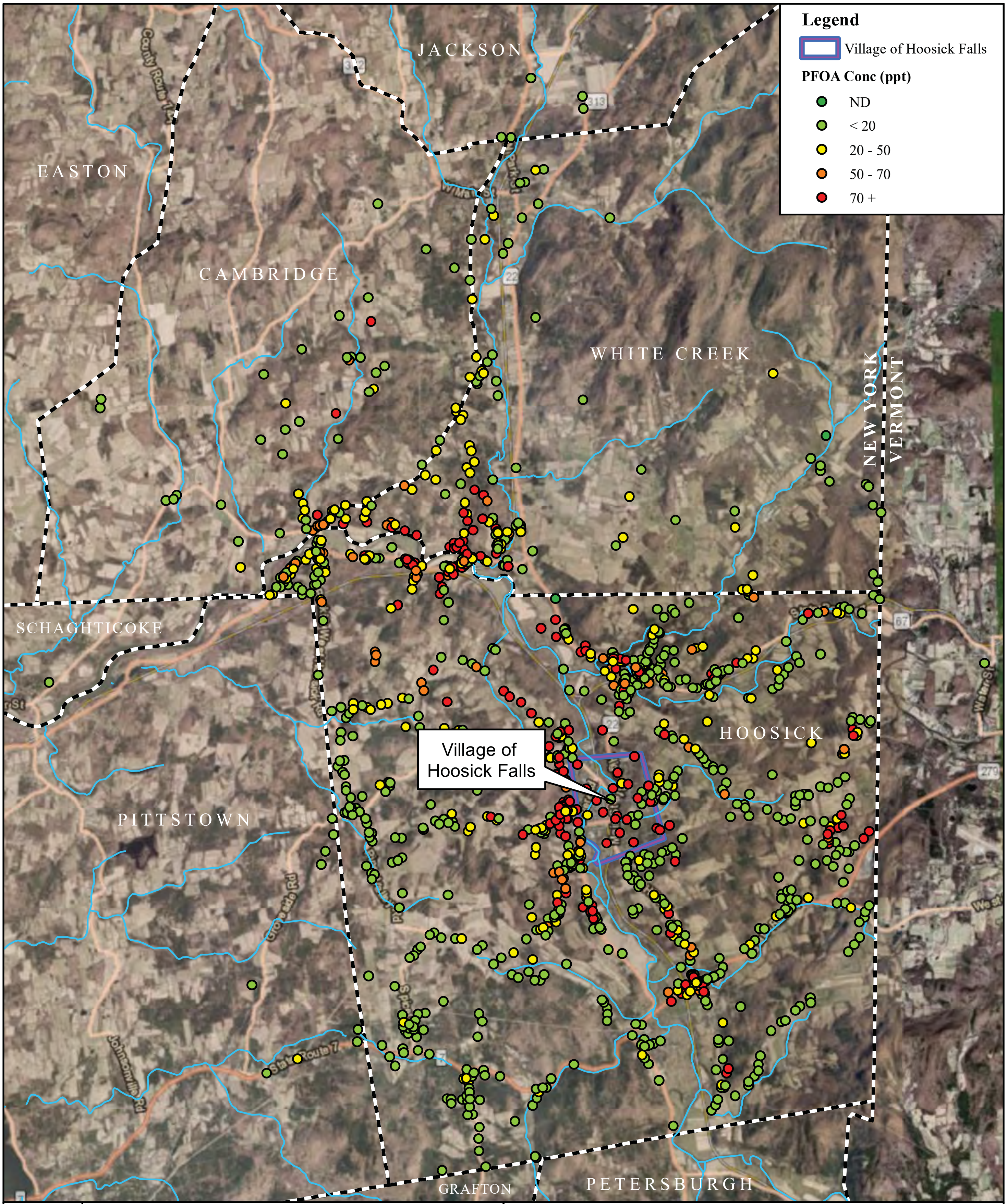
Appendix A – NYSDOH Private Well Sampling Results



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CHA
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NYSDOH Private Well Sampling
PFOA Results Map as of April 16, 2019

Hoosick Falls Alternative Water Supply Study
Village of Hoosick Falls, Rensselaer County, New York

Scale 1" = 10,000'

CHA Project No.
32091

June 2019

Map Credit: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix B – Public Water Systems in New York State Relying on GAC Treatment and Public Water System Treatment Data

Appendix B1
Public Water Systems in New York State (LI) Relying on GAC Treatment

NYS (LI) Municipal Water Supplies	Description of GAC Treatment	Population* served	GAC?	%GAC	Wells	GAC wells	Citation
----Nassau----							
Albertson Water District		13,500	N				
Bayville		8,800	N				
Bethpage Water District	The source of water for the District is groundwater that is pumped from nine (9) wells, however only eight (8) of these wells are used for production to the distribution system. Granular Activated Carbon (GAC) filters are used at Plant No. 1 (Well 7A & 8A) and Plant BGD (Well No. BGD) for primary VOC removal and, Plant No. 4 (Well 4-1 & 4-2) and Plant No. 6 (Well 6-1 & 6-2) for secondary polishing after air stripping (thus 7/8 wells, or 87.5%).	33,000	Y	87.5%	8	7	http://bethpagewater.com/Portals/0/Content/2016%20AWQR%20PMG_1.pdf
Carle Place Water District			N				
City of Glen Cove	The source water for the City is groundwater pumped from four (4) wells located throughout the community; source water from two (2) Duck Pond Road wells are treated by granular activated carbon filters to remove various organic chemicals and pesticides (thus 50% of wells treated with GAC filters).	28,000	Y	50.0%	4	2	http://www.glencove-li.us/wp-content/uploads/2015/02/doc04640420170531090738.pdf
City of Long Beach			N				
Farmingdale Village			N				
Franklin Square Water District	Five (5) wells located throughout the community; at Well Nos. 4 and 5, a granular activated carbon (GAC) filter system is installed for the removal of organic compounds that have been found in the water (i.e. 2/5 use GAC, or 40%).	20,000	Y	40.0%	5	2	http://www.fswd.org/wp-content/uploads/2017/04/2016-Water-Quality-Report.pdf
Freeport Village			N				
Garden City Park Water District	The source of water for the District is groundwater pumped from the six (6) wells located throughout the community; a granular activated carbon filter is used at Well No. 6 and 11 for the removal of volatile organic compounds (i.e. 2/6, or 30% use GAC systems). The population served by the Garden City Park Water District during 2016 was 18,000.	18,000	Y	33.3%	6	2	http://www.gcpwater.org/WaterNews/Water2017/DrinkingWaterQuality_2017.pdf
Garden City Village	Air strippers and granular activated carbon treatment are used to remove Volatile Organic Compounds from the water prior to distribution. All of the water supplied by the Water Authority comes from groundwater drawn from 24 drilled wells		Y				http://www.wawnc.org/cm/downloads/WAWNC_AWQR_2015.pdf
Hicksville Water District		47,810	N				
Lido-Point Lookout Water District		6,000	N				
Locust Valley Water District		7,500	N				
Manhasset-Lakeville Water District	Volatile organic chemicals found in our source water are removed using air stripping (aeration) or carbon filtration (adsorption). Currently, 10 of our 14 active wells have shown trace levels of volatile organic chemicals. The District currently operates seven treatment plants to remove these chemicals from our public supply. The District continues to strive for 100% non-detectable levels of all organic constituents in our finished water. About 45,000 people served in 2016.	45,000	Y				http://www.mlwd.net/pdf/2016WaterQualityReport.pdf
Massapequa Water District		43,000	N				
Merrick Operations District-Nassua County	A total of 16 wells in the system. Granular Activated Carbon (GAC) to remove organics at one well location (US Navy / Northrop-Grumman plume site).	177,000	Y	6.3%	16	1	http://www.amwater.com/ccr/merrick.pdf
Mineola Village		20,600	N				
Old Westbury Village		4,700	N				
Oyster Bay Water District	The source of water for the District is groundwater pumped from five (5) wells. A granular activated carbon treatment system is used at Plant No. 2 – Shutter Lane (assuming each plant has one (1) well, 1/5 or 20% use GAC treatment). The population served by the Oyster Bay Water District during 2016 was 8,500	8,500	Y	20.0%	5	1	http://www.oysterbaywaterdistrict.com/pdfs/ccr2016.pdf
Plainview Water District	The source of water for the District is groundwater pumped from 12 wells. Carbon adsorption treatment systems are available for Well Nos. 1-2 and 3-2 for the removal of volatile organic compounds (2/12, or . The population served by the Plainview Water District during 2016 was 34,000.	35,000	Y	16.7%	12	2	http://www.plainviewwater.org/documents/2016PLWDAWQR.pdf
Plandome Village		1,350	N				https://static1.squarespace.com/static/55009372e4b071f72529ac6e/t/59302d3e1e5b6ce47db010e4/1496329534902/supply+statement+2016.pdf
Port Washington Water District	The water source for the Port Washington Water District is groundwater pumped from 12 wells. Granulated activated carbon (GAC) adsorption facilities are used for organic chemical removal at five wells (5/12, or 41.7%). Our water system serves approximately 30,000 residents.	30,000	Y	41.7%	12	5	http://pwwd.org/wordpress/wp-content/uploads/2017/05/PWWD-2016-Water-Quality-Report.pdf
Rockville Centre Village		24,700	N				
Roslyn Water District	Eight common suction wells ranging in depths from 260 feet to 555 feet are located on a well field in the Inc. Village of Roslyn. Two (2) wells treated with granulated activated carbon for treatment of organic contaminants (2/8, or 25%). Served 17,900 in 2015.	17,000	Y	25.0%	8	2	http://www.roslynwater.org/qr.html http://www.roslynwater.org/rwd-pdf/2016/AWQR%202015%20Final.pdf
Sea Cliff Water		5,054	N				http://www.amwater.com/ccr/seacliff.pdf
South Farmingdale Water District	All water provided through our District is groundwater pumped from 11 wells located throughout the community. The District also operates one (1) granular activated carbon treatment system to remove 1,1-Dichloroethane (1,1-DCA) from Well No. 5-1 at Plant No. 5 (thus 1/11 wells, or 9.1%). 44,700 served in 2016.	44,700	Y	9.1%	11	1	http://sfwater.com/wordpress/wp-content/uploads/2017/05/SFWD-Spring-2017-Water-Report.pdf
Town of Hempstead-Nassau County (Bowling Green Estates, East Meadow, Levitown, Roosevelt Field and Uniondale)	A total of 29 wells in the system. Water is also treated for organic constituents at nine locations. Organic compounds are removed through granular activated carbon filtration and/or packed tower aeration (9/29=31%)	117,361	Y	31.0%	29	9	https://toh.li//files/pdfs/cs_water-2016-all.pdf
Water Authority of Great Neck North		32,400	N				http://www.waterauthorityofgreatnecknorth.com/waterquality.pdf
Water Authority of Western Nassau County	A total of 24 wells in the system. Air strippers and granular activated carbon treatment. Treatment facilities are used to remove Volatile Organic Compounds from the water prior to distribution. These compounds have entered the water supply as a result of improper disposal practices by industries and have been detected in groundwater.Air strippers and granular activated carbon treatment are the treatment approcahes used.	120,000	Y				http://www.wawnc.org/cm/downloads/WAWNC_AWQR_2016.pdf
West Hempstead Water District		32,031	N				
Westbury Water District		20,500	N				
Williston Park Village		7516	N				
	Total with system descriptions (i.e. Y/N descriptor)	969,022	33		116	34	
	Number of systems with GAC		14			29.3%	
	Population served by a PWS that includes GAC	693,561					

Appendix B1
Public Water Systems in New York State (LI) Relying on GAC Treatment

-----Suffolk-----							
Brookhaven National Labs		3,500	N				https://www.bnl.gov/water/process.php
Dix Hills Water District	Water sourced from 17 groundwater wells. GAC filters installed at Plants 1, 5, and 8 to remove VOCs (assuming one (1) well per plant, 3/17 or 17.6%). Served population of 41,000 in 2015.	41,000	Y	17.6%	17	3	http://www.huntingtonny.gov/filestorage/13749/13847/16804/16820/Dix_Hills_Water_2016_Water_Report.pdf
Greenlawn Water District	The source of water for the District is groundwater pumped from 13 active wells. Granular activated carbon filters are also installed at Plant Nos. 8, 11 and 13 to treat potable water for the removal of volatile organic compounds (3/13. or 23.1% using GAC systems). 42,00 served in 2015.	42,000	Y	23.1%	13	3	http://www.greenlawnwater.org/wp-content/uploads/2016/05/2015_GLWD_Drinking_Water_Quality_Report_5-23-16_a.pdf
Greenport Village**		2,050	N				http://villageofgreenport.org/files/15-04-24-FINAL-2014-AWQR.pdf
Hampton Bays Water District		12,500	N				http://www.southamptontownny.gov/DocumentCenter/Home/View/4394
Ocean Beach Village		4,500	N				http://www.villageofoceanbeach.org/pdfs/2016/drinking-water-quality-report-2.pdf
Riverhead Water District		35,000	N				
Smithtown WD**	Served 20,530 in 2016	19,635	N				http://www.smithtownny.gov/DocumentCenter/View/2264
South Huntington Water District	The source of water for the District is groundwater pumped from 23 wells. Granular activated carbon filters are installed at Well Nos. 3-2/3-3, 4, 6, 7-1/7-2, 8, 15-1/15-2 and 20 for the removal of volatile organic chemicals (asuming each #/# pair is one well, 7/23 or 30.4% use GAC systems). The population served by the South Huntington Water District during 2016 was 81,760.	81,760	Y	30.4%	23	7	http://www.shwd.org/PDF%20Documents/SHWD_WQR_JAN2016_FinalREV.pdf
St James WD**	Served 11,810 in 2016	11,810	N				http://www.smithtownny.gov/DocumentCenter/View/2265
Suffolk County Water Autority	Approximately 26% of our wells (586 active wells in system) receive treatment using granular activated carbon filtration to remove pesticides/ herbicides and volatile organic compounds. Packed Tower Aeration (PTA) units also called air strippers, ion exchange, reverse osmosis, and perchlorate resin filters are also used as needed. In some cases wells are blended together at the pump station to lower the amount of contaminants, such as nitrate and perchlorate, in the water we serve. Since January 2013, the SCWA Laboratory has been testing for fluorinated organic chemicals. Where positive detects of fluorinated organic chemicals were found, the Authority has been very pro-active with treatment. In some cases wells were blended together to lower concentration levels, and where levels were not acceptable for SCWA standards, the wells were taken out of service. We are currently installing granular activated carbon (GAC) filtration units at certain sites to treat for these compounds.	1,100,000	Y	26.0%			http://s1091480.instanturl.net/dwqr2017/AWQR2017_FINAL_052517.pdf
	Total with system descriptions (i.e. Y/N descriptor)	1,353,755	11		53	13	
	Number of systems with GAC		4			24.5%	
*Pop values obtained from either WQRs or SDWIS database	Population served by a PWS that includes GAC	1,264,760	36.4%				

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
West Morgan - East Lawrence Water Authority	AL	26,130	PFOA, PFOS	Yes (temp installed in December 2016)	Initially blended/diluted and bought from another source: RO planned to be installed by 2020	B2	http://www.decaturdaily.com/news/lawrence_county/west-morgan-east-lawrence-water-no-longer-blended-with-du/article_c5fe0959-9883-5938-9865-27d397f9b459.html Court Final Approval Order (2017) https://www.courthousenews.com/wp-content/uploads/2017/05/Water-settlement-order.pdf http://www.decaturdaily.com/news/local/officials-say-west-morgan-east-lawrence-water-safe-customers-still/article_fce72eb0-ce83-58de-bac2-f9fc206ea163.html http://www.rocketcitynow.com/news/daikin-settles-with-west-morgan-east-lawrence-water-authority/543019530 http://www.al.com/news/index.ssf/2016/06/north_alabama_drinking_water_c.html http://wmel.org/wp-content/uploads/2018/05/2017-quality-report.pdf https://whnt.com/2019/05/09/after-3-years-of-uncertainty-lawrence-county-residents-have-28-5-million-promise-of-clean-drinking-water/ http://adem.alabama.gov/newsEvents/reports/PFASDrinkingWaterSystemReport.pdf
West Lawrence Water Co-op	AL	14,517	PFOA,PFOS	GAC installed on source (West Morgan)	Eliminated impacted source water	A1	http://www.waff.com/story/32133025/west-lawrence-water-customers-to-switch-water-supply
Gadsden Waterworks & Sewer Board (Et	AL	46,551	PFOA, PFOS	GAC installed in January 2019		A1	http://gadsdenwater.org/files/HealthDepartmentPressRelease_09162016.pdf http://gadsdenwater.org/files/GWWSB_FiledComplaint_09222016.pdf https://www.al.com/news/anniston-gadsden/2019/03/gadsden-water-works-builds-5m-filter-to-meet-epa-health-advisory.html http://adem.alabama.gov/newsEvents/reports/PFASDrinkingWaterSystemReport.pdf
Centre Water Works and Sewer Board	AL	6,108	PFOA,PFOS	To begin construction of GAC	Blend/dilute; buy from another source	A2	http://wiat.com/2016/05/20/gadsden-water-works-suing-textile-manufacturers-after-water-put-under-health-advisory-months-ago/ https://www.al.com/news/anniston-gadsden/index.ssf/2017/05/state_warns_centre_residents_a.html https://www.centrewaterworks.com/pfoa---pfos-test-results.html
Northeast Alabama Water System (DeKal	AL	11,748	PFOA,PFOS		Eliminated impacted source water	F	http://southerntorch.com/dekalb-water-determined-safe-drinking/ http://adem.alabama.gov/newsEvents/reports/PFASDrinkingWaterSystemReport.pdf

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
Rainbow City Utilities Board (Etowah)	AL	10,800	PFOA, PFOS			F	http://wiat.com/2016/05/20/gadsden-water-works-suing-textile-manufacturers-after-water-put-under-health-advisory-months-ago/ http://www.rbcwater.net/docs/RBCWater2016.pdf http://adem.alabama.gov/newsEvents/reports/PFASDrinkingWaterSystemReport.pdf
Southside Waterworks (Etowah)	AL	37,500	PFOA, PFOS		Eliminated impacted source water	F	http://wiat.com/2016/05/20/gadsden-water-works-suing-textile-manufacturers-after-water-put-under-health-advisory-months-ago/ http://www.cityofsouthside.com/Default.asp?ID=151&pg=Council+Minutes&action=view&aid=626&hilite=PFOA
V.A.W. Water System Inc. (Vinemont And	AL	14,958	PFOA,PFOS		Eliminated impacted source water	F	http://www.cullmantimes.com/news/vaw-water-system-under-health-advisory-temporarily-switches-to-cullman/article_adc1caae-211d-11e6-b79a-7fcbe40aa53e.html http://vawwater.com/
Oatman Water Company (Mohave)	AZ	536	PFOA, PFOS		Evaluating options	C	https://www.atsdr.cdc.gov/HAC/pha/OatmanWaterCompany/Oatman_Water_Company_HC_(final)_11-14-2016_508.pdf https://theintercept.com/2016/05/19/with-new-pfoa-drinking-water-advisory-dozens-of-communities-suddenly-have-dangerous-water/
City of Tempe (Maricopa)	AZ	165,000	PFOA,PFOS		Eliminated impacted source water	F	http://www.wranglernews.com/2016/06/03/tempe-takes-corrective-action-meet-epa-water-regs/
Liberty Water LPSCO	AZ	45,298	PFOA, PFOS	GAC Treatment	Eliminated impacted source water	A1	http://static.azdeq.gov/wqd/reports/pfoapfosepareport_final.pdf https://arizona.libertyutilities.com/uploads/LP_CCR_16.pdf
City of Tucson	AZ	675,686	PFOA, PFOS		Eliminated impacted source water; blend/dilute	F	http://static.azdeq.gov/wqd/reports/pfoapfosepareport_final.pdf https://www.tucsonaz.gov/water/pfas
Salt River Public Works (Pima-Maricopa I	AZ-I	35,470	PFOS			X	https://bloximages.newyork1.vip.townnews.com/postguam.com/content/tncms/assets/v3/editorial/3/a1/3a13e9f8-d0cf-11e7-b141-572426bf3c32/5a179f0f2c0d7.pdf.pdf
CA Water Service - Visalia	CA	132,158	PFOS		Eliminated impacted source water; blend/dilute	F	https://www.calwater.com/waterquality/pfospfoa/ https://www.calwater.com/docs/ccr/2016/vis-vis-2016.pdf
City of Lathrop (San Joaquin)	CA	12,427	PFOA, PFOS			X	0
CA American Water Co. – Suburban (Sac	CA	33,914	PFOS, PFOA		Eliminated impacted source water	F	https://amwater.com/caaw/news-community/news/id/489
Eastern Municipal Water District (Riversid	CA	503,700	PFOA, PFOS			C	https://www.scpr.org/news/2016/08/12/63545/water-agencies-shut-down-wells-after-discovering-h/

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
City of Corona (Riverside)	CA	155,896	PFOA, PFOS		RO Evaluating other options; eliminate impacted source water	B1	http://discovercoronadwp.com/about/pfoa-info.shtml
City of Anaheim	CA	346,823	PFOA,PFOS		Eliminated impacted source water	F	http://www.scpr.org/news/2016/08/12/63545/water-agencies-shut-down-wells-after-discovering-h/?slide=2
City of Orange	CA	138,640	PFOA,PFOS		Eliminated impacted source water	F	https://www.cityoforange.org/1243/Water-Quality
Yorba Linda Water District	CA	77,513	PFOA, PFOS		Evaluating options; blend/dilute	C	https://ylwd.com/news-publications/26-water-quality
CA Water Service – Chico (Butte)	CA	97,274	PFOS, PFHXSA		Evaluating options blend/dilute; eliminate impacted water source	C	https://www.calwater.com/waterquality/pfospfoa/ https://www.calwater.com/docs/ccr/2016/ch-ch-2016.pdf
Santa Clara Valley Water District (2 pump	CA	93,300 + 15,300	PFOS			G	http://www.sanjoseca.gov/DocumentCenter/View/19738http://www.valleywater.org/services/TheWaterTre
City of Pica Rivera Water Deptment	CA	40,605	PFAS			X	https://www.waterboards.ca.gov/pfas/docs/7_investigation_plan.pdf
City of Fountain	CO	20,000	PFOA,PFOS	Yes	Blend/dilute	A1	https://www.fountaincolorado.org/department/division.php?structureid=328 http://www.denverpost.com/2017/06/29/air-force-filter-fountain-colorado-contaminated-water/ http://www.denverpost.com/2017/06/29/air-force-filter-fountain-colorado-contaminated-water/ Information on City of Fountain website
Security WSD	CO	19,000	PFOA,PFOS		Eliminated impacted source water	F	http://securitywsd.com/wp-content/uploads/2017/05/Security-fact-sheet-updated-2_11_16.pdf
Widefield WSD	CO	18,343	PFOA,PFOS			H	http://securitywsd.com/wp-content/uploads/2017/05/Security-fact-sheet-updated-2_11_16.pdf https://www.colorado.gov/pacific/sites/default/files/KLR_PFCs%20in%20the%20Widefield%20Aquifer_WQCC_031317.pdf http://www.denverpost.com/2017/06/29/air-force-filter-fountain-colorado-contaminated-water/ https://www.colorado.gov/pacific/cdphe/PFCs/water/levels https://jdshydro.com/2017/05/widefield-water-and-sanitation-district/

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
New Castle Artesian Water Company (Ne	DE	211,494	PFOA,PFOS	Yes	Eliminated impacted source water	A1	https://pfasproject.com/new-castle-delaware/ https://www.delawarepublic.org/post/water-contamination-worries-grow-feds-probe-new-castle-nat-l-guard-base-seek-weaker-cleanups https://www.delawareonline.com/story/news/local/2018/02/13/sussex-county-town-marks-fourth-site-known-pfcs-contamination-delaware/335173002/
New Castle Water Dept	DE	6,000	PFCs	Yes		A1	Municipal meeting minutes (2015, p2): http://newcastlemsc.delaware.gov/files/2015/08/03232015-Signed.pdf Municipal commission meeting minutes (2016, p3): http://newcastlemsc.delaware.gov/files/2017/02/11-22-2016-MSC-Metting-Minutes.pdf
Wilmington Water Dept	DE	107,976	PFOS		Eliminated impacted source water; evaluating options	C	Notice – impacted wells shut down http://www.artesianwater.com/wp-content/uploads/2014/06/06-12-2014-PFOS-DRINKING-WATER-NOTICE-6-12-14-DPH-clean-final1.pdf https://www.northjersey.com/story/news/local/2014/07/21/chemical-detection-shuts-public-supply/12975427/
City of Zephyrhills (Pasco)	FL	21,823	PFOS		Eliminated impacted source water; evaluating options	C	2016 Annual Drinking Water Quality Report http://pascocountyfl.net/ArchiveCenter/ViewFile/Item/1923 http://www.ci.zephyrhills.fl.us/Portals/0/Zephyrhills%20Consumer%20Letter%20-%20FDEP%20Comments%207.22.16.pdf http://pascocountyfl.net/ArchiveCenter/ViewFile/Item/1923
Emerald Coast Utilities Authority (Escamb	FL	249,872	PFOA,PFOS VOCs ("45 unregulated chemicals in water")	Yes		A1	http://news.caloosahatchee.org/docs/FL-CWN_160129.htm http://www.ecua.fl.gov/water-quality/treatment http://www.ecua.fl.gov/news/211 Court proceedings (2010): https://www.courtlistener.com/opinion/2475274/emerald-coast-utilities-authority-v-3m-co/ 2016 water quality report (p6) http://www.ecua.fl.gov/system/files/NEWS/CCR2016.pdf
City of Stuart Water PlantStuart Public W	FL	19,000	PFOA, PFOS	Proposed GAC	Replaced impacted wells	C	http://www.tcpalm.com/story/news/2017/06/09/epa-found-pfos-and-pfoa-stuart-drinking-water/380188001/
City of Rome	GA	45,586	PFOS, PFOA	Considering GAC	Blend/dilute	F	Water Quality Reporty 2017 https://www.romefloyd.com/water-quality

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
Westfield Water Department (Hampden)	MA	42,000	PFOS,PFOA	Yes	Eliminated impacted source water	A1	http://www.cityofwestfield.org/DocumentCenter/View/4754 http://wwlp.com/2017/05/31/westfield-to-build-water-filtration-unit-due-to-chemical-issue/ http://www.masslive.com/news/index.ssf/2017/01/aquifer_contamination_in_westf.html
Hyannis Water System (Barnstable)	MA	35,000	PFOA,PFOS 1,4-dioxane	Yes		A1	http://www.townofbarnstable.us/PublicWorks/Hyannis-Water-Advisory.pdf http://www.capecodtimes.com/news/20170301/65m-sought-to-treat-hyannis-water-contaminants
Centerville Osterville Marstons Mills WD	MA	50,000	PFOS, PFOA	Yes		A1	Town water board meeting minutes (2017): http://www.town.barnstable.ma.us/BoardsCommittees/HyannisWaterBoard/Minutes/2017/AR-M257_20170309_134718.pdf
Sanford Water District (York)	ME	14,025	PFOS, PFHxS			X	https://pfasproject.com/sanfordyork-county-maine/
Kennebunkc, Kennebunkport & Wells WD	ME	34,250	PFOA, PFOS	Yes		A1	https://kkw.org/kennebunk-river-well-pfas-information/ https://kkw.org/kennebunk-river-well-pfas-information/
City of Parchment	MI	3,174	PFOS, PFOA		Buy from an alternative source	E	https://www.michiganradio.org/post/pfas-where-have-they-been-found-public-water-supplies https://www.michigan.gov/pfasresponse/0,9038,7-365-86511_82704_87495---,00.html
Robinson Elementary School	MI	362	PFOS, PFOA, PFBS, PFHxS	GAC Proposed		A2	https://www.michigan.gov/pfasresponse/0,9038,7-365-86510_88061_88064-483785--,00.html
Cottage Grove	MN	36,492	PFOS, PFOA		Evaluating options; blend/dilute; eliminate impacted water source	C	http://www.twincities.com/2017/05/23/safety-of-washington-county-drinking-water-in-doubt-as-state-targets-3m-pollutants/ http://www.twincities.com/2017/06/22/3m-to-shoulder-entire-cost-of-cleaning-up-cottage-groves-drinking-water/ https://www.cottage-grove.org/administration/communication/news/1416-minnesota-department-of-health-issues-new-health-based-advisory-values-cottage-grove-city-water-is-safe-to-drink-and-compliant-with-all-mdh-health-based-values#affected-wells-filtration-system
Oakdale (Washington)	MN	27,378	PFOS, PFOA	Yes	Eliminated impacted source water	A1	http://www.twincities.com/2017/05/23/safety-of-washington-county-drinking-water-in-doubt-as-state-targets-3m-pollutants/ NJ State document (2015), case study on p5: http://www.nj.gov/dep/watersupply/pdf/pfna-pfc-treatment.pdf Oakdale PFC factsheet on p6-7 http://www.ci.oakdale.mn.us/vertical/Sites/%7B9D2ABE6F-4847-480E-9780-B9885C59543F%7D/uploads/Waterdrinkingwaterreportfor2016.pdf https://www.twincities.com/2018/06/30/3m-pollution-flares-up-again-st-paul-park-oakdale-woodbury-lake-elmo-cottage-grove-water-systems/

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
Bemidji (Beltrami)	MN	13,431	PFOS and PFOA		Study alternatives; blend/dilute; eliminate impacted water source	F	http://www.health.state.mn.us/news/pressrel/2016/pfc082316.html https://www.mprnews.org/story/2019/02/14/pfas-leaves-costly-water-problem-in-bemidji-and-other-cities
City of St. Paul Park	MN	5,519	PFBA, PFOA	Planning temporary GAC system in 2020		A2	https://www.twincities.com/2018/06/30/3m-pollution-flares-up-again-st-paul-park-oakdale-woodbury-lake-elmo-cottage-grove-water-systems/
South St. Paul	MN	20,400	PFBA	No		G	http://www.southstpaul.org/203/About-Our-Water
Lake Elmo	MN	4,878	PFOS			F	https://www.mprnews.org/story/2019/05/21/3m-lake-elmo-reach-tentative-settlement-in-pfas-drinking-water-lawsuit https://www.twincities.com/2018/06/30/3m-pollution-flares-up-again-st-paul-park-oakdale-woodbury-lake-elmo-cottage-grove-water-systems/
Moore County Public Utilities - Seven Lak	NC	19,368	PFOA, PFOS, PFHxS, PFHpA			X	https://test.moorecountync.gov/images/departments/public-works/ccr/2015/CCR_Seven_Lakes_2015.pdf
City of Greensboro (Guilford)	NC	250,000	PFOS, PFOA	Yes, temp system installed; planning permanent		A1	https://www.greensboro-nc.gov/Home/Components/News/News/13408/36?seldept=27
Dover Water Department (Strafford)	NH	28,000	PFOA, PFOS		Possible replacement well	C	https://www.dover.nh.gov/Assets/government/city-operations/2document/community-services/water-quality/2016%20CCR.pdf http://www.fosters.com/article/20160317/NEWS/160319457
Merrimack Village District Water Works	NH	25,000	PFOA, PFOS	Yes		A1	https://www.des.nh.gov/organization/commissioner/documents/pfoa-weekly-20170113.pdf
Pease Tradeport	NH	3,000	PFOA, PFHxS	Yes		A1	Repository of water supply updates: http://www.cityofportsmouth.com/publicworks/phwn.html Dept of Health investigation article with linked documents: https://www.dhhs.nh.gov/dphs/investigation-pease.htm PFCs treatment plan (2016): http://www.cityofportsmouth.com/publicworks/PeaseWaterSupplyUpdate9816.pdf Most recent update (6/2017): http://www.cityofportsmouth.com/publicworks/Pease%20Water%20Supply%20and%20PFC%20Demonstration%20Project%20Update%2007.10.17.pdf
NJ American Water Co. – Raritan (Union)	NJ	609,305	PFOA, PFOS		Blend/dilute	F	http://www.amwater.com/ccr/raritan.pdf http://www.njspotlight.com/stories/16/01/21/dep-urged-to-act-quickly-on-hazardous-chemical-found-in-nj-water-supplies/

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
South Orange Water Department (Essex)	NJ	16,924	PFOA		GAC Study; blend/dilute	C	http://www.southorange.org/562/PFOA-Information
Fair Lawn Water Department (Bergen)	NJ	32,573	PFOA, PFOS		Eliminated impacted source water; evaluating options	F	http://www.fairlawn.org/filestorage/355/357/623/2013_Water_Quality_Report.pdf https://www.northjersey.com/story/news/environment/2018/08/06/fair-lawn-nj-drinking-water-treament-superfund-nj/913788002/
Mahwah Water Department (Bergen)	NJ	24,062	PFOS			X	https://patch.com/new-jersey/mahwah/mahwah-water-department-named-contaminated-site-list-report
Ridgewood Water (Bergen)	NJ	61,700	PFOA, PFOS	GAC planned for Summer 2019	Eliminated impacted source water; evaluating options	F	http://mods.ridgewoodnj.net/pdf/water/RW%20PFAS%20Webinar%20091218_FINAL.pdf
Atlantic City MUA	NJ	150,000	PFOA, PFOS		Evaluating options	C	https://www.senatorsingleton.com/nj_implements_nation_s_toughest_pfas_standard
Brick Township MUA	NJ	86,898	PFOA			G	http://www.njspotlight.com/stories/16/01/21/dep-urged-to-act-quickly-on-hazardous-chemical-found-in-nj-water-supplies/
Greenwich Township Water Department	NJ	4,921	PFOA	Yes		A1	http://www.njspotlight.com/stories/16/01/21/dep-urged-to-act-quickly-on-hazardous-chemical-found-in-nj-water-supplies/
Montclair Water Bureau	NJ	37,669	PFOA, PFHpA		Blend/dilute; eliminated impacted water source	F	https://patch.com/new-jersey/montclair/pfoa-found-montclairs-drinking-water-0 http://www.montclairnjusa.org/dmdocuments/water-quality-2016.pdf
Garfield Water Department	NJ	30,487	PFOA, PFOS			G	http://www.njspotlight.com/stories/16/01/21/dep-urged-to-act-quickly-on-hazardous-chemical-found-in-nj-water-supplies/ http://www.garfieldnj.org/filestorage/2184/2210/2016_Water_Quality_Report.pdf
New Jersey American Water – Logan Sys	NJ	6,650	PFPA	Yes		A1	NJ State document (2015),cited case study on p5: http://www.nj.gov/dep/watersupply/pdf/pfna-pfc-treatment.pdf On 2014 water quality report (p7, not on more recent reports): https://dnnh3qht4.blob.core.windows.net/portals/1/CCRs/Logan%20-%202014.pdf?sr=b&si=DNNFileManagerPolicy&sig=%2B8UA3IwtiHDwpyBDW6VUTBUXCjs%2B1A1wDr9Xb%2FmDZ3A%3D
New Jersey American Water's (NJAW) –	NJ	10,900	PFOA, PFHpA, PFHxA, PFPA	Yes		A1	NJ State document (2015),cited case study on p5: http://www.nj.gov/dep/watersupply/pdf/pfna-pfc-treatment.pdf On 2014 water quality report (p7, not on more recent reports): https://dnnh3qht4.blob.core.windows.net/portals/1/CCRs/Logan%20-%202014.pdf?sr=b&si=DNNFileManagerPolicy&sig=%2B8UA3IwtiHDwpyBDW6VUTBUXCjs%2B1A1wDr9Xb%2FmDZ3A%3D NJ State document (2015),cited case study on p5: http://www.nj.gov/dep/watersupply/pdf/pfna-pfc-treatment.pdf 2016 water quality report, PFCs on p7: https://dnnh3qht4.blob.core.windows.net/portals/1/CCRs/Pennsgrove%20-%202015.pdf?sr=b&si=DNNFileManagerPolicy&sig=ZX%2Fd8aE0RIUxFzUFlu%2FaoC585OzsSCwM9Qp7HCkjO4Q%3D

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
Hampton Bays Water District	NY	12,500	PFOS		Eliminated impacted source water; evaluating options	C	http://www.southamptontownny.gov/DocumentCenter/Home/View/7011
Suffolk County Water Authority	NY	1,100,000	PFOS, PFOA	Yes	Blend/dilute; eliminated impacted water source	A1	http://s1091480.instanturl.net/dwqr2016/pages/page-10-11.pdf
New Windsor Consolidated Water District	NY	30,000	PFOA, PFOS		Eliminated impacted source water; evaluating options	C	http://town.new-windsor.ny.us/Portals/0/Documents/NW%20Annual%20Water%20Quality%20Testing%20Report%202016.pdf http://s1091480.instanturl.net/dwqr2018/THE_FINAL_AWQR2018_050918.pdf http://s1091480.instanturl.net/2018wellFiles/MEETINGHOUSE%20RD.pdf
Newburgh City PWS	NY	28,000	PFOS	Yes, constructed not operational		A2	NYS DOH FAQs specific to this case: https://www.health.ny.gov/environmental/investigations/newburgh/faq.htm NGO case study: https://www.riverkeeper.org/campaigns/safeguard/newburgh-2/ http://www.nbcnewyork.com/news/local/Cancer-Chemical-Water-Blood-PFOS-Newburgh-New-York-Taint-Sick-Test-EPA-Investigation-Environment-409506935.html
Wright-Patterson AFB Area A	OH	11,791	PFOA, PFOS	Yes	Eliminate impacted water source	A1	http://www.wpafb.af.mil/News/Article-Display/Article/818472/base-issues-drinking-water-advisory/ http://www.wpafb.af.mil/Portals/60/documents/Index/environmental/170518-2016-Drinking-Water.pdf?ver=2017-05-18-121221-917 http://www.wpafb.af.mil/Portals/60/documents/Index/environmental/170518-2016-Drinking-Water.pdf?ver=2017-05-18-121221-917
City of Cleveland Heights	OH	46,000	PFOS		Eliminate impacted water source; buy from another source	D	http://www.clevelandheights.com/index.aspx?page=34&recordid=1152 http://www.clevelandwater.com/2016WQR.pdf
Belpre City PWS	OH	6,441	PFOA	Yes		A1	EPA DuPont PFOA doc (2016): DuPont Teflon production at the Washington Works plant in Wood County, OH EPA DuPont PFOA doc (2016): https://www.epa.gov/sites/production/files/2016-05/documents/dupont-fs0309.pdf http://keepyourpromisesdupont.com/plant-paying-for-n-y-c8-treatment-process/
Little Hocking Water/Sewer Association	OH	12,522	PFOA	Yes		A1	EPA DuPont PFOA doc (2016): https://www.epa.gov/sites/production/files/2016-05/documents/dupont-fs0309.pdf http://www.fluoridealert.org/wp-content/pesticides/2006/pfoa-pfos.news.25.html http://keepyourpromisesdupont.com/plant-paying-for-n-y-c8-treatment-process/

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
Pomeroy Village Water District	OH	1,800	PFOA	Yes		A1	EPA DuPont PFOA doc (2016): https://www.epa.gov/sites/production/files/2016-05/documents/dupont-fs0309.pdf http://keepyourpromisesdupont.com/plant-paying-for-n-y-c8-treatment-process/
Tupper Plains-Chester Water District	OH	15,602	PFOA	Yes		A1	EPA DuPont PFOA doc (2016): https://www.epa.gov/sites/production/files/2016-05/documents/dupont-fs0309.pdf http://keepyourpromisesdupont.com/plant-paying-for-n-y-c8-treatment-process/
Suez Water (formerly United Water PA) (	PA	105,649	PFOA,PFOS			G	http://www.mysuezwater.com/water-my-area/pfos-pfoa/pfos-and-pfoa
Warminster Municipal Authority (Bucks)	PA	4,000	PFOA, PFOS, PFHxS, PFHpA	Yes		A1	http://www.pabulletin.com/secure/data/vol47/47-8/47_8_not.pdf
North Penn Water Authority (E. Rockhill)E	PA	588	PFOA, PFOS		Eliminate impacted water source; buy from another source	D	http://www.theintell.com/news/horsham-pfos/pa-dep-opens-pfoa-pfos-investigation-in-parts-of-perkasie/article_1ded01f2-acfd-11e6-bea8-1f7ab65406d1.html http://files.dep.state.pa.us/Water/DrinkingWater/Perfluorinated%20Chemicals/RidgeRunARDocket/NPWA%20Results%209-19-16.pdf
Doylestown Twp. Muni. Authority (Boro W	PA	8,655	PFOA		Eliminate impacted water source	F	http://www.theintell.com/news/local/doylestown-township-shuts-down-contaminated-well/article_6815ff9c-1de0-11e6-a2b5-37ecdc4dc495.html http://www.theintell.com/news/horsham-pfos/state-updates-investigation-of-doylestown-area-water-contamination/article_5ba3c282-bbd6-11e6-9446-ef3e00bcf41a.html
Horsham Water & Sewer Authority	PA	25,000	PFOS, PFOA	Yes		A1	County water authority PFOA update/timeline (2017): https://www.horshamwater-sewer.com/sites/default/files/website_pfc_update_as_of_7.10.17.pdf
Warrington Township Water & Sewer Dep	PA	21,588	PFOA, PFOS	Yes		A1	Township updates repository page: http://www.warringtontownship.org/departments/water-sewer/water-contamination-info/ Township PFCs public notice: http://www.warringtontownship.org/download/Water%20and%20Sewer%20department/WTWSD-PFOS-Public-Notice-2016-07-20.pdf Township overview presentation (p4): http://www.warringtontownship.org/download/Water%20and%20Sewer%20department/WTWSD-Powerpoint-2016-08-08-FINAL-Handouts.pdf
Town of Cumberland	RI	21,900	PFOA			G	http://ripr.org/post/cumberland-investigates-source-pfoa-drinking-water#stream/0

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links
Issaquah Water System	WA	22,926	PFBS, PFHpA, PFHxS, PFNA, PFOA, PFOS	Yes		A1	https://sammamishcomment.wordpress.com/2016/09/09/drinking-water-contamination-traced-to-efr-issaquah-says/ http://issaquahwa.gov/index.aspx?nid=490 – Data Water consulting company doc, case study (p4): https://www.hdrinc.com/sites/default/files/2017-05/hdr-abcs-of-pfcs.pdf 2016 WQR describing GAC system (p3) http://issaquahwa.gov/ArchiveCenter/ViewFile/Item/466 Water quality web page: http://issaquahwa.gov/waterquality
La Crosse Waterworks	WI	53,000	PFOS		Eliminate impacted water source	F	http://www.wxow.com/story/32020634/2016/05/Thursday/la-crosse-releases-drinking-water-advisory
Parkersburg (Parkersburgh Utility Board)	WV	34,251	PFOA			G	https://www.pubwv.com/notices/general/c8-or-pfoa-long-term-health-advisory https://www.pubwv.com/services/water
Lubeck PSD	WV	10,377	PFOA	Yes		A1	http://wvpublic.org/post/martinsburg-vienna-respond-drinking-water-warnings#stream/0 EPA DuPont PFOA doc (2016): https://www.epa.gov/sites/production/files/2016-05/documents/dupont-fs0309.pdf Legal application: http://www.psc.state.wv.us/scripts/webdocket/ViewDocument.cfm?CaseActivityID=189740&NotType=%27WebDocket%27
Vienna Water Works	WV	12,507	PFOA	Yes		A1	http://www.wsaz.com/content/news/Do-not-drink-advisory-issued-for-citizens-of-Vienna-380182771.html http://www.newsandsentinel.com/news/local-news/2017/01/epa-adds-chemours-to-water-order/ http://www.mariettatimes.com/news/local-news/2017/02/epa%E2%80%88c8-testing-in-expanded-area-begins-before-order-finalized/
City of Martinsburg	WV	15,180	PFOS		Eliminated impacted source water; evaluating options	C	http://www.heraldmailmedia.com/news/tri_state/west_virginia/martinsburg-shuts-down-water-plant-after-epa-advisory/article_7d2035a2-1e25-11e6-8900-7789868740f4.html http://www.journal-news.net/news/local-news/2016/07/big-springs-plant-reopened-water-testing-ongoing/
Mason County PSD-Camp Conley	WV	458	PFOA	Yes		A1	EPA DuPont PFOA doc (2016): https://www.epa.gov/sites/production/files/2016-05/documents/dupont-fs0309.pdf

Appendix B2 - Public Water System Treatment Data

Public Water System Name	State	Population Served	Contaminants Treated	GAC Treatment	Other Treatments	Category	References & Links

Categories

GAC Treatment	A1
GAC Treatment - proposed	A2
Reverse osmosis - existing system	B1
Reverse osmosis - proposed	B2
Option evaluation	C
Closed	D
Purchase water and blend	E
Eliiminate impacted source /blend	F
No action but concentrations below HA	G
No additional information found	X

Appendix C – Hydrogeologic Investigation Report

Hydrogeologic Investigation Report

Prepared for:

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Prepared by:

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August 2020

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ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

bgs	Below Ground Surface
CHA	CHA Consulting, Inc.
DER	Division of Environmental Remediation
ELAP	Environmental Laboratory Accreditation Program
ERM	Environmental Resources Management
HAS	Hollow Stem Auger
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NYCRR	New York Code, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	Polychlorinated Biphenyls
PFAS	Per- and Polyfluoroalkyl Substances
PFCs	Perfluorinated Compounds
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PID	Photoionization Detector
POC	Principal Organic Contaminant
PPE	Personal Protection Equipment
QA	Quality Assurance
QC	Quality Control
SCGs	Standards, Criteria and Guidelines

1.0 INTRODUCTION

The Remedial Investigation and Feasibility Study (RI/FS) Work Plan prepared pursuant to Order on Consent and Administrative Settlement; Index No. CO 4-20160212-18, between the New York State Department of Environmental Conservation (NYSDEC) and Saint-Gobain Performance Plastics (Saint-Gobain) and Honeywell (the Companies) required a study and assessment for the potential creation of an alternate public water supply source for the Village of Hoosick Falls (Village). This study includes five separate water supply alternatives and is documented in the "Municipal Water Supply Study for the Village of Hoosick Falls" (CHA & ERM, June 2019), hereafter referred as the Water Supply Study.

Alternative 1 in the Water Supply Study is a new groundwater source. A scope of work to advance this alternative entitled "Supplemental Hoosic Valley Aquifer Groundwater Source Investigation Work Plan" (CHA & ERM, July 2018) was approved by NYSDEC[1].

This Hydrogeologic Investigation Report presents the results of the field studies described in the approved Work Plan. This report also includes a summary of geophysical survey work conducted concurrently with the groundwater supply investigation that was performed to help define the geology and stratigraphy in the study area south of the Village of Hoosick Falls.

1.1 PREVIOUS FIELD INVESTIGATIONS

The consulting firm Arcadis, working on behalf of the NYSDEC, conducted an initial screening study and preliminary field investigations of some potential areas where a new groundwater source might be located, including the Wysocki Farm property (Arcadis, July 12, 2016). After identification of favorable geological deposits, a test well and observation wells were installed on the Wysocki Farm property for a more detailed study of water supply potential and water quality in that area. The water quality was found to have low level perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) impacts, low level pesticide detections, and an anomalous volatile organic compounds (VOC) impact which was unconfirmed; however, results were promising for an acceptable groundwater source with treatment. The long-term maximum yield of the Wysocki test well was reported as 300 gallons per minute based on a 72-hour pumping test (Arcadis, July 6, 2017). Arcadis did not assess whether multiple pumping wells could be installed in this hydrogeologic unit to sustain a higher pumping rate to meet current and conceptual future Village water demand. The results of the Arcadis work suggested that the aquifer may have a recharge boundary and is not entirely confined. Further analysis of the Wysocki pumping test performed by the USGS (Williams and Heisig, 2018) provided additional interpretation regarding potential aquifer boundaries and sources of recharge.

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[1] NYSDEC provided contingent approval of the Work Plan on June 20, 2018 and following discussion with the Department, the requested changes were incorporated into the final Work Plan dated July 2018.

1.2 EVALUATION AREA

Based on the results of the Desktop Study (described in Section 4.1 of the Water Supply Study) and the work conducted by Arcadis, an Evaluation Area south of the Village was selected for further evaluations (see Figures 1 and 2). This area is mapped as glacial outwash sand and gravel deposits and includes the Wysocki Farm property (parcel 8), as well as an area north and east of the Wysocki Farm property. The mapping represents surficial geology and does not reflect any potential deeper semi-confined or confined aquifers.

1.3 TECHNICAL APPROACH OVERVIEW

The field investigation activities were conducted on select sites in the Evaluation Area where access agreements with property owners were obtained. These investigation activities were conducted to better understand the areal and vertical extent of the deep confined aquifer and its recharge characteristics. The progression of activities involved in this field investigation was as follows:

1. Surface geophysical surveys were performed where the stratigraphy suggests there is sufficient saturated thickness to meet the water yield target. The surface geophysical surveys were used to determine the lateral and vertical extent of the water-bearing unit(s).
2. Test borings were installed through the unconsolidated deposits at locations selected based on the geophysical survey results. Stratigraphic information was collected in the field, from surface grade to bedrock. Monitoring wells were installed at these test boring locations.
3. Preliminary groundwater samples were collected from these monitoring wells and analyzed for a variety of analytes.
4. At the location with the highest potential for capacity and acceptable water quality, one 10” diameter test well, constructed to production well standards, was installed.
5. The test well was evaluated in a step-drawdown pumping test and a constant rate pumping test to estimate the yield of the well and the properties of the aquifer
6. A groundwater quality sampling event was performed near the end of the pumping tests to establish groundwater quality for both the test well and the surrounding monitoring wells.
7. An evaluation was performed to determine whether groundwater extracted from the test well can be considered under the direct influence of surface water.
8. An evaluation of the potential long-term yield of the contributing zones to the test was performed.

The details of each activity are discussed in the following sections.

2.0 PRELIMINARY SITE INVESTIGATIONS

The intent of the preliminary site investigations was to identify one or more target areas that had the potential to provide groundwater of suitable quality and in sufficient quantity to meet the project objectives. The work included performing geophysical surveys, advancing test borings to confirm the geology of the area, and installing and sampling monitoring wells to provide an indication of groundwater quality.

Within the Evaluation Area identified in the approved Work Plan, ERM was able to obtain access to parcels 2, 7, 8, 9, and 10 (Figure 2).

2.1 GEOPHYSICAL SURVEYS

Hager-Richter Geoscience, Inc. (HRGS) was contracted perform geophysical surveys in areas where published mapping indicates the presence of geologic deposits with sufficient porosity, permeability and saturated thickness to act as a water-bearing unit capable of meeting the project objective. HRGS used a combination of seismic refraction and electrical resistivity methods to:

- Determine the combined thickness of unconsolidated materials (sediments) and weathered bedrock;
- Distinguish, to the degree possible, major unconsolidated strata;
- Determine depth of competent bedrock;
- Map competent bedrock topography.

2.1.1 July 2018 Survey

In July 2018, HRGS surveyed 3 lines within the Evaluation Area (Lines 1-3). These lines were placed over parcels 9 and 10, north of the Wysocki Farm based on the mapped geology (Figure 3). Both the details and the results of the surveys are discussed in HRGS's report which is included in its entirety in Attachment 1.

In each case, the seismic survey shows three distinct velocity layers; the uppermost layer is interpreted to represent unsaturated sediments; the intermediate layer represents saturated sediments (undifferentiated silt and clay or sand and gravel deposits), and the lowermost layer is interpreted to represent bedrock. The results of the seismic survey indicate the depth to bedrock is 100 feet or greater, consistent with borings previously drilled.

The resistivity profiles generally show a 15-20-foot-thick high resistivity layer, overlying a 20- to 100-foot thick low resistivity layer interpreted to represent the unsaturated soils overlying a silt and clay layer. Beneath the low resistivity area, there is another zone of moderate to high resistivity. The resistivity method is not sensitive enough to distinguish between sand and gravel layers and bedrock. By superimposing the depth to bedrock data obtained from the seismic surveys on top of the resistivity data, HRGS inferred the presence of sand and gravel layers.

Using a combination of the seismic and resistivity surveys, it appeared that a relatively thick confining layer overlying a sand and gravel layer is present in the area. This interpretation is consistent with information developed by Arcadis for the Wysocki Farm parcels located to the south.

2.1.2 April 2019 Survey

An additional geophysical survey effort was conducted in April 2019, again using both seismic refraction and electrical resistivity, to provide additional information regarding the lateral and vertical extent of the aquifer. Lines 4A and 4B were surveyed on a Wysocki family property located to the south of the Evaluation Area. Line 4A runs from the western limb of the valley to Route 22, and Line 4B runs from Route 22 to the Hoosic River. Line 5 was surveyed on property owned by the Hoosac School parallel to Route 7 (Figure 3).

The results of these surveys indicate that the depth to bedrock is very shallow over the western portion of Line 4A, as expected given this line extends up from the valley floor. Line 4B reflects a similar profile to Lines 1-3 located further north. Line 5 reflects bedrock located close to land surface which is consistent with mapped rock outcrops in the vicinity.

2.2 TEST BORING INSTALLATION

Cascade Environmental, LP was contracted as the NYS-licensed driller for installation of all test borings and monitoring wells described herein. Prior to drilling, Dig Safely New York (DSNY) was contacted to locate and mark utilities in public rights-of-way. In addition, a private utility location subcontractor (New York Leak Detection, Inc.) was retained to scan a 10-foot radius around each proposed drilling locations using ground penetrating radar (GPR), magnetometry/metal detection and inductive cable/pipe location. No sub-surface utilities were identified at the proposed drilling sites.

Seven test borings were installed using the sonic drilling method with collection of a continuous soil core. All borings were advanced to bedrock with collection of a five-foot rock core (except borings GWI-04 and GWI-07, which did not include a rock core). Each rock core was drilled into the Walloomsac Formation which consists of phyllite in this area. The borings were installed in two mobilizations, consistent with the approved Work Plan (see Figure 4 for locations; Attachment 2 for lithologic logs).

2.2.1 Round 1 Borings

Following the geophysical surveys, three borings, designated GWI-01 through GWI-03, were drilled at the intersections of geophysical survey Lines 1-3 in September 2018.

In GWI-01, silt, sand and gravel unsaturated sediments were present to a depth of approximately 13 feet below ground surface (bgs). A gray, soft clay was then present to a depth of 35 feet bgs. This clay layer overlies various mixtures of sands and gravels to a depth of 102 feet bgs. A gray silt layer is present from 102 to 125 bgs, at which point bedrock was encountered.

The stratigraphy in GWI-02 is somewhat similar to GWI-01 although the clay layer is much thicker and extends from 12 to 86 feet bgs. The sand and gravel layer in this boring extends from 86 to 98 feet bgs. In this boring, bedrock was encountered at 100 feet bgs.

In GWI-03, the clay layer extends from 14 to 68.5 feet bgs. The clay layer overlies a sand layer from 75 feet to 102 feet bgs. The sand layer is much finer grained than that observed in GWI-01 or GWI-02. Bedrock was encountered at 104 feet bgs.

2.2.2 Round 2 Borings

In late October, early November 2018, four additional test borings were drilled. In GWI-04, unsaturated clayey silt was present to a depth of approximately 5.5 feet bgs. A brown fine to medium sand with varying amounts of gravel was present to a depth of 12 feet bgs and became saturated at 10 feet bgs. A brown to gray soft clay was then present to a depth of 35 feet bgs. This clay layer overlies a layer with varying percentages of clay and silt extending to 86 feet bgs. Between 86 feet bgs and 110 feet bgs a layer of various mixtures of sands and gravels was observed. A gray silt layer is present from 110 to 120 bgs, at which point the boring was finished.

The stratigraphy in GWI-05 is somewhat similar although the clay layer is thicker and extends from 8 to at least 40 feet bgs. No samples were recovered from 40 feet to 60 feet bgs. The silt and clay layer extend to at least 90 feet bgs followed by a 10-foot interval of no recovery. The observed sand and gravel layer in this boring extended from 90 to 111 feet bgs. In this boring, bedrock was observed at 111 feet bgs.

In GWI-06, the interval from 0 to 40 feet bgs is generally comparable to those observed in GWI-04 and GWI-05. The clay layer extends to 44 feet bgs in this boring. Underlying the clay layer is a silt and clay layer extending to nearly 60 feet bgs. Differing from GWI-04 and GWI-05, the sand and gravel layer is much thicker in GWI-06, extending from 60 feet bgs to 130 feet bgs with varying amounts of fine to coarse sands and gravels. Underlying the sand and gravel layer is a unit of fine sandy silt with gravel extending to 156 feet bgs. Bedrock was encountered immediately below this unit.

Pilot boring GWI-07 was installed in the approximate location of the test well. This boring was advanced using a sonic-type drill rig driving 4-inch casing to a final depth of 110 feet bgs. Topsoil was encountered to a depth of approximately 1.5 feet followed by silty sand. At a depth of 10 feet bgs a layer of clay and silty clay was encountered extending to a depth of 31 feet bgs. This clay layer was identified in previous borings in the vicinity and is believed to act as an aquitard over the confined aquifer below. Below the aquitard are generally fine to medium sands with varying amounts of fine to coarse gravels. At a depth of 85 feet bgs a 4-foot thick layer of fine to coarse gravel interval was encountered followed by fine to coarse sands and gravels to approximately 105 feet bgs. At 105 feet bgs, a silty fine sand layer was encountered. Previous borings have shown that this layer generally overlies bedrock and is very dense.

The pilot boring identified an interval of approximately 85 feet to 105 feet as the most likely to be acceptable for a groundwater test well. Therefore, this interval was targeted for the test well installation. The boring logs for GWI-04 through GWI-07 are presented in Attachment 2.

2.2.3 Summary of Geologic Conditions

The unconsolidated materials are heterogeneous in the investigation area. A shallow deposit consisting of silt, sand and gravel overlies silt and clay of varying thickness. A deeper sand and gravel unit underlies the silt and clay. In places, the deeper deposit is very coarse, consisting predominantly of gravel and has the potential to be a productive aquifer. A glacial till underlies the deeper sand and gravel unit in some locations, which in turn is underlain by bedrock (phyllite). In other locations, bedrock directly underlies the deeper sand and gravel unit. A geologic cross section running north-south through the valley is included as Figure 5. Figure 6 presents an isopach map for the confining clay unit.

2.3 MONITORING WELL INSTALLATION

All test borings, except GWI-07 were converted to two-inch diameter monitoring wells (see Figure 4). All monitoring wells were constructed with PVC riser pipe and machine-slotted well screen with a slot size of 0.020-inches. A sand pack, consisting of a minimum radial thickness of one inch, was placed within the annulus between the borehole and the well screen. A two-foot bentonite seal was placed above the sand pack. The remaining borehole between the bentonite seal and the ground surface was tremie-grouted with bentonite-cement grout. A steel stick-up protective pipe and gripper caps were installed at each well location to protect the riser pipe as the area is actively farmed. See Attachment 2 for well construction diagrams.

2.4 INITIAL GROUNDWATER QUALITY SAMPLING & RESULTS

2.4.1 Monitoring Well Sampling

All monitoring well samples were collected by low flow/minimal drawdown purging and sampling procedures (USEPA, 1996) using peristaltic pumps and HDPE tubing. Field parameter analyses were conducted using a calibrated YSI 566 meter with a flow-through cell which allows measurement of temperature, specific conductance, dissolved oxygen, pH, turbidity, oxidation/reduction potential, and a water level indicator to measure depth to water. The monitoring wells were sampled in three separate events as described below:

- September 2018 – The initial three monitoring wells (GWI-01 through GWI-03) were sampled and analyzed for all parameters in the NYSDOH Part 5 regulations for a public drinking water source. In addition, these samples were analyzed for: (a) 21 PFAS constituents using EPA Method 537-1.1; and (b) 1,4-dioxane via EPA Method 8270C with selected ion monitoring (SIM).
- November 2018 – All six monitoring wells (GWI-01 through GWI-06) were sampled and analyzed for 21 PFAS constituents using EPA Method 537-1.1. Results of the first two sampling rounds are presented in Table 1. These data indicate the presence of low PFAS levels in the deep confined aquifer targeted for production. Based on these results and consultation with NYSDEC and NYSDOH, the decision was made to proceed with installation of a test production well and aquifer testing.
- May 2019 – All six monitoring wells were sampled after completion of the constant rate aquifer test and analyzed for:

  - Principal organic contaminants via EPA Method 502.2
  - Selected metals via EPA Methods 6010 and 7470
  - Wet chemistry parameters
  - 21 PFAS constituents using EPA Method 537-1.1

All analyses were conducted by a laboratory NYSDOH-certified for the specified analytical methods.

2.4.2 Results of Monitoring Well Sampling

Table 1 presents a summary of all monitoring well groundwater sampling analytical results with comparison to New York State Ambient Water Quality Standards or Guidance Values for Class GA groundwater. Most of the broad spectrum NYSDOH Part 5 parameters were reported as "non-detect" in all samples. The only analytes detected at concentrations exceeding their respective comparison values were inorganic constituents. Most were only detected in one well, except for iron, manganese and sodium, which were more common. Well GWI-03 had elevated pH, believed to be due to grout contamination.

In addition, low levels of PFAS were detected as follows:

- Perfluorooctanoic acid (PFOA): (ND to 38 ng/L);
- Perfluorobutanoic Acid (PFBA): (ND to 3.0 ng/L);
- Perfluorooctanesulfonic acid (PFOS): (ND to 0.9 ng/L);
- Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2): (ND to 41 ng/L);
- Perfluorohexanoic acid (PFHxA): (ND to 2.1 ng/L); and
- Perfluorononanoic acid (PFNA): (ND to 0.46 ng/L).

The highest detected concentrations of PFAS (PFOA and Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate 6:2) were found in well GWI-3 in May 2019. However, earlier sampling of this well in September and November 2018 found much lower concentrations of these compounds.

2.4.3 Data Validation

Data Usability Summary Reports (DUSRs) were prepared for all samples. The DUSRs include an assessment of the deliverables with a description of the analytical results and any qualifications that should be considered when using the data. The DUSRs highlight data that did not meet QC limits and therefore required data qualification. These tables include information such as, blank contamination, surrogate recoveries, and internal standard area counts that did not meet QC criteria.

Qualification of data, where appropriate, was made by the use of qualifier codes based upon the data validation process. These qualifiers serve as an indication of the qualitative and quantitative reliability of the data. The qualifier codes utilized are as follows:

- No qualifier – Positive Detect. The compound was analyzed for and was positively identified above the sample reporting limit. The reported value is valid and useable.

- U – Non-Detect. The compound was analyzed for, but not detected. The associated numerical value is the reporting limit (RL). The value is valid and useable as a non-detect at the reporting limit.
- J - Positive Detect at an estimated value. The compound was analyzed for and was positively identified; the associated numerical value is the approximate concentration of the compound in the sample. The value was designated as estimated as a result of the data validation criteria or when an organic compound is present (mass spectral identification criteria are met), but the concentration is less than the RL. The value is valid and useable as an estimated result.
- UJ – Non-Detect at an estimated value. The compound was analyzed for, but not detected above the RL. The associated numerical value is the RL; however, the RL is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the compound in the sample. The value is valid and useable as a non-detect at the estimated RL.
- R – Rejected. The sample results are rejected due to deficiencies in the ability to analyze the sample and meet quality control criteria. The data are unusable. The presence or absence of the analyte cannot be verified.

The final review of the DUSRs was performed by the ERM Quality Assurance Officer. Results from the NYSDOH Part 5 analysis of the LaCroix test well meet all requisite quality criteria[2]. A small amount of data from the monitoring wells was rejected. These results are identified with an "R" qualifier on Table 1. Overall, the groundwater analytical data are valid and usable for the purposes of evaluating water quality for a potential potable source. DUSRs for all samples collected as part of this groundwater supply development project are provided in Attachment 3.

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[2] See Section 4.3 for presentation of these results.

3.0 TEST WELL INSTALLATION

Based on the results of the test boring program, the deep sand and gravel unit in the area of GWI-01 was determined to be most favorable for groundwater development and was chosen as the location for a test well. This property is owned by the LaCroix family; thus, the test well is also referred to as the LaCroix well. As noted previously, boring GWI-07 was installed within 20 feet of GWI-01 to provide a more detailed analysis of subsurface conditions prior to installing the test well.

The test well installation began on February 11, 2019. The well driller, Smith Well Drilling, recommended drilling the test well using a cable-tool rig to advance the test well based on the targeted depth of the well, the confined aquifer conditions, and their experience with drilling the Wysocki Farm well.

Additionally, this method has the advantages of a relatively light-weight drill rig and a minimal amount of drilling water required. The location of this well within an active farm field necessitated a light-weight drill for access. Additionally, due to the PFAS concerns associated with this project, certified clean water was required during the drilling process. The cable-tool method uses less water than other methods and was therefore ideal. This method utilizes a heavy drill bit on the end of drill rods suspended by a cable. The drill bit is repeatedly raised and allowed to drop to the boring bottom, loosening the material being penetrated. At certain intervals a bailer is lowered to remove drill cuttings that are suspended in water, which is added to the boring as needed. To prevent cave in, casing is driven below the interval being drilled.

The final location of the test well was approximately 4 feet west of the pilot boring GWI-07. This was done to allow the boring to progress through undisturbed soils. The drilling process began with the installation of a 16” diameter boring into the silt and clay deposit to a depth of 25 feet bgs. This provides a seal to prevent any shallow groundwater from migrating into the confined aquifer during the drilling process.

Following the 16” casing installation, drilling was advanced using 10” diameter steel casing and a 10” drill bit. The boring was advanced to a depth of approximately 60 feet bgs without sampling. From 60 feet bgs to the bottom of the boring at 104 feet bgs, samples were collected continuously using a bailer and allowing the water and sediment to settle in a bucket. The test well boring log is included in Attachment 2.

3.1.1 Well Screen Size Selection

Samples collected during the drilling phase were sent to Johnson Screens for sieve analysis. These samples were collected continuously from 60.3 feet to 104.8 feet bgs. The results of the sieve analysis indicated that the ideal screen interval was from 75 feet to 105 feet bgs. The recommended slot size was 100-slot from 75 feet to 89 feet bgs and 50-slot from 89 feet to 105 feet bgs. Typically, the entire productive zone would be screened in a confined aquifer, but Johnson recommended only 30 feet of screen to allow for greater drawdown above the pump level. Results of the sieve analysis are included in Attachment 4.

3.1.2 Final Well Construction Details

The final well is constructed of 10” steel casing consisting of 10- and 20-foot lengths welded together. The well screen is a nominal 10” telescoping continuous wrap stainless steel screen fabricated by Johnson

Screens. It is variable slot size with 100-slot from 75 feet to 89 feet bgs and 50-slot from 89 feet to 105 feet bgs. The screen was dropped inside the casing and pushed to the bottom of the borehole. The casing was then pulled back to expose the well screen with excess casing cut off as needed. The well screen was naturally packed (no filter pack was installed). The final casing extends from ground surface to 75 feet bgs. The well has a stickup above ground of approximately 4 feet. Construction was completed on April 9, 2019. A well construction log is included in Attachment 2.

3.1.3 Well Development Details

Following installation of the well screen and pull back of the casing the well was developed starting on April 10, 2019. Initial development was preformed using a 20-gallon bailer. Removal rates of up to 80 gallons per minute (gpm) were attained with this method with very minimal drawdown. Following bailing, a pump was installed and used to extract water at approximately 100 gpm. Drawdown of approximately 0.5 feet was observed during development pumping, with the water being very clear.

A surge block and pump were then installed to mechanically remove any fine material from the well screen interval. Pumping rates during this portion of development were approximately 190 gpm. After three working days of development turbidity was below 5 NTU, and the discharge water was clear. Well development was completed on April 12, 2019 based on field observations and the driller’s recommendations.

3.1.4 Well Disinfection

After well development was completed, Smith used tablets of calcium hypochlorite to disinfect the well. Smith later checked the residual chlorine level during the pumping test to ensure it had been used up and removed from the well.

4.0 TEST WELL EVALUATION

After completion of the installation of the test well and monitoring wells, the pumping test phase of the field investigation was initiated. Prior to starting any pumping tests, a discharge hose was installed to convey the discharged water away from the test well to eliminate the possibility that the discharged water could recharge the well or result in erosion of soil. The discharge hose was directed several hundred feet south of the test well into a drainage swale that ultimately discharged to the Hoosic River. The pumping tests consisted of two parts; a step drawdown pumping test and a constant rate pumping test.

4.1 STEP DRAWDOWN TEST

The step drawdown test was conducted on April 17, 2019 to determine the optimum pumping rate for a constant rate test and evaluate the specific capacity and anticipated well yield. Step intervals of 250, 350 and 450 gpm were chosen based on pump capacity and observations during development. As specified in the Work Plan, prior to the step test pressure transducers with data logging capability were deployed to monitor groundwater elevations on a continuous basis throughout the step test. These transducers were deployed in the test well, GWI-01, GWI-04, GWI-06 and a staff gauge in the Hoosic River to monitor groundwater and surface water elevations.

The step test was started at 10:00 on April 17, 2019 with a static water level approximately 13 feet below the top of casing. The test well was pumped at 250 gpm for 90 minutes with approximately 3 feet of drawdown. The second step was 350 gpm for 90 minutes with approximately 5 feet of drawdown. The final step was 450 gpm which was the highest flow rate the pump could reliability produce. At this step, there was approximately 6 feet of drawdown after 2 hours of pumping.

At the completion of the step drawdown test, water levels were monitored until over 90-percent recovery was achieved in the test well. Recovery took place within minutes of the test ending. See Attachment 5 for hydrographs of the test well and monitoring well GWI-01 vs. barometric pressure and Attachment 6 for hydrographs of the test well and monitoring well GWI-01 vs. river stage.

4.2 CONSTANT RATE PUMPING TEST

As described in the Work Plan, a constant rate pumping test was performed on the test well after the step drawdown test activities were completed. The constant rate pumping test consisted of three segments; an ambient monitoring period during which no pumping occurred, a 72-hour pumping period at a constant rate of 450 gpm, and a recovery period. The pumping test was conducted in accordance with “Pumping Test Procedures for Water Withdrawal Permitting” (NYSDEC, August 2018).

Note that the pump for this pumping test was a 15 HP Grundfos submersible turbine pump placed at 34 feet below grade leaving more than 20 feet of drawdown from the static water level. If this well was placed in permanent service, the pump would be placed at a greater depth providing for more available drawdown (see discussion in Section 5.8).

Prior to the pumping test a number of pressure transducers with data logging capability were deployed in monitoring wells both at the test well site and at other sites in the Hoosic Valley. These transducers were deployed on April 18, 2019. The monitoring wells selected for transducers are shown on Figure 7 and Table 2. The selected monitoring wells were chosen to provide a diverse set of data with which to evaluate aquifer characteristics in the vicinity of the test well. In addition, to evaluate the potential hydraulic connection between the aquifer and the river, the Hoosic River staff gauge was also monitored during the pumping test. The pressure transducers recorded data continuously during each testing phase (48-hour ambient monitoring period, 72-hour pumping period and 48-hour recovery period). All of the data from the pumping test collected by the pressure transducers was previously transmitted electronically to NYSDEC.

For further evaluation of a potential hydraulic connection between the test well and the Hoosic River, field parameters including pH, oxidation-reduction potential, specific conductivity, turbidity, dissolved oxygen, temperature and total dissolved solids were measured. Prior to the start of the pumping test a set of readings was collected from the river to establish baseline conditions of the surface water. During the pumping test a field meter with data logging capabilities was set up to record field parameters of the discharge water on 4-hour intervals. At the conclusion of the pumping test an additional set of surface water parameters was collected.

It is noted that during the pumping test anomalous turbidity measurements were observed. It is believed that this was due to air bubbles in the meter’s flow-thru cell interfering with the sensor. A separate turbidity meter was used to collect several turbidity readings are these results are believed to be correct. A summary of field parameters is included in Table 3.

The weather was monitored in advance of initiating the pumping test and a period with minimal rain in the forecast was selected. During the 72-hour pumping test there were several instances of very light rain; however, these rainfall events totaled 0.17 inches over the entirety of the pumping period.

The 72-hour pumping test was started at 9:30 am on April 29, 2019. Discharge rates quickly stabilized at 450 gpm and remained steady for the entirety of the pumping test. The pumping test was completed at 9:30 am on May 2, 2019.

Analysis of the constant rate pumping test is presented in Section 5.0.

4.3 WATER QUALITY TESTING

One water quality sample was collected from the test well immediately prior to shut down of the constant rate pumping test. The sample was collected from a sampling port directly on the discharge piping of the test well. The test well sample was analyzed for the complete list of parameters as listed in the NYSDOH Part 5 regulations for a public drinking water source, in addition to PFAS (list of 21 compounds) by USEPA Method 537-1.1 Modified. All analyses were conducted by a laboratory NYSDOH-certified for the specified analytical methods. The full results are presented in Table 4.

A summary of the water quality testing (detected parameters only) from the LaCroix test well is provided below. Only sodium and manganese exceeded their groundwater standard and then only slightly. No PFAS compounds were detected.

Detected Parameters
LaCroix Test Well

Parameter	Unit	NYDEC TOGS 111 CLASS GA STANDARD	LACROIX TEST WELL (sampled 5/2/19)
E200.7			
Iron	mg/l	0.3	0.027 J
Manganese	mg/l	0.3	0.36
Sodium	mg/l	20	29.9
E200.8			
Barium	ug/l	1000	236
Copper	ug/l	200	0.58 J
Nickel	ug/l	100	1.4 J
Uranium-238	ug/l	none	4.6
E300.0			
Chloride (As Cl)	mg/l	250	56
Fluoride	mg/l	1.5	0.065 J
Sulfate (As SO4)	mg/l	250	26
SM2130B			
Turbidity	NTU	none	0.14
shaded values exceed standard			

4.4 INTERCONNECTION BETWEEN GROUNDWATER & SURFACE WATER

A Microscopic Particulate Analysis (MPA) test was performed to evaluate the potential for groundwater under direct influence of surface water (GWUDI) in the source aquifer. Environmental Associates Ltd of Ithaca, New York was retained to perform the MPA test using EPA method 910/9-92-029. The test involved diverting a minimum of 1,000 gallons of discharge water, at a rate of 1 gpm, through a water filtration unit near the end of the test. The filter and water within in the filter housing were submitted to the qualified laboratory for analysis. Prior to, and after the sample for MPA was collected, the discharge was monitored for pH, temperature and specific conductance. The MPA test is utilized to generate a risk rating score that indicates the likelihood that the groundwater is under the direct influence of surface water.

The results of the MPA analysis (see Attachment 7) indicate that there is a low risk of surface water influence. The laboratory report indicated that iron bacteria were the only biological organisms observed. The report notes that iron bacteria are not considered a risk factor for surface water influence.

Prior to and immediately following the pumping test a set of field parameters (pH, oxidation-reduction potential, specific conductivity, turbidity, dissolved oxygen, temperature and total dissolved solids) were measured in the Hoosic River to establish baseline surface water parameters. Throughout the pumping test field parameters were measured in the discharge from the test well. The measurements were collected from a flow through cell connected to a sampling port on the discharge line. These parameters are included in Table 3. As shown, several of these parameters exhibit stark differences between the surface water and the test well discharge. These include specific conductivity, dissolved oxygen, temperature and total dissolved solids. Additionally, oxidation-reduction potential and pH show differences between the surface water and discharge water to a lesser degree. These results indicate a lack of direct hydraulic link between the test well aquifer and the Hoosic River and therefore, this potential drinking water source would not likely be considered GWUDI, but the NYSDOH makes the final determination.

5.0 AQUIFER TEST INTERPRETATION

In this section of the report, we describe the interpretation of the aquifer test data. This interpretation includes evaluation of river efficiencies and associated lag times, barometric efficiencies, and any pre-aquifer test water level trends. These parameters, if applicable, were calculated from the antecedent water level data and then used to correct the observed aquifer test drawdown data during the pumping period to eliminate any interferences attributable to variations in barometric pressure, to river fluctuations, and for any pre-aquifer test trends in observation well water levels. The corrected aquifer test drawdown data were then analyzed to determine aquifer transmissivity, storativity, hydraulic conductivity, and specific storage.

5.1 AQUIFER TESTING THEORY

An aquifer test must optimally be designed, implemented, and interpreted based upon an understanding of the nature of the hydrogeologic system being studied. It is evident from older and more recent aquifer testing of the deep glacial outwash aquifer that this aquifer behaves as a “semi-confined” (or “leaky artesian”) aquifer. Semi-confined aquifers require special efforts to ensure that appropriate data is collected and that the data is interpreted correctly. This aquifer is also a buried valley aquifer generally bounded on two sides by valley walls composed of lower-permeability soil and rock. In this sense, it might be considered as a classic “strip aquifer” (Walton, 1970). These factors, and others, need to be considered in interpretation of aquifer test data from this hydrogeologic regime.

Neuman and Witherspoon (1972), who earlier had developed a complete analytical solution for semi-confined, multi-aquifer systems (Neuman and Witherspoon, 1969a, 1969b), recommend that if the primary objective of the aquifer test of a semi-confined aquifer is determination of the transmissivity and storativity of the pumped aquifer (as is principally the case here), three things should be done:

1. Drawdown should be measured close to the pumping well;
2. Only early-time data, before significant leakage occurs, should be analyzed; and
3. This early-time data should be analyzed by means of the Theis Method.

Neuman and Witherspoon (1972) also demonstrated that the Hantush “r/B” method (1955) of analyzing semiconfined aquifers, typically overestimates aquifer transmissivity and underestimates the vertical hydraulic conductivity of subjacent aquitards. It does this because it makes several simplifying assumptions that limit its usefulness to most field situations. The most limiting of these recommendations are the following:

1. The storativity of overlying and underlying aquitards can be neglected; and
2. Drawdown in overlying and underlying aquifers is negligible.

Rarely are these conditions encountered in practice. Recognizing the limitations of his “r/B” solution to most field situations, Hantush developed another solution that incorporated the storativity of the aquitards (Hantush, 1960). In that solution, he maintained the assumption of zero drawdown in overlying or underlying aquifers. This solution is referred to as the “B” solution. Unfortunately, type curves for different values of “B” are very similar in shape, limiting the method’s usefulness as a diagnostic tool for determining aquifer properties. As mentioned earlier, Neuman and Witherspoon developed a complete analytical solution for multiple aquifer/aquitard systems in 1969. Based upon that solution, they definitively addressed the issues associated with field determination of the hydraulic properties of leaky aquifer/aquitard systems of the type we are dealing with at Hoosick Falls (Neuman and Witherspoon, 1972). They state the following:

> *“Thus, we arrive at the important conclusion that one can evaluate the transmissibility and storage coefficient of a leaky aquifer by using conventional methods of analysis based on the Theis solution. The errors introduced by these methods will be small if the data are collected close to the pumping well, but they may become significant when the observation well is placed too far away.”*

The reliance on wells close to the pumping well and the use of early-time data, before significant leakage occurs, as recommended by Neuman and Witherspoon (1972), is doubly important in the case of this “strip aquifer” because boundary effects also are manifested in the drawdown data. As the cone of influence expands it in effect “reflects” off the aquifer’s boundaries causing additional drawdown within the bounded aquifer. This additional drawdown produces a positive departure from the Theis method-predicted drawdown (i.e. more drawdown than would occur in an unbounded aquifer of comparable properties). These boundary effects typically occur in the mid-range to later-time drawdown data, not in the early-time data. In contrast to bounded aquifers, semi-confined aquifers exhibit negative departures from Theis method-predicted drawdown (i.e. less drawdown than would occur in a confined aquifer of comparable properties) due to leakage. The combination of semi-confined aquifer behavior causing negative departures and boundaries causing positive departures makes analysis of mid- and later-time data problematic.

Therefore, in the analysis of aquifer test data from this semiconfined aquifer, the above-described recommendations of Neuman and Witherspoon was observed. Hence, time-drawdown analyses is limited to early-time data from wells relatively close to the pumping well.

5.2 ANTECEDENT MONITORING OF GROUNDWATER LEVELS, BAROMETRIC PRESSURE AND HOOSIC RIVER STAGE

Pre-aquifer test, antecedent water levels and aquifer test water levels were monitored in a total of thirty-four monitoring wells. The groundwater monitoring wells monitored are listed in Table 2. As indicated in the table, datalogging pressure transducers were programmed to record groundwater levels at either 1-minute or 5-minute intervals. These monitoring frequencies were maintained throughout the antecedent water level monitoring, the aquifer test, and the post-aquifer test recovery monitoring. Maintaining these uniform monitoring frequencies precluded the need for reprogramming of the data loggers for either the aquifer test or recovery period

Barometric pressure was simultaneously monitored using a Van Essen Baro-Diver deployed near GWI-01. River stage in the adjacent Hoosic River was also contemporaneously monitored using a Solinst Levelogger deployed as a river stage gauge deployed near the Water Supply Area. This river stage gauge was removed during the time between the step yield test conducted on 4/17/2019 and the start of the constant rate aquifer test on 4/29/2019 due to concerns over equipment safety during anticipated high river flow events from rain storms. The river gauge was re-deployed approximately one hour prior to the start of the constant rate aquifer test. During the time between the step yield test and aquifer test, the USGS monitoring station 01334500 near Eagle Bridge, NY, which is approximately 5.5 miles downstream, was used as a surrogate. During the deployment of the Van Essen Baro-Diver deployed near GWI-01, the river stage data collected trended quite similarly to the USGS monitoring station 01334500 near Eagle Bridge, NY. The river stage data were utilized, where applicable, to calculate river efficiencies and associated lag times in wells proximal to the LaCroix well.

5.3 EVALUATION OF BAROMETRIC EFFICIENCIES, RIVER EFFICIENCES AND ASSOCIATED LAG TIMES, AND PRE-AQUIFER TEST WATER LEVEL TRENDS

Hydrographs of all the wells monitored during the aquifer test are presented in Attachment 8. In addition to groundwater levels, selected wells in proximity to the LaCroix Test Well are also plotted with barometric pressure included on the graph. The barometric pressure was measured with the onsite Solinst barologger. Barometric pressure, expressed in feet of water, is on the secondary Y axis and is plotted in reverse order; that is, with barometric pressure increasing downward. Plotted this way, barometric pressure should trend with water levels if the wells have a significant barometric efficiency. A review of these hydrographs and barometric pressure graphs indicate that no wells exhibit any perceptible barometric efficiency. This is likely due to the aquitard overlying the aquifer pinching out along both the east and the west sides of this valley fill aquifer, thus allowing barometric pressure changes to reach the aquifer itself and be transmitted throughout the aquifer given the high hydraulic conductivity and diffusivity of this aquifer.

In contrast to barometric efficiency, the hydrographs and co-plotted river stage graphs in Attachment 9 indicate that the wells in the Water Supply Development Area and Wysocki Farm Area may be influenced by river stage. As illustrated in the co-plotting of groundwater elevations and Hoosic River stage, water levels in all of the monitoring wells show a strong correlation with river stage during the antecedent period. In Attachment 10, the river efficiency and associated time lag of each observation well has been calculated. The results of those analyses are presented below.

Calculated River Efficiencies and Lag Times

Well	River	Lag Time (min)
Test Well	72.4%	82
GWI-01	78%	108
GWI-02	63%	187
GWI-03	69%	153
GWI-04	70%	108
GWI-05	63%	244
GWI-06	72%	93

Calculated River Efficiencies and Lag Times

Well	River	Lag Time (min)
WF-OBS-01	64%	171
WF-OBS-02	63%	167
WF-OBS-03	64%	178
WF-OBS-04	71%	189
WF-OBS-05	44%	248
WF-OBS-BR	63%	182

The river efficiencies range from 44 to 78 percent and the time lags from 93 to 248 minutes.

In Attachment 11, daily precipitation, recorded at the McCaffrey site weather station, is co-plotted with the groundwater level hydrographs. The correlation between rainfall events and groundwater level rises is evident in these figures. However, given the substantial thickness of glaciolacustrine clay overlying the aquifer and separating the Hoosic River from the aquifer in the vicinity of the test well, the observed river efficiencies are not believed indicative of actual hydraulic communication between the Hoosic River and this semi-confined aquifer through the glaciolacustrine clay, but rather may be attributable to two factors[3]:

1. Increases in total stress on the aquifer due to the sheer weight of the water in the river. Increases in river stage increase the total stress on the aquifer beneath and adjacent to the river, which in turn, as dictated by Terzaghi's Law, is apportioned between increases in effective stress within the aquifer and increases in aquifer pore pressure (i.e. increases in potentiometric levels). This is a common phenomenon in confined and semi-confined aquifers that are subject to loads imposed by rivers, estuaries, and other heavy loads, such as railroad cars (Freeze and Cherry, 1979).
2. The rises in river stage correlate with rainfall events. These same rainfall events, particularly the larger events, in addition to causing rises in river stage, likely also produce recharge to the aquifer, particularly from the surrounding hillsides and along the margins of the valley where the clay pinches out, causing rises in potentiometric levels throughout the aquifer.

A plan view plot of river lag times of each monitoring well and interpolated contours are illustrated in Figure 8. They indicate that river lag times generally increase with distance from the Hoosic River suggesting that changes in total stress on the aquifer due to rises and declines in river stage are the principal mechanism accounting for the river efficiencies and river lag times measured in the monitoring wells.

Trends in the antecedent data just prior to the aquifer test were not explicitly calculated, as they were subsumed within the river efficiency calculations.

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[3] The drawdown adjustments described in Section 5.4 are independent of the mechanism by which the semi-confined aquifer responded to river stage variations.

5.4 ADJUSTMENT OF OBSERVED DRAWDOWN DATA

The observed aquifer test drawdown data were adjusted for water level fluctuations induced by changes in the stage of the Hoosic River before undergoing early-time Theis and Cooper-Jacob analysis. The adjustments made to the data were quite small given that only modest changes in river stage occurred during the 72-hours of the aquifer test.

5.5 THEIS EARLY-TIME ANALYSES

As discussed in the technical approach section, time-drawdown analyses have been limited to wells relatively close to the pumping well and only to the early-time data observed in those wells. Four wells were selected that meet the criteria set forth by Neuman and Witherspoon (1972). These wells are GWI-02, GWI-03, GWI-04, and GWI-06. The radial distances from the pumping well to these wells varies from 251 to 717[4] feet. The results of the Theis early-time analyses are shown in Figures 9 through 12 and are summarized in the table below.

Summary of Early-Time Theis Analyses

Well	Transmissivity (ft^2/day)	Effective Hydraulic Conductivity* (ft/day)	Storativity (dimensionless)	Specific Storage* (ft^{-1})
GWI-02	12,800	711	2.9×10^{-4}	1.6×10^{-5}
GWI-03	7,700	428	1.6×10^{-4}	8.8×10^{-6}
GWI-04	9,200	511	9.9×10^{-5}	5.6×10^{-6}
GWI-06	9,800	544	1.8×10^{-4}	1.0×10^{-5}
Arithmetic Mean	9,880	548	1.8×10^{-4}	1.0×10^{-5}

** Based upon an average thickness of 18 feet*

As indicated in this table, the calculated transmissivities from these time-drawdown analyses vary from 7,700 to 12,800 feet^2/day, with an arithmetic mean of 9,880 feet^2/day. The calculated storativities vary from 1.0×10^{-4} to 2.9×10^{-4}, with an arithmetic mean of 1.8×10^{-4}.

It should be noted that these calculated transmissivities and storativities are representative in large measure of the higher hydraulic conductivity, gravel and sand unit within the aquifer since it is primarily through that subunit of the aquifer that the early-time lateral propagation of drawdown occurs. Consequently, calculation of unit properties, such as hydraulic conductivity and specific storage, must consider the effective thickness of the aquifer during the early-time data. It is reasonable to conclude that the effective

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[4] GWI-01, which is only 9.3 feet from the pumping well, was not selected for time-drawdown analyses because of its proximity to the pumping well. A slug test of this well indicated that it has a well response time (time to recover 63% of the initial instantaneous head difference created by the slug test) of approximately 10 seconds, which is too large to reflect the rapid potentiometric declines occurring this close to the pumping well at the beginning of the aquifer test. A simple Theis method calculation of drawdown 9.3 feet from the pumping well using the parameters calculated from the four observations wells indicates that after 6 seconds there would be over 3 feet of drawdown in the aquifer at GWI-01. At 6 seconds, GWI-01 is only recording 1.4 feet of drawdown due to piezometer time lag. This well will be useful, however, for analysis of later-time data.

thickness of the aquifer during the early-time lateral propagation of drawdown is consistent with the thickness of the high hydraulic conductivity (high K) gravel and sand subunit of the aquifer as observed in the well logs. Based upon the logs of wells GWI-01 through GWI-07, the thickness of the high K subunit varies from 9 to 25 feet and averages 18 feet in thickness. We used this thickness in converting transmissivity and storage to the unit properties of hydraulic conductivity and specific storage, respectively. The hydraulic conductivity and specific storage of the high K zone are given in the table above. Hydraulic conductivity varies from 428 to 711 ft/day, which is consistent with the coarse-grained lithology described in the well logs. Specific storage varies from $5.6\text{x}10^{-6}$ to $1.6\text{x}10^{-5}$ ft^{-1} and averaged $1.0\text{x}10^{-5}$ ft^{-1}. These values of specific storage are consistent with very dense gravels and sand (Batu, 1998).

5.6 COOPER-JACOB ANALYSIS OF DRAWDOWN IN THE PUMPING WELL

The time-drawdown, Cooper-Jacob method can be used to estimate the transmissivity of an aquifer based upon the measured drawdown in the pumping well, itself. The method is less precise than time-drawdown analyses of observation wells and can be subject to error if flow rates are not well-maintained during the test or if the pumped well is inefficient. Additionally, the method cannot estimate the storativity of the aquifer. In this case, flow rates were well maintained, and the well is efficient, so the Cooper-Jacob method was performed focusing, like the Theis analyses and for the same reasons, on the early-time data. The results of this analysis are shown in Figure 13. The transmissivity calculated by the Cooper-Jacob method is 9,000 ft^2/day, which comports well with the more precise early-time Theis analyses described above.

5.7 AREAL EXTENT OF THE AQUIFER TEST CONE OF INFLUENCE

The drawdowns measured in the monitoring wells after 1,000 minutes of pumping are depicted on Figure 14. An elapsed time of 1,000 minutes was selected because after 1,000 minutes drawdown begins to slightly fluctuate. As illustrated in Figure 14, drawdowns range from 5.94 feet in GWI-01, which is 9.3 feet from the pumping well, to 2.14 feet in WF-OBS-05, which is over 3,000 feet southeast of the pumping well. The full extent of the cone of influence is not well delineated by this data. However, the 2.14 feet of drawdown observed at WF-OBS-05 indicates that the cone of influence extends at least 3,000 feet to the southeast. In addition, the absence of any observed aquifer test drawdown in GW-2, which is approximately 3,740 feet north of the pumping well in the Village MWS well field, indicates that the cone of influence does not extend that far to the north.

As illustrated in Figure 14, the drawdown in the Lacroix Well produced at 1000 minutes of pumping was 3.64 feet and reached a maximum of 5.94 feet after 72 hours. The 2017 aquifer test conducted by Arcadis on the Wysocki Farm (Arcadis, 2017) generally produced 5.5 to 9 feet of drawdown on the Wysocki property.[5] The total drawdown created by both wells running at the same rates used in both aquifer tests (i.e. 450 gpm and 300 gpm, respectively, for the LaCroix and Wysocki well) can be estimated by

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[5] The one exception was WF-OBS-02, which had approximately 60 feet of drawdown. However, this well is 8.1 feet from the extraction well, which exhibited approximately 65 feet of drawdown. These drawdowns in the pumping well and the observation well, WF-OBS-02, indicate that the pumping well was operating near its maximum flow rate, since Arcadis recommended a maximum drawdown in the test well of about 87 feet.

superimposing the drawdowns from each test upon each other. If one superimposes the two sets of drawdowns, the resultant drawdowns would be on the order of 13 to 15 feet. Given that there is more than 60 feet of available drawdown in the Lacroix well, it is evident that this well could be pumped at least at 500 gpm and probably at substantially higher rates without exceeding available drawdown limits in this well.

5.8 PROJECTED 180-DAY DRAWDOWNS

Although this aquifer test and the analysis of the data have been completed as part of a feasibility study, it could eventually be submitted to NYSDEC as part of a Water Withdrawal Application. NYSDEC has published guidance on "DEC Pumping Test Procedures" for Water Withdrawal Applications that, among other things, requires estimation of a 180-day projection of drawdown in any pumping wells that fail to reach a condition of stabilized drawdown during an aquifer test. Moreover, if more than one well is planned for a well field, well interference; that is, the superimposed drawdown from each well on the other wells, must also be taken into account. This section addresses projected 180-day drawdowns and well interference between the LaCroix and Wysocki pumping wells if both wells were pumping simultaneously.

In the 2017 aquifer testing of the Wysocki well (Arcadis, 2017) and in this aquifer testing of the LaCroix wells, drawdowns in both pumping wells and their respective observation wells indicate that the aquifer behaves as a semi-confined aquifer[6]. This is evidenced by leakage entering the aquifer and causing negative departures from drawdowns that would be expected if the aquifer were confined. In semi-confined aquifers, leakage increases as the cone of influence expands until eventually the amount of leakage balances the pumping rate of the well and further drawdown ceases. This condition is often referred to as "stabilized drawdown" or as a state of "equilibrium". Both the Wysocki well and the LaCroix well showed substantial evidence of leakage during their respective aquifer tests and were likely approaching a point of stabilized drawdown as shown in Figures 15 and 16. The drawdown in the LaCroix well is shown in Figure 15. It is evident from that figure that the rate of drawdown is diminishing over time as the drawdowns do not plot in a straight line on the semilogarithmic graph, as would be expected in a confined aquifer. Similarly, the drawdown in the Wysocki well illustrated in Figure 16 also does not plot on a straight line in a semi-logarithmic plot, but instead shows a significantly declining rate of drawdown and may well have reached a state of stabilized drawdown after 1000 minutes. For the purposes of calculating a projected drawdown after 180 days of pumping, we have plotted a trend line on each drawdown curve beginning at a time of 200 minutes and have extended that trendline out to a time of 180 days in order to project drawdown at that time. Given that both curves show diminishing rates of drawdown, this is a conservative approach because either well could reach a state of stabilized drawdown or equilibrium before 180 days.

In the analysis of the LaCroix well, the trendline projects 8.1 feet of drawdown after a pumping period of 180 days, as illustrated in Figure 15. The Wysocki well drawdown, illustrated in Figure 16, has a trendline that projects 70 feet of drawdown after a pumping period of 180 days. The disparity in the productivity of

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[6] All drawdowns from the 2017 Arcadis aquifer testing were degraphed from the figures presented in the 2017 Arcadis Report as we do not have electronic copies of the drawdown data.

these two wells is abundantly clear in these figures. The Wysocki well produces 64 feet of drawdown after 72 hours, with a pumping rate of 300 gallons per minute, which translates to a specific capacity 4.7 gallons per minute per foot of drawdown (gpm/ft). In contrast, the LaCroix well produces less than 7 feet of drawdown after 72 hours while pumping 450 gallons per minute. The specific capacity of the LaCroix well is approximately 64 gpm/ft, which is more than 13 times the specific capacity of the Wysocki well. The above calculations indicate that, operated independently, the Wysocki well would have a 180-day drawdown of approximately 70 feet and the LaCroix well would have a projected 180-day drawdown of approximately 8.1 feet.

Estimation of Well Interference with the LaCroix and Wysocki Wells Operating at the Aquifer Testing Pumping Rates

If both wells are operating simultaneously at the aquifer test pumping rates, the cones of influence will overlap, producing additional drawdown in each pumping well. The amount of superimposed drawdown can be calculated based upon the results of the aquifer testing. The calculation of 180-day projected drawdown from the LaCroix well on the Wysocki well is relatively easy because drawdowns in the Wysocki observation wells were also measured during the 2019 LaCroix aquifer test. In fact, one of the observation wells, WF-OBS-02, is within 8 feet of the Wysocki well. The distance between the LaCroix well and WF-OBS-02 is approximately 705 feet as shown on Figure 4 of this report. Therefore, drawdown in WF-OBS-02 serves as a good surrogate for drawdown in the Wysocki production well. However, the analysis of 180-day projected drawdown at the LaCroix well due to the simultaneous pumping of the Wysocki well is a bit more difficult because at the time of the Wysocki well pumping test in 2017, the LaCroix test well and the observation wells associated with the 2019 LaCroix well test were not yet constructed. Nonetheless, the estimated 180-day superimposed drawdown from the Wysocki well at the Lacroix well can be reasonably well estimated from drawdown measured in the Wysocki observation wells during the Wysocki aquifer test.

We will begin with an analysis of the superimposed drawdown on the Wysocki well from the LaCroix well at a pumping period of 180 days.

Superimposed Drawdown on the Wysocki Well from Pumping of the LaCroix Well for 180-Days

During the 2019 aquifer test of the LaCroix well, drawdown was measured in WF-OBS-2, which as discussed above, is situated very close the Wysocki production well. They are both approximately 705 feet from the LaCroix well. The drawdown observed during the 2019 aquifer test of the LaCroix well in WF-OBS-2 is shown on Figure 17. This figure shows a semi-logarithmic plot of drawdown observed in WF-OBS-2 with a trendline fitting the data from 200 minutes to the conclusion of the 72-hour test and extrapolating that trendline out to 180 days. It shows that the projected drawdown in WF-OBS-02 from pumping of the LaCroix well at 450 gpm after a pumping period of 180-days is approximately 6.8 feet.

Superimposed Drawdown on the LaCroix Well from Pumping of the Wysocki Well for 180-Days

As mentioned above, the LaCroix well is approximately 705 feet from the Wysocki aquifer test pumping well, PW-01. However, the LaCroix well had not yet been constructed at the time of the Wysocki aquifer test in 2017. There were, however, two Wysocki observation wells at distances bracketing the distance of the LaCroix well from the Wysocki well. These are WF-OBS 3 and WF-OBS-04 that are at distances of 415.2 and 840.24 feet, respectively, from the Wysocki pumping well, PW-1. The projected 180-day drawdowns in these wells should allow for a reasonable estimate to be made of the 180-day drawdown to be expected in the LaCroix pumping well. As shown in Figures 18 and 19, the 180-day projected drawdowns in these two observation wells, using the same trendline method described earlier, are 12.74 feet and 12.71 feet, respectively. We can, therefore, estimate that the 180-day superimposed drawdown at the LaCroix well from the Wysocki well pumping at 300 gpm would be approximately 13 feet.

Total Estimated 180-Day Drawdowns in the LaCroix and Wysocki Pumping Wells During Simultaneous Operation

Figure 20 shows side by side schematics of Wysocki Well, PW-1, and the Lacroix Well showing their screen depths and lengths. Also depicted on this figure are the following:

- Approximate static water levels;
- 180-day projected drawdowns in each well when they are pumping independently at the aquifer test pumping rates of 300 gpm and 450 gpm;
- 180-day projected superimposed drawdowns from the LaCroix Well on the Wysocki well and from the Wysocki Well on the LaCroix Well;
- The total projected 180-day drawdown in each well with both wells pumping at the aquifer test pumping rates of 300 gpm and 450 gpm;
- The approximate maximum allowable drawdown in each well, which is assumed to be 12 feet above the top of the well screens (five feet from the top of the well screen to the base of the pump intake, a two-foot long pump intake, and five feet from the top of the pump intake to the water surface in the well); and
- The amount of addition available drawdown in each well, which equals the difference between the total projected 180-day drawdowns with both wells operating at the aquifer test flow rates and the maximum allowable drawdowns.

As illustrated in Figure 20, with both wells operating simultaneously at their respective aquifer testing pumping rates, the total drawdown in the Wysocki Well is 87.8 feet, while the maximum allowable drawdown is assumed to be 106 feet. This leaves 18.2 feet of additional available drawdown in the Wysocki Well. Under the same pumping conditions, the total drawdown in the LaCroix Well is 29.1 feet, while the maximum allowable drawdown is assumed to be 63 feet. This leaves 33.9 feet of additional available drawdown in the LaCroix Well.

5.9 DISCUSSION

The results of the LaCroix aquifer test demonstrate that a yield of greater than 450 gpm is achievable. This conclusion is substantiated by the following points:

- When interpreting the Theis curve analysis graphs, it must be remembered that this aquifer is subject to both leakage and to the impact of barrier boundaries. It was for these reasons that data interpretation was confined to early-time data, as recommended by Neuman and Witherspoon (1972), before significant leakage or barrier boundaries come into play. Leakage manifests itself as less drawdown over time than predicted by a Theis curve, which of course was designed for fully confined aquifers. In contrast, one or more barrier boundaries, in this case two sub-parallel boundaries, produces more drawdown than would be expected in an areally extensive aquifer. This increased drawdown occurs because the expanding cone of influence in effect “reflects” off each barrier boundary thereby producing more drawdown within the bounded aquifer. Given this discussion, all the time-drawdown curves show two phenomena:
    - A positive (increased drawdown) departure from the early-time Theis curve match occurring between six and 15 minutes due to the effect of barrier boundaries
    - A negative (decreasing drawdown) occurring after 100 to 300 minutes because of increasing leakage

This leakage ultimately causes the time-drawdown curves shown in Figures 9 to 12 to very nearly flatten during the course of this 72-hour aquifer test. During the last 4,000 minutes of the test, less than 0.5 to 1.0 feet of additional drawdown was observed in any of the monitoring wells. The same thing is seen in the pumping well. Drawdown in the pumping well increases exponentially (linearly on a semi-logarithmic plot as shown in Figure 13) until approximately 200 minutes when the rate of drawdown declines significantly, indicating aquifer-wide leakage.

The interpretations of the drawdown curves provided above have been predicated with what we know of the geology of this area. Specifically, we know that the aquifer is a valley-fill aquifer or strip aquifer created during deglaciation and the aquifer is bounded by bedrock uplands often mantled with glacial till. Moreover, we know that the clay aquitard is not infinite in extent: it is entirely absent in some portions of the Hoosic Valley and also appears to be absent along the margins of the valley walls.

- A water budget evaluation provided below in Section 6 shows the aquifer is naturally recharged at a rate 1.7 times the projected maximum daily demand of a new municipal water supply indicating a slight increase in pumping rate from that tested will be sustainable.

- It is also instructive that notwithstanding the influence of the two barrier boundaries, total drawdown in the pumping well after pumping 450 gallons per minute for three days was less than six feet. As shown in Figure 20, even accounting for the superposition of 13 feet of drawdown from the simultaneous operation of the Wysocki well for 180 days, and a conservative extrapolation of drawdown in the LaCroix well after 180 days of pumping of 8.1 feet, there still remains almost 34 feet of additional available drawdown to accommodate a higher pumping rate in the LaCroix well. Leakage in an aquifer system is a function of drawdown in the aquifer. As drawdown increases and, correspondingly, the cone of influence expands in depth and breadth, leakage into the aquifer increases. Consequently, modest increases in the likely pumping rate of the LaCroix well are strongly indicated to be sustainable. Naturally, any future increases in pumping rate could be evaluated and demonstrated by further well test pumping, but based upon the aquifer testing results, the well appears capable of a significantly higher steady-state pumping rate. Furthermore:

- The LaCroix well was tested at 450 gpm with less than 6 feet of drawdown (specific capacity = 76 gpm/foot-drawdown). This is approximately 10% of the available drawdown and strongly indicates the well is capable of greater yield.
- The combined tested yields of the Wysocki and LaCroix test wells was 750 gpm. This is only slightly less than the projected future Village demand of 785 gpm (1.13 MGD). Based on the specific capacity of the LaCroix well, additional drawdown of less than one foot would be needed to achieve the projected future Village demand.

6.0 ANALYSIS OF AQUIFER RECHARGE

The analysis of the pumping test data indicate that the LaCroix test well can be pumped at a rate of at least 450 gpm with a drawdown of less than 6 feet. A greater well yield is likely possible. To estimate the yield of the aquifer relative to its ability to support long term withdrawals, an analysis of potential groundwater recharge was performed.

Based on other studies (Morrissey, et. al.; 1987 and Miller, et. al.; 1998) recharge to stratified drift and gravel aquifers likely comes from several sources:

1. Infiltration directly into the aquifer where the confining unit is absent
2. Infiltration from upland drainage areas that occurs along the margins of the valley or seepage from underlying areas of bedrock
3. Seepage loss from upland tributary streams

Other potential sources of recharge include induced recharge from the Hoosic River associated with pumping and leakage through the confining units.

A first order estimate of available recharge was made by developing a water budget for the drainage area that likely contributes groundwater recharge to the semi-confined aquifer that is tapped by the LaCroix Well. A water budget can be constructed at varying levels of detail, considering seasonal changes in precipitation and evapotranspiration, variation in land cover, and a host of other variables. This water budget is based on long term annual mean values. The water budget equation is:

$$R = P - (ET + RO)$$

where:

R = groundwater recharge
P = mean annual precipitation
ET = mean annual evapotranspiration
RO = runoff

According to the National Weather Service, for the period 1981 to 2010, in Bennington VT, the average annual precipitation was 40.70 inches. Using the Glens Falls, NY records, the average annual precipitation was 39.06 inches. For purposes of our analysis, we have assumed 40 inches for the Hoosick Falls area.

Based on work by Sanford and Selnick (2012), the annual average evapotranspiration for Rensselaer County has been estimated to range between 40 to 49% of the annual precipitation (equivalent to 16 to 19.6 inches per year). In the same paper, they estimate the annual amount of evapotranspiration is 51-60 cm/year (equivalent to 20.1 to 23.6 inches/year). These estimates were made using streamflow data and assuming there is no significant change in groundwater storage. For the purposes of our analysis, we assumed a conservative value of 22 inches of water is lost to evapotranspiration.

The balance of the water budget consists of runoff directed to channeled streams and rivers, and/or water that is available to recharge the aquifer. For a simple unconfined aquifer, all runoff may eventually recharge the aquifer. However, given the presence of a thick confining unit over portions of the Hoosic Valley (see Figures 5 and 6), some water may be intercepted and flow to the river and therefore will not recharge the deeper semi-confined aquifer. This area has been subtracted from the total contributing area.

To be conservative, we have assumed that 50% of the remaining water (after evapotranspiration) is runoff that never reaches the semi-confined deeper aquifer. Additionally, we subtracted any area where the confining clay is present at depth from the total contributing area.

To determine the contributing area for the LaCroix well, the topographic divides on the western and eastern sides of the Hoosick Valley were identified to delineate a sub-basin of the Hoosic River watershed. Randall and others (1988) noted that "the water-table configuration in uplands nearly replicates topography throughout the region". Note that the groundwater flow system in the bedrock may not be entirely limited to this area if the tributaries in the sub-basin do not act as fully penetrating hydraulic boundaries. The northern boundary generally followed topographic divides but cuts across the valley south of the Village of Hoosick Falls. The southern boundary also generally follows topographic divides but cuts across the valley north of Route 7 (see Figure 15). This results in a total effective contributing area of 2,354 acres.

As can be observed, using a number of conservative factors, there is almost 700 million gallons of groundwater recharge occurring annually or 1.7 times the proposed maximum daily demand

Average Annual Recharge Available to Semi-Confined Aquifer

Watershed Area (ac)	Area of Confining Unit (ac)	Total Contributing Area (ac)	Mean Annual Rainfall (in)	Annual Average ET (in)	Annual Runoff (in)	Annual Available Recharge (in)	Annual Recharge (gal)
3,710	874	2,836	40	22.0	9.0	9.0	693,037,858

7.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of this hydrogeologic investigation can be summarized as follows:

1. The LaCroix well was successfully tested at 450 gpm with a little less than 6 feet of drawdown
2. It is evident from the time-drawdown plots of drawdown in the aquifer that the aquifer behaves as a "semi-confined" (or "leaky artesian") aquifer. This aquifer is also a buried valley aquifer bounded on two sides by valley walls composed of lower-permeability rock.
3. The transmissivity and storativity of the aquifer were determined from early-time, Theis, time-drawdown analyses to be 9,880 ft^2/day and 1.8×10^{-4}, respectively. The transmissivity of the aquifer was corroborated by a Cooper-Jacob analysis of early-time drawdown in the pumping well.
4. Given the average effective thickness of the high K, gravel and sand subunit of the aquifer of approximately 18 feet, the above-estimated transmissivity and storativity translate to a horizontal hydraulic conductivity of 548 ft/day and a specific storage of 1.0×10^{-5} ft^{-1}. Both values are consistent with the expected hydraulic conductivity and specific storage of the dense, gravels and sands comprising the high K subunit of this aquifer.
5. The cyclical pumping of Well #7 located at the Village MWS is known to create cyclical drawdown and recovery in water levels in many wells near and to the north of the Village MWS. These water level fluctuations in monitoring wells have been used in the past to calculate directional hydraulic conductivities in the deep glacial aquifer. However, no monitoring wells in the vicinity of the LaCroix well exhibited any perceptible fluctuations associated with Village Well #7.
6. Similarly, none of the wells up near the Village well field and wells further to the north show any influence from the 72-hour aquifer test conducted on the LaCroix well.
7. The fact that no perceptible influence is observed in the vicinity of the LaCroix well from the intermittent pumping of Village Well #7 and, similarly, no influence is observed in the Village well field area and further to the north from the 72-hour aquifer test on the LaCroix well is likely attributable to two factors:
   a. The glaciolacustrine clay is known to thin or be absent in the area just south of Village Well #7 and may well also be absent further to the south of the well field. In these areas, the absence of glaciolacustrine clay would mean that the aquifer in these areas becomes unconfined, rather than semi-confined. Propagation of drawdown would tend to stall in unconfined portions of the aquifer as the hydraulic diffusivity[7] of unconfined portions of the aquifer would be substantially lower in magnitude than the semi-confined portions of the aquifer.
   b. The village well field and the LaCroix well are nearly a mile apart.
8. Although monitoring wells in the vicinity of the LaCroix well do not show any influence from the cyclical pumping of Village Well #7, some wells do show intermittent, short-lived, drawdown and recovery cycles two or three times a day, which is likely attributable to the high school well. The magnitude of the intermittent drawdown observed in these wells is quite small, usually varying between 0.7 and 0.05 feet. The wells that exhibit this intermittent drawdown are GWI-02, WF-OBS-01, WF-OBS-02, WF-OBS-03, and WF-OBS-04. The likelihood that these intermittent

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[7] Hydraulic diffusivity is defined as the ratio of Transmissivity/Storativity (T/S) and controls the rate of drawdown or recovery propagation through geologic media. Given that the storativity of the semi-confined aquifer has been defined as approximately 1×10^{-4} and the storativity (or specific yield) of an unconfined portion of this aquifer would likely be on the order of 0.1, the hydraulic diffusivity of the unconfined portions of this aquifer could be approximately 1,000 times lower than the hydraulic diffusivity of the semi-confined portions of the same aquifer.

drawdowns are attributable to the high school well is supported by the fact that the magnitude of the drawdown generally decreases from west to east, away from the high school well.

9. The approximate maximum allowable drawdown in each well is assumed to be 12 feet above the top of the well screens. The projected 180-day drawdowns for both the Wysocki well and the LaCroix well are 87.8 feet and 29.1 feet, respectively with both wells pumping together. Under this scenario, the Wysocki well still has >18 feet of available drawdown and the LaCroix well has almost 34 feet of drawdown.

10. Most of the broad spectrum NYSDOH Part 5 parameters were reported as "non-detect" in the monitoring well samples. The only analytes detected at concentrations exceeding their respective comparison values were inorganic constituents detected in a single well, except for iron, manganese and sodium, which were more commonly detected in multiple wells. In addition, low levels of PFAS were detected as follows:

    - Perfluorooctanoic acid (PFOA): (ND to 38 ng/L);
    - Perfluorobutanoic Acid (PFBA): (ND to 3.0 ng/L);
    - Perfluorooctanesulfonic acid (PFOS): (ND to 0.9 ng/L);
    - Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2): (ND to 41 ng/L);
    - Perfluorohexanoic acid (PFHxA): (ND to 2.1 ng/L); and
    - Perfluorononanoic acid (PFNA): (ND to 0.46 ng/L).

    The highest detected concentrations of PFAS (PFOA and Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate 6:2) were found in well GWI-3 in May 2019. However, earlier sampling of this well in September and November 2018 found much lower concentrations of these compounds.

11. Water quality testing for NYSDOH Part 5 parameters in the LaCroix test well indicates that only sodium and manganese exceed groundwater standards, but only marginally. No PFAS were detected.

12. An evaluation of the potential hydrologic connection between the Hoosic River and the semi-confined aquifer does not indicate that groundwater is under the direct influence of surface water, but the NYSDOH makes the final determination.

13. A first order estimate of potential groundwater recharge to the semi-confined aquifer indicates that, even under conservative assumptions, there is more than adequate recharge to support the long-term extraction of groundwater.

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Figures

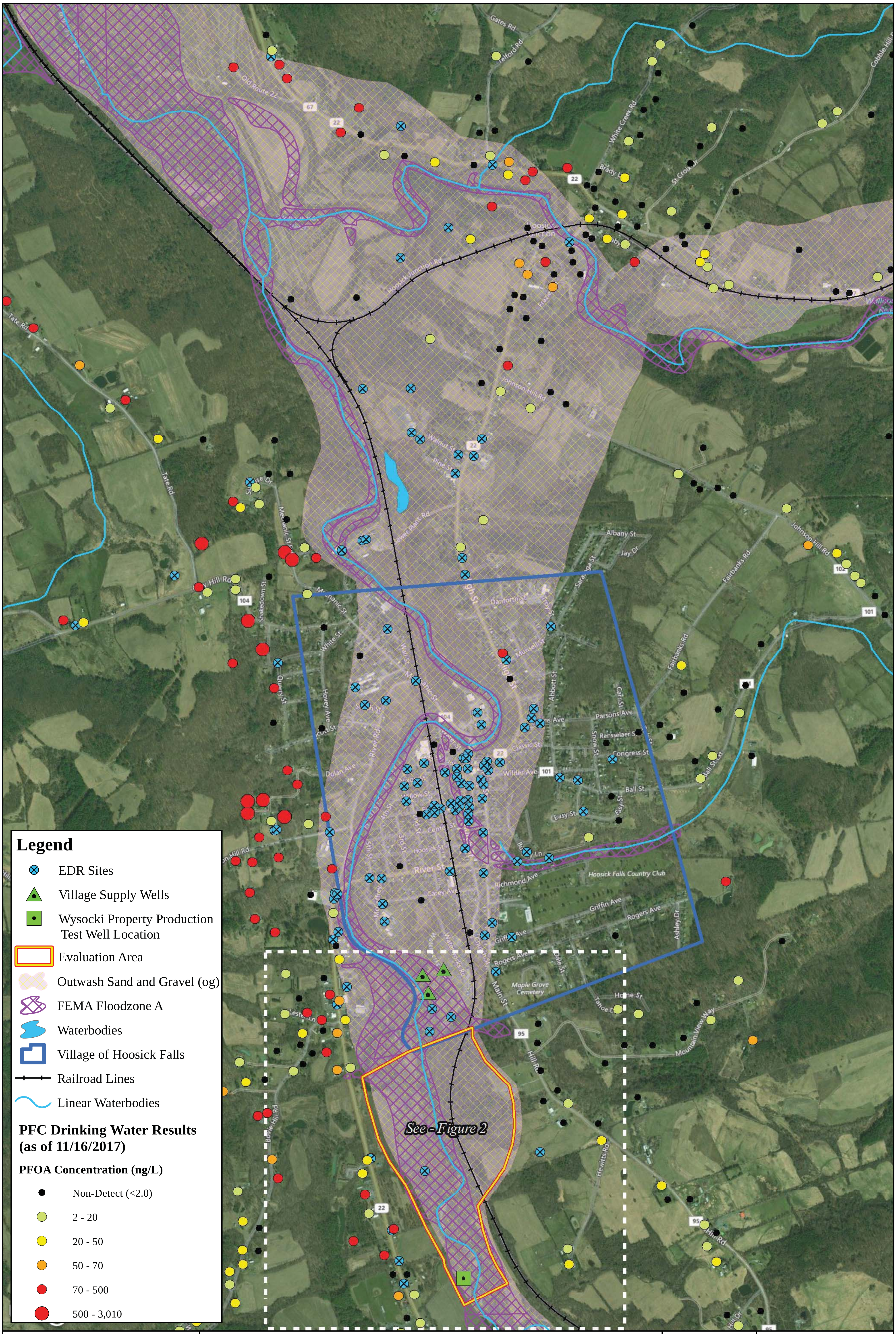

Figure 1 - Conditions in and Around Hoosick Falls

Hydrogeologic Investigation Report

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N
W E
S

1 inch = 1,500 feet

Project No. : 34730

June 2019

0 750 1,500
Feet

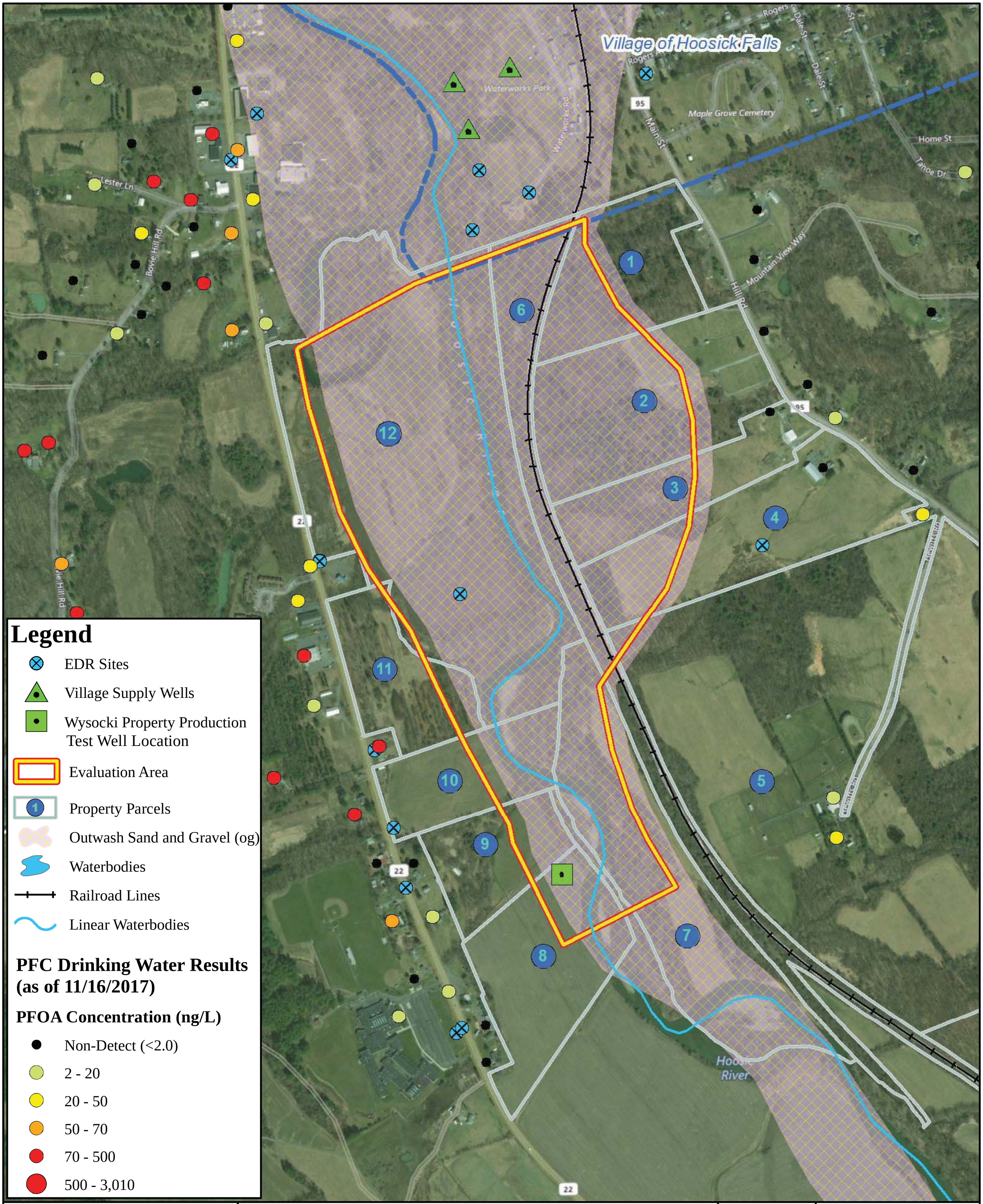

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Figure 2 - Conditions in and Around Hoosick Falls (enlarged)

Hydrogeologic Investigation Report

N
W E
S

1 inch = 825 feet

Project No. : 34730

June 2019

0 400 800 Feet

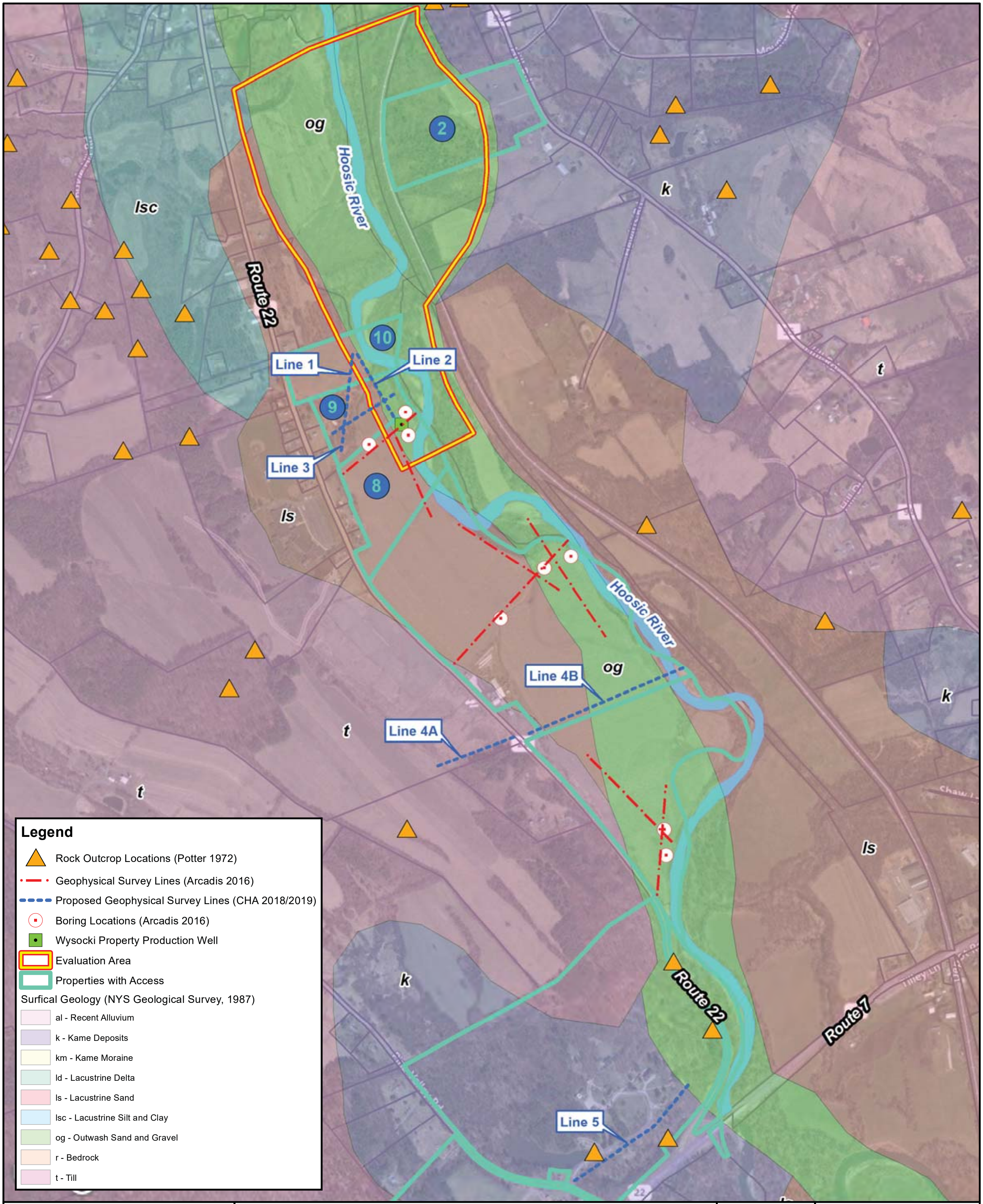

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Figure 3 - Geophysical Survey Locations

Hydrogeologic Investigation Report

N
W E
S

1 inch = 1,300 feet

Project No. : 34730

June 2019

0 650 1,300 Feet

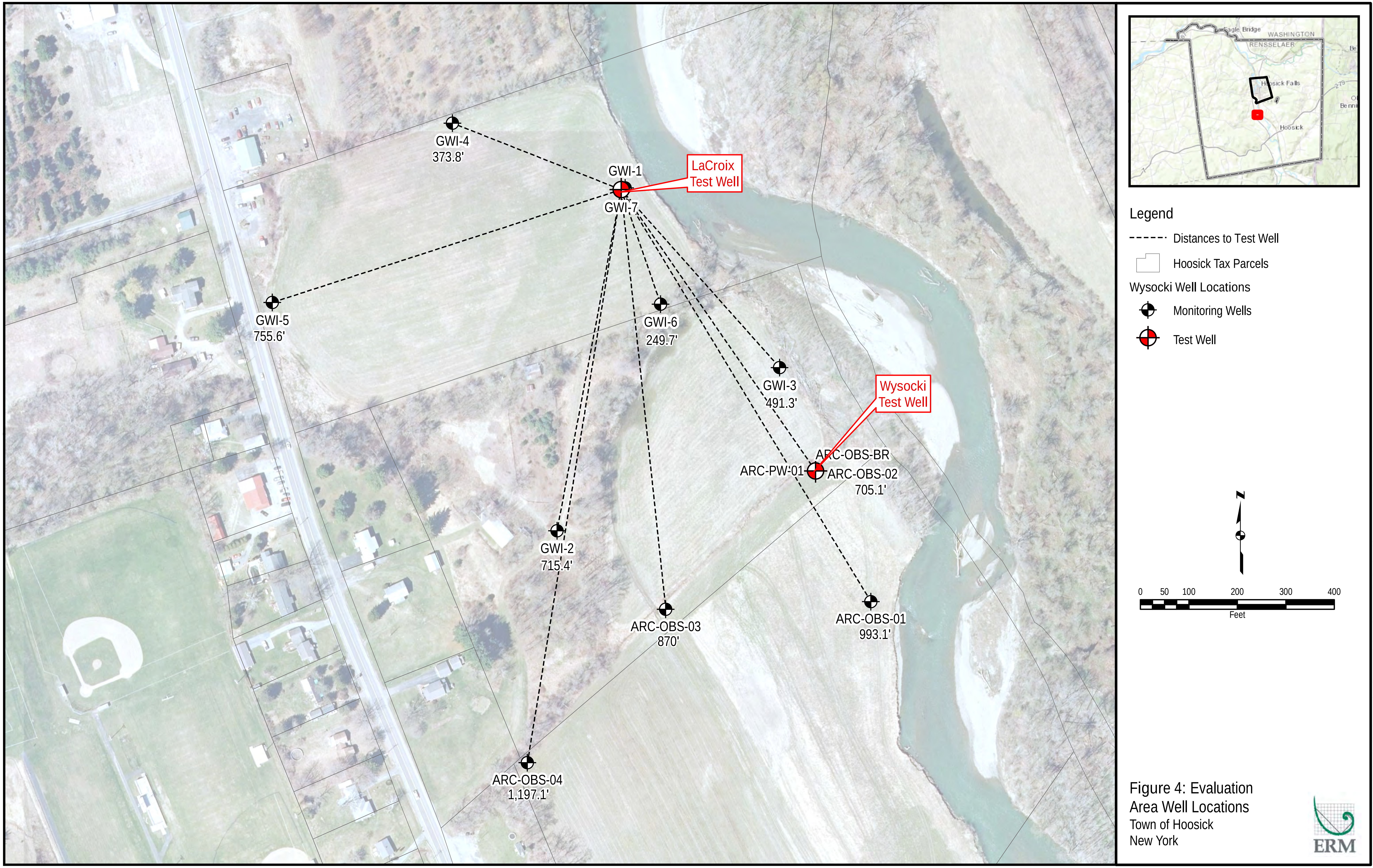

Figure 4: Evaluation
Area Well Locations
Town of Hoosick
New York

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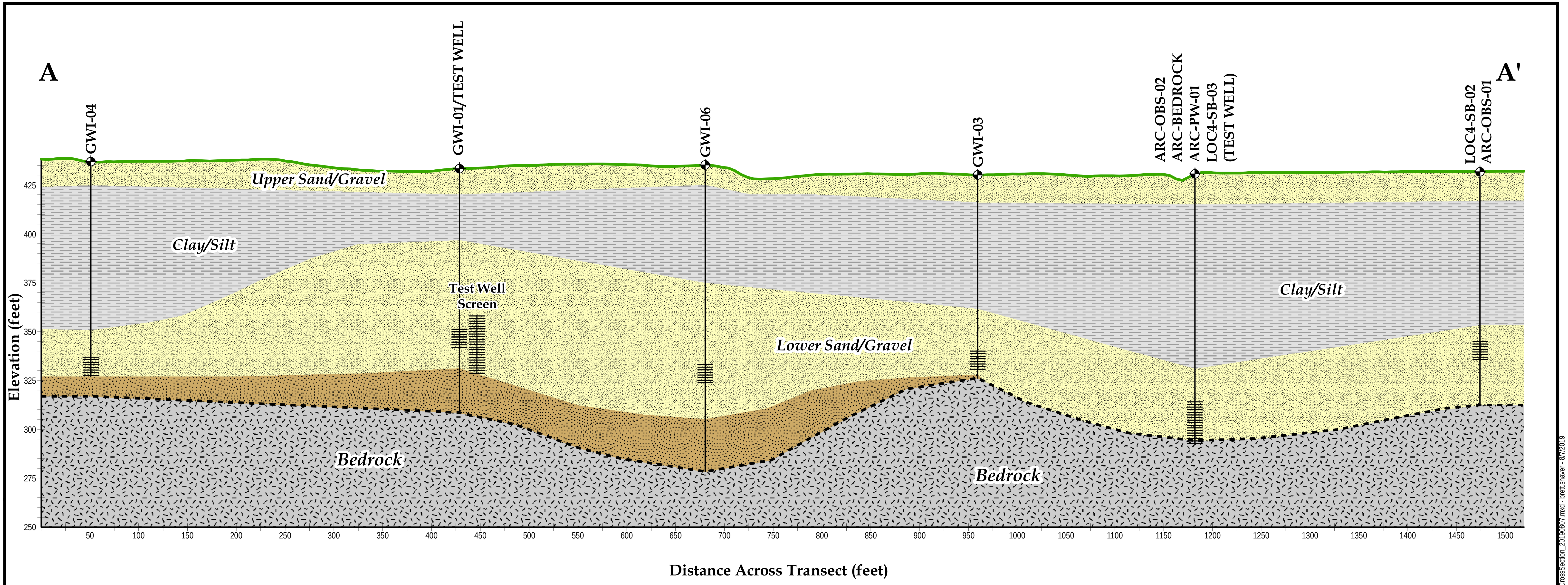

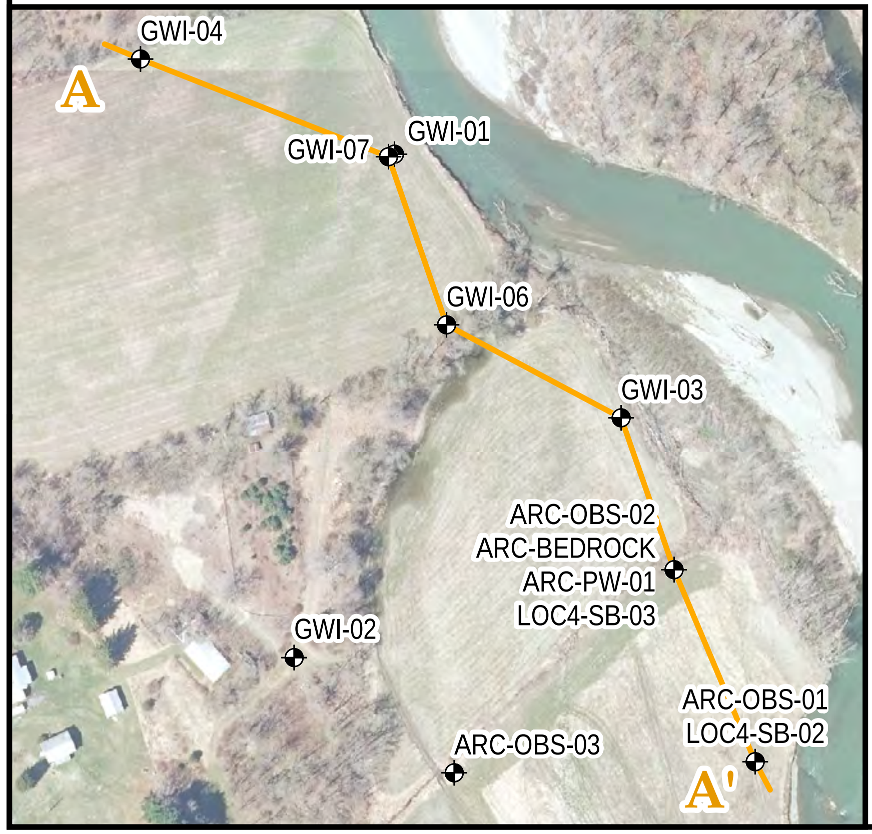

Legend

⌖ Monitoring Wells

— Transect Line

— Ground Surface

▥ Well Screen

— Borehole Lines

- - - Top of Bedrock

Predominant Geologic Material

▨ Bedrock

▤ Clay/Silt

▩ Sand/Gravel

▦ Diamict (Glacial Till)

NOTES:

- Geologic units estimated based on interpolation of borelog information
- Vertical Exaggeration = 2X

Figure 5a: GeologicCross Section A-A'

Town of Hoosick, New York

ERM

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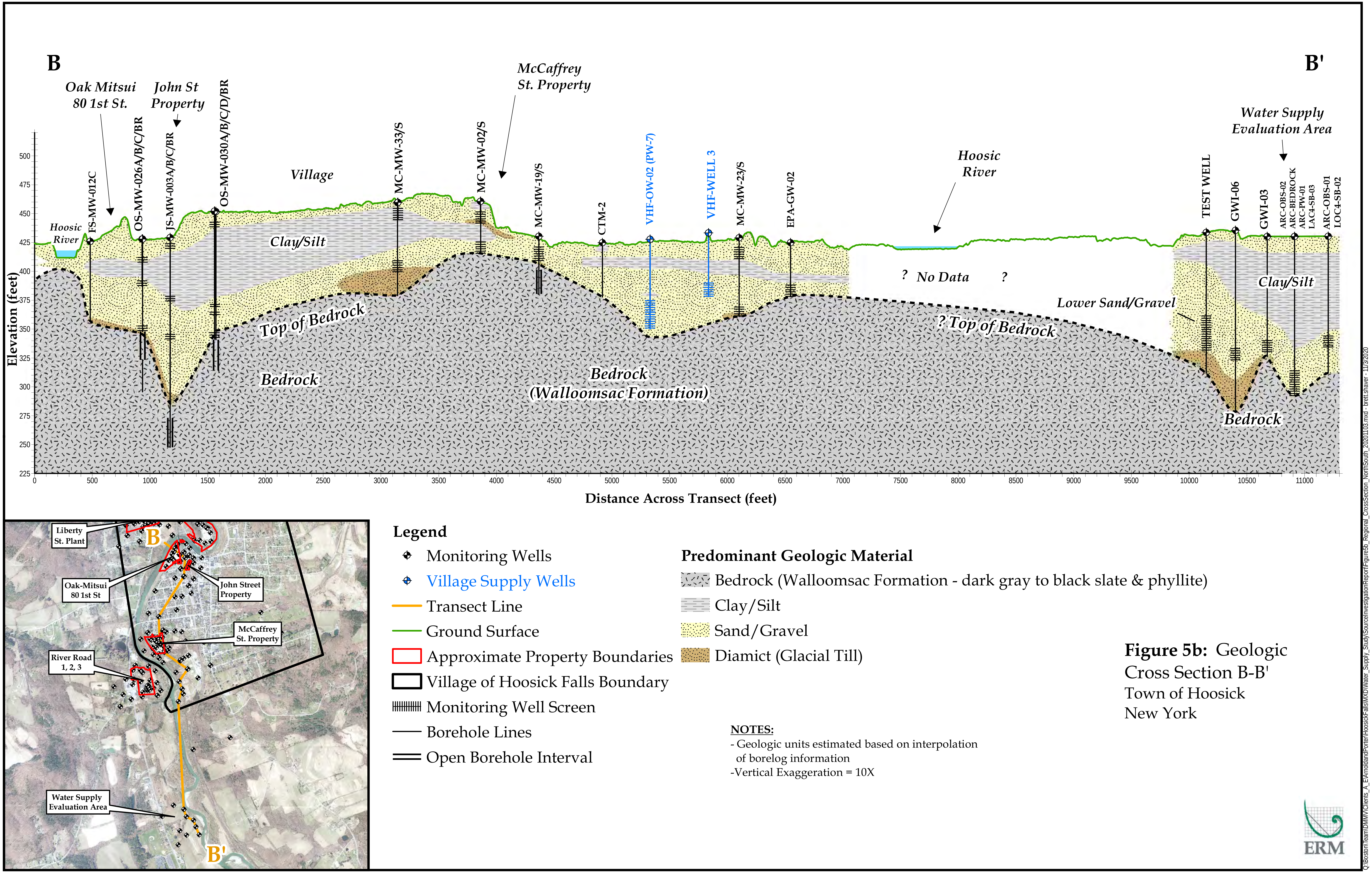

Legend

- ⌖ Monitoring Wells
- ⌖ Village Supply Wells
- — Transect Line
- — Ground Surface
- ☐ Approximate Property Boundaries
- ☐ Village of Hoosick Falls Boundary
- ▥ Monitoring Well Screen
- — Borehole Lines
- ═ Open Borehole Interval

Predominant Geologic Material

- ▨ Bedrock (Walloomsac Formation - dark gray to black slate & phyllite)
- ▤ Clay/Silt
- ▦ Sand/Gravel
- ▩ Diamict (Glacial Till)

NOTES:
- Geologic units estimated based on interpolation of borelog information
-Vertical Exaggeration = 10X

Figure 5b: Geologic Cross Section B-B'
Town of Hoosick
New York

ERM

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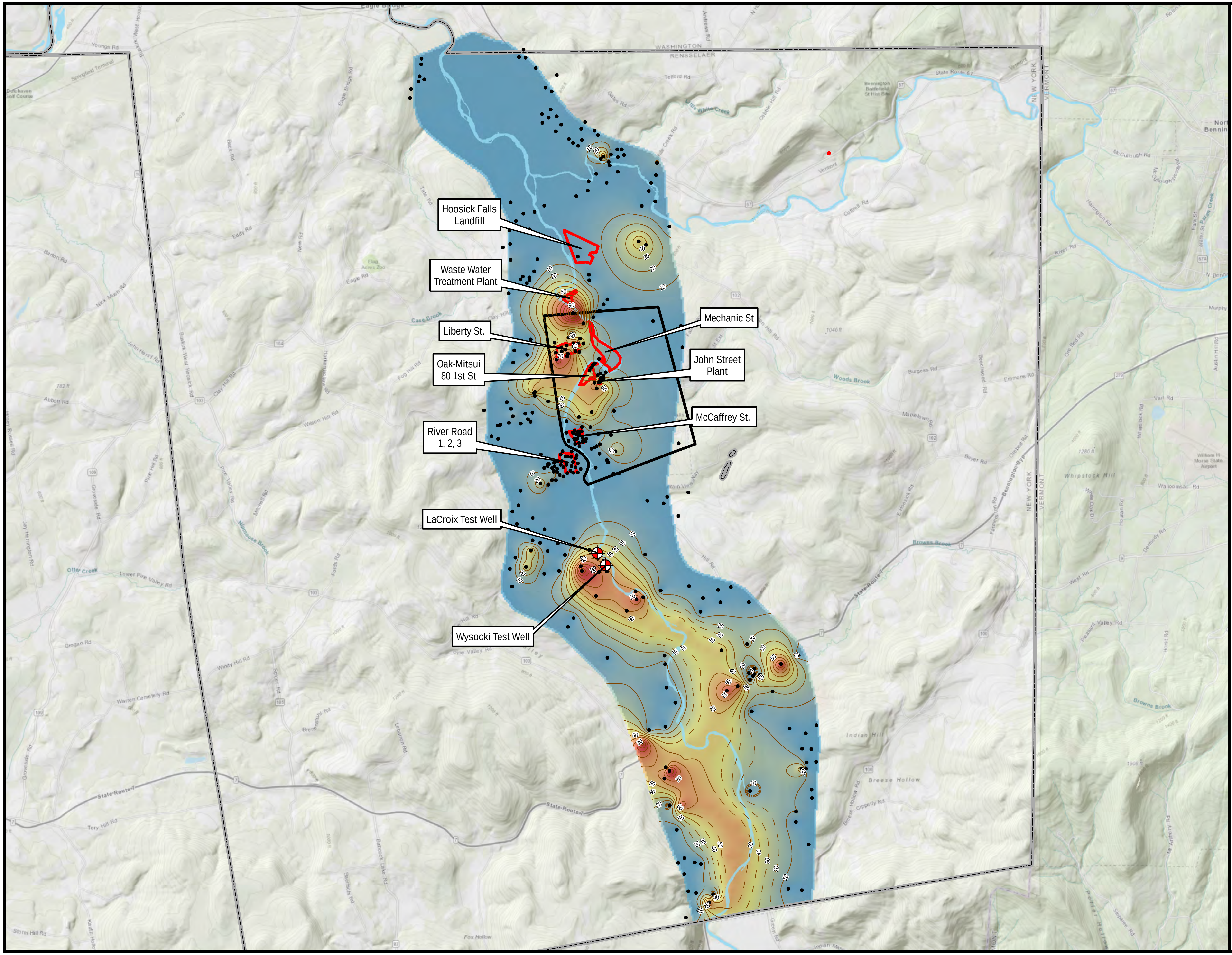

Legend

- ⊕ Test Well
- • Locations with Clay Thickness (n=348)
- — Clay Thickness (10 ft contours)
- – – Inferred Contour
- ⋯ Depression
- 🟥 Approximate Property Boundaries
- ☐ Village of Hoosick Falls Boundary
- ☐ Hoosick Town Boundary

Interpolated Clay Thickness (ft)

High : 140.727

Low : 0

NOTES:

Clay thickness data derived from individual site data and DEC well completion records. Thickness interpolated using GIS spatial analysis. Interpolation boundary is approximate Hoosick River Valley

N

0 0.25 0.5 1 1.5 2

Miles

Figure 6: Regional Clay Thickness

Town of Hoosick
New York
August, 2019

ERM

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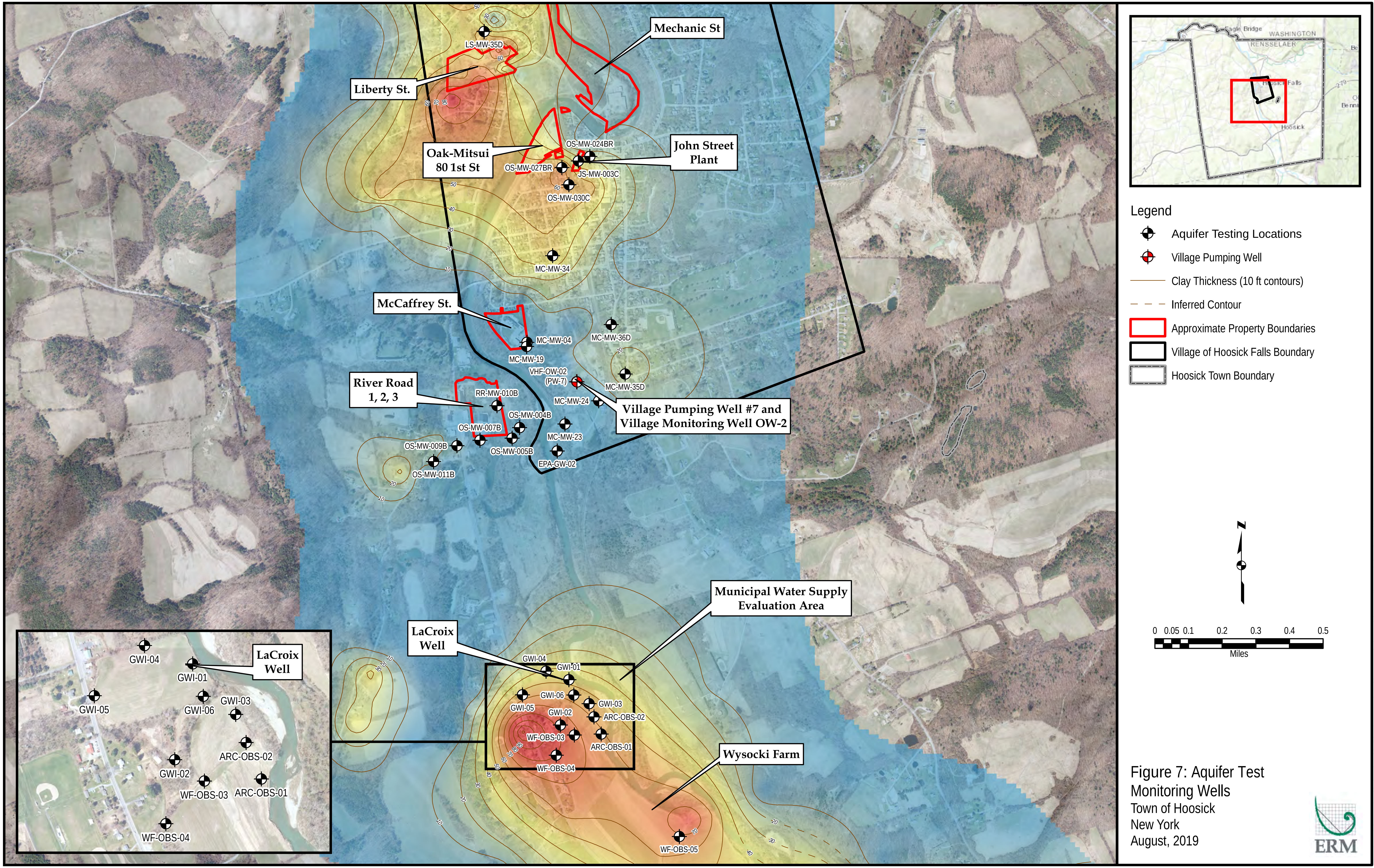

Figure 7: Aquifer Test Monitoring Wells
Town of Hoosick
New York
August, 2019

ERM

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Figure 8: River Time Lag in Minutes *Town of Hoosick , New York*

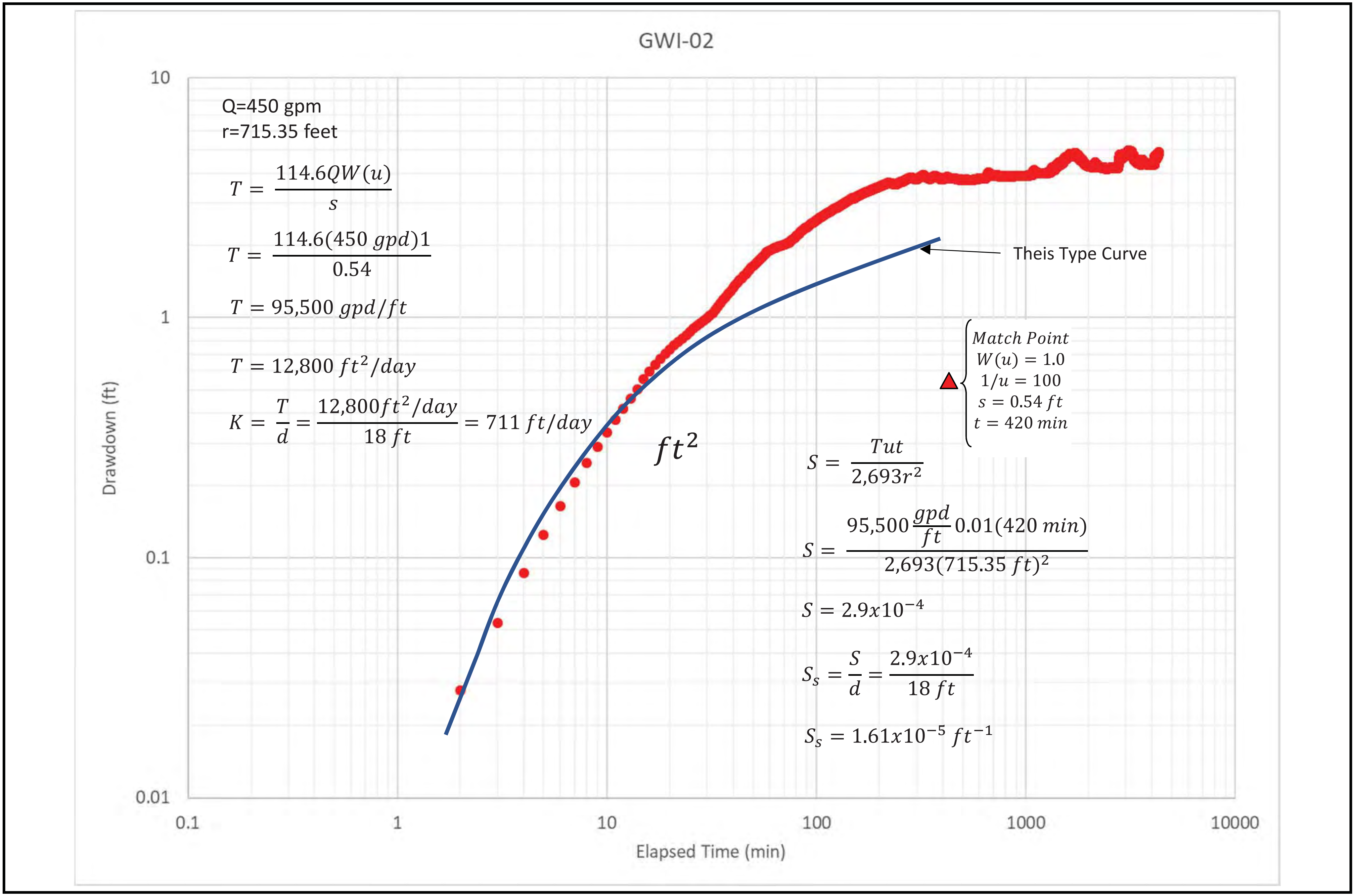


Figure 9: Early-Time Theis Type Curve Analysis of GWI-02 *Hoosick Falls, New York*

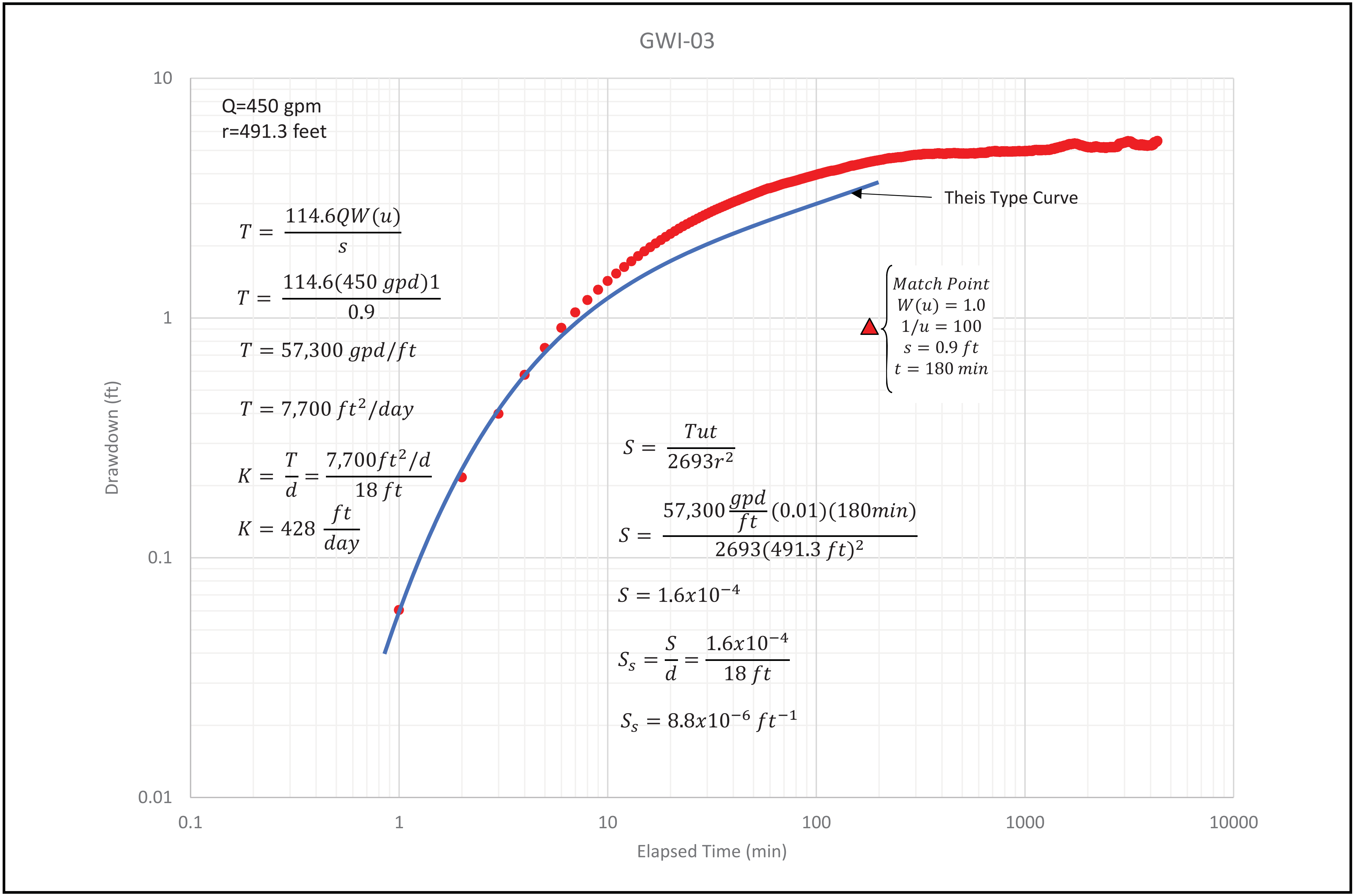
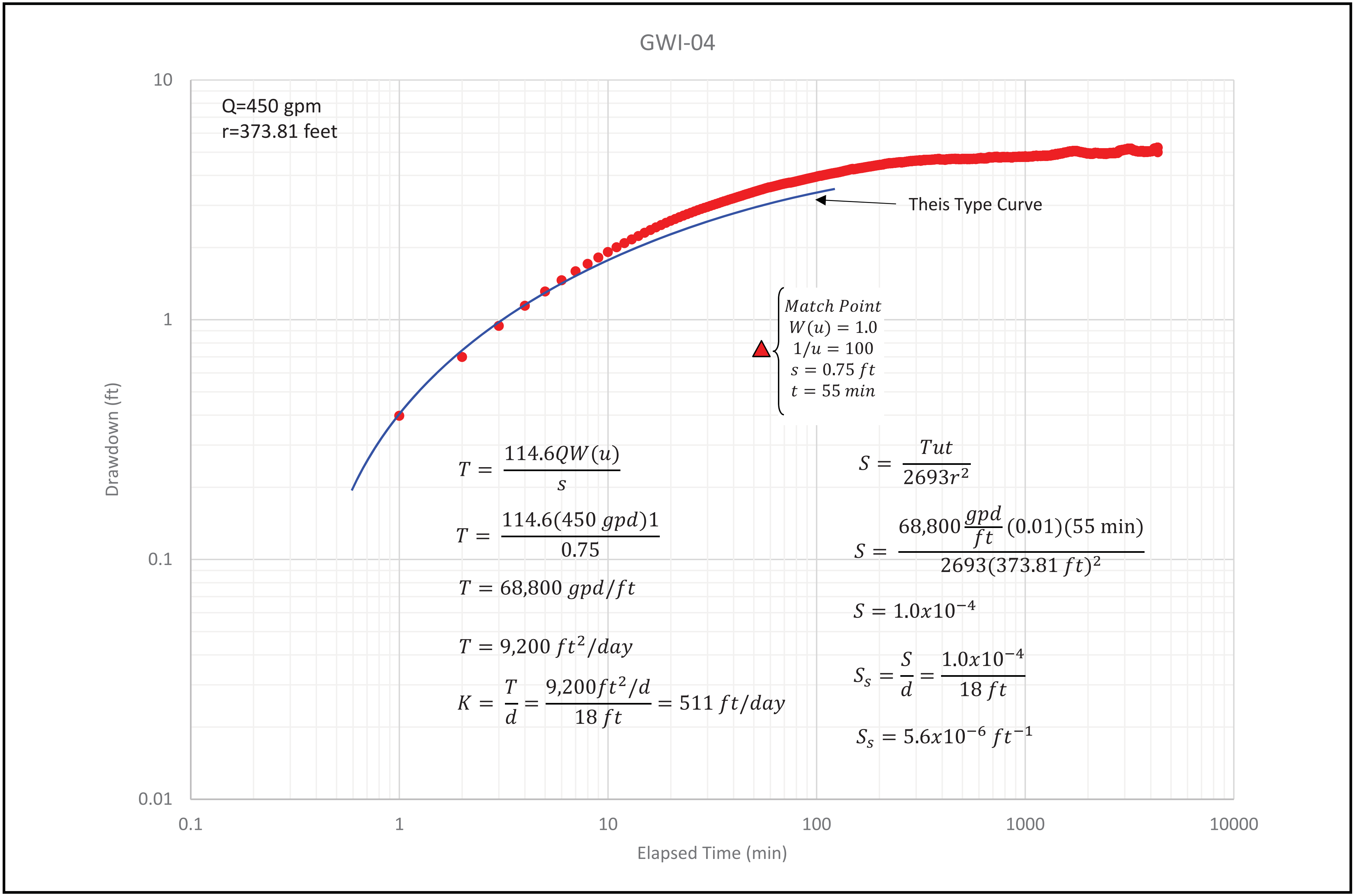


Figure 10: Early-Time Theis Type Curve Analysis of GWI-03 *Hoosick Falls, New York*



Match Point
$W(u) = 1.0$
$1/u = 100$
$s = 0.75\ ft$
$t = 55\ min$

$$T = \frac{114.6QW(u)}{s}$$

$$T = \frac{114.6(450\ gpd)1}{0.75}$$

$$T = 68{,}800\ gpd/ft$$

$$T = 9{,}200\ ft^2/day$$

$$K = \frac{T}{d} = \frac{9{,}200 ft^2/d}{18\ ft} = 511\ ft/day$$

$$S = \frac{Tut}{2693r^2}$$

$$S = \frac{68{,}800 \frac{gpd}{ft}(0.01)(55\text{ min})}{2693(373.81\ ft)^2}$$

$$S = 1.0x10^{-4}$$

$$S_s = \frac{S}{d} = \frac{1.0x10^{-4}}{18\ ft}$$

$$S_s = 5.6x10^{-6}\ ft^{-1}$$

Figure 11: Early-Time Theis Type Curve Analysis of GWI-04 *Hoosick Falls, New York*

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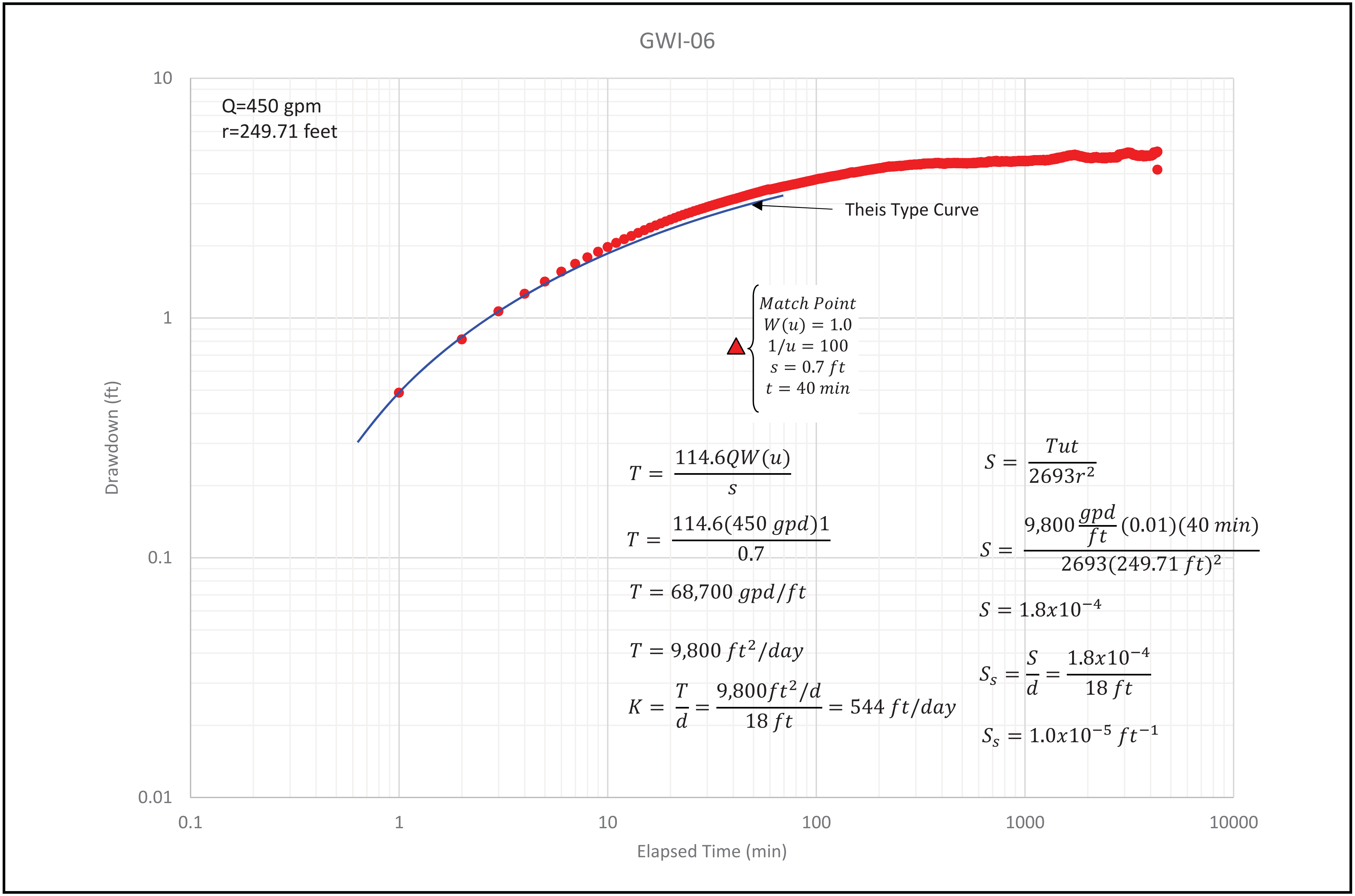

Figure 12: Early-Time Theis Type Curve Analysis of GWI-06 *Hoosick Falls, New York*

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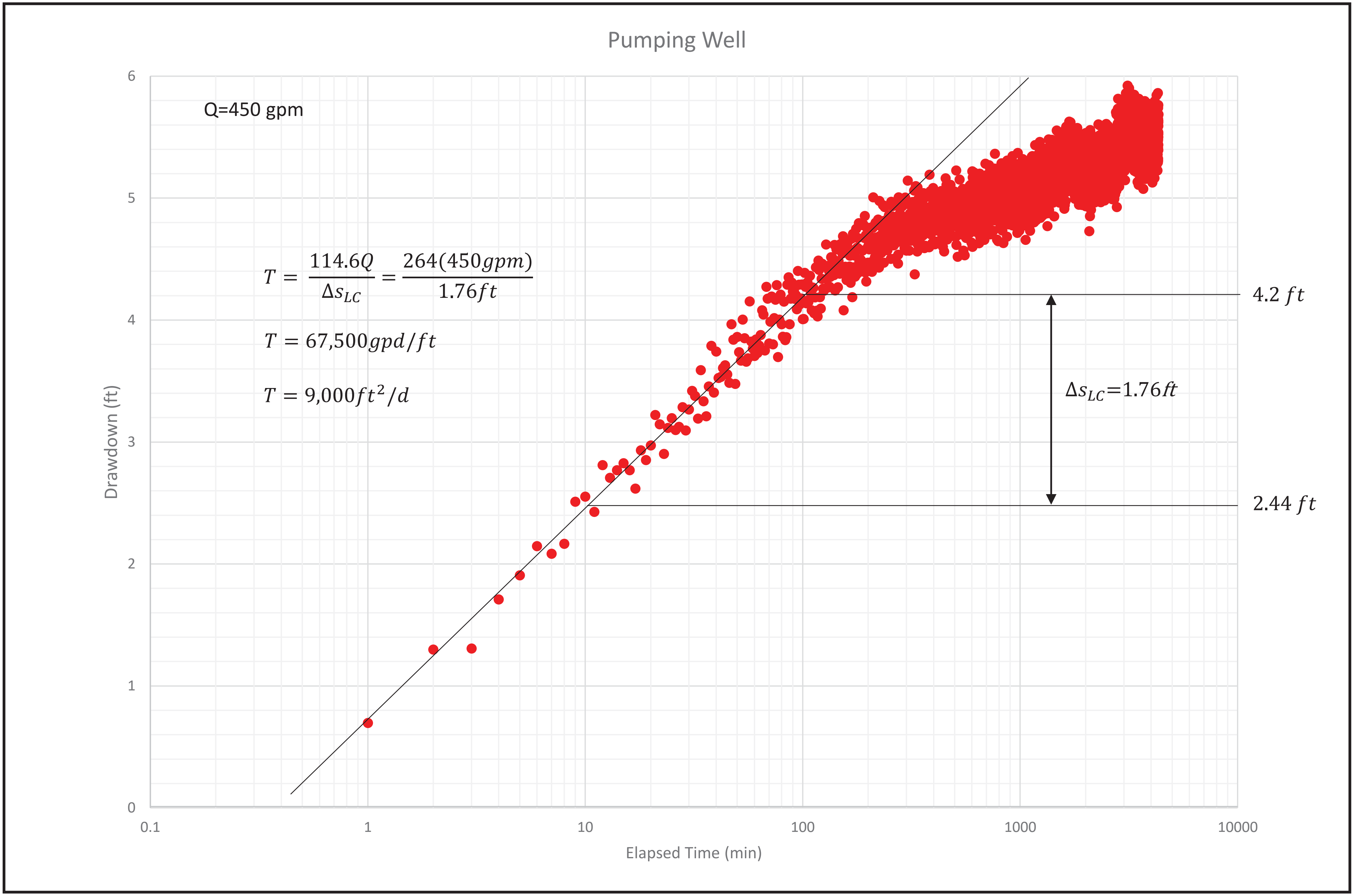

Figure 13: Cooper-Jacob Analysis of Drawdown in Pumping Well
Hoosick Falls, New York

Mutch Associates, LLC
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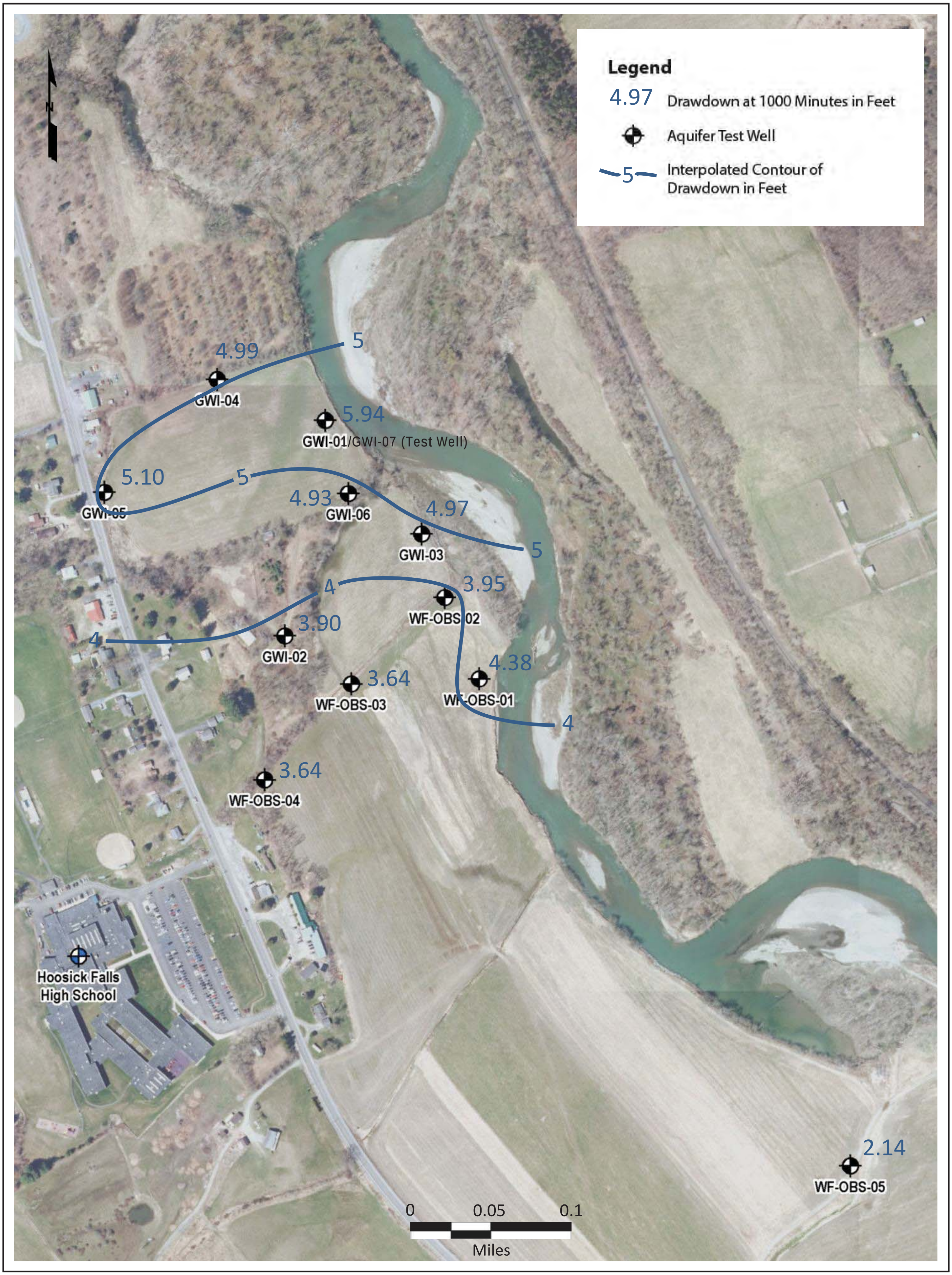

Figure 14: Drawdown at 1000 minutes in Feet *Town of Hoosick , New York*

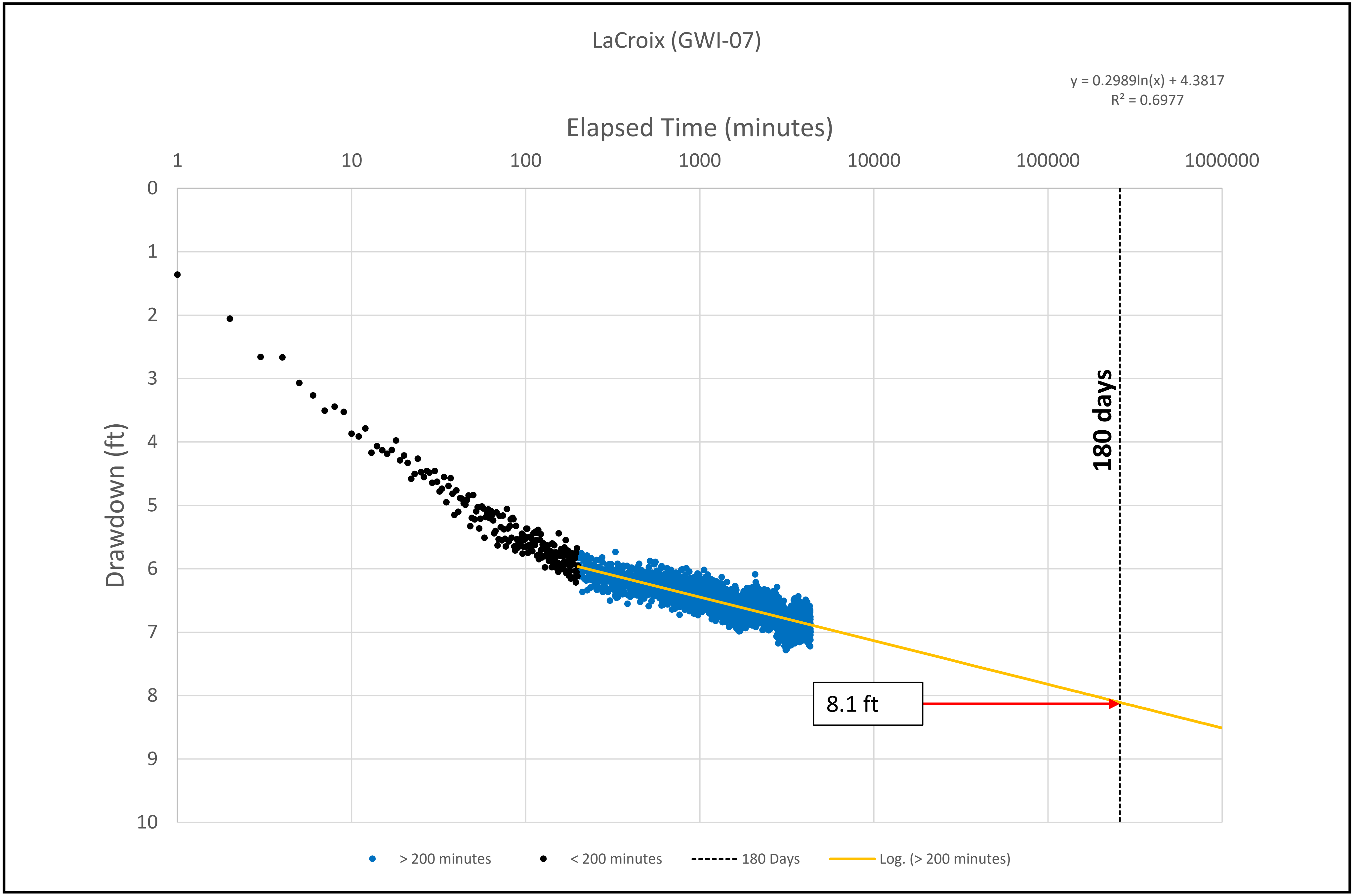

Figure 15: Extrapolated Drawdown at 180 days – LaCroix Well (GWI-07)

Hoosick Falls, New York

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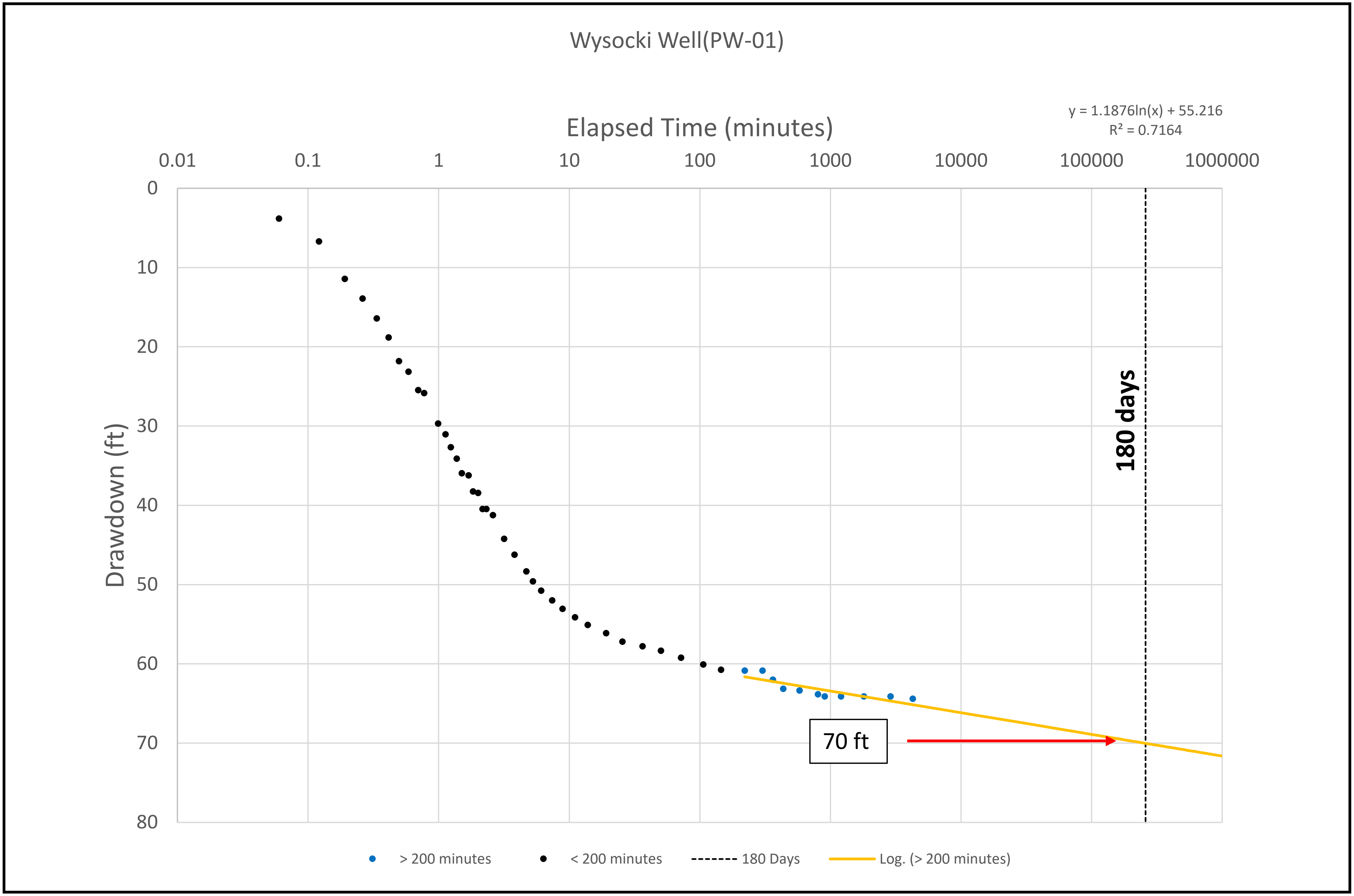

Figure 16: Extrapolated Drawdown at 180 days – Wysocki Well (PW-01)

Hoosick Falls, New York

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Environmental Engineers and Scientists

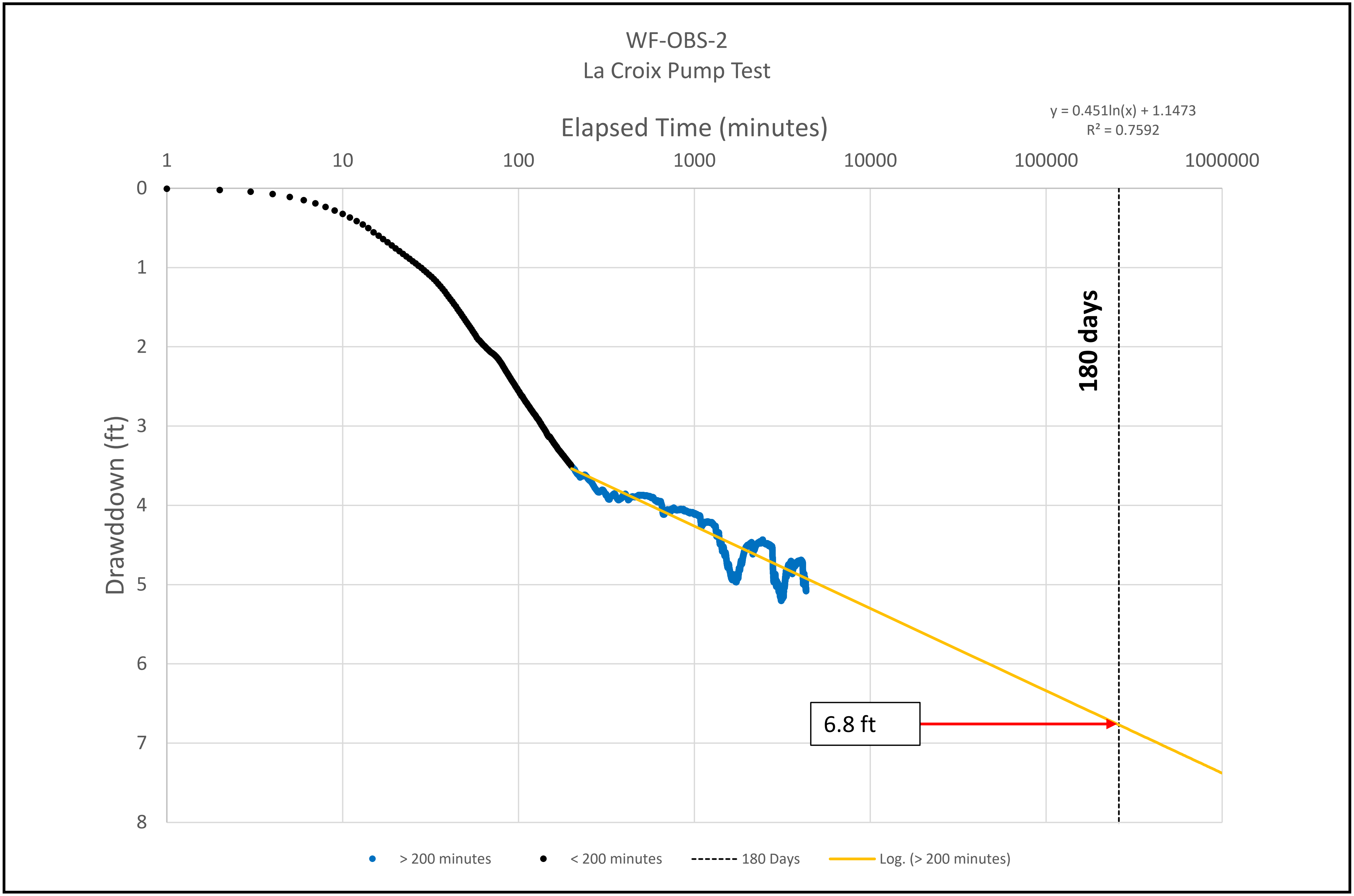

Figure 17: Extrapolated Drawdown at 180 days – La Croix WF-OBS-2

Hoosick Falls, New York

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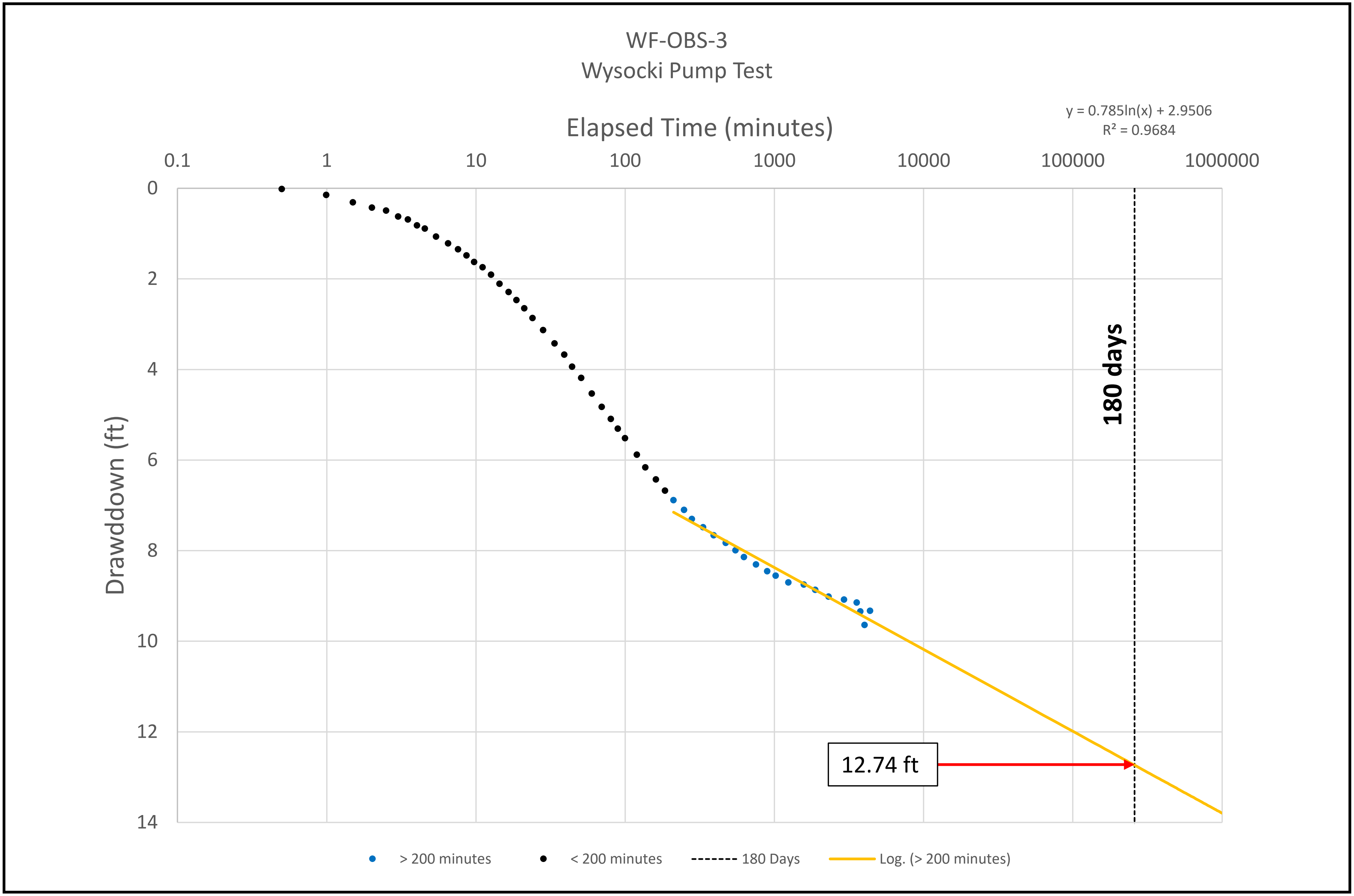

Figure 18: Extrapolated Drawdown at 180 days – Wysocki Pump Test – WF-OBS-3

Hoosick Falls, New York

Mutch Associates, LLC
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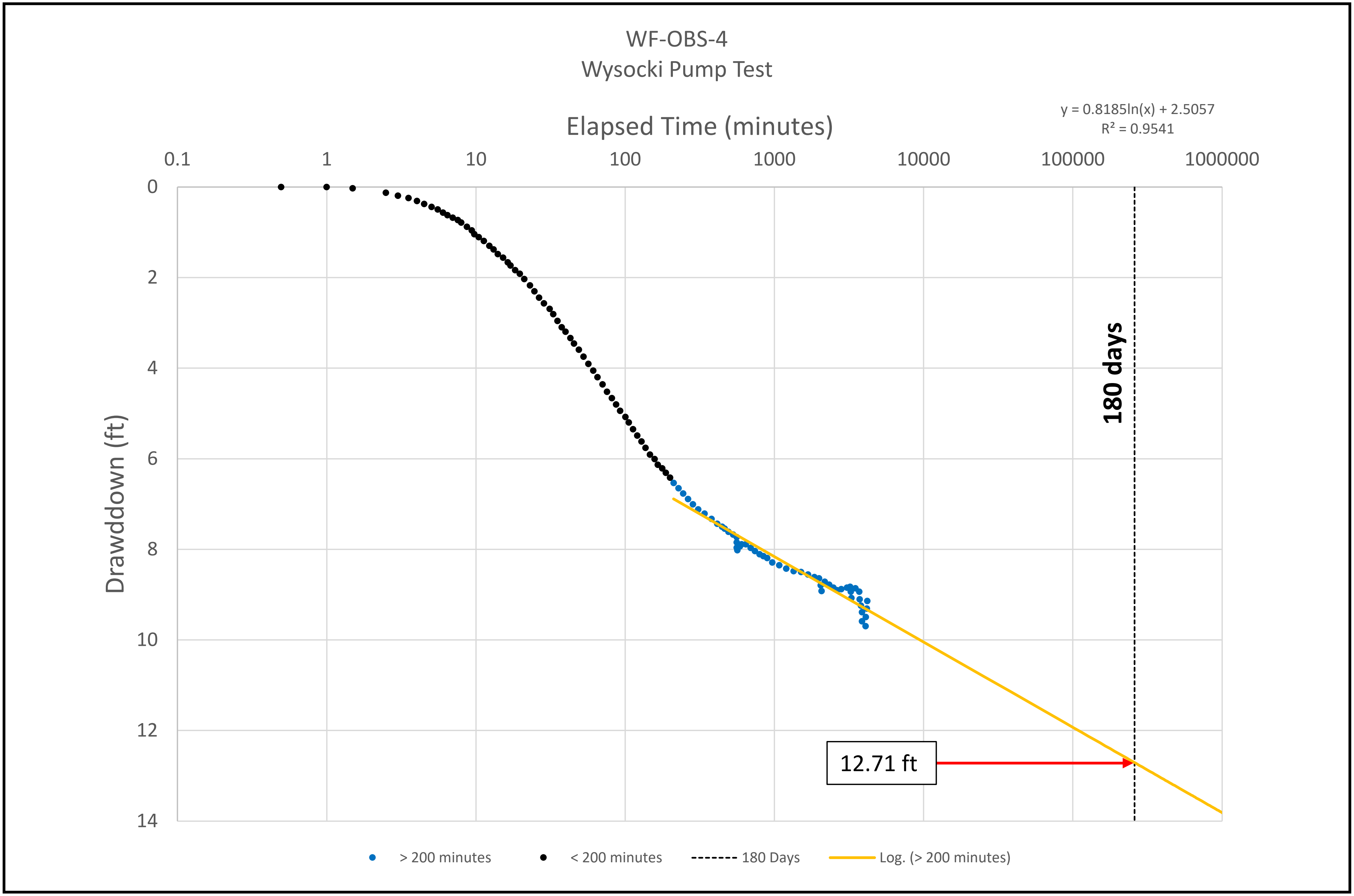

Figure 19: Extrapolated Drawdown at 180 days – Wysocki Pump Test – WF-OBS-4

Hoosick Falls, New York

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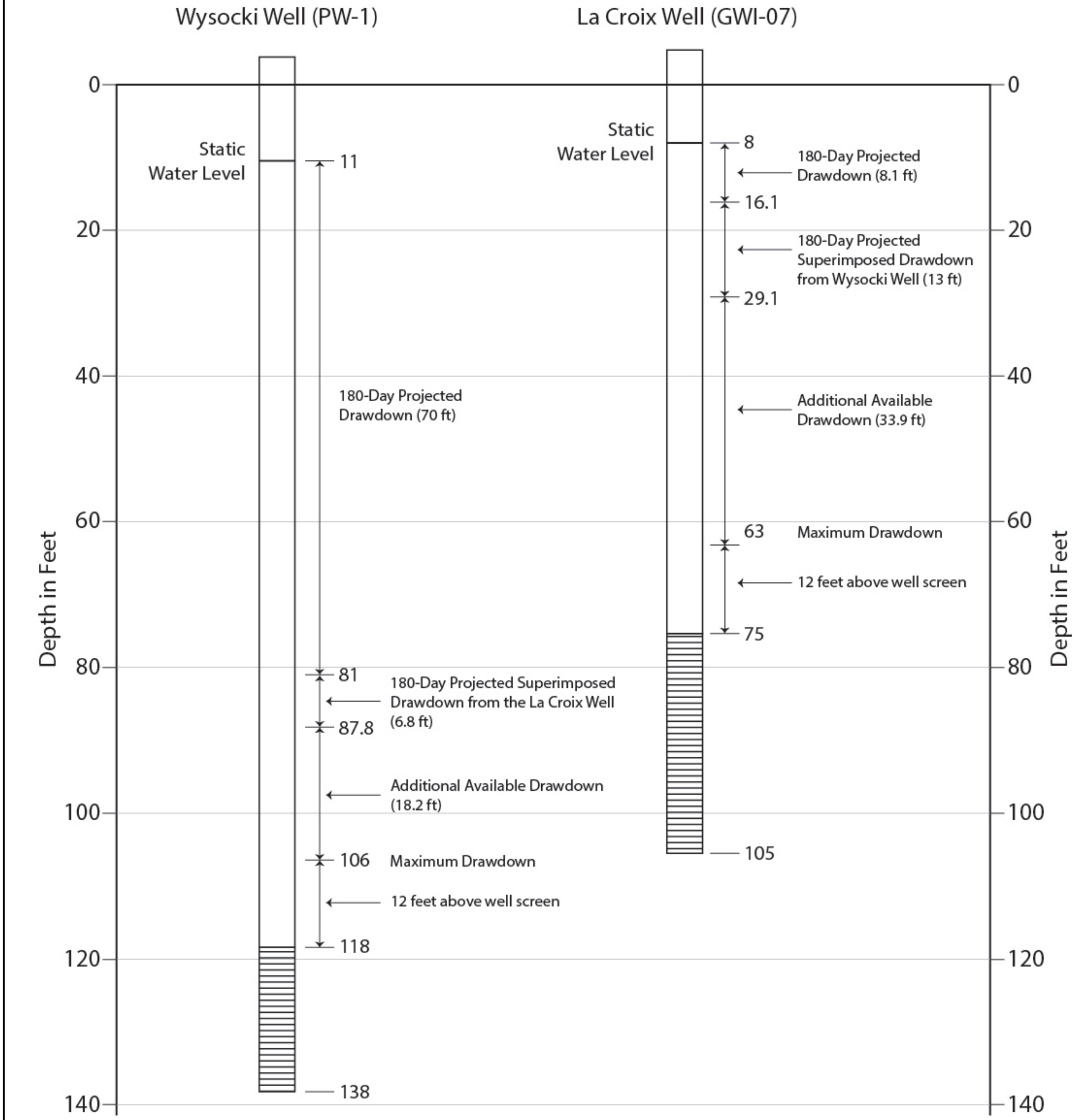

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Figure 20: Schematic of Projected and Additional Available Drawdowns in Wysocki Well (PW-1) and the La Croix Well

Town of Hoosick , New York

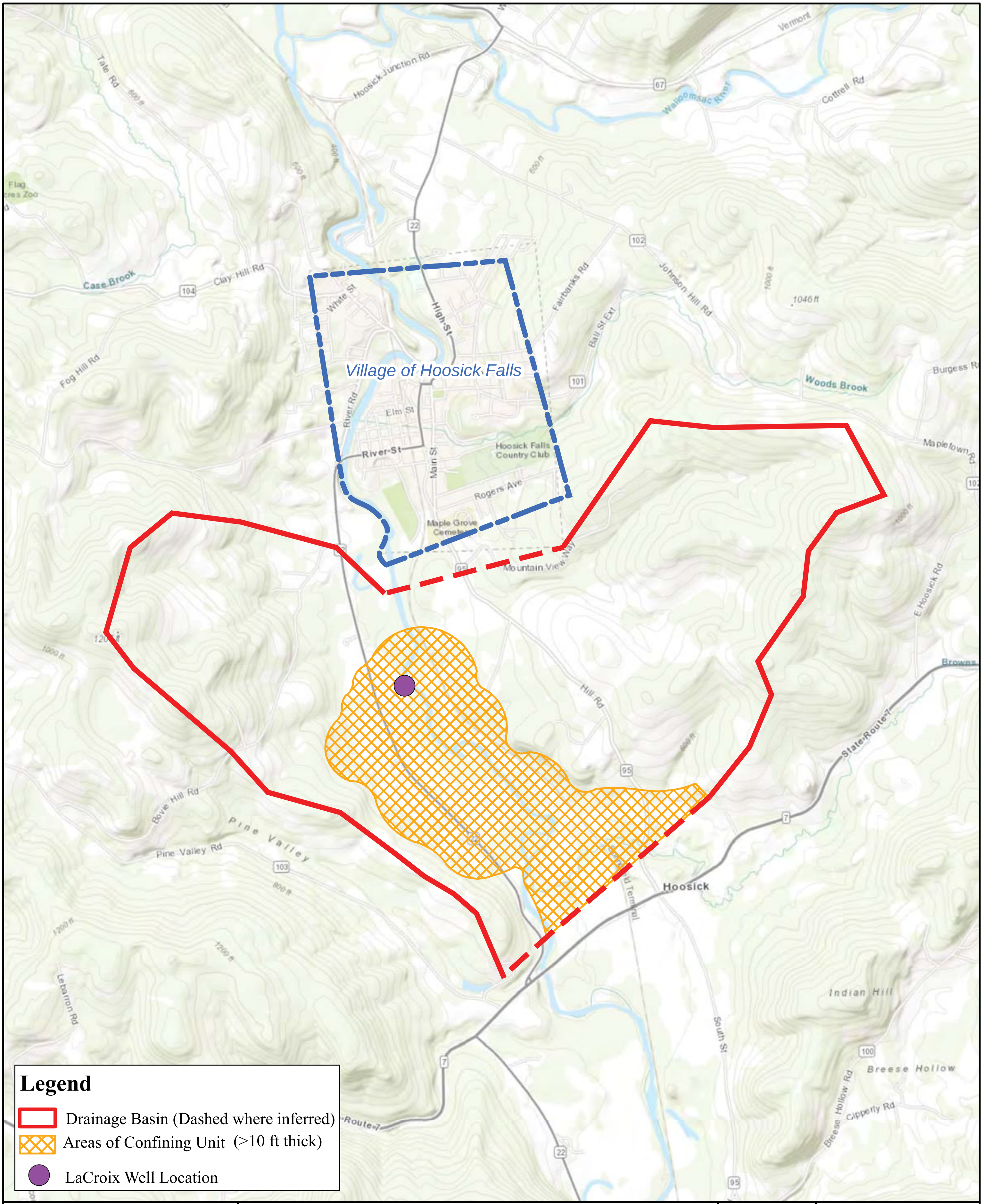

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Figure 21 - Groundwater Recharge Basin

Hydrogeologic Investigation Report

N
W E
S

1 inch = 3,400 feet

Project No. : 34730

June 2019

0 1,700 3,400
Feet

Tables

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-01
			Sample Date	9/26/2018	11/7/2018
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
General Chemistry					
Asbestos	mfl	NS	NS	5.4 U	
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS		
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS		
COD - Chemical Oxygen Demand	mg/l	NS	NS		
Color, Unknown	color unit	NS	NS	10	
Fecal Coliform	MPN/100 ml	NS	NS	10 U	
Total Coliform	per 100 ml	NS	NS	81	
Nitrate As Nitrous Oxide	mg/l	NS	NS		
Nitrogen, Ammonia (As N)	mg/l	NS	NS		
Nitrogen, Kjeldahl, Total	mg/l	NS	NS		
Nitrogen, Nitrate (As N)	mg/l	NS	10		
Nitrogen, Nitrate-Nitrite	mg/l	NS	10	0.05 UJ	
Nitrogen, Nitrite	mg/l	NS	0.02	0.17 UJ	
Odor	t.o.n.	NS	NS	1	
pH	ph units	NS	8.5		8
Resistivity	MOHM/CM	NS	NS		
Specific Conductance	umhos/cm	NS	NS		
Temperature	deg c	NS	NS		21.4
Total Dissolved Solids	mg/l	NS	NS	5 U	
Total Organic Carbon	mg/l	NS	NS		0.82 J
Turbidity	ntu	NS	NS	3.12	

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
mg/l = milligrams per liter
ug/l = micrograms per liter
ng/l = nanograms per liter
ntu = nephelometric turbidity units
t.o.n. = threshold order number
pg/l = picogram per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-02
			Sample Date	5/7/2019	9/27/2018
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
General Chemistry					
Asbestos	mfl	NS	NS		18.0 U
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS	206	
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS		
COD - Chemical Oxygen Demand	mg/l	NS	NS	7.5 J	
Color, Unknown	color unit	NS	NS		25
Fecal Coliform	MPN/100 ml	NS	NS		10 U
Total Coliform	per 100 ml	NS	NS		1636
Nitrate As Nitrous Oxide	mg/l	NS	NS		0.17 U
Nitrogen, Ammonia (As N)	mg/l	NS	NS	0.25 U	
Nitrogen, Kjeldahl, Total	mg/l	NS	NS	0.21	
Nitrogen, Nitrate (As N)	mg/l	NS	10	0.05 U	
Nitrogen, Nitrate-Nitrite	mg/l	NS	10		0.05 U
Nitrogen, Nitrite	mg/l	NS	0.02	0.05 U	0.05 U
Odor	t.o.n.	NS	NS		1 UJ
pH	ph units	NS	8.5	8.1	
Resistivity	MOHM/CM	NS	NS	0.2 U	
Specific Conductance	umhos/cm	NS	NS	590	
Temperature	deg c	NS	NS		
Total Dissolved Solids	mg/l	NS	NS	384	
Total Organic Carbon	mg/l	NS	NS		
Turbidity	ntu	NS	NS		50.8 J

Notes:
- N = Normal Environmental Sample
- FD = Field Duplicate Sample
- mg/l = milligrams per liter
- ug/l = micrograms per liter
- ng/l = nanograms per liter
- ntu = nephelometric turbidity units
- t.o.n. = threshold order number
- pg/l = picogram per liter

Qualifiers:
- J = Reported value is estimated.
- U = Indicates the analyte was analyzed for but not detected.
- Shaded cells = positive detection above comparison value
- Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-02
			Sample Date	9/27/2018	11/7/2018
			Sample Type	FD	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
General Chemistry					
Asbestos	mfl	NS	NS	5.4 U	
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS		
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS		
COD - Chemical Oxygen Demand	mg/l	NS	NS		
Color, Unknown	color unit	NS	NS	25	
Fecal Coliform	MPN/100 ml	NS	NS	10 U	
Total Coliform	per 100 ml	NS	NS	2100	
Nitrate As Nitrous Oxide	mg/l	NS	NS	0.17 U	
Nitrogen, Ammonia (As N)	mg/l	NS	NS		
Nitrogen, Kjeldahl, Total	mg/l	NS	NS		
Nitrogen, Nitrate (As N)	mg/l	NS	10		
Nitrogen, Nitrate-Nitrite	mg/l	NS	10	0.05 U	
Nitrogen, Nitrite	mg/l	NS	0.02	0.05 U	
Odor	t.o.n.	NS	NS	1 UJ	
pH	ph units	NS	8.5		8.1
Resistivity	MOHM/CM	NS	NS		
Specific Conductance	umhos/cm	NS	NS		
Temperature	deg c	NS	NS		21.7
Total Dissolved Solids	mg/l	NS	NS		
Total Organic Carbon	mg/l	NS	NS		1.4
Turbidity	ntu	NS	NS	6.81 J	

Notes:
- N = Normal Environmental Sample
- FD = Field Duplicate Sample
- mg/l = milligrams per liter
- ug/l = micrograms per liter
- ng/l = nanograms per liter
- ntu = nephelometric turbidity units
- t.o.n. = threshold order number
- pg/l = picogram per liter

Qualifiers:
- J = Reported value is estimated.
- U = Indicates the analyte was analyzed for but not detected.
- Shaded cells = positive detection above comparison value
- Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-02
			Sample Date	5/7/2019	5/7/2019
			Sample Type	FD	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
General Chemistry					
Asbestos	mfl	NS	NS		
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS	209	217
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS		
COD - Chemical Oxygen Demand	mg/l	NS	NS	10 U	10 U
Color, Unknown	color unit	NS	NS		
Fecal Coliform	MPN/100 ml	NS	NS		
Total Coliform	per 100 ml	NS	NS		
Nitrate As Nitrous Oxide	mg/l	NS	NS		
Nitrogen, Ammonia (As N)	mg/l	NS	NS	0.25 U	0.18 J
Nitrogen, Kjeldahl, Total	mg/l	NS	NS	0.24	0.18 J
Nitrogen, Nitrate (As N)	mg/l	NS	10	0.05 UJ	0.05 U
Nitrogen, Nitrate-Nitrite	mg/l	NS	10		
Nitrogen, Nitrite	mg/l	NS	0.02	0.05 UJ	0.05 U
Odor	t.o.n.	NS	NS		
pH	ph units	NS	8.5	8.1	8.1
Resistivity	MOHM/CM	NS	NS	0.2 U	0.2 U
Specific Conductance	umhos/cm	NS	NS	625	624
Temperature	deg c	NS	NS		
Total Dissolved Solids	mg/l	NS	NS	398	412
Total Organic Carbon	mg/l	NS	NS		
Turbidity	ntu	NS	NS		

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
mg/l = milligrams per liter
ug/l = micrograms per liter
ng/l = nanograms per liter
ntu = nephelometric turbidity units
t.o.n. = threshold order number
pg/l = picogram per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-03	GWI-03
			Sample Date	9/27/2018	11/7/2018
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
General Chemistry					
Asbestos	mfl	NS	NS	1.1 U	
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS		
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS		
COD - Chemical Oxygen Demand	mg/l	NS	NS		
Color, Unknown	color unit	NS	NS	10	
Fecal Coliform	MPN/100 ml	NS	NS	10 U	
Total Coliform	per 100 ml	NS	NS	171	
Nitrate As Nitrous Oxide	mg/l	NS	NS	0.17 U	
Nitrogen, Ammonia (As N)	mg/l	NS	NS		
Nitrogen, Kjeldahl, Total	mg/l	NS	NS		
Nitrogen, Nitrate (As N)	mg/l	NS	10		
Nitrogen, Nitrate-Nitrite	mg/l	NS	10	0.033 J	
Nitrogen, Nitrite	mg/l	NS	0.02	0.05 U	
Odor	t.o.n.	NS	NS	1 UJ	
pH	ph units	NS	8.5		8.9
Resistivity	MOHM/CM	NS	NS		
Specific Conductance	umhos/cm	NS	NS		
Temperature	deg c	NS	NS		21.8
Total Dissolved Solids	mg/l	NS	NS		
Total Organic Carbon	mg/l	NS	NS		1.2
Turbidity	ntu	NS	NS	22.8 J	

Notes:
- N = Normal Environmental Sample
- FD = Field Duplicate Sample
- mg/l = milligrams per liter
- ug/l = micrograms per liter
- ng/l = nanograms per liter
- ntu = nephelometric turbidity units
- t.o.n. = threshold order number
- pg/l = picogram per liter

Qualifiers:
- J = Reported value is estimated.
- U = Indicates the analyte was analyzed for but not detected.
- Shaded cells = positive detection above comparison value
- Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-03	GWI-03
			Sample Date	11/7/2018	5/7/2019
			Sample Type	FD	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
General Chemistry					
Asbestos	mfl	NS	NS		
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS		63.9
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS		2 UJ
COD - Chemical Oxygen Demand	mg/l	NS	NS		10 U
Color, Unknown	color unit	NS	NS		
Fecal Coliform	MPN/100 ml	NS	NS		
Total Coliform	per 100 ml	NS	NS		
Nitrate As Nitrous Oxide	mg/l	NS	NS		
Nitrogen, Ammonia (As N)	mg/l	NS	NS		0.25 U
Nitrogen, Kjeldahl, Total	mg/l	NS	NS		0.1 J
Nitrogen, Nitrate (As N)	mg/l	NS	10		0.05 UJ
Nitrogen, Nitrate-Nitrite	mg/l	NS	10		
Nitrogen, Nitrite	mg/l	NS	0.02		0.022 J
Odor	t.o.n.	NS	NS		
pH	ph units	NS	8.5	8.9	8.7
Resistivity	MOHM/CM	NS	NS		0.2 U
Specific Conductance	umhos/cm	NS	NS		256
Temperature	deg c	NS	NS	22	
Total Dissolved Solids	mg/l	NS	NS		20
Total Organic Carbon	mg/l	NS	NS	1.1	
Turbidity	ntu	NS	NS		

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
mg/l = milligrams per liter
ug/l = micrograms per liter
ng/l = nanograms per liter
ntu = nephelometric turbidity units
t.o.n. = threshold order number
pg/l = picogram per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1

Monitoring Well Analytical Data

Hydrogeologic Report

			Location ID	GWI-04	GWI-04
			Sample Date	11/7/2018	5/7/2019
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
General Chemistry					
Asbestos	mfl	NS	NS		
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS		180
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS		
COD - Chemical Oxygen Demand	mg/l	NS	NS		10 U
Color, Unknown	color unit	NS	NS		
Fecal Coliform	MPN/100 ml	NS	NS		
Total Coliform	per 100 ml	NS	NS		
Nitrate As Nitrous Oxide	mg/l	NS	NS		
Nitrogen, Ammonia (As N)	mg/l	NS	NS		0.15 J
Nitrogen, Kjeldahl, Total	mg/l	NS	NS		0.29
Nitrogen, Nitrate (As N)	mg/l	NS	10		0.05 U
Nitrogen, Nitrate-Nitrite	mg/l	NS	10		
Nitrogen, Nitrite	mg/l	NS	0.02		0.05 U
Odor	t.o.n.	NS	NS		
pH	ph units	NS	8.5	8	8.2
Resistivity	MOHM/CM	NS	NS		0.2 U
Specific Conductance	umhos/cm	NS	NS		418
Temperature	deg c	NS	NS	22	
Total Dissolved Solids	mg/l	NS	NS		288
Total Organic Carbon	mg/l	NS	NS	0.62 J	
Turbidity	ntu	NS	NS		

Notes:

N = Normal Environmental Sample
FD = Field Duplicate Sample
mg/l = milligrams per liter
ug/l = micrograms per liter
ng/l = nanograms per liter
ntu = nephelometric turbidity units
t.o.n. = threshold order number
pg/l = picogram per liter

Qualifiers:

J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-05	GWI-05
			Sample Date	11/1/2018	11/8/2018
			Sample Type	FD	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
General Chemistry					
Asbestos	mfl	NS	NS		
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS		
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS		
COD - Chemical Oxygen Demand	mg/l	NS	NS		
Color, Unknown	color unit	NS	NS		
Fecal Coliform	MPN/100 ml	NS	NS		
Total Coliform	per 100 ml	NS	NS		
Nitrate As Nitrous Oxide	mg/l	NS	NS		
Nitrogen, Ammonia (As N)	mg/l	NS	NS		
Nitrogen, Kjeldahl, Total	mg/l	NS	NS	0.21	
Nitrogen, Nitrate (As N)	mg/l	NS	10		
Nitrogen, Nitrate-Nitrite	mg/l	NS	10		
Nitrogen, Nitrite	mg/l	NS	0.02		
Odor	t.o.n.	NS	NS		
pH	ph units	NS	8.5		12.1 J
Resistivity	MOHM/CM	NS	NS		
Specific Conductance	umhos/cm	NS	NS		
Temperature	deg c	NS	NS		22
Total Dissolved Solids	mg/l	NS	NS		
Total Organic Carbon	mg/l	NS	NS		5.4
Turbidity	ntu	NS	NS		

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
mg/l = milligrams per liter
ug/l = micrograms per liter
ng/l = nanograms per liter
ntu = nephelometric turbidity units
t.o.n. = threshold order number
pg/l = picogram per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-05	GWI-06
			Sample Date	5/8/2019	11/9/2018
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
General Chemistry					
Asbestos	mfl	NS	NS		
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS	6.3	
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS		
COD - Chemical Oxygen Demand	mg/l	NS	NS	143	
Color, Unknown	color unit	NS	NS		
Fecal Coliform	MPN/100 ml	NS	NS		
Total Coliform	per 100 ml	NS	NS		
Nitrate As Nitrous Oxide	mg/l	NS	NS		
Nitrogen, Ammonia (As N)	mg/l	NS	NS	0.34	
Nitrogen, Kjeldahl, Total	mg/l	NS	NS	2.8	
Nitrogen, Nitrate (As N)	mg/l	NS	10	0.04 J	
Nitrogen, Nitrate-Nitrite	mg/l	NS	10		
Nitrogen, Nitrite	mg/l	NS	0.02	0.05 U	
Odor	t.o.n.	NS	NS		
pH	ph units	NS	8.5	10.7	8.2
Resistivity	MOHM/CM	NS	NS	0.2 U	
Specific Conductance	umhos/cm	NS	NS	444	
Temperature	deg c	NS	NS		21.6
Total Dissolved Solids	mg/l	NS	NS	314	
Total Organic Carbon	mg/l	NS	NS		1.2
Turbidity	ntu	NS	NS		

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
mg/l = milligrams per liter
ug/l = micrograms per liter
ng/l = nanograms per liter
ntu = nephelometric turbidity units
t.o.n. = threshold order number
pg/l = picogram per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-06
			Sample Date	5/7/2019
			Sample Type	N
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
General Chemistry				
Asbestos	mfl	NS	NS	
Alkalinity, Bicarbonate (As CaCO3)	mg/l	NS	NS	290
Biochemical Oxygen Demand (BOD)	mg/l	NS	NS	
COD - Chemical Oxygen Demand	mg/l	NS	NS	10 U
Color, Unknown	color unit	NS	NS	
Fecal Coliform	MPN/100 ml	NS	NS	
Total Coliform	per 100 ml	NS	NS	
Nitrate As Nitrous Oxide	mg/l	NS	NS	
Nitrogen, Ammonia (As N)	mg/l	NS	NS	0.25 U
Nitrogen, Kjeldahl, Total	mg/l	NS	NS	0.18 J
Nitrogen, Nitrate (As N)	mg/l	NS	10	0.05 U
Nitrogen, Nitrate-Nitrite	mg/l	NS	10	
Nitrogen, Nitrite	mg/l	NS	0.02	0.05 U
Odor	t.o.n.	NS	NS	
pH	ph units	NS	8.5	8.1
Resistivity	MOHM/CM	NS	NS	0.2 U
Specific Conductance	umhos/cm	NS	NS	582
Temperature	deg c	NS	NS	
Total Dissolved Solids	mg/l	NS	NS	390
Total Organic Carbon	mg/l	NS	NS	
Turbidity	ntu	NS	NS	

Notes:

N = Normal Environmental Sample
FD = Field Duplicate Sample
mg/l = milligrams per liter
ug/l = micrograms per liter
ng/l = nanograms per liter
ntu = nephelometric turbidity units
t.o.n. = threshold order number
pg/l = picogram per liter

Qualifiers:

J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-02	GWI-02	GWI-03
			Sample Date	9/26/2018	9/27/2018	9/27/2018	9/27/2018
			Sample Type	N	N	FD	N
			Validated - Y/N	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD				
Haloacetic Acids							
Chloroacetic Acid	ug/l	NS	NS	1 U	1 U	1 U	1 U
Dibromoacetic Acid	ug/l	NS	NS	1 U	1 U	1 U	1 U
Dichloroacetic Acid	ug/l	NS	NS	1 U	1 U	1 U	1 U
2,4-D (Dichlorophenoxyacetic Acid)	ug/l	NS	50	0.47 U	0.48 U	0.48 U	0.49 UJ
Haloacetic Acids 5, Total	ug/l	NS	NS	1 U	1 U	1 U	1 U
Haloacetic Acids, Total	ug/l	NS	NS	1 U	1 U	1 U	1 U
Monobromoacetic Acid	ug/l	NS	NS	1 U	1 U	1 U	1 U
Trichloroacetic Acid	ug/l	NS	NS	1 U	1 U	1 U	1 U

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:
U = Indicates the analyte was analyzed for but not detected.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-01
			Sample Date	9/26/2018	5/7/2019
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
Inorganics					
Aluminum	ug/l	NS	NS		49 U
Antimony	ug/l	NS	3	1 U	1 U
Arsenic	ug/l	NS	25	1 U	1
Barium	ug/l	NS	1000	112	251
Beryllium	ug/l	3	NS	0.4 U	0.4 U
Cadmium	ug/l	NS	5	0.5 U	0.5 U
Chromium	ug/l	NS	50	2 U	2 U
Cobalt	ug/l	NS	NS		0.28 J
Copper	ug/l	NS	200		0.71 J
Cyanide	ug/l	NS	200	10 U	
Iron	ug/l	NS	300	550	
Lead	ug/l	NS	25		0.093 J
Manganese	ug/l	NS	300	610	506
Mercury	ug/l	NS	0.7	0.2 U	0.2 U
Nickel	ug/l	NS	100	0.44 J	1.5 J
Potassium	ug/l	NS	NS		1200
Selenium	ug/l	NS	10	2 U	2 U
Silver	ug/l	NS	50	10 U	1 U
Sodium	ug/l	NS	20000	33300	
Thallium	ug/l	0.5	NS	0.2 U	0.2 U
Vanadium	ug/l	NS	NS		1 U
Zinc	ug/l	2000	NS	20 U	20 U
Bromate	ug/l	NS	NS	5 U	
Chloride (As Cl)	ug/l	NS	250000	54000	
Chlorite	ug/l	NS	NS	20 U	
Fluoride	ug/l	NS	1500	58 J	
Sulfate (As SO4)	ug/l	NS	250000	29000	24000

Notes:
- N = Normal Environmental Sample
- FD = Field Duplicate Sample
- ug/l = micrograms per liter

Qualifiers:
- J = Reported value is estimated.
- U = Indicates the analyte was analyzed for but not detected.
- Shaded cells = positive detection above comparison value
- Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-02
			Sample Date	9/27/2018	9/27/2018
			Sample Type	N	FD
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
Inorganics					
Aluminum	ug/l	NS	NS		
Antimony	ug/l	NS	3	1 U	1 U
Arsenic	ug/l	NS	25	1.1	1.4
Barium	ug/l	NS	1000	164	158
Beryllium	ug/l	3	NS	0.4 U	0.4 U
Cadmium	ug/l	NS	5	0.06 J	0.13 J
Chromium	ug/l	NS	50	2.5	3
Cobalt	ug/l	NS	NS		
Copper	ug/l	NS	200		
Cyanide	ug/l	NS	200	10 U	10 U
Iron	ug/l	NS	300	3000	3300
Lead	ug/l	NS	25		
Manganese	ug/l	NS	300	660	590
Mercury	ug/l	NS	0.7	0.2 U	0.2 U
Nickel	ug/l	NS	100	3.1 J	3.5 J
Potassium	ug/l	NS	NS		
Selenium	ug/l	NS	10	2 U	2 U
Silver	ug/l	NS	50	10 U	10 U
Sodium	ug/l	NS	20000	35100	30800
Thallium	ug/l	0.5	NS	0.2 U	0.2 U
Vanadium	ug/l	NS	NS		
Zinc	ug/l	2000	NS	9.1 J	8.9 J
Bromate	ug/l	NS	NS	5 U	5 U
Chloride (As Cl)	ug/l	NS	250000	62000	62000
Chlorite	ug/l	NS	NS	20 U	20 U
Fluoride	ug/l	NS	1500	66 J	66 J
Sulfate (As SO4)	ug/l	NS	250000	27000	27000

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-02
			Sample Date	5/7/2019	5/7/2019
			Sample Type	FD	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
Inorganics					
Aluminum	ug/l	NS	NS	31.8 U	30.7 U
Antimony	ug/l	NS	3	1 U	1 U
Arsenic	ug/l	NS	25	0.83 J	0.7 J
Barium	ug/l	NS	1000	196	188
Beryllium	ug/l	3	NS	0.4 U	0.4 U
Cadmium	ug/l	NS	5	0.5 U	0.5 U
Chromium	ug/l	NS	50	2 U	2 U
Cobalt	ug/l	NS	NS	0.22 J	0.2 J
Copper	ug/l	NS	200	0.74 J	0.71 J
Cyanide	ug/l	NS	200		
Iron	ug/l	NS	300		
Lead	ug/l	NS	25	0.089 J	0.085 J
Manganese	ug/l	NS	300	460	441
Mercury	ug/l	NS	0.7	0.2 U	0.2 U
Nickel	ug/l	NS	100	1.4 J	1.3 J
Potassium	ug/l	NS	NS	4760	4600
Selenium	ug/l	NS	10	2 U	2 U
Silver	ug/l	NS	50	1 U	1 U
Sodium	ug/l	NS	20000		
Thallium	ug/l	0.5	NS	0.2 U	0.2 U
Vanadium	ug/l	NS	NS	1 U	1 U
Zinc	ug/l	2000	NS	20 U	20 U
Bromate	ug/l	NS	NS		
Chloride (As Cl)	ug/l	NS	250000		
Chlorite	ug/l	NS	NS		
Fluoride	ug/l	NS	1500		
Sulfate (As SO4)	ug/l	NS	250000	25000	24000

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1

Monitoring Well Analytical Data

Hydrogeologic Report

			Location ID	GWI-03	GWI-03
			Sample Date	9/27/2018	5/7/2019
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
Inorganics					
Aluminum	ug/l	NS	NS		109
Antimony	ug/l	NS	3	1 U	0.69 J
Arsenic	ug/l	NS	25	3	2.1
Barium	ug/l	NS	1000	111	28.5
Beryllium	ug/l	3	NS	0.4 U	0.4 U
Cadmium	ug/l	NS	5	0.075 J	0.5 U
Chromium	ug/l	NS	50	1.7 J	2 U
Cobalt	ug/l	NS	NS		0.4 U
Copper	ug/l	NS	200		1.3 J
Cyanide	ug/l	NS	200	10 U	
Iron	ug/l	NS	300	1200	
Lead	ug/l	NS	25		0.3 U
Manganese	ug/l	NS	300	240	8.7 U
Mercury	ug/l	NS	0.7	0.2 U	0.2 U
Nickel	ug/l	NS	100	1.7 J	0.51 J
Potassium	ug/l	NS	NS		12200
Selenium	ug/l	NS	10	2 U	2 U
Silver	ug/l	NS	50	10 U	1 U
Sodium	ug/l	NS	20000	22900	
Thallium	ug/l	0.5	NS	0.2 U	0.2 U
Vanadium	ug/l	NS	NS		4
Zinc	ug/l	2000	NS	20 U	20 U
Bromate	ug/l	NS	NS	5 U	
Chloride (As Cl)	ug/l	NS	250000	29000	
Chlorite	ug/l	NS	NS	20 U	
Fluoride	ug/l	NS	1500	68 J	
Sulfate (As SO4)	ug/l	NS	250000	29000	23000

Notes:

N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:

J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-04	GWI-05
			Sample Date	5/7/2019	5/8/2019
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
Inorganics					
Aluminum	ug/l	NS	NS	186	87000
Antimony	ug/l	NS	3	1 U	0.46 J
Arsenic	ug/l	NS	25	2.7	32
Barium	ug/l	NS	1000	105	983
Beryllium	ug/l	3	NS	0.4 U	4.9
Cadmium	ug/l	NS	5	0.5 U	1.4
Chromium	ug/l	NS	50	2 U	125
Cobalt	ug/l	NS	NS	0.25 J	47.6
Copper	ug/l	NS	200	0.79 J	166
Cyanide	ug/l	NS	200		
Iron	ug/l	NS	300		
Lead	ug/l	NS	25	0.14 J	80.1
Manganese	ug/l	NS	300	379	3450
Mercury	ug/l	NS	0.7	0.2 U	0.1 J
Nickel	ug/l	NS	100	2 J	115
Potassium	ug/l	NS	NS	1310	20800
Selenium	ug/l	NS	10	2 U	2
Silver	ug/l	NS	50	1 U	0.41 J
Sodium	ug/l	NS	20000		
Thallium	ug/l	0.5	NS	0.2 U	0.42
Vanadium	ug/l	NS	NS	0.74 J	92.3
Zinc	ug/l	2000	NS	20 U	353
Bromate	ug/l	NS	NS		
Chloride (As Cl)	ug/l	NS	250000		
Chlorite	ug/l	NS	NS		
Fluoride	ug/l	NS	1500		
Sulfate (As SO4)	ug/l	NS	250000	27000	150000

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-06
			Sample Date	5/7/2019
			Sample Type	N
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
Inorganics				
Aluminum	ug/l	NS	NS	97.4
Antimony	ug/l	NS	3	1 U
Arsenic	ug/l	NS	25	1
Barium	ug/l	NS	1000	203
Beryllium	ug/l	3	NS	0.4 U
Cadmium	ug/l	NS	5	0.5 U
Chromium	ug/l	NS	50	2 U
Cobalt	ug/l	NS	NS	0.18 J
Copper	ug/l	NS	200	0.83 J
Cyanide	ug/l	NS	200	
Iron	ug/l	NS	300	
Lead	ug/l	NS	25	0.078 J
Manganese	ug/l	NS	300	349
Mercury	ug/l	NS	0.7	0.2 U
Nickel	ug/l	NS	100	1.2 J
Potassium	ug/l	NS	NS	1330
Selenium	ug/l	NS	10	2 U
Silver	ug/l	NS	50	1 U
Sodium	ug/l	NS	20000	
Thallium	ug/l	0.5	NS	0.2 U
Vanadium	ug/l	NS	NS	1 U
Zinc	ug/l	2000	NS	20 U
Bromate	ug/l	NS	NS	
Chloride (As Cl)	ug/l	NS	250000	
Chlorite	ug/l	NS	NS	
Fluoride	ug/l	NS	1500	
Sulfate (As SO4)	ug/l	NS	250000	24000

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Shaded cells = positive detection above comparison value
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-02
			Sample Date	9/26/2018	9/27/2018
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
Pesticides, Dioxin, PCBs					
1,2-Dibromo-3-Chloropropane	ug/l	NS	0.04	0.018 U	0.018 U
1,2-Dibromoethane (Ethylene Dibromide)	ug/l	NS	0.0006	0.018 U	0.018 U
2,4-D (Dichlorophenoxyacetic Acid)	ug/l	NS	50	0.47 U	0.48 U
3-Hydroxycarbofuran	ug/l	NS	NS	2.5 U	2.5 U
Alachlor	ug/l	NS	0.5	0.19 U	0.2 UJ
Aldicarb	ug/l	NS	0.35	2.5 U	2.5 U
Aldicarb Sulfone	ug/l	2	NS	2.5 U	2.5 U
Aldicarb Sulfoxide	ug/l	4	NS	2.5 U	2.5 U
Aldrin	ug/l	NS	NS	0.024 UJ	0.024 U
Atrazine	ug/l	NS	7.5	0.19 U	0.2 UJ
Benzo(A)Pyrene	ug/l	NS	0	0.19 U	0.2 UJ
Bis(2-Ethylhexyl) Phthalate	ug/l	NS	5	1.9 U	2 UJ
Butachlor	ug/l	NS	3.5	0.48 U	0.49 UJ
Carbofuran	ug/l	15	NS	2.5 U	2.5 U
Chlordane	ug/l	NS	0.05	0.24 UJ	0.24 U
Dalapon	ug/l	NS	50	R	4.8 U
Dicamba	ug/l	NS	0.44	0.47 U	0.48 U
Dieldrin	ug/l	NS	0.004	0.024 UJ	0.024 U
Dinoseb	ug/l	NS	1	0.95 U	0.96 U
Dioctyl Adipate	ug/l	NS	NS	1.5 U	0.83 J
Diquat Dibromide	ug/l	NS	NS	R	2 U
Endothal	ug/l	50	NS	10 U	10 U
Endrin	ug/l	NS	0	0.024 UJ	0.024 U
Gamma Bhc (Lindane)	ug/l	NS	0.05	0.024 UJ	0.024 U
Glyphosate	ug/l	50	NS	25 U	25 U
Heptachlor	ug/l	NS	0.04	0.024 UJ	0.024 U
Heptachlor Epoxide	ug/l	NS	0.03	0.024 UJ	0.024 U
Hexachlorobenzene	ug/l	NS	0.04	0.19 U	0.2 UJ
Hexachlorocyclopentadiene	ug/l	NS	5	1.9 U	2 UJ
Methomyl	ug/l	NS	0.35	2.5 U	2.5 U
Methoxychlor	ug/l	NS	35	0.024 UJ	0.024 U
Metolachlor	ug/l	NS	NS	0.19 U	0.2 UJ
Metribuzin	ug/l	NS	50	0.19 U	0.2 UJ
Oxamyl	ug/l	NS	50	2.5 U	2.5 U
Pentachlorophenol	ug/l	NS	1	0.19 U	0.19 U
Picloram	ug/l	NS	50	0.47 U	0.48 U
Propachlor	ug/l	NS	35	0.19 U	0.2 UJ
Sevin (Carbaryl)	ug/l	NS	29	2.5 U	2.5 U
Silvex (2,4,5-TP)	ug/l	NS	0.26	0.24 U	0.24 U

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-02
			Sample Date	9/26/2018	9/27/2018
			Sample Type	N	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
Pesticides, Dioxin, PCBs					
Simazine	ug/l	NS	0.5	0.48 U	0.49 UJ
Toxaphene	ug/l	NS	0.06	2.4 UJ	2.4 U
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	ug/l	NS	0.0000007	9.5E-06 U	9.6E-06 U
PCB-1016 (Aroclor 1016)	ug/l	NS	0.09	0.48 UJ	0.49 U
PCB-1221 (Aroclor 1221)	ug/l	NS	0.09	0.48 UJ	0.49 U
PCB-1232 (Aroclor 1232)	ug/l	NS	0.09	0.48 UJ	0.49 U
PCB-1242 (Aroclor 1242)	ug/l	NS	0.09	0.48 UJ	0.49 U
PCB-1248 (Aroclor 1248)	ug/l	NS	0.09	0.48 UJ	0.49 U
PCB-1254 (Aroclor 1254)	ug/l	NS	0.09	0.48 UJ	0.49 U
PCB-1260 (Aroclor 1260)	ug/l	NS	0.09	0.48 UJ	0.49 U
Polychlorinated Biphenyl (PCBs)	ug/l	NS	0.09	0.48 UJ	0.49 U

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

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Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-03
			Sample Date	9/27/2018	9/27/2018
			Sample Type	FD	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
Pesticides, Dioxin, PCBs					
1,2-Dibromo-3-Chloropropane	ug/l	NS	0.04	0.017 U	0.018 U
1,2-Dibromoethane (Ethylene Dibromide)	ug/l	NS	0.0006	0.017 U	0.018 U
2,4-D (Dichlorophenoxyacetic Acid)	ug/l	NS	50	0.48 U	0.49 UJ
3-Hydroxycarbofuran	ug/l	NS	NS	2.5 U	2.5 U
Alachlor	ug/l	NS	0.5	0.2 UJ	0.19 U
Aldicarb	ug/l	NS	0.35	2.5 U	2.5 U
Aldicarb Sulfone	ug/l	2	NS	2.5 U	2.5 U
Aldicarb Sulfoxide	ug/l	4	NS	2.5 U	2.5 U
Aldrin	ug/l	NS	NS	0.024 UJ	0.024 U
Atrazine	ug/l	NS	7.5	0.2 UJ	0.19 U
Benzo(A)Pyrene	ug/l	NS	0	0.2 UJ	0.19 U
Bis(2-Ethylhexyl) Phthalate	ug/l	NS	5	2 UJ	1.9 U
Butachlor	ug/l	NS	3.5	0.49 UJ	0.48 U
Carbofuran	ug/l	15	NS	2.5 U	2.5 U
Chlordane	ug/l	NS	0.05	0.24 UJ	0.24 U
Dalapon	ug/l	NS	50	4.8 U	4.9 UJ
Dicamba	ug/l	NS	0.44	0.48 U	0.49 U
Dieldrin	ug/l	NS	0.004	0.024 UJ	0.024 U
Dinoseb	ug/l	NS	1	0.96 U	0.97 UJ
Dioctyl Adipate	ug/l	NS	NS	1.5 UJ	1.5 U
Diquat Dibromide	ug/l	NS	NS	2 U	2 U
Endothal	ug/l	50	NS	10 U	10 U
Endrin	ug/l	NS	0	0.024 UJ	0.024 U
Gamma Bhc (Lindane)	ug/l	NS	0.05	0.024 UJ	0.024 U
Glyphosate	ug/l	50	NS	25 U	25 U
Heptachlor	ug/l	NS	0.04	0.024 UJ	0.024 U
Heptachlor Epoxide	ug/l	NS	0.03	0.024 UJ	0.024 U
Hexachlorobenzene	ug/l	NS	0.04	0.2 UJ	0.19 U
Hexachlorocyclopentadiene	ug/l	NS	5	2 UJ	1.9 U
Methomyl	ug/l	NS	0.35	2.5 U	2.5 U
Methoxychlor	ug/l	NS	35	0.024 UJ	0.024 U
Metolachlor	ug/l	NS	NS	0.2 UJ	0.19 U
Metribuzin	ug/l	NS	50	0.2 UJ	0.19 U
Oxamyl	ug/l	NS	50	2.5 U	2.5 U
Pentachlorophenol	ug/l	NS	1	0.19 U	0.19 UJ
Picloram	ug/l	NS	50	0.48 U	0.49 UJ
Propachlor	ug/l	NS	35	0.2 UJ	0.19 U
Sevin (Carbaryl)	ug/l	NS	29	2.5 U	2.5 U
Silvex (2,4,5-TP)	ug/l	NS	0.26	0.24 U	0.24 UJ

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-03
			Sample Date	9/27/2018	9/27/2018
			Sample Type	FD	N
			Validated - Y/N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD		
Pesticides, Dioxin, PCBs					
Simazine	ug/l	NS	0.5	0.49 UJ	0.48 U
Toxaphene	ug/l	NS	0.06	2.4 UJ	2.4 U
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	ug/l	NS	0.0000007	9.6E-06 U	9.6E-06 UJ
PCB-1016 (Aroclor 1016)	ug/l	NS	0.09	0.49 UJ	0.48 U
PCB-1221 (Aroclor 1221)	ug/l	NS	0.09	0.49 UJ	0.48 U
PCB-1232 (Aroclor 1232)	ug/l	NS	0.09	0.49 UJ	0.48 U
PCB-1242 (Aroclor 1242)	ug/l	NS	0.09	0.49 UJ	0.48 U
PCB-1248 (Aroclor 1248)	ug/l	NS	0.09	0.49 UJ	0.48 U
PCB-1254 (Aroclor 1254)	ug/l	NS	0.09	0.49 UJ	0.48 U
PCB-1260 (Aroclor 1260)	ug/l	NS	0.09	0.49 UJ	0.48 U
Polychlorinated Biphenyl (PCBs)	ug/l	NS	0.09	0.49 UJ	0.48 U

Notes:

N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:

J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.

Table 1

Monitoring Well Analytical Data

Hydrogeologic Report

			Location ID	GWI-01	GWI-01	GWI-01	GWI-02
			Sample Date	9/26/2018	11/7/2018	5/7/2019	9/27/2018
			Sample Type	N	N	N	N
			Validated - Y/N	Y	Y	Y	N
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD				
PFAS							
NEtFOSAA	ng/l	NS	NS	1.7 U	0.89 U	1.4 U	
NMeFOSAA	ng/l	NS	NS	2.7 U	0.89 U	1.6 U	
PERFLUORO(2-PROPOXYPROPANOIC) ACID	ng/l	NS	NS	1.3 U		0.62 U	
Perfluorobutanesulfonic acid (PFBS)	ng/l	NS	NS	0.17 U	0.27 U	0.45 U	
Perfluorobutanoic Acid	ng/l	NS	NS	2.5	2 J	1.4 J	
Perfluorodecane Sulfonic Acid	ng/l	NS	NS	0.28 U	0.54 U	0.82 U	
Perfluorodecanoic acid (PFDA)	ng/l	NS	NS	0.27 U	0.8 U	0.7 U	
Perfluorododecanoic acid (PFDoA)	ng/l	NS	NS	0.48 U	0.45 U	0.54 U	
Perfluoroheptane Sulfonate (PFHPS)	ng/l	NS	NS	0.17 U	0.36 U	0.87 U	
Perfluoroheptanoic acid (PFHpA)	ng/l	NS	NS	0.22 U	0.36 U	0.83 U	
Perfluorohexanesulfonic acid (PFHxS)	ng/l	NS	NS	0.31 U	0.36 U	0.73 U	
Perfluorohexanoic acid (PFHxA)	ng/l	NS	NS	0.51 U	0.36 U	0.69 U	
Perfluorononanoic acid (PFNA)	ng/l	NS	NS	0.24 U	0.36 U	0.25 U	
Perfluorooctanesulfonic acid (PFOS)	ng/l	NS	NS	0.47 U	0.69 J	0.56 U	
Perfluorooctanoic acid (PFOA)	ng/l	NS	NS	0.74 U	0.54 J	0.58 U	
Perfluoropentanoic Acid (PFPeA)	ng/l	NS	NS	0.43 U	1.8 U	0.58 U	
Perfluorotetradecanoic acid (PFTA)	ng/l	NS	NS	0.25 U	0.27 U	0.84 U	
Perfluorotridecanoic Acid (PFTriA)	ng/l	NS	NS	1.1 U	0.36 U	0.55 U	
Perfluoroundecanoic Acid (PFUnA)	ng/l	NS	NS	0.96 U	0.36 U	0.48 U	
SODIUM 1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2)	ng/l	NS	NS	1.7 U	1.8 U	2.7 U	
SODIUM 1H,1H,2H,2H-PERFLUOROOCTANE SULFONATE (6:2)	ng/l	NS	NS	1.7 U	8.7	4.2 U	

Notes:

N = Normal Environmental Sample
FD = Field Duplicate Sample
ng/l = nanograms per liter

Qualifiers:

J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-02	GWI-02	GWI-02
			Sample Date	9/27/2018	9/27/2018	9/27/2018	11/7/2018
			Sample Type	N	FD	FD	N
			Validated - Y/N	Y	N	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD				
PFAS							
NEtFOSAA	ng/l	NS	NS	1.8 U		1.6 U	0.9 U
NMeFOSAA	ng/l	NS	NS	2.9 U		2.7 U	0.9 U
PERFLUORO(2-PROPOXYPROPANOIC) ACID	ng/l	NS	NS	1.4 U		1.3 U	
Perfluorobutanesulfonic acid (PFBS)	ng/l	NS	NS	0.19 U		0.17 U	0.27 U
Perfluorobutanoic Acid	ng/l	NS	NS	3		3	1.8 U
Perfluorodecane Sulfonic Acid	ng/l	NS	NS	0.3 U		0.28 U	0.54 U
Perfluorodecanoic acid (PFDA)	ng/l	NS	NS	0.29 U		0.27 U	0.81 U
Perfluorododecanoic acid (PFDoA)	ng/l	NS	NS	0.52 U		0.48 U	0.45 U
Perfluoroheptane Sulfonate (PFHPS)	ng/l	NS	NS	0.18 U		0.16 U	0.36 U
Perfluoroheptanoic acid (PFHpA)	ng/l	NS	NS	0.23 U		0.22 U	0.36 U
Perfluorohexanesulfonic acid (PFHxS)	ng/l	NS	NS	0.26 U		0.15 U	0.36 U
Perfluorohexanoic acid (PFHxA)	ng/l	NS	NS	0.54 U		0.5 U	0.36 U
Perfluorononanoic acid (PFNA)	ng/l	NS	NS	0.25 U		0.23 U	0.36 U
Perfluorooctanesulfonic acid (PFOS)	ng/l	NS	NS	0.51 U		0.47 U	0.36 U
Perfluorooctanoic acid (PFOA)	ng/l	NS	NS	0.8 U		0.73 U	0.27 U
Perfluoropentanoic Acid (PFPeA)	ng/l	NS	NS	0.46 U		0.42 U	1.8 U
Perfluorotetradecanoic acid (PFTA)	ng/l	NS	NS	0.27 U		0.25 U	0.27 U
Perfluorotridecanoic Acid (PFTriA)	ng/l	NS	NS	1.2 U		1.1 U	0.36 U
Perfluoroundecanoic Acid (PFUnA)	ng/l	NS	NS	1 U		0.95 U	0.36 U
SODIUM 1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2)	ng/l	NS	NS	1.9 U		1.7 U	1.8 U
SODIUM 1H,1H,2H,2H-PERFLUOROOCTANE SULFONATE (6:2)	ng/l	NS	NS	1.9 U		1.7 U	0.9 U

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ng/l = nanograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-02	GWI-03	GWI-03
			Sample Date	5/7/2019	5/7/2019	9/27/2018	9/27/2018
			Sample Type	FD	N	N	N
			Validated - Y/N	Y	Y	N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD				
PFAS							
NEtFOSAA	ng/l	NS	NS	1.4 U	1.2 U		1.6 U
NMeFOSAA	ng/l	NS	NS	1.5 U	1.4 U		2.5 U
PERFLUORO(2-PROPOXYPROPANOIC) ACID	ng/l	NS	NS	0.62 U	0.56 U		1.2 U
Perfluorobutanesulfonic acid (PFBS)	ng/l	NS	NS	0.45 U	0.41 U		0.16 U
Perfluorobutanoic Acid	ng/l	NS	NS	1.3 J	1.4 J		0.88 J
Perfluorodecane Sulfonic Acid	ng/l	NS	NS	0.82 U	0.75 U		0.26 U
Perfluorodecanoic acid (PFDA)	ng/l	NS	NS	0.7 U	0.64 U		0.25 U
Perfluorododecanoic acid (PFDoA)	ng/l	NS	NS	0.54 U	0.49 U		0.45 U
Perfluoroheptane Sulfonate (PFHPS)	ng/l	NS	NS	0.86 U	0.79 U		0.16 U
Perfluoroheptanoic acid (PFHpA)	ng/l	NS	NS	0.83 U	0.76 U		0.21 U
Perfluorohexanesulfonic acid (PFHxS)	ng/l	NS	NS	0.73 U	0.66 U		0.27 U
Perfluorohexanoic acid (PFHxA)	ng/l	NS	NS	0.69 U	0.63 U		0.48 U
Perfluorononanoic acid (PFNA)	ng/l	NS	NS	0.25 U	0.22 U		0.22 U
Perfluorooctanesulfonic acid (PFOS)	ng/l	NS	NS	0.55 U	0.51 U		0.44 U
Perfluorooctanoic acid (PFOA)	ng/l	NS	NS	0.57 U	0.52 U		0.7 U
Perfluoropentanoic Acid (PFPeA)	ng/l	NS	NS	0.57 U	0.52 U		0.4 U
Perfluorotetradecanoic acid (PFTA)	ng/l	NS	NS	0.84 U	0.76 U		0.24 U
Perfluorotridecanoic Acid (PFTriA)	ng/l	NS	NS	0.55 U	0.5 U		1.1 U
Perfluoroundecanoic Acid (PFUnA)	ng/l	NS	NS	0.48 U	0.44 U		0.9 U
SODIUM 1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2)	ng/l	NS	NS	2.6 U	2.4 U		1.6 U
SODIUM 1H,1H,2H,2H-PERFLUOROOCTANE SULFONATE (6:2)	ng/l	NS	NS	4.2 U	3.8 U		2.7 J

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ng/l = nanograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-03	GWI-03	GWI-03	GWI-04
			Sample Date	11/7/2018	11/7/2018	5/7/2019	11/7/2018
			Sample Type	N	FD	N	N
			Validated - Y/N	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD				
PFAS							
NEtFOSAA	ng/l	NS	NS	0.89 U	0.9 U	1.3 U	0.96 U
NMeFOSAA	ng/l	NS	NS	0.89 U	0.9 U	1.5 U	0.96 U
PERFLUORO(2-PROPOXYPROPANOIC) ACID	ng/l	NS	NS			0.59 U	
Perfluorobutanesulfonic acid (PFBS)	ng/l	NS	NS	0.27 U	0.27 U	0.43 U	0.29 U
Perfluorobutanoic Acid	ng/l	NS	NS	1.8 U	1.8 U	0.87 U	1.9 U
Perfluorodecane Sulfonic Acid	ng/l	NS	NS	0.53 U	0.54 U	0.79 U	0.57 U
Perfluorodecanoic acid (PFDA)	ng/l	NS	NS	0.8 U	0.81 U	0.67 U	0.86 U
Perfluorododecanoic acid (PFDoA)	ng/l	NS	NS	0.45 U	0.45 U	0.52 U	0.48 U
Perfluoroheptane Sulfonate (PFHPS)	ng/l	NS	NS	0.36 U	0.36 U	0.83 U	0.38 U
Perfluoroheptanoic acid (PFHpA)	ng/l	NS	NS	0.36 U	0.36 U	1.4 J	0.38 U
Perfluorohexanesulfonic acid (PFHxS)	ng/l	NS	NS	0.36 U	0.36 U	0.7 U	0.38 U
Perfluorohexanoic acid (PFHxA)	ng/l	NS	NS	0.38 J	0.36 U	2.1	0.38 U
Perfluorononanoic acid (PFNA)	ng/l	NS	NS	0.46 J	0.36 U	0.24 U	0.38 U
Perfluorooctanesulfonic acid (PFOS)	ng/l	NS	NS	0.38 J	0.36 U	0.58 J	0.9 J
Perfluorooctanoic acid (PFOA)	ng/l	NS	NS	1.8	1.8	38	0.71 J
Perfluoropentanoic Acid (PFPeA)	ng/l	NS	NS	1.8 U	1.8 U	0.55 U	1.9 U
Perfluorotetradecanoic acid (PFTA)	ng/l	NS	NS	0.27 U	0.27 U	0.8 U	0.29 U
Perfluorotridecanoic Acid (PFTriA)	ng/l	NS	NS	0.36 U	0.36 U	0.52 U	0.38 U
Perfluoroundecanoic Acid (PFUnA)	ng/l	NS	NS	0.36 U	0.36 U	0.46 U	0.38 U
SODIUM 1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2)	ng/l	NS	NS	1.8 U	1.8 U	2.5 U	1.9 U
SODIUM 1H,1H,2H,2H-PERFLUOROOCTANE SULFONATE (6:2)	ng/l	NS	NS	12	13	41 J	0.96 U

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ng/l = nanograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-04	GWI-05	GWI-05	GWI-05
			Sample Date	5/7/2019	11/1/2018	11/1/2018	11/8/2018
			Sample Type	N	FD	N	N
			Validated - Y/N	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD				
PFAS							
NEtFOSAA	ng/l	NS	NS	1.3 U	1.9 U	1.9 U	0.91 U
NMeFOSAA	ng/l	NS	NS	1.5 UJ	3.1 U	3.1 U	0.91 U
PERFLUORO(2-PROPOXYPROPANOIC) ACID	ng/l	NS	NS	0.59 U			
Perfluorobutanesulfonic acid (PFBS)	ng/l	NS	NS	0.43 U	0.2 U	0.2 U	0.27 U
Perfluorobutanoic Acid	ng/l	NS	NS	0.87 U	2.2 J	2.2 J	3.1 J
Perfluorodecane Sulfonic Acid	ng/l	NS	NS	0.78 U	0.32 U	0.32 U	0.55 U
Perfluorodecanoic acid (PFDA)	ng/l	NS	NS	0.67 U	0.31 U	0.31 U	0.82 U
Perfluorododecanoic acid (PFDoA)	ng/l	NS	NS	0.51 U	0.55 U	0.54 U	0.46 U
Perfluoroheptane Sulfonate (PFHPS)	ng/l	NS	NS	0.83 U	0.19 U	0.19 U	0.37 U
Perfluoroheptanoic acid (PFHpA)	ng/l	NS	NS	0.79 U	0.66 J	0.65 J	0.37 U
Perfluorohexanesulfonic acid (PFHxS)	ng/l	NS	NS	0.7 U	0.17 U	0.17 U	0.37 U
Perfluorohexanoic acid (PFHxA)	ng/l	NS	NS	0.66 U	1.5 J	1.6 J	0.79 J
Perfluorononanoic acid (PFNA)	ng/l	NS	NS	0.23 U	0.44 J	0.46 J	0.37 U
Perfluorooctanesulfonic acid (PFOS)	ng/l	NS	NS	0.53 U	0.54 U	0.53 U	0.49 J
Perfluorooctanoic acid (PFOA)	ng/l	NS	NS	1.6 J	6.3	7.1	5.5
Perfluoropentanoic Acid (PFPeA)	ng/l	NS	NS	0.55 U	0.79 J	0.88 J	1.8 U
Perfluorotetradecanoic acid (PFTA)	ng/l	NS	NS	0.8 U	0.29 U	0.29 UJ	0.27 U
Perfluorotridecanoic Acid (PFTriA)	ng/l	NS	NS	0.52 U	1.3 U	1.3 U	0.37 U
Perfluoroundecanoic Acid (PFUnA)	ng/l	NS	NS	0.46 U	1.1 U	1.1 U	0.37 U
SODIUM 1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2)	ng/l	NS	NS	2.5 U	2 U	2 U	1.8 U
SODIUM 1H,1H,2H,2H-PERFLUOROOCTANE SULFONATE (6:2)	ng/l	NS	NS	4 U	2 U	2 U	0.91 U

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ng/l = nanograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-05	GWI-06	GWI-06
			Sample Date	5/8/2019	11/9/2018	5/7/2019
			Sample Type	N	N	N
			Validated - Y/N	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD			
PFAS						
NEtFOSAA	ng/l	NS	NS	1.3 U	0.91 U	1.4 U
NMeFOSAA	ng/l	NS	NS	1.5 U	0.91 U	1.6 U
PERFLUORO(2-PROPOXYPROPANOIC) ACID	ng/l	NS	NS	0.60 U		0.62 U
Perfluorobutanesulfonic acid (PFBS)	ng/l	NS	NS	0.43 U	0.27 U	0.45 U
Perfluorobutanoic Acid	ng/l	NS	NS	0.89 U	2.7 J	2 J
Perfluorodecane Sulfonic Acid	ng/l	NS	NS	0.8 U	0.54 U	0.83 U
Perfluorodecanoic acid (PFDA)	ng/l	NS	NS	0.68 U	0.82 U	0.71 U
Perfluorododecanoic acid (PFDoA)	ng/l	NS	NS	0.52 U	0.45 U	0.54 U
Perfluoroheptane Sulfonate (PFHPS)	ng/l	NS	NS	0.84 U	0.36 U	0.87 U
Perfluoroheptanoic acid (PFHpA)	ng/l	NS	NS	0.81 U	0.36 U	0.84 U
Perfluorohexanesulfonic acid (PFHxS)	ng/l	NS	NS	0.71 U	0.36 U	0.73 U
Perfluorohexanoic acid (PFHxA)	ng/l	NS	NS	0.67 U	0.36 U	0.7 U
Perfluorononanoic acid (PFNA)	ng/l	NS	NS	0.24 U	0.36 U	0.25 U
Perfluorooctanesulfonic acid (PFOS)	ng/l	NS	NS	0.54 U	0.36 U	0.56 U
Perfluorooctanoic acid (PFOA)	ng/l	NS	NS	8.4	0.27 U	0.58 U
Perfluoropentanoic Acid (PFPeA)	ng/l	NS	NS	0.56 U	1.8 U	0.6 J
Perfluorotetradecanoic acid (PFTA)	ng/l	NS	NS	0.81 U	0.27 U	0.84 U
Perfluorotridecanoic Acid (PFTriA)	ng/l	NS	NS	0.53 U	0.36 U	0.55 U
Perfluoroundecanoic Acid (PFUnA)	ng/l	NS	NS	0.47 U	0.36 U	0.49 U
SODIUM 1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2)	ng/l	NS	NS	2.6 U	1.8 U	2.7 U
SODIUM 1H,1H,2H,2H-PERFLUOROOCTANE SULFONATE (6:2)	ng/l	NS	NS	4.1 U	0.91 U	4.2 U

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ng/l = nanograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-02	GWI-02	GWI-03
			Sample Date	9/26/2018	9/27/2018	9/27/2018	9/27/2018
			Sample Type	N	N	FD	N
			Validated - Y/N	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD				
Radionuclides							
Alpha Radiation	pci/l	NS	15	3.43 ± 2.33	9.03 ± 4.41	5.69 ± 3.73	1.64 ± 1.57 U
Beta Radiation	pci/l	NS	1000	2.94 ± 1.14	7.02 ± 2.42	7.78 ± 2.13	4.50 ± 1.26
Radium-226	pci/l	NS	5	0.549± 0.431 U	1.56 ± 0.60	1.79 ± 0.652	1.14 ± 0.56
Radium-228	pci/l	NS	5	0.597± 0.311	0.00514 ± 0.235 U	0.472 ± 0.298	0.0747 ± 0.273 U
Uranium	ug/l	NS	NS	0.905	2.67	2.67	1.73

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
pci/l = picocuries per liter

Qualifiers:
U = Indicates the analyte was analyzed for but not detected.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-01	GWI-02	GWI-02	GWI-02
			Sample Date	9/26/2018	5/7/2019	9/27/2018	9/27/2018	5/7/2019
			Sample Type	N	N	N	FD	FD
			Validated - Y/N	Y	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD					
VOCs								
1,1,1,2-Tetrachloroethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane (TCA)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	ug/l	NS	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	ug/l	NS	0.04	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U
1,2,4-Trichlorobenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	ug/l	NS	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	ug/l	NS	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	ug/l	NS	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	ug/l	NS	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichloropropane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	ug/l	NS	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane (P-Dioxane)	ug/l	NS	NS	0.2 U		0.2 U	0.2 U	
2,2-Dichloropropane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chlorotoluene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-Chlorotoluene	ug/l	NS	NS	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	ug/l	NS	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromobenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-01	GWI-02	GWI-02	GWI-02
			Sample Date	9/26/2018	5/7/2019	9/27/2018	9/27/2018	5/7/2019
			Sample Type	N	N	N	FD	FD
			Validated - Y/N	Y	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD					
VOCs								
Bromodichloromethane	ug/l	50	NS	0.5 U		0.5 U	0.5 U	
Bromoform	ug/l	50	NS	0.5 U		0.5 U	0.5 U	
Bromomethane	ug/l	NS	5	1 U	1 UJ	1 U	1 U	1 UJ
Carbon Tetrachloride	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	ug/l	NS	5	1 U	1 U	1 U	1 U	1 U
Chloroform	ug/l	NS	7	0.5 U		0.5 U	0.5 U	
Chloromethane	ug/l	NS	5	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
Cis-1,2-Dichloroethylene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cis-1,3-Dichloropropene	ug/l	NS	0.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cymene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	ug/l	50	NS	0.5 U		0.5 U	0.5 U	
Dibromomethane	ug/l	NS	NS	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane	ug/l	NS	5	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 U
Ethylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Hexachlorobutadiene	ug/l	NS	0.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene (Cumene)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m,p-Xylene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
N-Butylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
N-Propylbenzene	ug/l	NS	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
O-Xylene (1,2-Dimethylbenzene)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sec-Butylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
T-Butylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-01	GWI-01	GWI-02	GWI-02	GWI-02
			Sample Date	9/26/2018	5/7/2019	9/27/2018	9/27/2018	5/7/2019
			Sample Type	N	N	N	FD	FD
			Validated - Y/N	Y	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD					
VOCs								
Tert-Butyl Methyl Ether	ug/l	10	NS	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethylene (PCE)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	ug/l	NS	5	0.5 U	0.5 U	0.09 J	0.1 J	0.22 J
Total Trihalomethanes	ug/l	NS	NS	0.5 U		0.5 U	0.5 U	
Trans-1,2-Dichloroethene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,3-Dichloropropene	ug/l	NS	0.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene (TCE)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Chloride	ug/l	NS	2	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 U
Xylenes, Total	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes:

N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:

J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
R = Rejected.
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-03	GWI-03	GWI-04	GWI-05
			Sample Date	5/7/2019	9/27/2018	5/7/2019	5/7/2019	5/8/2019
			Sample Type	N	N	N	N	N
			Validated - Y/N	Y	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD					
VOCs								
1,1,1,2-Tetrachloroethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane (TCA)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	ug/l	NS	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	ug/l	NS	0.04	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	ug/l	NS	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	ug/l	NS	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	ug/l	NS	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichlorobenzene	ug/l	NS	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-Dichloropropane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dichlorobenzene	ug/l	NS	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane (P-Dioxane)	ug/l	NS	NS		0.2 U			
2,2-Dichloropropane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chlorotoluene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
4-Chlorotoluene	ug/l	NS	NS	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	ug/l	NS	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromobenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-03	GWI-03	GWI-04	GWI-05
			Sample Date	5/7/2019	9/27/2018	5/7/2019	5/7/2019	5/8/2019
			Sample Type	N	N	N	N	N
			Validated - Y/N	Y	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD					
VOCs								
Bromodichloromethane	ug/l	50	NS		0.5 U			
Bromoform	ug/l	50	NS		0.5 U			
Bromomethane	ug/l	NS	5	1 UJ	1 U	1 UJ	1 UJ	1 UJ
Carbon Tetrachloride	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	ug/l	NS	5	1 U	1 U	R	1 U	1 U
Chloroform	ug/l	NS	7		0.5 U			
Chloromethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cis-1,2-Dichloroethylene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cis-1,3-Dichloropropene	ug/l	NS	0.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cymene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	ug/l	50	NS		0.5 U			
Dibromomethane	ug/l	NS	NS	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane	ug/l	NS	5	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U
Ethylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Hexachlorobutadiene	ug/l	NS	0.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene (Cumene)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m,p-Xylene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
N-Butylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
N-Propylbenzene	ug/l	NS	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
O-Xylene (1,2-Dimethylbenzene)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sec-Butylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
T-Butylbenzene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-02	GWI-03	GWI-03	GWI-04	GWI-05
			Sample Date	5/7/2019	9/27/2018	5/7/2019	5/7/2019	5/8/2019
			Sample Type	N	N	N	N	N
			Validated - Y/N	Y	Y	Y	Y	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD					
VOCs								
Tert-Butyl Methyl Ether	ug/l	10	NS	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethylene (PCE)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	ug/l	NS	5	0.24 J	0.09 J	0.11 J	0.5 U	0.11 J
Total Trihalomethanes	ug/l	NS	NS		0.5 U			
Trans-1,2-Dichloroethene	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,3-Dichloropropene	ug/l	NS	0.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethylene (TCE)	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Chloride	ug/l	NS	2	0.5 U	0.5 UJ	R	0.5 U	0.5 U
Xylenes, Total	ug/l	NS	5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
R = Rejected.
Empty cells indicate that compound not reported by the laboratory.

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-06
			Sample Date	5/7/2019
			Sample Type	N
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
VOCs				
1,1,1,2-Tetrachloroethane	ug/l	NS	5	0.5 U
1,1,1-Trichloroethane (TCA)	ug/l	NS	5	0.5 U
1,1,2,2-Tetrachloroethane	ug/l	NS	5	0.5 U
1,1,2-Trichloroethane	ug/l	NS	1	0.5 U
1,1-Dichloroethane	ug/l	NS	5	0.5 U
1,1-Dichloroethene	ug/l	NS	5	0.5 U
1,1-Dichloropropene	ug/l	NS	5	0.5 U
1,2,3-Trichlorobenzene	ug/l	NS	5	0.5 U
1,2,3-Trichloropropane	ug/l	NS	0.04	0.5 U
1,2,4-Trichlorobenzene	ug/l	NS	5	0.5 U
1,2,4-Trimethylbenzene	ug/l	NS	5	0.5 U
1,2-Dichlorobenzene	ug/l	NS	3	0.5 U
1,2-Dichloroethane	ug/l	NS	0.6	0.5 U
1,2-Dichloropropane	ug/l	NS	1	0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	ug/l	NS	5	0.5 U
1,3-Dichlorobenzene	ug/l	NS	3	0.5 U
1,3-Dichloropropane	ug/l	NS	5	0.5 U
1,4-Dichlorobenzene	ug/l	NS	3	0.5 U
1,4-Dioxane (P-Dioxane)	ug/l	NS	NS	
2,2-Dichloropropane	ug/l	NS	5	0.5 U
2-Chlorotoluene	ug/l	NS	5	0.5 U
4-Chlorotoluene	ug/l	NS	NS	0.5 U
Benzene	ug/l	NS	1	0.5 U
Bromobenzene	ug/l	NS	5	0.5 U
Bromochloromethane	ug/l	NS	5	0.5 U

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-06
			Sample Date	5/7/2019
			Sample Type	N
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
VOCs				
Bromodichloromethane	ug/l	50	NS	
Bromoform	ug/l	50	NS	
Bromomethane	ug/l	NS	5	1 UJ
Carbon Tetrachloride	ug/l	NS	5	0.5 U
Chlorobenzene	ug/l	NS	5	0.5 U
Chloroethane	ug/l	NS	5	1 U
Chloroform	ug/l	NS	7	
Chloromethane	ug/l	NS	5	0.5 U
Cis-1,2-Dichloroethylene	ug/l	NS	5	0.5 U
Cis-1,3-Dichloropropene	ug/l	NS	0.4	0.5 U
Cymene	ug/l	NS	5	0.5 U
Dibromochloromethane	ug/l	50	NS	
Dibromomethane	ug/l	NS	NS	0.5 U
Dichlorodifluoromethane	ug/l	NS	5	0.5 U
Ethylbenzene	ug/l	NS	5	0.5 U
Hexachlorobutadiene	ug/l	NS	0.5	0.5 U
Isopropylbenzene (Cumene)	ug/l	NS	5	0.5 U
m,p-Xylene	ug/l	NS	5	0.5 U
Methylene Chloride	ug/l	NS	5	0.5 U
N-Butylbenzene	ug/l	NS	5	0.5 U
N-Propylbenzene	ug/l	NS	50	0.5 U
O-Xylene (1,2-Dimethylbenzene)	ug/l	NS	5	0.5 U
Sec-Butylbenzene	ug/l	NS	5	0.5 U
Styrene	ug/l	NS	5	0.5 U
T-Butylbenzene	ug/l	NS	5	0.5 U

Table 1
Monitoring Well Analytical Data
Hydrogeologic Report

			Location ID	GWI-06
			Sample Date	5/7/2019
			Sample Type	N
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
VOCs				
Tert-Butyl Methyl Ether	ug/l	10	NS	0.5 U
Tetrachloroethylene (PCE)	ug/l	NS	5	0.5 U
Toluene	ug/l	NS	5	0.5 U
Total Trihalomethanes	ug/l	NS	NS	
Trans-1,2-Dichloroethene	ug/l	NS	5	0.5 U
Trans-1,3-Dichloropropene	ug/l	NS	0.4	0.5 U
Trichloroethylene (TCE)	ug/l	NS	5	0.5 U
Trichlorofluoromethane	ug/l	NS	5	0.5 U
Vinyl Chloride	ug/l	NS	2	0.5 U
Xylenes, Total	ug/l	NS	5	0.5 U

Notes:
N = Normal Environmental Sample
FD = Field Duplicate Sample
ug/l = micrograms per liter

Qualifiers:
J = Reported value is estimated.
U = Indicates the analyte was analyzed for but not detected.
R = Rejected.
Empty cells indicate that compound not reported by the laboratory.

Table 2
Aquifer Pump Test Monitoring Well Network
Hydrogeologic Investigation Report

Location ID	Facility	Screen Start Depth (ft)	Screen End Depth (ft)	Well Depth (ft)	Depth to Bedrock (ft)	Top of Casing Elevation	Geologic Unit Code	Top of Clay Depth (ft)	Bottom of Clay Depth (ft)	Clay Thickness (ft)	Surface Elevation (ft MSL)	Data Logger
JS-MW-003C	John Street	83	88	89		430.42	DEEP CONFINED	8.5	47.5	38.32	430.80	V
OS-MW-030C	Off-Site John Street	87	90	90		451.56	DEEP CONFINED	13.7	74.4	60.64	451.90	V
OS-MW-024BR	Off-Site John Street			102	66.0	434.41	BEDROCK	6	36	29.30	434.90	V
OS-MW-027BR	Off-Site John Street			136.1	101.0	429.29	BEDROCK	18.5	83.3	63.20	429.70	V
MC-MW-04	McCaffrey Street	11	11	27	26.0	431.17	SHALLOW (A)			0.00	431.16	I
MC-MW-19	McCaffrey Street	29	50	55	22.0	430.39	BEDROCK			0.00	428.85	I
MC-MW-19S	McCaffrey Street	19	24	24		428.31				0.00	428.68	I
MC-MW-23	McCaffrey Street	59.5	67.5	70	68.0	428.89	DEEP (D)			0.00	428.89	I
MC-MW-24	McCaffrey Street	129	139	145	140.0	434.22	DEEP (D)			0.00	434.22	I
MC-MW-34	McCaffrey Street	85	91	93	91.0	466.46	DEEP CONFINED	12	62	49.80	466.46	I
MC-MW-35D	McCaffrey Street	105	110	110	105.0	481.9	DEEP CONFINED	11	30	28.94	482.42	I
MW-MW-36D	McCaffrey Street	135	145	146	143.0	474.02	DEEP CONFINED	18	33	15.00	474.56	I
OS-MW-004B	Off-Site River Road	28	33	33		423.88	INTERMEDIATE (B)	14	16	2.00	424.00	V
OS-MW-005B	Off-Site River Road	21	24	24		424.76	INTERMEDIATE (B)	14	16	2.00	425.20	V
OS-MW-007B	Off-Site River Road	23.5	26.5	26.5		431.58	INTERMEDIATE (B)	14.5	16	0.72	432.00	V
OS-MW-009B	Off-Site River Road	19.2	24.2	24.2		450.46	INTERMEDIATE (B)	9	20	10.74	450.80	V
OS-MW-011B	Off-Site River Road	20.5	23.5	23.5		468.52	INTERMEDIATE (B)	8	20	11.36	469.00	V
RR-MW-010B	River Road	30.2	25.1	30.1		425.78	INTERMEDIATE (B)	20	24	4	426.20	V
RR-MW-005BR	River Road	37	62	62			BEDROCK					V
OW-02 (PW-7)	Village Well Field	53	63	63		427.82		15	23	8.00	426.39	I
GW-02	Village Well Field	33.9	43.3	43.9		424.44				<7		I
GWI-01	Water Supply Area	82	92	95	125.0	435.78	DEEP CONFINED	13	36.5	23.50	433.41	S
GWI-02	Water Supply Area	88.5	98.5	99	100.0	436.05	DEEP CONFINED	12	86	74.00	433.79	S
GWI-03	Water Supply Area	90	100	102	104.0	432.45	DEEP CONFINED	14	68.5	54.50	430.24	S
GWI-04	Water Supply Area	99.9	109.9	109.9		439.64	DEEP CONFINED	12	86	74.00	437.05	S
GWI-05	Water Supply Area	100	110	110	114.0	438.32	DEEP CONFINED	8	90	82.00	436.15	S
GWI-06	Water Supply Area	102	112	112	157.0	437.8	DEEP CONFINED	10	60	50.00	435.35	S
Test Well	Water Supply Area	75	105	105	125.0	436.6	DEEP CONFINED					S
River Gauge	Water Supply Area	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	S
WF-OBS-01	Wysocki Farm	86	96	96		432.2	DEEP CONFINED			60.72	431.16	S
WF-OBS-02	Wysocki Farm	116	131	131		431.31	DEEP CONFINED			59.94	430.22	S
WF-OBS-03	Wysocki Farm	100	110	110		432.14	DEEP CONFINED			74.21	430.92	S
WF-OBS-04	Wysocki Farm	61.66	76.66	76.66		437.22	DEEP CONFINED			79.17	435.65	S
WF-OBS-05	Wysocki Farm	134.08	139.08	139.08		434.68	DEEP CONFINED			69.56	434.26	S
WF-OBS-BR	Wysocki Farm				136.9	431.91	BEDROCK					S

Data Logger Key:

V = Van Essen Micro-Diver M20 *I = In-Situ Rugged TROLL 100* *S = Solinst Levelogger M100*

1. Wells selected to monitor aquifer test in water supply area and pre-test period for trend analysis and evaluating drawdown propagation of Village Well #7 cycling.

Table 3
Aquifer Pump Test Field Parameters

Date	Time	ORP/Eh (mV)	pH	Spec. Cond. (uS/cm)	DO (mg/L)	Temp. (°C)	Total Dissolved Solids (mg/L)	Turbidity (NTU)	Alternate Turbitidy Meter (NTU)
Hoosic River									
4/29/2019	9:20	316.1	7.45	179.2	12.48	6.736	116	20.83	
5/2/2019	9:35	141.6	7.94	206.5	11.92	8.586	134	NM	10.8
LaCroix Well									
4/29/2019	9:40	315.8	7.34	613.0	2.69	10.575	398	3.78	
	12:05	234.5	7.68	599.7	3.08	10.349	390	*52.01*	
	16:05	135.0	7.70	596.8	-0.08	10.29	388	*132.83*	
	20:05	122.3	7.70	597.5	-0.11	10.082	388	*45.17*	
4/30/2019	0:05	97.3	7.70	598.3	-0.13	9.884	389	*10.03*	
	4:05	84.6	7.70	600.2	-0.13	9.909	390	*18.50*	
	8:05	73.9	7.70	599.5	-0.13	9.941	390	*29.60*	
	12:05	62.9	7.71	601.2	-0.13	10.081	391	*43.9*	10.2
	12:25	60.0	7.70	601.1	-0.13	10.045	391	*37.85*	9.68
	16:25	44.1	7.70	596.7	-0.13	10.225	388	*43.06*	
	20:25	30.7	7.70	599.2	-0.13	9.990	389	*67.75*	
5/1/2019	0:25	15.3	7.70	599.5	-0.13	9.888	390	*90.42*	
	4:45	3.8	7.71	598.9	-0.13	9.824	389	*125.31*	
	8:25	-3.1	7.71	597.3	-0.13	10.003	388	*20.89*	
	12:25	75.5	7.71	598.0	0.88	10.139	389	*137.71*	11.5
	16:25	-5.6	7.71	594.1	-0.12	10.398	386	*353.37*	
	20:25	-19.9	7.70	592.8	-0.13	10.194	385	*202.39*	
5/2/2019	0:25	-28.0	7.70	593.1	-0.13	10.132	385	*194.90*	
	4:25	-33.6	7.70	595.4	-0.13	10.127	387	*286.54*	
	8:25	-38.6	7.70	598.3	-0.13	10.212	389	*3.63*	
	8:45	-41.0	7.71	596.1	-0.13	10.226	387	*38.51*	10.2

Notes:

- Italicized Turbidity Data is believed to be innacurate

-Data logger was stopped and restarted on 4/30 resulting in an extra reading

Table 4
LaCroix Test Well Analtyical Data
Hydrogeologic Report

			Location ID	LACROIX TEST WELL
			Sample Date	5/2/2019
			Sample Type	N
			Sample ID	LACROIX TEST WELL
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
E100.2				
Asbestos	mfl	NS	NS	2.1 U
E200.7				
Iron	mg/l	NS	0.3	0.027 J
Manganese	mg/l	NS	0.3	0.36
Silver	mg/l	NS	0.05	0.01 U
Sodium	mg/l	NS	20	29.9
Zinc	mg/l	2	NS	0.02 U
E200.8				
Antimony	ug/l	NS	3	1 U
Arsenic	ug/l	NS	25	1 U
Barium	ug/l	NS	1000	236
Beryllium	ug/l	3	NS	0.4 U
Cadmium	ug/l	NS	5	0.5 U
Chromium, Total	ug/l	NS	50	2 U
Copper	ug/l	NS	200	0.58 J
Lead	ug/l	NS	25	0.3 U
Nickel	ug/l	NS	100	1.4 J
Selenium	ug/l	NS	10	2 U
Thallium	ug/l	0.5	NS	0.2 U
URANIUM-238	ug/l	NS	NS	4.6
E245.1				
Mercury	ug/l	NS	0.7	0.2 U
E300.0				
Chloride (As Cl)	mg/l	NS	250	56
Fluoride	mg/l	NS	1.5	0.065 J
Nitrogen, Nitrate (As N)	mg/l	NS	10	0.023 U
Nitrogen, Nitrate-Nitrite	mg/l	NS	10	0.023 U
Nitrogen, Nitrite	mg/l	NS	0.02	0.023 U
Sulfate (As SO4)	mg/l	NS	250	26
E300.1				
Bromate	ug/l	NS	NS	5 U
Chlorite	ug/l	NS	NS	20 U
E335.4				
Cyanide	mg/l	NS	0.2	0.01 U
E504				
1,2-Dibromo-3-Chloropropane	mg/l	NS	0.00004	0.0000023 U
1,2-Dibromoethane (Ethylene Dibromide)	mg/l	NS	0.0000006	0.0000024 U

Table 4
LaCroix Test Well Analtyical Data
Hydrogeologic Report

			Location ID	LACROIX TEST WELL
			Sample Date	5/2/2019
			Sample Type	N
			Sample ID	LACROIX TEST WELL
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
E508A				
Aldrin	mg/l	NS	NS	0.000024 U
Chlordane	mg/l	NS	0.00005	0.00024 U
Dieldrin	mg/l	NS	0.000004	0.000024 U
Endrin	mg/l	NS	0	0.000024 U
Gamma Bhc (Lindane)	mg/l	NS	0.00005	0.000024 U
Heptachlor	mg/l	NS	0.00004	0.000024 U
Heptachlor Epoxide	mg/l	NS	0.00003	0.000024 U
Methoxychlor	mg/l	NS	0.035	0.000024 U
PCB-1016 (Aroclor 1016)	mg/l	NS	0.00009	0.00048 UJ
PCB-1221 (Aroclor 1221)	mg/l	NS	0.00009	0.00048 U
PCB-1232 (Aroclor 1232)	mg/l	NS	0.00009	0.00048 U
PCB-1242 (Aroclor 1242)	mg/l	NS	0.00009	0.00048 U
PCB-1248 (Aroclor 1248)	mg/l	NS	0.00009	0.00048 U
PCB-1254 (Aroclor 1254)	mg/l	NS	0.00009	0.00048 U
PCB-1260 (Aroclor 1260)	mg/l	NS	0.00009	0.00048 U
Polychlorinated Biphenyl (PCBs)	mg/l	NS	0.00009	0.00048 U
Toxaphene	mg/l	NS	0.00006	0.0024 U
E515.1				
2,4-D (Dichlorophenoxyacetic Acid)	mg/l	NS	0.05	0.0005 U
Dalapon	mg/l	NS	0.05	0.005 U
Dicamba	ug/l	NS	0.44	0.5 U
Dinoseb	mg/l	NS	0.001	0.001 U
Pentachlorophenol	mg/l	NS	0.001	0.0002 U
Picloram	mg/l	NS	0.05	0.0005 U
Silvex (2,4,5-TP)	mg/l	NS	0.00026	0.00025 U
E524.2				
1,1,1,2-Tetrachloroethane	mg/l	NS	0.005	0.0005 U
1,1,1-Trichloroethane (TCA)	mg/l	NS	0.005	0.0005 U
1,1,2,2-Tetrachloroethane	mg/l	NS	0.005	0.0005 U
1,1,2-Trichloroethane	mg/l	NS	0.001	0.0005 U
1,1-Dichloroethane	mg/l	NS	0.005	0.0005 U
1,1-Dichloroethene	mg/l	NS	0.005	0.0005 U
1,1-Dichloropropene	mg/l	NS	0.005	0.0005 U
1,2,3-Trichlorobenzene	mg/l	NS	0.005	0.0005 U
1,2,3-Trichloropropane	mg/l	NS	0.00004	0.0005 U
1,2,4-Trichlorobenzene	mg/l	NS	0.005	0.0005 U
1,2,4-Trimethylbenzene	mg/l	NS	0.005	0.0005 U

Table 4
LaCroix Test Well Analtyical Data
Hydrogeologic Report

			Location ID	LACROIX TEST WELL
			Sample Date	5/2/2019
			Sample Type	N
			Sample ID	LACROIX TEST WELL
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
1,2-Dichlorobenzene	mg/l	NS	0.003	0.0005 U
1,2-Dichloroethane	mg/l	NS	0.0006	0.0005 U
1,2-Dichloropropane	mg/l	NS	0.001	0.0005 U
1,3,5-Trimethylbenzene (Mesitylene)	mg/l	NS	0.005	0.0005 U
1,3-Dichlorobenzene	mg/l	NS	0.003	0.0005 U
1,3-Dichloropropane	mg/l	NS	0.005	0.0005 U
1,4-Dichlorobenzene	mg/l	NS	0.003	0.0005 U
2,2-Dichloropropane	mg/l	NS	0.005	0.0005 U
2-Chlorotoluene	mg/l	NS	0.005	0.0005 U
4-Chlorotoluene	mg/l	NS	NS	0.0005 U
Benzene	mg/l	NS	0.001	0.0005 U
Bromobenzene	mg/l	NS	0.005	0.0005 U
Bromochloromethane	mg/l	NS	0.005	0.0005 U
Bromodichloromethane	ug/l	50	NS	0.5 U
Bromoform	ug/l	50	NS	0.5 U
Bromomethane	mg/l	NS	0.005	0.001 UJ
Carbon Tetrachloride	mg/l	NS	0.005	0.0005 U
Chlorobenzene	mg/l	NS	0.005	0.0005 U
Chloroethane	mg/l	NS	0.005	0.001 U
Chloroform	ug/l	NS	7	0.5 U
Chloromethane	mg/l	NS	0.005	0.0005 U
Cis-1,2-Dichloroethylene	mg/l	NS	0.005	0.0005 U
Cis-1,3-Dichloropropene	mg/l	NS	0.0004	0.0005 U
Cymene	mg/l	NS	0.005	0.0005 U
Dibromochloromethane	ug/l	50	NS	0.5 U
Dibromomethane	mg/l	NS	NS	0.0005 U
Dichlorodifluoromethane	mg/l	NS	0.005	0.0005 U
Ethylbenzene	mg/l	NS	0.005	0.0005 U
Hexachlorobutadiene	mg/l	NS	0.0005	0.0005 U
Isopropylbenzene (Cumene)	mg/l	NS	0.005	0.0005 U
m,p-Xylene	mg/l	NS	0.005	0.0005 U
Methylene Chloride	mg/l	NS	0.005	0.0005 U
N-Butylbenzene	mg/l	NS	0.005	0.0005 U
N-Propylbenzene	mg/l	NS	0.05	0.0005 U
O-Xylene (1,2-Dimethylbenzene)	mg/l	NS	0.005	0.0005 U
Sec-Butylbenzene	mg/l	NS	0.005	0.0005 U
Styrene	mg/l	NS	0.005	0.0005 U
T-Butylbenzene	mg/l	NS	0.005	0.0005 U

Table 4
LaCroix Test Well Analtyical Data
Hydrogeologic Report

			Location ID	LACROIX TEST WELL
			Sample Date	5/2/2019
			Sample Type	N
			Sample ID	LACROIX TEST WELL
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
Tert-Butyl Methyl Ether	mg/l	0.01	NS	0.0005 U
Tetrachloroethylene (PCE)	mg/l	NS	0.005	0.0005 U
Toluene	mg/l	NS	0.005	0.0005 U
Total Trihalomethanes	ug/l	NS	NS	0.5 U
Trans-1,2-Dichloroethene	mg/l	NS	0.005	0.0005 U
Trans-1,3-Dichloropropene	mg/l	NS	0.0004	0.0005 U
Trichloroethylene (TCE)	mg/l	NS	0.005	0.0005 U
Trichlorofluoromethane	mg/l	NS	0.005	0.0005 U
Vinyl Chloride	mg/l	NS	0.002	0.0005 U
Xylenes, Total	mg/l	NS	0.005	0.0005 U
E525				
Alachlor	mg/l	NS	0.0005	0.0002 U
Atrazine	mg/l	NS	0.0075	0.0002 U
Benzo(A)Pyrene	mg/l	NS	0	0.0002 U
Bis(2-Ethylhexyl) Phthalate	mg/l	NS	0.005	0.002 U
Butachlor	ug/l	NS	3.5	0.49 U
Dioctyl Adipate	ug/l	NS	NS	1.5 U
Hexachlorobenzene	mg/l	NS	0.00004	0.0002 U
Hexachlorocyclopentadiene	mg/l	NS	0.005	0.002 U
Metolachlor	mg/l	NS	NS	0.0002 U
Metribuzin	mg/l	NS	0.05	0.0002 U
Propachlor	mg/l	NS	0.035	0.0002 U
Simazine	mg/l	NS	0.0005	0.00049 U
E531.1				
3-Hydroxycarbofuran	mg/l	NS	NS	0.0025 U
Aldicarb	mg/l	NS	0.00035	0.0025 U
Aldicarb Sulfone	mg/l	0.002	NS	0.0025 U
Aldicarb Sulfoxide	mg/l	0.004	NS	0.0025 U
Carbofuran	mg/l	0.015	NS	0.0025 U
Methomyl	mg/l	NS	0.00035	0.0025 U
Oxamyl	mg/l	NS	0.05	0.0025 U
Sevin (Carbaryl)	mg/l	NS	0.029	0.0025 U
E537-LL				
NEtFOSAA	ng/l	NS	NS	1.8 U
NMeFOSAA	ng/l	NS	NS	2.9 U
Perfluorobutanesulfonic acid (PFBS)	ng/l	NS	NS	0.19 U
Perfluorobutanoic Acid	ng/l	NS	NS	3.1 U
Perfluorodecane Sulfonic Acid	ng/l	NS	NS	0.3 U

Table 4
LaCroix Test Well Analtyical Data
Hydrogeologic Report

			Location ID	LACROIX TEST WELL
			Sample Date	5/2/2019
			Sample Type	N
			Sample ID	LACROIX TEST WELL
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
Perfluorodecanoic acid (PFDA)	ng/l	NS	NS	0.29 U
Perfluorododecanoic acid (PFDoA)	ng/l	NS	NS	0.52 U
Perfluoroheptane Sulfonate (PFHPS)	ng/l	NS	NS	0.18 U
Perfluoroheptanoic acid (PFHpA)	ng/l	NS	NS	0.24 U
Perfluorohexanesulfonic acid (PFHxS)	ng/l	NS	NS	0.25 U
Perfluorohexanoic acid (PFHxA)	ng/l	NS	NS	0.55 U
Perfluorononanoic acid (PFNA)	ng/l	NS	NS	0.25 U
Perfluorooctane Sulfonamide (FOSA)	ng/l	NS	NS	0.33 U
Perfluorooctanesulfonic acid (PFOS)	ng/l	NS	NS	0.51 U
Perfluorooctanoic acid (PFOA)	ng/l	NS	NS	0.8 U
Perfluoropentanoic Acid (PFPeA)	ng/l	NS	NS	0.46 U
Perfluorotetradecanoic acid (PFTA)	ng/l	NS	NS	0.27 U
Perfluorotridecanoic Acid (PFTriA)	ng/l	NS	NS	1.2 U
Perfluoroundecanoic Acid (PFUnA)	ng/l	NS	NS	1 U
SODIUM 1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2)	ng/l	NS	NS	1.9 U
SODIUM 1H,1H,2H,2H-PERFLUOROOCTANE SULFONATE (6:2)	ng/l	NS	NS	1.9 U
E547				
Glyphosate	ug/l	50	NS	25 U
E548.1				
Endothal	ug/l	50	NS	10 U
E549.2				
Diquat Dibromide	ug/l	NS	NS	2 U
E552.2				
Chloroacetic Acid	ug/l	NS	NS	1 U
Dibromoacetic Acid	ug/l	NS	NS	1 U
Dichloroacetic Acid	ug/l	NS	NS	1 U
Haloacetic Acids 5, Total	ug/l	NS	NS	1 U
Haloacetic Acids, Total	ug/l	NS	NS	1 U
Monobromoacetic Acid	ug/l	NS	NS	1 U
Trichloroacetic Acid	ug/l	NS	NS	1 UJ
E555.2				
Haloacetic Acids 5, Total	ug/l	NS	NS	1 U
Haloacetic Acids, Total	ug/l	NS	NS	1 U
E900				
Alpha Radiation	pci/l	NS	15	- 0.242 ± 1.01 U
Beta Radiation	pci/l	NS	1000	1.21 ± 0.591

Table 4
LaCroix Test Well Analtyical Data
Hydrogeologic Report

			Location ID	LACROIX TEST WELL
			Sample Date	5/2/2019
			Sample Type	N
			Sample ID	LACROIX TEST WELL
			Validated - Y/N	Y
Parameter	Unit	NYDEC TOGS111 GA GUIDANCE	NYDEC TOGS111 GA STANDARD	
E903.1				
Radium-226	pci/l	NS	5	- 0.0713 ± 0.463 U
E904.0				
Radium-228	pci/l	NS	5	- 0.367 ± 0.309 U
SM2120B				
Color, Unknown	color unit	NS	NS	5 U
SM2130B				
Turbidity	ntu	NS	NS	0.14
SM2150B				
Odor	t.o.n.	NS	NS	1 U
SM9223B				
Fecal Coliform	MPN/100 ml	NS	NS	1 U
Colilert-18				
Total Coliform	per 100 ml	NS	NS	Negative
SW1613B				
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	pg/l	NS	0.7	9.5 U
SW8015				
Propylene Glycol	mg/l	NS	NS	5 U

Notes:

N = Normal Environmental Sample
FD = Field Duplicate Sample
mfl = million fibers per liter
mg/l = milligrams per liter
MPN/100 ml = most probable number per 100 ml
ng/l = nanograms per liter
ntu = nephelometric turbidity units
t.o.n. = threshold order number
ug/l = micrograms per liter
pg/l = picogram per liter

Qualifiers:

J = Reported value is estimated.
U = Analyte was analyzed for but not detected.

Attachment 1

Hager Richter Geophysical Survey Report

HAGER-RICHTER
GEOSCIENCE, INC.

SURFACE GEOPHYSICAL SURVEY AQUIFER CHARACTERIZATION HOOSICK VALLEY, NEW YORK

Prepared for:

CHA Consulting, Inc.
III Winners Circle
P.O. Box 5269
Albany, NY 12205-0269

Prepared by:

Hager-Richter Geoscience, Inc.
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8 Industrial Way - D10
Salem, New Hampshire 03079

File 18SG14
May, 2019

HAGER-RICHTER
GEOSCIENCE, INC.

GEOPHYSICS FOR THE ENGINEERING COMMUNITY
SALEM, NEW HAMPSHIRE
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May 9, 2019
File 18SG14

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RE: Surface Geophysical Survey Aquifer Characterization Hoosic Valley, New York

Dear Dr. Burns:

In this report, we summarize the results of a surface geophysical survey conducted by Hager-Richter Geoscience, Inc., dba HR Geological Services in New York, (HRGS) for an aquifer characterization study in the Hoosic Valley, New York, for CHA Consulting, Inc., (CHA) in July 2018 and April 2019. Preliminary results for the portion of the work conducted in 2018 were provided to CHA in August 2018. The scope of the survey and area of interest were specified by CHA.

INTRODUCTION

CHA is conducting an aquifer investigation project in the Hoosic Valley of New York, in the general vicinity of the Town of Hoosick, New York. In order to aid their investigations, CHA requested a surface geophysical survey to determine the depth of rock and characterize overburden stratigraphy, including that of a confining clay layer. CHA specified five (5) transects for geophysical surveying, all located west and northwest of the Town of Hoosick. The general locations of the transects are shown in Figure 1.

According to information provided by CHA, overburden in the valley portions of the investigation area broadly consists of (from the top down) 10 to 20 feet of sand; 20 to 100 feet of clay and silt, generally considered to be an aquitard; and 15 to 40 feet of sand, gravel, and silt, generally considered to be an aquifer. Bedrock varies in depth from a few tens of feet in the valley wall areas to more than 150 feet in the valley floor areas.

In consultation with HRGS, CHA specified five (5) lines for seismic refraction profiling and electrical resistivity imaging on the west side of the Hoosic River. Farthest to the north, Lines 1, 2, and 3 were located in agricultural lands in the valley floor in an area located east of State Route 22, approximately midway between Hoosick and the village of Hoosick Falls. The locations of Lines 1, 2, and 3 are shown in Figure 2A. Geophysical surveying along Lines 1, 2, and 3 was conducted in July, 2018.

Line 4 crossed agricultural land from the western valley wall to the river in the valley floor, and its location is shown in Figure 2B. Because geophysical data could not be acquired in the active highway, Line 4 was subdivided into Lines 4A and Line 4B, located west and east of State Route 22, respectively. Line 5 was located on the Hoosac School Campus in an upland area, and its location is shown in Figure 2C. Geophysical surveying along Lines 4 and 5 was conducted in April 2019.

OBJECTIVE

The objective of the surface geophysical survey was to determine the depth and configuration of the bedrock surface and to characterize the overburden stratigraphy, including that of a confining clay layer, along five (5) transects specified by CHA.

THE SURVEY

Jeffrey Reid, P.G., Amanda Fabian, P.G. and Sean Reid of HRGS conducted the surface geophysical survey on July 30 and 31, 2018. Steven Grant, P.G., Amanda Fabian, P.G., Bryan Carnahan, and Sean Reid of HRGS conducted the surface geophysical survey on April 8, 9, and 10, 2019. The project was coordinated with Dr. Christopher A. Burns, Ph.D., P.G., of CHA. Mr. William Pierce, also of CHA, was on site for the duration of the field work in July 2018. Ms. Elizabeth Wos and Mr. William Pierce of CHA, Mr. Ian Beilby of the Environmental Resources Management Group, Inc. (ERM), and Mr. William Shaw of the New York State Department of Environmental Conservation (NYS DEC), were on site at the beginning of the field work in April 2019. Ms. Wos was present for the duration of the April 2019 field work. The locations of the geophysical survey lines were surveyed by CHA and HRGS using differential global positioning (DGPS). Elevations along the survey lines were determined from 2-meter digital elevation models “u_6345074600_2_meter.img” and “u_6345074500_2_meter.img” available from gis.ny.gov and are relative to NAVD88.

EQUIPMENT & PROCEDURES

General

The surface geophysical surveys were conducted using seismic refraction profiling and electrical resistivity imaging (ERI). Seismic refraction and ERI data were acquired along the five (5) specified transects totaling approximately 5,165 and 6,500 linear feet, respectively.

Seismic Refraction Profiling

Seismic refraction data were acquired along five (5) transects totaling 5,165 feet. Figures 2A-C show the locations of the seismic refraction transects.

We used our 48-channel seismograph (two 24-channel Geometrics Geodes) connected to, and controlled by, a notebook PC computer. The software provides for the acquisition, display, plotting, filtering and storage of seismic data. The seismogram image presented in real time on the notebook screen allows the operator to verify the quality of the data. The stored digital data are later transferred at the end of the field day for storage, backup, and future data processing.

The Geodes were coupled to two 24-element seismic spread cables for a total of 48 geophones. The geophones measure only the vertical component of the compressional wave energy, and their resonant frequency is 14 Hz. The geophones are equipped with a vertical 3-inch spike that is pressed into the soil so that the geophone case is contacting the ground surface. A geophone spacing of five feet was used.

A seismic trigger is attached to the hammer and sends an electrical impulse via a cable to the seismograph at the exact time of impact to start the seismograph recording. The core of the seismic trigger is a piezoelectric crystal, which emits a small electrical impulse when its crystal structure is distorted by a sharp impact, such as a hammer blow. The timing mechanism in the seismograph is factory calibrated and does not require additional calibration according to manufacturing specifications.

Seismic energy was provided by a 12-lb sledge hammer striking a metal base plate. We recorded up to seven "shots" per cable spread - one shot off each end of the cable, one shot at each end of the cable, and three shots interior to the cable, as access allowed. The number of stacks per shot location is variable, and the quality of the stacked seismic signal for each shot location was verified in the field with the visual display. Data are acquired at every sixth geophone location for a total of eleven shot points for each 48-geophone spread, including two offset shot locations. The seismic refraction data were acquired using a 200-millisecond recording length and a sample interval of 0.02833 milliseconds.

The seismic data were analyzed using the Generalized Reciprocal Method (GRM) of seismic refraction interpretation. The method is described in detail in Palmer (1980)[1]. GRM allows for some variation in the surface topography as well as lateral variation in the seismic velocity of the upper layers. The method uses the principle of migration whereby the refractor need only be planar over a short distance, thus allowing the calculation of depth to an undulating interface. In addition, GRM is relatively insensitive to dip angles as high as 20°, unlike most other methods that can be sensitive to dips as low as 5°. GRM also allows for the calculation of depth below

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[1] Palmer, Derecke (1980) The Generalized Reciprocal Method of Seismic Refraction Interpretation, Society of Exploration Geophysicists, 104 p.

each geophone instead of below only the shot points as in the Time-Intercept and Crossover Distance methods. The GRM software that we use for data analysis (IXRefraX by Interpex) contains several internal tests for data consistency.

The results are used to construct an interpreted velocity profile of the subsurface for each seismic line. The velocities of seismic waves are functions of the types of geologic material through which they pass. One can thus infer the general subsurface stratigraphy from the velocities determined. Seismic velocities are expressed in feet per second (fps).

Electrical Resistivity Imaging Survey

The ERI survey was conducted using an AGI Super Sting R8 earth resistivity instrument with an addressable multi-electrode system for electrical imaging surveys. ERI incorporates both vertical electrical sounding and lateral profiling to produce a data set suitable to create a two-dimensional resistivity model.

The Super Sting R8 allows automatic measurement of several types of array, i.e., most combinations of current and voltage electrode connections can be controlled by the Super Sting system. Fifty-six (56) electrodes, or any multiple of fourteen (14) electrodes (with a maximum of 254 electrodes) can be used with the Super Sting system.

For Lines 1, 2, and 3, acquired in 2018, ERI data were acquired using both the Dipole-Dipole and Schlumberger array configurations with electrode spacings of 14 and 15 feet. These array configurations and electrode spacings provide approximate depths of exploration of about 140 to 150 feet. For Lines 4 and 5, acquired in 2019, ERI data were acquired using the Schlumberger array configurations and electrode spacings of 20 and 10 feet for approximate depths of exploration of 200 and 100 feet, respectively. The locations of the resistivity lines are shown in Figures 2A-C.

The Super Sting R8 earth resistivity instrument measures the contact resistance of each electrode, and, if the resistance of any electrode is judged to be excessive, salt water is poured on the ground around that electrode to decrease the surface resistance. After the contact resistance of all electrodes is satisfactory, the data are acquired under program control. The electrodes are moved to the next survey line and the procedures repeated.

The resulting data sets are inverted using AGI EarthImager 2D, commercially licensed software, to create two-dimensional resistivity models. Apparent resistivity values are calculated with a forward modeling subroutine, and a smoothness-constrained least-squares optimization routine is used to invert the data. Both finite-difference and finite-element forward modeling techniques are available in the software.

Although there are many ways to display the results of 2D resistivity inversions, the essential element is a plot of the distribution of resistivity as a function of depth and distance along the survey line. The choice of scales affects the appearance of the plots and further emphasizes particular aspects of the results, and the choice is most commonly between linear and logarithmic scales, although others could be made. A resistivity image profile can be made to highlight either local detail or regional information.

The interpretation of resistivity plots is based upon the experience of the interpreter, his/her knowledge of typical values or ranges of values of resistivity for the types of geologic materials expected below a survey line. The interpreter uses the measured values to infer what materials are present - including soil and/or rock types, porosity, permeability, presence or absence of contamination, the presence of such geological features as faults and fracture zones, and the presence of such man-made features as tar pits, concrete walls, slurry walls, and former lagoons.

LIMITATIONS OF THE METHODS

Seismic Refraction

As with all geophysical methods, the seismic refraction method is based on the assumption that the local geology is uncomplicated. In particular, the seismic refraction method assumes that interfaces between geologic materials correlate with sharp increases in seismic velocity and that the interfaces between geologic units are relatively flat-lying. The method is not very sensitive to lateral variations within layers, and relatively subtle features such as fracture zones within bedrock generally cannot be detected unless there is a topographic expression of the feature and/or a significant drop in bedrock velocity. The accuracy of the method is degraded in areas with strong topographic relief and/or where the interfaces have apparent dips greater than about 20°. *In general, the accuracy of depths determined is stated to be about 10% or 2 feet, whichever is greater.*

Where two materials do not exhibit contrasting velocities, or where velocities gradually increase with depth, a clear refracted signal is not generated, and the GRM method cannot be used to distinguish the two materials. In some cases, the "geophysical contact" between materials with contrasting velocities does not correlate exactly with the "geologic contact." For example, where a highly weathered bedrock is overlain by a dense material such as till, the velocity range of the weathered bedrock might overlap or approach the velocity range of the till, and the two materials cannot be distinguished seismically. In such cases, the depth determined by GRM is the depth of *competent* bedrock, which might be located at some depth below the geologic contact.

The depth relations of the water table and bedrock may constitute a significant problem for processing with GRM. This problem is that of a "blind layer." A blind layer occurs where the thickness of the saturated overburden is less than about half the depth of bedrock. In such cases, the water-saturated material immediately above bedrock is "blind" in the sense that no refracted seismic energy from it will be received as a first arrival of seismic energy, and all methods used to reduce the seismic data to determine the depth of bedrock, the objective of this survey, use *only* first arrivals. Thus, the saturated layer will not be detected where it is close to bedrock, and most methods of seismic data reduction will indicate that bedrock is considerably shallower than it actually is. Although GRM, the method used by HRGS to reduce the seismic refraction data, does not use first arrivals through the water saturated zone (because there is none to use) in such cases, GRM determines the depth of bedrock correctly by using the *average* velocity of the saturated and unsaturated zones.

Electrical Resistivity Imaging

As with any of the electrical geophysical methods, resistivity data are subject to certain limitations, including site surface and subsurface conditions and structures, electrical and "geological" noise, and target depth and size. Interference from cultural features as buildings, fencing, railroad tracks, and underground and overhead power lines is common at many sites, particularly at active industrial sites. Thus, for certain applications, the use of the resistivity method in urban settings might be inappropriate.

The subsurface is three dimensional in character, and although the resistivity data are acquired along a line, the data are affected by resistivity changes off-line. Therefore, unless there are parallel survey lines that are spaced appropriately, resistivity changes off-line may be interpreted as changes below the survey line. This limitation is particularly significant for single survey lines. A further limitation of the resistivity method arises at the ends of a survey line where the data density is necessarily reduced.

The target depth, size, and of course, resistivity contrast may pose limitations. These three parameters, generally characterized as large or small, are important in the survey design,[1] and extreme values can limit the usefulness of the resistivity method. For example: a small target, a granite boulder 2 ft in diameter at a large depth of 20 ft or more, even with very high resistivity contrast, 10^5 Ohm-m in a medium of 0.2 Ohm-m, cannot be detected. A target of reasonable size, a granite boulder 2 ft in diameter at a shallow depth of 6 ft or less, may not be detectable where the resistivity contrast is low, 10^5 Ohm-m in a medium of 10^4 Ohm-m.

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[1] The parameters depth and size scale to the electrode spacing. A "large depth" is any depth greater than 10 times the electrode spacing. A "small depth" is any depth less than 3 times the electrode spacing. Depths less than 10 but greater than 3 times the electrode spacing are termed "intermediate depths." A "large size" is any size greater than 2½ times the electrode spacing. A "small size" is any size less than 1 times the electrode spacing. Sizes less than 2½ but greater than 1 times the electrode spacing are termed "intermediate sizes." Resistivity contrast refers to the ratio of the resistivity of one material to that of the second material. A large resistivity contrast is any such ratio of at least 100. A small resistivity contrast is any such ratio no greater than 0.5. Ratios less than 100 but greater than 0.5 are termed "intermediate ratios."

RESULTS

General

Seismic refraction and ERI surveys were conducted along five (5) transects totaling approximately 5,165 and 6,500, respectively, to determine the depth and configuration of the bedrock surface and to characterize the overburden stratigraphy.

Seismic Refraction

General. Seismic refraction data were acquired along five traverses (Seismic Lines 1-5) totaling approximately 5,165 feet at the Site. The locations of the seismic lines are shown in Figures 2A-C. The results of the seismic survey are shown in profile form in the lower panels of Figures 3 through 8 and are listed in Table 1.

Data Quality. The quality of the seismic refraction data ranges from good to very good. A measure of the accuracy of the data can be obtained by comparing the depths determined seismically with depths reported from nearby borings that intersect bedrock. For the present survey, however, the closest boring to a seismic line is Loc 4 SB 3, which is more than 150 feet east of the south send of Seismic Line 2. While the boring is too far away for a direct comparison, the refusal depth of 101.5 feet bgs is broadly consistent with the seismically determined depth of approximately 130 feet below ground surface

A measure of the internal consistency of the data can be obtained by comparing the depths determined seismically at the intersections of seismic lines. The only seismic line intersection for the present project is for Lines 2 and 3. The seismically determined depths at the intersection differ by 3.6 feet, or about 2.5 %. Based on the results of comparing seismically determined depths at intersecting seismic lines, and data acquired for similar projects, H-R estimates the accuracy (standard deviation) of the *depths* of competent bedrock determined by the seismic refraction survey to be about ± 10% of the depth of bedrock, or ± 2 feet), whichever is greater.

Interpretation of Velocities. In valley floor areas (Lines 1, 2, 3 and 4B), materials with three distinct velocity ranges were detected based on the GRM interpretation of the seismic data. The upper material exhibits a compressional wave velocity range of 1,100 to 1,200 feet per second (fps) and is interpreted to consist of unsaturated sediment. The middle material exhibits a compressional wave velocity range of 4,400 fps to 5,000 fps and is interpreted as saturated soils consisting of clay, sand and silt deposits.

In upland and valley wall areas (Lines 4A and 5), the upper material exhibits a compressional wave velocity of 1,200 to 3,900 fps and is interpreted to consist of saturated and unsaturated sediments. Detected velocities for this layer are greater at the east end of Line 4A, likely indicating that saturated sediments are more prevalent as bedrock deepens but are not thick enough to be resolved into a separate layer seismically.

The lowest material in all areas surveyed exhibits a compressional wave velocity of 12,500 fps to 17,100 fps and is interpreted to consist of competent bedrock. Where the top of bedrock is highly fractured and/or deeply weathered, it might exhibit lower velocities that cannot be detected as a distinct layer on the basis of the seismic refraction data. Thus, the top of rock determined on the basis of seismic refraction data is generally the top of competent bedrock, which might be located somewhat below the geologic contact between the overburden and bedrock.

Bedrock Elevation and Configuration. For valley floor areas (Lines 1, 2, 3, and 4B), the depth of competent bedrock along the seismic lines varies from about 37 feet to about 159 feet, and bedrock elevation varies from about 276 feet to 397 feet, for a total apparent relief of approximately 121 feet. Most areas surveyed in the valley floor are deeper than 100 feet. The west portion of Line 4B, which approaches the edge of the valley, contains the shallowest depths of bedrock.

For Line 4A, located on the western valley wall, bedrock depth varies between 7 and 51 feet, and bedrock elevation varies between 392 and 548 feet, for a total relief of 156 feet. Bedrock generally gets progressively deeper to the east, as the line approaches the valley floor.

For Line 5, located in an upland area, bedrock depth varies between 7.5 and 30 feet, and bedrock elevation varies between 490 feet and 524 feet, for a total relief of 34 feet. Bedrock depth below ground surface is greatest between stations 8+00 and 10+00 on Line 5.

Electrical Resistivity Imaging

ERI data were acquired along five traverses (ERI Lines 1-5) totaling approximately 6,500 feet at the Site. The locations of the ERI Lines are shown in Figures 2A-C. Inverted electrical resistivity models for ERI Lines 1 through 5 are shown in the upper panels of Figures 3 through 8, respectively. The ERI data shown were acquired using the Schlumberger array configuration.

The horizontal axes in Figures 3 through 8 are the profile distance along the ground surface, and the vertical axes are elevations in feet. The red and orange colors typically indicate relatively high resistivity materials such as dry sand and gravel located above the water table or bedrock, and the blue colors typically indicate relatively low resistivity materials such as saturated or conductive soils and clays. The intermediate colors (yellow and green) typically indicate moderately conductive materials such as partially saturated or moist soils and zones of weathered/fractured bedrock.

Cultural features such as metal structures and subsurface utilities can cause anomalies in ERI profiles. Line 5 was located on the Hoosac School campus along the entry road. Relatively abrupt lateral discontinuities in the resistivity model (e.g. such as at stationing 2+10 and 6+60 on Line 5) may be related to such man-made features. The remainder of the lines were located in agricultural areas and are less likely to be affected by cultural features. However, note that model resistivity values for the deeper section of the south half of Line 1 are anomalously high. Such high resistivity values may be the result of anomalous conditions caused by the hard-packed gravel road present at this location.

For the valley floor area (Lines 1, 2, 3, and 4B), the ERI profiles are characterized by a 15 to 20-ft thick high resistivity layer over a 20 to 100-ft thick low resistivity layer and a lower moderate to high resistivity zone at the bottom of the profiles. HRGS infers that the uppermost high resistivity layer correlates with unsaturated soil and the underlying low resistivity layer corresponds with clay and silt layers. HRGS infers that the lower moderate to high resistivity zone correlates with either sand and gravel or bedrock, between which it can be difficult to distinguish on the basis of resistivity data.

The bedrock surface as determined by seismic refraction GRM analysis (a more accurate method of determining the depth of the bedrock surface than the ERI method) has been superimposed on the ERI profiles shown in Figure 3 through 8. For potions of the valley floor, the seismically determined top of bedrock approximately corresponds with the top of the deeper moderate to high resistivity zone. For other portions of the valley floor (e.g. north portion of Line 1, central portions of Lines 3 and 4B), the seismically determined top of bedrock is significantly lower than the top of the moderate to high resistivity zone. For such areas, we infer that the top of the moderate to high resistivity zone corresponds with the top of the sand and gravel deposits. A thin layer of sand and gravel has also been inferred for the eastern end of Seismic Line 4A, located on the valley wall. The locations of inferred sand and gravel zones are shown in the resistivity profiles in Figures 3, 5, 6, and 7.

For Line 5 (Figure 8), located in an upland area, the ERI profile is characterized by a thin zone of moderate to low resistivity values over a zone of high resistivity values. We infer that the zone of thin moderate to low resistivity values correlate with unsaturated soils and the high resistivity zone correlates with bedrock.

CONCLUSIONS

Based upon the results of the surface geophysical survey conducted by HRGS as part of an aquifer characterization investigation study in Hoosic Valley, New York, in July 2018 and April 2019, we conclude the following:

- For valley floor areas (Lines 1, 2, 3, and 4B), the depth of competent bedrock along the seismic lines varies from about 37 feet to about 159 feet, and bedrock elevation varies from about 276 feet to 397 feet, for a total apparent relief of approximately 121 feet

- For Line 4A, located on the western valley wall, bedrock depth varies between 7 and 51 feet, and bedrock elevation varies between 392 and 548 feet, for a total relief of 156 feet.

- For Line 5, located in an upland area, bedrock depth varies between 7.5 and 30 feet, and bedrock elevation varies between 490 feet and 524 feet, for a total relief of 34 feet

- For valley floor and lower valley wall areas, possible zones of sand and gravel were detected between a thick clay and silt layer and bedrock.

LIMITATIONS ON USE OF THIS REPORT

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Sincerely,
HAGER-RICHTER GEOSCIENCE, INC.
dba HR Geological Services in NY

Steven Grant, P.G. (NY000495)
Senior Geophysicist

Jeffrey Reid, P.G. (NY000018)
Owner / Principal Geophysicist

Attachments: Figures 1 – 8

TABLE 1
SEISMIC REFRACTION RESULTS
AQUIFER CHARACTERIZATION
HOOSIC VALLEY, NEW YORK

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
1	0+00	799103.9	1475135.9	435	116	319
1	0+10	799104.8	1475145.9	435	116	319
1	0+20	799105.7	1475155.8	434	113	321
1	0+30	799106.6	1475165.6	434	112	322
1	0+40	799107.5	1475175.6	434	111	323
1	0+50	799108.4	1475185.6	434	113	320
1	0+60	799109.4	1475195.6	434	113	321
1	0+70	799110.3	1475205.5	434	113	321
1	0+80	799111.2	1475215.5	434	115	319
1	0+90	799112.1	1475225.5	435	114	321
1	1+00	799113.1	1475235.4	435	115	320
1	1+10	799113.9	1475245.4	436	117	319
1	1+20	799114.9	1475255.2	436	116	319
1	1+30	799115.9	1475265.2	436	119	317
1	1+40	799116.8	1475275.2	436	122	314
1	1+50	799117.7	1475285.2	436	123	313
1	1+60	799118.6	1475295.1	436	124	312
1	1+70	799119.5	1475305.1	436	126	310
1	1+80	799120.4	1475315.0	436	127	308
1	1+90	799121.4	1475325.0	436	129	306
1	2+00	799122.3	1475335.0	436	131	305
1	2+10	799123.2	1475344.9	436	133	303
1	2+20	799124.1	1475354.9	436	134	302
1	2+30	799125.1	1475364.9	436	135	301
1	2+40	799126.1	1475374.9	436	137	299
1	2+50	799127.2	1475384.8	436	139	297
1	2+60	799128.2	1475394.8	436	141	295
1	2+70	799129.3	1475404.6	436	142	293
1	2+80	799130.4	1475414.5	436	144	292
1	2+90	799131.5	1475424.5	436	146	290
1	3+00	799132.5	1475434.5	436	145	290
1	3+10	799133.6	1475444.4	435	147	289
1	3+20	799134.7	1475454.2	435	148	287
1	3+30	799135.8	1475464.2	435	148	287
1	3+40	799136.8	1475474.2	435	150	284
1	3+50	799137.9	1475484.1	435	151	284

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New York State Plane East NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from 2-meter digital elevation models “u_6345074600_2_meter.img” and “u_6345074500_2_meter.img” available at gis.ny.gov relative to NAVD88.

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
1	3+60	799138.9	1475494.1	435	150	285
1	3+70	799140.1	1475504.0	435	152	284
1	3+80	799141.1	1475514.0	435	155	280
1	3+90	799142.2	1475524.0	435	155	280
1	4+00	799143.2	1475533.9	435	158	278
1	4+10	799144.4	1475543.9	436	159	276
1	4+20	799145.4	1475553.8	436	158	278
1	4+30	799146.5	1475563.6	436	158	278
1	4+40	799147.6	1475573.6	435	158	277
1	4+50	799148.6	1475583.5	435	158	277
1	4+60	799149.7	1475593.5	435	158	277
1	4+70	799150.8	1475603.4	435	158	277
2	0+00	799546.5	1475220.5	431	133	298
2	0+10	799541.9	1475229.4	431	133	298
2	0+20	799537.2	1475238.2	429	133	296
2	0+30	799532.7	1475247.2	428	133	295
2	0+40	799528.1	1475256.0	430	133	297
2	0+50	799523.6	1475265.0	430	134	296
2	0+60	799518.9	1475273.9	430	134	296
2	0+70	799514.4	1475282.8	430	135	296
2	0+80	799509.8	1475291.6	431	135	295
2	0+90	799505.2	1475300.6	431	136	294
2	1+00	799500.7	1475309.4	430	138	292
2	1+10	799496.1	1475318.2	430	140	291
2	1+20	799491.5	1475327.1	431	139	292
2	1+30	799486.9	1475336.1	431	137	294
2	1+40	799482.4	1475345.0	431	138	293
2	1+50	799477.8	1475353.9	431	138	294
2	1+60	799473.2	1475362.8	432	135	297
2	1+70	799468.6	1475371.6	432	136	297
2	1+80	799464.1	1475380.5	432	136	296
2	1+90	799459.4	1475389.5	432	136	296
2	2+00	799454.9	1475398.4	432	136	296
2	2+10	799450.3	1475407.2	432	137	295
2	2+20	799445.8	1475416.1	432	137	295
2	2+30	799441.2	1475425.0	432	137	295
2	2+40	799436.6	1475433.9	431	138	294
2	2+50	799432.1	1475442.8	431	138	294

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
2	2+60	799427.6	1475451.8	432	138	294
2	2+70	799423.0	1475460.6	432	138	294
2	2+80	799418.5	1475469.5	431	137	294
2	2+90	799413.9	1475478.5	431	137	295
2	3+00	799409.4	1475487.4	431	136	295
2	3+10	799404.9	1475496.2	431	136	295
2	3+20	799400.4	1475505.2	431	135	296
2	3+30	799395.8	1475514.1	430	134	296
2	3+40	799391.3	1475523.0	430	133	297
2	3+50	799386.8	1475532.0	430	132	298
2	3+60	799382.2	1475540.9	430	129	301
2	3+70	799377.7	1475549.8	430	124	305
2	3+80	799373.1	1475558.8	430	124	305
2	3+90	799368.6	1475567.6	429	120	309
2	4+00	799364.1	1475576.5	429	119	310
2	4+10	799359.6	1475585.4	429	117	312
2	4+20	799355.0	1475594.4	428	116	313
2	4+30	799350.5	1475603.2	428	119	309
2	4+40	799345.9	1475612.2	428	120	309
2	4+50	799341.4	1475621.1	430	120	310
2	4+60	799336.9	1475630.0	433	120	313
2	4+70	799332.4	1475639.0	434	120	314
3	2+40	799198.6	1475243.8	429	130	300
3	2+50	799206.4	1475250.0	430	130	300
3	2+60	799214.2	1475256.2	430	130	300
3	2+70	799222.1	1475262.4	429	131	298
3	2+80	799229.9	1475268.6	430	134	296
3	2+90	799237.8	1475274.9	430	137	293
3	3+00	799245.6	1475281.0	430	138	292
3	3+10	799253.5	1475287.2	429	140	289
3	3+20	799261.3	1475293.5	430	140	290
3	3+30	799269.1	1475299.8	430	142	287
3	3+40	799277.0	1475305.9	430	142	288
3	3+50	799284.8	1475312.1	430	144	286
3	3+60	799292.6	1475318.2	430	145	285
3	3+70	799300.5	1475324.6	431	146	284
3	3+80	799308.3	1475330.8	431	147	283
3	3+90	799316.1	1475337.0	431	151	280

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
3	4+00	799324.0	1475343.2	431	151	280
3	4+10	799331.8	1475349.4	430	149	281
3	4+20	799339.6	1475355.6	430	149	281
3	4+30	799347.4	1475361.9	430	149	282
3	4+40	799355.3	1475368.1	430	148	282
3	4+50	799363.1	1475374.2	431	148	283
3	4+60	799371.0	1475380.5	431	147	284
3	4+70	799378.8	1475386.6	431	147	284
3	4+80	799386.9	1475392.6	431	146	285
3	4+90	799394.9	1475398.5	431	145	286
3	5+00	799403.0	1475404.5	431	144	287
3	5+10	799411.0	1475410.4	432	143	288
3	5+20	799419.1	1475416.4	432	143	289
3	5+30	799427.1	1475422.4	432	142	290
3	5+40	799435.1	1475428.2	432	141	291
3	5+50	799443.2	1475434.1	432	140	292
3	5+60	799451.2	1475440.1	432	139	293
3	5+70	799459.3	1475446.1	432	138	294
3	5+80	799467.3	1475452.0	432	137	294
3	5+90	799475.4	1475458.0	431	137	294
3	6+00	799483.4	1475463.9	431	137	294
3	6+10	799491.4	1475469.8	432	137	294
3	6+20	799499.5	1475475.8	431	137	294
3	6+30	799507.6	1475481.6	431	137	294
3	6+40	799515.6	1475487.6	431	137	294
3	6+50	799523.6	1475493.6	431	137	294
3	6+60	799531.7	1475499.6	431	137	294
3	6+70	799539.8	1475505.4	431	137	294
3	6+80	799547.8	1475511.4	431	137	293
3	6+90	799555.8	1475517.4	430	137	293
3	7+00	799563.9	1475523.2	430	137	292
3	7+10	799571.9	1475529.2	428	137	291
4A	0+00	799999.9	1471440.5	565	17	548
4A	0+10	800008.7	1471445.4	562	17	546
4A	0+20	800017.4	1471450.2	560	17	543
4A	0+30	800026.2	1471455.0	557	17	540
4A	0+40	800035.0	1471459.8	554	15	539
4A	0+50	800043.8	1471464.6	551	15	536

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
4A	0+60	800052.5	1471469.5	549	16	533
4A	0+70	800061.3	1471474.2	547	15	532
4A	0+80	800070.1	1471479.0	544	14	530
4A	0+90	800078.8	1471483.9	542	13	529
4A	1+00	800087.6	1471488.8	540	13	527
4A	1+10	800096.4	1471493.5	538	11	527
4A	1+20	800105.1	1471498.2	536	11	525
4A	1+30	800113.9	1471503.1	534	12	522
4A	1+40	800122.6	1471507.9	532	11	521
4A	1+50	800131.4	1471512.8	530	11	519
4A	1+60	800140.2	1471517.5	528	9	519
4A	1+70	800148.9	1471522.4	525	8	517
4A	1+80	800157.8	1471527.1	523	7	516
4A	1+90	800166.5	1471532.0	521	7	514
4A	2+00	800175.2	1471536.8	519	7	512
4A	2+10	800184.1	1471541.5	518	9	510
4A	2+20	800192.8	1471546.4	518	13	505
4A	2+30	800201.6	1471551.1	518	17	501
4A	2+40	800210.4	1471556.0	518	21	497
4A	2+50	800219.1	1471560.8	518	23	495
4A	2+60	800227.9	1471565.5	516	24	493
4A	2+70	800236.7	1471570.5	515	23	492
4A	2+80	800245.4	1471575.1	514	22	492
4A	2+90	800254.1	1471580.0	513	22	491
4A	3+00	800262.9	1471584.9	512	22	490
4A	3+10	800271.7	1471589.6	511	23	488
4A	3+20	800280.4	1471594.4	510	23	487
4A	3+30	800289.2	1471599.2	508	23	485
4A	3+40	800298.0	1471604.1	507	22	485
4A	3+50	800306.8	1471608.9	506	23	483
4A	3+60	800315.6	1471613.8	504	24	481
4A	3+70	800324.3	1471618.5	503	24	480
4A	3+80	800333.1	1471623.2	502	24	478
4A	3+90	800341.9	1471628.1	501	25	477
4A	4+00	800350.6	1471633.0	500	26	474
4A	4+10	800359.4	1471637.8	499	28	472
4A	4+20	800368.2	1471642.5	498	28	471
4A	4+30	800376.9	1471647.4	497	28	469

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
4A	4+40	800385.8	1471652.1	496	27	469
4A	4+50	800394.5	1471657.0	495	26	469
4A	4+60	800403.2	1471661.8	494	26	468
4A	4+70	800412.0	1471666.6	493	26	467
4A	4+80	800420.8	1471671.4	492	27	466
4A	4+90	800429.5	1471676.1	491	27	464
4A	5+00	800438.3	1471681.0	489	27	462
4A	5+10	800447.1	1471685.8	487	27	460
4A	5+20	800455.8	1471690.6	485	26	459
4A	5+30	800464.6	1471695.4	485	25	459
4A	5+40	800473.4	1471700.2	483	26	457
4A	5+50	800482.1	1471705.0	482	27	455
4A	5+60	800490.9	1471709.9	481	30	451
4A	5+70	800499.7	1471714.6	480	33	447
4A	5+80	800508.4	1471719.5	480	34	446
4A	5+90	800517.2	1471724.2	480	37	443
4A	6+00	800526.0	1471729.0	479	38	441
4A	6+10	800534.8	1471733.9	479	39	440
4A	6+20	800543.6	1471738.6	479	40	440
4A	6+30	800552.3	1471743.5	478	39	440
4A	6+40	800561.1	1471748.4	478	38	440
4A	6+50	800569.8	1471753.1	477	35	443
4A	6+60	800578.6	1471757.9	477	34	443
4A	6+70	800587.4	1471762.8	476	33	443
4A	6+80	800596.1	1471767.5	475	33	442
4A	6+90	800604.9	1471772.4	474	34	440
4A	7+00	800613.7	1471777.1	473	35	438
4A	7+10	800622.4	1471782.0	472	37	436
4A	7+20	800631.2	1471786.8	472	40	432
4A	7+30	800640.0	1471791.6	471	41	429
4A	7+40	800648.8	1471796.4	469	42	427
4A	7+50	800657.5	1471801.2	468	43	425
4A	7+60	800666.3	1471806.0	466	44	422
4A	7+70	800675.1	1471810.9	463	44	420
4A	7+80	800683.8	1471815.8	461	43	418
4A	7+90	800692.6	1471820.4	459	42	417
4A	8+00	800701.4	1471825.2	457	41	416
4A	8+10	800710.1	1471830.1	455	41	414

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
4A	8+20	800718.9	1471834.9	454	41	413
4A	8+30	800727.6	1471839.6	453	41	412
4A	8+40	800736.4	1471844.5	452	42	410
4A	8+50	800745.2	1471849.4	451	43	408
4A	8+60	800753.9	1471854.0	451	44	406
4A	8+70	800762.7	1471858.9	450	46	404
4A	8+80	800771.5	1471863.8	449	47	402
4A	8+90	800780.2	1471868.5	448	48	400
4A	9+00	800789.0	1471873.4	447	49	398
4A	9+10	800797.8	1471878.1	447	50	397
4A	9+20	800806.6	1471883.0	446	50	396
4A	9+30	800815.3	1471887.8	445	51	394
4A	9+40	800824.1	1471892.6	444	51	393
4B	0+00	800875.5	1471937.5	441	51	390
4B	0+10	800883.6	1471943.4	440	51	389
4B	0+20	800891.7	1471949.1	439	51	388
4B	0+30	800899.8	1471955.0	439	51	388
4B	0+40	800907.9	1471960.9	439	51	388
4B	0+50	800916.1	1471966.8	438	51	388
4B	0+60	800924.2	1471972.5	438	51	387
4B	0+70	800932.3	1471978.4	438	51	387
4B	0+80	800940.4	1471984.2	437	51	387
4B	0+90	800948.6	1471990.0	437	51	387
4B	1+00	800956.7	1471995.9	437	50	387
4B	1+10	800964.8	1472001.8	437	50	386
4B	1+20	800972.9	1472007.6	436	50	386
4B	1+30	800981.1	1472013.4	436	50	386
4B	1+40	800989.1	1472019.2	435	47	389
4B	1+50	800997.2	1472025.1	435	44	391
4B	1+60	801005.4	1472030.9	435	41	394
4B	1+70	801013.4	1472036.8	434	38	396
4B	1+80	801021.6	1472042.6	434	37	397
4B	1+90	801029.7	1472048.5	434	38	396
4B	2+00	801037.8	1472054.2	433	40	393
4B	2+10	801045.9	1472060.1	433	41	393
4B	2+20	801054.1	1472066.0	434	39	395
4B	2+30	801062.2	1472071.8	434	42	392
4B	2+40	801070.3	1472077.8	435	44	391

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
4B	2+50	801078.4	1472083.5	438	50	388
4B	2+60	801086.6	1472089.4	438	54	383
4B	2+70	801094.6	1472095.1	438	55	383
4B	2+80	801102.8	1472101.0	438	57	381
4B	2+90	801110.9	1472106.9	438	60	379
4B	3+00	801119.0	1472112.8	439	65	374
4B	3+10	801127.2	1472118.5	439	66	373
4B	3+20	801135.3	1472124.4	439	69	370
4B	3+30	801143.4	1472130.1	439	73	366
4B	3+40	801151.6	1472135.9	439	76	363
4B	3+50	801159.8	1472141.8	439	79	361
4B	3+60	801167.9	1472147.5	439	79	360
4B	3+70	801176.0	1472153.4	439	78	361
4B	3+80	801184.1	1472159.2	439	75	364
4B	3+90	801192.2	1472165.0	439	74	366
4B	4+00	801200.4	1472170.8	439	71	368
4B	4+10	801208.6	1472176.6	439	72	367
4B	4+20	801216.7	1472182.4	439	75	364
4B	4+30	801224.8	1472188.2	439	75	364
4B	4+40	801233.0	1472194.0	439	74	365
4B	4+50	801241.1	1472199.8	439	74	365
4B	4+60	801249.2	1472205.6	439	74	365
4B	4+70	801257.4	1472211.4	439	74	365
4B	4+80	801265.6	1472217.2	439	73	366
4B	4+90	801273.7	1472223.0	439	73	366
4B	5+00	801281.8	1472228.9	439	73	366
4B	5+10	801290.0	1472234.6	439	73	365
4B	5+20	801298.1	1472240.5	439	75	364
4B	5+30	801306.3	1472246.2	439	76	363
4B	5+40	801314.4	1472252.0	439	83	356
4B	5+50	801322.6	1472257.9	439	84	355
4B	5+60	801330.7	1472263.6	439	87	351
4B	5+70	801338.8	1472269.5	439	85	354
4B	5+80	801346.9	1472275.2	439	85	353
4B	5+90	801355.1	1472281.1	439	83	356
4B	6+00	801363.2	1472286.9	439	83	355
4B	6+10	801371.4	1472292.8	439	84	354
4B	6+20	801379.5	1472298.5	439	87	351

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
4B	6+30	801387.6	1472304.4	438	88	350
4B	6+40	801395.8	1472310.2	438	89	350
4B	6+50	801403.9	1472316.1	438	89	349
4B	6+60	801412.0	1472321.9	438	89	349
4B	6+70	801420.1	1472327.8	438	90	348
4B	6+80	801428.2	1472333.5	438	90	348
4B	6+90	801436.4	1472339.4	438	91	348
4B	7+00	801444.5	1472345.1	438	91	347
4B	7+10	801452.6	1472351.0	438	92	347
4B	7+20	801460.8	1472356.9	438	90	348
4B	7+30	801468.9	1472362.6	438	91	347
4B	7+40	801477.0	1472368.5	438	92	346
4B	7+50	801485.1	1472374.2	438	92	346
4B	7+60	801493.2	1472380.1	438	95	343
4B	7+70	801501.4	1472386.0	438	97	341
4B	7+80	801509.5	1472391.9	438	97	341
4B	7+90	801517.6	1472397.8	438	98	340
4B	8+00	801525.8	1472403.5	437	99	338
4B	8+10	801533.9	1472409.4	437	99	338
4B	8+20	801542.0	1472415.1	437	98	339
4B	8+30	801550.1	1472421.0	437	96	341
4B	8+40	801558.2	1472426.9	437	96	341
4B	8+50	801566.4	1472432.8	437	97	340
4B	8+60	801574.5	1472438.5	437	100	337
4B	8+70	801582.6	1472444.4	437	101	336
4B	8+80	801590.8	1472450.1	438	99	339
4B	8+90	801598.9	1472456.0	438	100	338
4B	9+00	801607.0	1472461.8	438	97	341
4B	9+10	801615.2	1472467.6	438	96	342
4B	9+20	801623.3	1472473.4	438	92	346
4B	9+30	801631.4	1472479.2	438	90	348
4B	9+40	801639.6	1472484.9	438	92	346
4B	9+50	801647.8	1472490.8	438	92	345
4B	9+60	801655.9	1472496.6	438	94	343
4B	9+70	801664.0	1472502.4	438	91	346
4B	9+80	801672.2	1472508.1	438	88	349
4B	9+90	801680.3	1472513.9	437	89	348
4B	10+00	801688.5	1472519.8	437	93	344

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
4B	10+10	801696.6	1472525.5	437	96	341
4B	10+20	801704.8	1472531.4	437	95	342
4B	10+30	801712.9	1472537.1	436	88	348
4B	10+40	801721.1	1472543.0	436	84	352
4B	10+50	801729.2	1472548.8	436	88	348
4B	10+60	801737.4	1472554.6	435	85	350
4B	10+70	801745.6	1472560.4	435	85	351
4B	10+80	801753.7	1472566.1	435	86	349
4B	10+90	801761.8	1472571.9	435	85	351
4B	11+00	801770.0	1472577.8	435	85	350
4B	11+10	801778.1	1472583.5	435	83	352
4B	11+20	801786.2	1472589.4	435	81	354
4B	11+30	801794.4	1472595.1	435	81	355
4B	11+40	801802.6	1472600.9	435	80	355
4B	11+50	801810.7	1472606.8	435	80	355
4B	11+60	801818.8	1472612.5	435	76	359
4B	11+70	801827.0	1472618.4	435	75	360
4B	11+80	801835.1	1472624.1	435	75	361
4B	11+90	801843.3	1472629.9	436	74	362
4B	12+00	801851.4	1472635.6	436	73	362
4B	12+10	801859.6	1472641.5	436	77	359
4B	12+20	801867.8	1472647.2	436	79	357
4B	12+30	801875.9	1472653.0	436	76	360
4B	12+40	801884.1	1472658.8	436	79	357
4B	12+50	801892.3	1472664.5	436	84	352
4B	12+60	801900.5	1472670.2	436	90	346
4B	12+70	801908.7	1472676.0	436	91	345
4B	12+80	801916.9	1472681.9	436	93	343
4B	12+90	801925.0	1472687.5	436	95	342
4B	13+00	801933.2	1472693.4	436	96	340
4B	13+10	801941.4	1472699.1	436	95	341
4B	13+20	801949.5	1472704.9	436	95	341
4B	13+30	801957.7	1472710.6	436	96	340
4B	13+40	801965.9	1472716.4	436	103	333
4B	13+50	801974.1	1472722.1	435	105	330
4B	13+60	801982.2	1472727.9	435	110	326
4B	13+70	801990.4	1472733.6	435	111	324
4B	13+80	801998.6	1472739.4	435	115	319

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
4B	13+90	802006.8	1472745.2	434	118	316
4B	14+00	802014.9	1472751.0	434	122	312
4B	14+10	802023.1	1472756.8	434	125	309
4B	14+20	802031.2	1472762.5	434	129	305
4B	14+30	802039.4	1472768.2	433	131	302
4B	14+40	802047.6	1472774.0	433	131	302
4B	14+50	802055.8	1472779.8	433	134	299
4B	14+60	802063.9	1472785.5	433	133	299
4B	14+70	802072.1	1472791.2	433	135	298
4B	14+80	802080.3	1472797.0	434	136	298
4B	14+90	802088.5	1472802.8	434	136	298
4B	15+00	802096.6	1472808.5	434	137	297
4B	15+10	802104.8	1472814.4	434	137	298
4B	15+20	802112.9	1472820.1	434	138	296
4B	15+30	802121.1	1472825.9	434	138	297
4B	15+40	802129.3	1472831.8	435	138	297
4B	15+50	802137.5	1472837.4	434	141	293
4B	15+60	802145.6	1472843.2	434	140	294
4B	15+70	802153.8	1472849.0	431	138	293
4B	15+80	802161.9	1472854.8	430	137	293
4B	15+90	802170.1	1472860.5	431	137	295
4B	16+00	802178.3	1472866.2	432	137	295
4B	16+10	802186.5	1472872.0	432	137	296
4B	16+20	802194.6	1472877.8	433	137	296
4B	16+30	802202.8	1472883.6	433	137	297
4B	16+40	802210.6	1472889.0	434	139	294
5	0+00	801765.8	1467445.4	528	8	520
5	0+05	801770.1	1467447.9	528	8	520
5	0+10	801774.5	1467450.4	528	8	521
5	0+15	801778.8	1467452.9	528	8	520
5	0+20	801783.1	1467455.4	528	8	520
5	0+25	801787.4	1467457.9	528	9	519
5	0+30	801791.8	1467460.4	528	10	519
5	0+35	801796.1	1467462.8	528	9	519
5	0+40	801800.5	1467465.2	528	9	519
5	0+45	801804.8	1467467.8	529	9	520
5	0+50	801809.1	1467470.2	529	10	519
5	0+55	801813.5	1467472.8	529	10	519

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
5	0+60	801817.8	1467475.2	529	10	518
5	0+65	801822.2	1467477.8	529	10	518
5	0+70	801826.5	1467480.1	529	10	518
5	0+75	801830.9	1467482.6	529	11	518
5	0+80	801835.2	1467485.2	529	11	518
5	0+85	801839.6	1467487.6	529	11	518
5	0+90	801843.9	1467490.1	529	11	519
5	0+95	801848.2	1467492.6	529	11	519
5	1+00	801852.6	1467495.0	529	12	518
5	1+05	801856.9	1467497.6	530	12	518
5	1+10	801861.2	1467500.0	530	12	518
5	1+15	801865.6	1467502.5	530	12	518
5	1+20	801869.9	1467505.0	530	11	519
5	1+25	801874.2	1467507.5	530	11	519
5	1+30	801878.6	1467510.0	530	11	518
5	1+35	801882.9	1467512.5	530	11	518
5	1+40	801887.2	1467515.1	530	12	518
5	1+45	801891.6	1467517.6	530	12	518
5	1+50	801895.9	1467520.1	530	12	518
5	1+55	801900.2	1467522.6	530	13	517
5	1+60	801904.5	1467525.1	530	13	517
5	1+65	801908.9	1467527.6	530	12	518
5	1+70	801913.2	1467530.1	530	13	517
5	1+75	801917.5	1467532.6	530	13	518
5	1+80	801921.8	1467535.1	531	12	518
5	1+85	801926.1	1467537.6	531	12	518
5	1+90	801930.5	1467540.1	531	12	519
5	1+95	801934.8	1467542.8	531	12	519
5	2+00	801939.1	1467545.2	531	12	519
5	2+05	801943.4	1467547.8	531	12	519
5	2+10	801947.8	1467550.2	532	12	520
5	2+15	801952.1	1467552.8	532	12	520
5	2+20	801956.4	1467555.2	532	12	520
5	2+25	801960.7	1467557.9	532	12	521
5	2+30	801965.0	1467560.4	532	12	520
5	2+35	801969.4	1467562.8	533	13	520
5	2+40	801973.7	1467565.4	533	13	520
5	2+45	801978.0	1467567.9	533	13	520

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
5	2+50	801982.3	1467570.4	533	14	520
5	2+55	801986.6	1467572.9	534	14	520
5	2+60	801990.9	1467575.4	534	14	520
5	2+65	801995.2	1467578.0	534	14	520
5	2+70	801999.6	1467580.5	534	15	519
5	2+75	802003.9	1467583.0	534	16	519
5	2+80	802008.2	1467585.6	534	15	519
5	2+85	802012.5	1467588.1	534	16	519
5	2+90	802016.8	1467590.6	534	15	519
5	2+95	802021.1	1467593.1	534	14	520
5	3+00	802025.4	1467595.6	535	14	521
5	3+05	802029.8	1467598.2	535	14	521
5	3+10	802034.1	1467600.8	534	13	521
5	3+15	802038.4	1467603.2	534	13	521
5	3+20	802042.7	1467605.9	534	14	521
5	3+25	802047.0	1467608.4	534	13	522
5	3+30	802051.4	1467610.9	534	12	522
5	3+35	802055.7	1467613.4	534	12	523
5	3+40	802060.0	1467615.9	534	11	523
5	3+45	802064.3	1467618.5	534	11	523
5	3+50	802068.6	1467621.0	534	11	523
5	3+55	802072.9	1467623.5	534	11	523
5	3+60	802077.3	1467625.9	534	10	523
5	3+65	802081.7	1467628.4	534	10	524
5	3+70	802086.0	1467630.8	534	10	524
5	3+75	802090.4	1467633.2	533	10	523
5	3+80	802094.7	1467635.6	533	11	521
5	3+85	802099.1	1467638.1	532	12	521
5	3+90	802103.4	1467640.6	532	12	520
5	3+95	802107.9	1467643.0	533	13	519
5	4+00	802112.2	1467645.4	533	13	519
5	4+05	802116.6	1467647.9	532	12	520
5	4+10	802120.9	1467650.4	532	12	520
5	4+15	802125.2	1467652.8	532	11	521
5	4+20	802129.6	1467655.1	531	10	521
5	4+25	802134.0	1467657.6	531	10	521
5	4+30	802138.4	1467660.0	530	10	520
5	4+35	802142.7	1467662.5	530	10	521

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
5	4+40	802147.1	1467664.9	529	9	521
5	4+45	802151.4	1467667.4	529	8	521
5	4+50	802155.8	1467669.9	529	8	521
5	4+55	802160.2	1467672.2	529	8	521
5	4+60	802164.6	1467674.6	528	7	521
5	4+65	802168.9	1467677.1	528	7	521
5	4+70	802173.3	1467679.6	528	7	521
5	4+75	802177.7	1467682.0	528	7	521
5	4+80	802181.5	1467685.2	528	7	521
5	4+85	802185.4	1467688.4	528	7	520
5	4+90	802189.2	1467691.5	528	8	520
5	4+95	802193.1	1467694.8	528	7	520
5	5+00	802197.0	1467697.9	528	8	520
5	5+05	802200.9	1467701.0	528	9	519
5	5+10	802204.7	1467704.2	528	9	519
5	5+15	802208.6	1467707.4	528	9	519
5	5+20	802212.4	1467710.6	528	9	519
5	5+25	802216.3	1467713.8	528	9	519
5	5+30	802220.2	1467716.9	528	8	520
5	5+35	802224.1	1467720.1	528	8	520
5	5+40	802227.9	1467723.2	528	8	520
5	5+45	802231.8	1467726.4	528	8	520
5	5+50	802235.6	1467729.6	528	9	519
5	5+55	802239.5	1467732.8	528	10	519
5	5+60	802243.4	1467736.0	528	10	519
5	5+65	802247.2	1467739.1	528	10	518
5	5+70	802251.1	1467742.2	528	10	518
5	5+75	802254.9	1467745.5	528	10	518
5	5+80	802258.8	1467748.6	528	11	517
5	5+85	802262.7	1467751.8	528	11	516
5	5+90	802266.2	1467755.2	528	12	516
5	5+95	802269.8	1467758.9	527	13	514
5	6+00	802273.2	1467762.4	527	13	514
5	6+05	802276.8	1467766.0	527	12	515
5	6+10	802280.2	1467769.6	527	12	515
5	6+15	802283.8	1467773.1	527	13	515
5	6+20	802287.3	1467776.6	528	12	516
5	6+25	802290.8	1467780.2	528	12	516

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
5	6+30	802294.3	1467783.8	529	12	517
5	6+35	802297.9	1467787.4	529	13	517
5	6+40	802301.3	1467791.0	529	13	517
5	6+45	802304.8	1467794.5	530	12	517
5	6+50	802308.3	1467798.1	530	13	517
5	6+55	802311.9	1467801.6	530	13	517
5	6+60	802315.4	1467805.1	530	12	517
5	6+65	802318.9	1467808.8	530	12	518
5	6+70	802322.4	1467812.4	530	12	518
5	6+75	802325.9	1467815.9	530	12	517
5	6+80	802329.4	1467819.5	530	12	517
5	6+85	802332.9	1467823.0	530	13	517
5	6+90	802336.4	1467826.5	530	13	517
5	6+95	802339.9	1467830.1	529	12	517
5	7+00	802343.4	1467833.8	529	12	517
5	7+05	802346.9	1467837.2	529	12	517
5	7+10	802350.9	1467840.2	528	12	516
5	7+15	802354.9	1467843.4	528	12	516
5	7+20	802358.8	1467846.5	528	12	516
5	7+25	802362.8	1467849.5	527	12	515
5	7+30	802366.7	1467852.5	527	12	515
5	7+35	802370.7	1467855.6	527	12	515
5	7+40	802374.6	1467858.8	526	12	514
5	7+45	802378.6	1467861.8	526	13	514
5	7+50	802382.5	1467864.8	526	13	513
5	7+55	802386.4	1467867.9	526	13	513
5	7+60	802390.4	1467871.0	526	14	512
5	7+65	802394.4	1467874.0	526	15	511
5	7+70	802398.3	1467877.0	526	16	510
5	7+75	802402.2	1467880.1	527	17	509
5	7+80	802406.2	1467883.2	527	20	507
5	7+85	802410.1	1467886.4	527	21	506
5	7+90	802414.1	1467889.4	527	22	505
5	7+95	802418.0	1467892.4	527	22	505
5	8+00	802422.0	1467895.5	527	23	504
5	8+05	802425.9	1467898.6	526	23	503
5	8+10	802429.9	1467901.6	527	23	504
5	8+15	802433.9	1467904.6	527	23	504

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

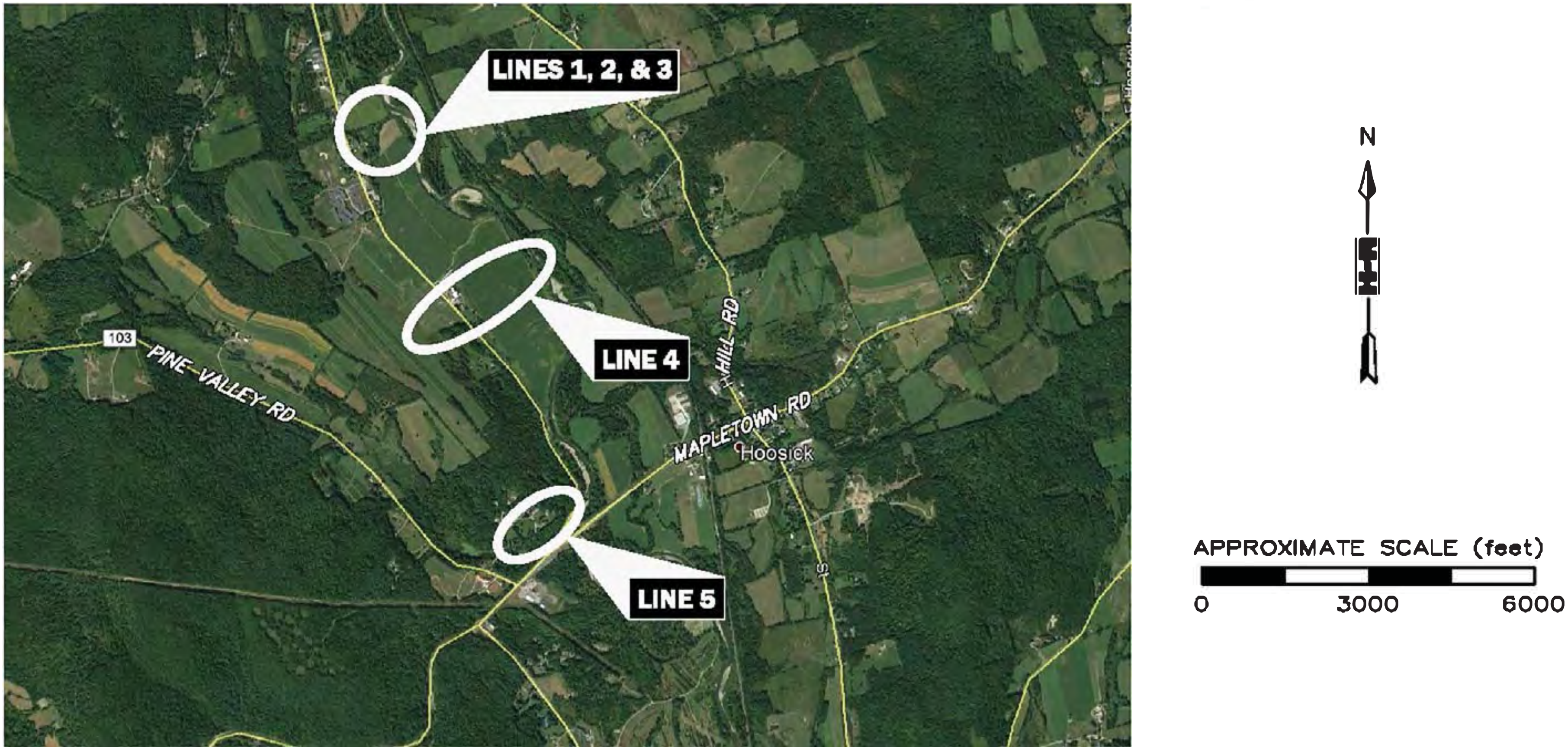
Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
5	8+20	802437.8	1467907.8	527	24	503
5	8+25	802441.8	1467910.8	527	23	503
5	8+30	802445.9	1467913.6	526	25	502
5	8+35	802450.0	1467916.5	526	26	501
5	8+40	802454.1	1467919.4	526	26	500
5	8+45	802458.2	1467922.2	526	27	499
5	8+50	802462.3	1467925.1	526	28	498
5	8+55	802466.4	1467927.9	525	29	497
5	8+60	802470.5	1467930.8	525	30	495
5	8+65	802474.6	1467933.6	525	29	495
5	8+70	802478.7	1467936.5	525	30	495
5	8+75	802482.8	1467939.4	525	30	495
5	8+80	802486.9	1467942.4	525	30	495
5	8+85	802491.0	1467945.1	525	29	495
5	8+90	802495.1	1467948.0	524	29	495
5	8+95	802499.2	1467950.9	524	29	495
5	9+00	802503.2	1467953.8	524	29	495
5	9+05	802507.4	1467956.6	524	29	495
5	9+10	802511.4	1467959.5	523	29	495
5	9+15	802515.6	1467962.2	523	28	495
5	9+20	802519.6	1467965.2	523	28	495
5	9+25	802523.8	1467968.0	522	27	495
5	9+30	802527.8	1467971.0	522	27	495
5	9+35	802531.9	1467973.9	522	26	495
5	9+40	802536.1	1467976.6	521	26	495
5	9+45	802540.1	1467979.6	521	25	495
5	9+50	802544.2	1467982.5	520	25	495
5	9+55	802548.3	1467985.4	520	25	495
5	9+60	802552.4	1467988.2	520	24	496
5	9+65	802556.4	1467991.0	520	24	496
5	9+70	802560.5	1467994.0	519	23	497
5	9+75	802564.6	1467996.9	519	22	497
5	9+80	802568.7	1467999.8	519	21	498
5	9+85	802572.8	1468002.6	519	21	497
5	9+90	802576.8	1468005.5	518	21	497
5	9+95	802580.9	1468008.4	518	20	497
5	10+00	802585.1	1468011.2	517	20	498
5	10+05	802589.1	1468014.1	517	18	499

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).

TABLE 1 (CONTINUED)
SEISMIC REFRACTION RESULTS

Line	Station (ft)	Easting (ft)	Northing (ft)	Surface Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
5	10+10	802593.2	1468017.0	517	17	500
5	10+15	802597.2	1468019.9	516	16	501
5	10+20	802601.4	1468022.9	516	16	500
5	10+25	802605.4	1468025.8	515	15	500
5	10+30	802609.6	1468028.5	514	15	500
5	10+35	802613.6	1468031.5	514	14	500
5	10+40	802617.7	1468034.4	514	13	501
5	10+45	802621.8	1468037.2	513	13	501
5	10+50	802625.9	1468040.1	513	12	501
5	10+55	802629.9	1468043.0	513	12	501
5	10+60	802633.9	1468046.0	513	11	502
5	10+65	802637.9	1468049.1	513	11	502
5	10+70	802641.9	1468052.0	512	11	501
5	10+75	802645.9	1468055.0	511	10	501
5	10+80	802649.9	1468058.1	511	10	500
5	10+85	802653.9	1468061.1	510	10	500
5	10+90	802657.9	1468064.1	510	10	500
5	10+95	802661.9	1468067.1	510	10	500
5	11+00	802665.9	1468070.1	509	9	500
5	11+05	802669.9	1468073.1	509	9	500
5	11+10	802673.9	1468076.1	509	10	499
5	11+15	802677.9	1468079.1	508	9	499
5	11+20	802681.9	1468082.1	508	10	498
5	11+25	802685.9	1468085.1	507	10	498
5	11+30	802689.9	1468088.1	507	9	498
5	11+35	802693.9	1468091.1	506	9	497
5	11+40	802697.9	1468094.1	505	10	496
5	11+45	802701.8	1468097.1	505	10	495
5	11+50	802705.9	1468100.2	505	9	495
5	11+55	802709.8	1468103.2	504	10	494
5	11+60	802713.8	1468106.1	503	10	493
5	11+65	802717.8	1468109.2	502	10	492
5	11+70	802721.8	1468112.2	501	10	491
5	11+75	802725.8	1468115.2	500	10	490

Estimated standard deviation of depth of interfaces for seismic lines is normally taken as 10% or 2 feet, whichever is greater. Depths and elevations of bedrock determined here are for competent bedrock. Heavily weathered or highly fractured bedrock may occur at shallower depths. The easting and northing coordinates are relative to New Hampshire State Plane NAD83 (CORS96) in US survey feet. Elevations along the seismic lines were determined from plans provided by Golder and are relative to mean sea level (MSL).



LOCATION

NOTE:

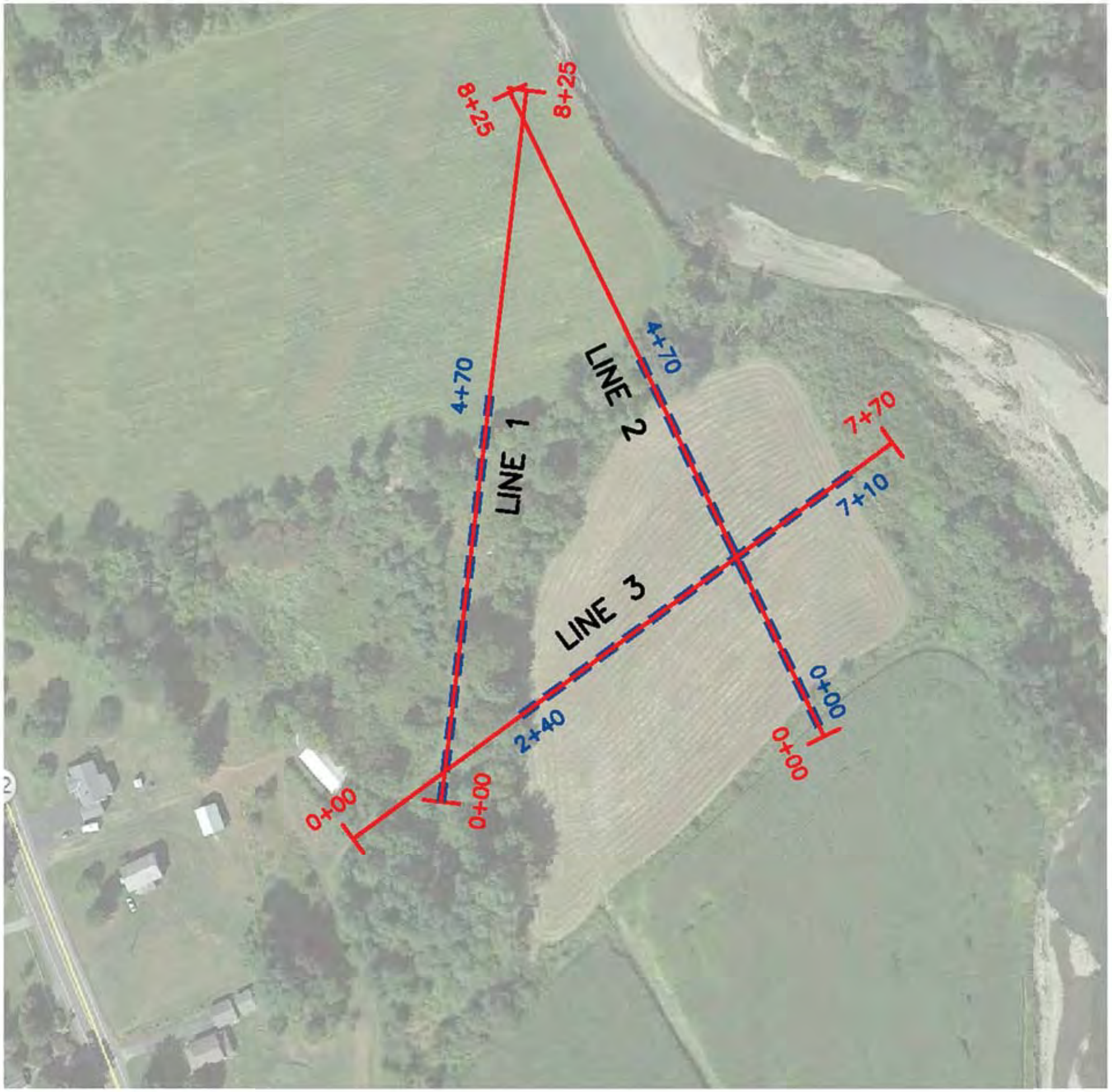
Modified from Google Earth Pro aerial photograph.

* DBA HR Geological Services in New York

Figure 1
General Site Location
Aquifer Characterization
Hoosic Valley, New York

File 18SG14 | May, 2019

HAGER–RICHTER*
Salem, NH | Fords, NJ



N

H-R

LEGEND

🟥	RESISTIVITY LINE
▬ ▬ ▬	SEISMIC LINE

APPROXIMATE SCALE (feet)

0 200 400

Figure 2A
Geophysical Survey Line Locations
Lines 1, 2, & 3
Aquifer Characterization
Hoosic Valley, New York

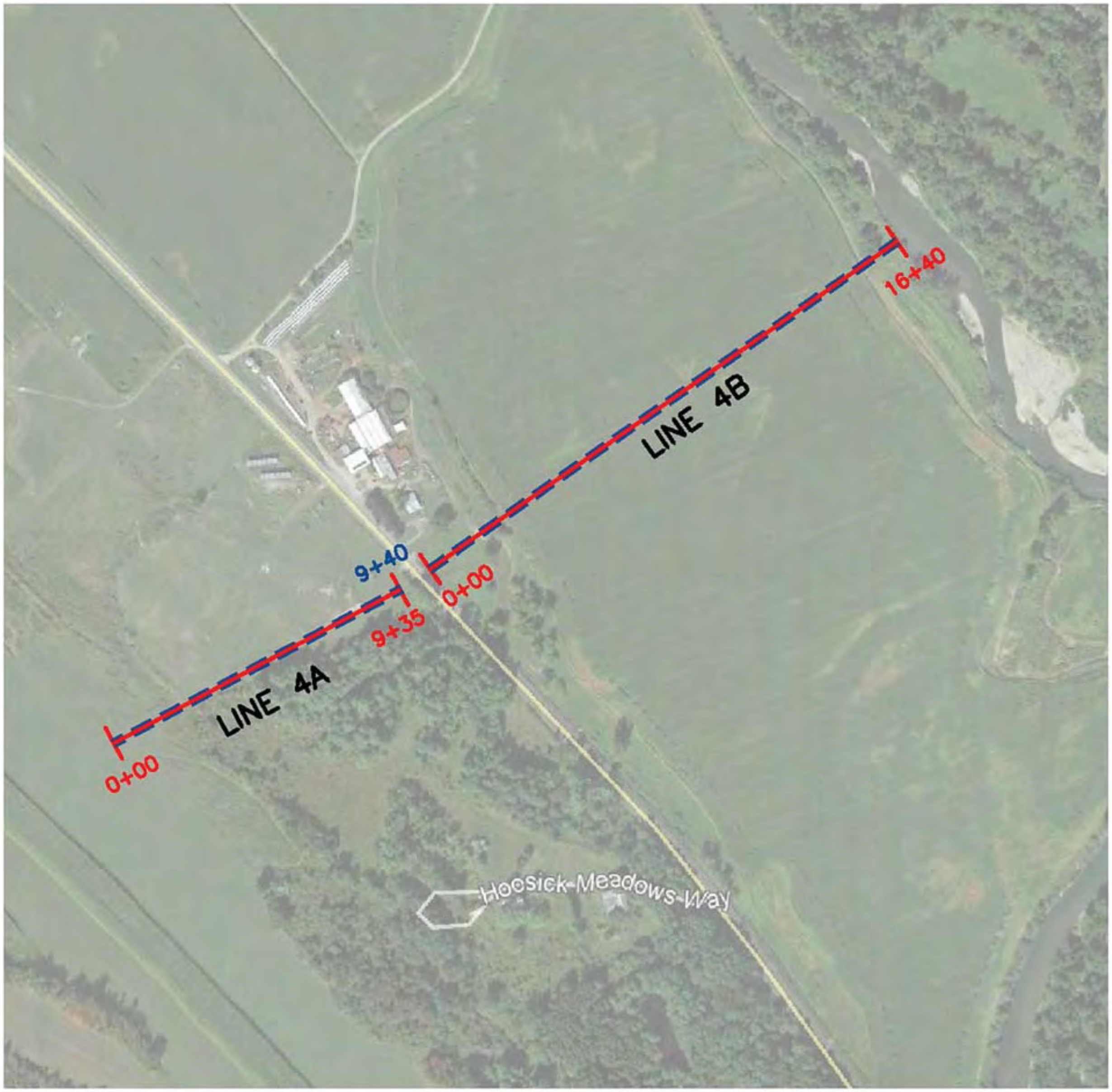
File 18SG14	May, 2019

HAGER–RICHTER*
Salem, NH | Fords, NJ

NOTE:

Modified from Google Earth Pro aerial photograph.

* DBA HR Geological Services in New York



NOTE:

Modified from Google Earth Pro aerial photograph.

* DBA HR Geological Services in New York

Figure 2B
Geophysical Survey Line Locations
Lines 4A & 4B
Aquifer Characterization
Hoosic Valley, New York

File 18SG14

May, 2019

HAGER–RICHTER*

Salem, NH | Fords, NJ

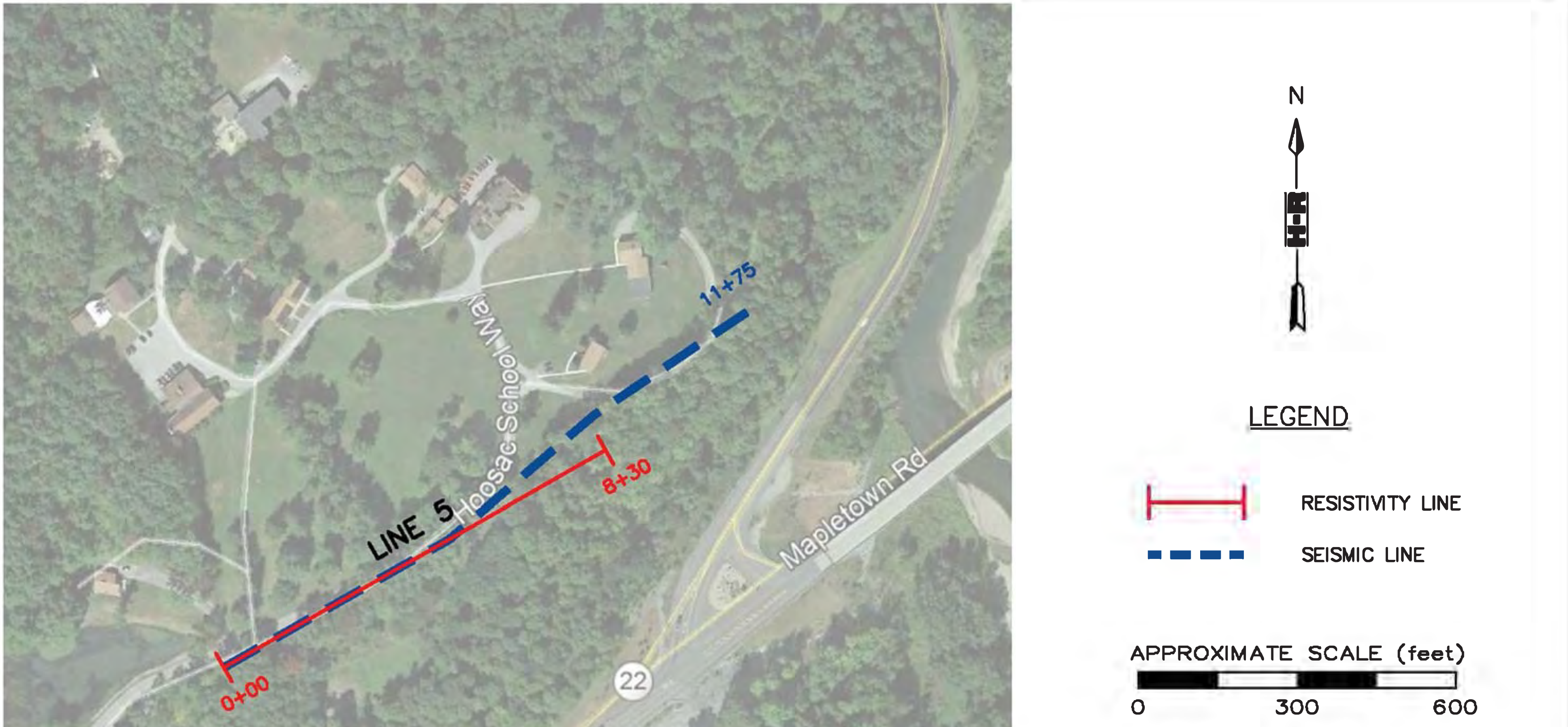


Figure 2C
Geophysical Survey Line Location
Line 5
Aquifer Characterization
Hoosic Valley, New York

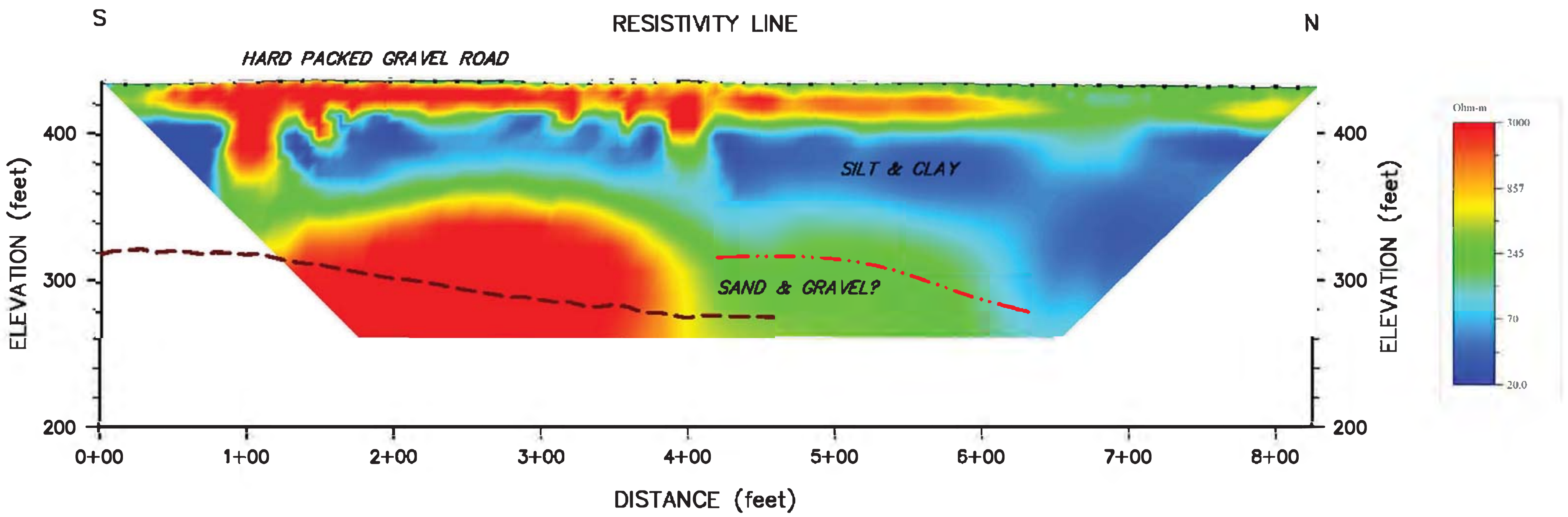
File 18SG14 | May, 2019

HAGER–RICHTER*
Salem, NH | Fords, NJ

NOTE:

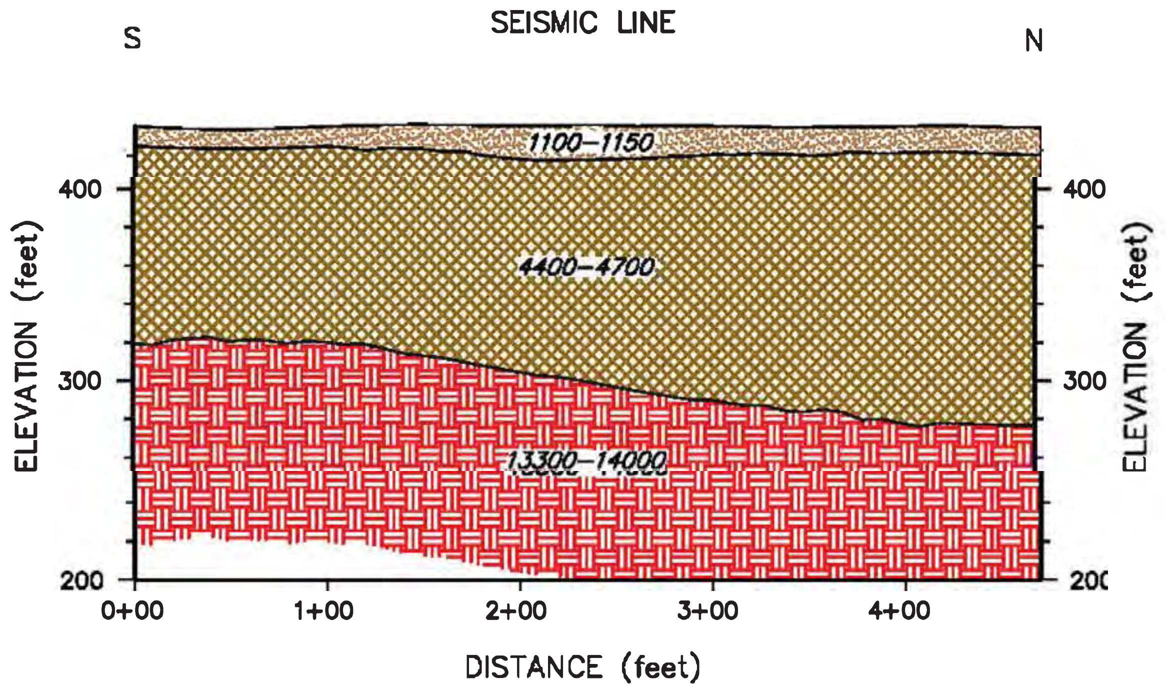
Modified from Google Earth Pro aerial photograph.

* DBA HR Geological Services in New York



LEGEND

▨	Unsaturated soils
▨	Saturated soils
🟥	Competent bedrock
13000–14000	Velocity (fps)
—	Interface determined from seismic refraction data
- -	Bedrock surface from seismic refraction data
-·-	Inferred interface from resistivity data
SEISMIC LINE 3 5+40 ↓ ×	Intersecting seismic line with depth of bedrock



NOTES:

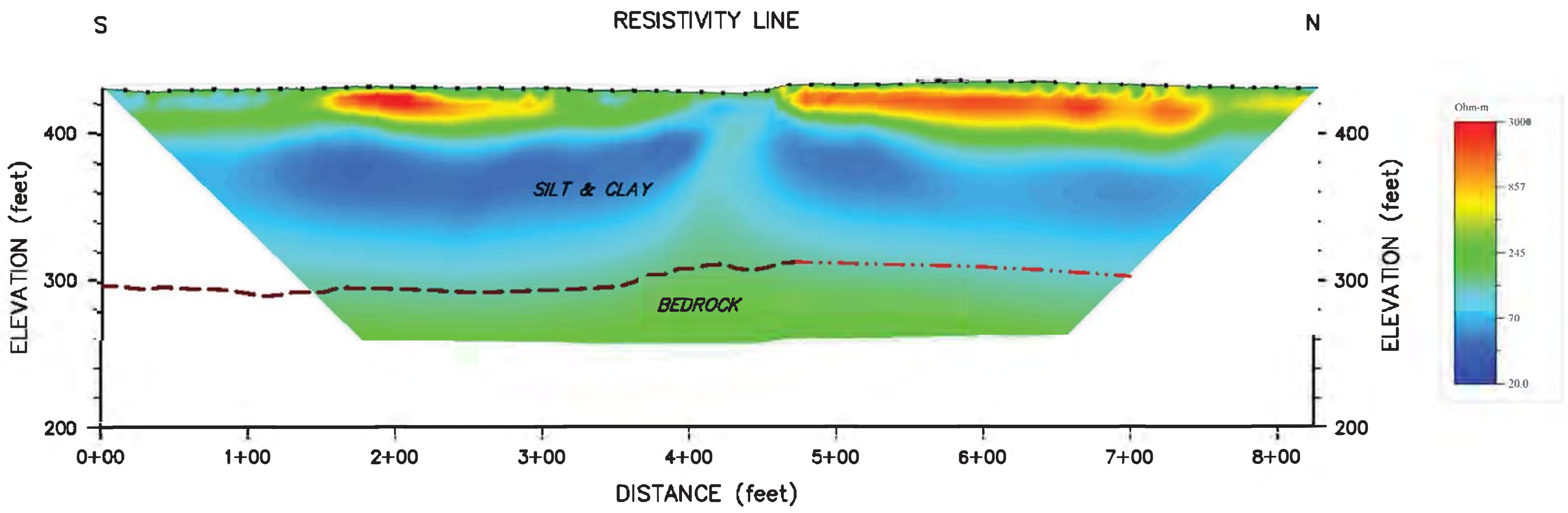
1. Resistivity data acquired using an AGI SuperSting R8 with the Dipole–Dipole electrode configuration, 56 electrodes, and a 15 foot electrode spacing.
2. Resistivity data processed and inverted using EarthImager2D Software by AGI.
3. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.
4. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.
5. Elevations along the seismic lines were determined from 2–meter digital elevation models "u_6345074600_2_meter.img" and "u_6345074500_2_meter.img" available at gis.ny.gov relative to NAVD88.
6. Data were analyzed using the Generalized Reciprocal Method.

* DBA HR Geological Services in New York

Figure 3
Survey Line 1
Aquifer Characterization
Hoosic Valley, New York

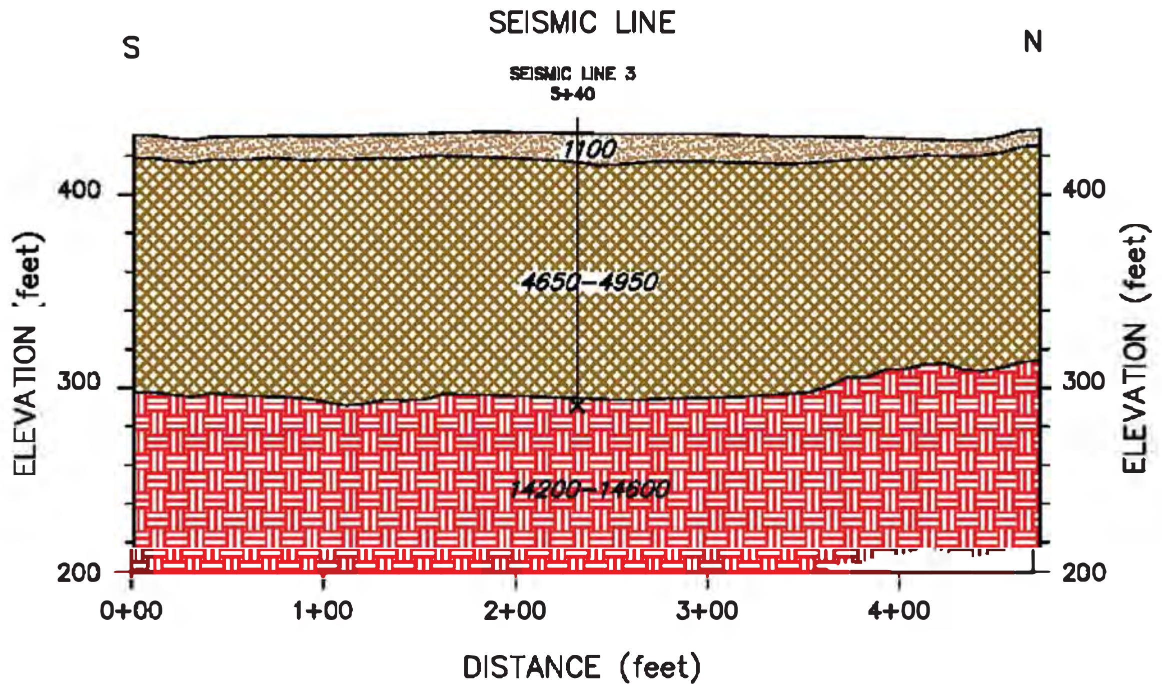
File 18SG14 | May, 2019

HAGER–RICHTER*
Salem, NH | Fords, NJ



LEGEND

▨	Unsaturated soils
▩	Saturated soils
🟥	Competent bedrock
13000–14000	Velocity (fps)
——	Interface determined from seismic refraction data
– – –	Bedrock surface from seismic refraction data
–·–·–	Inferred interface from resistivity data
SEISMIC LINE 3 5+40 ↓ ×	Intersecting seismic line with depth of bedrock



SCALE (feet)

0 100 200

NOTES:

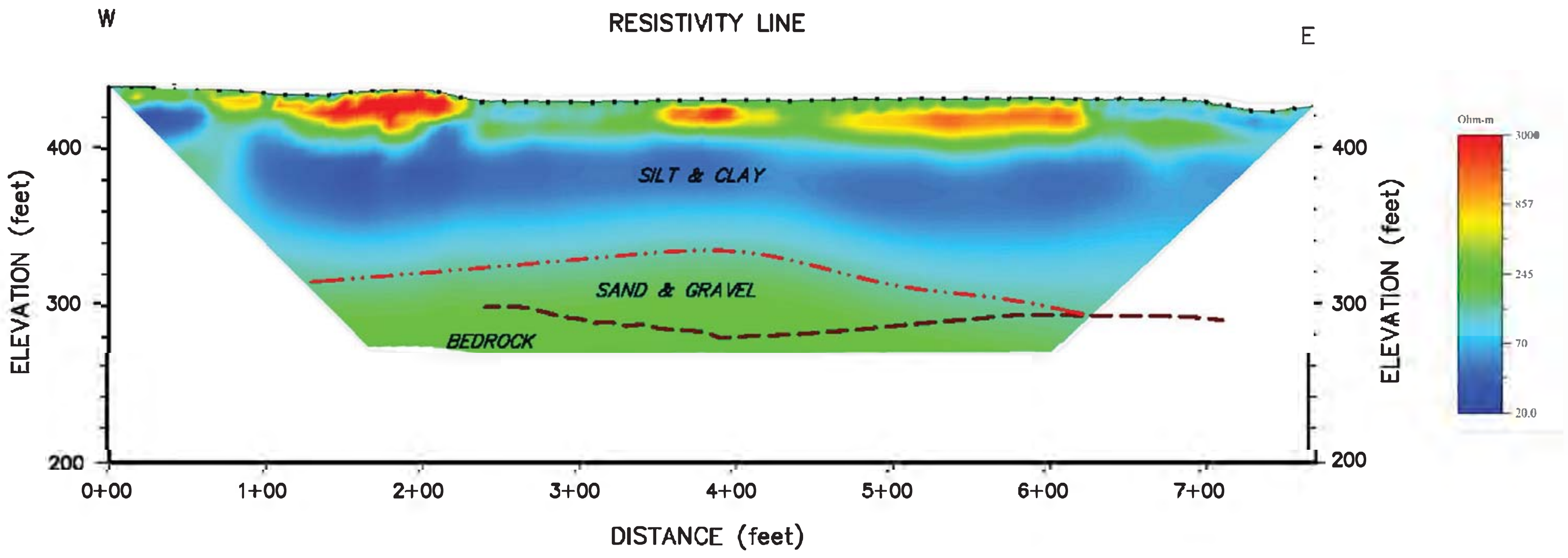
1. Resistivity data acquired using an AGI SuperSting R8 with the Dipole–Dipole electrode configuration, 56 electrodes, and a 15 foot electrode spacing.
2. Resistivity data processed and inverted using EarthImager2D Software by AGI.
3. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.
4. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.
5. Elevations along the seismic lines were determined from 2–meter digital elevation models "u_6345074600_2_meter.img" and "u_6345074500_2_meter.img" available at gis.ny.gov relative to NAVD88.
6. Data were analyzed using the Generalized Reciprocal Method.

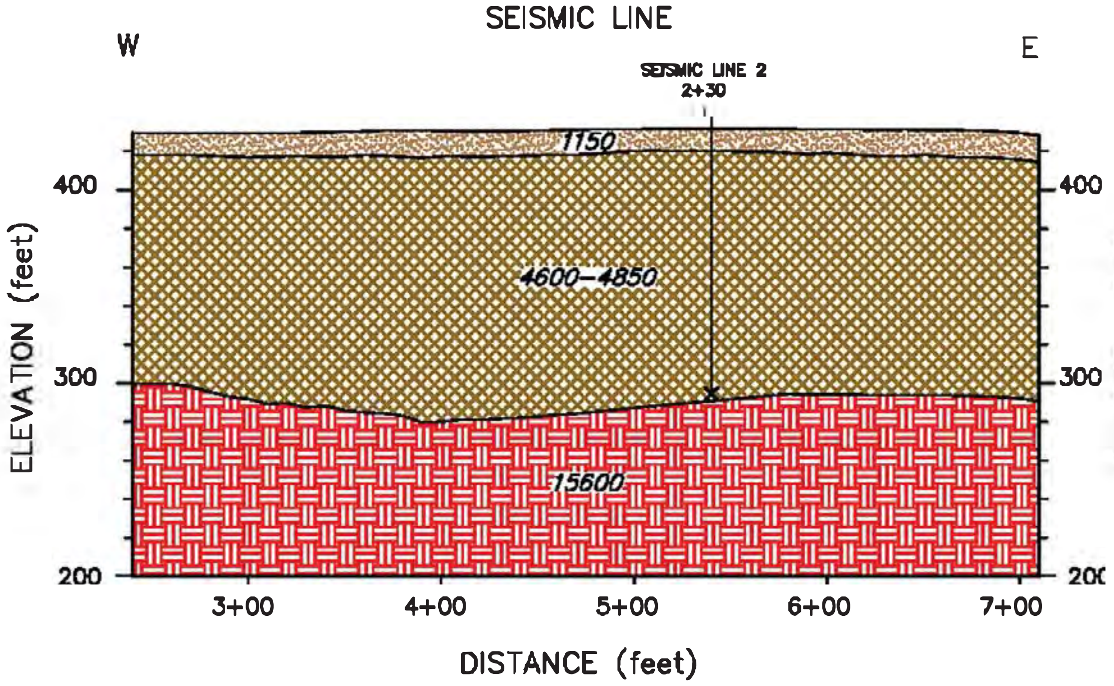
* DBA HR Geological Services in New York

Figure 4
Survey Line 2
Aquifer Characterization
Hoosic Valley, New York

File 18SG14 | May, 2019

HAGER–RICHTER*
Salem, NH | Fords, NJ





LEGEND

▒	Unsaturated soils
▨	Saturated soils
▦	Competent bedrock
13000–14000	Velocity (fps)
──	Interface determined from seismic refraction data
— — —	Bedrock surface from seismic refraction data
-·-·-	Inferred interface from resistivity data
SEISMIC LINE 3 5+40 ↓	Intersecting seismic line with depth of bedrock

SCALE (feet)

0 100 200

NOTES:

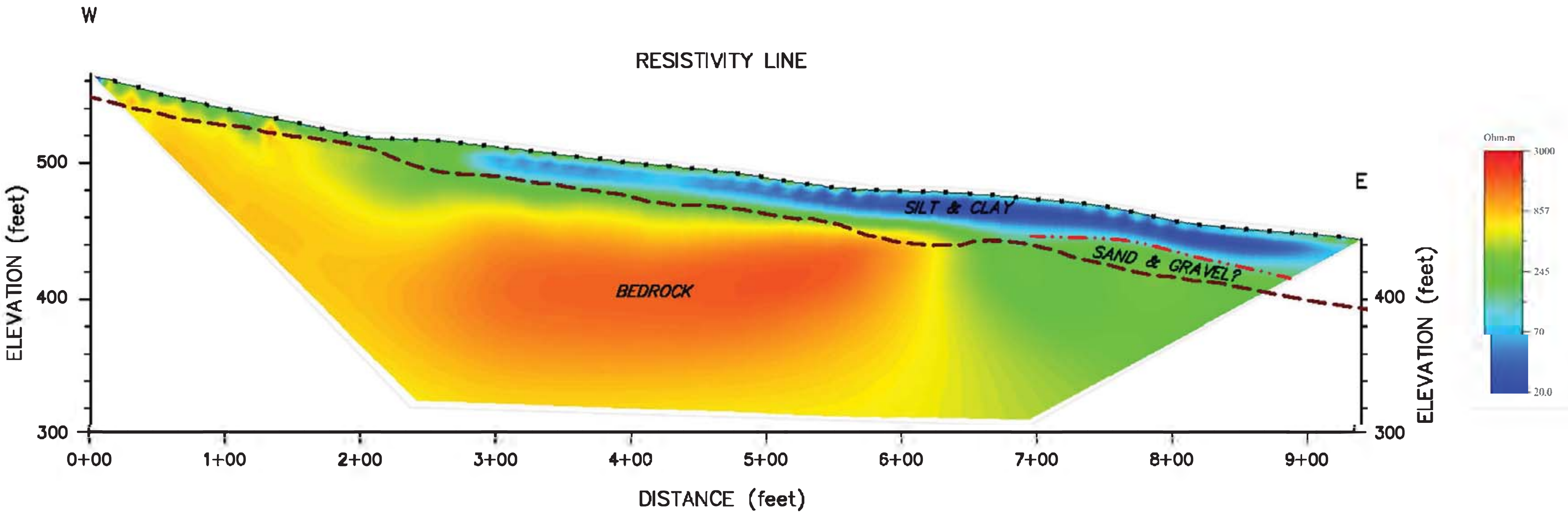
1. Resistivity data acquired using an AGI SuperSting R8 with the Dipole–Dipole electrode configuration, 56 electrodes, and a 15 foot electrode spacing.
2. Resistivity data processed and inverted using EarthImager2D Software by AGI.
3. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.
4. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.
5. Elevations along the seismic lines were determined from 2–meter digital elevation models "u_6345074600_2_meter.img" and "u_6345074500_2_meter.img" available at gis.ny.gov relative to NAVD88.
6. Data were analyzed using the Generalized Reciprocal Method.

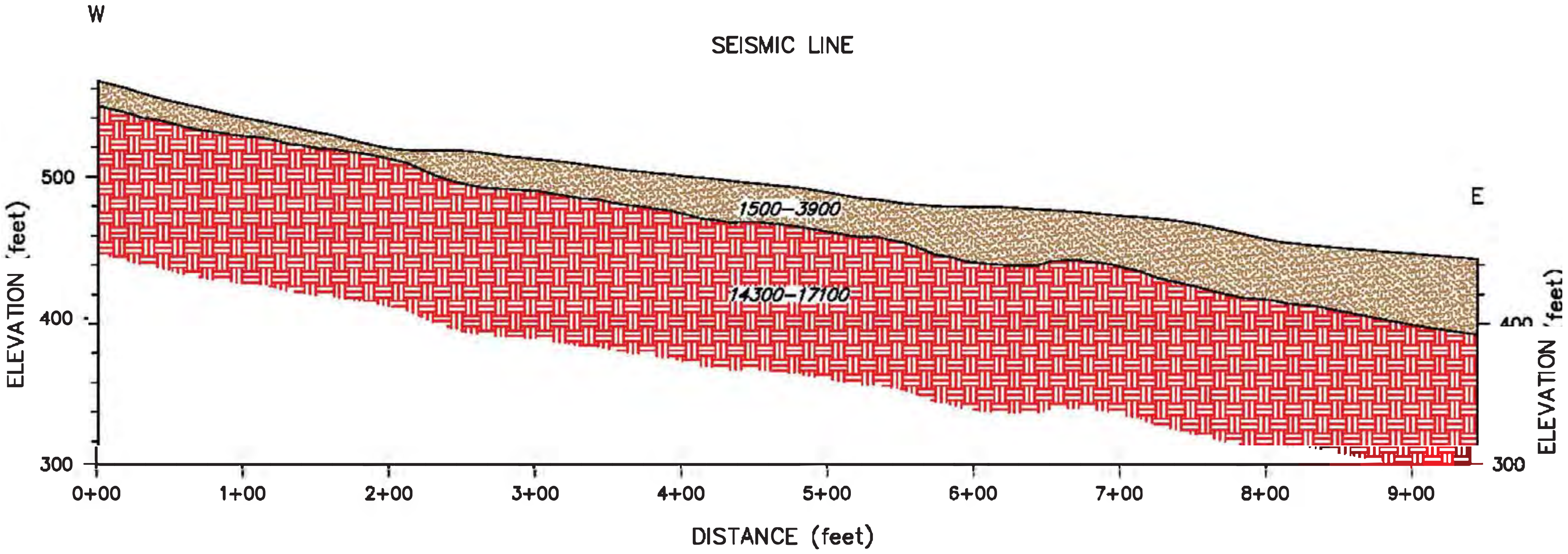
* DBA HR Geological Services in New York

Figure 5
Survey Line 3
Aquifer Characterization
Hoosic Valley, New York

File 18SG14 | May, 2019

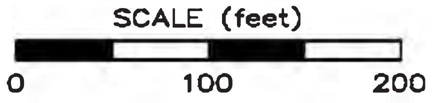
HAGER–RICHTER*
Salem, NH | Fords, NJ





LEGEND

▨	Unsaturated soils
▩	Saturated soils
🟥	Competent bedrock
13000–1400	Velocity (fps)
—	Interface determined from seismic refraction data
- - -	Bedrock surface from seismic refraction data
-·-·-	Inferred interface from resistivity data
SEISMIC LINE 3 5+40 ↓	Intersecting seismic line with depth of bedrock



NOTES:

1. Resistivity data acquired using an AGI SuperSting R8 with the Dipole–Dipole electrode configuration, 56 electrodes, and a 15 foot electrode spacing.

2. Resistivity data processed and inverted using EarthImager2D Software by AGI.

3. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.

4. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.

5. Elevations along the seismic lines were determined from 2–meter digital elevation models "u_6345074600_2_meter.img" and "u_6345074500_2_meter.img" available at gis.ny.gov relative to NAVD88.

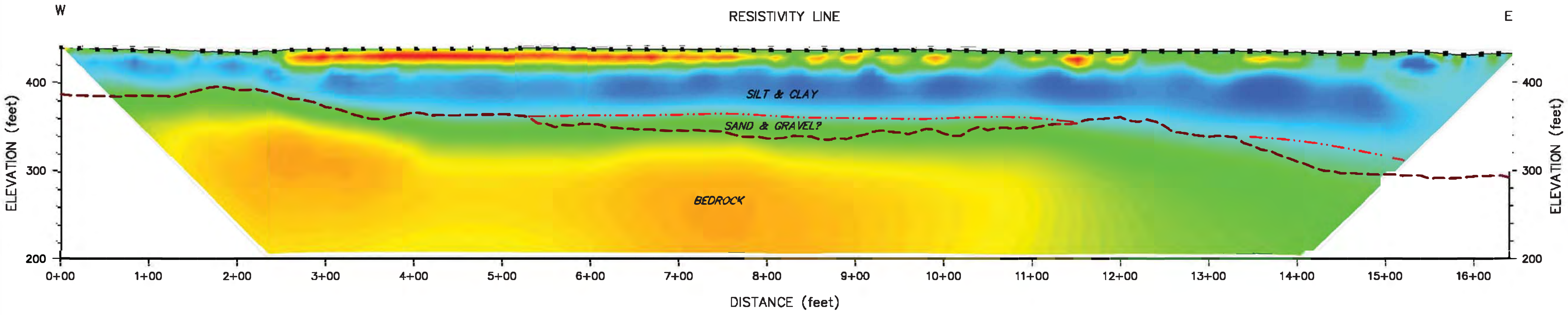
6. Data were analyzed using the Generalized Reciprocal Method.

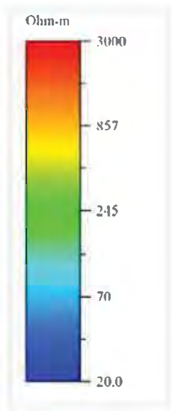
Figure 6
Survey Line 4A
Aquifer Characterization
Hoosic Valley, New York

File 18SG14 | May, 2019

HAGER–RICHTER*
Salem, NH | Fords, NJ

* DBA HR Geological Services in New York





LEGEND

▨ Unsaturated soils

▩ Saturated soils

▦ Competent bedrock

13000–14000 Velocity (fps)

— Interface determined from seismic refraction data

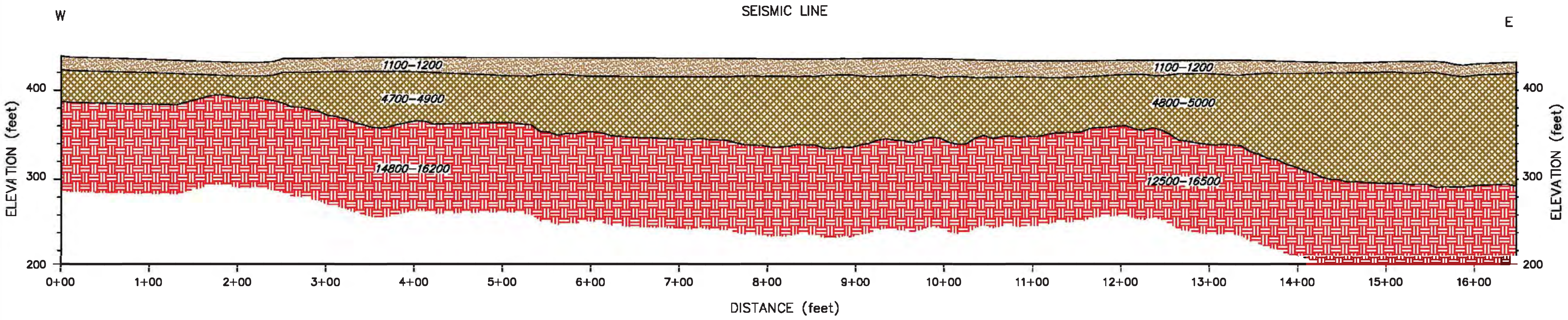
– – – Bedrock surface from seismic refraction data

–·–· Inferred interface from resistivity data

SEISMIC LINE 3 5+40 ↓ Intersecting seismic line with depth of bedrock

SCALE (feet)

0 100 200



NOTES:

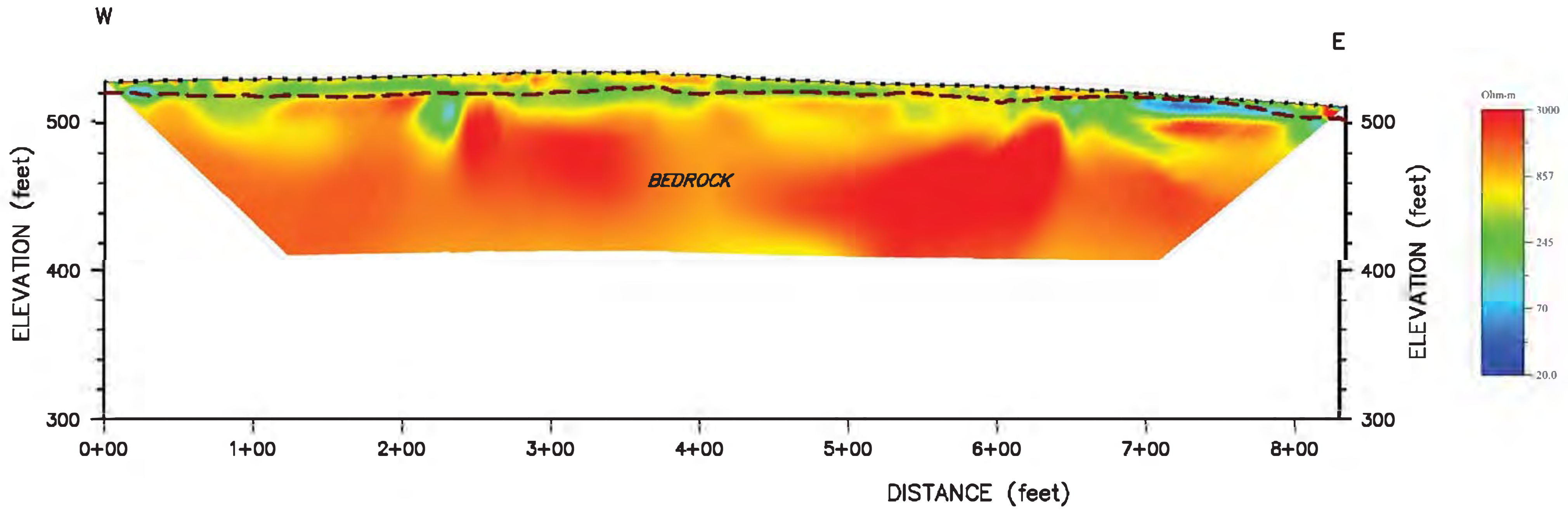
1. Resistivity data acquired using an AGI SuperSting R8 with the Dipole–Dipole electrode configuration, 56 electrodes, and a 15 foot electrode spacing.
2. Resistivity data processed and inverted using EarthImager2D Software by AGI.
3. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.
4. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might accur at shallower depths.
5. Elevations along the seismic lines were determined from 2–meter digital elevation models "u_6345074600_2_meter.img" and "u_6345074500_2_meter.img" available at gis.ny.gov relative to NAVD88.
6. Data were analyzed using the Generalized Reciprocal Method.

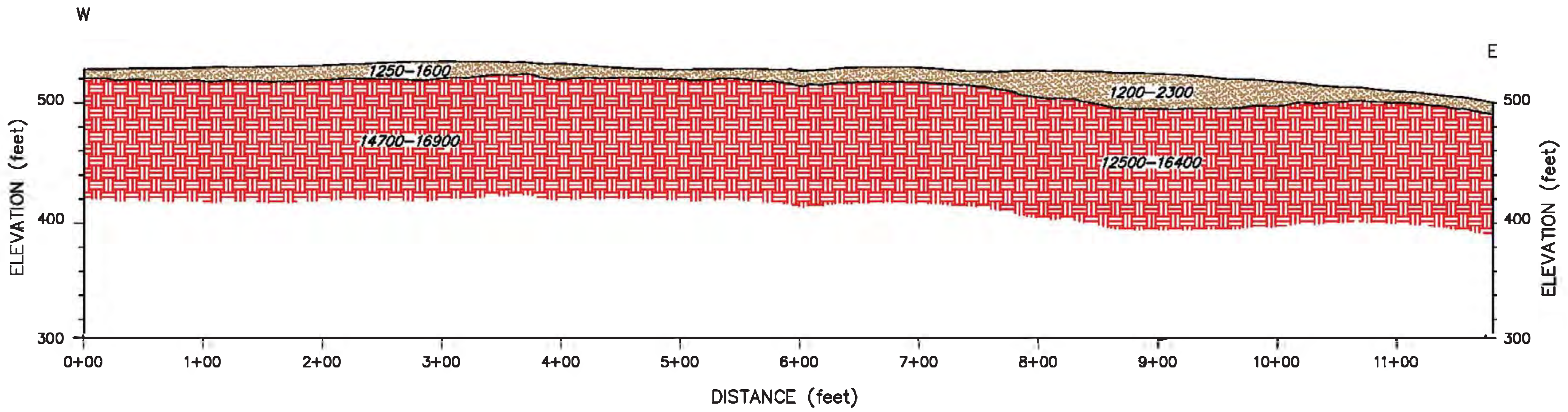
Figure 7
Survey Line 4B
Aquifer Characterization
Hoosic Valley, New York

File 18SG14 | May, 2019

HAGER–RICHTER*
Salem, NH | Fords, NJ

* DBA HR Geological Services in New York





LEGEND

▨	Unsaturated soils
▩	Saturated soils
▦	Competent bedrock
13000–14000	Velocity (fps)
—	Interface determined from seismic refraction data
- - -	Bedrock surface from seismic refraction data
-·-·-	Inferred interface from resistivity data
SEISMIC LINE 3 5+40 ↓	Intersecting seismic line with depth of bedrock

SCALE (feet)

0 100 200

NOTES:

1. Resistivity data acquired using an AGI SuperSting R8 with the Dipole–Dipole electrode configuration, 56 electrodes, and a 15 foot electrode spacing.
2. Resistivity data processed and inverted using EarthImager2D Software by AGI.
3. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.
4. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.
5. Elevations along the seismic lines were determined from 2–meter digital elevation models "u_6345074600_2_meter.img" and "u_6345074500_2_meter.img" available at gis.ny.gov relative to NAVD88.
6. Data were analyzed using the Generalized Reciprocal Method.

Figure 8
Survey Line 5
Aquifer Characterization
Hoosic Valley, New York

File 18SG14 | May, 2019

HAGER–RICHTER*
Salem, NH | Fords, NJ

* DBA HR Geological Services in New York

Attachment 2

Boring and Construction Logs

ERM

GWI-01

PAGE 1 OF 6

Client: Arnold & Porter

Project Name: Hoosick

Project Number: 0378075

Project Location: Hoosick, New York

DRILLING CONTRACTOR: Cascade Drilling

DRILLING METHOD: Mini-Sonic

DATE BORING COMPLETED: 9/10/2018

DATE WELL INSTALLED: 9/11/2018

GROUND ELEVATION: not available

TOC ELEVATION: not available

NOTES:

TOTAL DEPTH: 135 feet bgs

DIAMETER: 4 inches

LOGGED BY: J. Reynolds

CHECKED BY: H. Usle

NORTHING: 1475883.074

EASTING: 799237.757

ACRONYM LEGEND

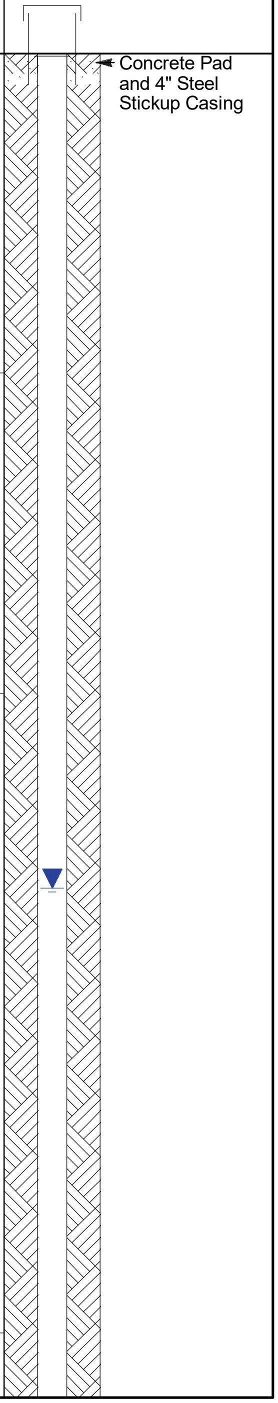
amsl = above mean sea level
bgs = below ground surface
ft = feet
PID = Photoionization Detector
ppm = parts per million
SC = Sonic Core
HA = Hand Auger
NR = No Recovery

GRAPHIC LOG LEGEND

- Silty Sand
- Silty Clay
- Well-graded Gravel
- Well-graded Gravelly Sand
- Poorly-graded Gravelly Sand
- Poorly-graded Sand
- Low Plasticity Clay
- Well-graded Sandy Gravel
- Poorly-graded Gravel

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		HA	60	100	SM		Brown, SAND, and silt with gravel, (2.5-3" diameter), subrounded, cobbles, roots, loose, moist.	0.0
						1.0		
5		SC	48	80	SM		Brown, SAND, and silt with gravel, (2.5-3" diameter), subrounded, cobbles, loose, moist.	0.0
						8.0		
					SW		Brown, FINE TO MEDIUM SAND, and subrounded fine to coarse gravel, (2.5-3" diameter), cobbles, well graded, loose, moist.	
10						10.0		
		SC	120	100	SW		Brown, FINE TO MEDIUM SAND, and subrounded fine to coarse gravel, (2.5-3" diameter), trace silt, well graded, loose, moist to wet.	
						11.0		
					SW		Dark brown, FINE TO COARSE GRAVELLY SAND, subrounded (2.5-3" diameter), trace silt, well graded, loose, wet.	
						13.0		
					CL		Gray Brown, CLAY, light brown from 13-13.5 ft bgs, gray from 13.5-14 ft bgs, soft, medium plasticity, wet.	
						14.0		
15					CL		Gray, CLAY, soft, medium plasticity, wet.	0.0
20								

WELL DIAGRAM



ERM

ERM

GWI-01

Client: Arnold & Porter

Project Name: Hoosick

Project Number: 0378075

Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
					CL		Gray, CLAY, soft, medium plasticity, wet. *(continued)*		
25		SC	36	30		25.0		0.0	
					CL		Gray, CLAY, trace silt, silt stringers from 26-27 and 28-29 ft bgs, soft, medium plasticity, wet.		
30						30.0			
					CL		Gray, CLAY, soft, medium plasticity, wet.		
35		SC	112	93		35.0		0.0	
					CL-ML	36.5	Gray, CLAY AND SILT, soft, low plasticity, saturated.		
					SP	37.0	Gray, FINE TO MEDIUM SAND, and fine gravel, (0.5" diameter), well graded, loose, saturated.		
					SW	40.0	Gray, FINE TO COARSE SAND, and subrounded fine to coarse gravel, (0.5-2" diameter), well graded, loose, wet.		Bentonite Grout Seal
40									
					GW	41.3	Gray, FINE TO MEDIUM GRAVEL, some subrounded medium to coarse sand, (0.5" diameter), well graded, loose, wet.		
					GW	42.2	Gray, MEDIUM TO COARSE GRAVEL, (0.5-2" diameter), subrounded, well graded, loose, wet.		
					GW	44.0	Gray, MEDIUM TO COARSE GRAVEL, (2.5-3" diameter), subrounded, well graded, loose, wet.		
					SP		Dark Gray, FINE SAND, well sorted, medium dense, wet.		
45									

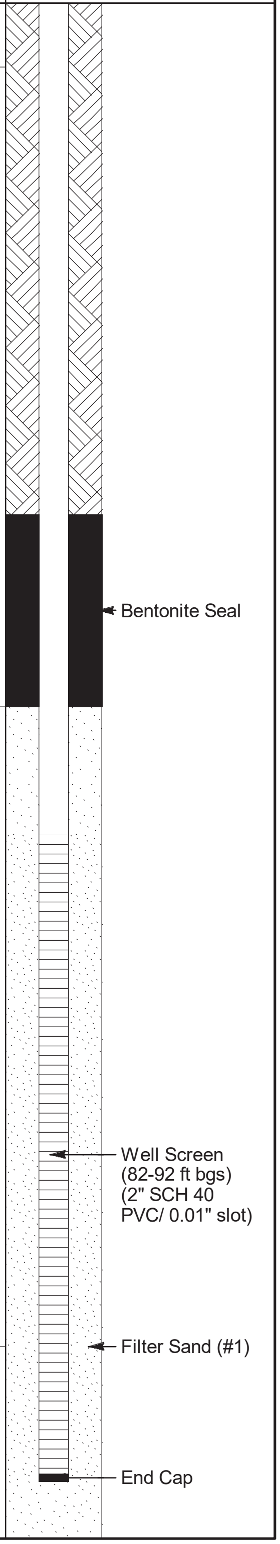
Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
		SC	120	100	SP		Dark Gray, FINE SAND, well sorted, medium dense, wet. *(continued)* 49.5	0.0	
					SP		Dark Gray, FINE SAND, some subrounded medium to coarse gravel, (0.5-2" diameter), medium dense, wet. 50.0		
50					SP		Dark Gray, FINE SAND, with subangular fine gravel, (0.5-2" diameter), poorly graded, medium dense, wet. 51.0		
55		SC	84	70	SP		Dark Gray, FINE SAND, and subangular fine to coarse gravel, (0.5-2" diameter), poorly graded, medium dense, wet. 56.3	0.0	
					SP		Dark Gray, FINE SAND, medium dense, wet. 57.0		
					SW		Dark Gray, FINE TO COARSE SAND, with subrounded fine to coarse gravel, (0.5-2" diameter), well graded, loose, wet. 58.2		
					SP		Dark Gray, FINE SAND, medium dense, wet. 59.0		
					SP		Dark Gray, FINE TO MEDIUM SAND, with subrounded fine to coarse gravel, (0.5-2" diameter), poorly graded, loose, wet. 60.0		
60					SP		Dark Gray, FINE TO MEDIUM SAND, with subrounded fine gravel, (0.5" diameter), poorly graded, loose, wet. 63.0		
					SW		Dark Gray, MEDIUM TO COARSE SAND, and subangular fine gravel, (0.5" diameter), well graded, loose, wet. 65.0		
65		SC	120	100	SW		Dark Gray, FINE TO COARSE SAND, and subangular fine to coarse gravel, (0.5-2" diameter), cobbles and trace silt, well graded, loose, wet. 68.0	0.0	
					SP		Dark Gray, FINE TO MEDIUM SAND, poorly graded, medium dense, wet. 69.0		

Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

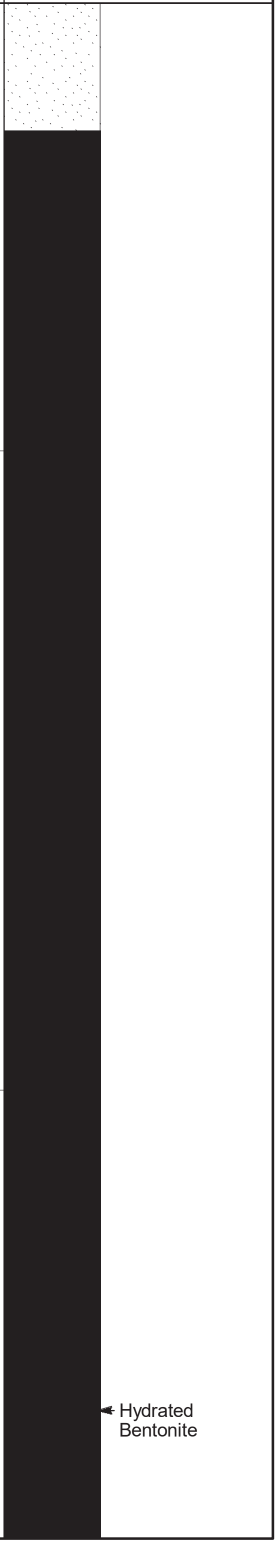
DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
70					SP	70.0	Dark Gray, FINE TO MEDIUM SAND, with subrounded fine to coarse gravel, (0.5-1" diameter), poorly graded, medium dense, wet. *(continued)*	
					SW	72.0	Gray, FINE TO COARSE SAND, and subangular fine gravel, (0.5" diameter), well graded, loose, wet.	
75		SC	24	20	SW	76.0	Gray, MEDIUM TO COARSE SAND, and subangular fine gravel, (0.5" diameter), cobbles, well graded, loose, wet.	0.0
					GP	79.0	Gray, FINE TO MEDIUM GRAVEL, (0.5" diameter), subangular, poorly graded, loose, wet.	
80					GW	80.0	Gray, MEDIUM TO COARSE GRAVEL, subrounded (0.5-1" diameter), cobbles (4" diameter), well graded, loose, wet.	
					SP	83.0	Gray, FINE TO MEDIUM SAND, with subangular fine gravel, (0.5" diameter), poorly sorted, loose, wet.	
85		SC	30	25	GW	90.0	Gray, FINE TO COARSE GRAVEL, some fine to coarse sand, (0.5-2" diameter), subangular, well graded, loose, wet.	0.0
90					SP		Gray, FINE TO MEDIUM SAND, with subangular fine gravel, (0.5" diameter), poorly graded, loose, wet.	

WELL DIAGRAM



Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
					SP		Gray, FINE TO MEDIUM SAND, with subangular fine gravel, (0.5" diameter), poorly graded, loose, wet. *(continued)* 94.0		
95		SC	110	92	SW		Gray, FINE TO COARSE SAND, with subrounded fine to coarse gravel, (0.5-2" diameter), some silt, well graded, loose, wet. 98.0	0.0	
					SW		Gray, FINE TO COARSE SAND, and subrounded fine to medium gravel, (0.5" diameter), well graded, loose, wet. 99.0		
100					SW		Gray, FINE TO COARSE SAND, and subrounded fine to coarse gravel, (0.5-2" diameter), some silt, well graded, loose, wet. 100.0		
					SP		Dark Gray, FINE SAND, medium dense, moist to wet. 102.0		
105		SC	120	100				0.0	
110					ML		Gray, SILT, with subrounded medium to coarse gravel, (0.5-2" diameter), trace fine-grained sand, cobbles, diamict, firm, moist.		
115		SC	120	100				0.0	



Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
					ML		Gray, SILT, with subrounded medium to coarse gravel, (0.5-2" diameter), trace fine-grained sand, cobbles, diamict, firm, moist. *(continued)*		
120							120.0		
					ML		Gray, SILT, with subrounded fine to medium gravel, (0.5" diameter), some fine-grained sand, diamict, firm, moist to wet.		
							122.0		
					ML		Gray, SILT, some subangular fine to medium gravel, (0.5" diameter), diamict, firm to dense, dry to moist.		
125		SC	120	100			125.0	0.0	
130							Gray, PHYLLITE, pulverized with angular clasts, loose.		
		SC	60	100				0.0	
135							135.0		
							Bottom of Boring @ 135.00 ft bgs		
140									

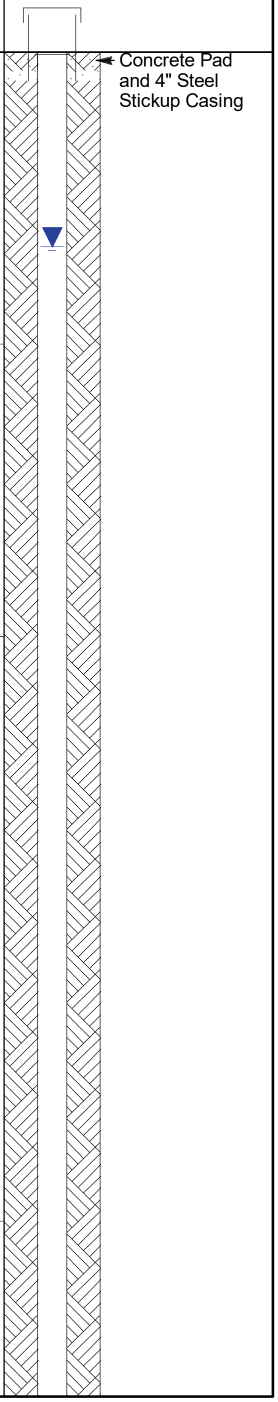
Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Mini-Sonic
DATE BORING COMPLETED: 9/6/2018
DATE WELL INSTALLED: 9/7/2018
GROUND ELEVATION: not available
TOC ELEVATION: not available
NOTES:

TOTAL DEPTH: 115.5 feet bgs
DIAMETER: 4 inches
LOGGED BY: J. Reynolds
CHECKED BY: H. Usle
NORTHING: 1475172.034
EASTING: 799103.9591

ACRONYM LEGEND
amsl = above mean sea level
bgs = below ground surface
ft = feet
PID = Photoionization Detector
ppm = parts per million
SC = Sonic Core
HA = Hand Auger
NR = No Recovery

GRAPHIC LOG LEGEND
- ▥ Silt
- ▥ Silty Sand
- ⬚ Poorly-graded Sand
- ▨ Low Plasticity Clay
- ▨ Silty Clay
- ⬚ Poorly-graded Gravelly Sand
- ⬚ Well-graded Gravelly Sand
- ▨ Poorly-graded Sand with Clay
- ▤ Till/ Diamict

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
5		HA	60	100	ML		Brown, SILT, and fine sand, loose, moist. 5.0	0.0	
		SC	44	73	SM		Gray Brown, FINE TO MEDIUM SAND, and silt, some oxidation, medium dense, moist, mottling. 6.0	0.0	
					SP		Gray Brown, FINE TO MEDIUM SAND, and subrounded fine gravel, (0.5" diameter), trace silt, loose, moist. 8.0		
10					SM		Gray Brown, FINE TO MEDIUM SAND, some silt and fine gravel, (0.5" diameter), subangular, poorly graded, loose, dry. 10.0		
		SC	120	100	SM		Gray Brown, FINE TO MEDIUM SAND, some silt and fine gravel, (0.5" diameter), subangular, poorly graded, loose, saturated. 11.0	0.0	
					CL		Gray Brown, CLAY, trace subangular medium gravel, (0.5" diameter), soft, low plasticity, wet. 12.0		
15 20					CL		Gray Brown, CLAY, soft, low plasticity, wet. 20.0		
					CL		Gray, CLAY, soft, medium plasticity, wet.		

ERM

GWI-02

Client: Arnold & Porter

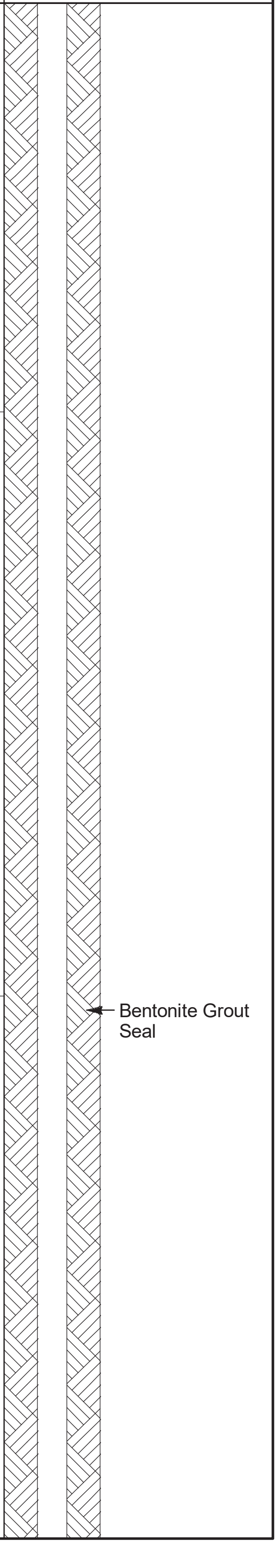
Project Name: Hoosick

Project Number: 0378075

Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
25		SC	120	100	CL		Gray, CLAY, soft, medium plasticity, wet. *(continued)*	0.0
30								
						33.0		
35		SC	120	100	CL-ML		Gray, CLAY, with fine sand and silt, soft, low plasticity, wet.	0.0
						37.0		
					CL		Gray, CLAY, soft, medium plasticity, wet.	
40						40.0		
45		SC	120	100	CL-ML		Gray, CLAY, some silt, soft, low plasticity, wet to saturated.	0.0

WELL DIAGRAM



Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
50					CL-ML		Gray, CLAY, some silt, soft, low plasticity, wet to saturated. *(continued)*		
						50.0			
55		SC	120	100				0.0	
					CL		Gray, CLAY, soft, medium plasticity, wet to saturated.		
60									
						63.0			
65		SC	108	90				0.0	
					CL-ML		Gray, CLAY, some silt, firm, low plasticity, wet.		
70						70.0			
					CL-ML		Gray, CLAY, some silt, firm, low plasticity, wet to saturated.		
75		SC	108	90				0.0	

ERM

GWI-02

PAGE 4 OF 5

Client: Arnold & Porter

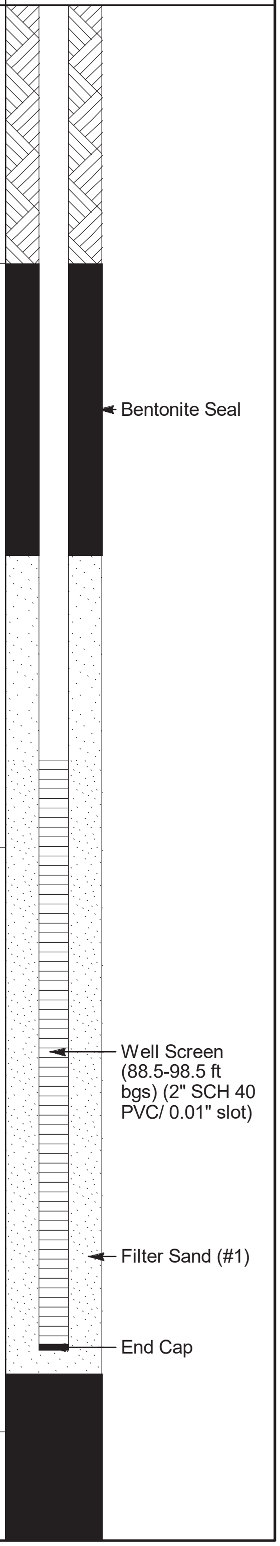
Project Name: Hoosick

Project Number: 0378075

Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
80					CL-ML	80.0	Gray, CLAY, some silt, firm, low plasticity, wet to saturated. *(continued)*	
85		SC	84	70	CL-ML	86.0	Gray, CLAY, and silt, soft, low plasticity, saturated.	0.0
90					SP	93.0	Gray, FINE TO MEDIUM SAND, with silt with gravel, (2.5-3" diameter), subrounded, poorly graded, soft, saturated.	
					SW	95.0	Gray, MEDIUM TO COARSE SAND, and fine gravel and silt, (1-2" diameter), subrounded, well graded, loose, saturated.	
95		SC	84	70	SP-SC	96.0	Gray, CLAY, with subrounded fine to medium sand and gravel, (1-2" diameter), medium dense, wet.	0.0
					SP	98.0	Gray, FINE TO MEDIUM SAND, with subrounded gravel and silt, (2.5-3" diameter), poorly graded, soft, saturated.	
100					ML	100.0	Gray, SILT, with subrounded gravelly fine sand, (2.5-3" diameter), diamict, poorly graded, firm, wet.	
							Gray, PHYLLITE, pulverized.	

WELL DIAGRAM



Client: Arnold & Porter

Project Name: Hoosick

Project Number: 0378075

Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
105		SC	120	100		▨	Gray, PHYLLITE, pulverized. *(continued)*	0.0	Hydrated Bentonite
110		SC	60	91		▨		0.0	
115							115.5		
							Bottom of Boring @ 115.50 ft bgs		
120									
125									

ERM

GWI-03

Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Mini-Sonic
DATE BORING COMPLETED: 9/12/2018
DATE WELL INSTALLED: 9/13/2018
GROUND ELEVATION: not available
TOC ELEVATION: not available
NOTES:

TOTAL DEPTH: 110 feet bgs
DIAMETER: 4 inches
LOGGED BY: J. Reynolds
CHECKED BY: H. Usle
NORTHING: 1475508.546
EASTING: 799556.3194

ACRONYM LEGEND

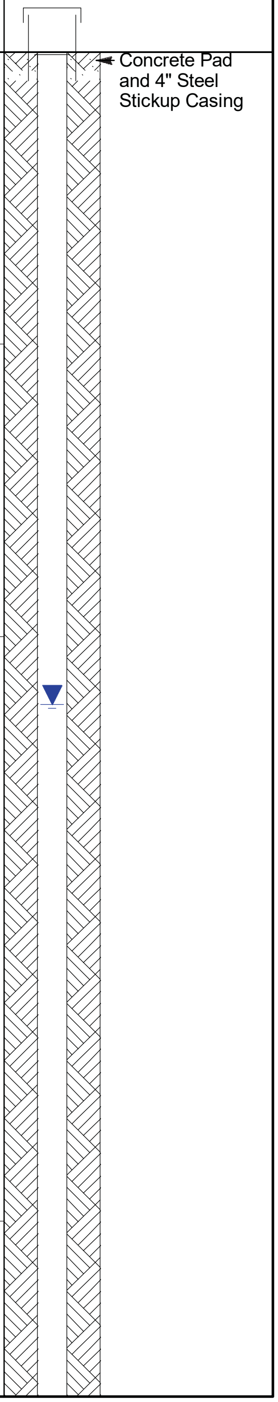
amsl = above mean sea level
bgs = below ground surface
ft = feet
PID = Photoionization Detector
ppm = parts per million
SC = Sonic Core
HA = Hand Auger
NR = No Recovery

GRAPHIC LOG LEGEND

▥ Silt	▥ Silty Sand	⬚ Poorly-graded Sand
⬚ Poorly-graded Gravelly Sand	▨ Low Plasticity Clay	▨ Silty Clay
⬚ Well-graded Gravelly Sand	⬚ Till/ Diamict	▧ Bedrock

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
5		HA	60	100	ML		Brown, SILT, and fine sand, loose, moist. 5.0	0.0
		SC	60	100	SM		Gray Brown, FINE TO MEDIUM SILTY SAND, medium dense, moist. 6.0	0.0
					SP		Dark Gray To Brown, FINE TO MEDIUM SAND, trace silt and fine gravel, (0.5" diameter), subrounded, some oxidation, poorly graded, medium dense, wet, mottling. 9.0	
10					SP		Brown, FINE TO MEDIUM SAND, and subrounded fine to coarse gravel, (0.5-1" diameter), trace silt, poorly graded, loose to medium dense, wet. 10.0	
		SC	120	100	SP		Brown, FINE TO MEDIUM SAND, and subrounded fine to coarse gravel, (0.5-1" diameter), trace silt, cobbles, poorly graded, loose to medium dense, wet. 14.0	0.0
15 20					CL		Gray Brown, CLAY, soft, medium plasticity, wet to saturated. 20.0	
					CL		Gray Brown, CLAY, soft, medium plasticity, wet.	

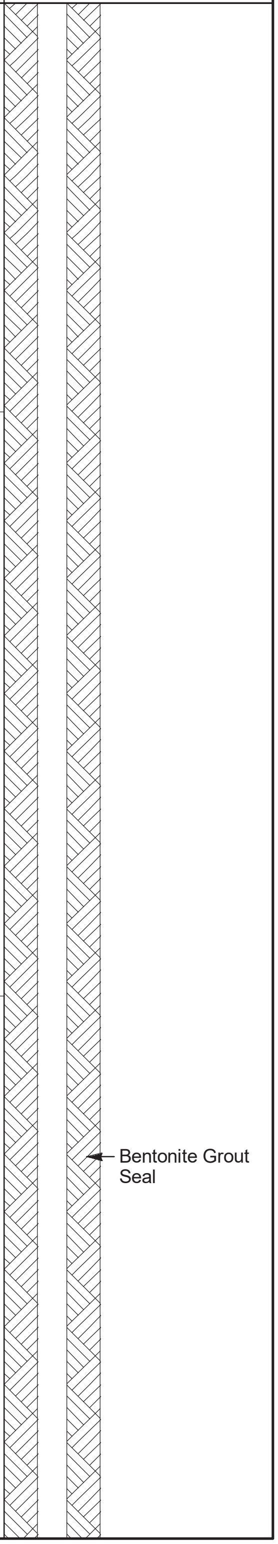
WELL DIAGRAM



Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
25		SC	120	100				0.0
					CL		Gray Brown, CLAY, soft, medium plasticity, wet. *(continued)*	
30							30.0	
35		SC	96	80	CL		Gray, CLAY, soft, medium plasticity, wet.	0.0
40							40.0	
					CL		Gray, CLAY, soft, medium plasticity, wet to saturated.	
							43.0	
					CL-ML		Gray, CLAY, some silt, soft, low plasticity, wet to saturated.	
							44.0	
45		SC	96	80	CL		Gray, CLAY, soft, medium plasticity, wet to saturated.	0.0
							46.0	
					CL-ML		Gray, CLAY, some silt, soft, low plasticity, wet to saturated.	
							47.0	
					CL		Gray, CLAY, soft, medium plasticity, wet to saturated.	
							48.8	
					CL-		49.0 Gray, CLAY, with silt, soft, low plasticity, wet to saturated.	

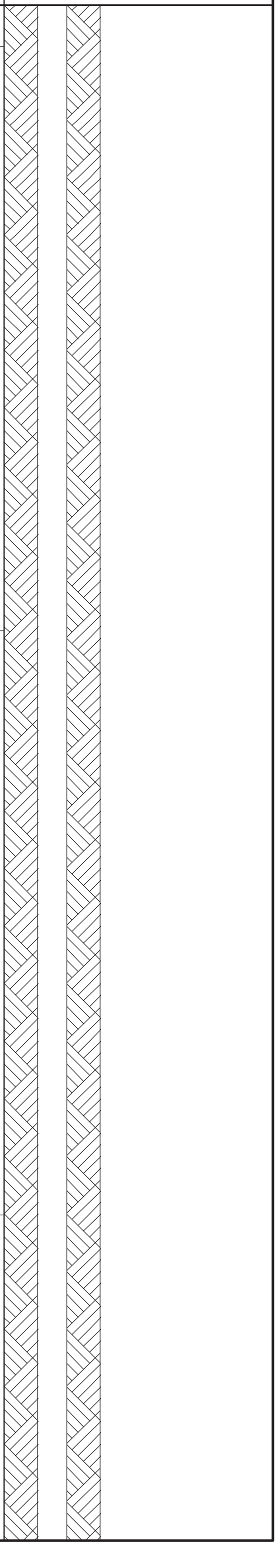
WELL DIAGRAM



Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
50					ML CL		Gray, CLAY, soft, medium plasticity, wet to saturated. *(continued)* 50.0	
55		SC	84	70	CL-ML		Gray, CLAY, some silt lenses, medium stiff, wet to saturated.	0.0
60							60.0	
65		SC	120	100	CL-ML		Gray, CLAY AND SILT, soft, low plasticity, wet. 67.0	0.0
					CL		Gray, CLAY, soft, medium plasticity, wet. 68.5	
					SW		Gray, FINE TO COARSE SAND, with silt and gravel, (1-2" diameter), subrounded, well graded, medium dense, wet. 69.0	
70					CL-ML		Gray, SILT AND COARSE SAND, with clay, medium dense, wet to saturated. 70.0	
							NO RECOVERY.	
75		SC	48	40			75.0	0.0
					SM		Gray, FINE SAND AND SILT, medium dense, wet to saturated.	

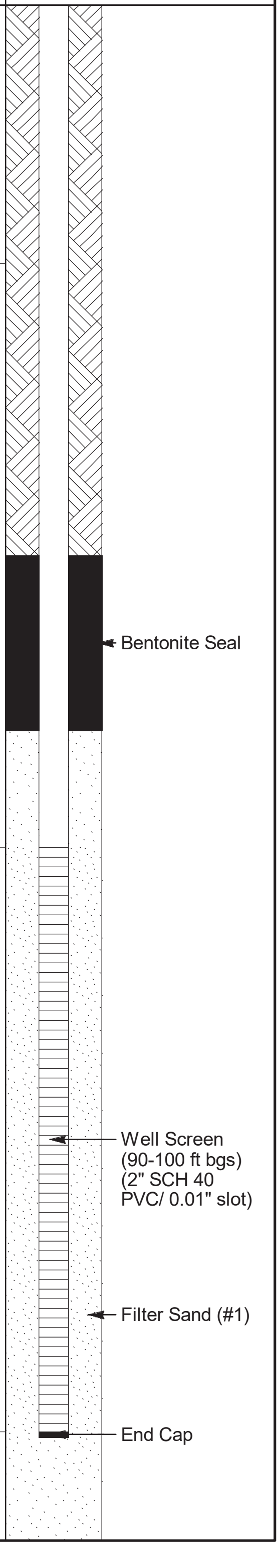
WELL DIAGRAM



Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
					SM		Gray, FINE SAND AND SILT, medium dense, wet to saturated. *(continued)*	
						78.0		
80								
85		SC	72	60	SP		Dark Gray, FINE SAND, trace silt, medium dense, wet to saturated.	0.0
90						90.0		
95		SC	72	60	SP		Dark Gray, FINE SAND, trace silt and clay, medium dense, wet.	0.0
100						100.0		
					SP		Gray, FINE SAND, medium dense, wet.	

WELL DIAGRAM



ERM

GWI-03

Client: Arnold & Porter

Project Name: Hoosick

Project Number: 0378075

Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
102.0–104.0		SC	120	100	ML		Gray, SILT, and clay and gravel, (0.5" diameter), subangular, diamict, dense, dry to moist.	0.0	Hydrated Bentonite
104.0–110.0							Gray, PHYLLITE, pulverized.		
							Bottom of Boring @ 110.00 ft bgs		

Depth scale: 105, 110, 115, 120, 125

Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Mini-Sonic
DATE BORING COMPLETED: 10/31/2018
DATE WELL INSTALLED: 11/1/2018
GROUND ELEVATION: not available
TOC ELEVATION: not available
NOTES:

TOTAL DEPTH: 120 feet bgs
DIAMETER: 4 inches
LOGGED BY: J. Reynolds
CHECKED BY: H. Usle
NORTHING: 1476018.44
EASTING: 798880.2544

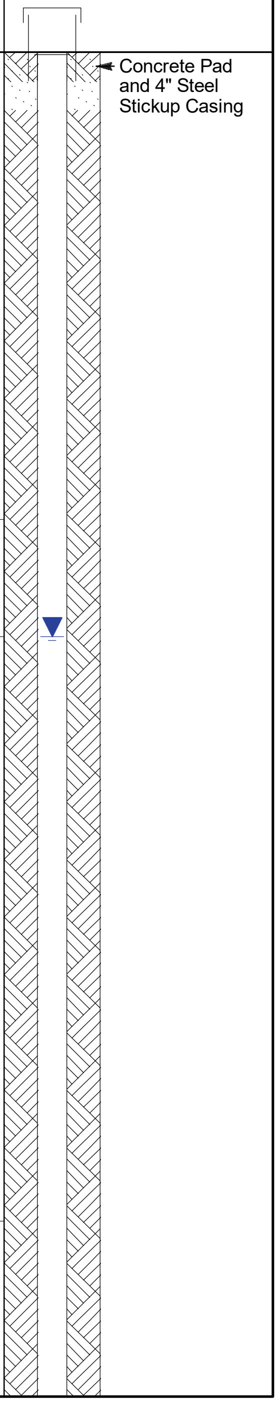
ACRONYM LEGEND
amsl = above mean sea level
bgs = below ground surface
ft = feet
PID = Photoionization Detector
ppm = parts per million
SC = Sonic Core
HA = Hand Auger
NR = No Recovery

GRAPHIC LOG LEGEND

▨ Silty Clay	▥ Silty Sand	⬚ Poorly-graded Sand
▨ Low Plasticity Clay	▨ Clayey Sand	⬚ Well-graded Gravelly Sand
⬚ Well-graded Sand	⬚ Poorly-graded Gravel	⬚ Poorly-graded Gravelly Sand

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
5		HA	96	100	CL-ML		Brown To Gray, CLAYEY SILT, some fine to medium sand, moist, mottling. 5.5	0.0
					SM		Brown, FINE TO MEDIUM SAND, some silt, moist, mottling. 8.0	
10		SC	24	100	SP		Brown, FINE TO MEDIUM SAND, and subangular gravel, well sorted, loose, dry. 10.0	0.0
		SC	96	80	SP		Brown, FINE TO MEDIUM SAND, with subangular gravel, well sorted, loose, wet. 11.0	
					SP		Brown, FINE TO MEDIUM SAND, trace gravel, subangular cobbles (5" diameter), well sorted, loose, wet. 12.0	
					CL		Light Brown, CLAY, medium plasticity, wet. 14.0	
15					CL		Gray Brown, CLAY, trace silt, silt lenses throughout, soft to medium stiff, low plasticity, wet. 15.0	0.0
20					CL		Gray Brown, CLAY, soft, plastic, wet. 20.0	
					CL		Brown To Gray, CLAY, soft, plastic, wet.	

WELL DIAGRAM



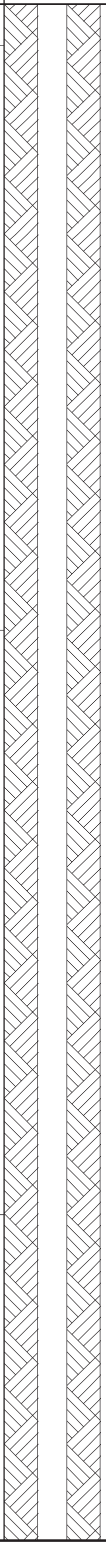
ERM

GWI-04
PAGE 2 OF 5

Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
25		SC	84	70	CL		Brown To Gray, CLAY, soft, plastic, wet. *(continued)*	0.0	
30							30.0		
35		SC	120	100	CL		Gray, CLAY, soft, plastic, wet.	0.0	
							37.0		
					CL		Gray, CLAY, firm, low plasticity, wet.		
							38.0		
					CL		Gray, CLAY, soft, plastic, wet.		
							39.0		
					SC		Gray Brown, CLAYEY SAND, medium dense, wet.		
40							40.0		
45		SC	96	80	CL		Gray Brown, CLAY, medium stiff, wet.	0.0	Bentonite Grout Seal

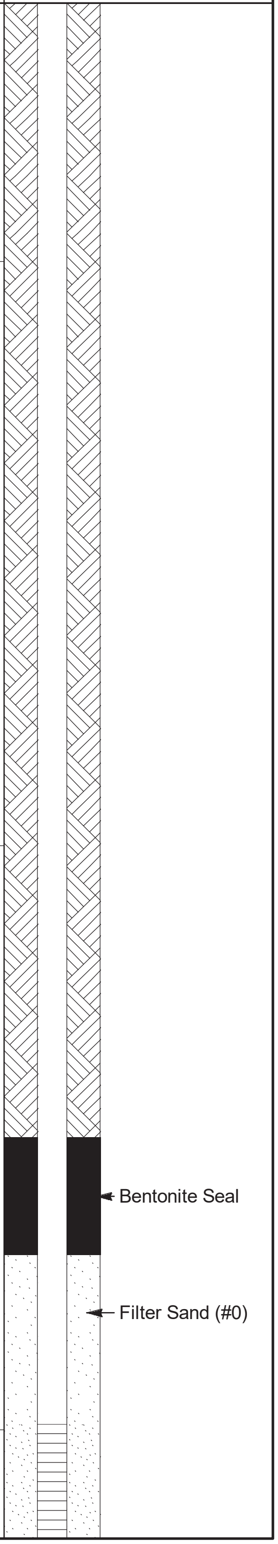
Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
50					CL		Gray Brown, CLAY, medium stiff, wet. *(continued)*		
							50.0		
55		SC	120	100	CL-ML		Gray, CLAY AND SILT, silt lenses throughout, soft to medium stiff, plastic, wet to saturated.	0.0	
60							60.0		
65		SC	120	100	CL-ML		Gray, SILTY CLAY, semi-plastic, varved, medium stiff, wet.	0.0	
							69.0		
70					CL-ML		Gray, CLAYEY SILT, non-plastic, medium stiff, wet.		
75		SC	NR	0					

Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
					CL-ML		Gray, CLAYEY SILT, non-plastic, medium stiff, wet. *(continued)*	
80							80.0	
					CL-ML		Gray, SILT AND CLAY, trace fine sand, firm, wet.	
85		SC	96	80				0.0
							86.0	
					SW		Gray, FINE TO COARSE SAND, some subrounded gravel, well graded, loose, wet.	
							87.0	
					SP		Gray, FINE TO MEDIUM SAND, trace subangular medium to coarse gravel, loose, wet.	
							87.5	
					SP		Gray, FINE TO MEDIUM SAND, some subangular fine to coarse gravel, loose.	
90							90.0	
					SW		Gray, FINE TO COARSE SAND, some subrounded fine to coarse gravel, lithic, well graded, loose, wet.	
95		SC	72	60				0.0
							96.0	
					GP		COBBLES, (5" diameter).	
							96.5	
					SP		Gray, FINE TO MEDIUM SAND, lithic, well sorted, loose, wet.	
							97.5	
					SW		Gray, MEDIUM TO COARSE SAND, with subrounded fine to medium gravel, well graded, loose, wet.	
							98.0	
					SP		Gray, FINE TO MEDIUM SAND, lithic, well sorted, loose, wet.	
							98.5	
					SP		Gray, FINE TO MEDIUM SAND, with subrounded medium to coarse gravel, lithic, well sorted, loose, wet.	
100							100.0	
					SP		Gray, FINE TO MEDIUM SAND, lithic, well sorted, loose.	

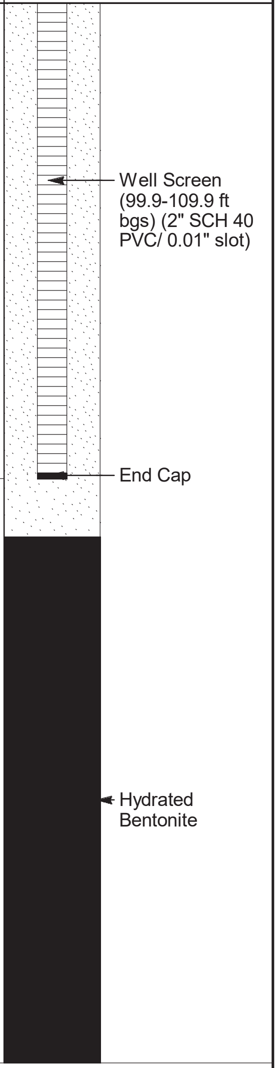
WELL DIAGRAM



Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	MATERIAL DESCRIPTION	PID (ppm)
102.0–104.0		SC	120	100	SW	Gray, FINE TO COARSE SAND, some subrounded fine to coarse gravel, lithic, well graded, loose, wet.	0.0
104.0–109.5					GP	Gray, FINE TO MEDIUM GRAVEL, with subangular fine to medium sand, subrounded cobbles, trace silt, poorly graded, wet.	
109.5–110.0					SP	Gray, FINE SAND, with cobbles, firm, wet.	
110.0–120.0		SC	144	120	ML	Gray, SILT, with subangular coarse gravel, diamict, hard, moist.	0.0

Bottom of Boring @ 120.00 ft bgs



GWI-05

Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Mini-Sonic
DATE BORING COMPLETED: 10/29/2018
DATE WELL INSTALLED: 10/30/2018
GROUND ELEVATION: not available
TOC ELEVATION: not available
NOTES:

TOTAL DEPTH: 120 feet bgs
DIAMETER: 4 inches
LOGGED BY: J. Reynolds
CHECKED BY: H. Usle
NORTHING: 1475646.402
EASTING: 798509.0423

ACRONYM LEGEND

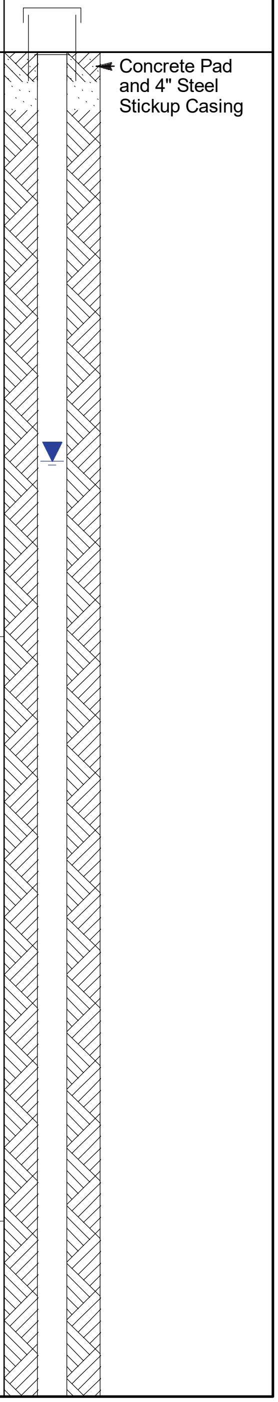
amsl = above mean sea level
bgs = below ground surface
ft = feet
PID = Photoionization Detector
ppm = parts per million
SC = Sonic Core
HA = Hand Auger
NR = No Recovery

GRAPHIC LOG LEGEND

▨ Silty Clay
▥ Silty Sand
▨ Poorly-graded Sandy Gravel
▨ Low Plasticity Clay
▨ Poorly-graded Sand
▨ Well-graded Sand
▨ Poorly-graded Gravel
▨ Bedrock
▥ Gravelly Silt

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
5		HA	72	60	CL-ML	5.5	Brown To Gray, CLAYEY SILT, some fine to medium sand, moist, mottling.	0.0
					SM	7.5	Brown, FINE TO MEDIUM SAND, some silt, moist to wet.	
					GP	8.0	Brown, COARSE GRAVEL, with fine to medium sand, (1-3"diameter), poorly graded, loose, wet.	
10					CL	10.0	Grayish Brown, CLAY, soft, plastic, wet.	
15 20		SC	96	80	CL	20.0	Gray, CLAY, soft, plastic, wet.	0.0
					CL		Gray, CLAY, soft, plastic, wet.	

WELL DIAGRAM



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GWI-05

Client: Arnold & Porter

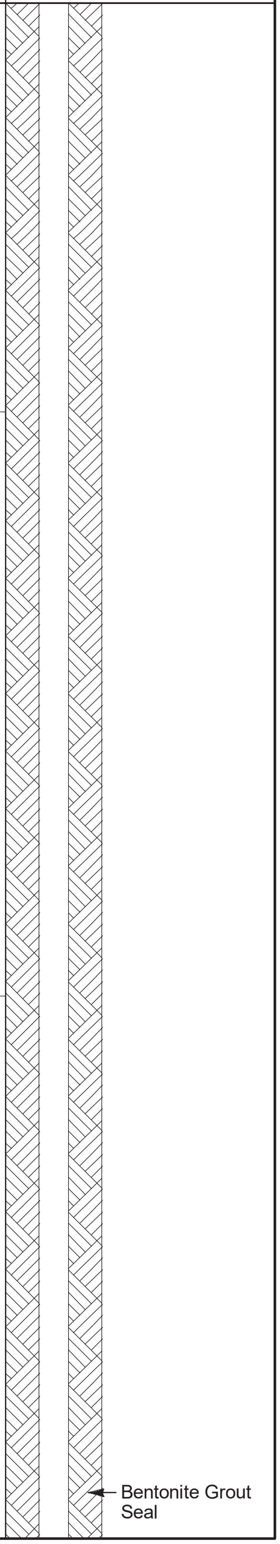
Project Name: Hoosick

Project Number: 0378075

Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
25		SC	120	100	CL	▨	Gray, CLAY, soft, plastic, wet. *(continued)*	0.0
30							30.0	
35		SC	120	100	CL	▨	Gray, CLAY, soft, plastic, wet.	0.0
40							40.0	
45		SC	NR	0			NO RECOVERY.	

WELL DIAGRAM

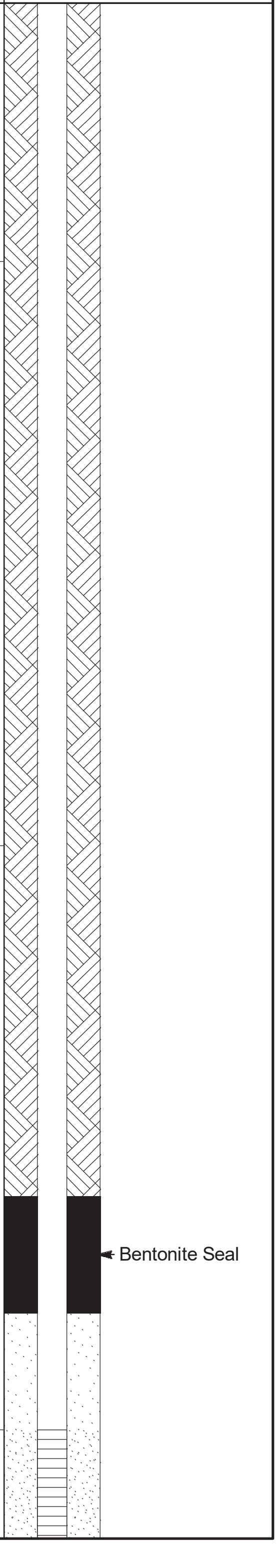


Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
50									
55		SC	NR	0			NO RECOVERY. *(continued)*		
60							60.0		
65		SC	120	100	CL-ML		Gray, SILTY CLAY, semi-plastic, medium stiff, wet.	0.0	
70							70.0		
					CL-ML		Gray, SILTY CLAY, semi-plastic, varved, medium stiff, wet.		
75		SC	120	100				0.0	

Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
					CL-ML		Gray, SILTY CLAY, semi-plastic, varved, medium stiff, wet. *(continued)*		
80							80.0		
85		SC	96	80	CL-ML		Gray, SILTY CLAY, semi-plastic, wet.	0.0	
90							90.0		
95		SC	NR	0			NO RECOVERY.		
100							100.0		
					SM		Brown, FINE TO MEDIUM SILTY SAND, with subrounded fine to coarse gravel, well sorted, wet.		



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GWI-05

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Client: Arnold & Porter

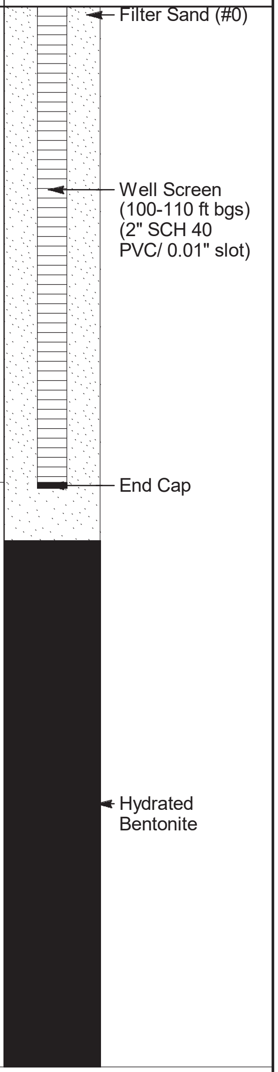
Project Name: Hoosick

Project Number: 0378075

Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
					SM		Brown, FINE TO MEDIUM SILTY SAND, with subrounded fine to coarse gravel, well sorted, wet. *(continued)*	
						104.0		
105		SC	60	50	SM		Gray, SILTY SAND, with subrounded fine to coarse gravel, some cobbles (5" diameter), well sorted, wet.	0.0
						107.0		
					SP		Dark Gray, FINE TO MEDIUM SAND, lithic, well sorted, wet.	
						109.0		
					SW		Dark Gray, MEDIUM TO COARSE SAND, with subrounded fine to medium gravel, lithic, well graded, wet.	
110						110.0		
					GP		COBBLES, (3" diameter), wet.	
						111.0		
							Gray, PHYLLITE, angular, foliated.	
						113.0		
					ML		Gray, SILT, with subangular coarse gravel, stiff, moist.	
						114.0		
115		SC	144	120			Dark Gray, PHYLLITE, some quartz.	0.0
						116.0		
							Dark Gray, PHYLLITE, foliated.	
120						120.0		
							Bottom of Boring @ 120.00 ft bgs	
125								

WELL DIAGRAM



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GWI-06

PAGE 1 OF 7

Client: Arnold & Porter **Project Name:** Hoosick

Project Number: 0378075 **Project Location:** Hoosick, New York

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Mini-Sonic
DATE BORING COMPLETED: 11/5/2018
DATE WELL INSTALLED: 11/7/2018
GROUND ELEVATION: not available
TOC ELEVATION: not available
NOTES:

TOTAL DEPTH: 157 feet bgs
DIAMETER: 4 inches
LOGGED BY: J. Reynolds
CHECKED BY: H. Usle
NORTHING: 1475642.394
EASTING: 799314.7323

ACRONYM LEGEND

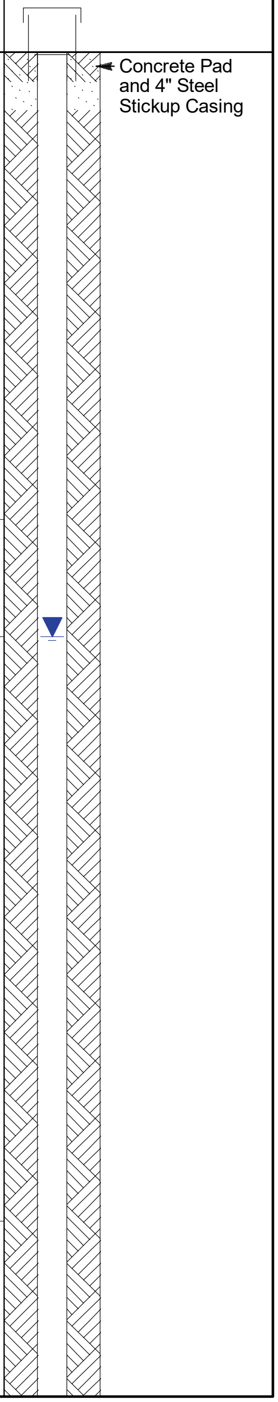
amsl = above mean sea level
bgs = below ground surface
ft = feet
PID = Photoionization Detector
ppm = parts per million
SC = Sonic Core
HA = Hand Auger
NR = No Recovery

GRAPHIC LOG LEGEND

▨ Silty Clay	▥ Silty Sand	▨ Low Plasticity Clay
⬚ Poorly-graded Sand	⬚ Poorly-graded Gravelly Sand	● Well-graded Gravel
▥ Sandy Silt	○ Poorly-graded Gravel	⬚ Well-graded Sand

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
5		HA	96	100	CL-ML	5.0	Brown To Gray, CLAYEY SILT, with fine to medium sand, increasing sand with depth, loose, moist, mottling.	0.0
					SM		Brown, SILTY FINE SAND, and subangular fine to coarse gravel, trace cobbles, poorly graded, loose, dry.	
10		SC	24	100		10.0		0.0
15		SC	108	90	CL		Gray Brown, CLAY, soft, plastic, wet.	0.0
20						20.0		
		SC			CL		Brown To Gray, CLAY, soft, plastic, wet.	

WELL DIAGRAM



ERM

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GWI-06

PAGE 2 OF 7

Client: Arnold & Porter

Project Name: Hoosick

Project Number: 0378075

Project Location: Hoosick, New York

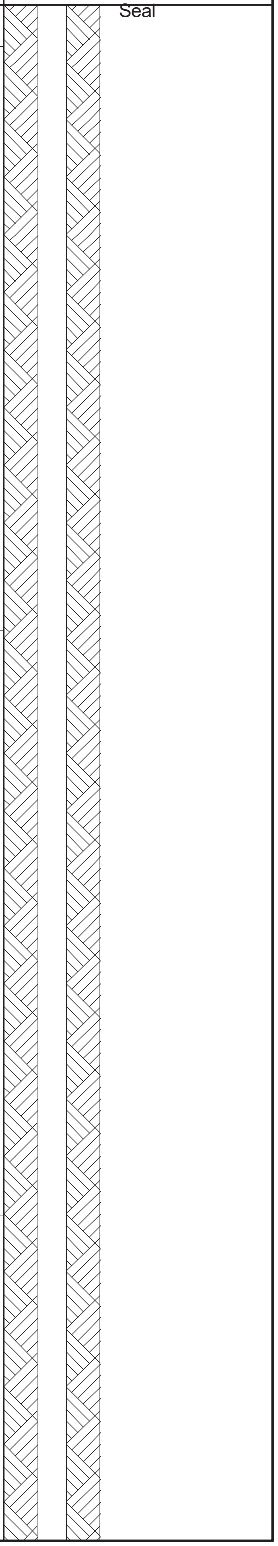
DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
25		SC	84	70				0.0	
30					CL		Brown To Gray, CLAY, soft, plastic, wet. *(continued)*		
35		SC	120	100				0.0	
40					CL		40.0 Grayish Brown, CLAY, plastic, medium stiff, wet.		
45		SC	96	80	CL-ML		44.0 Grayish Brown, SILTY CLAY, semi-plastic, medium stiff, wet.	0.0	
					CL-ML		48.5 Gray, CLAYEY SILT, non-plastic, soft to medium stiff, wet.		Bentonite Grout

Client: Arnold & Porter **Project Name:** Hoosick

Project Number: 0378075 **Project Location:** Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
50					CL-ML		Gray, CLAYEY SILT, non-plastic, soft to medium stiff, wet. *(continued)*	
							50.0	
					CL		Gray, CLAY, soft, plastic, saturated.	
							53.5	
55		SC	120	100				0.0
					CL-ML		Gray, CLAYEY SILT, semi-firm, wet.	
							59.5	
					SP		Dark Gray, FINE TO MEDIUM SAND, trace silt, lithic, well sorted, loose, wet.	
60							60.0	
					SP		Dark Gray, FINE TO MEDIUM SAND, lithic, well sorted, loose.	
							63.0	
65		SC	120	100				0.0
					SP		Dark Gray, FINE TO MEDIUM SAND, with subrounded fine to coarse gravel, trace cobbles, well sorted, loose.	
							68.0	
					SP		Dark Gray, FINE TO MEDIUM SAND, some fine to medium gravel, lithic, well sorted, wet.	
							69.0	
					GW		Gray, FINE TO COARSE GRAVEL, subrounded, well graded, loose.	
							69.8	
70					ML		Gray To Brown, SILT, with subrounded sand and gravel, diamict, stiff, moist.	
							70.0	
					SP		Gray, FINE TO MEDIUM SAND, with subrounded fine to medium gravel, lithic, well sorted, wet.	
							71.0	
					GW		Gray, FINE TO COARSE GRAVEL, with fine sand, subrounded, trace silt, well graded, loose, wet.	
							72.0	
					SP		Gray, FINE TO MEDIUM SAND, with subrounded fine to coarse gravel, lithic, well sorted, loose, wet.	
75		SC	120	100				0.0

WELL DIAGRAM



Client: Arnold & Porter

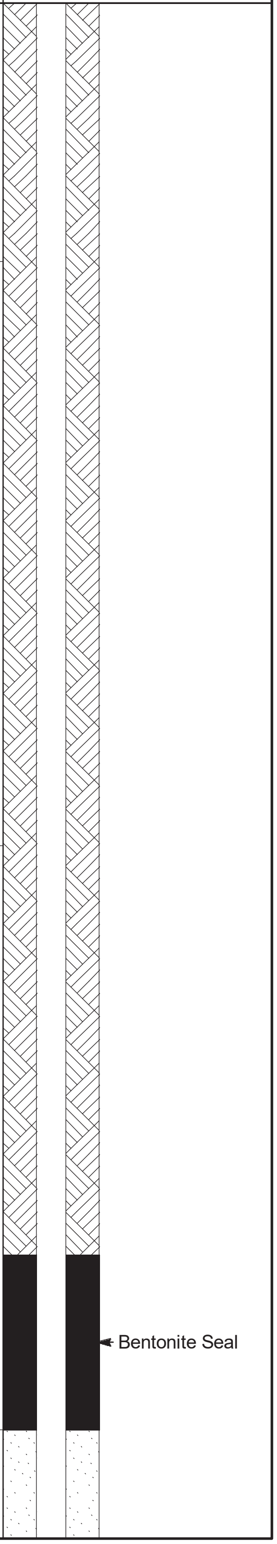
Project Number: 0378075

Project Name: Hoosick

Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
					SP		76.0	
					SP		76.5 Gray, FINE SAND, dense, wet.	
					GP		77.0 COBBLES.	
					SP		Gray, FINE TO MEDIUM SAND, trace subrounded medium gravel, lithic, well sorted, loose, wet. 79.0	
80					SP		Gray, FINE SAND, compact, medium dense, moist to wet. 80.0	
					SW		Gray, FINE TO COARSE SAND, lithic, well graded, loose, moist to wet. 84.0	
85		SC	120	100	SP		Gray, FINE TO MEDIUM SAND, with subrounded fine to coarse gravel, lithic, trace cobbles, well sorted, loose, wet. 88.5	0.0
90					SP		Gray, FINE SAND. 90.0	
					SP		Gray, FINE TO MEDIUM SAND, with subrounded fine to coarse gravel, lithic, well sorted, loose, wet. 93.5	
					SP		Gray, FINE TO MEDIUM SAND, trace subrounded coarse gravel, lithic, well sorted, loose, wet. 95.0	
95		SC	120	100	SP		Gray, FINE TO MEDIUM SAND, some subrounded fine to medium gravel, lithic, well sorted, loose, wet. 96.0	0.0
					GW		Gray, FINE TO COARSE GRAVEL, some fine to medium sand, subrounded, lithic, well graded, loose, wet. 98.0	
100					SP		Gray, FINE TO MEDIUM SAND, some subrounded medium to coarse gravel, lithic, some cobbles, loose, wet. 100.0	
					SP		Gray, FINE TO MEDIUM SAND, lithic, well sorted, loose. 101.0	
					SW		Gray, FINE TO COARSE SAND, and subrounded fine to coarse gravel, lithic, trace silt, trace cobbles, well graded, loose, wet.	

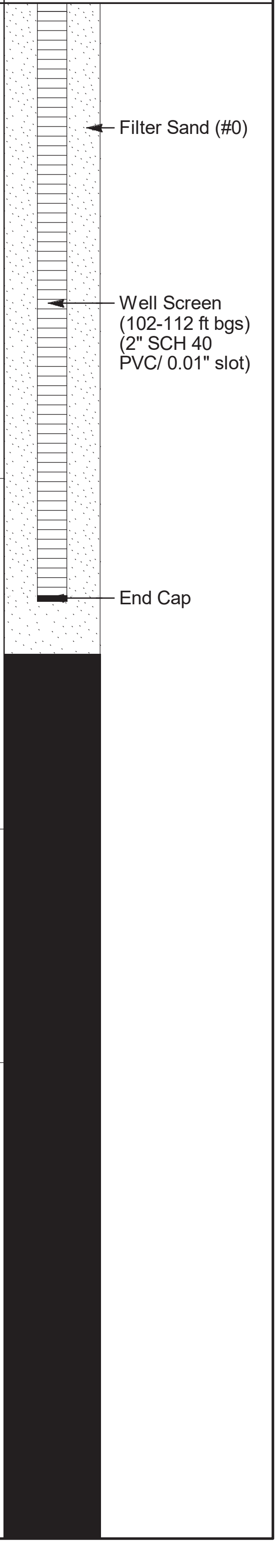
WELL DIAGRAM



Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
105		SC	120	100	SW		Gray, FINE TO COARSE SAND, and subrounded fine to coarse gravel, lithic, trace silt, trace cobbles, well graded, loose, wet. *(continued)*	0.0
							109.5	
110					SM		Dark Grayish Brown, SANDY SILT, with subrounded medium to coarse gravel, diamict, dense, wet.	
							110.0	
		SC	72	100	SW		Gray, FINE TO COARSE SAND, some subrounded fine to medium gravel, lithic, well graded, loose, wet.	0.0
							112.0	
					GW		Gray, FINE TO COARSE GRAVEL, some fine to coarse sand, subrounded, lithic, well graded, loose, wet.	
							112.5	
					SP		Gray, FINE TO MEDIUM SAND, trace subrounded fine to medium gravel, lithic, trace cobbles, well sorted, loose, wet.	
							113.5	
					SP		Gray, FINE SAND, trace silt, compact, medium dense, wet.	
115							115.0	
					SP		Gray, FINE TO MEDIUM SAND, lithic, well sorted, loose, wet.	
							116.0	
		SC	NR	0			NO RECOVERY.	
120							120.0	
		SC	72	60	SW		Gray, FINE TO COARSE SAND, some subrounded fine to coarse gravel, lithic, well graded, loose, wet.	
							122.0	
					GW		Gray, FINE TO COARSE GRAVEL, some subrounded fine to coarse sand, lithic, well graded, loose, wet.	
125								0.0
							126.0	
					SP		Gray, FINE TO MEDIUM SAND, lithic, well sorted, loose, wet.	
							128.0	

WELL DIAGRAM



Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
					SP SP		Gray, FINE TO MEDIUM SAND, and subrounded fine to coarse gravel, lithic. *(continued)*		
130							130.0		
135		SC	96	80				0.0	Hydrated Bentonite
140					SM		Gray, FINE SANDY SILT, with subangular fine to coarse gravel, diamict, stiff, dry to moist.		
145		SC	120	100				0.0	
150									
							153.0		
		SC	84	100	SM		Gray, FINE SANDY SILT, with subangular fine to medium gravel, diamict, medium stiff, wet.	0.0	

Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
155					SM		Gray, FINE SANDY SILT, with subangular fine to medium gravel, diamict, medium stiff, wet. *(continued)*		
							156.5		
							157.0 Dark Gray, PHYLLITE, fragments in drilling shoe.		
							Bottom of Boring @ 157.00 ft bgs		
160									
165									
170									
175									
180									

ERM

GWI-07

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Client: Arnold & Porter
Project Name: Hoosick
Project Number: 0378075
Project Location: Hoosick, New York

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Mini-Sonic
DATE BORING COMPLETED: 11/8/2018
DATE WELL INSTALLED: NA
GROUND ELEVATION: not available
TOC ELEVATION: not available

TOTAL DEPTH: 110 feet bgs
DIAMETER: 4 inches
LOGGED BY: J. Reynolds
CHECKED BY: H. Usle
NORTHING: 1475878.61455133
EASTING: 799229.87756087

ACRONYM LEGEND

amsl = above mean sea level
bgs = below ground surface
ft = feet
PID = Photoionization Detector
ppm = parts per million
SC = Sonic Core
HA = Hand Auger
NR = No Recovery

GRAPHIC LOG LEGEND

▨ Silty Clay	▥ Silty Sand	▨ Low Plasticity Clay
▣ Well-graded Gravelly Sand	⬚ Poorly-graded Sand	▣ Poorly-graded Gravelly Sand
● Well-graded Gravel	▥ Sandy Silt	▤ Till/ Diamict

NOTES: Northing and Easting coordinates obtained handheld Trimble unit.

DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	
0–1.5		HA	60	63	CL-ML	1.5	Brown To Gray, CLAYEY SILT, some fine to medium sand, loose, moist.	0.0	
1.5–5					SM		Brown, SILTY FINE SAND, and subangular fine to coarse gravel, poorly graded, loose, dry.		
5–8									
8–10		SC	24	100		10.0		0.0	▼
10–15		SC	120	100	CL		Grayish Brown, CLAY, soft, plastic, wet.	0.0	
15–20						20.0			

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DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	
25		SC	120	100	CL		Brown To Gray, CLAY, soft, plastic, wet. *(continued)* 26.0	0.0	
					CL-ML		Grayish Brown, SILTY CLAY, medium firm, semi-plastic, wet. 27.5		
					CL-ML		Grayish Brown, CLAYEY SILT, non-plastic, medium stiff, wet. 30.0		
30					CL-ML		Grayish Brown, CLAYEY SILT, non-plastic, soft, saturated. 31.0		
					SW		Gray, FINE TO COARSE SAND, and subrounded fine to medium gravel, well graded, loose, wet. 34.0		
35		SC	120	100	SW		Gray, MEDIUM TO COARSE SAND, and subrounded fine to coarse gravel, trace cobbles, well graded, loose, wet. 39.5	0.0	
					SP		Gray, FINE SAND, trace silt, loose, wet. 40.0		
40					SP		Gray, FINE TO MEDIUM SAND, well sorted, loose, wet.		

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DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	
45		SC	108	90				0.0	
50					SP		Gray, FINE TO MEDIUM SAND, well sorted, loose, wet. *(continued)*		
55		SC	120	100				0.0	
							57.5		
60					SW		Gray, FINE TO COARSE SAND, and subrounded fine to coarse gravel, trace cobbles, well graded, loose, wet.		
65		SC	96	80				0.0	

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DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	
					SW		Gray, FINE TO COARSE SAND, and subrounded fine to coarse gravel, trace cobbles, well graded, loose, wet. *(continued)* 66.5		
70					SP		Gray, FINE TO MEDIUM SAND, trace subrounded coarse gravel, trace cobbles, well sorted, loose, wet. 70.0		
75		SC	NR	0			NO RECOVERY. 75.0		
					SW		Gray, FINE TO COARSE SAND, and subangular fine to coarse gravel, lithic, some cobbles, well graded, loose, wet. 77.5		
		SC	60	100	SW		Gray, FINE TO COARSE SAND, and subrounded fine to coarse gravel, lithic, trace cobbles, well graded, wet. 79.5	0.0	
80					SP		Gray, FINE TO MEDIUM SAND, and subangular fine to coarse gravel, lithic, little silt, well sorted, wet. 80.0		
					SP		Gray, FINE SAND, loose, saturated. 82.0		
					SP		Gray, FINE TO MEDIUM SAND, and subrounded fine gravel, lithic, trace silt, well sorted, loose, wet. 84.0		
85		SC	96	80	SW		Gray, FINE TO COARSE SAND, and subrounded fine to coarse gravel, trace silt, well graded, loose, wet. 85.0	0.0	
					GW		Gray, FINE TO COARSE GRAVEL, some subrounded coarse sand, some cobbles, well graded, loose, wet.		

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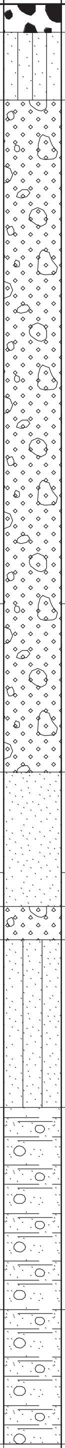


DEPTH (ft)	ELEVATION (feet amsl)	SAMPLE TYPE	RECOVERY (inches)	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
					GW		89.0	
90					ML		Gray, SILT, with fine to medium sand, trace fine gravel, diamict, medium firm, moist to wet. 90.0	
95		SC	120	100	SW		Gray, FINE TO COARSE SAND, and subrounded fine to medium gravel, lithic, well graded, loose, wet. 97.5	0.0
100					SW		Gray, FINE TO COARSE SAND, and subrounded fine to coarse gravel, lithic, some cobbles, well graded, loose, wet. 100.0	
					SP		Gray, FINE SAND, loose, wet. 101.5	
					SP		Gray, FINE TO MEDIUM SAND, trace coarse sand, lithic, well sorted, loose, wet. 102.0	
					SW		Gray, FINE TO COARSE SAND, and subangular fine to coarse gravel, lithic, well graded, loose, wet. 102.5	
105		SC	120	100	SM		Gray, SILTY FINE SAND, medium dense, wet to saturated. 105.0	0.0
					SM		Gray, SILTY FINE SAND, and subrounded fine to coarse gravel, diamict, medium dense, wet to saturated. 108.0	
110					SM		Gray, FINE SAND AND SILT, some subrounded fine to coarse gravel, diamict, dense, moist. 110.0	
							Bottom of Boring @ 110.00 ft bgs	

PROJECT NUMBER: 34730 5/29/19

Hydrogeologic Investigation Report
SUBSURFACE LOG
HOLE NUMBER LaCroix Well

LOCATION: Hoosick Falls, New York

CLIENT: ERM

CONTRACTOR: Smith Well Drilling

DRILLER: T. Wills INSPECTOR: W. Pierce

START DATE and TIME: 2/11/2019 1:00:00 PM

FINISH DATE and TIME: 2/19/2019 3:30:00 PM

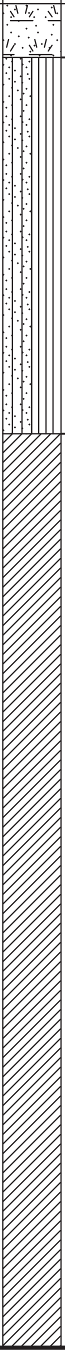
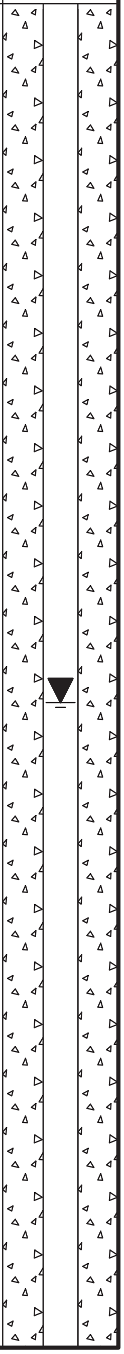
SURFACE ELEV:

CHECKED BY: C. Burns

DRILL FLUID: Treated Water

DRILLING METHOD: Cable-Tool

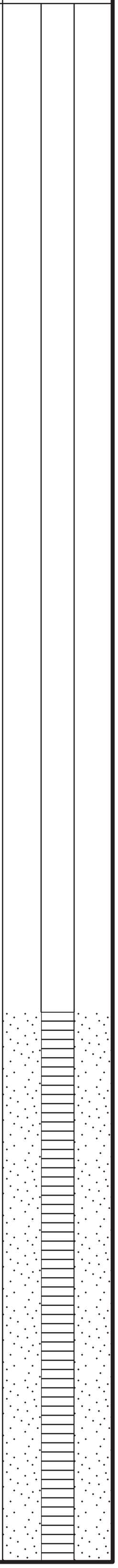
	DATE	TIME	WATER DEPTH (ft)	CASING BOTTOM (ft)	HOLE BOTTOM (ft)
WATER LEVEL OBSERVATIONS	29-4-19	09:00	13	104	104

SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	"N" Value or RQD%	SAMPLE	DEPTH (Feet)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
							**TOPSOIL**			
							f. SAND and SILT, little f. gravel, brown **(SM)**		Soil lithology from 1' to 8' based on cutting observations. Actual soil lithology may vary.	
					5					
							CLAY, gray **(CL)**		Soil lithology from 8' to 30' based on cutting observations. Actual soil lithology may vary.	
					10					
					15					
					20					

SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	"N" Value or RQD%	SAMPLE	DEPTH (Feet)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
						▨	**<u>CLAY</u>**, gray **(CL)** *(continued)*			
					30		**<u>f. SAND</u>**, some f. gravel **(SP)**		Soil lithology from 30' to 40' based on cutting observations. Actual soil lithology may vary.	
					35					
					40		**<u>f.m.c. SAND and SILT</u>**, litte g. gravel, few cobbles, gray **(SM)**		Soil lithology from 40' to 60.3' based on cutting observations. Actual soil lithology may vary.	
					45					
					50					
					55					

Hydrogeologic Investigation Report
SUBSURFACE LOG
HOLE NUMBER LaCroix Well

SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	"N" Value or RQD%	SAMPLE	DEPTH (Feet)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
							f.m.c. SAND and SILT, litte g. gravel, few cobbles, gray **(SM)** *(continued)*			
					60					
							f.m. SAND, some subangular f. Gravel, little silt, little cobbles, gray **(SP)**		Sample 1 collected for sieve analysis.	
					65					
							f. GRAVEL and c. SAND, some Silt, gray **(SGP)**		Sample 2 collected for sieve analysis.	
					70					
							f. GRAVEL, some c. Sand, little silt, few cobbles, gray **(GP)**		Sample 3 collected for sieve analysis.	
					75					
							f.c. GRAVEL, some c. Sand, little silt, gray **(GP)**		Sample 4 collected for sieve analysis.	
					80					
							f.c. GRAVEL, some f. Sand and Silt, few cobbles, gray **(GP)**		Sample 5 collected for sieve analysis.	
					85					



SAMP./CORE NUMBER	SAMP. ADV. (ft) LEN. CORE (ft)	RECOVERY (ft)	"N" Value or RQD%	SAMPLE	DEPTH (Feet)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	ELEVATION (Feet)	Remarks on Character of Drilling, Water Return, etc.	WATER LEVELS AND/OR WELL DATA
							f.c. GRAVEL, some f. Sand and Silt, few cobbles, gray **(GP)** *(continued)*			
					90		**c. SAND and f. GRAVEL**, some Silt, few cobbles, gray **(SGP)**		Sample 6 collected for sieve analysis.	
					95		**m.c. SAND**, some Silt, some f. Gravel, gray **(SP)**		Sample 7 collected for sieve analysis.	
					100		grades to f.m.c. SAND		Sample 8 collected for sieve analysis.	
					105		End of Boring at 104.8 ft			
					110					
					115					

PROJECT NUMBER: 34730 5/29/19

Hydrogeologic Investigation Report
WELL CONSTRUCTION LOG
WELL NUMBER LaCroix Well

CLIENT: ERM
SURFACE ELEV:
COOR-DINATES:
CASING STICKUP:

SOIL BORING CROSS-REFERENCE: LaCroix Well
TOWN AND CITY: Hoosick Falls
COUNTY AND STATE: New York

INSTALLATION DATE(S): 2/11/2019 - 4/8/2019

DRILLING METHOD: Cable-Tool
DRILLING CONTRACTOR: Smith Well Drilling
DRILLING FLUID: Treated Water

DEVELOPMENT TECHNIQUE(S) / DATES:
Surging and Pumping

FLUID LOSS DURING DRILLING (GALS): 0
WATER REMOVED DURING DEVELOPMENT (GALS):
75,000

STATIC DEPTH TO WATER DATE:
STATIC DEPTH TO WATER (FEET):

WELL PURPOSE: Municipal Supply

REMARKS: Boring was 16" from 0' to 27' bgs, and 10" from 27' to 104' bgs. No backfill was required below 27' bgs.

PREPARED BY: W. Pierce
DATE PREPARED: 29/5/19