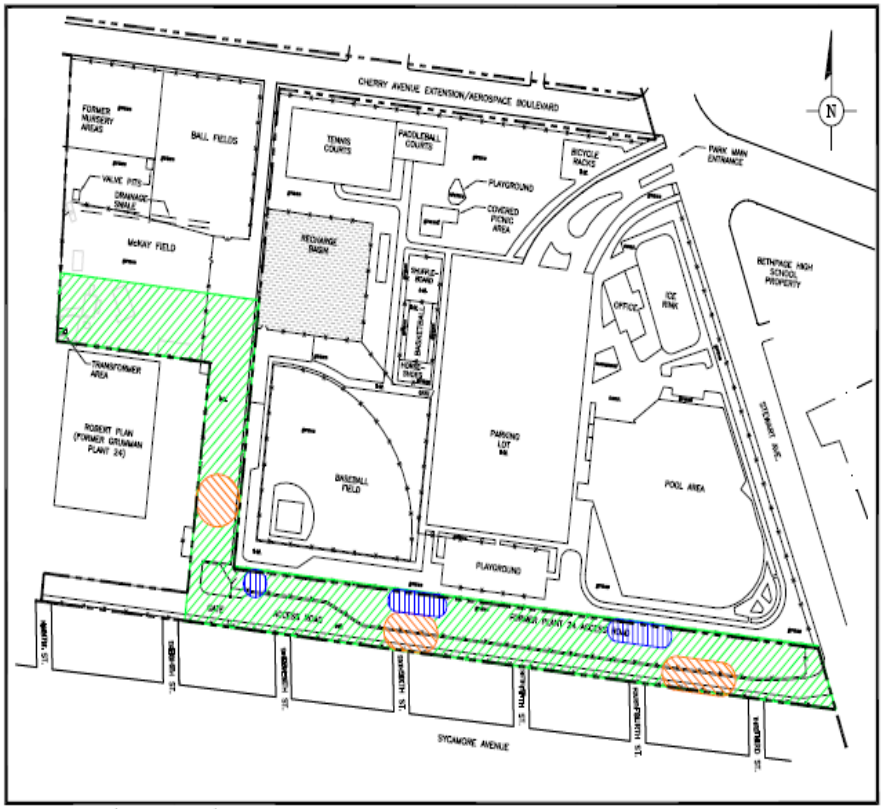
ARCADIS
NORTHROP GRUMMAN
OPERABLE UNIT 3
SOIL GAS INTERIMM REMEDIAL MEASURE
BETHPAGE, NEW YORK
GEOLOGICAL CROSS-SECTION A-A'
NY001464.1007
7



EXPLANATION:

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- LIMITS OF BETHPAGE HIGH SCHOOL MAIN BUILDING
- b.st. BITUMINOUS PAVEMENT
- PROPOSED LOCATION OF GROUNDWATER & SOIL GAS INTERIM REMEDIAL MEASURE SYSTEMS
- SOIL GAS PILOT STUDY LOCATION
- GROUNDWATER BENCH SCALE/ TREATABILITY STUDY SAMPLE COLLECTION LOCATION

DRAFT

NO.	ISSUED DATE	REVISION DESCRIPTION	BY/CKD
1	6-07	HYDRO PUMP MTG.	DES

KEYPLAN

SEAL

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Melville, NY 11747
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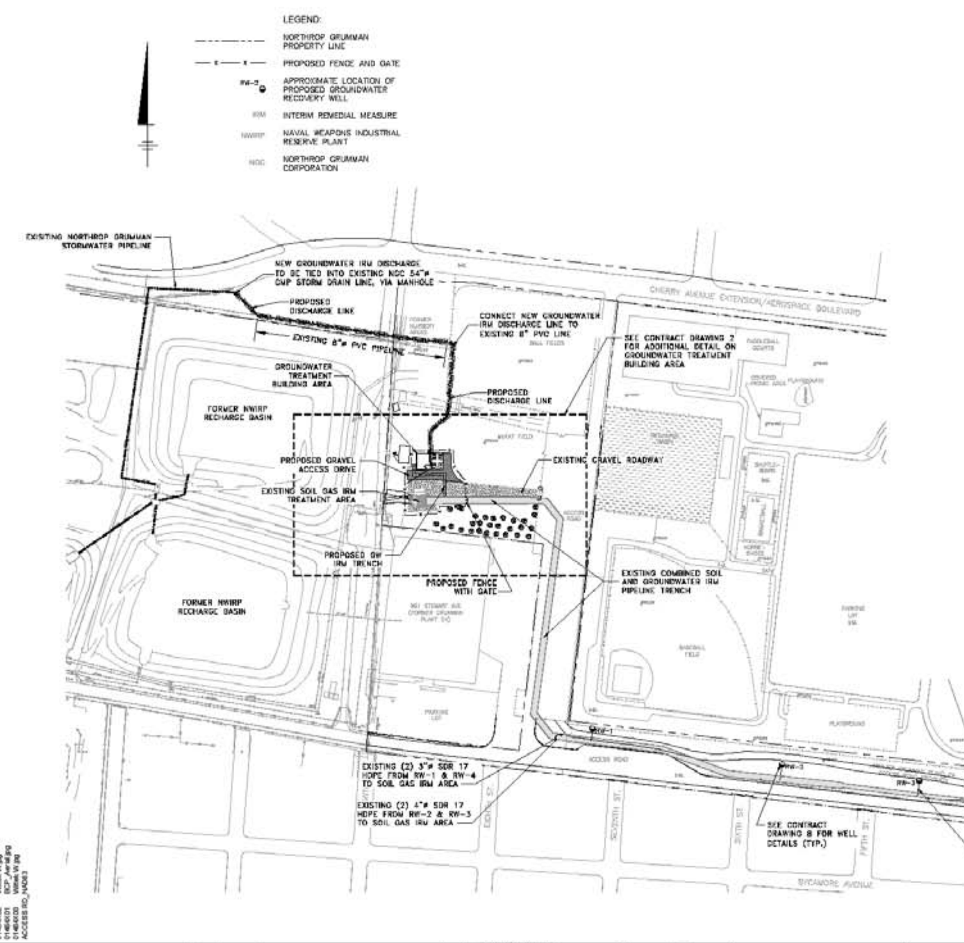
PROJECT TITLE
NORTHROP GRUMMAN
OPERABLE UNIT 3
INTERIM REMEDIAL MEASURES
BETHPAGE, NEW YORK

SHEET TITLE
PROPOSED LOCATION OF INTERIM REMEDIAL MEASURE SYSTEMS

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
C. SAN GIOVANNI	M. WILHELM		D. STERN
		TASK/PHASE NUMBER: 00002	DRAWN BY: A. SANCHEZ
		PROJECT NUMBER: NY001464.1007	FIGURE: 8

Groundwater Interim Remedial Measure

- Objectives:
  - –Minimize off-site migration of VOCs in groundwater
  - –Create/enhance VOC-free water-table lens south of Park
- Options Under Consideration:
  - –Groundwater Pump & Treat
  - –Enhanced Biodegradation
  - –Reactive Barrier
  - –Chemical Oxidation



NOTES:

1. LOCATION OF WORK: ALL WORK DESCRIBED IN THESE DRAWINGS/SPECIFICATIONS SHALL BE PERFORMED ON BEHALF OF NORTHROP GRUMMAN SYSTEMS CORPORATION, INC.
2. CONTRACTORS SHOULD VISIT THE SITE AND EXAMINE ALL OF THE PHYSICAL CONDITIONS THAT AFFECT THE FINAL BID PRICE.
3. CONTRACTORS SHALL OBTAIN ALL NECESSARY FIELD MEASUREMENTS TO VERIFY THE ABILITY TO EXECUTE THE WORK IN ACCORDANCE WITH THIS SCOPE OF WORK AND DRAWINGS. NO ADDITIONS OR REVISIONS TO THE BID OR CONTRACT PRICE WILL BE PERMITTED BASED ON EXISTING CONDITIONS.
4. CONTRACTORS SHALL PROVIDE ALL LABOR, MATERIAL, AND EQUIPMENT, UNLESS OTHERWISE STATED, NECESSARY TO PERFORM THIS WORK. THE SITE WILL BE A UNION SITE.
5. CONTRACTORS SHALL BE RESPONSIBLE FOR OBTAINING ALL TRADE PERMITS, AND APPROVALS NECESSARY TO PERFORM THIS WORK, INCLUDING AGREEMENTS WITH APPLICABLE, LOCAL AND TRADE UNIONS.
6. ALL SITE WORKERS SHALL HAVE THE APPROPRIATE HEALTH AND SAFETY TRAINING; REVIEW AND SIGN THE PROJECT HEALTH AND SAFETY PLAN UNLESS WAIVER IS GRANTED BY THE PROJECT HEALTH AND SAFETY OFFICE; AND REVIEW AND ACKNOWLEDGE NORTHROP GRUMMAN SYSTEMS CORPORATION INTEGRATED SYSTEMS EASTERN REGION'S (ISER) "ON-SITE CONTRACTOR'S ENVIRONMENTAL, SAFETY AND HEALTH COMPLIANCE MANUAL, BETHPAGE, NEW YORK, DATED JUNE 12, 2008." COPIES OF EACH PERSON'S APPLICABLE STRANDING CERTIFICATES SHALL BE PROVIDED TO THE PROJECT HEALTH AND SAFETY OFFICER PRIOR BEFORE THE EMPLOYEE CAN START WORK AT THE SITE. COPIES OF TRAINING CERTIFICATES SHALL BE KEPT ON FILE WITH THE PROJECT FILE.
7. WHILE CONSTRUCTION ACTIVITIES ARE UNDER WAY AT LEAST ONE CONTRACTOR, FOREMAN, OR CREW SUPERVISOR SHALL BE PRESENT AT THE JOB SITE AT ALL TIMES AND WILL DIRECTLY REPORT TO THE ARCADIS SITE SUPERVISOR.
8. ALL EXCAVATED/DEMOLITION MATERIALS INTO TWO CATEGORIES: CONCRETE/ASPHALT/METAL MATERIAL AND SOIL MATERIAL. CONCRETE/ASPHALT/METAL MATERIAL SHALL BE DISPOSED OF BY CONTRACTOR. SOIL MATERIAL WILL BE CHARACTERIZED AND DISPOSED OF BY IN ACCORDANCE WITH THE SPECIFICATIONS ON DRAWING 12 AND ALL FEDERAL, STATE AND LOCAL REGULATIONS.
9. CONTRACTORS ARE RESPONSIBLE FOR LOCATING AND VERIFYING LOCATION OF ALL UTILITIES WITHIN AREA AFFECTED BY CONSTRUCTION. COPIES OF PRINTS OBTAINED OR LOCATIONS PROVIDED TO CONTRACTOR WITH RESPECT TO UTILITIES SHALL BE SUPPLIED TO THE ENGINEER WITH A RECORD SET OF DRAWINGS AT COMPLETION OF CONSTRUCTION. IF A CONFLICT EXISTS BETWEEN THE UTILITY LOCATION AND THE CONSTRUCTION DRAWINGS, CONTRACTOR IS TO NOTIFY THE ENGINEER IMMEDIATELY SO THAT THE CONFLICT MAY BE RESOLVED.
10. CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE ENGINEER WITH ALL INFORMATION REQUIRED TO COMPLETE A SET OF "RECORD" DRAWINGS BY KEEPING A RECORD SET OF DAILY PROGRESSION OF WORK.
11. UNLESS OTHERWISE NOTED, ALL AREAS DISTURBED BY THIS WORK SHALL BE RESTORED TO ORIGINAL CONDITION.
12. CONTRACTOR TO PROTECT AND PRESERVE ALL EXISTING FEATURES (I.E. MONITORING WELLS, EQUIPMENT, ETC.) WITHIN AREAS AFFECTED BY CONSTRUCTION. DAMAGE SUSTAINED TO AN EXISTING FEATURE WILL BE REPAIRED/REPLACED AT CONTRACTOR'S EXPENSE TO SATISFACTION OF ENGINEER.
13. CONTRACTOR SHALL PERFORM ALL WORK IN ACCORDANCE WITH ALL COUNTY, LOCAL, STATE, AND FEDERAL REGULATIONS, INCLUDING, BUT NOT LIMITED TO, ALL APPLICABLE LOCAL, STATE, AND/OR FEDERAL (OSHA, USEPA, AND DOT, ETC.) RULES AND REGULATIONS.
14. UNLESS OTHERWISE INDICATED HEREIN, ALL MATERIALS AND EQUIPMENT FURNISHED UNDER THIS CONTRACT SHALL BE NEW, FREE FROM DEFECTS, AND SHALL BE GUARANTEED FOR A PERIOD OF AT LEAST ONE YEAR FROM THE DATE OF ACCEPTANCE OF THE WORK. THE CONTRACTOR SHALL FURNISH, AT NO COST TO THE ENGINEER, ALL LABOR AND MATERIALS NECESSARY TO CORRECT PROBLEMS DUE TO FAULTY WORKMANSHIP OR MATERIALS.
15. OTHER CONSTRUCTION ACTIVITIES MAY BE TAKING PLACE CONCURRENTLY WITH THIS PROJECT. THE CONTRACTOR SHALL CONSULT WITH THE VARIOUS PARTIES AND SHALL COORDINATE SCHEDULES.
16. THE INFORMATION SHOWN ON THE DRAWINGS CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATIONS AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO.
17. TRENCHING WILL BE PERFORMED IN AREAS WHERE VEHICULAR TRAFFIC MAY BE PRESENT. THE CONTRACTOR(S) SHALL NOTIFY THE TOWN OF OYSTER BAY HIGHWAY DEPARTMENT AND ENGINEER OF THE PROPOSED START OF WORK WITHIN THESE TRAFFIC AREAS A MINIMUM OF 48 HOURS PRIOR TO THE START OF THE WORK. FURTHERMORE, THE CONTRACTOR WILL PERFORM THIS WORK IN A MANNER TO ALLOW FOR MINIMAL DISRUPTION TO TRAFFIC. THIS WILL INCLUDE PERFORMING WORK IN ACCORDANCE WITH TOWN OF OYSTER BAY HIGHWAY DEPARTMENT REQUIREMENTS IN SECTIONS AND/OR PROVIDING TRAFFIC PLATES TO ALLOW TRENCH SECTIONS TO BE DRIVEN OVER. TRAFFIC CONTROLS SHALL BE PROVIDED AS REQUIRED BY TOWN OF OYSTER BAY HIGHWAY DEPARTMENT REQUIREMENTS.
18. PIPE ROUTING SHOWN FOR CONSTRUCTION LAYOUT PURPOSES ONLY. ACTUAL ROUTING TO BE FIELD DETERMINED AND IS SUBJECT TO ENGINEER'S APPROVAL.
19. CONTRACTOR SHALL EXTEND ALL PROCESS PIPING AND MAKE ALL NECESSARY CONNECTIONS TO WELL VAULTS.
20. ALL PIPING PRESSURE TESTS SHALL BE MADE BY THE CONTRACTOR IN THE PRESENCE OF THE ENGINEER.
21. CONTRACTOR SHALL PROVIDE ALL PRODUCTS AND PROPERLY CALIBRATED TESTING EQUIPMENT REQUIRED TO PERFORM THE PIPING PRESSURE TESTING WORK.
22. TESTS MAY BE PERFORMED ON SEPARATE SECTIONS OF PIPING TO EXPEDITE CONSTRUCTION. THE CONTRACTOR SHALL NOT PERFORM PRESSURE TESTING AGAINST SYSTEM VALVES.
23. AFTER THE INITIAL PRESSURE TEST ON PIPING IS COMPLETED SUCCESSFULLY, THE CONTRACTOR SHALL BACKFILL THE TRENCHES AS SPECIFIED.
24. EXCAVATIONS SHALL BE KEPT FREE FROM STANDING WATER.
25. CONTRACTOR SHALL NOTIFY THE ENGINEER AT THE COMPLETION OF EXCAVATIONS AND TRENCHING TO ALLOW FOR INSPECTIONS.
26. CONTRACTOR SHALL PROVIDE APPROPRIATE SAFETY BARRICADES AROUND TRENCHING AND EXCAVATION TO PREVENT ACCIDENTS OR UNAUTHORIZED ENTRY.
27. BACKFILL OF TRENCHES IN UNPAVED AREAS WILL BE APPLIED IN 6-INCH THICK COMPACTED LIFTS. BACKFILL OF TRENCHES IN DESIGNATED ROAD CROSSING AREAS SHALL BE APPLIED IN 6-INCH COMPACTED LIFTS SUCH THAT A 95% MODIFIED PROCTOR DENSITY SHALL BE ACHIEVED.
28. CONTRACTOR'S FILL SOURCE MUST BE TESTED BY CONTRACTOR AND APPROVED BY THE ENGINEER PRIOR TO COMMENCING THE WORK AND/OR PLACING THE MATERIAL.
29. EXCAVATIONS WILL BE BACKFILLED AS PROMPTLY AS WORK PERMITS ONCE REQUIRED INSPECTIONS HAVE BEEN COMPLETED.
30. DO NOT PLACE MATERIALS ON SURFACES THAT ARE MUDDY, FROZEN, OR CONTAIN ICE OR FROST.
31. CONTRACTOR SHALL PLACE A STRIP(S) OF UTILITY WARNING TAPE SPACED AT 18 INCHES ON CENTER IN ALL TRENCHED AREAS. THIS TAPE SHALL CONTAIN A WIRE FOR METAL DETECTION OR HAVE AN ALUMINUM CORE. TAPE SHALL BE PLACED AT A DEPTH OF 9 INCHES IN NON-PAVED AREAS AND BELOW THE SUBBASE IN PAVED AREAS.
32. ALL CONCRETE AND PAVEMENT CUTS ARE TO BE SMOOTH EDGE SAW CUTS BY CIRCULAR SAW BLADES.
33. SURVEY NOTE: MAP FEATURES BASED ON SURVEY PREPARED BY NELSON & POPE ENGINEERS AND SURVEYORS, "EXISTING TOPOGRAPHY", DATED 4-19-07.
34. EXISTING FEATURES ON PARK AND OFF-SITE ARE BASED ON AERIAL PHOTOGRAPHY AND ARE APPROXIMATE.
35. ALL PAVED AREAS SHALL BE RESTORED.
36. ALL EXISTING GROUNDWATER EXTRACTION PIPING SHALL BE FLUSHED OUT PRIOR TO CONNECTING TO FINAL CONNECTION.
37. ALL INFLUENT LINES SHALL BE FLUSHED PRIOR TO MAKING FINAL CONNECTIONS AT WELL VAULT AND BUILDING.
38. PIPE CLEAN-OUTS SHALL BE INSTALLED AT WELL VAULTS AND AT PIPE PENETRATIONS INSIDE TREATMENT BUILDING FOR ALL INFLUENT LINES.
39. GROUNDWATER IRM LINES SHALL BE FLUSHED OUT WITH CLEAN WATER PRIOR TO PRESSURE TESTING.
40. ALL INFORMATION PRESENTED ON THESE DRAWINGS IS CONFIDENTIAL.

ZONING NOTES:

SECTION 46 BLOCK 5, LOT 92 LIE WITHIN THE TOWN OF OYSTER BAY AND ARE ZONED "GB" GENERAL BUSINESS.

THE FOLLOWING IS A PARTIAL LISTING OF ZONING REQUIREMENTS PRINTED IN THE CODE OF THE TOWN OF OYSTER BAY:

MAXIMUM LOT WIDTH/FRONTAGE:	40 FEET
MAXIMUM BUILDING COVERAGE:	80%
MINIMUM FRONT YARD SETBACK:	15 FEET
MINIMUM REAR YARD SETBACK:	20 FEET
MAXIMUM BUILDING HEIGHT:	38 FEET

0 100' 200'
SCALE IN FEET

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING — USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd

THIS DRAWING IS THE PROPERTY OF THE ARCADIS ENTITY IDENTIFIED IN THE TITLE BLOCK AND MAY NOT BE REPRODUCED OR ALTERED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF SAME.

Professional Engineer's Name: WILLIAM S. WITTEK
Professional Engineer's No.: 060027
State: NY | Date Signed: | Project Mgr.: CSG
Designed by: CDL | Drawn by: BKD | Checked by: TRM

ARCADIS
ARCADIS OF NEW YORK, INC.

NORTHROP GRUMMAN CORPORATION • BETHPAGE, NEW YORK
OPERABLE UNIT 3 - FORMER GRUMMAN SETTLING PONDS

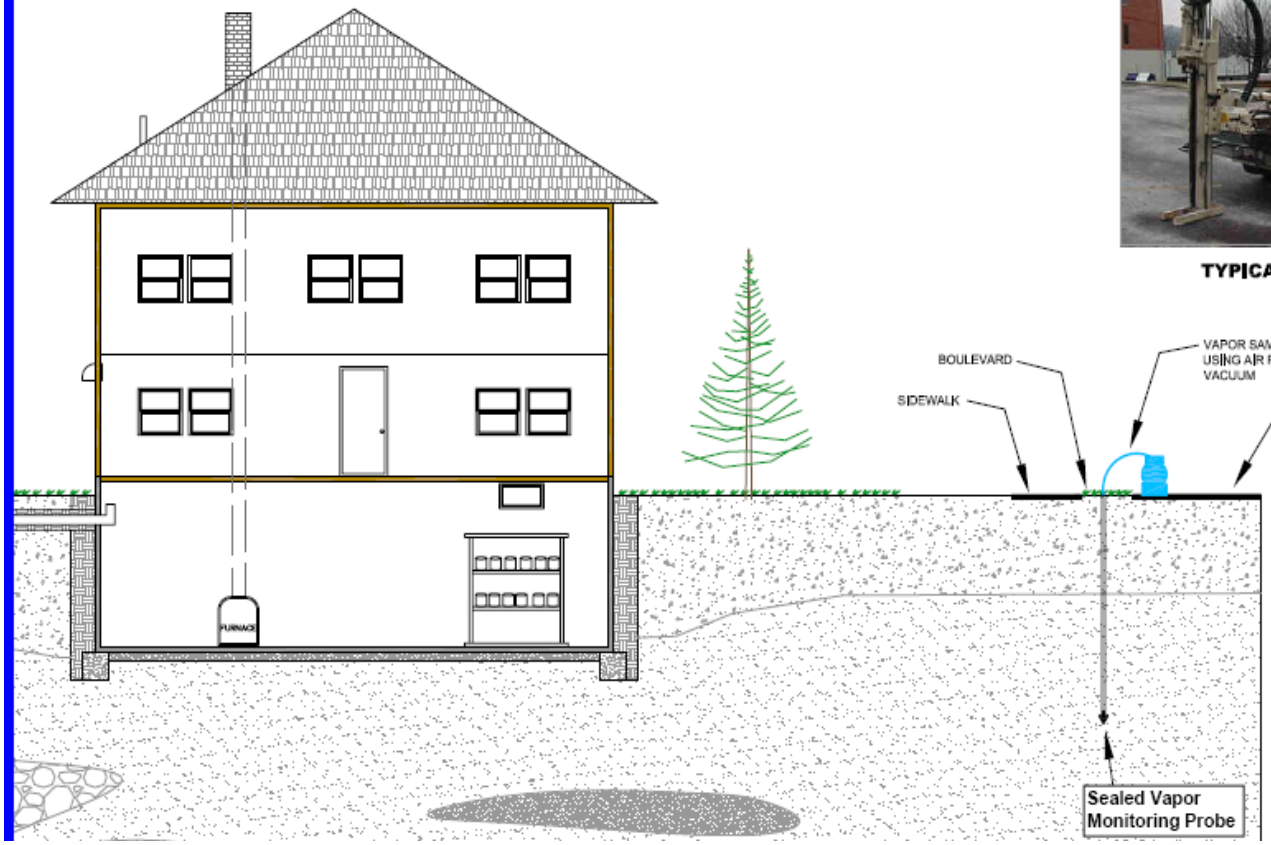
SITE PLAN

ARCADIS Project No. NY001464.1607.00003
Date: JUNE 2009
ARCADIS
6723 Towpath Road
Box 66
Syracuse, NY 13214
Tel: 315-446-9120

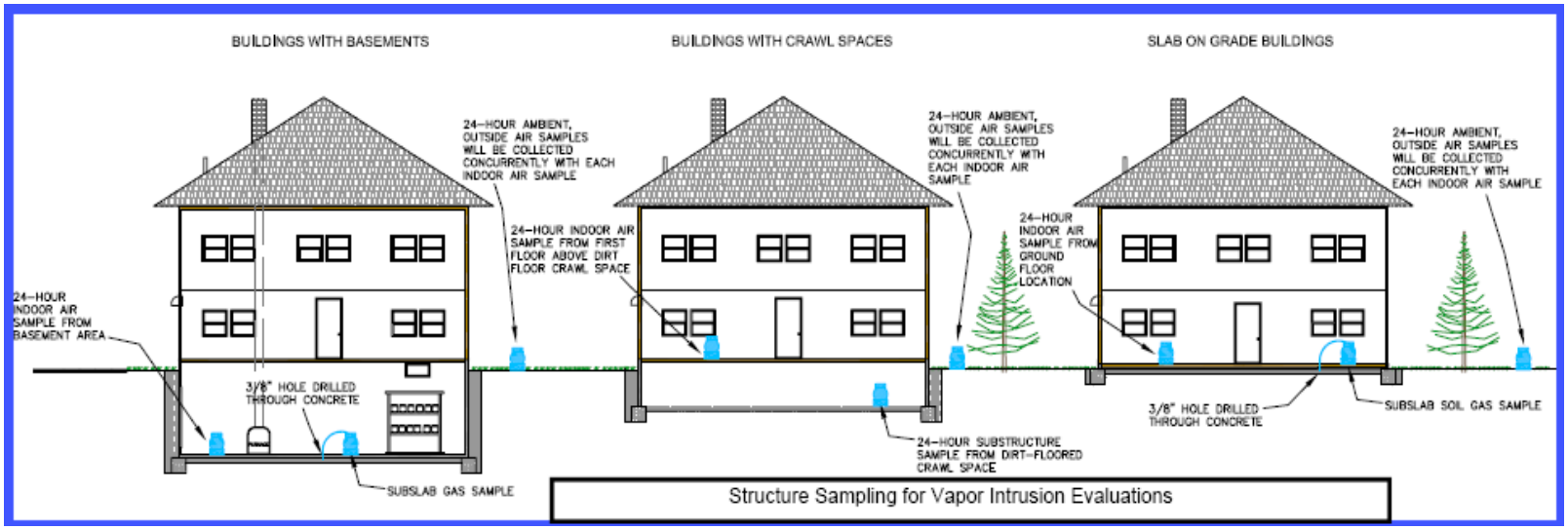
1

Soil Gas Sampling

TYPICAL SOIL GAS SAMPLING RIG



- Sampling points are identified and marked in the public right-of-way.
- Truck mounted drill rig is used to drive a 1.5-inch diameter steel rod into soil.
- Air sample is collected at a depth of 6 to 8 feet below ground, similar to building foundation depth.
- Samples are submitted for laboratory analysis.
- Soil Gas Results will be presented


BUILDINGS WITH BASEMENTS
BUILDINGS WITH CRAWL SPACES
SLAB ON GRADE BUILDINGS
24-HOUR AMBIENT, OUTSIDE AIR SAMPLES WILL BE COLLECTED CONCURRENTLY WITH EACH INDOOR AIR SAMPLE
24-HOUR INDOOR AIR SAMPLE FROM FIRST FLOOR ABOVE DIRT FLOOR CRAWL SPACE
24-HOUR AMBIENT, OUTSIDE AIR SAMPLES WILL BE COLLECTED CONCURRENTLY WITH EACH INDOOR AIR SAMPLE
24-HOUR INDOOR AIR SAMPLE FROM GROUND FLOOR LOCATION
24-HOUR AMBIENT, OUTSIDE AIR SAMPLES WILL BE COLLECTED CONCURRENTLY WITH EACH INDOOR AIR SAMPLE
24-HOUR INDOOR AIR SAMPLE FROM BASEMENT AREA
3/8" HOLE DRILLED THROUGH CONCRETE
SUBSLAB GAS SAMPLE
24-HOUR SUBSTRUCTURE SAMPLE FROM DIRT-FLOORED CRAWL SPACE
3/8" HOLE DRILLED THROUGH CONCRETE
SUBSLAB SOIL GAS SAMPLE
Structure Sampling for Vapor Intrusion Evaluations

Human Health Risk Assessment, Screening of Alternatives and FS

TECHNOLOGY	CONTAMINANT			COMMENTS
	VOCs	PCBs	Metals	
SOILS, LPZ, AND PERCHED WATER				
Excavation w/off-site disposal	Y	Y	Y	Retained for all alternatives
Excavation w/on-site treatment	Y	Y	Y	Off-site disposal is more effective and less costly than on-site treatment options considered (soil washing, chemical oxidation, and incineration). Incineration was also eliminated due to the likelihood that the technology would not be acceptable to the NYSDEC, NYSDOH, and/or public.
Stabilization	N	Y	Y	Stabilization is not effective at treating VOCs.
Stabilization enhanced w/Zero-Valent Iron for VOCs only	Y	Y	Y	Retained for Alternatives 2 and 3
Stabilization enhanced w/Zero-Valent Iron for VOCs & PCBs	Y	Y	Y	Retained for Alternative 3 (2'-6'/10') only
In-situ Thermal Remediation	Y	N	N	Retained for Alternatives 2 and 3
In-situ Thermal Remediation (enhanced for PCBs)	Y	Y	N	Overall costs were prohibitive compared to excavating w/off-site disposal for alternatives considered.
Soil Vapor Extraction	Y	N	N	Retained for Alternatives 2 and 3
Multi-phase Extraction	Y	N	Y	Retained for Alternatives 2 and 3
Gravel Cap	Y	Y	Y	Retained for Alternatives 2 and 3
GROUNDWATER				
Pump & Treat	Y	NA	Y	Retained for all alternatives
Stabilization enhanced w/Zero-Valent Iron for VOCs only	Y	NA	Y	Retained for Alternatives 2 and 3
In-situ Thermal Remediation	Y	NA	N	Retained for Alternatives 2 and 3
In-situ Chemical Oxidation w/Permanganate	Y	NA	N	Retained for Alternative 4 only
In-situ Chemical Oxidation w/Persulfate	Y	NA	N	Site-specific bench-scale tests found permanganate to be a more effective oxidant.
Multi-phase Extraction	Y	NA	Y	The OM&M costs will be prohibitive due to the large quantity of water that would have to be extracted, treated, and discharged.
Enhanced Anaerobic Bioremediation	Y	NA	N	Is not compatible with the existing GW IRM due to the generation and release of significant quantities of dissolved iron within the anaerobic zone which would, ultimately, render the groundwater recovery system inoperable.
SOIL VAPOR				
Soil Vapor Extraction	Y	NA	NA	Retained for all alternatives

Estimated Project Schedule

- On-Site
  - RI Field Work: Completed
  - Soil Gas IRM Startup: October 2007
  - RI Report: Late Summer 2007
  - Feasibility Study: December 2007
  - Groundwater IRM Startup: October 2008
- Off-Site
  - RI Field Work: First Quarter 2008
  - RI Report: June 2008
  - Feasibility Study: September 2008
- Additional Public Meetings: To Be Determined