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Subject: Third Quarter 2024 Operation, Maintenance, and Monitoring Report, Operable Unit 2, Northrop Grumman and Naval Weapons Industrial Reserve Plant (NWIRP) Sites, Bethpage, New York.
(NYSDEC Site #'s 1-30-003A and B)

Dear Ms. Johnston:

On behalf of Northrop Grumman, Arcadis is providing the NYSDEC with the Third Quarter 2024 Operation, Maintenance, and Monitoring Report (Report). This Report was prepared to document the operation, maintenance, and monitoring (OM&M) activities conducted for the Operable Unit 2 (OU2) groundwater remedy and the results of ongoing volatile organic compound (VOC) and inorganic monitoring in groundwater to meet the remedial objectives set forth in the March 2001 OU2 Record of Decision (ROD) and associated December 2019 Amended Record of Decision (AROD).

Table 1 summarizes OU2 remedial system performance operational data, mass removed, and water balance. **Tables 2 and 3A/3B** provide the analytical results for remedial system water and vapor samples, respectively, for this period. **Tables 4A and 4B** provide an air quality impact analysis (under 6 CRR-NY 212 [Rule 212]) for quarterly vapor sample results collected from the Building 96 and Building 102 systems, respectively, including air modeling analysis if warranted. **Table 5** provides validated analytical results associated with groundwater monitoring efforts completed during this period. **Figures 1 through 3** show the Locations of Wells and On-site Groundwater Remedy, ONCT Groundwater Extraction and Treatment System Site Plan, and the ONCT Groundwater Extraction and Treatment System Schematic, respectively.

Sarah Johnston
NYSDEC
December 3, 2024

Please contact us if you have any questions or comments.

Sincerely,
Arcadis of New York, Inc.



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Enclosures

Tables

Table 1
Operational Summary for the Treatment System
Third Quarter 2024⁽¹⁾ Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York



	Quarterly Flow Rates (gpm)		Quarterly Flow Volumes (MG)			Quarterly VOC Concentrations (µg/L)		VOC Mass Removed (lbs)		Third Quarter Remedial Well Uptime (%)
	Current Model Design ⁽²⁾	Current Operational Flow ^(3,4)	Design ⁽²⁾	Actual ^(3,4)	% of Design	TCE ⁽⁵⁾	TVOC ^(5,6)	Quarterly	Cumulative	
Influent Groundwater ⁽⁷⁾										
Well 1	800	814	106	107	101%	432	456	408	57,732	99.5%
Well 3R	700	803	93	96	103%	173	234	188	95,071	90%
Well 17	1,000	1,004	132	133	101%	111	126	140	56,635	99.7%
Well 18	800	984	106	130	123%	22.1	40.7	44	7,659	99.7%
Well 19	500	494	66	65	98%	48.6	61.1	33	9,844	99.7%
Total ⁽⁸⁾	3,800	4,099	503	531	106%	--	--	813	226,941	--
Effluent Groundwater ^(9,14)										
Calpine	100 - 400	195	--	26	--	--	--	--	--	--
OXY Biosparge ⁽¹⁰⁾	2 - 42	0	--	0	--	--	--	--	--	--
West Recharge Basins	1,112 - 1,455	1,223	--	162	--	--	ND	--	--	--
South Recharge Basins (Building 102)	2231 - 4631	2,654	296 - 607	374	--	--	ND	--	--	--
South Recharge Basins (Building 109)	1,500	1,676	199	200	--	--	ND	--	--	--
South Recharge Basins (Combined)	2231 - 4631	4,330	495 - 806	574	--	--	ND	--	--	--
Total	--	5,748	--	762	--	--	ND	--	--	--
Additional Flow to South Recharge Basins										
Storm Water Runoff Contributing to South Recharge Basins Flow Volume ⁽¹¹⁾	--	--	--	25	--	--	--	--	--	--
Total Flow Volume to South Recharge Basins ^(10,11,12)	--	--	495 - 806	599	--	--	--	--	--	--
Treatment Efficiencies ⁽¹³⁾										
Building 96 System:	>99.9%									
Building 102 System:	>99.9%									

See Notes and Abbreviations on last page.

Notes and Abbreviations:

- (1) Quarterly reporting period: July 1, 2024 through September 30, 2024.
- (2) "Current Model Design" flow rates were determined for the five remedial wells and for the South Recharge Basin based on computer modeling (ARCADIS G&M, Inc. 2002, updated in 2021 and 2023). Flow rates for Calpine Power Plant (Calpine), Occidental Chemical (OXY) Biosparge, and West Recharge Basin flow rates are typical flow rates and are provided for reader information. Flow to SRB reflects operation of the B109 treatment system. High-end of range reflects up to a 2,400 gpm contribution from B109 (RW-21 and DEC-EX-06). Model simulations demonstrated ONCT capture zone maintained for SRB discharge rates within range. "Design" flow volumes represent the volume of water that is expected to be pumped/discharged during the reporting period and is calculated by multiplying the design rate by the reporting period duration.
- (3) Actual flow rates for the remedial wells represent the average actual pumping rates when the pumps are operational and do not take into account the time that a well is not operational. Actual flow volumes are collated from the monthly SPDES reports, which are calculated using the SCADA instantaneous flow rates transmitted from local flow meters.
- (4) "Actual" flow rates for the system discharges represent the average flow rate during the reporting period and are determined by dividing the total flow recorded during the reporting period by the reporting period duration.
- (5) The TCE and TVOC concentrations are from the quarterly sampling events performed during this reporting period on August 28, 2024 and September 10, 2024.
- (6) The TVOC concentrations for the West Recharge Basin (Outfall 006 of the Building 96 System) and the South Recharge Basin (Outfall 005 of the Building 102 System) are their respective average monthly Outfall SPDES concentrations for the current quarter.
- (7) Building 96 (Wells 1 and 3R): Building 96 was shut down this reporting period on July 17th due to an Exterior GAC change-out. Well 3R was shut down for approximately 8 days in October due to flowmeter and VFD issues. The flow meters in Well 1 and Well 3R were replaced.
 Building 102 (Wells 17, 18, and 19) was shut down for approximately 1 day in September for maintenance.
- (8) Total pumpage/recharge rates are accurate to ±15% based on available information and expected or typical precision/accuracy factors for the gauges and meters.
- (9) There are four possible discharges for the effluent groundwater: South Recharge Basins, West Recharge Basins, Calpine, and the OXY Biosparge system. Treated water is continuously discharged to the south and west recharge basins during routine operation, and is available "on-demand" to both Calpine for use as make-up water, and the OXY Biosparge remediation system. For this quarter, the quarterly flow rates to the south and west recharge basins (SRB and WRB, respectively) were calculated using the remedial well flow rates and available additional information and assumptions provided by Northrop Grumman regarding flow distribution, as follows: the Building 96 system (Remedial Wells 1 and 3R) discharges effluent water to the WRB, less Calpine usage and less 119 gpm of Building 102 steam condenser usage (15.8 MG); the Building 102 System (Remedial Wells 17 through 19), including the Building 102 steam condenser usage (15.8 MG), and the Building 109 System (Remedial Wells 20 through 22) discharge effluent water to the SRB.
- (10) Oxy has not reported any water usage for the OXY Biosparge system since May 2016.
- (11) Storm water runoff volume is calculated by multiplying the adjusted tributary area and NOAA precipitation data for the reporting periods. The tributary area is adjusted by the runoff coefficient to exclude the infiltration volume from the total rainfall volume. The tributary area, runoff coefficient, and adjusted tributary area are from Dvirka and Bartilucci Consulting Engineers' Storm Water Permit Evaluation Report (January, 28, 2010). The NOAA precipitation data are calculated as a sum of NOAA daily precipitation data for the reporting period. NOAA precipitation data are retrieved from Station GHCND:USW00054787 - FARMINGDALE REPUBLIC AIRPORT, NY US for July, August, and September 2024.
- (12) Total flow volume to South Recharge Basins is estimated as a sum of flow volumes contributed by the effluent groundwater to South Recharge Basins (B102 and B109 treatment systems) and from storm water runoff to South Recharge Basins. Third Quarter 2024 calculated South Recharge Basin flow volume is within historical operating range.
- (13) Treatment system efficiencies are calculated by dividing the difference between the remedial well flow weighted influent and effluent TVOC concentrations by the remedial well flow weighted influent concentration.
- (14) RW-21 system start-up testing was initiated in May 2023, and continuing with full-scale operation beginning in August 2023. As such, flow volumes to the south recharge basins are representative of volumes from the Building 102 and Building 109 treatment systems since RW-21 system start-up.

- Not Applicable
- µg/L micrograms per liter
- gpm gallons per minute
- lbs pounds
- MG million gallons
- NOAA National Oceanic and Atmospheric Administration
- SCADA Supervisory Controls and Data Acquisition
- SPDES State Pollution Discharge Elimination System
- TCE trichloroethene
- TVOC total volatile organic compounds
- VOC volatile organic compounds

Table 2
 Concentrations of Constituents in Remedial Wells and
 Treatment System Effluents
 Third Quarter 2024⁽¹⁾ Reporting Period
 Operable Unit 2
 Northrop Grumman
 Bethpage, New York



Constituents ⁽²⁾ (units in µg/L)	CAS#	Location ID:	WELL 1	WELL 3R	96 EFFLUENT	WELL 17	WELL 18	WELL 19	102 EFFLUENT
		Sample ID: Sample Date:	WELL 1 8/28/2024	WELL 3R 8/28/2024	96 EFFLUENT 8/28/2024	WELL 17 9/10/2024	WELL 18 9/10/2024	WELL 19 9/10/2024	102 EFFLUENT 9/10/2024
Volatile Organic Compounds (VOCs)⁽³⁾									
1,1,1-Trichloroethane	00071-55-6		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	00079-34-5		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	00079-00-5		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	00075-34-3		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	00075-35-4		0.83 J	1.5	<1.0	<1.0	1.2	<1.0	<1.0
1,2-Dichloroethane	00107-06-2		2.2	4.5	<1.0	0.72 J	1.6	0.67 J	<1.0
1,2-Dichloropropane	00078-87-5		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone (MEK)	00078-93-3		2.7	<1.0	<1.0	0.79 J	<1.0	<1.0	<1.0
2-Hexanone (MBK)	00591-78-6		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methyl-2-Pentanone (MIK)	00108-10-1		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	00067-64-1		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	00071-43-2		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	00075-27-4		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	00075-25-2		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	00074-83-9		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Carbon Disulfide	00075-15-0		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Carbon Tetrachloride	00056-23-5		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	00108-90-7		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	00075-00-3		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	00067-66-3		<1.0	0.50 J	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	00074-87-3		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	00156-59-2		6.4	3.8	<1.0	1.9	2.0	6.4	<1.0
cis-1,3-Dichloropropene	10061-01-5		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane	00124-48-1		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	00100-41-4		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dichloromethane	00075-09-2		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Styrene	00100-42-5		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	00127-18-4		10.7	47.1	<1.0	10.7	13.8	4.6	<1.0
Toluene	00108-88-3		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	00156-60-5		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	10061-02-6		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	00079-01-6		432	173	<1.0	111	22.1	48.6	<1.0
Trichlorotrifluoroethane (Freon 113)	00076-13-1		1.6 J	2.3 J	<5.0	1.2 J	<5.0	0.81 J	<5.0
Vinyl Chloride	00075-01-4		<1.0	1.3	<1.0	<1.0	<1.0	<1.0	<1.0
Xylene-o	00095-47-6		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylene-m,p	179601-23-1		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs⁽⁴⁾			456	234	ND	126	40.7	61.1	ND
1,4-Dioxane⁽⁵⁾			5.2	7.0	5.9	6.4	4.4	3.2	5.6

Notes and abbreviations on last page.

Table 2
Concentrations of Constituents in Remedial Wells and
Treatment System Effluents
Third Quarter 2024⁽¹⁾ Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

- (1) Quarterly reporting period: July 1, 2024 through September 30, 2024.
- (2) Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).
- (3) VOC samples analyzed using USEPA Method 8260C. 1,4-Dioxane samples analyzed using USEPA Method 8270D-SIM.
- (4) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.

1.2	Bold value indicates a detection
< 1.0	Compound is not detected above its laboratory quantification limit
µg/L	micrograms per liter
J	Compound detected below its reporting limit; value is estimated
ND	Not detected
OU2	Operable Unit 2
REP	Blind Replicate Sample
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Table 3A
Vapor Sample Analytical Results,
Building 96 Treatment System,
Third Quarter 2024⁽¹⁾ Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York



Constituents (units in µg/m3)	Location ID: Sample ID: Sample Date:	96 INFLUENT T96 INFLUENT 8/28/2024	96 MID-EFFLUENT T96 MIDTRAIN 8/28/2024	96 EFFLUENT T96 EFFLUENT 8/28/2024
<u>Volatile Organic Compounds (VOCs)⁽²⁾</u>	CAS #			
1,1,1-Trichloroethane	00071-55-6	<28	<1.1	<0.44
1,1,2,2-Tetrachloroethane	00079-34-5	<35	<1.4	<0.55
1,1,2-Trichloroethane	00079-00-5	<28	<1.1	<0.44
1,1-Dichloroethane	00075-34-3	47.8	24	<0.65
1,1-Dichloroethene	00075-35-4	107	90.8	0.44
1,2-Dichloroethane	00107-06-2	<40	<1.6	<0.65
1,2-Dichloropropane	00078-87-5	47.6	<1.8	<0.74
Benzene	00071-43-2	<32	<1.3	<0.51
Bromodichloromethane	00075-27-4	<34	<1.3	<0.54
Bromoform	00075-25-2	<21	<0.83	<0.33
Bromomethane	00074-83-9	<39	<1.6	<0.62
Carbon Disulfide	00075-15-0	<31	<1.2	<0.50
Carbon Tetrachloride	00056-23-5	<13	<0.50	<0.20
Chlorobenzene	00108-90-7	<46	<1.8	<0.74
Chloroethane	00075-00-3	<26	1.8	1.8
Chloroform	00067-66-3	<49	5.4	<0.78
Chloromethane	00074-87-3	<21	0.83	0.85
cis-1,2-Dichloroethene	00156-59-2	189	56.7	<0.13
cis-1,3-Dichloropropene	10061-01-5	<45	<1.8	<0.73
Dibromochloromethane	00124-48-1	<35	<1.4	<0.68
Ethylbenzene	00100-41-4	<43	<1.7	<0.69
Dichloromethane	00075-09-2	<35	<1.4	1.8
Styrene	00100-42-5	<43	<1.7	<0.68
Tetrachloroethene	00127-18-4	1,150	13	1.0
Toluene	00108-88-3	<38	<1.5	0.64
trans-1,2-Dichloroethene	00156-60-5	<40	<1.6	<0.63
trans-1,3-Dichloropropene	10061-02-6	<45	<1.8	<0.73
Trichloroethylene	00079-01-6	12,800	287	7.5
Trichlorotrifluoroethane (Freon 113)	00076-13-1	77.4	16	<0.61
Vinyl Chloride	00075-01-4	19	19	20
Xylene-o	00095-47-6	<0.69	<43	<1.7
Xylene-m,p	179601-23-1	<0.69	<43	<1.7
Total VOCs⁽³⁾		14,438	515	33

Notes and abbreviations on last page.

Table 3A
Vapor Sample Analytical Results,
Building 96 Treatment System,
Third Quarter 2024⁽¹⁾ Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York



Notes and Abbreviations:

- (1) Quarterly reporting period: July 1, 2024 through September 30, 2024.
 - (2) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.
 - (3) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.
- 107** Bold value indicates a detection
- < 1.1 Compound is not detected above its laboratory quantification limit
- µg/m³ micrograms per cubic meter
- J Compound detected below its reporting limit; value is estimated
- ELAP Environmental Laboratory Approval Program
- NYSDOH New York State Department of Health
- USEPA United States Environmental Protection Agency
- VOC Volatile Organic Compound

Table 3B
Vapor Sample Analytical Results
Building 102 Treatment System
Third Quarter 2024⁽¹⁾ Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York



Constitents (units in µg/m3)	Location ID: Sample ID: Sample Date:	102 INFLUENT T102 INFLUENT 9/10/2024	102 EFFLUENT T102 EFFLUENT 9/10/2024
<u>Volatile Organic Compounds (VOCs) ⁽²⁾</u>	CAS #		
1,1,1-Trichloroethane	00071-55-6	<11	0.6
1,1,2,2-Tetrachloroethane	00079-34-5	<14	<0.55
1,1,2-Trichloroethane	00079-00-5	<11	<0.44
1,1-Dichloroethane	00075-34-3	32	31
1,1-Dichloroethene	00075-35-4	37	44.4
1,2-Dichloroethane	00107-06-2	<16	<0.65
1,2-Dichloropropane	00078-87-5	18 J	<0.74
Benzene	00071-43-2	<13	<0.51
Bromodichloromethane	00075-27-4	<13	<0.54
Bromoform	00075-25-2	<8.3	<0.33
Bromomethane	00074-83-9	<16	<0.62
Carbon Disulfide	00075-15-0	<12	<0.50
Carbon Tetrachloride	00056-23-5	<5.0	<0.20
Chlorobenzene	00108-90-7	<18	<0.74
Chloroethane	00075-00-3	<11	<0.42
Chloroform	00067-66-3	<20	3
Chloromethane	00074-87-3	<8.3	0.64
cis-1,2 Dichloroethene	00156-59-2	138	21
cis-1,3-Dichloropropene	10061-01-5	<18	<0.73
Dibromochloromethane	00124-48-1	<14	1.5
Ethylbenzene	00100-41-4	<17	<0.69
Dichloromethane	00075-09-2	<14	1.5
Styrene	00100-42-5	<17	<0.68
Tetrachloroethene	00127-18-4	773	1.9
Toluene	00108-88-3	<15	<0.60
trans-1,2-Dichloroethene	00156-60-5	<16	0.40 J
trans-1,3-Dichloropropene	10061-02-6	<18	<0.73
Trichloroethylene	00079-01-6	3,150	16
Trichlorotrifluoroethane (Freon 113)	00076-13-1	31	38
Vinyl Chloride	00075-01-4	<2.0	<0.082
Xylene-o	00095-47-6	<17	<0.69
Xylene-m,p	179601-23-1	<17	<0.69
Total VOCs ⁽³⁾		4,179	158

Notes and abbreviations on last page.

Table 3B
Vapor Sample Analytical Results
Building 102 Treatment System
Third Quarter 2024⁽¹⁾ Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York



Notes and Abbreviations:

- (1) Quarterly reporting period: July 1, 2024 through September 30, 2024.
- (2) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.
- (3) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.

32	Bold value indicates a detection
< 11	Compound is not detected above its laboratory quantification limit
µg/m ³	micrograms per cubic meter
J	Compound detected below its reporting limit; value is estimated
ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Table 4A
 Rule 212 Evaluation
 Building 96 Treatment System
 Third Quarter 2024⁽¹⁾ Reporting Period
 Operable Unit 2
 Northrop Grumman
 Bethpage, New York



Project VOCs	CAS#	HTAC ²	Tower 96 Treatment System Effluent Conc. (ug/m3) ³	Tower 96 Emissions (lb/yr) ⁴	Rule 212 Limit (lb/yr) ⁵	Rule 212 Evaluation ⁶	Further evaluation Required? ⁶
1,1-Dichloroethene	75-35-4	No	0.44	0.063	100	Less than limit, Rule 212 compliant	N
Chloroethane	75-00-3	No	1.8	0.259	100	Less than limit, Rule 212 compliant	N
Chloromethane	74-87-3	No	0.85	0.122	100	Less than limit, Rule 212 compliant	N
Methylene Chloride	75-09-2	No	1.8	0.259	100	Less than limit, Rule 212 compliant	N
Tetrachloroethene	127-18-4	Yes	1.0	0.144	1,000	Less than limit, Rule 212 compliant	N
Trichloroethylene	79-01-6	Yes	7.5	1.078	500	Less than limit, Rule 212 compliant	N
Vinyl Chloride	75-01-4	Yes	20	2.875	100	Less than limit, Rule 212 compliant	N

Flowrates and Normalized Modeling Impacts

Description	Flow (cfm)	AERMOD Normalized Ambient Impact at 1 g/s	
		Hourly ([µg/m ³]/[g/s])	Annual ([µg/m ³]/[g/s])
Tower 96	4,390	148.1	4.3

Notes and Abbreviations:

- (1) Quarterly reporting period: July 1, 2024 through September 30, 2024.
- (2) High toxicity air contaminant (HTAC) based on 6 CRR-NY Rule 212-2.2, Table 2 – High Toxicity Air Contaminant List.
- (3) Effluent concentrations based on sampling performed in the quarterly reporting period. Compounds not detected above the laboratory reporting limit are excluded from the air quality impact analysis summary.
- (4) Emission rate calculated based on maximum effluent concentration and maximum air flow rates measured during the sampling events. Emission rate standardized at 70 °F and 1 atm.

$$\text{Trichloroethylene (lb/yr)} = \text{Trichloroethylene } [\mu\text{g}/\text{m}^3] \times \text{Air Flow Rate } [\text{ft}^3/\text{min}] \times (1 \text{ m}^3/35.3147 \text{ ft}^3) \times (60 \text{ min}/\text{hr}) \times (0.000001 \text{ g}/1 \mu\text{g}) \times (0.0022 \text{ lb}/\text{g}) \times 8,760 \text{ hrs}/\text{yr}$$
- (5) 100 lb/yr for non-HTACs, and mass emission limits based on Rule 212-2.2, Table 2 for HTACs.
- (6) For HTACs, no further demonstration is required if the actual emissions are less than mass emission limit. For non-HTACs, no further demonstration is required if the actual emissions are less than 100 lbs/yr.

SGC Short-Term Guideline Concentrations
 AGC Annual Guideline Concentrations

Table 4B
 Rule 212 Evaluation
 Building 102 Treatment System
 Third Quarter 2024⁽¹⁾ Reporting Period
 Operable Unit 2
 Northrop Grumman
 Bethpage, New York



Project VOCs	CAS#	HTAC ²	Tower 102 Treatment System Effluent Conc. (ug/m3) ^{3,8}	Tower 102 Emissions (lb/yr) ⁴	Rule 212 Limit (lb/yr) ⁵	Rule 212 Evaluation ⁶	Further evaluation Required? ⁶
1,1,1-Trichloroethane	71-55-6	No	0.6	0.155	100	Less than limit, Rule 212 compliant	N
1,1-Dichloroethane	75-34-3	No	31	8.019	100	Less than limit, Rule 212 compliant	N
1,1-Dichloroethene	75-35-4	No	44.4	11.485	100	Less than limit, Rule 212 compliant	N
Chloroform	67-66-3	Yes	3	0.776	100	Less than limit, Rule 212 compliant	N
Chloromethane	74-87-3	No	0.64	0.166	100	Less than limit, Rule 212 compliant	N
cis-1,2 Dichloroethene	156-59-2	No	21	5.432	100	Less than limit, Rule 212 compliant	N
Methylene Chloride	75-09-2	No	1.5	0.388	100	Less than limit, Rule 212 compliant	N
Tetrachloroethene	127-18-4	Yes	1.9	0.491	1,000	Less than limit, Rule 212 compliant	N
trans-1,2-Dichloroethene	156-60-5	No	0.40	0.103	100	Less than limit, Rule 212 compliant	N
Trichloroethylene	79-01-6	Yes	16	4.139	500	Less than limit, Rule 212 compliant	N
Trichlorotrifluoroethane (Freon 113)	76-13-1	No	38	9.830	100	Less than limit, Rule 212 compliant	N

Flowrates and Normalized Modeling Impacts			
Description	Flow (cfm)	AERMOD Normalized Ambient Impact at 1 g/s	
		Hourly ([µg/m ³]/[g/s])	Annual ([µg/m ³]/[g/s])
Tower 102	7,900	348.9	2.3

Notes and Abbreviations:

- (1) Quarterly reporting period: July 1, 2024 through September 30, 2024.
- (2) High toxicity air contaminant (HTAC) based on 6 CRR-NY Rule 212-2.2, Table 2 – High Toxicity Air Contaminant List.
- (3) Effluent concentrations based on sampling performed in the quarterly reporting period. Compounds not detected above the laboratory reporting limit are excluded from the air quality impact analysis summary.
- (4) Emission rate calculated based on maximum effluent concentration and maximum air flow rates measured during the sampling events. Emission rate standardized at 70 Trichloroethylene (lb/yr) = Trichloroethylene [µg/m³] x Air Flow Rate [ft³/min] x (1 m³/35.3147 ft³) x (60 min/hr) x (0.000001 g/1 µg) x (0.0022 lb/g) x 8,760
- (5) 100 lb/yr for non-HTACs, and mass emission limits based on Rule 212-2.2, Table 2 for HTACs.
- (6) For HTACs, no further demonstration is required if the actual emissions are less than mass emission limit. For non-HTACs, no further demonstration is required if the actual emissions are less than 100 lbs/yr.

SGC Short-Term Guideline Concentrations
 AGC Annual Guideline Concentrations

Table 5
Concentrations of Volatile Organic Compounds and 1,4 Dioxane in Monitoring and Outpost (BPOW) Wells
Third Quarter 2024
Operable Unit 2
Northrop Grumman
Bethpage, New York



Constituents (units in ug/L)	Well ID:	BPOW 1-1	BPOW 1-2	BPOW 1-3	BPOW1-4	BPOW 1-5	BPOW 1-6
	Sample ID: Date:	BPOW 1-1 9/3/2024	BPOW 1-2 8/5/2024	BPOW 1-3 9/3/2024	BPOW1-4 8/6/2024	BPOW 1-5 8/6/2024	BPOW 1-6 8/6/2024
Volatile Organic Constituents ^(1, 2, 3)							
1,1,1-Trichloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloropropane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Butanone (MEK)		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acetone		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane		<0.50	0.58	<0.50	<0.50	<0.50	<0.50
Bromoform		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromomethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Disulfide		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Tetrachloride		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chlorobenzene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chlorodibromomethane		<0.50	0.38 J	<0.50	<0.50	<0.50	<0.50
Chloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chloroform		<0.50	1.2	<0.50	<0.50	<0.50	<0.50
Chloromethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,2-Dichloroethene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,3-Dichloropropene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dichloromethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
m&p-Xylenes		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl N-Butyl Ketone (2-Hexanone)		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Styrene (Monomer)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,3-Dichloropropene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethene		0.69	0.40 J	<0.50	<0.50	<0.50	<0.50
Vinyl chloride		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
TVOCs ⁽⁴⁾		0.69	2.6	ND	ND	ND	ND
1,4 Dioxane ^(1, 2, 3)		0.0840 J	0.100 J	0.296	0.292	<0.200	<0.200

See notes and abbreviations on last page.

Table 5
Concentrations of Volatile Organic Compounds and 1,4 Dioxane in Monitoring and Outpost (BPOW) Wells
Third Quarter 2024
Operable Unit 2
Northrop Grumman
Bethpage, New York



Constituents (units in ug/L)	Well ID:	BPOW 2-1	BPOW 2-2	BPOW 2-3	BPOW 3-1	BPOW 3-2	BPOW 3-3
	Sample ID: Date:	BPOW 2-1 8/5/2024	BPOW 2-2 8/7/2024	BPOW 2-3 8/5/2024	BPOW 3-1 8/30/2024	BPOW 3-2 8/30/2024	BPOW 3-3 8/8/2024
Volatile Organic Constituents ^(1, 2, 3)							
1,1,1-Trichloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)		<1.0	<1.0	<1.0	<1.0	<1.0	0.89 J
1,1,2-Trichloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloropropane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Butanone (MEK)		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acetone		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromoform		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromomethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Disulfide		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Tetrachloride		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chlorobenzene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chlorodibromomethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chloroethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chloroform		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chloromethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,2-Dichloroethene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,3-Dichloropropene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dichloromethane		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
m&p-Xylenes		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl N-Butyl Ketone (2-Hexanone)		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Styrene (Monomer)		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,3-Dichloropropene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethene		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl chloride		<0.50	<0.50	<0.50	<0.50 J	<0.50 J	<0.50
TVOCs ⁽⁴⁾		ND	ND	ND	ND	ND	0.89
1,4 Dioxane ^(1, 2, 3)		2.71	0.599	3.95	0.919	2.73	9.89

See notes and abbreviations on last page.

Table 5
Concentrations of Volatile Organic Compounds and 1,4 Dioxane in Monitoring and Outpost (BPOW) Wells
Third Quarter 2024
Operable Unit 2
Northrop Grumman
Bethpage, New York



Constituents (units in ug/L)	Well ID:	BPOW 3-4	BPOW 4-1R	BPOW 4-2R	GM-21D2
	Sample ID: Date:	BPOW 3-4 8/8/2024	BPOW 4-1R 9/3/2024	BPOW 4-2R 8/8/2024	GM-21D2 7/29/2024
Volatile Organic Constituents ^(1, 2, 3)					
1,1,1-Trichloroethane		0.74	<0.50	<0.50	<1.0
1,1,2,2-Tetrachloroethane		<0.50	<0.50	<0.50	<1.0
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)		11.3	33.7	48.8	<5.0
1,1,2-Trichloroethane		1.4	<0.50	<0.50	<1.0
1,1-Dichloroethane		1.4	<0.50	<0.50	<1.0
1,1-Dichloroethene		11.5	0.90	1.0	<1.0
1,2-Dichloroethane		0.19 J	<0.50	<0.50	<1.0
1,2-Dichloropropane		<0.50	<0.50	<0.50	<1.0
2-Butanone (MEK)		<5.0	<5.0	<5.0	<10
4-Methyl-2-Pentanone		<2.0	<2.0	<2.0	<5.0
Acetone		<5.0	<5.0	<5.0	<10
Benzene		<0.50	<0.50	<0.50	<0.50
Bromodichloromethane		<0.50	<0.50	<0.50	<1.0
Bromoform		<0.50	<0.50	<0.50	<1.0
Bromomethane		<0.50	<0.50	<0.50	<2.0
Carbon Disulfide		<0.50	<0.50	<0.50	<2.0
Carbon Tetrachloride		1.0	0.31 J	0.32 J	<1.0
Chlorobenzene		<0.50	<0.50	<0.50	<1.0
Chlorodibromomethane		<0.50	<0.50	<0.50	<1.0
Chloroethane		<0.50	<0.50	<0.50	<1.0
Chloroform		1.6 B	0.63	<0.50	<1.0
Chloromethane		<0.50	<0.50	<0.50	<1.0 J
cis-1,2-Dichloroethene		2.6	0.32 J	0.34 J	<1.0
cis-1,3-Dichloropropene		<0.50	<0.50	<0.50	<1.0
Dichloromethane		<0.50	<0.50	<0.50	<2.0
Ethylbenzene		<0.50	<0.50	<0.50	<1.0
m&p-Xylenes		<0.50	<0.50	<0.50	<1.0
Methyl N-Butyl Ketone (2-Hexanone)		<2.0	<2.0	<2.0	<5.0
o-Xylene		<0.50	<0.50	<0.50	<1.0
Styrene (Monomer)		<0.50	<0.50	<0.50	<1.0
Tetrachloroethene		<0.50	<0.50	1.7	<1.0
Toluene		<0.50	<0.50	<0.50	<1.0
trans-1,2-Dichloroethene		<0.50	<0.50	<0.50	<1.0
trans-1,3-Dichloropropene		<0.50	<0.50	<0.50	<1.0
Trichloroethene		207	1.3	4.8	3.8
Vinyl chloride		<0.50	<0.50	<0.50	<1.0
TVOCs ⁽⁴⁾		239	37.2	60.0	3.8
1,4 Dioxane ^(1, 2, 3)		15.3	5.49	3.53	4.8 J

See notes and abbreviations on last page.

Table 5
Concentrations of Volatile Organic Compounds and 1,4 Dioxane in Monitoring and Outpost (BPOW) Wells
Third Quarter 2024
Operable Unit 2
Northrop Grumman
Bethpage, New York



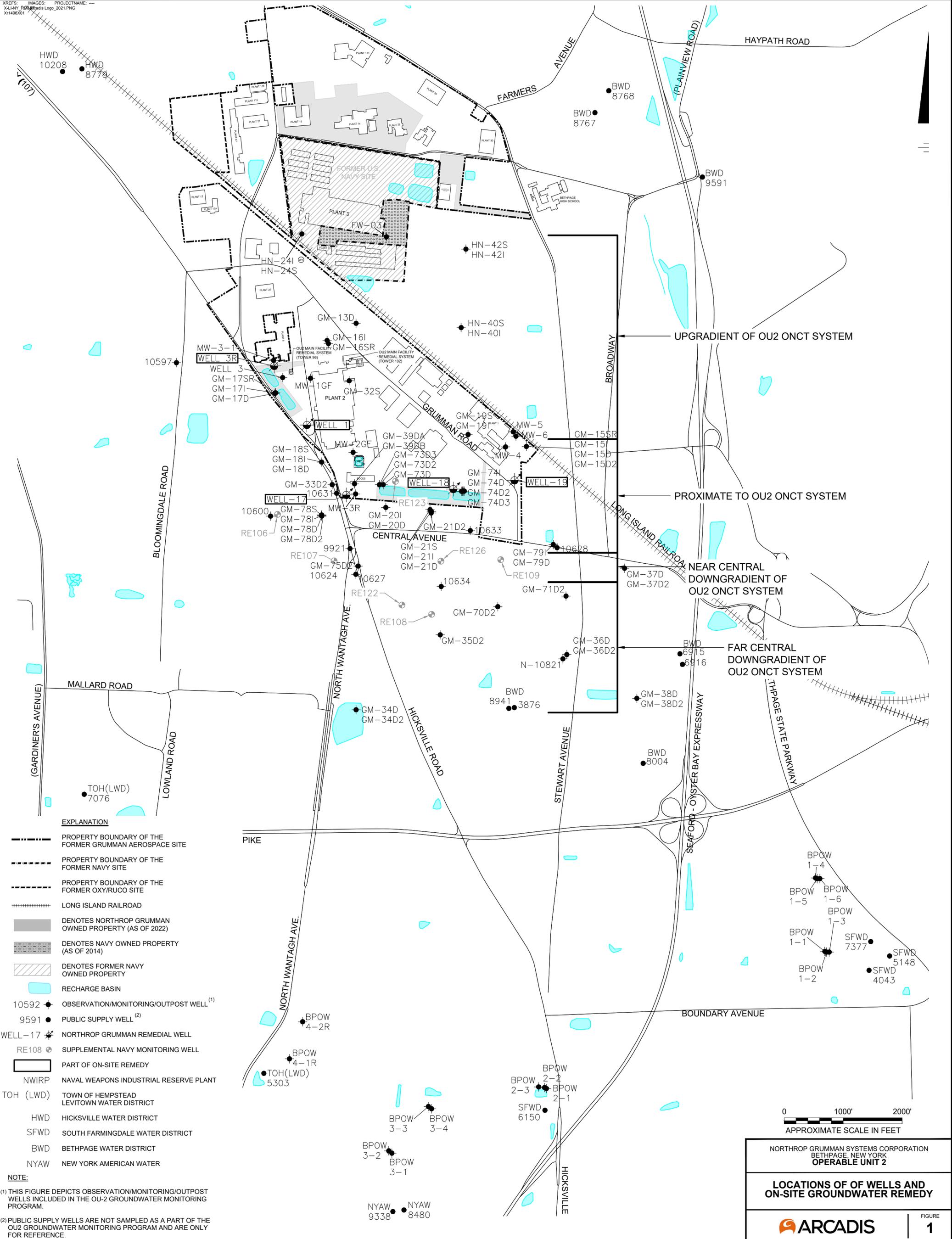
Notes and Abbreviations:

- (1) Samples were analyzed for VOCs using USEPA Method 524.2. Samples were analyzed for 1,4-dioxane using USEPA Method 522.
- (2) Samples were analyzed for VOCs using USEPA Method 8260C. Samples were analyzed for 1,4-dioxane using USEPA Method 8270D-SIM.
- (3) Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).
- (4) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least precision (decimal places), including whole numbers with no decimal place.

Bold	Value indicates constituent detected
TVOCs	Total Volatile Organic Compounds
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds
µg/L	micrograms per liter
<0.5	Compound not detected above its laboratory quantification limit
J	Value is estimated concentration
ND	Not Detected
B	Results were reported with blank contamination

Figures

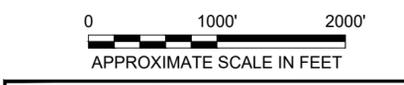
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EXPLANATION

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER NAVY SITE
- PROPERTY BOUNDARY OF THE FORMER OXY/RUCO SITE
- ++++ LONG ISLAND RAILROAD
- DENOTES NORTHROP GRUMMAN OWNED PROPERTY (AS OF 2022)
- DENOTES NAVY OWNED PROPERTY (AS OF 2014)
- DENOTES FORMER NAVY OWNED PROPERTY
- RECHARGE BASIN
- 10592 ● OBSERVATION/MONITORING/OUTPOST WELL (1)
- 9591 ● PUBLIC SUPPLY WELL (2)
- WELL-17 ● NORTHROP GRUMMAN REMEDIAL WELL
- RE108 ● SUPPLEMENTAL NAVY MONITORING WELL
- PART OF ON-SITE REMEDY
- NWIRP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
- TOH (LWD) TOWN OF HEMPSTEAD LEVITOWN WATER DISTRICT
- HWD HICKSVILLE WATER DISTRICT
- SFWD SOUTH FARMINGDALE WATER DISTRICT
- BWD BETHPAGE WATER DISTRICT
- NYAW NEW YORK AMERICAN WATER

NOTE:
 (1) THIS FIGURE DEPICTS OBSERVATION/MONITORING/OUTPOST WELLS INCLUDED IN THE OU-2 GROUNDWATER MONITORING PROGRAM.
 (2) PUBLIC SUPPLY WELLS ARE NOT SAMPLED AS A PART OF THE OU2 GROUNDWATER MONITORING PROGRAM AND ARE ONLY FOR REFERENCE.

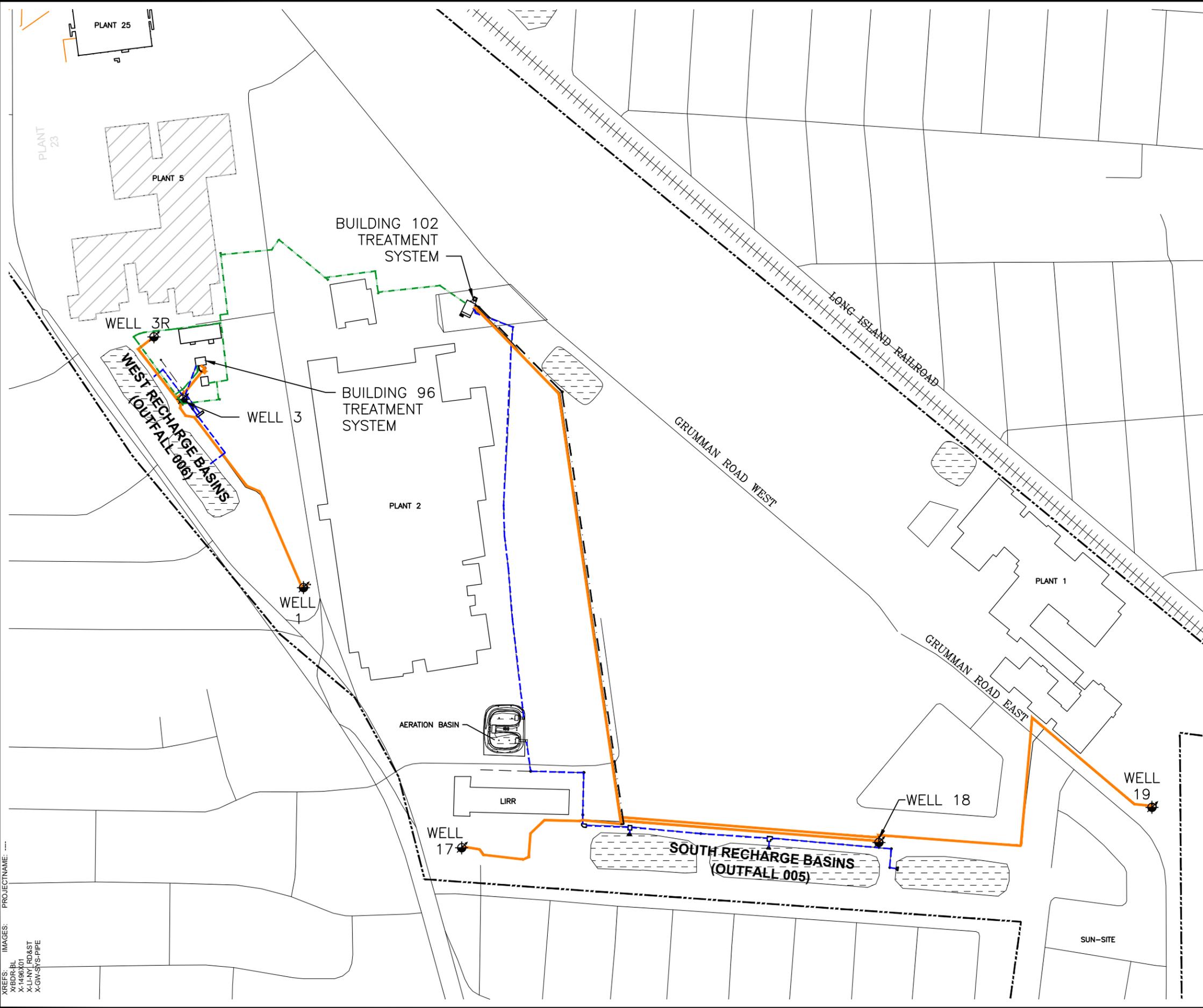


NORTHROP GRUMMAN SYSTEMS CORPORATION
 BETHPAGE, NEW YORK
OPERABLE UNIT 2

**LOCATIONS OF OF WELLS AND
 ON-SITE GROUNDWATER REMEDY**

ARCADIS | FIGURE
1

CITY:SYRACUSE,NY DIV:GROUPEPENY DBA:ARCADIS L:DALE DC:(G) TH:(G) LVR:(G)ON:4-CF-REF: C:\Users\smallbrian\OneDrive\Documents\ARCADIS\Projects\BETHPAGE_NY\Project Files\10_WIP\101_ARC_EN\202401-DWG\GEN-ONCT-GW-ETS-STEP\PLAN.DWG LAYOUT: 2. SAVED: 5/30/2024 4:50 PM. ACADVER: 24.2S (LMS TECH) PAGES: 1 OF 1. PLOTTED: 5/30/2024 4:51 PM BY: SMALL BRIAN



LEGEND:

- FORMER NORTHROP GRUMMAN PROPERTY LINE
- INFLUENT LINE
- BYPASS
- STORM DRAIN (EFFLUENT)
- NON POTABLE WATER DISTRIBUTION LINE (EFFLUENT)
- +++++ RAILROAD TRACKS
- x-x-x- FENCE
- WELL 18 REMEDIAL WELL
- BASIN
- ONCT ON-SITE CONTAMINANT

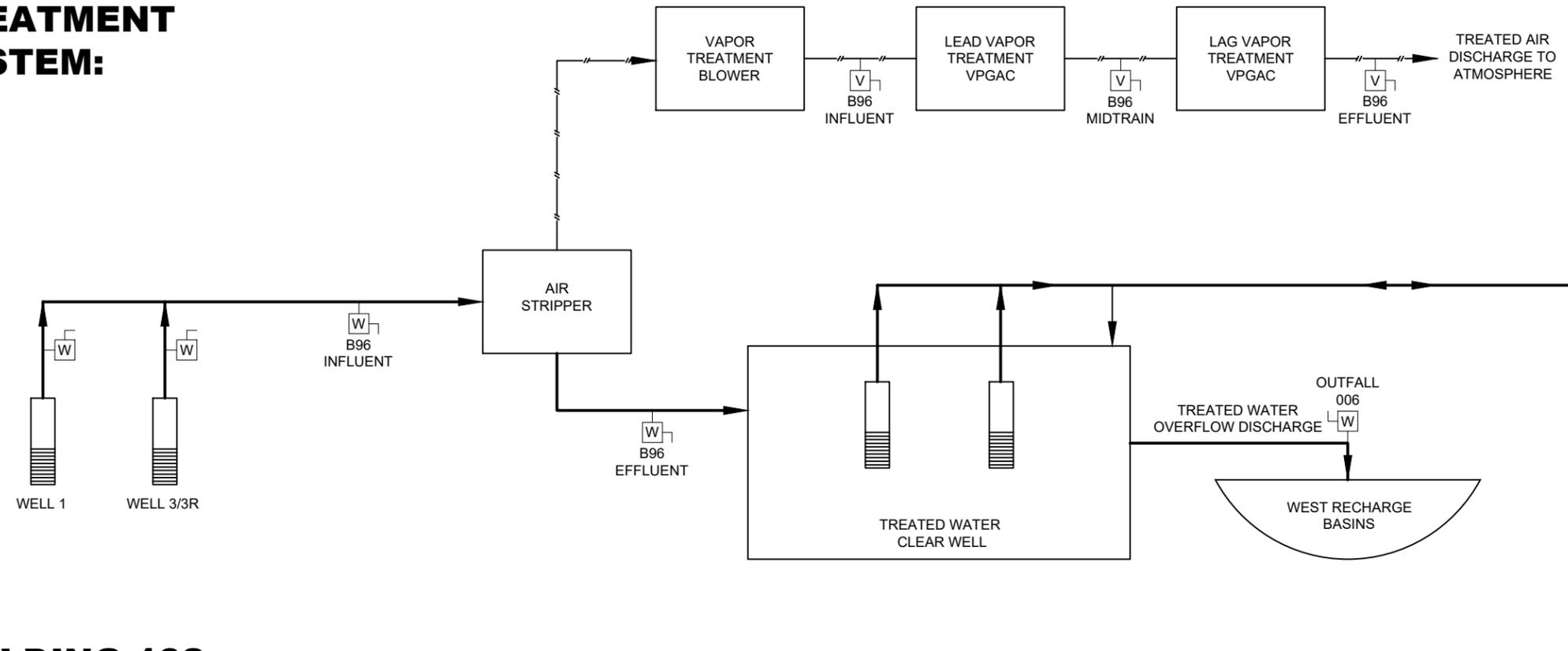
NOTES:

1. DRAWING IS NOT TO BE USED FOR DESIGN PURPOSES. LAYOUT OF PIPING IS FOR REPRESENTATION ONLY (LOCATIONS ARE APPROXIMATE).
2. THE PIPING REPRESENTED IN THIS DRAWING MAY BE CONSTRUCTED OF CAST IRON PIPE (CIP), DUCTILE IRON PIPE (DIP), ASBESTOS CEMENT PIPE (ACP) OR TRANSITE, OR A COMBINATION OF THESE PIPE TYPES.

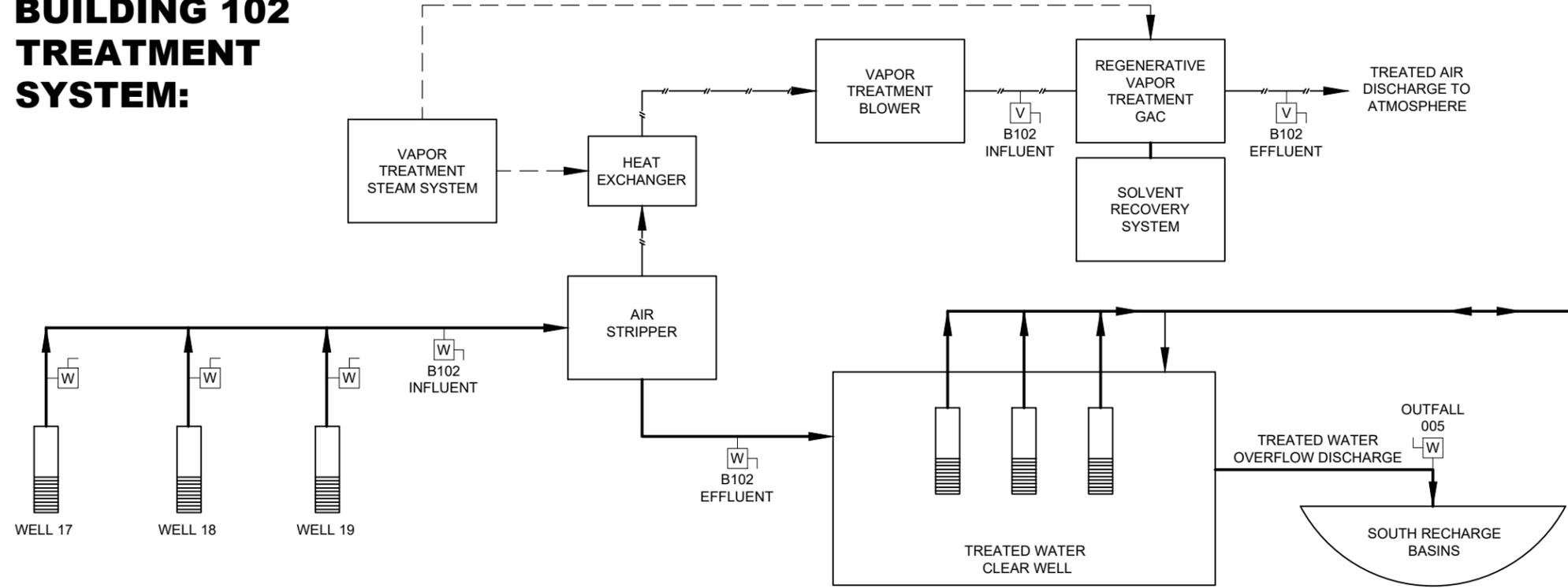
NORTHROP GRUMMAN BETHPAGE, NEW YORK OPERABLE UNIT 2	
ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SITE PLAN	
	FIGURE 2

CITY: MANCHESTER DIV/GRP: ENV/CAD DB: B.SMALL PM: TM
 C:\Users\BSSMAIL\OneDrive\Documents\ARCADIS\US\US-9898989-NOR GRUM_BETHPAGE_NY\Project Files\10_WIP\101_ARC_ENV\202401-DWG\OU2-F03-GWE SYSTEM.dwg LAYOUT: 3
 PLOTTED: 3/28/2024 12:05 PM BY: SMALL, BRIAN
 XREFS: IMAGES: PROJECTNAME: ---
 PAGES: 24.2S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTFULL.CTB

BUILDING 96 TREATMENT SYSTEM:



BUILDING 102 TREATMENT SYSTEM:



NOTE:
 SCHEMATIC REPRESENTS SYSTEM CONFIGURATIONS AT THE TIME OF SAMPLE LOCATION EVENTS, AFTER B96 RECONFIGURATION TO BYPASS THE REGENERATIVE VAPOR-PHASE GAC COMPONENTS

- LEGEND:
- PROCESS WATER
 - - - PROCESS AIR
 - - - - STEAM
 - W SAMPLE LOCATION
 - W WATER SAMPLE
 - V VAPOR SAMPLE
 - ONCT ON-SITE CONTAMINANT

NORTHROP GRUMMAN
 BETHPAGE, NEW YORK
OPERABLE UNIT 2

**ONCT GROUNDWATER
 EXTRACTION AND TREATMENT
 SYSTEM SCHEMATIC**

ARCADIS

FIGURE
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