SECOND FIVE-YEAR REVIEW REPORT FOR THE GEDDES BROOK/NINEMILE CREEK SITE (OPERABLE UNIT OF LAKE BOTTOM SUBSITE) AND FOURTH FIVE-YEAR REVIEW REPORT FOR THE LCP BRIDGE STREET SUBSITE ONONDAGA LAKE SUPERFUND SITE ONONDAGA COUNTY, NEW YORK

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York

Pat Evangelista

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09/30/2022

Pat Evangelista, Director
Superfund and Emergency Management Division

Date

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LIST OF ABBREVIATIONS & ACRONYMS

AMSL	Above Mean Sea Level
ANC	Atmospheric Nitrogen Company
BERA	Baseline Ecological Risk Assessment
BSQV	Bioaccumulation-Based Sediment Quality Value
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
cm	centimeters
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
GBNMC	Geddes Brook/Ninemile Creek
HHRA	Human Health Risk Assessment
ICs	Institutional Controls
IRM	Interim Remedial Measure
LEL	Lowest Effects Level
LOAEL	Lowest-observed-adverse-effect-level
LCP	Linden Chemicals and Plastics
MCL	maximum contaminant level
Metro	Syracuse Metropolitan Wastewater Treatment Facility
µg/kg	Micrograms per Kilogram
mg/kg	Milligrams per Kilogram
ng/kg	Nanograms per Kilogram
ng/L	Nanograms per Liter
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	Operation, Maintenance and Monitoring
OU	Operable Unit
PCBs	Polychlorinated Biphenyls
PCDD/PCDFs	Polychlorinated Dibenzodioxins/Polychlorinated Dibenzofurans
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutane sulfonic acid
PFOA	perfluorooctanoic acid
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RG	Remedial Goal
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RPM	Remedial Project Manager
TEQ	Toxicity Equivalent
UCL	Upper Confidence Limit
UU/UE	Unlimited Use/Unrestricted Exposure
ww	Wet Weight

EXECUTIVE SUMMARY

The Onondaga Lake site currently includes eleven subsites (subsites are defined as any site that is situated on Onondaga Lake's shores or tributaries that has contributed contamination to or threatens to contribute contamination to Onondaga Lake). Each subsite is an operable unit (OU).

The U.S. Environmental Protection Agency (EPA) is preparing this five-year review (FYR) for the LCP Bridge Street subsite (OU5) as well as Geddes Brook/Ninemile Creek (OUs 20 and 24) (GBNMC) (part of the Lake Bottom subsite) concurrently because they are located in close proximity to each other and because portions of GBNMC are downstream of and were impacted by historical releases from the LCP Bridge Street subsite.

The purpose of these FYRs is to assess current information to determine if the implemented remedial measures are, and will continue to be, protective of human health and the environment. The triggering action for this statutory review is the completion date of the previous GBNMC FYR, which occurred in 2017. The previous FYR for the LCP Bridge Street subsite was completed in 2020.

Remedial activities at the LCP Bridge Street subsite included removal of contaminated sediments from the West Flume, on-site ditches, and wetlands; restoration of wetlands; installation of a low-permeability cutoff wall around this subsite; installation of a low-permeability landfill cover; and hydraulic control and collection of contaminated groundwater inside the cutoff wall. There has been general improvement in the effectiveness of the hydraulic control system within the soil/sediment containment area over time, particularly since completion of the landfill cover in 2015 and replacement of the groundwater extraction pumps in 2017-2020.

Remediation activities at GBNMC included excavation of mercury-contaminated channel sediments and floodplain soils/sediments, transport of excavated materials to the LCP Bridge Street Subsite Final Cover Area, placement of clean imported material with appropriate substrate types and thickness, and performing site restoration in accordance with approved designs.

The 2017 GBNMC FYR and 2020 LCP Bridge Street FYR reports presented environmental data for evaluation periods ending in 2016 and 2018, respectively. This FYR report presents available environmental data since those reports were issued, but the discussion and presentation of the data includes much of the prior results from the 2017 and 2020 reports to support the evaluation of the data and provide additional context for it.

At the LCP Bridge Street subsite, the average dissolved mercury concentration in West Flume surface water between 2014 and 2018 was below the New York State protection of wildlife surface water standard of 2.6 nanograms/liter (ng/L). Although average dissolved mercury concentrations in surface water may be useful for looking at trend analysis, compliance will be based primarily on individual station concentrations. There were no exceedances of this standard at individual stations in the West Flume from 2015 to 2018. Wetland C had elevated dissolved mercury concentrations in surface water in 2016, but all samples were below the standard in 2017 and 2018. No surface water samples were collected from the West Flume or Wetland C in 2019 or 2020. All surface water samples in Wetland A were above the standard every year since 2015 through 2020.

Two Remediation Goals (RG) for surface water were established in the GBNMC Record of Decision (ROD). The New York State protection of wildlife surface water standard of 2.6 ng/L is applied to each

of the six surface water locations sampled. The more stringent New York State protection of human health via fish consumption surface water standard of 0.7 ng/L is applied to five of the locations which support populations of sport fish (i.e., those that are consumed by humans). Following remediation, levels of dissolved mercury in GBNMC surface water samples were below the protection of wildlife goal of 2.6 ng/L. Average levels of dissolved mercury were also below the RG of 0.7 ng/L for protection of human health via fish consumption in the four sampling events in Geddes Brook since 2015 and in three sampling events during low flow conditions in Ninemile Creek. As stated previously, although average dissolved mercury concentrations in surface water may be useful for looking at trend analysis, compliance will be based primarily on individual station concentrations. During the last two events in Geddes Brook, there was one exceedance of the 0.7 ng/L RG for dissolved mercury in 2017 and no exceedances at any of the five locations supporting sport fish in 2019. There were no exceedances at the four downstream locations during the three low-flow events in Ninemile Creek (2015 to 2017). While average levels of dissolved mercury were above the 0.7 ng/L criterion in Ninemile Creek during high flow conditions in the downstream area of the Creek in 2015 and 2016, the levels were consistent with levels of dissolved mercury in Ninemile Creek at the upstream location and were lower than the criterion at all locations in 2017.

A summary of the post-remediation results and RGs for dissolved mercury in LCP Bridge Street Subsite and GBNMC surface water is provided in **Table ES-1,** below.

Table ES-1
Surface Water Average/Maximum Levels - Dissolved Mercury (nanograms per liter)

Area	2013	2014	2015	2016	2017	2018	2019	2020	Surface Water Criteria/ Remediation Goals[1]	
LCP Wetland C	-	1.22/1.75	0.66/0.71	2.75/3.67	0.74/0.82	1.16/1.31	-	-	2.6	
LCP Wetland A	-	0.98/1.40	3.6/4.6	6.15/6.95	6.07/8.68	4.8/5.71	4.17/5.59	3.79/5.18		
LCP West Flume	-	1.84/3.20	0.79/1.01	1.49/1.87	0.75/1.19	1.12/1.41	-	-		
Geddes Brook	0.25/0.38	0.96/2.0	0.37/0.77	0.32/0.44	0.61/1.53	-	0.39/0.74	-	2.6	0.7
Ninemile Creek (Downstream - Low Flow)	-	-	0.18/0.19	0.19/0.24	0.12/0.13	-	-	-		
Ninemile Creek (Downstream - High Flow)[2]	-	-	1.21/1.37	1.2/1.38	0.17/0.21	-	-	-		

Table ES-1 Notes:

1. ROD remediation goals for mercury in surface water include 2.6 ng/L for protection of wildlife and 0.7 ng/L for protection of human health via fish consumption. The 0.7 ng/L standard does not apply to the LCP Bridge Street subsite because the West Flume and open water wetland areas do not support fish that are large enough for human consumption. This standard also does not apply to a perched wetland location at Geddes Brook, which is one of six Geddes Brook surface water sampling locations, since surface water at the perched wetland location does not support fish large enough for human consumption as well.
2. Dissolved mercury levels at NMC Upstream during high flow were 1.09, 1.21 and 0.17 ng/L in 2015, 2016 and 2017, respectively.

No RGs are specified in the ROD for unfiltered mercury and methylmercury in surface water. However, post-remediation levels of unfiltered mercury and methylmercury in surface water are below baseline (pre-remediation) levels in Geddes Brook, and are below baseline and/or upstream levels in lower Ninemile Creek, except for unfiltered mercury under low flow conditions in 2015 and 2016.

Sediment results at the LCP Bridge Street subsite in Wetland C and the West Flume continue to show decreased total mercury concentrations relative to pre-remediation conditions. Discrete sample results have been below the Ninemile Creek bioaccumulation-based sediment quality value (BSQV) of 0.8 mg/kg, which serves as a useful benchmark for evaluating trends at LCP. As in the case for surface water, elevated levels of mercury in sediment remain in Wetland A. Supplemental data collected in 2018, 2020 and 2021 indicate that additional remedial actions in and adjacent to a portion of Wetland A are needed to ensure long-term protectiveness to ecological receptors.

Post-remediation levels of total mercury in Geddes Brook sediment, Ninemile Creek channel sediment, and Ninemile Creek (Reach CD) floodplain soil are below the RGs. While no RGs are specified in the ROD for methylmercury in sediment, post-remediation levels of methylmercury in Geddes Brook and Ninemile Creek channel sediment are below baseline levels.

In the SYW-10 forested wetland area, average total mercury levels in soil/sediment in the combined remediated and unremediated areas are above the BSQV of 0.6 mg/kg; however, this is not unanticipated, given that a sizeable area within the SYW-10 area was excluded from remediation so as to continue to provide forested wetland functions, consistent with the remedial objective, conceptual approach, and design for SYW-10. Average total mercury levels in soil/sediment in the remediated area within SYW-10 are below the mercury BSQV of 0.6 mg/kg for floodplain soil.

A summary of the post-remediation results for mercury in sediment/floodplain soil and sediment/soil RGs for LCP Bridge Street Subsite and GBNMC is provided in **Table ES-2**, below.

Table ES-2

Sediment/Soil Average Levels - Mercury (milligrams per kilogram)

Area/ Media	2013	2014	2015	2016	2017	2018	2019	2020	2021	Sediment/Soil Criteria/Remediation Goals					
LCP Wetland C	-	0.18	0.13	0.18	0.19	0.11	-	-	-	-	-	0.2	-	0.8	1.3
LCP Wetland A	-	0.92	0.92	1.24	2.76	1.83	0.49	0.86	-						
LCP West Flume	-	0.48	0.3	0.29	0.38	0.12	-	-	-						
LCP Wetland A Upland	-	-	-	-	-	-	-	-	13.15	-	-	-	0.6	-	-
Geddes Brook Soil/ Sediment	0.044	0.052	0.063	0.028	0.039	-	-	-	-	0.15	0.18	-	0.6	0.8	1.3
SYW-10 Soil/ Sediment Remediated Area	-	-	0.07	0.06	-	0.08	-	-	-						
SYW-10 Soil/ Sediment Combined Remediated + Un-remediated Area	-	-	1.47	1.9	-	1.45	-	-	-						
Ninemile Creek Channel Sediment	-	-	-	0.07	-	0.06	-	-	-	0.15	-	-	-	0.8	1.3
Ninemile Creek Reach CD Soil	-	-	-	0.033	-	0.075	-	-	-	-	0.18	-	0.6	-	-

Table ES-2 Notes:

1. ROD remediation goals for mercury in GBNMC soil/sediment include 0.15 mg/kg (NYSDEC Lowest Effect Level), 0.18 mg/kg (NYSDEC unrestricted use soil cleanup objective), 0.6 mg/kg (Floodplain Soil BSQV), 0.8 mg/kg (Sediment BSQV) and 1.3 mg/kg (NYSDEC Severe Effect Level). ROD remediation goals for mercury in LCP Bridge Street Subsite sediment include 0.2 mg/kg (site-specific total mercury background value identified within sediments from the West Flume at locations upstream of the site). While the remedial goals for GBNMC soil/sediment are not applicable to LCP, they may be considered when evaluating results for LCP soil/sediment.
2. LCP Wetland A Upland Soil 2021 average represents a weighted average of the 0-0.5', 0.5-1' and 1-2' sample depth intervals at 8 sample locations.

In the Geddes Brook floodplain area, average post-remediation levels of mercury and methylmercury in earthworm composite samples and small mammals were below average baseline levels. Detected levels of total mercury and methylmercury in earthworms in the Ninemile Creek (Reach CD) floodplain area are well below levels detected during baseline sampling. Total mercury was not detected in small mammals in the Ninemile Creek (Reach CD) floodplain area. Average total mercury levels in small mammals in both the remediated and unremediated areas in SYW-10 are below baseline levels. In addition, total mercury was not detected in small mammals in the remediated area in 2016 and 2018 and was also not detected in four of the five small mammal samples from the unremediated area in 2018. These results indicate that mercury concentrations within biota have been reduced on a site-wide basis despite some elevated levels of mercury remaining in soil in the unremediated area. Thus, potential exposures to higher trophic level receptors have also been considerably reduced.

The average and 95% Upper Confidence Limit (UCL) total mercury concentrations in prey fish collected from the West Flume during the 2015 to 2018 review period were generally lower than values observed during the previous review period, and remained below baseline concentrations. The average and 95% UCL concentrations of total mercury in Geddes Brook prey fish and Ninemile Creek prey and sport fish (all species combined) in the downstream (remediated) locations are below the ROD RGs except for the 2017 95% UCL values for Geddes Brook and Ninemile Creek prey fish which were slightly higher than the RG. As the 95% UCLs in Geddes Brook and Ninemile Creek prey fish as well as in one of the sport fish species (Rock Bass) in Ninemile Creek exceeded the RGs in 2017, and the fish data collected in 2019 were determined not to be usable, an additional fish sampling event will be conducted in both Geddes Brook and Ninemile Creek in 2022. The RGs are based on protection of ecological receptors (based on the lowest-observed-adverse-effect-level (LOAEL) target tissue concentrations calculated from exposure parameters used in the GBNMC Baseline Ecological Risk Assessment (BERA) for the mink, river otter and belted kingfisher) and EPA's methylmercury National Recommended Water Quality criterion for the protection of human health due to consumption of fish. A summary of the post-remediation results and RGs for mercury in fish tissue is provided in **Table ES-3**, below.

Table ES-3
Fish - Average and 95% UCLs[1] for Mercury (milligrams per kilogram wet weight)

Area/Media	2013		2014		2015		2016		2017		2018		Remediation Goals[2]
	Avg	95 UCL	Avg	95 UCL	Avg	95 UCL	Avg	95 UCL	Avg	95 UCL	Avg	95 UCL	
LCP Prey Fish	-	-	-	-	0.041	0.052	-	-	0.11	0.12	0.066	0.077	0.1
Geddes Brook Prey Fish	0.083	0.1	0.072	0.09	-	-	0.058	0.09	0.09	0.104	-	-	
Ninemile Creek Prey Fish (Downstream)	-	-	-	-	0.065	0.088	0.051	0.067	0.085	0.103	-	-	
Ninemile Creek Sport Fish (All Species Combined) (Downstream)	-	-	-	-	0.099	0.16	0.106	0.15	0.17	0.2	-	-	0.3

Table ES-3 Notes:

1. The 95% UCL is an estimate of the upper bound for the true population mean.
2. The RGs are specific to Geddes Brook/Ninemile Creek, but the prey fish RG may be considered as a point of comparison for mercury levels in LCP prey fish.

The averages and 95% UCLs for polychlorinated biphenyls (PCBs) and polychlorinated dibenzodioxins/polychlorinated dibenzofurans (PCDD/PCDFs) in Ninemile Creek sport fish are within the acceptable risk range for cancer effects and below the noncancer targets for children and adults, except for the 2015 and 2016 means and 2015-2017 95% UCLs for PCBs, which were above the noncancer target for children. However, the 2015-2017 mean PCB concentrations in upstream sport fish were also above this lower noncancer target. The targets are based on protection of human health due to consumption of fish. A summary of the post-remediation results for PCBs and PCDD/PCDFs in sport fish along with fish tissue targets is provided in **Table ES-4**, below.

Table ES-4
Sport Fish - Ninemile Creek Downstream Average and 95% UCLs for PCBs (micrograms/kilogram wet weight) and PCDD/PCDFs (nanograms/kilogram wet weight)

Contaminant	2015		2016		2017		Fish Tissue Targets[1]		
	Avg	95 UCL	Avg	95 UCL	Avg	95 UCL	1 in 10,000 Excess Adult Cancer Risk	Noncancer Adult	Noncancer Child
PCBs	129	151	146	171	111	137	1,100	190	120
PCDDs/PCDFs	0.353	0.487	-	-	0.414	0.591	10	6.5	4.2

Table ES-4 Notes:

1. The fish tissue targets for sport fish are based on protection of human health due to consumption of fish. There are no fish tissue targets for PCBs or PCDD/PCDFs in prey fish.

As noted above, an additional fish sampling event will be conducted in both Geddes Brook and Ninemile Creek in 2022. In addition to mercury, the Ninemile Creek samples will be analyzed for PCBs and PCDD/PCDFs.

Based on site inspections and review of post-remediation operation, maintenance, and monitoring results obtained to date, all construction-related components of the remedies have been implemented consistent with the decision documents cited above and approved designs, and are functioning as intended. It is anticipated that operating procedures, monitoring, and maintenance, as currently being implemented, will maintain the effectiveness of the remedies.

The implemented actions are considered to be protective of human health and the environment in the short-term at the LCP Bridge Street subsite. Except for Wetland A, the remedy for this subsite is protective of human health and the environment in the short-term since exposure routes have been eliminated and biota data suggest that tissue concentrations are below baseline levels. For the remedy at the LCP Bridge Street subsite to be protective in the long-term, additional remedial action will be needed to address elevated levels of mercury in soil, sediment and surface water in Wetland A and the inward gradient in the deep zone in the area of the hydraulic containment system needs to be evaluated for additional optimization measures. The remedial measures to be implemented at Wetland A will be determined after additional collection and evaluation of surface water, soil and sediment data.

The implemented actions are protective of human health and the environment at GBNMC in the short-term. At GBNMC, sediment and floodplain soils have been excavated and remediated areas have been restored to reduce potential exposure to site contaminants. In addition, post-remediation monitoring indicates that the cover system at GBNMC remains in place and that contaminant levels in surface soil and sediment in remediated areas have decreased relative to pre-remediation conditions. Fish tissue concentrations have also declined since baseline, but monitoring will continue in 2022 as the 95% UCLs in 2017 exceeded the RGs and fish data collected in 2019 were determined not to be usable. These data, along with data from 2015 to 2017, will be used to evaluate compliance with the RGs and targets. Fish tissue monitoring will continue into the next FYR period for assessing attainment of goals and targets and for further trend evaluation. For the implemented actions at GBNMC to be protective in the long-term, institutional controls in the form of environmental easements need to be implemented to restrict

dredging/excavating in the areas where residual contamination remains beneath clean cover material at levels above that which would allow for unlimited use and unrestricted exposure.

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The Onondaga Lake site currently includes eleven subsites (subsites are defined as any site that is situated on Onondaga Lake's shores or tributaries that has contributed contamination to or threatens to contribute contamination to Onondaga Lake). Each subsite is an operable unit (OU).

The U.S. Environmental Protection Agency (EPA) is preparing FYRs for the LCP Bridge Street subsite, which is OU5 of the Onondaga Lake site, and for Geddes Brook/Ninemile Creek (GBNMC) (part of the Lake Bottom subsite), which is OU20 and OU24 of the Onondaga Lake site, concurrently because they are located in close proximity to each other and because portions of GBNMC are downstream of and were impacted by historical releases from the LCP Bridge Street subsite. The FYRs are being conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Section 300.430(f)(4)(ii), and considering EPA policy.

This is the fourth FYR for the LCP Bridge Street subsite and the second FYR for GBNMC. The triggering action for this statutory review is the completion date of the previous GBNMC FYR, which was September 17, 2017 (the completion date of the previous FYR for the LCP Bridge Street subsite was June 11, 2020). These FYRs have been prepared because hazardous substances, pollutants or contaminants remain at the sites above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The LCP Bridge Street and GBNMC teams were led by the EPA remedial project managers (RPMs) Mark Granger and Robert Nunes, respectively. Other team members included EPA hydrogeologist, Kathryn Flynn, EPA human health and ecological risk assessor, Nicholas Mazziotta, EPA community involvement coordinator, Larisa Romanowski, and New York State Department of Environmental Conservation (NYSDEC) project managers, Timothy Larson, Tracy Smith, and Kristin Granzen.

The potential responsible party for the subsites is Honeywell International Inc. (Honeywell). Honeywell's principal contractor for the project was notified of the initiation of the FYR. The review began on August 30, 2021.

Site Background

LCP Bridge Street Subsite

The LCP Bridge Street subsite is located in the Village of Solvay, Onondaga County, New York in an industrial area south of the New York State Fairgrounds complex and a Conrail right-of-way

and north of Belle Isle Road. A scrap yard owned by Ben Weitsman of Syracuse and the former NAKOH Chemical Company are located northeast of the subsite. The WPS Syracuse Cogeneration facility (formerly known as Kamine) is located immediately west of the subsite (See **Figure 1**[1] for the subsite location).

The LCP Bridge Street subsite encompasses approximately 30 acres, 20 acres of which housed various former industrial, storage, and office buildings, as well as storage tanks and railroad tracks. These structures were remediated (*e.g.,* tank cleaning, lead and asbestos abatement) and demolished during an Interim Remedial Measure (IRM) completed in 2001. This 20-acre area subsequently became a soil/sediment containment area covered with a low-permeability cap and surrounded by a slurry wall. The containment area received excavated contaminated soil, sediment, and debris from subsite-related remedial action (RA) efforts, as well as RA efforts related to materials that had migrated to GBNMC. The containment area is surrounded by a fence that prevents public access. The remaining 10 acres are associated with flumes, wetlands, ditches, and other non-facility features. See **Figure 2** for the site plan.

From the mid-1800s to 1908, the land on which the LCP Bridge Street subsite is located was occupied by several companies that produced salt from naturally-occurring brine springs in the area. The subsite was subsequently developed and used for commercial/industrial purposes by the Atmospheric Nitrogen Company (ANC). ANC constructed and operated a plant that manufactured ammonia. Ammonia production eventually ceased and in the early 1950s, the facility was demolished. The resulting debris was used to fill the subsite.

In 1953, the Allied Chemical Corporation, a predecessor to AlliedSignal and then Honeywell, constructed a chlor-alkali facility at the LCP Bridge Street property to manufacture caustic soda (sodium hydroxide) and chlorine gas. In 1979, the facility was purchased by LCP. LCP installed a hydrochloric-acid production process in 1980 and a sodium-hypochlorite bleach production process in 1981. Manufacturing operations ceased in 1988. The eastern portion of the facility was leased by the HoltraChem Manufacturing Company from the mid-1990s through 1998 and was used as a product transfer station for the distribution of caustic soda and acids. Currently, no operations are conducted at the LCP Bridge Street subsite.

The on-site aquifers are not used for drinking water. Residents located in the vicinity of the LCP Bridge Street subsite use the public water supply provided by Onondaga County. Groundwater near the subsite will not be used as a source of potable water under future-use scenarios.

The property and surrounding areas are presently zoned industrial, and the reasonably-anticipated future land use is not expected to change.

GBNMC

GBNMC is located southwest of Onondaga Lake **(see Figure 1)**. As is implied by its name, GBNMC consists of portions of Geddes Brook and Ninemile Creek.

[1] Figures can be found in Appendix A.

Geddes Brook, a Class C stream below the Old Erie Canal and Class C trout stream upstream of the Old Erie Canal, originates in the Town of Camillus (located southwest of Syracuse, New York) and flows approximately three miles northeast to its confluence with the West Flume, a drainage ditch that passes through the LCP Bridge Street subsite, and an additional 0.3 miles north to Ninemile Creek on the perimeter of the New York State Fairgrounds in Syracuse, New York **(see Figure 3)**.[2]

Ninemile Creek, a Class C stream downstream of the former Honeywell water intake and a Class C trout stream upstream of the intake, originates at Otisco Lake and flows approximately 16 miles northeast to its mouth at Onondaga Lake. Ninemile Creek receives surface water from Beaver Meadow Brook and Geddes Brook at approximately 2.8 miles and 1.3 miles, respectively, upstream of Onondaga Lake **(see Figure 3)**. Between Amboy Dam and Onondaga Lake, Ninemile Creek flows adjacent to Solvay Wastebeds 1 through 8, 9 through 11, and 12 through 15. During the time that Honeywell utilized the Solvay process for the production of soda ash (1881 to 1986), wastes from this process were disposed of in numerous wastebeds along Onondaga Lake and Ninemile Creek. Wastebeds 1 through 8 were used from as early as 1916 until 1944 and Wastebeds 9 through 15 were used from 1944 until 1986. Upstream of the dam, Ninemile Creek flows through woodlands, farmlands, and some light industrial/commercial areas. Ground surface elevations range from approximately 400 feet above mean sea level (AMSL) at the most upstream section of Ninemile Creek addressed in this study, to approximately 363 feet AMSL where the stream enters Onondaga Lake (NYSDEC and EPA, 2009b and NYSDEC and EPA, 2009c).

GBNMC is defined as the channel sediments, floodplain soils/sediments, and surface water of the two waterbodies that were impacted or had the potential to be impacted by the disposal of hazardous and industrial wastes. This definition was based on the understanding at the time of the remedial investigation and feasibility study (RI/FS) work plan (1998) that contaminants from Honeywell's operations (e.g., LCP Bridge Street and Solvay Wastebeds) were discharged (directly or indirectly) to GBNMC, where they settled into the stream beds, banks, and floodplains.

The stretch of Ninemile Creek downstream of the area just above the confluence with Geddes Brook has been designated as "lower Ninemile Creek," which was further subdivided into three reaches (AB, BC, and CD). Major physical features within and near the Site, the approximate limits of the respective operable units, and the approximate limits of lower Ninemile Creek Reaches AB, BC, and CD are shown in the aerial photographs presented in **Figures 3 and 4**.

For more details related to subsites' background, physical characteristics, geology/hydrogeology, land/resource use, and history, please refer to: www.epa.gov/superfund/onondaga-lake.

Appendix C, attached, summarizes the documents utilized to prepare this FYR.

[2] The Old Erie Canal is adjacent and parallel to Gerelock Road which is shown on Figure 3.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Onondaga Lake site (LCP Bridge Street Subsite – Operable Unit 05)		
EPA ID: NYD986913580		
Region: 2	**State:** NY	**City/County:** Town of Geddes, Onondaga County

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Have all OUs of the Onondaga Lake NPL site achieved construction completion?** No

REVIEW STATUS
Lead agency: State ***[If "Other Federal Agency", enter Agency name]*:**
Author name (Federal or State Project Manager): Mark Granger
Author affiliation: EPA
Review period: 6/12/2020 - 9/29/2022
Date of site inspection: 7/14/2022
Type of review: Statutory
Review number: 4
Triggering action date: 6/11/2020
Due date *(five years after triggering action date)*: 6/11/2025

SITE IDENTIFICATION		
Site Name: Onondaga Lake site (GBNMC – Operable Units 20 and 24)		
EPA ID: NYD986913580		
Region: 2	**State:** NY	**City/County:** Town of Geddes, Onondaga County

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Have all OUs of the Onondaga Lake NPL site achieved construction completion?** No

REVIEW STATUS
Lead agency: State ***[If "Other Federal Agency", enter Agency name]*:**
Author name (Federal or State Project Manager): Robert Nunes
Author affiliation: EPA
Review period: 9/8/2017- 9/29/2022
Date of site inspection: 7/14/2022
Type of review: Statutory
Review number: 2
Triggering action date: 9/7/2017
Due date *(five years after triggering action date)*: 9/7/2022

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

LCP Bridge Street Subsite

In 1995, the State of New York and Honeywell entered into a Stipulation and Order, under the 1992 Onondaga Lake RI/FS Interim Consent Decree, to conduct an RI/FS at the LCP Bridge Street subsite. Field work was completed in 1996. In 1997, Honeywell (as AlliedSignal) completed an RI report for the subsite. The report was subsequently modified by NYSDEC and reissued in 1999. Honeywell completed the FS in May 1999. The need for a remedy was driven by the presence of unacceptable risks to human and ecological receptors attributable to mercury and polychlorinated biphenyls (PCBs).

GBNMC

As part of the RI process, a baseline risk assessment was conducted for GBNMC to estimate the risks to human health and the environment. The baseline risk assessment, consisting of a human health risk assessment (HHRA), which evaluated risks to people, and a BERA, which evaluated risks to the environment, analyzed the potential for adverse effects, both under current conditions, and if no actions are taken to control or reduce exposure to hazardous substances at GBNMC.

The HHRA concluded that contamination at GBNMC presented risks to human health that were above EPA guidelines, particularly as a result of fish consumption. The primary sources of these cancer risks and noncancer health hazards were methylmercury, PCBs, and polychlorinated dibenzodioxins/polychlorinated dibenzofurans (PCDD/PCDFs).

The BERA concluded that comparisons of tissue concentrations and modeled doses of chemicals to toxicity reference values showed exceedances of hazard quotients for site-related chemicals. Many of the contaminants at the site were persistent and, therefore, the risks associated with these contaminants were unlikely to decrease significantly in the absence of remediation. On the basis of these comparisons, it was determined through the BERA that all receptors of concern were at risk. Contaminants and stressors at the Site either impacted or potentially impacted every trophic level examined in the BERA.

Based upon the results of the RI, HHRA and BERA for GBNMC, NYSDEC and EPA determined that active remediation was necessary to protect public health or welfare and the environment from actual and threatened releases of hazardous substances into the environment. In addition, the control of contamination migrating from GBNMC into Onondaga Lake is an integral part of the overall remediation of Onondaga Lake.

Response Actions

LCP Bridge Street Subsite

In 1986, LCP submitted a closure plan for surface impoundments and subsequently obtained NYSDEC approval. The closure entailed the removal of sludge, liners, and impacted soil associated with the impoundments. The surface-impoundment closures were completed in 1989.

In 1990, PCB-contaminated soils were excavated and removed from the Eastern Rectiformer Area by LCP in accordance with the Toxic Substance Control Act (TSCA). In 1995, approximately 21,000 gallons of PCB-impacted oil were drained from transformers and rectifiers in the Western Rectiformer Area. As part of an IRM conducted by Honeywell (as AlliedSignal), approximately 200,000 pounds of PCB-impacted electrical equipment and the 21,000 gallons of PCB-impacted oil were disposed of off-site under TSCA and NYSDEC Part 375 requirements.

In 1999, an IRM involving the drumming and off-site disposal of hazardous laboratory chemicals was conducted by Honeywell. That year, a hazardous wastewater and sludge IRM was also completed. Under this action, Honeywell removed hazardous wastewaters and sludges from the on-site tanks and disposed of the waste off-site.

In 1999, NYSDEC collected groundwater samples from north of the West Flume on an adjacent property in the vicinity of the Peroxide Building. Laboratory analysis characterized the groundwater as having elevated xylene concentrations (xylene was used by Allied Chemical in the hydrogen peroxide process).

In 2000, an IRM was performed to remove portions of the on-site sewers that may have been releasing mercury-impacted water into the West Flume and East Ditch and plugged the downgradient ends of the sewers.

IRMs involving the decontamination and demolition of on-site structures were performed from 2000 to 2001. The measures implemented included the removal and recycling of elemental mercury from cells inside the Former Mercury Cell Building.

Based upon the results of the RI/FS, in 2000, a remedy for the subsite was selected in a Record of Decision (ROD). The following remedial action objectives (RAOs) were identified:

- Eliminate, to the extent practicable, contaminant migration from the LCP Bridge Street subsite to the Onondaga Lake environs and environmental media (groundwater, surface waters, soil, air and sediment);
- Restore, to the extent practicable, groundwater quality to levels which meet state and federal drinking water standards;
- Mitigate, to the extent practicable, the migration and potential migration of contaminated waters through LCP Bridge Street subsite sewers;
- Eliminate, to the extent practicable, the direct-contact threat associated with contaminated soil, surface water and groundwater; and
- Reduce, to the extent practicable, the level of contaminants in surface water and sediments to attain surface water Applicable or Relevant and Appropriate Requirements (ARARs) and sediment remedial goals to be protective of fish, wildlife and the resources upon which they depend.

The key components of the LCP Bridge Street subsite selected remedy include:

- Excavation of approximately 54,300 cubic yards (CY) of sediment exceeding upstream mercury concentrations. Backfilling of the excavated areas with clean fill and revegetating such areas, as appropriate. All excavated material will be dewatered, characterized and placed on-site under a New York State 6 NYCRR Part 360 equivalent low-permeability cap. Restoration of any wetlands impacted by remedial activities. The restored wetlands will require routine inspection for several years to ensure adequate survival of the planted vegetation;
- Cleaning sewer catch basins and manhole structures and filling the LCP Bridge Street subsite sewer systems with grout;
- Excavation of approximately 3,200 CY of brine muds and placement of the brine muds onsite under a New York State 6 NYCRR Part 360 equivalent low-permeability cap;
- Excavation and on-site treatment of approximately 4,500 CY of mercury-contaminated principal threat waste shallow soils at the facility with on-site placement of the treated soils under a New York State 6 NYCRR Part 360 equivalent low-permeability cap;
- Excavation and off-site disposal of soils that contain PCB contamination above NYSDEC Division of Environmental Remediation Technical and Administrative Guidance Memorandum levels. All excavated material will be characterized and transported for treatment/disposal at an off-site Resource Conservation and Recovery Act- and/or Toxic Substances Control Act-compliant facility, as appropriate;
- Installation of a New York State 6 NYCRR Part 360 equivalent low-permeability cap over the facility to contain LCP Bridge Street subsite soils, excavated sediments and brine muds and demolition debris;
- Hydraulic containment of both the shallow and deep aquifers with a subsurface barrier wall and a groundwater collection-and-treatment system to maintain proper hydraulic gradients;
- Implementation of institutional controls (ICs) (i.e., deed restrictions) to prohibit the use of groundwater at the LCP Bridge Street subsite and the disturbance of the subsite cap and slurry wall; and

- Long-term monitoring of groundwater, surface water, sediment and biota to ensure the effectiveness of the selected remedy.

GBNMC

In 2002, Honeywell entered into a consent order with NYSDEC to perform an IRM to address contaminated channel sediments and floodplain soils/sediments associated with lower Geddes Brook. The scope of the IRM included full bank-to-bank removal (estimated to be 4,200 CY) from lower Geddes Brook, beginning at the confluence with the West Flume and ending at the confluence with Ninemile Creek. In addition to sediment removal, impacted floodplain soils/sediments associated with lower Geddes Brook (estimated to be 63,000 CY) were also remediated. In 2009, NYSDEC and EPA selected the LCP Bridge Street subsite containment system as the disposal location for contaminated channel sediment and floodplain soil/sediment that were removed under the IRM (NYSDEC and EPA, 2009a). Pursuant to the IRM, which was performed from 2011 through 2013, approximately 102,400 CY of contaminated sediments and floodplain soils/sediments over approximately 16 acres were removed from the Geddes Brook channel and adjoining floodplains, the Geddes Brook culverts, and the Outfall 019 drainage ditch and associated floodplains (Parsons, 2014a). Following removal, approximately one foot of vegetated cover was placed in areas where soil/sediment had been excavated, resulting in a lower overall elevation with the intent to establish an emergent wetland. Restoration of the Geddes Brook channel downstream of the culverts included its relocation westward to provide increased buffer from the State Fair Landfill and to provide increased channel length and better connectivity with the emergent wetland/floodplain.

RODs were issued for GBNMC (OU20 and OU24 of the Onondaga Lake Site) in 2009.

The RAOs, which were the same for both OUs, are:

- RAO 1: To eliminate or reduce, to the extent practicable, further transport of sediments and soils, containing mercury and other chemical parameters of interest (CPOIs), from the channel and floodplain of lower Geddes Brook and lower Ninemile Creek to Geddes Brook, Ninemile Creek, and, ultimately, Onondaga Lake.
- RAO 2: To eliminate or reduce, to the extent practicable, existing and potential future adverse ecological effects on fish and wildlife resources, as well as potential risks to humans.
- RAO 3: To eliminate or reduce, to the extent practicable, levels of mercury and other CPOIs in surface water to meet surface water quality standards.

To achieve the RAOs, remedial goals (RGs) were developed to provide specific goals to address the four primary affected media within the Site: channel sediments, floodplain soils/sediments, biological tissue, and surface water.

The RODs present the following RGs:

- RG 1: Reduce, contain, or control, to the extent practicable, mercury and other CPOI concentrations in erodible channel sediments and in erodible floodplain soils/sediments within the Site.
- RG 2: Achieve CPOI concentrations, to the extent practicable, in channel sediments and floodplain soils/sediments that are protective of human health and fish and wildlife resources. This RG covers a range of risk levels for mercury and other CPOIs.
- RG 3: Achieve CPOI concentrations, to the extent practicable, in fish tissue that are protective of humans and wildlife that consume fish.
- RG 4: Achieve, to the extent practicable, aqueous CPOI concentrations to meet surface water quality standards.

The remedy outlined in the first GBNMC ROD included: removal, placement of an isolation cap or backfill, and placement of a habitat layer. The remedy outlined in the second GBNMC ROD included: removal of Ninemile Creek channel sediments and floodplain soils/sediments in Reach AB to various depths and placement of backfill and habitat layer. These remedies included the dredging/excavation and removal of an estimated 117,000 CY of contaminated channel sediments and floodplain soils/sediments covering approximately 30 acres. The remedies also included restoration of the streambed and banks, wetlands, and habitats of Ninemile Creek following sediment and soil removal and placement of an isolation cap or backfill, where needed. This included the placement of a habitat layer with appropriate substrate types and thickness, as well as planting of appropriate species of wetlands and uplands vegetation. The major components of the OU20 and OU24 remedies are illustrated on **Figures 5a and 5b***,* respectively.

The intent of the selected remedies was to address all areas of the GBNMC site (with the exception of a portion of the forested wetland in Reach AB, as further discussed below), such that concentrations of mercury and other CPOIs following remediation were expected to be below NYSDEC's sediment criteria (including the lowest effects level [LEL] of 0.15 milligrams per kilogram [mg/kg] for mercury) in the top two feet of channel sediments and 6 NYCRR Part 375 unrestricted use soil cleanup objectives (including the objective of 0.18 mg/kg for mercury) in the top two feet in floodplain areas. The selected remedies were also to attain a 0.8 mg/kg site-specific bioaccumulation-based sediment quality value (BSQV) for mercury in sediments for protection of wildlife consumption of fish and a 0.6 mg/kg site-specific BSQV for mercury in floodplain soils for protection of wildlife consumption of terrestrial invertebrates.[3] The selected remedies were also intended to achieve fish tissue mercury concentrations ranging from 0.1 mg/kg wet weight (ww), which is for protection of ecological receptors, and which is based on the LOAEL target tissue concentrations calculated based on exposure parameters used in the GBNMC BERA for the mink, river otter and belted kingfisher, to 0.3 mg/kg ww, which is based on EPA's methylmercury National Recommended Water Quality criterion for the protection of human health from the consumption of organisms.

[3] The mercury BSQV of 0.8 mg/kg is a LOAEL-based sediment target that is protective of the most sensitive ecological receptors, the mink and river otter, that consume fish. As this target is below the lower end of the calculated human health target range based on fish consumption, it is also protective of human health. The mercury BSQV of 0.6 mg/kg is a LOAEL-based soil target that is protective of the short-tailed shrew, the most sensitive ecologcal receptor that consumes terrestrial invertebrates. Additional information on the development of the BSQVs is presented in the GBNMC RODs.

In addition to the RGs for mercury in fish tissue cited above, ecological target tissue concentrations for mercury based on the no-observed-adverse-effect levels, as well as target tissue concentrations for PCBs and PCDD/PCDFs, corresponding to both the 10^{-4} (1 in 10,000) and 10^{-5} (1 in 100,000) excess cancer risk levels as well as non-cancer effects for human health exposure were developed in the FS report, based on exposure parameters from the GBNMC HHRA and BERA, and were included in the RODs. Although these targets were not cited as remediation goals in the descriptions of the selected remedies, they may be considered points of reference for evaluations of reduction of risk for human and wildlife consumers of fish.

It was indicated in the GBNMC RODs that PCBs and PCDD/PCDFs were not widespread in GBNMC sediments and that the areas where these contaminants were elevated were generally located within the areas addressed under the selected remedies. The reduction in PCB and PCDD/PCDF concentrations in sediment as a result of the implementation of the remedies were expected to result in reduced fish tissue concentrations over time, to the extent that GBNMC sediments contribute to the body burden of these contaminants in fish tissue. The exposures to these compounds would be reduced to the same or greater extent as that of mercury. It was therefore expected that if the remediation goals for mercury in fish tissue are met in the future, the future fish tissue concentrations for PCBs and PCDD/PCDFs would fall within the target tissue concentration ranges for each contaminant and receptor. If this assumption is proven not to be the case in the future, based on ongoing fish tissue monitoring, then an evaluation will take place to determine why this assumption may no longer be valid. Remediation goals and target concentrations for fish are further presented in **Table 1**.[4]

The remedy for GBNMC OU2 included the performance of a focused study during the design phase on the 27.2-acre Class I forested wetland portion of SYW-10 to identify areas that would require remediation and areas that could be excluded from remediation to preserve valuable habitat. A conceptual approach for this area was developed and incorporated into the Remedial Design for Reaches BC and AB.[5] The remedial approach for this area is shown on **Figure 6**. It was expected that remediation of the indicated area, in conjunction with the remediation of the immediately adjacent areas, including the forested uplands and spits, would result in lower mercury concentrations in soil on a site-wide average basis (especially in the biologically-active zone), reduced mercury concentrations in biota from remediated areas, and reduced exposure to higher level receptors such as the red-tailed hawk.

The remedy for Reach BC included the removal of channel sediment to allow for the installation of an isolation cap and habitat layer and the removal of soil overlying structural stone on the adjoining banks and backfill/restoration with approximately one foot of vegetated habitat layer. In

[4] Tables identified numerically can be found in Appendix B. Tables identified with capital letters can be found in the body of the text.

[5] The lower 300 feet of the Ninemile Creek channel, as well as the adjacent SYW-10 wetland spits (see Figure 5b) which were included in the selected remedy in the OU2 ROD, were incorporated in the remedial design for the Onondaga Lake site. Remediation and restoration of the lower 300 feet of the channel and the wetland spits have been completed under the Onondaga Lake remedy and long-term monitoring and maintenance of these areas is being performed under the lake monitoring program and, thus, these areas are included in the Five-Year Reviews for the Onondaga Lake Bottom site.

2013, an Explanation of Significant Differences was issued for a 240-foot long stretch of the Reach BC channel and adjoining banks in the vicinity of railroad and roadway bridges, an overpass abutment for NYS 695, and an Onondaga County sewage force main (see **Figures 4 and 7**). Based on an evaluation of construction implementability and safety conducted as part of the remedial design, it was determined that sediment excavation in this area posed hazards (worker safety and structural stability) because of its proximity to the bridge supports and low clearances under bridges and utility conduits. In addition, supplemental sediment characterization data gathered during the remedial design indicated that the concentrations of contaminants in channel sediments and stream bank soils in this area are relatively low. Because of the noted hazards, in combination with the low levels of contaminants in this area, the remedy for this area was modified to eliminate channel removal and backfilling. Material would only be removed from a portion of the bank and floodplain that is accessible. The excavated areas would be backfilled and revegetated in a manner consistent with other site areas that are being remediated, while taking into consideration existing infrastructure to avoid potential structural impacts and hazards to workers (NYSDEC and EPA, 2013).

The GBNMC selected remedies also include institutional controls (ICs). These are described below.

Status of Implementation

LCP Bridge Street Subsite

Remedial construction, which was performed from 2004 to 2007 and 2011 to 2012 (supplemental excavation work during the later period), included the removal of contaminated sediments from the West Flume, on-site ditches, and wetlands; restoration of the wetlands; installation of a low-permeability cutoff wall around the subsite; and installation of an interim low-permeability cap. Contaminated groundwater inside the cutoff wall is collected and conveyed to an on-site groundwater extraction building that houses two 10,000-gallon storage tanks and a pretreatment system. The pretreatment system includes a filter feed pump, two 5-micron bag filters, two granular activated carbon vessels, and a flow meter. Pre-treated groundwater is conveyed to a sewer main from which it flows to the Syracuse Metropolitan Wastewater Treatment Facility (Metro) for additional treatment. Remediation of the LCP Bridge Street subsite has eliminated discharges of contaminants, mainly mercury, to the West Flume, some of which migrated to Onondaga Lake through GBNMC.[6] Construction of a final cap was completed in 2015. The subsite is undergoing long-term operation, maintenance and monitoring (OM&M).

GBNMC

Under the IRM implemented consistent with the 2002 consent order Honeywell entered into with NYSDEC, approximately 102,400 CY of mercury-contaminated sediments and floodplain soils/sediments were removed from the Geddes Brook channel and adjoining floodplains, the Geddes Brook culverts, and the Outfall 019 drainage ditch and associated floodplains from 2011

[6] Mercury was used in the mercury cell process to manufacture caustic soda (sodium hydroxide) and chlorine gas at the chlor-alkali facility located at LCP Bridge Street.

through 2013. Following the excavations, clean material was placed over the area, and the area was subsequently restored. As the excavations removed nearly 100% of the mercury mass in the floodplain soil and sediment, the IRM was the final action for the Geddes Brook area. A Construction Completion Report documenting the remedial work implemented at Geddes Brook was approved by NYSDEC in 2014.

Excavation/dredging of the mercury-contaminated soil/sediment began in Reach CD of Ninemile Creek in 2012. In accordance with the Reach CD design, a portion of Reach CD was relocated to facilitate remedial construction and to create a buffer between Ninemile Creek and Wastebeds 9 and 10. This phase of the construction was completed in 2012 (Parsons, 2016a). In coordination with construction of an Onondaga Lake Canalways Trail extension, excavations in SYW-10 began in 2012 in the southern corner where the Trail Extension footprint overlapped the SYW-10 removal limits. Excavations in the remainder of SYW-10 were performed in 2013. Remedial work in Reaches BC and AB was performed from 2013 to 2014 (Parsons, 2016b).

In addition to the IRM volume of 102,400 CY for Geddes Brook, 127,250 CY of contaminated soil/sediment were removed from Ninemile Creek Reaches CD, BC, and AB and were transported via dump truck to the LCP Bridge Street Final Cover Area. If excavated material was unsuitable for transport upon removal, a solidification agent (pelletized quicklime) was added to the material prior to its transport. Construction water generated during the effort was treated at a temporary water treatment plant located adjacent to the LCP Bridge Street Final Cover Area. Treated construction water was initially discharged to the West Flume, but beginning in 2012, treated water was conveyed to Metro. The excavated areas were backfilled with clean imported fill. Site restoration features, which included crib walls, woody debris, rock features, live stakes, gabion baskets, downed trees, stone with joint plantings, large flat stone piles, rock lunker structures, small trees and shrubs, were installed consistent with the designs. Construction Completion Reports for the work implemented at Ninemile Creek Reach CD and Reaches BC/AB were approved by NYSDEC in 2016. Operation, maintenance and monitoring activities at the Site commenced following completion of construction.

Restoration at Geddes Brook included the planting of 74 large trees (Parsons and Anchor QEA, 2011).

Institutional Controls

LCP Bridge Street Subsite

The LCP Bridge Street Subsite ROD called for ICs (*i.e.,* deed restrictions) to prohibit the use of groundwater, prohibit the disturbance of the Part 360 cap and slurry wall, and restrict unacceptable future use at the subsite. Because obtaining owner approval was not possible (the property was abandoned in bankruptcy and corporate dissolution in the 1980s), consistent with *NYSDEC Division of Environmental Remediation-33, Institutional Controls: A Guide to Drafting and Recording Institutional Controls*, an Environmental Notice was finalized in lieu of deed restrictions in 2015. **Table A**, below, summarizes the implemented ICs at the LCP Bridge Street Subsite.

Table A: **Summary of Planned and/or Implemented Institutional Controls at the LCP Bridge Street Subsite**

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	Subsite property	Restrict groundwater use on the subsite property.	Environmental Notice May 2015
Engineered Controls	Yes	Yes	Subsite property	Protect engineering controls (*e.g.,* cap and slurry wall) on the subsite property.	Environmental Notice May 2015
Future Land Use	Yes	Yes	Subsite property	Restrict unacceptable future use of the subsite property.	Environmental Notice May 2015

GBNMC

The GBNMC selected remedies include ICs in the form of environmental easements to restrict dredging/excavating in the areas where residual contamination would remain beneath the habitat layer at levels above that which would allow for unlimited use or unrestricted exposure. In accordance with the selected remedies, it will be certified on an annual basis that the ICs are in place and that remedy-related OM&M is being performed. In addition, the New York State Department of Health (NYSDOH) fish consumption advisories for Onondaga Lake and its tributaries, including GBNMC, remain in effect. **Table B**, below, summarizes the planned and implemented ICs at GBNMC.

Table B: Summary of Planned and/or Implemented Institutional Controls at GBNMC

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Soil, sediment	Yes	Yes	Site-wide	Restrict dredging/excavating in the areas where residual contamination remains at the surface or beneath the habitat layer at levels above that which would allow for unlimited use or unrestricted exposure.	It is anticipated that Environmental Easements will be in place by 06/30/23
Fish[7]	Yes	Yes	Lower Geddes Brook, Lower Ninemile Creek	Provide an advisory regarding consumption of fish	NYSDOH fish consumption advisory for Onondaga Lake and its tributaries (Implemented)

Systems Operations/Operation & Maintenance

LCP Bridge Street Subsite

OM&M requirements are identified in the OM&M Plan for the LCP Bridge Street subsite and include the operation of the groundwater collection system and the implementation of monitoring and inspections. OM&M activities are documented and submitted to NYSDEC in monthly reports (Parsons, 2009).

Subsite inspections focus on four major items: 1) general site conditions (*i.e.,* access roads, security fence/gates, signs, erosion control measures); 2) the groundwater collection/storage system (*i.e.,* building structure, extraction wells, piezometers, pumps, instrumentation, storage tanks); 3) Part 360 cap condition (*i.e.,* vegetative cover, vent pipes, drainage system, settlement and subsidence); and 4) static water-level measurements within the groundwater piezometers upgradient and downgradient of the cut-off wall.

The monitoring components of the OM&M Plan for the LCP Bridge Street subsite include:

[7] From 1970 to 1985, fishing on Onondaga Lake was banned due to contamination. A NYSDOH fish consumption advisory for the lake and its tributaries has been in place since 1986, with modifications, as appropriate.

- periodic sampling of groundwater, surface water/sediment, and biota; and
- wetlands assessments.

Three monitoring wells located within the area with deep elemental mercury within the Part 360 cap soil/sediment containment area are sampled quarterly for total mercury and inspected for the presence of elemental mercury. The OM&M Plan specifies that if elemental mercury is detected in a monitoring well, the three monitoring wells should be sampled each month for three months. In addition, groundwater from piezometers located outside the cut-off wall are sampled quarterly and analyzed for total mercury. See **Figure 8** for the locations of monitoring wells and piezometers.

The LCP Bridge Street subsite groundwater extraction and pretreatment system is designed to maintain a horizontal inward and vertical upward hydraulic gradient within the cut-off wall. The design pumping rate is approximately 5 to 25 gallons per minute (gpm). The system includes 15 pumping wells which were originally electric positive displacement pumps. From 2014 to 2017, the annual pumping volumes showed that the pumping rate was less than 3.3 gpm. Fourteen of the 15 pumps were replaced in 2017 with Grundfos submersible pumps to improve overall system efficiencies and improve the ability to perform regular maintenance. Pump replacement for one of the 15 pumps was delayed until early 2019 because the original pump was difficult to remove. Throughout 2019 and 2020, several of the pumps were replaced. In addition, three interior groundwater monitoring wells, MW-34D, MW-35D, and MW-36D, were redeveloped in spring 2019 and silt was removed from each well. Since the pumps were replaced, hydraulic containment has improved and higher pumping rates have been maintained. Pumping rates after the first pump replacements have been almost four times higher than the pumping rates achieved in 2016 and 2017 before the pump replacements. In 2020, the annual pumping volume showed that the pumping rate was approximately 8.8 gpm. Analytical results for groundwater collected from piezometers located outside and downgradient of the slurry wall, as well as the interior groundwater monitoring wells, are discussed in the "Data Review" section below.

There are nine surface water/sediment annual monitoring locations. Surface water is analyzed for total and dissolved mercury and methylmercury. Sediments are analyzed for total mercury and methylmercury. Prey fish in and around the West Flume, Wetland A, and Wetland C have been collected and analyzed for total mercury most recently in 2015, 2017, and 2018. The data generated from these efforts are discussed in the Data Review section below.

Consistent with the requirements of the OM&M Plan, restored Wetlands A and C were monitored twice annually for five years to evaluate the success of the restoration. The parameters monitored included vegetation (type, percent cover, and frequency), hydrology, invasive species (species, location and approximate size of patch), and wildlife usage. The monitoring program for the restored Wetland B was completed in 2012 (EPA, 2020). Monitoring of Wetlands A and C was conducted for five consecutive years (2013 through 2017) following restoration. Because monitoring results demonstrated successful restoration, habitat monitoring was discontinued in 2018 with NYSDEC approval and consistent with recommendations made in the 2017 Annual Report (Parsons, 2020a). The findings from that five-year program are summarized in the Draft LCP/Geddes Brook/Ninemile Creek 2020 Annual and Five-Year Comprehensive Report (Parsons, 2022b).

Baseline sampling was conducted in 2005 to establish body burden at the subsite prior to remediation to ensure that, in addition to overall habitat improvement, potential construction-related body burden increases were subsequently obviated. The OM&M Plan established a long-term monitoring program that analyzes mercury concentrations in prey fish, benthic macroinvertebrates, small mammals, and earthworms. The OM&M Plan specifies that monitoring should continue every two to three years until the results indicate that the remedy has been effective and the contaminant concentrations have stabilized. Based on the results of the monitoring program through 2013, the recommendation was made to discontinue the biota sampling; however, NYSDEC requested that prey fish be collected following the 2015 completion of construction of the final site cover.

Biota collection (small mammals, earthworms, and macroinvertebrates) from Wetlands A and B and the West Flume was discontinued after 2012 due to stabilized concentrations (Wetland C was not restored until 2012).

There has been general improvement in the effectiveness of the LCP Bridge Street subsite hydraulic control system within the soil/sediment containment area over time, particularly since completion of the landfill cover in 2015 and replacement of the groundwater extraction pumps in 2017-2020. In addition, monitoring wells MW-34D, MW-35D, and MW-36D were redeveloped in 2019 and silt was removed from each. As a result of these actions, hydraulic containment trends have improved and higher pumping rates have been maintained.

GBNMC

OM&M activities were performed at GBNMC consistent with the selected remedies, the 2011 OM&M Plan for Geddes Brook, the 2016 draft OM&M Plan for Ninemile Creek, the 2018 final Monitoring and Maintenance Plan for Ninemile Creek and annual monitoring scoping memoranda. Maintenance and restoration activities in wetland areas included invasive vegetation control, planting/seeding in areas of sparse vegetation, and tree replacement. Vegetation monitoring at the Site included quantitative vegetation sampling at 51 plot locations. Thirty plot locations are in the Geddes Brook area, including five in Outfall 019, and 21 plot locations are in the Ninemile Creek area, including three in SYW-10 (Parsons, 2022b) (see **Figures 9a, 9b, 9c, and 9d**). At each station, 100- and 400-square foot sample plots were established to evaluate herbaceous and woody vegetation, respectively. Overall plant cover at the site was calculated using data from the sample plots. Annual goals for percent cover of seeded areas and survival of trees/shrubs and invasive species are provided in the OM&M plans. Monitoring of restored wetlands was required to be conducted for five years after restoration (up to 2017 in Geddes Brook and Reach CD, up to 2018 in SYW-10, and up to 2019 in Reaches BC/AB). At the end of five years, the data are evaluated for comparison against restoration goals and to determine if additional monitoring and maintenance is necessary for specific habitats or species, taking into consideration any major replanting or reseeding that was performed. In addition, due to the time needed for woody material (trees and shrubs) to develop, monitoring in these areas may extend longer than the five-year monitoring period. The monitoring results of the restored wetlands for Geddes Brook, Reach CD, Reaches BC/AB, and SYW-10 are depicted on **Figures 10a, 10b, 10c and 10d**), respectively, and are further discussed below.

Data collected from plots in Geddes Brook in 2017, the fifth year of the five-year monitoring program, showed that vegetation coverage across the site was at 93 percent, exceeding the restoration goal of 85 percent or greater. Invasive species cover was less than 1 percent, which met the restoration goal of less than 5 percent. (Parsons, 2022b; Parsons, 2011).

The results from data collected from plots in Reach CD in 2017, which was in the fifth year of restoration monitoring for that reach of Ninemile Creek, indicated that vegetative cover was 100 percent in riparian areas and 96 percent in wetland areas. Cover in both areas exceed the restoration goals of 90 percent and 85 percent, respectively. Invasive species cover at the site is less than one percent, which is less than the 10 percent maximum threshold (Parsons, 2022b; Parsons, 2020a, Parsons, 2018). Periodic site inspections were conducted in 2018 and 2020 to verify there were no erosion concerns in Reach CD.

During the fifth year of restoration monitoring for SYW-10 in 2018, the average percent cover was 100 percent (the entire sampling area is wetland). Cover in all riparian areas exceeded the fifth-year restoration goal of 85 percent. Invasive species cover in SYW-10 in 2018 was four percent, which met the fifth year goal of less than 10 percent (Parsons 2022b; Parsons, 2022a; Parsons, 2018).

At Reaches AB and BC in 2019, which was the fifth year of restoration monitoring, the measured vegetative cover was 93 percent in wetland areas and 99 percent in upland areas, both of which exceeds the restoration goal of 85 percent. Invasive species cover measured at the site was zero percent in wetland areas and were at one percent in upland areas, both of which are less than the 10 percent threshold (Parsons, 2022b, Parsons, 2022c).

Initial restoration at Geddes Brook included the planting 74 large trees (Parsons and Anchor QEA, 2011). During the 2013 to 2017 five-year monitoring period, annual large tree condition surveys were used to identify any trees needing to be replaced to meet the fifth-year goal of having all 74 planted large trees present and alive. Trees that were replaced were either replaced with a single comparably sized tree of the same species, a different species that had performed well at Geddes Brook, or by multiple smaller trees (i.e., 2:1 or greater ratio). Because of the greater than 1:1 replacement ratio in some cases, after the fifth year of monitoring, 98 large trees or their smaller replacements (approximately 130 percent of the original number planted) were present and alive. Periodic site visits were made in 2018 and 2019 during the growing season to monitor the condition of nine replacement trees installed at Geddes Brook in 2017 and to verify that there were no erosion concerns per the GBNMC Site Management Plan. The final visit in fall 2019 confirmed that all nine trees had survived (see **Figure 11** for the tree locations). During the site visits to monitor the replacement trees, no erosion concerns were noted. (Parsons, 2022c; Parsons, 2022b).

During the design process, it was recognized that the extent of remedial action needed across Ninemile Creek Reaches AB, BC, CD, Geddes Brook/Outfall-019 and SYW-10 would affect the ability to restore acreage at each individual subsite to the exact amount present prior to the remedy. Therefore, the wetland restoration goal was defined as achieving a total wetland acreage across all the sites combined, that was at least equal to the overall acreage of wetlands present within the remedial boundaries prior to remediation. To achieve this, some subsites were designed and constructed with the goal of establishing more wetland acreage overall than existed prior to the

remedy to mitigate for areas that would have less. In addition, more wetland acreage was designed overall than existed prior to the remedy to provide a buffer in the event that some restored wetland/riparian areas were drier than expected and were delineated as upland. Based on comparisons between pre-remedy and fifth-year delineations, wetland acreages goals have been met. Fifth-year wetland delineations were conducted in 2017 for Geddes Brook/Outfall-019 and Ninemile Creek Reach CD; in 2018 for SYW-10; and in 2019 for Reaches AB and BC. Total wetland acreages delineated during these events across all sites equaled 20.35 acres, slightly exceeding the goal of restoring at least as much wetland acreage as was present prior to remedy implementation (20.06 acres). (See **Table 2**.) (Parsons, 2022c)

In accordance with the 2018 Ninemile Creek Operation, Monitoring and Maintenance (OM&M) Plan, Ninemile Creek channel surface elevation and composition data is to be collected along multiple transects across the creek to verify that the channel had remained stable following the completion of the remedy. The goal stated in the M&M Plan was that no individual survey point along these transects should exhibit a bed loss of 12 inches or greater and no more than 25 percent of the surveyed points on a given transect should exhibit a bed loss of between six and 12 inches. If the survey results were generally consistent with as-built conditions, future transect surveys would not be required as part of routine monitoring. Additionally, under the M&M Plan, all 10 stations would be surveyed should a 50-year or greater flow event (>3,000 cubic feet per second [cfs]) occur. Should a 100-year or greater flow event (>3,400 cfs) occur first, no additional surveys would be necessary if the post 100-year survey results were within tolerance.

Monitoring of the bed elevation was performed annually between 2014 and 2018. The monitoring included collecting elevation and composition data of the channel surface material along multiple transects across the creek. As called for in the Ninemile Creek M&M plan, these surveys were completed at five stations in 2014 and 2015, eight stations in 2017, and all 10 stations in 2016 and 2018. Transect stations are depicted on **Figure 12**. As discussed in the Draft 2018 Annual Report (Parsons, 2021), results from these surveys show that the goals stated in the M&M plan were met in all areas and in all years. None of the 464 individual survey points exhibited a bed loss of greater than 12 inches in any of the surveys, and no more than 25 percent of the survey points on any transect exhibited a bed loss of greater than six inches. The survey results show that the channel is consistent with as-built conditions.

Following the successful completion of the monitoring required under the OM&M Plan and as discussed in the Draft 2018 Annual Report (Parsons 2021), routine channel elevation monitoring was discontinued in 2018. As stated in the OM&M Plan, following the next 50-year or greater flow event (greater than 3,000 cfs) in Ninemile Creek, all 10 previously monitored stations will be re-surveyed to verify no significant bed-loss has occurred. Should a 100-year or greater flow event (greater than 3,400 cfs) occur first, no additional surveys will be necessary if the post 100-year survey results are within tolerance stated in the OM&M Plan.

As discussed in the Draft 2019 Annual Report (Parsons 2022a), the Onondaga Creek U.S. Geological Survey Spencer Street Gauge was used as a surrogate for Ninemile Creek in 2020. During 2020, since no flows were observed greater than the 50-year flow event of 3,000 cfs, no channel monitoring was necessary. Flows will continue to be monitored and reported in annual

reports. If flows are observed greater than these thresholds, monitoring of the Ninemile Creek channel will be implemented in coordination with NYSDEC (Parsons, 2022b).

Potential site impacts from climate change have been assessed, and the performance of the remedies is currently not believed to be at risk due to the expected effects of climate change in the region and near the LCP Bridge Street subsite or GBNMC. As indicated above, additional channel elevation monitoring will be conducted in Ninemile Creek following the next 50-year and/or 100-year or greater flow event consistent with the OM&M Plan. If site impacts are observed as a result of such flow events, these will be documented and, corrective measures will be implemented, as appropriate. In addition, the monitoring program for Ninemile Creek includes an adaptive management approach to identify potential concerns that can be corrected with maintenance activities, as feasible, on a case-by-case basis. Adaptive management will include evaluation of monitoring data to identify deviation from design conditions. Based on those data, installing alternative plant species (or focusing on those performing well at the site), site modifications (e.g., addition of more structure), or additional data collection may be implemented (Parsons, 2018). Site-wide inspections will also be performed at GBNMC after all severe weather conditions that may affect engineering controls. Moreover, periodic assessments, which consider the potential vulnerabilities of the GBNMC remedial systems and/or engineering controls to severe storms/weather events and associated flooding, will be conducted as needed. These assessments will include discussion of potential vulnerabilities resulting from wind damage or erosion which may occur during periods of severe rain events. The cap at the LCP Bridge Street subsite has not been found to have been impacted by any severe weather events since the cap was constructed. As the cap at the LCP Bridge Street subsite is inspected on a routine basis, any impacts to it that may occur as a result of severe weather events would be known and addressed in a timely manner.

Results pertaining to contaminant concentrations in LCP Bridge Street Subsite and GBNMC media are discussed in the Data Review section below.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYRs as well as the recommendations and other findings from the previous FYRs and the current status of those recommendations and other findings.

LCP Bridge Street Subsite

Tables C, D, and E, below, summarize the protectiveness determinations and statements, and the status of recommendations and other findings, respectively, from the 2020 FYR.

Table C: Protectiveness Determinations and Statements from the 2020 LCP Bridge Street Subsite Five-Year Review

OU #	Protectiveness Determination	Protectiveness Statement
5	Short-term Protective	The remedy for OU5 is protective of human health and the environment in the short-term since exposure routes have been eliminated and biota data suggests that tissue concentrations are below baseline levels. To be protective in the long-term, the inward gradient in the deep zone needs to be evaluated for additional optimization measures and sediment and surface water data from Wetland A needs to be further assessed to evaluate what actions, if any, may be necessary to address the elevated contaminant concentrations there.

Table D: Status of Recommendations from the 2020 LCP Bridge Street Subsite Five-Year Review

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
5	The deep zone requires further evaluation with respect to sustained inward gradients.	The piezometer data from the deep zone and the need for potential additional optimization measures to achieve inward gradients should be evaluated.	Ongoing	The evaluation of the piezometer data is currently ongoing.	Click here to enter a date
5	Mercury levels in Wetland A sediment and surface water are above the cleanup goals.	Sediment and surface water data should continue to be collected from Wetland A and compared to the cleanup goals established by the ROD and historical benchmarks to evaluate what actions, if any, may be necessary to address the elevated contaminant concentrations identified in sediment there.	Ongoing	Additional surface water and sediment sampling in Wetland A was conducted in 2020 and supplemental sampling of soil/sediment in Wetland A was conducted in 2021. Additional removal of soil/sediment in areas with elevated levels of mercury is anticipated in 2023. Future monitoring of media at Wetland A will be performed following the planned removal activities.	Click here to enter a date

Table E: Status of Other Findings from the 2020 LCP Bridge Street Subsite Five-Year Review

OU #	Other Findings	Current Status
5	Consideration should be given to sampling piezometer clusters PZ-6B and PZ-7B as part of the groundwater sampling program.	This finding remains under discussion.
	Continued sample collection from the West Flume is recommended to ensure that the decreasing contamination trends observed there are sustained.	This finding is being incorporated into upcoming sampling efforts.
	As groundwater quality outside the eastern side of the soil/sediment containment area lacks definition, the three PZ-5B piezometers should be added to the quarterly groundwater monitoring schedule.	This finding remains under discussion.
	Based on an evaluation of the data to be collected from Wetland A, consideration should be given to the resumption of biota sampling there.	This finding will be discussed further after the additional removal of soil/sediment in Wetland A is complete.

GBNMC

Tables F, G, and H, below, summarize the protectiveness determinations and statements, and the status of recommendations and other findings, respectively, from the 2017 FYR.

Table F: Protectiveness Determinations and Statements from the 2017 GBNMC Five-Year Review

OU #s	Protectiveness Determination	Protectiveness Statement
20, 24	Short-term Protective	The implemented actions at the Site are protective of human health and the environment in the short-term because sediment and floodplain soils have been excavated and remediated areas have been restored to reduce potential exposure to Site contaminants. In addition, post-remediation monitoring indicates that the cover system remains in place and that contaminant levels in surface soil and sediment in remediated areas have decreased relative to pre-remediation conditions. For the implemented actions to be protective in the long-term, ICs need to be implemented.

Table G: Status of Recommendations from the 2017 GBNMC Five-Year Review

OU #s	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
20, 24	The selected remedies include ICs in the form of environmental easements to restrict dredging/excavating in the areas where residual contamination would remain beneath the habitat layer at levels above that which would allow for unlimited use or unrestricted exposure.	The required institutional controls need to be implemented.	Ongoing	The ICs include several environmental easements within the GBNMC project area. The development of easements require extensive coordination and negotiations among various entities, including property owners and their legal representatives, approval by NYSDEC and filing with the County Clerk's office. The required easements have not yet been finalized.	Click here to enter a date

Table H: Status of Other Findings from the 2017 GBNMC Five-Year Review

OU #s	Other Findings	Current Status
20, 24	The available post-construction data for soil/sediment and biota other than fish are limited and additional monitoring of these media is not currently scheduled in the Ninemile Creek and SYW-10 areas, or in the Geddes Brook area beyond 2017. It is recommended that monitoring of surface water, soil/sediment, and biota should continue pursuant to the GBNMC OM&M Plans until it is determined by NYSDEC and EPA that the RGs have been achieved and to fully evaluate remedy effectiveness.	The First GB/NMC FYR (2017) included data collected through 2016. As noted in Table 3 herein, this Second FYR also includes data for all media in GB in 2017 and surface water of GB in 2019. Fish were also sampled in 2017 and 2019 in both GB and NMC, although, as noted above, the 2019 fish data were determined not to be usable. Soil/sediment were sampled in NMC and SYW-10 in 2018, and earthworms and mammals were sampled in SYW-10 in 2018. As required by the GB Operations, Maintenance and Monitoring Plan (OMMP) (Parsons, 2011), sampling and analysis of biota other than fish (benthic macroinvertebrates in sediments, earthworms in soil, small mammals) was completed in years 1, 2, 4, and 5 (2013, 2014, 2016, 2017) following remedial construction of the GB IRM (completed in 2012). As required by the NMC OMMP (Parsons, 2018), sampling and analysis of biota other than fish, including benthic macroinvertebrates in all three reaches of NMC, and

		earthworms and small mammals in the NMC Reach CD floodplain, were completed in 2016 as a post-remedy baseline sampling event, as well as earthworms and small mammals in SYW-10 remediated and unremediated areas in 2015, 2016, and 2018. The need for additional biota sampling other than fish will be evaluated. Fish (in both GB and NMC) and surface water (in GB) monitoring will be performed in 2022, if necessary. Monitoring after 2022 will continue, as needed, until it is determined by NYSDEC and EPA that the GB/NMC goals/targets have been achieved and to fully evaluate continued remedy effectiveness.
	The extent of any public outreach that may have been performed in regard to increasing awareness of the NYSDOH fish consumption advisory for Onondaga Lake and its tributaries specific to the Site is not clear. It is recommended that New York State provide EPA with information on any Site-related outreach activities that have been performed to date relating to the Onondaga Lake fish consumption advisory and any future planned activities to enhance outreach and increase public awareness of the advisory.	NYSDOH has been performing outreach activities to increase awareness of the fish consumption advisory for Onondaga Lake. In addition, ATSDR established the Biomonitoring of Great Lakes Populations (BGLP) program and funded the New York State Department of Health (NYSDOH) for the BGLP-II Program between 2013 and 2018. The BGLP-II Program's general objective was to develop information about the levels of specific contaminants found within certain adult populations in central NY State who ate fish caught in the Great Lakes Basin's Onondaga Lake and nearby water bodies. Recruitment began in 2015 and focused on Burmese and Bhutanese refugees, and low income, local anglers from the City of Syracuse. Participants included 311 refugee adults from Burma and Bhutan and 89 local anglers residing in Syracuse area who eat fish from Onondaga Lake and nearby waters. NYSDOH has reviewed this data and believes that the fish consumption advisories for Onondaga Lake, including Geddes Brook and Ninemile Creek, are appropriate for those consuming fish from Onondaga Lake and its tributaries. NYSDOH will continue to conduct additional outreach and educational activities to increase awareness of Onondaga Lake, and its tributaries, fish consumption advisories and safe practices for cleaning and cooking fish to reduce toxins.
	It was noted during the site inspection that stormwater runoff from the NYS 695 overpass was cascading directly onto Geddes Brook. It may be appropriate to contact the New York State Department of Transportation to determine if stormwater flow can be redirected or otherwise modified so as to minimize its potential impact on the brook.	NYSDOT was notified of the issue following the site inspection. As it was determined that no erosion of Geddes Brook is occurring as a result of stormwater runoff from the overpass, no further action is warranted.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On August 6, 2021, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, Puerto Rico and the U.S. Virgin Islands, including the GBNMC Subsite. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews. EPA is conducting the reviews of the LCP Bridge Street and GBNMC Subsites concurrently and will be issuing a single five-year review report because the Subsites are located in close proximity to each other and because portions of Geddes Brook and Ninemile Creek are downstream of, and were impacted by historical releases from, the LCP Bridge Street facility.

In addition to this notification, the EPA Community Involvement Coordinator (CIC) for the site, Larisa Romanowski, posted a public notice on the EPA site webpage (www.epa.gov/superfund/onondaga-lake) and provided the notice to the town of Geddes and village of Solvay on April 5, 2022, with a request that the notice be posted in municipal offices and on their respective webpages. In addition, on April 11, 2022, the notice was distributed via the NYSDEC's Onondaga Lake News email listserv, which includes approximately 10,000 subscribers. This notice indicated that a FYR would be conducted at the LCP Bridge Street and GBNMC Subsites to ensure that the cleanups at the sites continue to be protective of human health and the environment. Once the FYR is completed, the results will be made available at the following repository: NYSDEC Albany and Syracuse offices; the Onondaga County Public Library, Syracuse Branch at the Galleries, 447 South Salina Street, Syracuse New York; the Solvay Public Library, 615 Woods Road, Solvay, New York; the Atlantic States Legal Foundation, 658 West Onondaga Street, Syracuse, New York and the EPA Region 2 Superfund Records Center, 290 Broadway, 18th Floor, New York, New York. In addition, the final report will be posted on the following webpage: www.epa.gov/superfund/onondaga-lake. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

Monitoring activities conducted at the LCP Bridge Street subsite from 2014 through 2020 consisted of monitoring of groundwater, sediment, surface water, wetlands, and biota. Groundwater monitoring consisted of monitoring groundwater elevations and contamination levels in accordance with the LCP Bridge Street OM&M Plan to determine if a horizontal inward and vertical upward hydraulic gradients are being maintained within the cut-off wall of the groundwater extraction system and pre-treatment system. A discussion of the monitoring results relating to the effectiveness of the hydraulic containment system is included below. Analytical results for collected groundwater, as well as for sediment, surface water, wetlands, and biota at LCP Bridge Street subsite, are also provided in this section.

Monitoring of GBNMC surface water, channel sediment, floodplain soil/sediment, and fish tissue was conducted in order to provide sufficient data to assess progress toward achieving the RGs and the RAOs established in the RODs. In addition, monitoring of GBNMC biota other than fish, including benthic macroinvertebrates, earthworms, and small mammals, has been conducted to

help evaluate remedy effectiveness. Following the completion of construction, monitoring commenced in 2013 and 2015 in Geddes Brook and Ninemile Creek (including SYW-10), respectively, consistent with the Geddes Brook OM&M Plan, the draft Ninemile Creek OM&M Plan, and direction from NYSDEC.

A discussion of the post-construction monitoring results that includes data collected between 2013 and 2020 is provided below. A summary of the conducted sampling events is also presented in **Table 3.** The 2017 GBNMC FYR and 2020 LCP Bridge Street FYR reports presented environmental data for evaluation periods from 2013-2016 and 2013-2018, respectively. This FYR report presents available environmental data since those reports were issued, but the discussion and presentation of the data includes much of the prior results from the 2017 and 2020 reports to support the evaluation of the data and provide additional context. It should also be noted that while fish samples were collected from both Geddes Brook and Ninemile Creek in 2019, it was determined by NYSDEC and Honeywell that the laboratory had not adhered to project standard operating procedures for the processing and homogenization of the samples (see Attachment A of the revised 2019 report [Parsons, 2022]) and, thus, the 2019 fish tissue data are not presented or discussed herein. At least one additional round of fish sampling in GBNMC will be conducted in 2022.

The presentation of the data in the text below generally focuses on the mean and range (i.e., minimum, maximum) of the numerical values. Non-detect values are represented as ½ of the detection limit. For locations where duplicate samples were collected, the mean of the original and duplicate sample results at the location were used in the calculations. With respect to fish tissue results, the 95% upper confidence limit (UCL) of the mean[8] is also presented where it can be calculated. In addition, statistical metrics that may be used to demonstrate whether the concentrations of adult sport fish and prey fish are statistically below the stated goals are currently under development and will be considered, as may be appropriate, in subsequent GBNMC-LCP Bridge Street subsite FYRs.

LCP Bridge Street Subsite

LCP Bridge Street Surface Water/Sediment

During the period from 2014 through 2018, surface water and sediment samples were collected annually from two locations in Wetland A, three locations in Wetland C, and four locations in the West Flume. Surface water and sediment samples were also collected at an additional location, LCP1-SED-110, within Wetland A in 2019 and 2020 (Parsons, 2022b) (see **Figure 13** for the sampling locations).

All surface water samples were analyzed for dissolved mercury, total mercury, and methylmercury. Analytical results for all surface water analyses pertaining to the West Flume, Wetland A and Wetland C for the baseline and 2014-2018 periods are included in **Table 4**. Analytical results for the 2019 and 2020 surface water analyses conducted for Wetland A are also included in **Table 4.** Surface water dissolved mercury concentrations by location are depicted on **Figure 14**. The NY State surface water standard is 2.6 nanograms per liter (ng/L) for dissolved

[8] The 95% UCL is an estimate of the upper bound for the true population mean.

mercury, based on wildlife protection. The human health standard based on fish consumption (0.7 ng/L) does not apply to the LCP Bridge Street subsite because, unlike Geddes Brook and Ninemile Creek, the West Flume and open water wetland areas do not support this route of exposure. Fish at the LCP Bridge Street subsite are not large enough for human consumption (NYSDEC 1999) and the LCP Bridge Street subsite is not accessible to the public, nor is it expected to be accessible in the future. In addition, because Wetland A only intermittently contains standing water, it is not capable of sustaining a sport fish population (Parsons, 2022c; Parsons 2022b). Average dissolved mercury concentrations by area for the West Flume, Wetland A and Wetland C surface water since 2009 are depicted on **Figure 15**. Dissolved mercury concentrations for individual sample locations within the West Flume, Wetland A and Wetland C surface water are depicted over time in **Figures 16a, 16b, and 16c,** respectively**.**

In the West Flume, no dissolved mercury surface water samples exceeded the 2.6 ng/L standard from 2015 to 2018. The average dissolved mercury concentration from the West Flume in 2018 was 1.12 ng/L. Wetland C had elevated dissolved mercury concentrations of 3.55 ng/L at location LCP-SW-71 and 3.64 ng/L at location LCP-SW-70 in 2016, but all samples were below the standard in 2017 and 2018.

All samples in Wetland A were above the 2.6 ng/L standard every year since 2015. In 2019 and 2020, dissolved mercury averaged 4.17 ng/L (range of 3.33 to 5.59 ng/L) and 3.79 ng/L (range of 2.14 to 5.18 ng/L), respectively, in Wetland A.

Recent surface water concentrations of both total and methylmercury are two to three orders-of-magnitude lower than baseline results. There are no criteria for total mercury or methylmercury in surface water (Parsons, 2022b).

Annual sediment results for total mercury in Wetland C and West Flume sediments from 2014 through 2018 were generally consistent with concentrations observed during the previous monitoring period (2008 through 2013) **(**see **Figures 17, 18a and 18b)** and **Table 5),** including sample results collected in 2008 shortly after construction completion. These results are lower than the pre-remediation mercury concentrations reported in the RI. All Wetland C and West Flume sediment sample results for mercury since 2015 have been below the Ninemile Creek BSQV of 0.8 mg/kg for mercury in sediments for protection of wildlife consumption of fish and the Severe Effect Level (SEL) of 1.3 mg/kg. Average levels of mercury in West Flume sediment were above the ROD cleanup goal of 0.2 mg/kg for mercury from 2014 to 2017, but below it in 2018. Average levels of mercury in Wetland C sediment were below the 0.2 mg/kg cleanup goal from 2014 to 2018 (Parsons, 2022b).

Average total mercury results in Wetland A sediment from 2014 through 2020 ranged from 0.5 mg/kg to 2.8 mg/kg, with the highest result (5.3 mg/kg) occurring in 2017 at sediment location LCP-SW-68 (**Table 5** and **Figures 17, 18c and 19).** Due to elevated results at sediment location LCP-SW-68, supplemental sampling was conducted at additional locations in Wetland A and the West Ditch in 2018. Supplemental sediment sampling locations are shown on **Figure 20** and sample results are presented in **Table 6.** Mercury concentrations in 17 of the 26 samples collected from Wetland A in 2018 exceeded the ROD cleanup goal of 0.2 mg/kg. Six of these results (ranging from 1.29 to 5.92 mg/kg) also exceeded the NYSDEC Class C value for mercury in

sediment (1 mg/kg). Class C values are considered likely to pose risk to aquatic life (EPA, 2020). Following a review of these results, a second supplemental sampling event in Wetland A was conducted in 2020.

In 2020, sampling of both sediment and soil locations was conducted in Wetland A. Samples were collected from 28 stations at three depth intervals (0-6 inches, 6-12 inches, and 12-18 inches) for a total of 84 samples (see **Figure 21**). Each sediment and soil sample was analyzed for total mercury; the results can be found in **Table 7a**. The range of total mercury concentrations was 0.052 mg/kg at sediment location LCP1-SED-126 to 14 mg/kg at sediment location LCP1-SED-133. The results confirmed that there are elevated mercury concentrations in Wetland A sediments. Based on these elevated results and on discussions with NYSDEC it was recommended that additional soil samples would be collected in an adjacent upland area in 2021 (Parsons, 2022b).

In 2021, soil sampling was conducted in the adjacent upland area to Wetland A. Samples were collected from eight stations at three depth intervals (0-6 inches, 6-12 inches, and 12-24 inches) for a total of 24 samples (see **Figure 22**). Each soil sample was analyzed for total mercury; the results can be found in **Table 7b**. All the 2021 samples exceeded 0.2 mg/kg and the maximum concentration of 65 mg/kg was found at the surface soil sample locations at both LCP1-SB-05 and LCP1-SB-09. These findings further indicate the presence of contamination within the upland area directly southeast of Wetland A. Based on the results from the three supplemental events, additional remediation in and adjacent to Wetland A is anticipated.

LCP Bridge Street Biota

The 2005 average and 95% UCL baseline for the LCP Bridge Street subsite prey fish are 0.14 mg/kg and 0.18 mg/kg, respectively. Three sampling events (2015, 2017, and 2018) were conducted to collect and analyze prey fish from three reaches (A, B, and C) within the West Flume. Five samples from each location were analyzed for total mercury. The average and 95% UCL prey fish tissue values for mercury for the 2015-2018 sampling period ranged between 0.04 - 0.11 mg/kg and 0.05 – 0.12 mg/kg, respectively, within the three reaches during each sampling event. See **Table 8** and **Figure 23** for mean and 95% values. Scatter plots for the mercury concentrations in LCP OU1 prey fish are depicted on **Figure 24a**. The types of fish species and sample locations with results for individual fish are shown on **Figure 24b**. These results show that concentrations have continued to decline since the previous monitoring period (2008 to 2013) in all three reaches to levels below the average and 95% baseline concentrations of 0.14 mg/kg and 0.18 mg/kg, respectively (EPA, 2020; Parsons, 2022b). RGs were not identified in the LCP Bridge Street Subsite ROD for contaminants in prey fish. Although not specific to LCP, the most recent mercury results in 2018 also show that the mean (0.07 mg/kg ww) and 95% UCL (0.08 mg/kg ww) concentrations are below the Geddes Brook and Ninemile Creek RG in small prey fish for protection of ecological receptors of 0.1 mg/kg. In 2018, only one of the 15 samples in the West Flume exceeded 0.1 mg/kg. However, due to elevated mercury concentration for both surface water and sediment in Wetland A, an additional prey fish sampling event was conducted in 2021 at the same three reaches (A, B, and C) within the West Flume (Parsons, 2022b). Analytical data from these samples have been received but were not available for review during the development of this report.

LCP Bridge Street Groundwater

Groundwater samples are collected from four piezometer clusters (PZ-1B, PZ-2B, PZ-3B and PZ-4B, each with the depth designators -S, -I and -D for shallow, intermediate and deep, respectively) located on the outside of the cut-off wall and from three monitoring wells located within the soil/sediment containment area. Samples are collected quarterly and analyzed for total mercury. Due to ongoing construction activities, no samples were collected from the piezometers in the second and third quarters of 2015, nor from the three monitoring wells in 2014 and 2015.

Mercury was reported as not detected (ND) for most piezometers for a majority of the sampling quarters from 2014 to 2020 **(Table 9).** Of the detections reported, most tended to be lower than 0.1 µg/L, below the NYSDEC Groundwater Standard of 0.7 µg/L. However, mercury concentrations in shallow piezometer PZ-2B-S on the downgradient side of the soil/sediment containment area were consistently elevated, ranging from 1.4 to 2.5 µg/L during the reporting period. These results display an increase during this FYR period, but are within the range of concentrations measured since 2008 at this shallow well location. The intermediate downgradient piezometer PZ-3B-I showed more frequent detections (all 0.25 µg/L or below) in this period that may also be increasing, but were well below the 0.7 µg/L standard (See **Table 9**).

Three monitoring wells (MW-34D, MW-35D and MW-36D) located within the soil/sediment containment area and downgradient of the area with deep elemental mercury were analyzed for total mercury. Concentrations in groundwater samples collected quarterly from these wells ranged from 0.2 to 0.92 µg/L in monitoring well MW 34D, 1.9 to 4.9 ug/L in monitoring well MW 35D, and non-detect to 3.9 µg/L in monitoring well MW-36D. Although no decreasing trends were noted, mercury concentrations are lower compared to those reported in 2011 before the above-noted construction (a maximum of 17.6 µg/L at MW-35D was reported). Monitoring well analytical results data from 2014 through 2020 can be found in **Table 10**. The monitoring wells were also inspected for the presence of elemental mercury via visual means and, in 2019/2020, using a conductance probe. Elemental mercury was not present during any of the sampling events.

The primary mechanism for hydraulic containment at the Site is the perimeter low-permeability barrier wall which is tied into the underlying low-permeability layer of glacial till. The barrier wall, as specified in the design, is a minimum of three feet thick, has a permeability of less than 10^{-7} centimeters per second (cm/sec), which is the same permeability requirement as a landfill clay liner. To achieve total containment in the long term, groundwater is extracted from within the containment area with a goal of reaching inward and upward hydraulic gradients.

Hydraulic containment is monitored biweekly via the collection of static water level elevations in a series of piezometer pairs located within and outside the soil/sediment containment area, as shown in Figure 8, to confirm that there is an inward and upward groundwater flow around the containment area. The piezometer network includes:

- Seven pairs of shallow piezometers within the shallow aquifer
- Seven pairs of intermediate piezometers within the deep aquifer
- Seven pairs of deep piezometers within the underlying low-permeability till layer

Evidence of inward gradients is based upon interior shallow, intermediate, and deep piezometer readings that are less than the corresponding exterior shallow, intermediate and deep piezometer readings. Upward gradients are demonstrated by the deep piezometer readings being higher than the intermediate levels at piezometer locations inside the area. Detailed plots of gradients between paired piezometers for 2015 through October 2021 are provided in **Figures 25a through 25h**.

In the shallow piezometers, piezometer pair PZ-2 fluctuated between inward and outward from January 2018 to late 2019, but an inward gradient has been maintained since late 2019. Water levels in piezometer pair PZ-3 have shown an inward gradient since 2017 and water levels in piezometer pair PZ-4 achieved an inward gradient since December 2018 except for a period in mid-2020. Gradients at piezometer pairs PZ-5 and PZ-7 were inward throughout the reporting period and have shown improvement since 2016. Gradients at piezometer pair PZ-6 have been inward since September 2014. The gradient at piezometer pair PZ-1 has improved, but this piezometer pair has never achieved an inward gradient.

The gradients at intermediate piezometer pairs PZ-2 and PZ-3 have been improving since late 2017, and although they are fluctuating, they have been inward since 2018. The gradient at piezometer PZ-1 has been inward during most events since 2018, though it had an outward gradient in early 2020. The gradient at piezometer PZ-4 has been inward since late 2017. The gradients at intermediate piezometer pairs PZ-5, PZ-6, and PZ-7 were consistently inward during this period.

Most of the deep piezometer pairs had an improvement in the inward gradient in this period, but the water levels at piezometer PZ-4 showed a flat or slightly outward gradient and the water levels at piezometer PZ-5 show an outward gradient, with approximately 4 feet of head difference.

At the piezometer pairs measuring vertical gradients, PZ-4, PZ-5, PZ-6, and PZ-7 have shown an upward gradient in this period and piezometer pairs at PZ-2 and PZ-3 have shown an upward vertical gradient starting in 2018. The gradient at the intermediate and deep piezometer pair at PZ-1 has been close to flat since the piezometers were installed.

Although the shallow, intermediate, deep, and upward gradients improved in this period, the shallow piezometer pair at PZ-1 and the deep piezometer pair at PZ-5have not displayed consistent containment and will require further evaluation.

In response to a request from NYSDEC that groundwater at the Honeywell Syracuse Sites be sampled and analyzed for per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane, groundwater samples were collected at three LCP Bridge Street subsite locations, MW-35D, PZ-6B-S, and PZ-2B-D, in October 2018. Select PFAS compounds were detected in samples collected from all three locations with the maximum levels being estimated concentrations of 6.5 ng/L for both perfluorooctanoic acid (PFOA) and perfluorobutanoic acid (PFBA) at MW-35-D. 1,4-dioxane was detected at two of the three groundwater monitoring locations with the maximum level being 0.59 µg/L at PZ-2B-D (Honeywell, 2019). The detected levels of PFOA and 1,4-dioxane are lower than NYS drinking water standards adopted in 2020 for public water systems that set maximum contaminant levels (MCLs) of 10 ng/L for PFOA and 1 µg/L for 1,4-dioxane. There are no groundwater or drinking water standards for PFBA.

GBNMC

Geddes Brook Surface Water

Consistent with the OM&M Plan (Parsons, 2011), six surface water monitoring locations in Geddes Brook and Outfall 019 (see **Figure 26**) were sampled annually between 2013 and 2017, and again in 2019 for dissolved mercury, total mercury, and methylmercury.

During the review period, dissolved mercury concentrations at the Geddes Brook and Outfall 019 sampling stations averaged 0.25 ng/L (range 0.15 to 0.38 ng/L), 0.96 ng/L (range 0.66 to 2.0 ng/L), 0.37 ng/L (range 0.19 to 0.77 ng/L), 0.32 ng/L (range 0.25 to 0.44 ng/L), 0.61 ng/L (range 0.14 to 1.53 ng/L) and 0.39 ng/L (range 0.27 to 0.74 ng/L) in 2013, 2014, 2015, 2016, 2017, and 2019, respectively. The average concentrations are below the ROD goals of 2.6 ng/L for protection of wildlife and 0.7 ng/L for protection of human health via fish consumption, except for the 2014 mean concentration, which exceeded the more stringent goal. The post-remediation average levels of dissolved mercury are lower than the average 2010/2011 baseline sampling dissolved mercury level of 1.59 ng/L (range 0.6 to 2.88 ng/L). In the 2017 event, the dissolved mercury goal of 0.7 ng/L was exceeded at one (GB-SW-03CGW) of the five locations (GB-SW-01WP, GB-SW-02WWL, GB-SW-03CGW, GB-SW-04GB, and GB-SW-060F) supporting sport fish. In 2019, however, none of the five locations exhibited results that exceeded this goal.[9] Sitewide averages of dissolved mercury in Geddes Brook are depicted on **Figure 27**. Individual concentrations for each station of dissolved mercury in Geddes Brook are depicted over time and by location on **Figures 28 and 29**, respectively.

Total mercury in Geddes Brook surface water averaged 0.98 ng/L (range 0.15 to 1.79 ng/L), 1.37 ng/L (range 0.70 to 2.30 ng/L), 1.71 ng/L (range 0.38 to 3.77 ng/L), 1.10 ng/L (range 0.25 to 3.91 ng/L), 1.69 ng/L (range 0.55 to 4.21 ng/L), and 0.95 ng/L (range 0.25 to 2.21 ng/L) in 2013, 2014, 2015, 2016, 2017, and 2019, respectively. Methylmercury levels averaged 0.074 ng/L (range 0.026 to 0.17 ng/L), 0.13 ng/L (range 0.05 to 0.33 ng/L), 0.16 ng/L (range 0.01 to 0.50 ng/L), 0.07 ng/L (range 0.01 to 0.26 ng/L), 0.65 ng/L (range 0.09 to 1.66 ng/L) and 0.11 ng/L (range 0.01 to 0.24 ng/L) in 2013, 2014, 2015, 2016, 2017 and 2019, respectively. These average post-remediation levels continue to be notably lower than the average total mercury level of 23.86 ng/L (range 2.7 to 89.4 ng/L) documented during 2010/2011 baseline sampling conducted at low flow and high flow conditions, and the 1992 baseline average for methylmercury of 0.62 ng/L (range 0.08 to 1.83 ng/L).[10] No goals are specified in the ROD for total mercury or methylmercury in surface water (see **Table 11** for concentrations of total mercury and methylmercury in Geddes Brook surface water). In addition, annual average concentrations of total mercury in Geddes Brook have been consistently lower than the annual average concentrations in the West Flume (ranging from 4.3 to 17.6 ng/L) during the 2014 to 2018 period.

[9] Note that Geddes Brook location GB-SW-05PW is situated in a perched wetland that is not capable of supporting sport fish populations. As such, the results from this location are not compared to the dissolved mercury RG of 0.7 ng/L, which protects human health via fish consumption.

[10] Baseline sampling in 2010/2011 did not include analyses for methylmercury in surface water, however, methylmercury (unfiltered) baseline sampling was conducted in lower Geddes Brook and lower Ninemile Creek in 1992.

Geddes Brook Sediment

The Geddes Brook OM&M Plan established six sediment monitoring locations that were collocated with the surface water sample locations **(Figure 26**) and have been analyzed annually for total mercury and methylmercury. Samples were collected annually between 2013 and 2017, and the results for total mercury and methylmercury in Geddes Brook sediment are presented in **Table 12**. The results for total mercury as sitewide averages for Geddes Brook sediment are also presented in **Figure 30**). The results for total mercury for Geddes Brook sediment for each station are also presented by location and as a time series in **Figures 29 and 31**, respectively. A narrative summary of the results is provided below.

Sediment concentrations for total mercury in Geddes Brook (and adjacent wetland areas) and the Outfall 019 area averaged 0.044 mg/kg (range 0.028 to 0.067 mg/kg), 0.052 mg/kg (range 0.025 to 0.095 mg/kg), 0.063 mg/kg (range 0.040 to 0.095 mg/kg), 0.028 mg/kg (range 0.014 to 0.045 mg/kg) and 0.04 mg/kg (range 0.02 to 0.06 mg/kg) in 2013, 2014, 2015, 2016 and 2017, respectively. These levels are lower than the LEL for mercury in sediment (0.15 mg/kg)[11], the Part 375 unrestricted use soil cleanup objective of 0.18 mg/kg for mercury for floodplain soil and the site-specific mercury BSQVs for floodplain soil and sediment of 0.6 and 0.8 mg/kg, respectively. The levels are also lower than the average total mercury levels in Geddes Brook sediment of 5.37 mg/kg (range 0.8 to 14.2 mg/kg) in baseline samples (0-15 centimeters [cm]) collected in 2010.

Goals are not specified in the ROD for methylmercury in sediment; however, concentrations documented between 2013 and 2017 were, like total mercury levels in sediment, notably lower than during the baseline period. Methylmercury averaged 0.33 micrograms per kilogram (µg/kg) (range 0.027 to 0.953) µg/kg, 0.39 µg/kg (range 0.025 to 0.710 µg/kg), 0.401 µg/kg (range 0.010 to 0.912 µg/kg), 0.405 µg/kg (range 0.030 to 1.440 µg/kg) and 0.23 µg/kg (range 0.03 to 0.66 µg/kg) in 2013, 2014, 2015, 2016 and 2017, respectively. The averages for methylmercury are below the average of 4.31 µg/kg (range 0.34 to 8.65 µg/kg) in lower Geddes Brook sediment baseline samples (0-15 cm) collected in 2010.

Geddes Brook Biota

Baseline sampling was conducted in 2010 at the Geddes Brook site to establish mercury concentrations in biota prior to remediation. Prey (forage) fish, benthic macroinvertebrates, small mammals, and earthworms were sampled for mercury in 2013, 2014, 2016, 2017 at the locations shown on **Figure 32**. Prey fish were also collected and sampled for mercury at the indicated locations in 2019 but those data were determined not to be usable as noted above. Among these biota, prey fish are the only biota collected that have RGs. Prey fish species collected included Longnose Dace (*Rhinichthys cataractae*), Sunfish (*Lepomis* spp.), Round Goby (*Neogobius melanostomus*), Shorthead Redhorse (*Moxostoma macrolepidotum*), White Suckers (*Catostomus commersoni*), Pumpkinseed (*Lepomis gibbosus*), Creek Chub (*Semotilus atromaculatus*), Brook Stickleback (*Culaea inconstans*) and Bluntnose Minnow (*Pimephales notatus*). It is conservatively assumed that all mercury in fish is methylmercury, making methylmercury analysis unnecessary in prey fish.

[11] The LEL of 0.15 mg/kg is the lowest of four criteria identified for GBNMC soil/sediment. (See Table ES-2 above.)

The average for total mercury concentrations in prey fish collected during 2013, 2014, 2016 and 2017 were 0.08 mg/kg ww (range 0.042 to 0.165 mg/kg ww), 0.07 mg/kg ww (range 0.015 to 0.175 mg/kg ww), 0.06 mg/kg ww (range 0.015 to 0.190 mg/kg ww), and 0.09 mg/kg ww (range 0.046 to 0.140 mg/kg ww), respectively. The averages were below the baseline average of 0.135 mg/kg ww (range 0.088 to 0.190 mg/kg ww) and the RG of 0.1 mg/kg ww for protection of ecological receptors specified in the ROD. The 95% UCL for total mercury concentrations in prey fish collected during 2013, 2014, 2016 and 2017 were 0.10 mg/kg ww, 0.09 mg/kg ww, 0.09 mg/kg ww, and 0.10 mg/kg ww, respectively. The 95% UCLs were at or just below the RG of 0.1 mg/kg ww in 2013, 2014, and 2016, and marginally above the goal in 2017. As the 95% UCL and six of the 15 prey fish samples (40 percent) in Geddes Brook exceeded the goal in 2017, an additional prey fish sampling event was conducted in 2019. However, as noted above, those data were determined not to be usable. At least one additional event will be conducted in 2022. (See **Figures 33 and 34** and **Table 13)**. Total mercury concentrations in Geddes Brook prey fish and other biota are presented by location in **Figure 35**.

Total mercury and methylmercury results for Geddes Brook biota other than fish are presented in **Tables 14a, 14b, and 14c** and **Figures 36a and 36b**. For the benthic macroinvertebrates, species have varied with each sampling event depending on availability. Species collected in post-remediation samples included the dragonfly nymph (*Anisoptera*), crayfish (*Astacoidea*), amphipod (*Amphipoda*), and damselfly (*Zygoptera*). Total mercury concentrations in macroinvertebrates averaged 0.03 mg/kg ww (range 0.015 to 0.056 mg/kg ww), 0.13 mg/kg ww (range 0.030 to 0.360 mg/kg ww), 0.02 mg/kg ww (range 0.005 to 0.028 mg/kg ww) and 0.02 mg/kg ww (range non-detect to 0.05 mg/kg ww) in 2013, 2014, 2016 and 2017, respectively. The average levels of total mercury in macroinvertebrates in 2016 and 2017 were lower than the average total mercury levels in macroinvertebrates in 2013 (0.031 mg/kg [range 0.015 to 0.042 mg/kg]) and in 2014 (0.13 mg/kg [range 0.03 to 0.36 mg/kg]).

As in the case for total mercury, the average methylmercury concentrations in macroinvertebrates in 2016 and 2017 were lower than the corresponding means in 2013 and 2014. Methylmercury concentrations in macroinvertebrates averaged 46.7 µg/kg ww (range 21.1 to 78.5 µg/kg ww), 76.4 µg/kg ww (range 24.1 to 148.0 µg/kg ww), 15.6 µg/kg ww (range 4.4 to 28.3 µg/kg ww) and 21.1 µg/kg ww (range 11.7 to 37.5 µg/kg ww) in 2013, 2014, 2016 and 2017, respectively

Total mercury concentrations in earthworms collected in the Geddes Brook area averaged 0.025 mg/kg ww (range 0.010 to 0.050 mg/kg ww), 0.173 mg/kg ww (range 0.080 to 0.230 mg/kg ww), 0.039 mg/kg ww (range 0.030 to 0.047 mg/kg ww) and 0.06 mg/kg ww (range 0.05 to 0.08 mg/kw ww) in 2013, 2014, 2016 and 2017, respectively. The averages are below the average baseline concentration (2010) for total mercury of 0.196 mg/kg ww (range 0.036 to 0.380 mg/kg ww).[12] Methylmercury concentrations in earthworms collected in Geddes Brook averaged 20 µg/kg ww

[12] Baseline sampling of earthworms in GBNMC included a depuration (purging in a clean environment) step prior to analysis. Earthworms in SYW-10 were not depurated during baseline sampling. Contaminant levels in baseline samples would likely be lower if the sampling procedure included a depuration step relative to contaminant levels in samples that do not undergo depuration. Post-remediation earthworm samples from Geddes Brook in 2013 and 2014 and SYW-10 in 2015 were depurated. None of the earthworm samples collected between 2016 and 2018 from Geddes Brook, Ninemile Creek or SYW-10 underwent a depuration step.

(range 16.0 to 23.7 µg/kg ww), 1.6 µg/kg ww (range 0.8 to 2.1 µg/kg ww) and 2.6 µg/kg ww (range 1.4 to 4.4 µg/kg ww) in 2013, 2016 and 2017, respectively. These levels were below the average baseline concentration for methylmercury of 59 µg/kg ww. Methylmercury was not detected in the 2014 earthworm samples.

Small mammals collected in the Geddes Brook area included the white-footed mouse (*Peromyscus leucopus*), the meadow vole (*Microtus pennnsylvanicus*), and the Northern Short-tailed Shrew (*Blarina brevicauda*). Total mercury concentrations in small mammals collected in the Geddes Brook area averaged 0.016 mg/kg ww (range 0.005 to 0.025 mg/kg ww), 0.012 mg/kg ww (range 0.010 to 0.020 mg/kg ww), 0.039 mg/kg ww (range 0.005 to 0.106 mg/kg ww) and 0.04 mg/kg ww (range 0.005 to 0.132 mg/kg ww) in 2013, 2014, 2016 and 2017, respectively. The averages are below the average baseline (2010) concentration for total mercury of 0.109 mg/kg ww (range 0.011 to 0.400 mg/kg ww). Methylmercury concentrations in Geddes Brook area small mammals averaged 9.4 µg/kg ww (range 3.4 to 14.0 µg/kg ww), 7.2 µg/kg ww (range 4.8 to 16.4 µg/kg ww), 19.7 µg/kg ww (range 0.2 to 53.2 µg/kg ww) and 35.3 µg/kg ww (range 1.0 to 137 µg/kg ww) in 2013, 2014, 2016 and 2017, respectively. The averages are below the average baseline (2010) concentration for methylmercury of 72.2 µg/kg ww (range 11.5 to 225.0 µg/kg ww).

Ninemile Creek Surface Water

Sampling of surface water was conducted in Ninemile Creek in 2015, 2016 and 2017 at one location upstream of the site and four locations downstream of the confluence with Geddes Brook (one in Reach CD, one in Reach BC, and two in Reach AB); once during high flow and once during low flow conditions. The sample locations are provided on **Figure 37**. Samples were analyzed for dissolved mercury, total (unfiltered) mercury, and methylmercury. Analytical results are reported on **Table 15**. Analytical results for dissolved mercury are presented by location on **Figure 38**. Dissolved mercury sitewide averages and dissolved mercury concentrations for each station in Ninemile Creek as a time series are depicted on **Figures 39a and 39b**, respectively. A narrative summary of the dissolved mercury, total mercury and methylmercury results for both low and high flow conditions is presented below.

Dissolved mercury concentrations at the four downstream Ninemile Creek sampling stations averaged 0.18 ng/L (range 0.17 to 0.19 ng/L), 0.19 ng/L (range 0.16 to 0.24 ng/L) and 0.12 ng/L (range 0.11 to 0.13 ng/L) during low flow conditions in 2015, 2016 and 2017, respectively. The averages as well as all individual samples during low flow are below the ROD goals of 2.6 ng/L for the protection of wildlife and 0.7 ng/L for the protection of human health due to fish consumption. The dissolved mercury concentrations in the upstream location in 2015, 2016 and 2017 were 0.19 ng/L, 0.16 ng/L and 0.20 ng/L, respectively. Dissolved mercury concentrations at the four downstream stations during high flow conditions averaged 1.21 ng/L (range 1.04 to 1.37 ng/L), 1.20 ng/L (range 1.10 to 1.38 ng/L) and 0.17 ng/L (range 0.15 to 0.21 ng/L) in 2015, 2016 and 2017, respectively. The 2015 and 2016 levels during high flow are below the ROD goal of 2.6 ng/L, but above the 0.7 ng/L goal. This is not contrary to what might be anticipated since the dissolved mercury concentrations at the upstream location during high flow were comparable at 1.09 ng/L and 1.21 ng/L in 2015 and 2016, respectively. Therefore, the exceedances of the 0.7 ng/L goal in 2015 and 2016 during high flow are not believed to be due to site-related sources. The 2017 dissolved mercury levels during high flow were below both the 2.6 ng/L and the 0.7 ng/L goals.

During high flow conditions, total (unfiltered) mercury at the four downstream Ninemile Creek surface water stations averaged 42.78 ng/L (range 15.70 to 55.40 ng/L), 66.46 ng/L (range 61.70 to 69.25 ng/L) and 2.77 ng/L (range 2.73 to 3.1 ng/L) in 2015, 2016 and 2017, respectively. The average detected levels during high flow conditions in 2015 and 2016 were significantly higher than the average detected level of 14.93 ng/L (range 8.35 to 18.70 ng/L) during 2011 high flow baseline sampling in Ninemile Creek. It should be noted, however, that total mercury levels were also elevated in the upstream sampling location in Ninemile Creek during the high flow sampling events in 2015 (50.10 ng/L) and 2016 (78.40 ng/L) and were higher than the average levels at the downstream locations for the corresponding years. The elevated total mercury levels in 2015 and 2016 during high flow relative to baseline conditions at high flow may be attributable to higher average flow rates at the time of sampling in 2015 (630 cfs) and 2016 (809 cfs) as compared to the average flow rate at the time of high flow baseline sampling (340 cfs). At the four downstream sampling stations during low flow conditions, total mercury in Ninemile Creek surface water averaged 2.50 ng/L (range 0.82 to 5.10 ng/L), 2.67 ng/L (range 1.39 to 4.60 ng/L) and 0.85 ng/L (range 0.64 to 1.78 ng/L) in 2015, 2016 and 2017, respectively. These total mercury levels in Ninemile Creek during low flow are similar to levels in Geddes Brook during these years.

At the four downstream sampling stations during low flow conditions, methylmercury levels in Ninemile Creek surface water averaged 0.07 ng/L (range 0.05 to 0.10 ng/L), 0.12 ng/L (range 0.04 to 0.29 ng/L) and 0.04 ng/L (range 0.03 to 0.05 ng/L) in 2015, 2016 and 2017, respectively. The averages for methylmercury at the upstream and downstream locations under low flow conditions are below the 1992 baseline average of 0.15 ng/L (range 0.11 to 0.20 ng/L) during low flow. During high flow conditions, methylmercury in Ninemile Creek surface water at the downstream sampling locations averaged 0.58 ng/L (range 0.40 to 0.70 ng/L), 1.32 ng/L (range 1.17 to 1.53 ng/L), and 0.06 ng/L (range 0.06 to 0.07 ng/L) in 2015, 2016 and 2017, respectively. The 1992 baseline average for methylmercury in Ninemile Creek was 0.45 ng/L (range 0.13 to 1.44 ng/L) during high flow. During both the 2015 and 2016 high flow sampling events in Ninemile Creek, methylmercury levels were higher at the upstream sampling location relative to any of the downstream locations. As noted above, no goals are specified in the ROD for total mercury or methylmercury in surface water.

Ninemile Creek Sediment and Macroinvertebrates

Four channel surface sediment samples (0-15 cm) were collected in the downstream reaches of Ninemile Creek (one in Reach CD, two in Reach BC, and one in Reach AB) in 2016 and 2018. (See **Figure 40** for sample locations) and analyzed for total mercury and methylmercury. The results for total mercury and methylmercury in Ninemile Creek channel sediment are presented on **Table 16**. Total mercury Ninemile Creek channel sediment sitewide averages are shown on **Figure 41**. Total Ninemile Creek channel sediment mercury concentrations at individual stations are shown as a time series and by location **on Figures 42a and 42b**, respectively.

Channel sediment concentrations for total mercury averaged 0.07 mg/kg (range 0.04 to 0.15 mg/kg) in 2016. These levels did not exceed the LEL for mercury in sediment (0.15 mg/kg) and were lower than the site-specific mercury BSQV for sediment of 0.8 mg/kg. The average concentration for total mercury in Ninemile Creek channel sediment in 2016 was also lower than the average baseline (2010) level of 0.5 mg/kg for lower Ninemile Creek channel sediment (range

0.04 to 1.1 mg/kg). Mercury was not detected in any of the Ninemile Creek channel sediment samples in 2018. Using one-half the detection limit for the non-detect samples, the average level of mercury in channel sediment (0.06 mg/kg) in 2018 was also lower than the mercury LEL and the mercury BSQV for sediment. Goals are not specified in the ROD for methylmercury in sediment; however, the average methylmercury levels of 0.43 microgram per kilogram (µg/kg) (range 0.22 to 0.69 µg/kg) and 0.60 µg/kg (range 0.10 to 1.01 µg/kg) in 2016 and 2018, respectively, in Ninemile Creek channel sediment are below the average baseline level of 0.66 µg/kg (range 0.3 to 1.35 µg/kg).

Benthic macroinvertebrates (crayfish) were collected in 2016 at three locations in Ninemile Creek (one per reach) as shown on **Figure 40**. Analytical results are shown in **Table 17** and **Figures 42b, 43a, and 43b**. Methylmercury concentrations in 2016 averaged 21.9 µg/kg, which was higher than the average observed during the baseline; however, the macroinvertebrates collected during baseline sampling were limited to amphipods and chironomids (Chironomidae), whereas sampling in 2016 was limited to crayfish, and therefore the results are not directly comparable. Total mercury concentrations averaged 0.021 mg/kg, which was lower than the average concentration observed during baseline (Parsons, 2022b).

Ninemile Creek Fish

The Ninemile Creek 2015 OM&M Sampling Work Plan established protocols for monitoring prey fish (as whole body samples) and sport fish (as fillets) in Ninemile Creek Reaches AB, BC, and CD, as well as at an upstream reference location. Prey fish and sport fish tissue data are evaluated for comparison to RGs for mercury (both sport fish and prey fish) and target concentrations for organics (sport fish only), which are intended to be protective of ecological receptors and of human health due to consumption of fish, respectively. The range of goals and targets used for comparison to the data include the ecological goal of 0.1 mg/kg for mercury in prey fish, and human health based cancer and non-cancer targets of 0.12 to 1.1 mg/kg (120 to 1,100 µg/kg) for PCBs and 4.2 to 10 ng/kg for PCDD/PCDFs in sport fish. These goals and targets are presented on **Table 18**.

Small prey fish were targeted for collection at four sampling locations in Ninemile Creek in 2015, 2016 and 2017. Three locations were in the remediation areas, while a fourth was located upstream (**see Figure 44** for sample locations). All prey fish samples were composited and analyzed for total mercury and percent moisture. The results for mercury in individual Ninemile Creek prey fish for the 2015-2017 period are shown on **Figure 45**. A subset of the 2015, 2016 and 2017 prey fish samples was analyzed for PCBs and lipid content and a subset of the 2015 and 2017 samples was analyzed for PCDD/PCDFs. Prey fish species collected included Creek Chub, Round Goby, Banded Killifish (*Fundulus diaphanus*), and White Suckers.

The averages for total mercury concentrations in prey fish collected in Ninemile Creek downstream locations during 2015, 2016 and 2017 were 0.065 mg/kg ww (range 0.013 to 0.168 mg/kg ww), 0.051 mg/kg ww (range 0.018 to 0.137 mg/kg ww), and 0.085 mg/kg ww (range 0.028 to 0.136 mg/kg ww), respectively. The averages were below the RG of 0.1 mg/kg ww for protection of ecological receptors specified in the ROD. The 95% UCL of the mean for total mercury concentrations in downstream Ninemile Creek prey fish collected during 2015, 2016 and 2017 were 0.088 mg/kg ww, 0.067 mg/kg ww and 0.103 mg/kg ww, respectively. The 95% UCLs were below the RG of 0.1 mg/kg ww for protection of ecological receptors in 2015 and 2016, but

marginally above it in 2017. As the 95% UCL and seven of the 15 prey fish samples (47 percent) in Ninemile Creek exceeded the goal in 2017, an additional prey fish sampling event was conducted in 2019. However, as noted above, those data were determined not to be usable. At least one additional event will be conducted in 2022 (see **Figures 46 and 47** and **Table 19a).**

Average prey fish PCB concentrations in Ninemile Creek have decreased since monitoring commenced in 2015 (see **Table 19a**, **Figures 48a and 48b**). At the downstream locations, PCBs detected in prey fish averaged 217 µg/kg ww (range 52 to 1,100 µg/kg ww), 85 µg/kg ww (range 51 to 157 µg/kg ww), and 68 µg/kg ww (range 34 to 91 µg/kg ww) in 2015, 2016 and 2017, respectively. At the downstream locations, 95% UCLs for PCBs in prey fish were 685 µg/kg ww, 115 µg/kg ww, and 81 µg/kg ww in 2015, 2016 and 2017, respectively. At the upstream locations, PCBs detected in prey fish averaged 169 µg/kg ww (range 143 to 194 µg/kg ww), 157 µg/kg ww (range 46 to 267 µg/kg ww) and 95 µg/kg ww (range 91 to 98 µg/kg ww), in 2015, 2016 and 2017, respectively. Due to an insufficient number of collected samples, 95% UCLs could not be calculated for PCBs in upstream prey fish. In 2017, the mean and maximum concentrations at the downstream and upstream locations were comparable. The average levels of PCBs for prey fish at both the upstream and downstream locations in Ninemile Creek were below the 2002 baseline average of 278 µg/kg ww (range 250 to 300 µg/kg ww). There are no goals or target concentrations in prey fish specified in the GBNMC RODs for PCBs.

The average levels of PCDD/PCDFs (TEQ as 2,3,7,8-TCDD) in 2015 prey fish were 0.295 nanograms per kilogram (ng/kg) ww (range 0.19 to 0.406 ng/kg ww) and 0.650 ng/kg ww (range 0.527 to 0.773 ng/kg ww) for downstream and upstream samples, respectively (see **Table 19a and Figures 48c and 48d**). The average levels of PCDD/PCDFs (TEQ as 2,3,7,8-TCDD) in 2017 prey fish were 0.309 ng/kg ww (range 0.134 to 0.591 ng/kg ww) and 0.285 ng/kg ww (range 0.207 to 0.363 ng/kg ww) for downstream and upstream samples, respectively. The 95% UCLs of PCDD/PCDFs (TEQ as 2,3,7,8-TCDD) in downstream prey fish were 0.347 ng/kg ww and 0.416 ng/kg ww in 2015 and 2017, respectively. The average levels of PCDD/PCDFs for prey fish at both the upstream and downstream locations in Ninemile Creek in 2015 and 2017 were below the 2002 baseline average of 1.801 ng/kg ww (range 1.347 to 2.324 µg/kg ww). The 95% UCLs of PCDD/PCDFs for prey fish at both the upstream and downstream locations in Ninemile Creek in 2017 were below the 2011 95% UCL of 2.630 ng/kg ww for the downstream locations. There are no goals or target concentrations in prey fish specified in the GBNMC RODs for PCDD/PCDFs.

Sport fish were targeted for collection from two locations in Ninemile Creek in 2015, 2016 and 2017. One location encompassed all of the downstream reaches, while the other represented the upstream location (see **Figure 44** for sample locations). All samples were analyzed for mercury and percent moisture. The results for mercury in individual sport fish are shown on **Figure 45**. As noted above, it is assumed that all mercury in fish is methylmercury, making methylmercury analysis unnecessary in sport fish. Sport fish species collected in the downstream reach included Brown Trout (*Salmo trutta*), Brown Bullhead (*Ameiurus nebulosus*), Rock Bass (*Ambloplites rupestris*), and Green Sunfish (*Lepomis cyanellus*). Only Brown Trout were collected at the upstream location. Mercury results for sport fish are presented in **Table 19b** and **Figures 49a, 49b and 49c**. Total mercury levels in downstream sport fish (all species combined) averaged 0.099 mg/kg ww (range 0.039 to 0.442 mg/kg ww), 0.106 mg/kg ww (range 0.029 to 0.400 mg/kg ww) and 0.17 mg/kg ww (range 0.027 to 0.408 mg/kg ww), in 2015, 2016 and 2017, respectively. The average concentrations as well as the 95% UCLs (as can be seen on **Figure 49a** are below the

ROD goal of 0.3 mg/kg ww for human consumption of sport fish. As shown on **Figure 49c,** total mercury levels exceeded the ROD goal in only one of the 11 downstream sport fish samples in 2015, one of the 17 downstream sport fish samples in 2016 and three of the 24 downstream sport fish samples in 2017. As these three exceedances in 2017 were all in Rock Bass (of the eight Rock Bass samples in 2017) and the 95% UCL (0.325 mg/kg ww) for this species also exceeded the 0.3 mg/kg goal (see Figure 49b), an additional sport fish sampling event was conducted in Ninemile Creek for Rock Bass in 2019. However, as noted above, those data were determined not to be usable. At least one additional event will be conducted in 2022. Total mercury in upstream samples averaged 0.056 mg/kg ww (range 0.04 to 0.07 mg/kg ww), 0.041 mg/kg ww (range 0.020 to 0.050 mg/kg ww) and 0.096 mg/kg ww (range 0.041 to 0.133 mg/kg ww) in 2015, 2016 and 2017, respectively.

As in the case for the prey fish, a subset of the 2015, 2016 and 2017 sport fish samples was analyzed for PCBs and lipid content and a subset of the 2015 and 2017 samples was analyzed for PCDD/PCDFs. The results for PCBs and PCDD/PCDFs in sport fish are presented in **Table 19b** and **Figures 50a, 50b, 50c and 50d.**

From the downstream location in Ninemile Creek, PCB levels in sport fish (all Brown Trout) averaged 129 µg/kg ww (range 76 to 183 µg/kg ww), 146 µg/kg ww (range 97 to 210 µg/kg ww) and 111 µg/kg ww (range 60 to 180 µg/kg ww), in 2015, 2016 and 2017, respectively. At the downstream location in Ninemile Creek, the 95% UCLs for PCBs in sport fish were 151 µg/kg ww, 171 µg/kg ww and 137 µg/kg ww in 2015, 2016 and 2017, respectively. The means and 95% UCLs for PCBs in sport fish collected from the downstream location in all three years are below the fish tissue target concentration of 1,100 µg/kg ww based on a reasonable maximum exposure (RME) excess cancer risk of one in 10,000 and the fish tissue target concentration of 190 µg/kg ww based on non-cancer effects for adults. The average level of PCBs in sport fish collected from the downstream location in 2017 was below the target of 120 µg/kg ww based on non-cancer effects for children, whereas the average levels of PCBs in sport fish collected from the downstream location in 2015 and 2016 and the 95% UCLs for the downstream location in all three years were above this target. The 2015, 2016 and 2017 averages and 95% UCLs for PCBs in downstream sport fish (Brown Trout) were below the 2011 baseline average and 95% UCL for PCBs in sport fish (Channel Catfish) of 1,107 ug/kg ww (range 650 to 1,700 ug/kg ww) and 2014 ug/kg ww, respectively.

At the upstream location, PCB levels in sport fish averaged 132 µg/kg ww (range 112 to 151 µg/kg ww), 187 µg/kg ww (range 150 to 223 µg/kg ww), and 185 µg/kg ww (range 170 to 200 µg/kg ww), in 2015, 2016 and 2017, respectively. The average levels in sport fish collected from the upstream locations in 2015, 2016 and 2017 were below the fish tissue cancer target concentration of 1,100 µg/kg ww and the target of 190 µg/kg ww based on non-cancer effects for adults, but above the 120 µg/kg ww based on non-cancer effects for children. Due to an insufficient number of collected samples, 95% UCLs could not be calculated for PCBs in upstream sport fish.

The average levels of PCDD/PCDFs (TEQ as 2,3,7,8-TCDD) in sport fish (all Brown Trout) in 2015 were 0.353 ng/kg ww (range 0.169 to 0.734 ng/kg ww) and 0.262 ng/kg ww (range 0.186 to 0.337 ng/kg ww) for downstream and upstream samples, respectively. The average levels of PCDD/PCDFs (TEQ as 2,3,7,8-TCDD) in sport fish in 2017 were 0.414 ng/kg ww (range 0.188

to 0.715 ng/kg ww) and 1.238 ng/kg ww (range 0.331 to 2.144 ng/kg ww) for downstream and upstream samples, respectively. The 95% UCLs for PCDD/PCDFs (TEQ as 2,3,7,8-TCDD) in downstream sport fish were 0.487 ng/kg ww and 0.591 ng/kg ww in 2015 and 2017, respectively. The averages and 95% UCLs in sport fish in both 2015 and 2017 are below the target of 10 ng/kg ww based on an RME excess cancer risk of one in 10,000 (i.e., $1x10^{-4}$) for adults. They are also below the RME noncancer endpoint target of 4.2 ng/kg ww. The PCB and PCDD/PCDF cancer and noncancer targets are based on protection of human health due to fish consumption for children and are protective of both adults and children. The 2015 and 2017 averages and 95% UCLs for PCDD/PCDFs (TEQ as 2,3,7,8-TCDD) in sport fish (Brown Trout) were below the 2011 baseline average and 95% UCL for PCDD/PCDFs (TEQ as 2,3,7,8-TCDD) in sport fish (Channel Catfish) of 1.801 ng/kg ww (range 1.347 to 2.324 ng/kg ww) and 2.630 ng/kg ww, respectively.

In addition to mercury, the sport fish (Rock Bass) collected in Ninemile Creek in 2019 were to be analyzed for PCBs and PCDD/PCDFs. As noted above, those data were determined not to be usable. At least one additional event, including analysis of PCBs and PCDD/PCDFs, will be conducted in 2022.

Ninemile Creek Floodplain Soil and Biota

Four Ninemile Creek floodplain soil samples were collected from three locations in 2016 and 2018 in the Reach CD area (see **Figure 40** and analyzed for total mercury and methylmercury). The average detected concentrations of these samples for total mercury were 0.033 mg/kg (range 0.031 to 0.034 mg/kg) and 0.075 mg/kg (range 0.07 to 0.08 mg/kg) in 2016 and 2018, respectively. These levels are below the site-specific mercury BSQV for soil of 0.6 mg/kg, the Part 375 unrestricted use soil cleanup objective of 0.18 mg/kg for mercury and the average total mercury baseline concentration of 0.50 mg/kg (range 0.13 to 0.71 mg/kg) from samples collected in 2010. The averages for methylmercury of 0.42 µg/kg (range 0.39 to 0.46 µg/kg) and 0.54 µg/kg (range 0.30 to 0.68 µg/kg) in 2016 and 2018, respectively, are below the average methylmercury baseline concentration of 2.07 µg/kg (range 1.57 to 2.34 µg/kg). Goals for methylmercury in floodplain soil are not specified in the ROD. Ninemile Creek floodplain soil results for total mercury and methylmercury are presented on **Table 16**. The results for total mercury in Ninemile Creek floodplain soil by location, as well as the results for Ninemile Creek earthworms and small mammals which are discussed below, are shown on **Figure 42b**.

Earthworm composite samples co-located with the floodplain soil samples in 2016 were analyzed for total mercury and methylmercury. The average concentrations of the earthworm samples for total mercury and methylmercury were 0.025 mg/kg ww (range 0.024 to 0.026 mg/kg ww) and 1.5 µg/kg ww (range 0.4 to 3.3 µg/kg ww), respectively. These levels are well below Ninemile Creek earthworm concentrations detected during baseline sampling in 2010. The average concentrations of the earthworm samples for total mercury and methylmercury during baseline sampling were 0.70 mg/kg ww (range 0.34 to 0.97 mg/kg ww) and 31.5 µg/kg ww (range 21 to 43.2 µg/kg ww), respectively. Ninemile Creek earthworm results for total mercury and methylmercury are presented on **Table 20** (EPA, 2017; Parsons, 2022b).[13]

[13] Also, see Footnote 12 regarding depuration of earthworm samples.

Two white-footed mice, two meadow voles, and one deer mouse were collected in the Reach CD area in 2016 (see Figure 17). Although baseline mammal sampling adjacent to Ninemile Creek included methylmercury as well as total mercury, it was assumed that all total mercury would be in the form of methylmercury for the 2016 Ninemile Creek mammal samples. For this reason, the 2016 Ninemile Creek small mammal samples were analyzed for total mercury only. In these five samples, total mercury was not detected (less than 0.01 mg/kg ww). In the Ninemile Creek baseline samples (2010), average total mercury in the deer mice was 0.038 mg/kg ww and total mercury was 0.048 mg/kg ww in the one white-footed mouse collected. The total mercury results for Ninemile Creek small mammals are provided on **Table 21** (EPA, 2017; Parsons, 2022b).

SYW-10 Soil/Sediment and Biota

As noted above, some areas of SYW-10 were not remediated to preserve a valuable habitat not found on other areas of the lakeshore. Soil/sediment and earthworm samples were collected in SYW-10 in 2015, 2016 and 2018. These samples were analyzed for total mercury and methylmercury consistent with the established monitoring protocols in the Ninemile Creek 2015 OM&M Sampling Work Plan. Small mammal samples were also collected in SYW-10 in 2015, 2016 and 2018, and analyzed for total mercury consistent with the Work Plan. Sample locations for soil/sediment and biota are provided on **Figure 51.** Analytical results by location for SYW-10 soil/sediment and biota are presented on **Figure 52**.

Post-remediation soil/sediment samples (composite samples from the top six inches) were collected from ten stations in SYW-10 in 2015, 2016 and 2018 consistent with baseline monitoring locations in both remediated (six stations) and unremediated (four stations) areas. Total mercury and methylmercury results for the SYW-10 soil/sediment samples are provided on **Table 22**. Total mercury was detected at all six remediated stations in 2015 and 2016. In 2018, total mercury in soil/sediment was only detected in two of the six remediated area locations; levels in these two samples were below the LEL of 0.15 mg/kg, the Part 375 unrestricted use mercury soil cleanup objective of 0.18 mg/kg, and the site specific mercury BSQVs of 0.6 mg/kg and 0.8 mg/kg for soil and sediment, respectively. The calculated mean for mercury in the remediated area in 2018 (0.08 mg/kg), as well as the calculated means calculated for 2015 (0.07 mg/kg) and 2016 (0.06 mg/kg) were also below the LEL (SYW-10 mercury concentrations in soil within remediated areas at individual sample locations as a time series are depicted on **Figure 53**).

Soil/sediment total mercury concentrations for the combined remediated and unremediated areas averaged 1.47 mg/kg, 1.90 mg/kg, and 1.45 mg/kg in 2015, 2016, and 2018, respectively (see **Figure 54**). While the mean concentrations exceed the mercury BSQVs, this is not unanticipated given that a sizeable area within the SYW-10 area was excluded from remediation so as to continue to provide forested wetland functions, consistent with the remedial objective, and the conceptual approach and design for SYW-10. In the remediated areas, methylmercury in soil/sediment averaged 1.96 µg/kg, 1.29 µg/kg, and 1.74 µg/kg in 2015, 2016, and 2018, respectively. Soil/sediment methylmercury concentrations for the combined remediated and unremediated areas averaged 7.42 µg/kg in 2018, which is slightly higher than the calculated means for 2015 (6.16 µg/kg) and 2016 (6.65 µg/kg). Goals for methylmercury in SYW-10 sediment or floodplain soil are not specified in the GBNMC OU2 ROD.

Earthworm samples in SYW-10 were collected in 2015, 2016 and 2018 and were collocated with the soil/sediment samples. Total mercury and methylmercury results for the SYW-10 earthworm samples are summarized in **Table 23**. Total mercury results for the SYW-10 earthworm samples are also provided in **Figure 55**. In the SYW-10 remediated areas, total mercury averaged 0.13 mg/kg ww (range 0.04 to 0.19 mg/kg ww), 0.13 mg/kg ww (range 0.08 to 0.19 mg/kg ww) and 0.12 mg/kg ww (range 0.09 to 0.17 mg/kg ww) in the 2015, 2016 and 2018 earthworm samples, respectively. In the SYW-10 remediated areas, methylmercury earthworm samples averaged 111.3 µg/kg ww (range 26.8 to 181.0 µg/kg ww), 39.6 µg/kg ww (range 22.8 to 61.1 µg/kg ww) and 37.3 µg/kg ww (range 18.3 to 54.9 µg/kg ww) in 2015, 2016 and 2018, respectively. As anticipated, earthworm total mercury and methylmercury levels were higher in unremediated areas relative to the remediated areas. Earthworm concentrations for total mercury in SYW-10 for the combined remediated and unremediated areas averaged 0.20 mg/kg ww (range 0.04 to 0.49 mg/kg ww), 0.33 mg/kg ww (range 0.08 to 1.25 mg/kg ww) and 0.36 mg/kg ww (range 0.09 to 1.23 mg/kg ww) in 2015, 2016 and 2018, respectively. Earthworm methylmercury concentrations for the combined remediated and unremediated areas averaged 157.5 µg/kg ww (range 14.3 to 515.0 µg/kg ww), 127.1 µg/kg ww (range 22.8 to 506.0 µg/kg ww) and 168.5 µg/kg ww (range 18.3 to 549.0 µg/kg ww) in 2015, 2016 and 2018, respectively. While goals for total mercury and methylmercury in earthworms are not specified in the GBNMC OU2 ROD, the 2015, 2016 and 2018 average concentrations for mercury and methylmercury for earthworms collected from the remediated areas in SYW-10 are lower than baseline levels for the SYW-10 remediated areas.[14]

Small mammal (white-footed mouse, deer mouse and meadow vole) samples were collected in 2015, 2016 and 2018 from the large contiguous areas of the remediated and unremediated zones of SYW-10 and analyzed for total mercury (see **Table 24** and **Figure 56**). Total mercury was detected in all of the SYW-10 small mammal samples collected in 2015 and in all five of the 2016 small mammal samples collected in the non-remediated area. All five of the small mammal samples (all deer mice) collected in the SYW-10 remediated area in 2016 were non-detect for total mercury. In 2018, mercury was not detected in nine of ten samples, including all samples from remediated areas and four of the five samples collected from unremediated areas. Small mammal total mercury concentrations in SYW-10 for the combined remediated and unremediated areas averaged 0.027 mg/kg ww and 0.022 mg/kg ww in 2015 and 2016, respectively. Using one-half the detection limit for the nine samples in which mercury was not detected and the reported value for the single detected sample, the average mercury concentration was 0.04 mg/kg in 2018 (Parsons, 2022a). The average total mercury concentrations in small mammals from the combined remediated and unremediated areas of SYW-10 in 2015, 2016 and 2018 were approximately one order-of-magnitude lower than the average baseline concentration (0.29 mg/kg ww) in 2010.

Site Inspection

An inspection of the LCP Bridge Street Subsite and GBNMC related to this FYR was conducted on July 14, 2022. The purpose of the inspection was to assess the protectiveness of the remedy. Those in attendance included Mr. Nunes; Mr. Granger, Ms. Flynn, Mr. Mazziotta, Mr. Smith, Ms. Granzen, Hazel Powless and Alma Lowry representing the Onondaga Nation; Mark Arrigo of Parsons (Honeywell contractor); Craig Milburn of Brown and Sanford (Honeywell consultant),

[14] Also, see Footnote 12 regarding depuration of earthworm samples.

James Lighton and John Formoza of Jacobs Engineering Group (Honeywell consultant).

During the inspection, the cap at the LCP Bridge Street Subsite was observed to be in good condition. No significant areas of erosion or slumping in the GBNMC channel areas were observed. Vegetative cover, including native plants, shrubs, and trees, were observed to be well established and in good condition throughout the LCP Bridge Street Subsite and GBNMC, including the remediated as well as the unremediated area of Wetland SYW-10.

V. TECHNICAL ASSESSMENT

QUESTION A: *Is the remedy functioning as intended by the decision documents?*

LCP Bridge Street

The September 2000 ROD called for the excavation of sediment exceeding upstream mercury concentrations, backfilling of the excavated areas with clean fill and re-vegetating, sewer system closure, mercury removal from soil on the former plant property, construction of an underground cut-off wall and low-permeability engineered soil cover over the soil/sediment containment area, installation of an on-site groundwater collection system and long-term monitoring of groundwater, surface water, sediment and biota to ensure the effectiveness of the selected remedy. The ROD also calls for the implementation of ICs to prohibit the use of groundwater at the LCP Bridge Street subsite and to prohibit the disturbance of the subsite Part 360 cap and slurry wall.

These measures were necessary to achieve the RAOs, to the extent practicable, of eliminating contaminant migration from the LCP Bridge Street subsite to the Onondaga Lake environs and environmental media; restoring groundwater quality to state and federal drinking water standards; mitigating the migration of contaminated waters through LCP subsite sewers; eliminating the direct contact threat associated with contaminated soil, surface water, and groundwater and reducing the level of contaminants in surface water and sediments to attain surface water ARARs and sediment remedial goals to be protective of fish, wildlife and the resources upon which they depend.

There has been general improvement in the effectiveness of the LCP Bridge Street subsite hydraulic control system within the soil/sediment containment area over time, particularly since completion of the landfill cover in 2015 and replacement of the groundwater extraction pumps in 2017-2020. In addition, monitoring wells MW-34D, MW-35D, and MW-36D were redeveloped in spring 2019, and silt was removed from each. Since the pumps were replaced, hydraulic containment trends have improved and higher pumping rates have been maintained. Additional monitoring will be needed to evaluate the containment of groundwater within the hydraulic containment system.

Sediment results in Wetland C and the West Flume continue to show decreased total mercury concentrations relative to pre-remediation conditions. Discrete sample results have been below the SEL of 1.3 mg/kg and the Ninemile Creek BSQV of 0.8 mg/kg, which serves as a useful benchmark for evaluating trends at the LCP Bridge Street subsite. As of 2018, average

concentrations within each area were below the remedial goal of 0.2 mg/kg as well. In addition, dissolved mercury concentrations in surface water within the West Flume and Wetland C were below the 2.6 ng/L standard for protection of wildlife during this review period since 2017, thus verifying the protectiveness of the remedy in these areas. Although some concentrations exceeded the human health standard based on fish consumption (0.7 ng/L), this metric does not apply to the LCP Site because the West Flume and open water wetland areas do not support this route of exposure since fish at the site are not large enough for human consumption.

Elevated levels of mercury in sediment and surface water remain in Wetland A. Exposures to ecological receptors are not currently considered significant, since biota sampling has indicated a lack of significant impacts to higher trophic level receptors in the past and because fish and predatory birds are intermittently present in this area of the LCP Bridge Street subsite. Exposures to humans are not considered likely because the site is not accessible to the public and fish within Wetland A are not present or large enough for human consumption. Nevertheless, data collected in 2018, 2020 and 2021 indicate that the RG for mercury in sediment has not been met and additional remedial actions in and adjacent to a portion of Wetland A are needed to ensure long-term protectiveness to ecological receptors.

Average mercury concentrations in prey fish collected from the West Flume during the 2015 to 2018 review period were generally lower than values observed during the previous review period, and remained below baseline concentrations. As documented in the 2nd FYR (2014), biota collection (small mammals, earthworms, and macroinvertebrates) from Wetlands A and B and the West Flume was discontinued after 2012 due to stabilized concentrations (Wetland C was not restored until 2012 and therefore was not included in the biota sampling prior to 2012). Due to elevated mercury concentrations for both surface water and sediment in Wetland A, an additional prey fish sampling event was conducted in 2021 within the West Flume. Analytical results for these prey fish were not available at the time that this report was developed.

GBNMC

Following the remediation in the GBNMC areas conducted from 2011 through 2014, the levels of dissolved mercury in GBNMC surface water samples were below the ROD goal of 2.6 ng/L for protection of wildlife. While the average levels of dissolved mercury were above the ROD goal of 0.7 ng/L for protection of human health via fish consumption in Geddes Brook in 2014, they were below that level in the four sampling events conducted between 2015 and 2019, and during low flow conditions for the three sampling events conducted in Ninemile Creek between 2015 and 2017. There was one exceedance of the 0.7 ng/L goal at one of the five Geddes Brook locations supporting sport fish populations in 2017, but none in 2019. While levels of dissolved mercury were above the 0.7 ng/L criterion in Ninemile Creek during high flow conditions, the levels were consistent with levels of dissolved mercury in Ninemile Creek upstream of the Site. While no RGs are specified in the ROD for unfiltered mercury and methylmercury in surface water, post-remediation levels of unfiltered mercury and methylmercury in surface water are below baseline levels in Geddes Brook, and are below baseline and/or upstream levels in lower Ninemile Creek, except for unfiltered mercury under low flow conditions in 2015 and 2016.

Post-remediation levels of total mercury in GBNMC wetland and channel sediment continue to be below the ROD RGs and baseline levels. While no RGs are specified in the ROD for methylmercury in sediment, post-remediation levels of methylmercury in GBNMC wetland and channel sediment are below baseline levels.

The average concentrations of total mercury in Geddes Brook prey fish, as well as Ninemile Creek prey and sport fish (in all species combined) in the downstream (remediated) locations, are below the RGs established in the RODs (0.1 mg/kg in prey fish and 0.3 mg/kg in sport fish). In 2017, the 95% UCLs for total mercury in GBNMC prey fish were marginally above the RGs established in the RODs. As the 95% UCLs and six of the 15 prey fish samples (40 percent) in Geddes Brook and seven of the 15 prey fish samples (47 percent) in Ninemile Creek exceeded the goals in 2017, and the data collected in 2019 were determined not to be usable, an additional prey fish sampling event will be conducted in both Geddes Brook and Ninemile Creek in 2022.

Between 2015 and 2017, the 95% UCLs for total mercury in Ninemile Creek sport fish (for all species combined) were below the RGs established in the RODs. However, as noted above, the three exceedances in 2017 were all in Rock Bass (of the eight Rock Bass samples in 2017) and the 95% UCL (0.325 mg/kg ww) for this species also exceeded the 0.3 mg/kg goal. Therefore, at least one additional sport fish sampling event will be conducted in 2022.

Furthermore, the means and 95% UCLs for PCBs and PCDD/PCDFs in Ninemile Creek sport fish are within the acceptable risk range for cancer effects and below the noncancer targets for children and adults, except for the 2015 and 2016 means and 95% UCLs for PCBs between 2015-2017, which were above the noncancer target for children. However, the mean PCB concentrations in upstream fish were also above this lower noncancer target.

The RGs for mercury and targets for PCBs and PCDD/PCDFs are based on protection of ecological receptors and protection of human health due to consumption of fish. Fish tissue monitoring will continue into the next FYR period for assessing attainment of goals and targets[15] and for further trend evaluation. As stated under the Data Review Section, statistical metrics used to determine whether fish tissue results have met stated goals and targets are currently under development, and may be utilized in subsequent FYRs.

In the Geddes Brook floodplain area, average post-remediation levels of mercury and methylmercury in earthworm composite samples and small mammals are below the average baseline levels. In Ninemile Creek (Reach CD) floodplain soil, the levels of total mercury are well below the Part 375 unrestricted use soil cleanup objective of 0.18 mg/kg and the BSQV of 0.6 mg/kg. Detected levels of total mercury and methylmercury in collocated Ninemile Creek floodplain soil and earthworms are well below levels detected during baseline sampling. Total mercury was not detected in small mammals in the Ninemile Creek (Reach CD) floodplain area.

In the SYW-10 area, total mercury levels in soil/sediment in the combined remediated and unremediated areas are above the Site-specific mercury BSQV of 0.6 mg/kg; however, this is not

[15] As noted in the NMC OMMP, to account for natural variability, performance criteria for fish tissue will be considered to have been met after multiple years of data indicate attainment. Performance criteria would need to be met at least three years in a row or four years out of five.

unanticipated, given that a sizeable area within the SYW-10 area was excluded from remediation so as to continue to provide forested wetland functions, consistent with the remedial objective, conceptual approach, and design for SYW-10. The average total mercury levels in soil/sediment in the remediated area within SYW-10 are below the Part 375 unrestricted use soil cleanup objective of 0.18 mg/kg and the BSQV of 0.6 mg/kg for soil. The average total mercury levels in small mammals in both the remediated and unremediated areas in SYW-10 are below baseline levels. In addition, total mercury was not detected in small mammals in the remediated area in 2016 and 2018 and was also not detected in four of the five small mammal samples from the unremediated area in 2018. These results indicate that mercury concentrations within biota have been reduced on a site-wide basis despite some elevated levels of mercury remaining in soil in the unremediated area. Thus, potential exposures to higher trophic level receptors have also been considerably reduced which is consistent with the RAOs developed for the site.

QUESTION B: *Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?*

LCP Bridge Street

There have been no changes in the physical conditions of the LCP Bridge Street subsite or land uses that would affect the protectiveness of the selected remedy. The exposure assumptions and toxicity values that were used to estimate the potential risk and hazards to human health and ecological receptors from exposure to LCP Bridge Street subsite contaminants followed the general practice at the time the risk assessment was performed. Although specific parameters and toxicity values may have changed, the risk assessment process that was used is still consistent with current practices and the need for a remedial action remains valid.

The RAOs and remedial goals discussed under Section II remain valid as well. For groundwater, the remedy identified in the ROD includes containment of groundwater inside the soil/sediment containment area at the subsite in both the shallow and the deep aquifers and ICs in the form of deed restrictions to prohibit the use of groundwater, and restoration of groundwater quality outside the soil/sediment containment area to levels which meet state and federal standards. Groundwater within the containment area is being controlled by an extraction and treatment system and no potable wells are impacted by LCP Bridge Street subsite-related contamination. The excavation of contaminated soils and sediments was intended to interrupt potential future commercial/industrial exposure pathways and to remove contaminant pathways to ecological receptors. Shallow soils associated with unacceptable risks were excavated, treated, and relocated to the onsite soil/sediment containment area. The most significant risk driver in the shallow soils was mercury, therefore, a cap was placed over shallow soils with mercury concentrations exceeding 0.1 mg/kg, which was determined to be protective of human health and the environment for any foreseeable future activity at this subsite. Surface soils contaminated with PCBs above 1 mg/kg and subsurface soils with PCBs above 10 mg/kg were excavated and disposed of off-site. These levels remain protective of human health, based on the commercial/industrial exposures that are expected to occur at this subsite.

The remedial goal for contaminated sediment in the ROD was the site-specific total mercury background value identified within sediments from the West Flume at locations upstream of the site (0.2 mg/kg). This is also equivalent to the July 2014 NYSDEC Screening and Assessment of

Contaminated Sediment guidance which identifies 0.2 mg/kg as a concentration where sediments are considered to be of low risk to aquatic life (i.e., Class A values). Surface water concentrations are compared to the NYSDEC Part 703 Surface Water Quality Standards for protection of wildlife (2.6 ng/L), which are still valid. Post-remediation monitoring has been conducted in all areas where contaminated soils and sediments have been excavated. Mercury concentrations in sediment and surface water from the West Flume and Wetland C have continued to decline to levels below cleanup goals. Mercury concentrations in Wetland A sediment and surface water, however, remain elevated. Exposures to humans are not considered to be likely since this site is not accessible to the public and fish within Wetland A are not present or are small and not large enough for human consumption. Exposures to ecological receptors are not currently considered significant, since biota sampling indicated stabilized results below baseline levels, thus indicating a lack of significant impacts to higher trophic level receptors. Further, Wetland A is often dry at certain times during the warmer months as recharge from precipitation is limited due to the presence of thick vegetation on the landfill cover. As a result, fish and predatory birds that could be exposed are infrequently present. Therefore, although some individual ecological receptors may be exposed to elevated mercury from sediment, impacts at the community level are not currently considered significant. Nevertheless, supplemental sediment and soil sampling results from 2018, 2020, and 2021 indicate that additional remedial action is needed to ensure long-term protectiveness to ecological receptors by preventing any further transport of mercury into the wetland from the upland areas sampled.

Vapor Intrusion

The potential for vapor intrusion was evaluated during the 2009 FYR. During that evaluation, groundwater concentrations were compared to health-based screening criteria provided in the *EPA 2002 Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils*. This guidance provides concentrations of chemicals in groundwater associated with indoor air concentrations at acceptable levels of cancer risk and noncancer hazard using residential exposure assumptions. At the time, no occupied buildings were above the contaminated groundwater, and the FYR recommended that future FYRs should continue to evaluate this pathway if the buildings become occupied or if new buildings are constructed over the contaminated groundwater. As of this current FYR, no buildings have been constructed or have become occupied over the contaminated groundwater and there are no plans in either case prior to the next FYR.

Changes in Toxicity and Other Contaminant Characteristics

In 2020, the New York State Department of Health Drinking Water Program formally adopted the drinking water MCLs of 10 ng/L for PFOA and PFOS as well as 1 µg/L for 1,4-dioxane. Although PFAS compounds and 1,4-dioxane were detected in samples collected from the subsite, the maximum concentrations of these chemicals were below the referenced standards. There are currently no groundwater or drinking water standards for PFBA. In May 2022, EPA released updated Regional Screening Levels for several PFAS compounds, including PFOA and PFOS, using toxicity values from ATSDR. The tapwater RSLs for these chemicals (based on a hazard of 1) are 60 ng/L and 40 ng/L, respectively, and are greater than the current State standards. Any

further updates related to groundwater or drinking water standards and toxicity values of emerging contaminants will be monitored through the next FYR period.

GBNMC

There have been no changes in the physical conditions of the GBNMC Site over the past five years that would change the protectiveness of the remedy. Land use assumptions, exposure assumptions and pathways, and clean-up levels considered in the decision documents followed Agency guidance and policy and remain valid. Although specific parameters may have changed since the time the risk assessment was completed, the process that was used also remains valid.

The RAOs discussed under Section II remain valid as well. The current GBNMC Site and surrounding land use is primarily commercial and industrial and is not expected to change in the future. Potential exposure to channel sediments and floodplain soil has been mitigated through excavation, placement of clean material and restoration. Although the GBNMC HHRA concluded that exposure to contaminants in fish tissue, primarily methylmercury and PCBs, would result in noncarcinogenic hazards that exceeded EPA's benchmarks, there is currently a fish advisory for consumption of fish caught from Onondaga Lake and its tributaries. In addition, an analysis of fish tissue samples collected from Geddes Brook and Ninemile Creek between 2015 and 2017 indicates that average concentrations, and in some cases 95% UCLs, for total mercury (conservatively assumed to be methylmercury), PCBs and PCDD/PCDF are below the risk-based RGs and target levels established for the Site. Statistical metrics used to determine whether fish tissue results have met these goals and target concentrations are currently under development, and fish tissue monitoring will continue into the next FYR period for further trend evaluation.

Although the ecological risk assessment screening and toxicity values used to support the 2009 GBNMC RODs may not necessarily reflect the current studies and values, the selected cleanup levels and screening values are still appropriate and protective of ecological receptors. Furthermore, where RGs were not established, monitoring studies comparing baseline and post-remediation conditions for media and biota were conducted to determine the protectiveness of the remedy, which is a valid method of measuring protectiveness in this system. The data collected post-remediation continue to show that concentrations in Geddes Brook and Ninemile Creek biota are lower than baseline conditions.

Changes in Toxicity Characteristics

At the time of the GBNMC RODs, the human health target fish tissue concentrations for PCDD/PCDFs were based on RME carcinogenic risks at risk targets ranging from $1x10^{-5}$ (1.0 ng/kg) to $1x10^{-4}$ (10.0 ng/kg). Noncarcinogenic targets were not developed for PCDD/PCDFs prior to the issuance of the ROD since a noncarcinogenic reference dose (RfD) was not available. Subsequent to the issuance of the ROD, an RME noncancer endpoint target of 4.2 ng/kg was developed using the EPA 2012 reference dose of $7x10^{-10}$ mg/kg-day. This target falls within the range based on carcinogenic risks. Therefore, the PCDD/PCDF targets for comparison with the PCDD/PCDF fish tissue data considered in this FYR included the noncancer endpoint, 4.2 ng/kg (noncancer), in addition to the 10.0 ng/kg ($1x10^{-4}$) cancer risk.

QUESTION C: *Has any* ***other*** *information come to light that could call into question the protectiveness of the remedy?*

There is no new information that calls into question the protectiveness of the LCP Bridge Street and GBNMC site remedies.

VI. ISSUES/RECOMMENDATIONS

Table I, below, presents the recommendations and follow-up actions for this FYR. There are also some suggestions to improve remedy performance noted below.

Table I: Issues and Recommendations

<table>
<tr><th colspan="5">Issues/Recommendations</th></tr>
<tr><td colspan="5">OU(s) without Issues/Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td colspan="5">None.</td></tr>
<tr><td colspan="5">Issues and Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td rowspan="3">OU: 5

(Inside Groundwater)</td><td colspan="4">Issue Category: Operations and Maintenance</td></tr>
<tr><td colspan="4">Issue: The deep zone requires further evaluation with respect to sustained inward gradients.</td></tr>
<tr><td colspan="4">Recommendation: The piezometer data from the deep zone and the need for potential additional optimization measures should be evaluated.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>State</td><td>9/30/2025</td></tr>
<tr><td rowspan="3">OU: 5

(Soil/Sediment)</td><td colspan="4">Issue Category: Remedy Performance</td></tr>
<tr><td colspan="4">Issue: Mercury levels in Wetland A sediment and surface water are above the cleanup goals. Mercury concentrations in upland soil located adjacent to Wetland A are also at levels above criteria.</td></tr>
<tr><td colspan="4">Recommendation: Sediment and surface water data should continue to be collected from Wetland A and compared to the cleanup goals established by the ROD and historical benchmarks to evaluate what actions are necessary to address the elevated contaminant concentrations identified in sediment there. Additional sampling of upland soil located adjacent to Wetland A may also be conducted to help evaluate additional remedial measures to address elevated levels of mercury present in this area.</td></tr>
</table>

Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	12/31/2025
OUs: 20 and 24	**Issue Category:** Institutional Controls			
	Issue: All institutional controls are not in place. The selected remedies include ICs in the form of environmental easements to restrict dredging/excavating in the areas where residual contamination would remain at the surface or beneath the habitat layer at levels above that which would allow for unlimited use or unrestricted exposure.			
	Recommendation: Institutional controls should be put into place.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	State	6/30/2023

OTHER FINDINGS

In addition, the following are recommendations that were identified during the FYR and may improve management of O&M but do not affect current and/or future protectiveness:

- The analytical results from fish tissue samples collected from GBNMC in 2019 were not utilized due to concerns about data quality. Therefore, fish tissue samples should be collected from GBNMC and monitoring should continue to confirm the remedy remains protective.
- The need for additional sampling in the West Flume will be considered after review of data in the recently-received draft 2021 Annual Monitoring and Maintenance Report for LCP/GBNMC.

VII. PROTECTIVENESS STATEMENT

Table J, below, presents the operable unit and sitewide protectiveness statements.

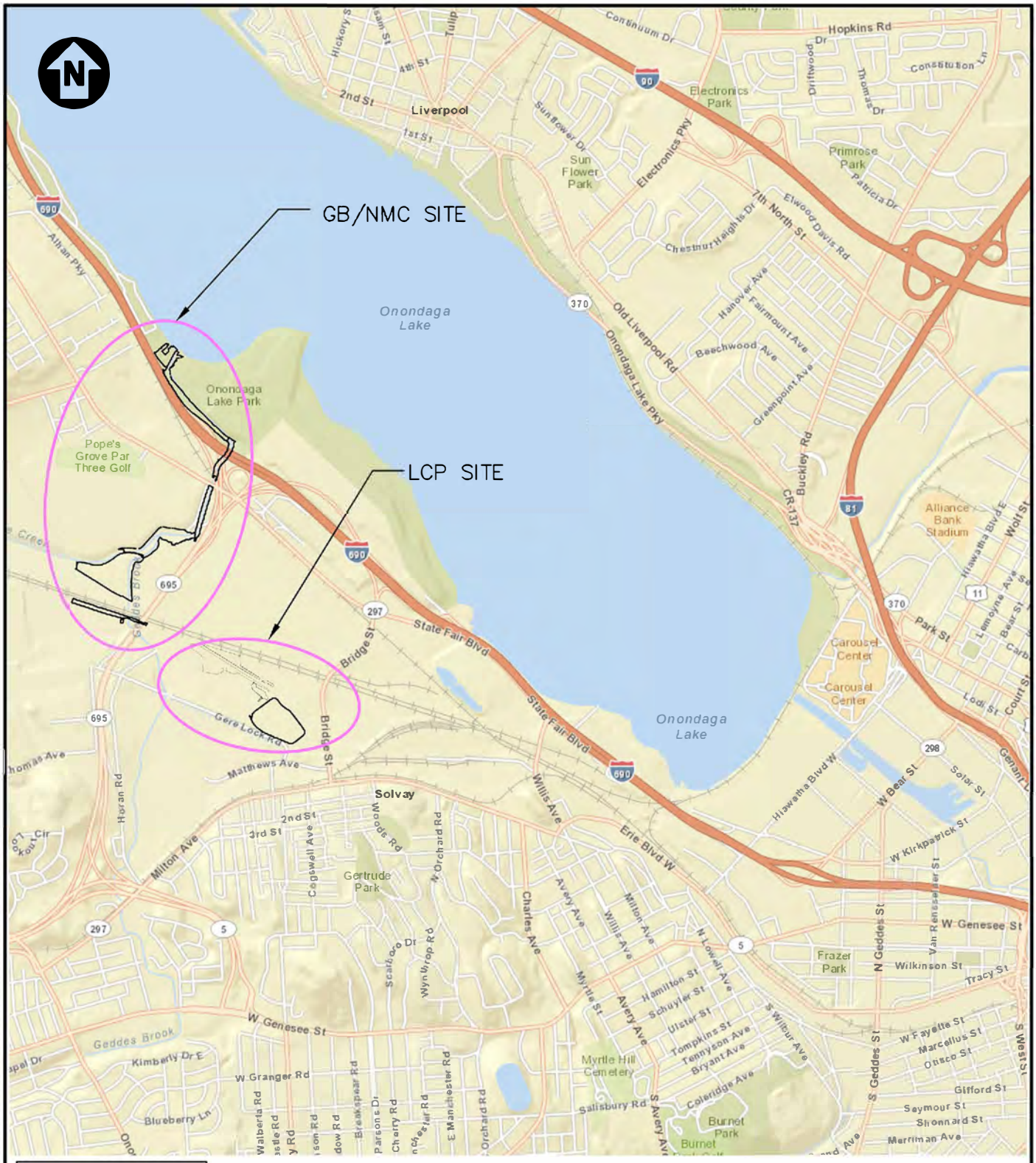
Table J: Protectiveness Statements

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
OU 05 (LCP Bridge Street Subsite)	**Short-term Protective**
Protectiveness Statement: The remedy for OU5 is protective of human health and the environment in the short-term since exposure routes have been eliminated and biota data suggest that tissue concentrations are below baseline levels. For the remedy to be protective in the long-term, additional remedial action will be needed to address elevated levels of mercury in upland soil immediately adjacent to Wetland A, and sediment and surface water in Wetland A. The remedial measures to be implemented in and adjacent to Wetland A will be determined after additional collection and evaluation of soil, surface water and sediment data. In addition, the inward gradient in the deep zone in the area of the hydraulic containment system needs to be evaluated.	
Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
OUs 20 and 24 (GBNMC)	**Short-term Protective**
Protectiveness Statement: The remedy for OU20 and 24 is protective of human health and the environment in the short-term because sediment and floodplain soils have been excavated and remediated areas have been restored to reduce potential exposure to Site contaminants. For the implemented actions to be protective in the long-term, ICs need to be implemented.	

VIII. NEXT REVIEW

The next FYR report for GBNMC and the LCP Bridge Street subsite of the Onondaga Lake Superfund Site is required five years from the completion date of this review.

APPENDIX A – FIGURES



LATITUDE: N43° 04' 30"
LONGITUDE: W76° 13' 56"

SOURCE ARCVIEW GIS– WORLD STREET MAP

FIGURE 1

Honeywell

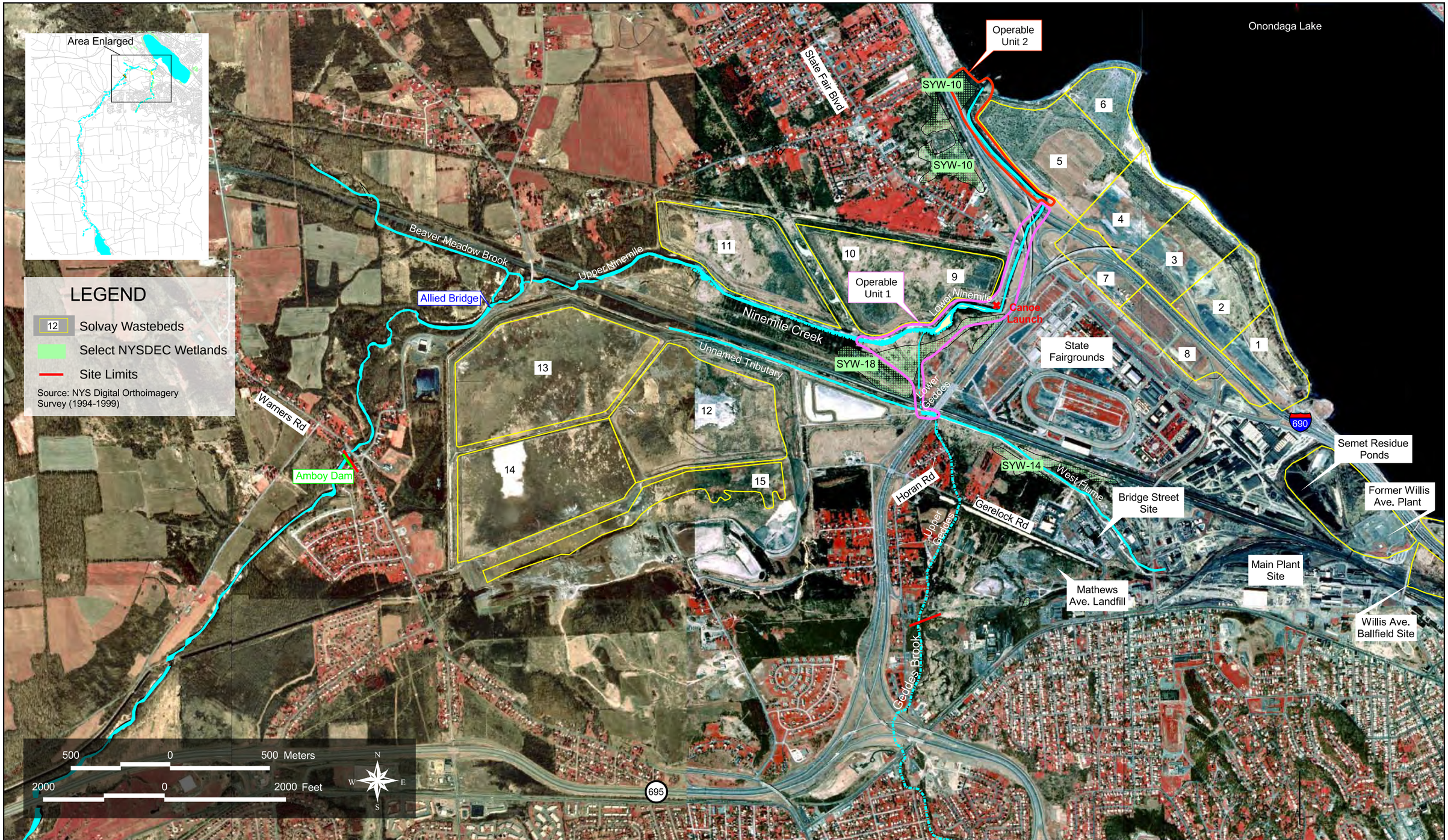
LCP/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

SITE LOCATION MAP

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

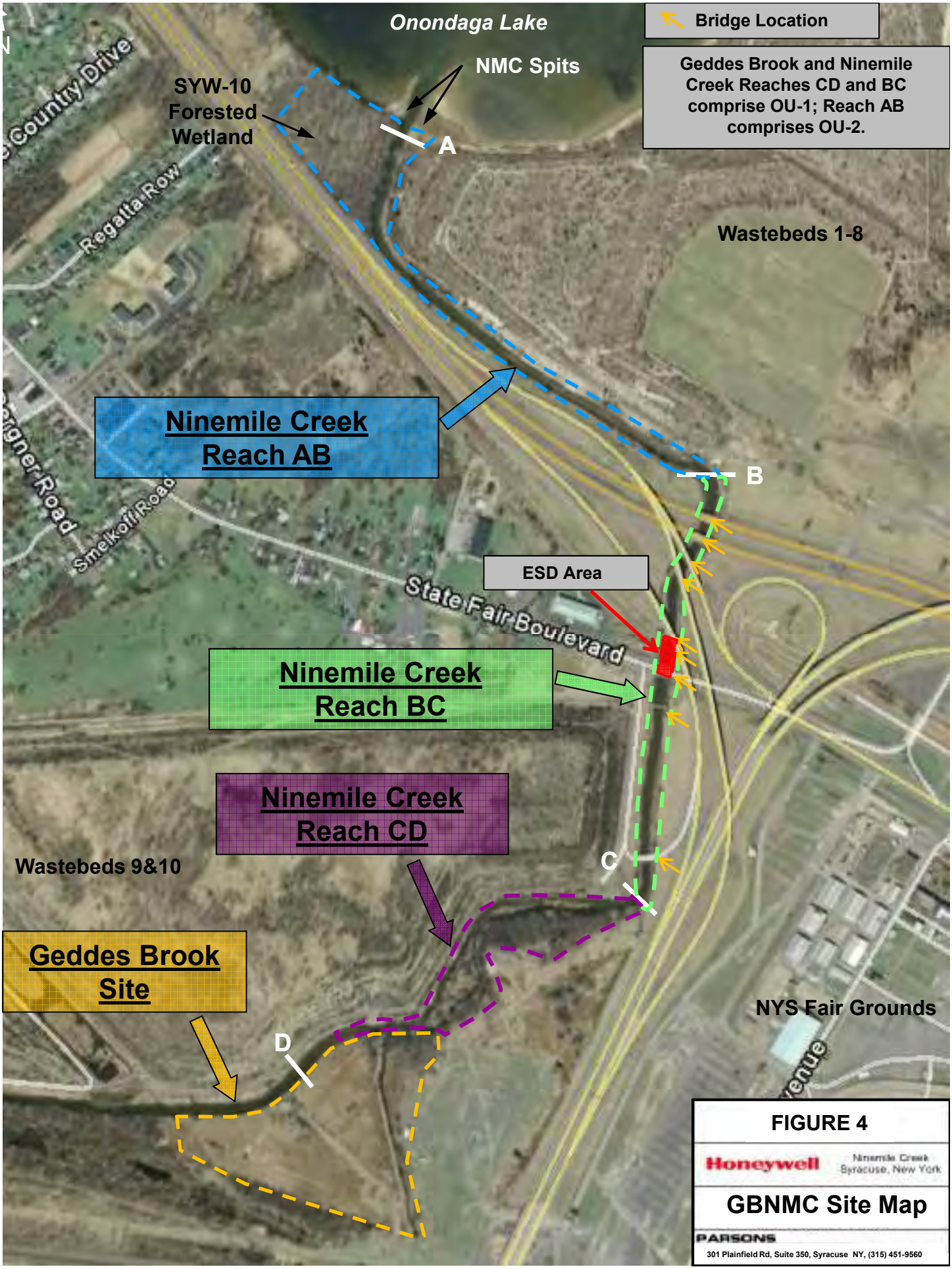
FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-SLM OMM 2020.DWG
PLOT DATE: 8/2/2010 1:51 PM PLOTTED BY: RUSSO, JILL [US-US]

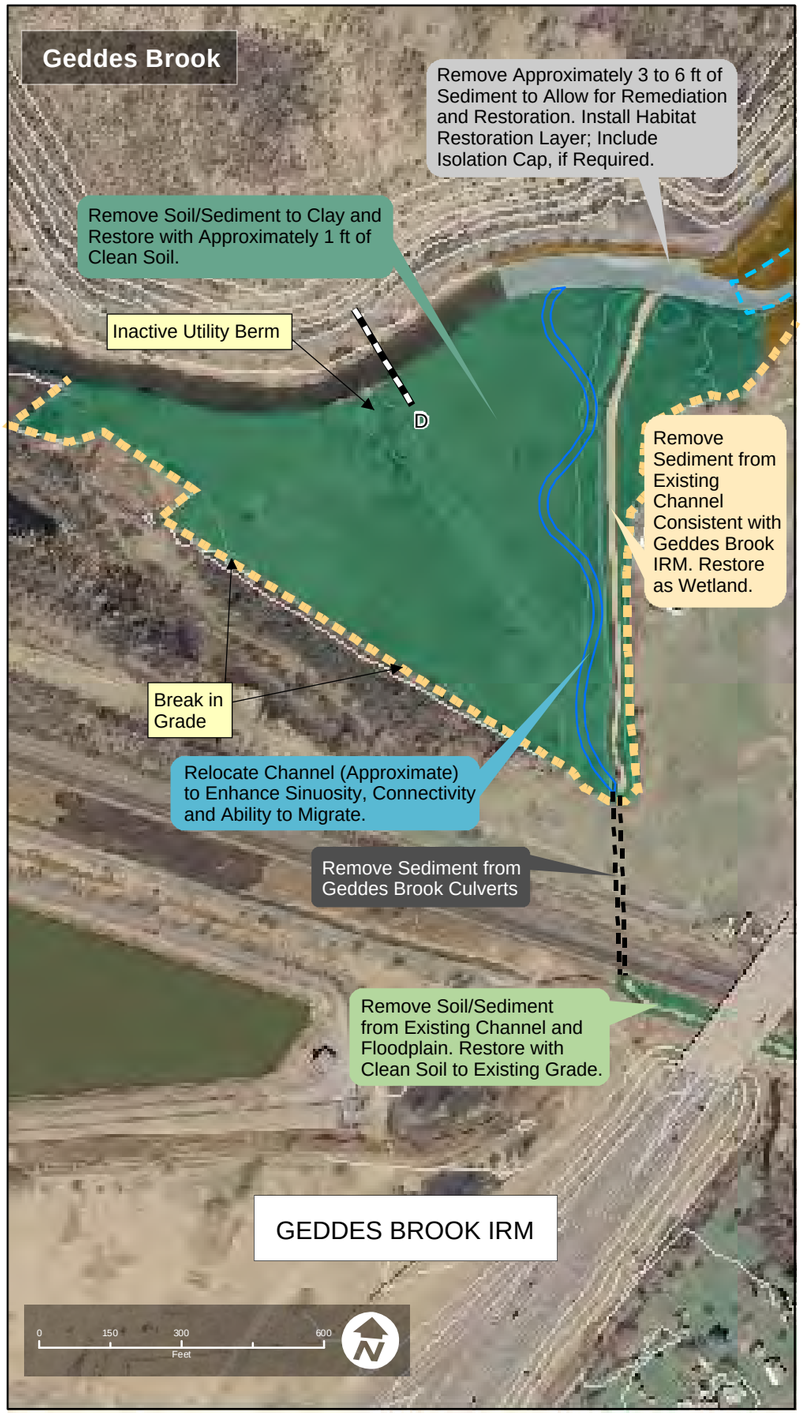
Figure 2: LCP Site Plan

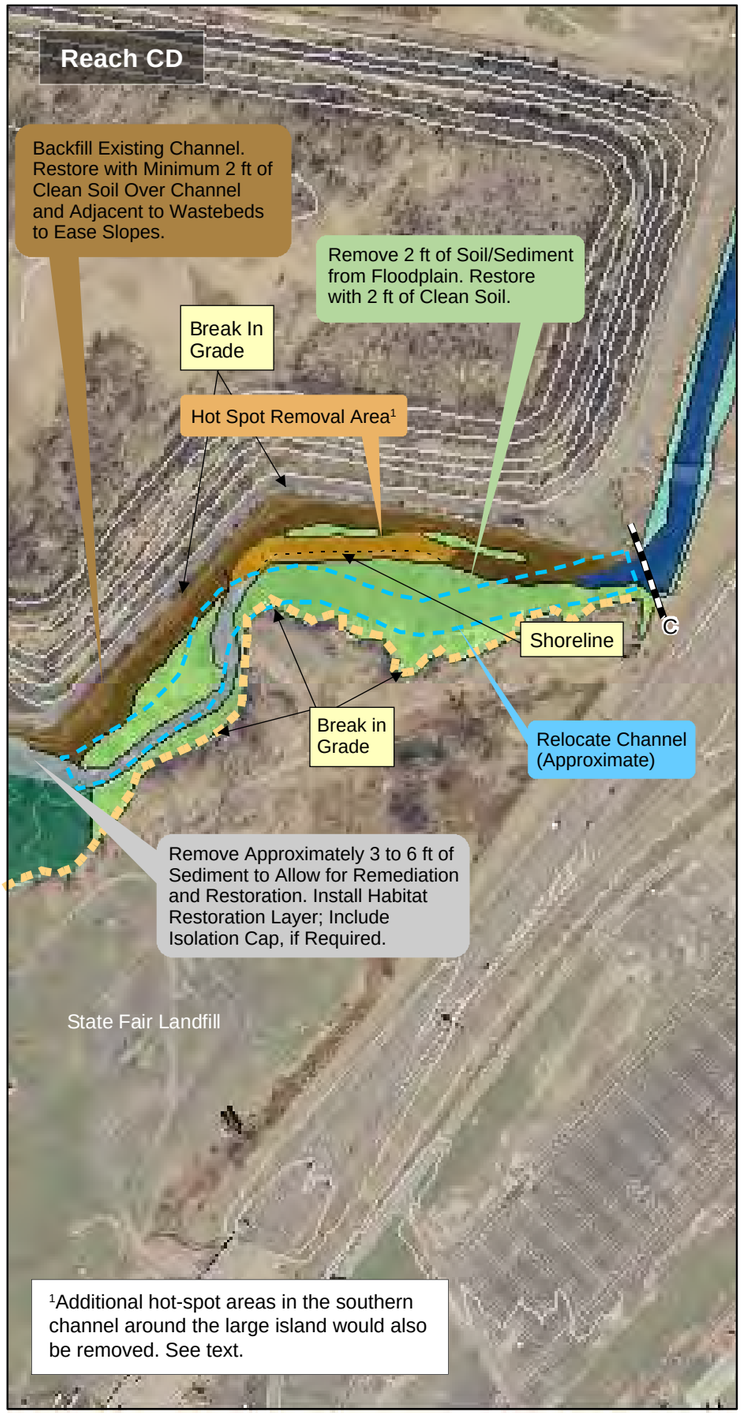


Source: Modified from RI Figure 1-2 (TAMS/Earth Tech, 2003c)

Figure 3
Geddes Brook/Ninemile Creek and Vicinity


Onondaga Lake
Bridge Location
Geddes Brook and Ninemile Creek Reaches CD and BC comprise OU-1; Reach AB comprises OU-2.
NMC Spits
SYW-10 Forested Wetland
A
Regatta Row
Wastebeds 1-8
Ninemile Creek Reach AB
B
Smelkoff Road
ESD Area
State Fair Boulevard
Ninemile Creek Reach BC
Ninemile Creek Reach CD
Wastebeds 9&10
C
Geddes Brook Site
D
NYS Fair Grounds
FIGURE 4
Honeywell
Ninemile Creek Syracuse, New York
GBNMC Site Map
PARSONS
301 Plainfield Rd, Suite 350, Syracuse NY, (315) 451-9560





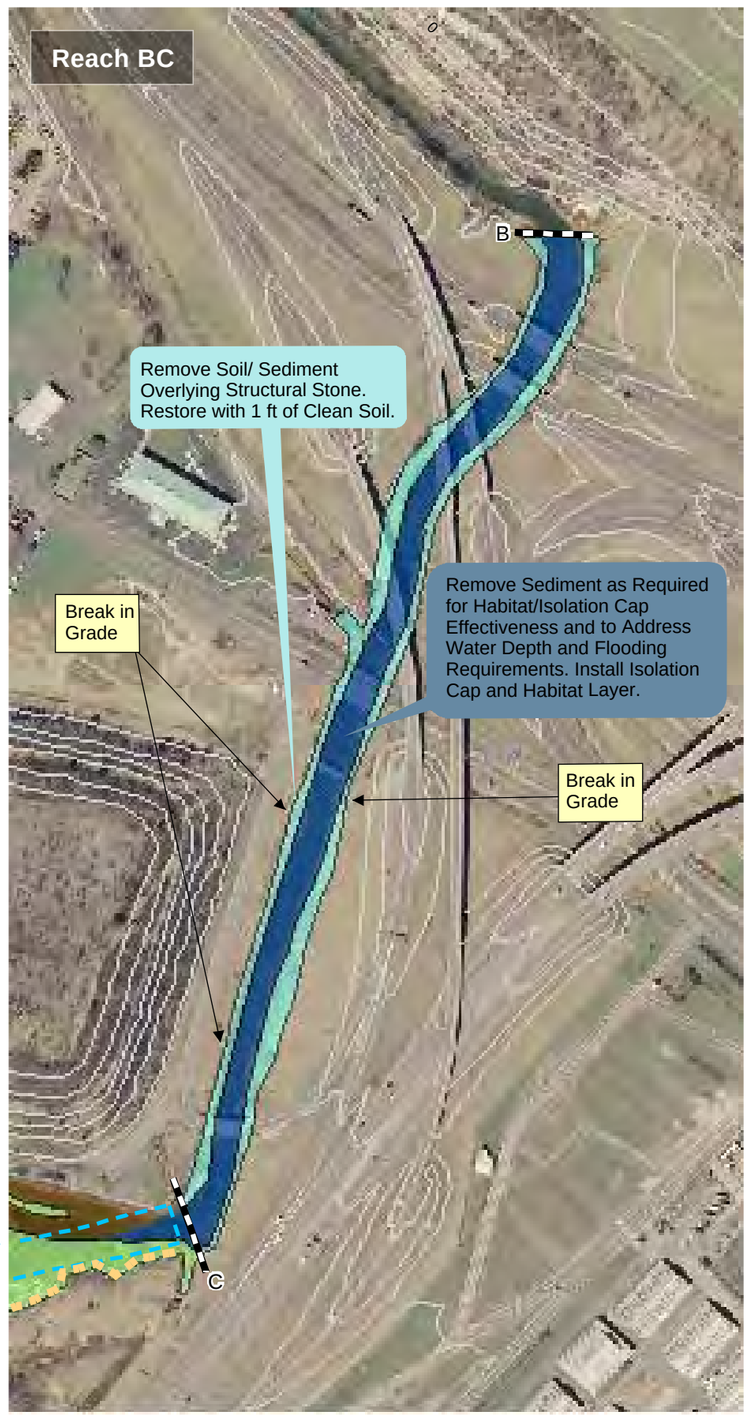
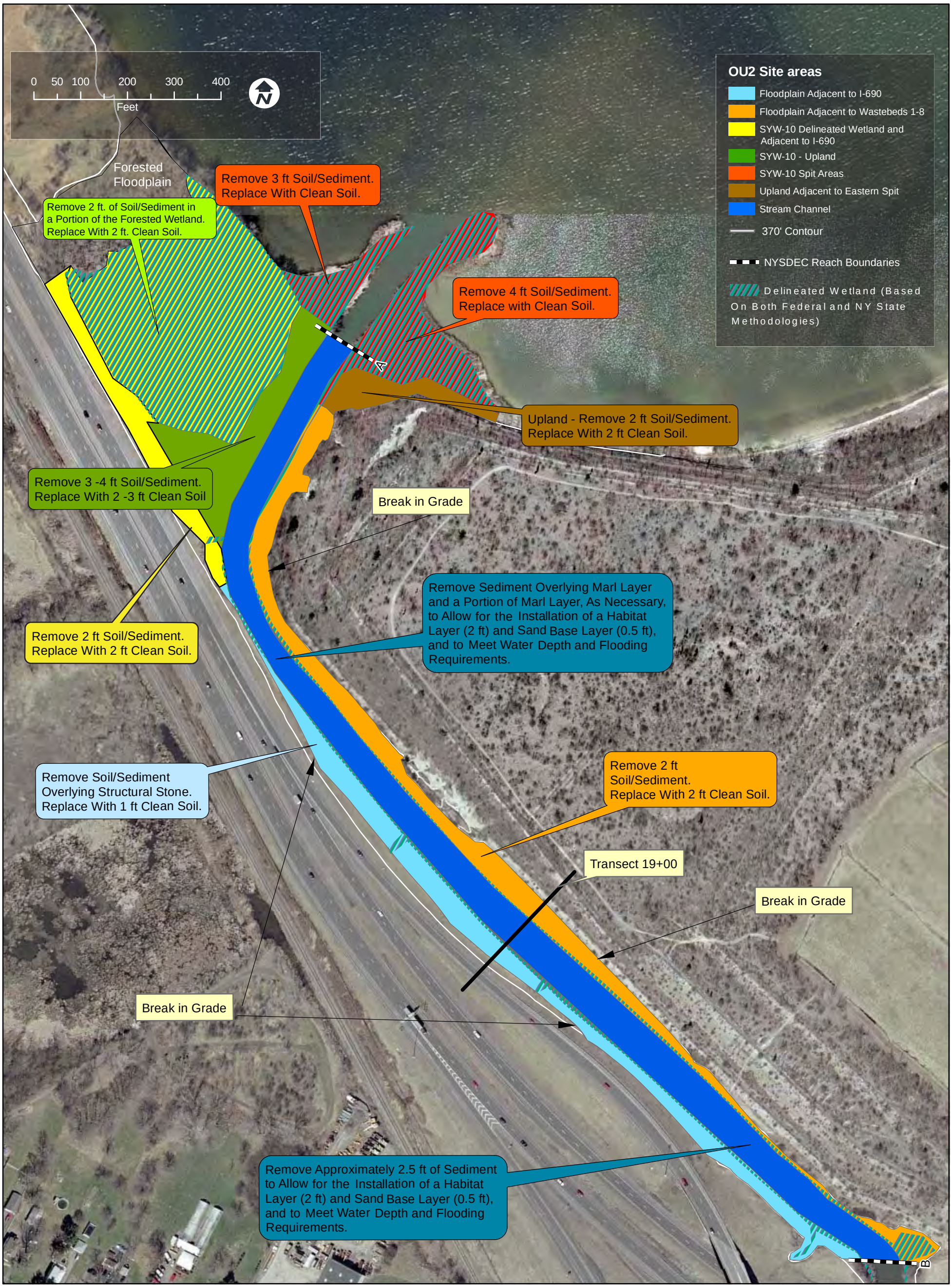


Figure 5a.
Ninemile Creek OU1 Alternative 3 (Selected Remedy) Remedial Approach and Geddes Brook IRM

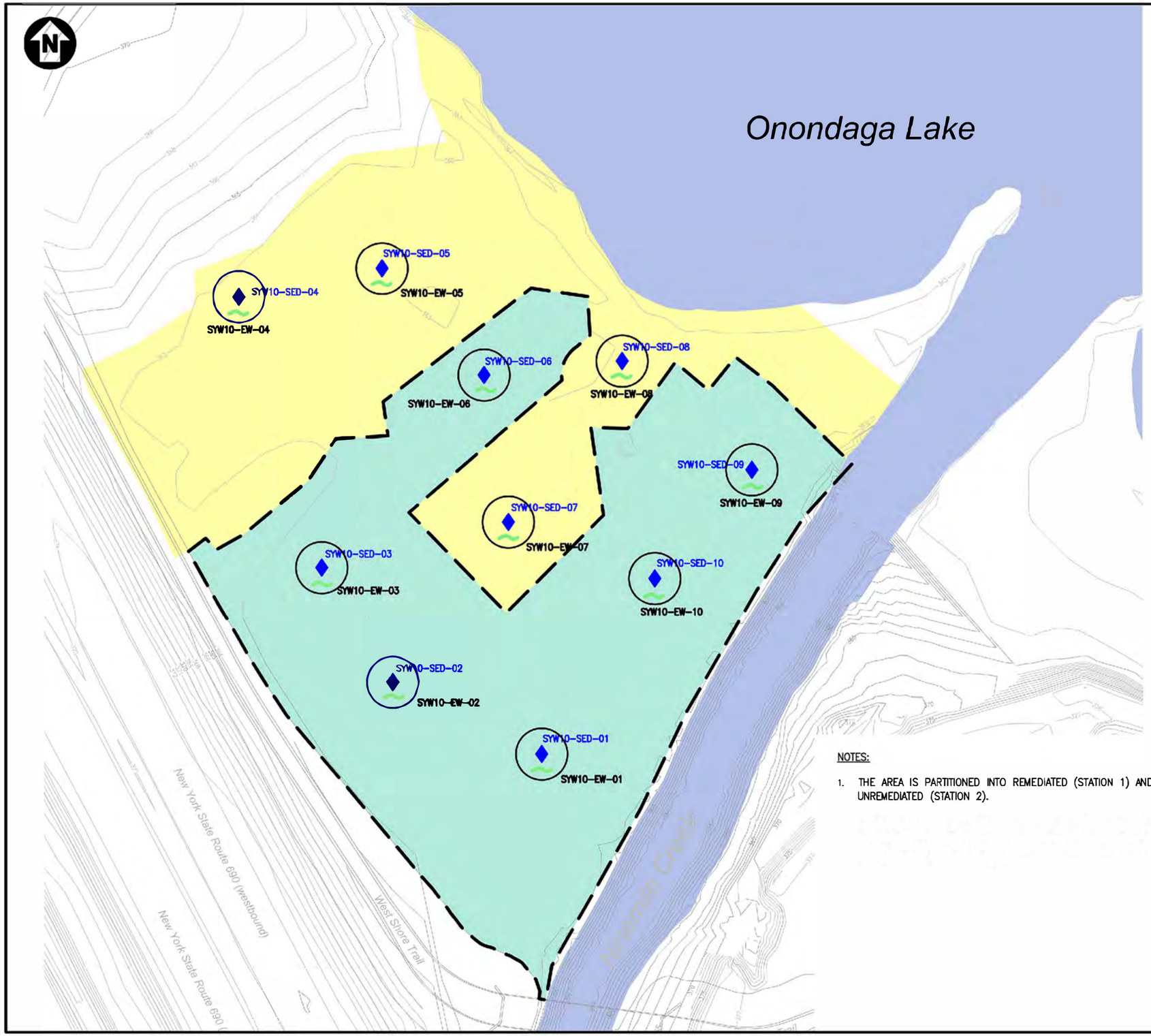
Source: Modified from Supplemental FS (Parsons, 2008a)

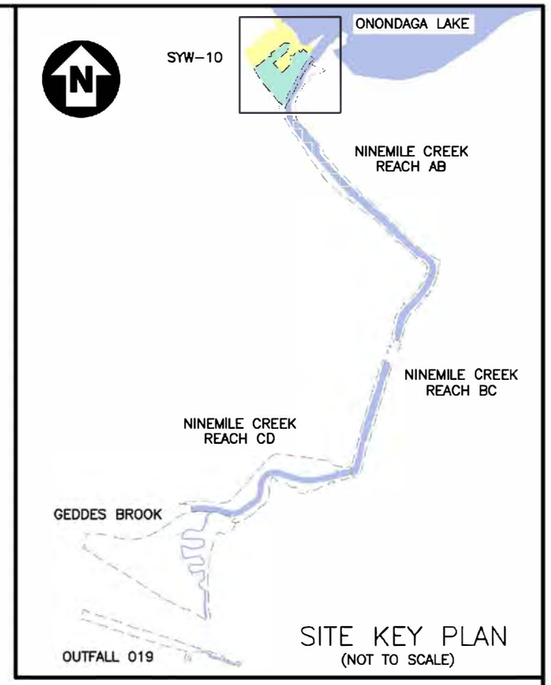


Note: Removal depths noted above are preliminary and would be finalized during remedial design.

Source: Modified from OU2 Supplemental FS (Parsons, 2009)

Figure 5b
Ninemile Creek OU2 Alternative 3 (Selected Remedy) Remedial Approach





LEGEND:

- RESTORATION AREA
- EXISTING ELEVATION CONTOUR
- STREAM BED
- SMALL MAMMAL REMEDIATED AREA, STATION 1
- SMALL MAMMAL UNREMEDIATED AREA, STATION 2
- SEDIMENT SAMPLING LOCATION
- DESIGNATED EARTHWORM SAMPLING AREA STATION
- EARTHWORM SAMPLES

NOTES:

1. THE AREA IS PARTITIONED INTO REMEDIATED (STATION 1) AND UNREMEDIATED (STATION 2).

80 40 0 80 160

SCALE: 1"=80'

FIGURE 6

Honeywell

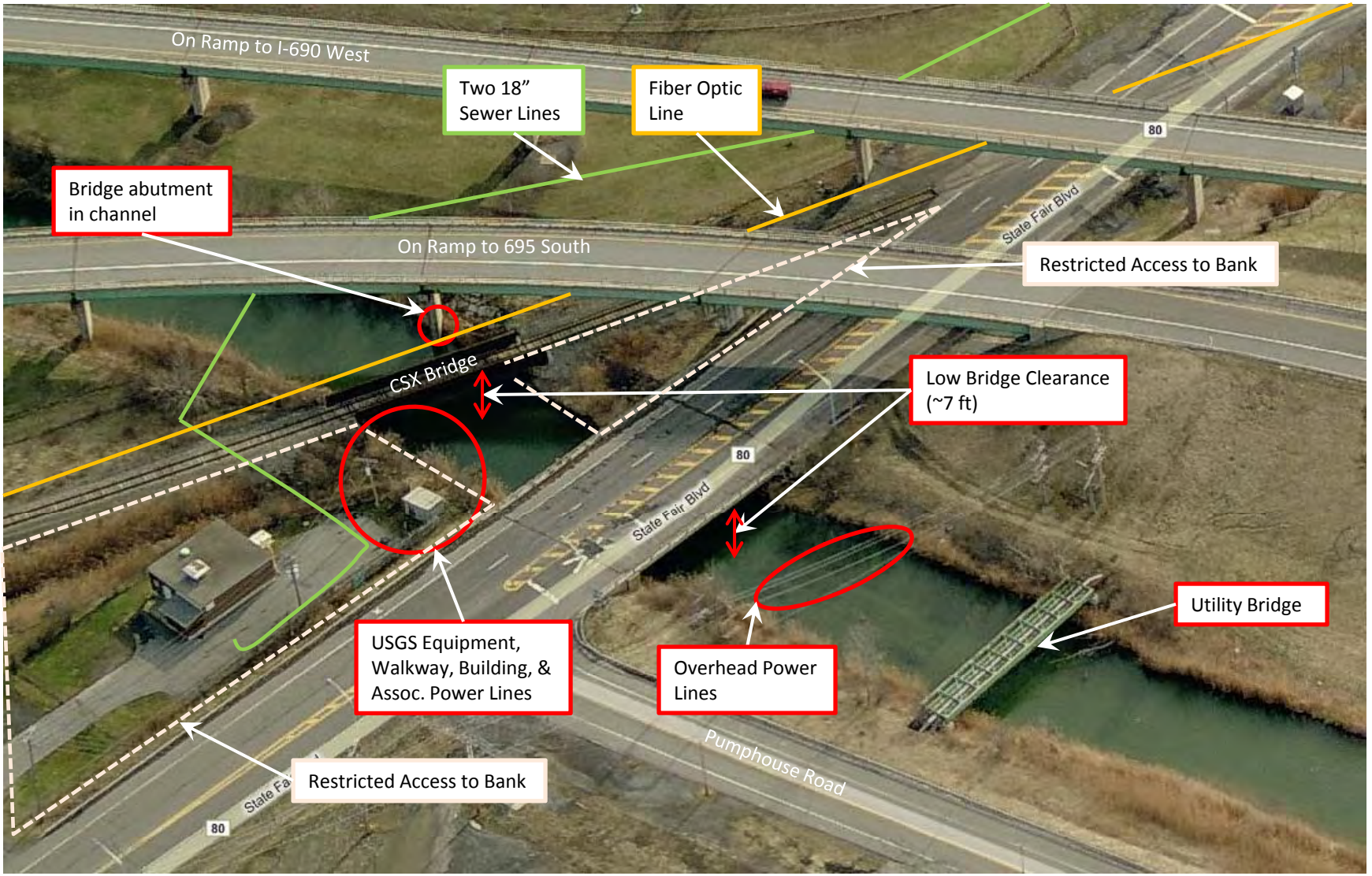
LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

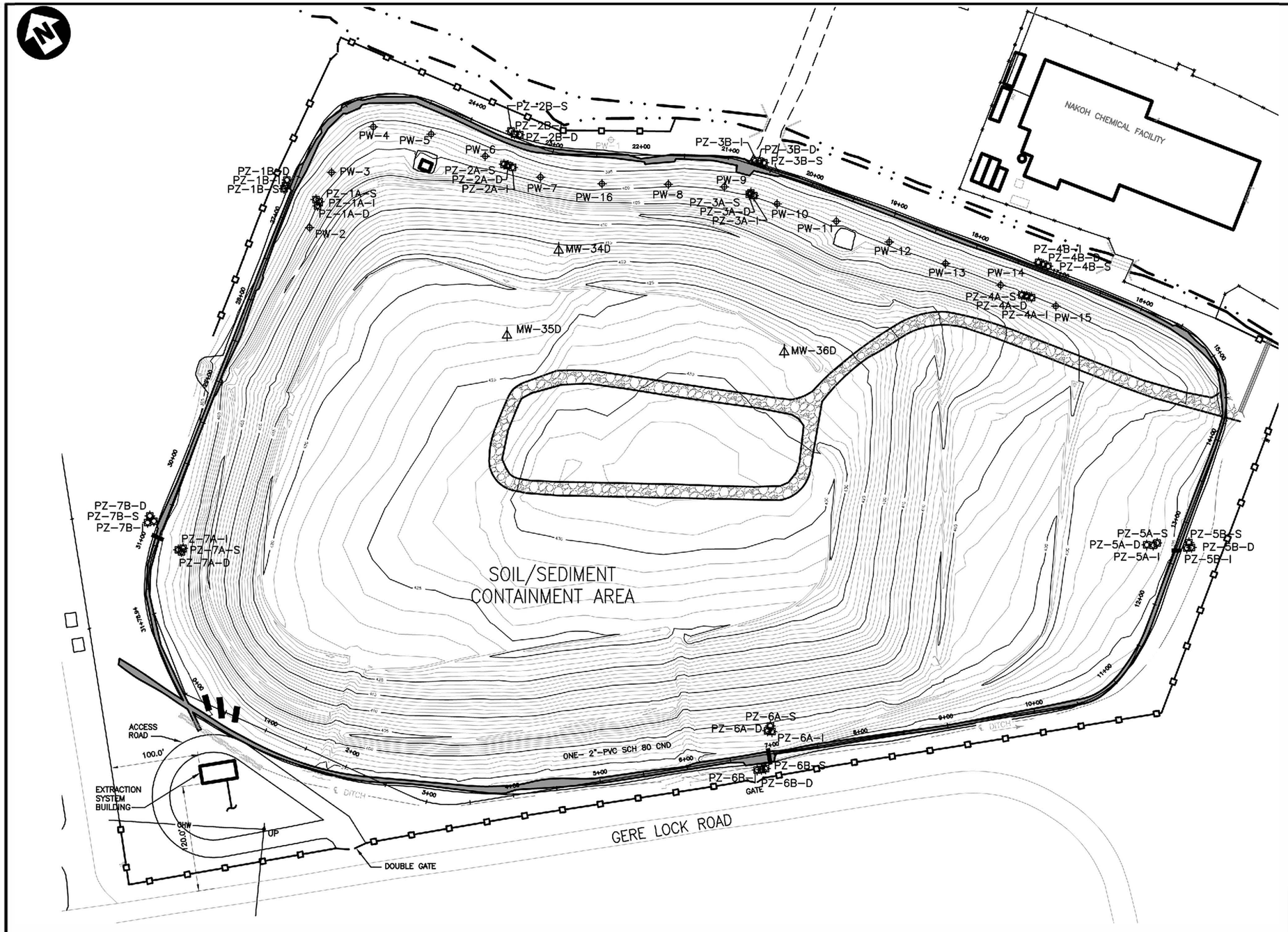
SYW-10 REMEDIAL APPROACH AREA

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GP-NMC 2021 PYM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-SYW-10-2016-BIOTA SAMPLING LOCATIONS.DWG
PLOT DATE: 5/9/2022 1:34 PM PLOTTED BY: RUSSO, JILL [US-US]

Figure 7 – Aerial View of ESD Area (Utility Bridge to Sewer Lines)





LEGEND:

- PUMPING WELL LOCATIONS
- PIEZOMETER LOCATIONS
- GROUNDWATER MONITORING WELL LOCATIONS

120 60 0 120 240

SCALE: 1"=120'

FIGURE 8

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

LCP PIEZOMETER/MONITORING
WELL LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-LCP-OMM 2020.DWG
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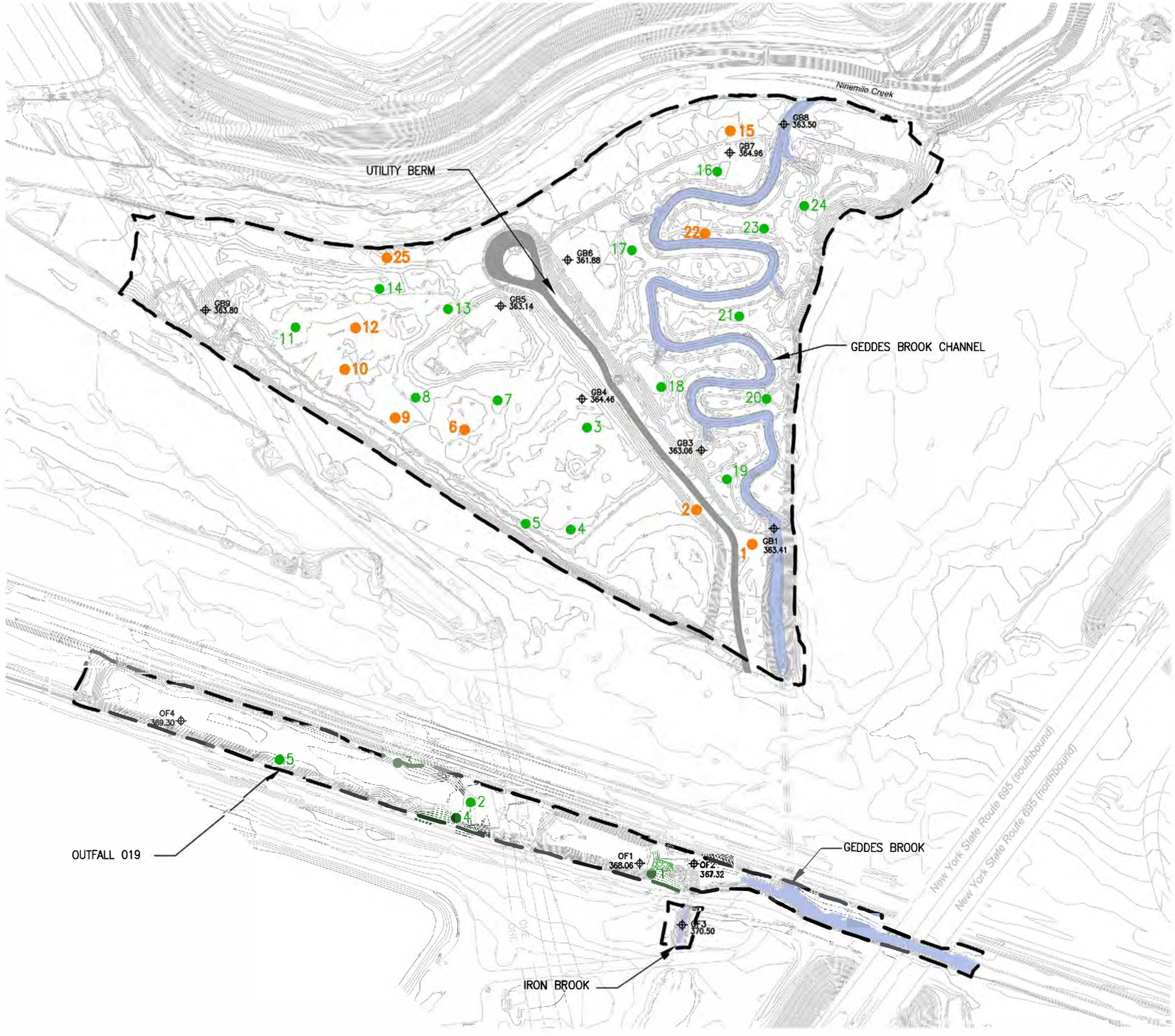

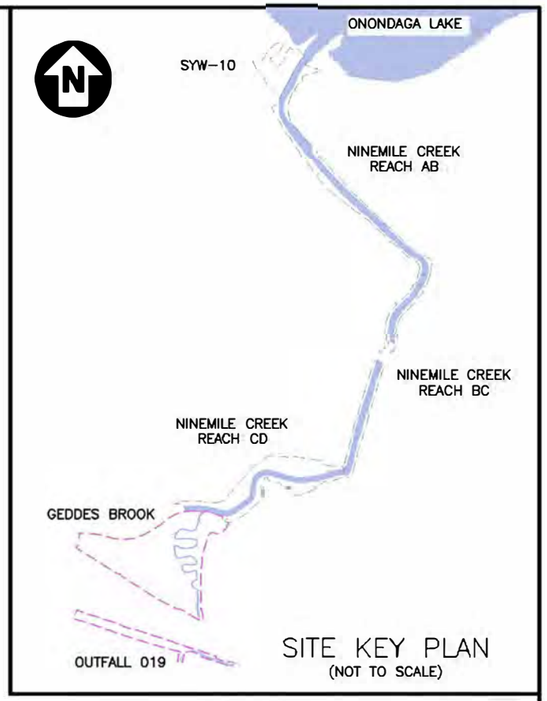

SITE KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- EXISTING ELEVATION CONTOUR
- STREAM BED
- VEGETATED TRAFFICABLE LANE
- RIPARIAN LOCATIONS
- WETLAND LOCATIONS
- STAFF GAUGES

NOTES:

1. LOCATION DESIGNATIONS ARE BASED ON FINAL DESIGN (PARSONS, 2011).

200 100 0 200 400

SCALE: 1"=200'

FIGURE 9a

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

GEDDES BROOK AND OUTFALL 019 QUANTITATIVE VEGETATION MONITORING PLOT LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 • 315-451-9560

FILE NAME: P:\HONEYWELL-SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-GB-VEGPLOT-OMM 2020.DWG
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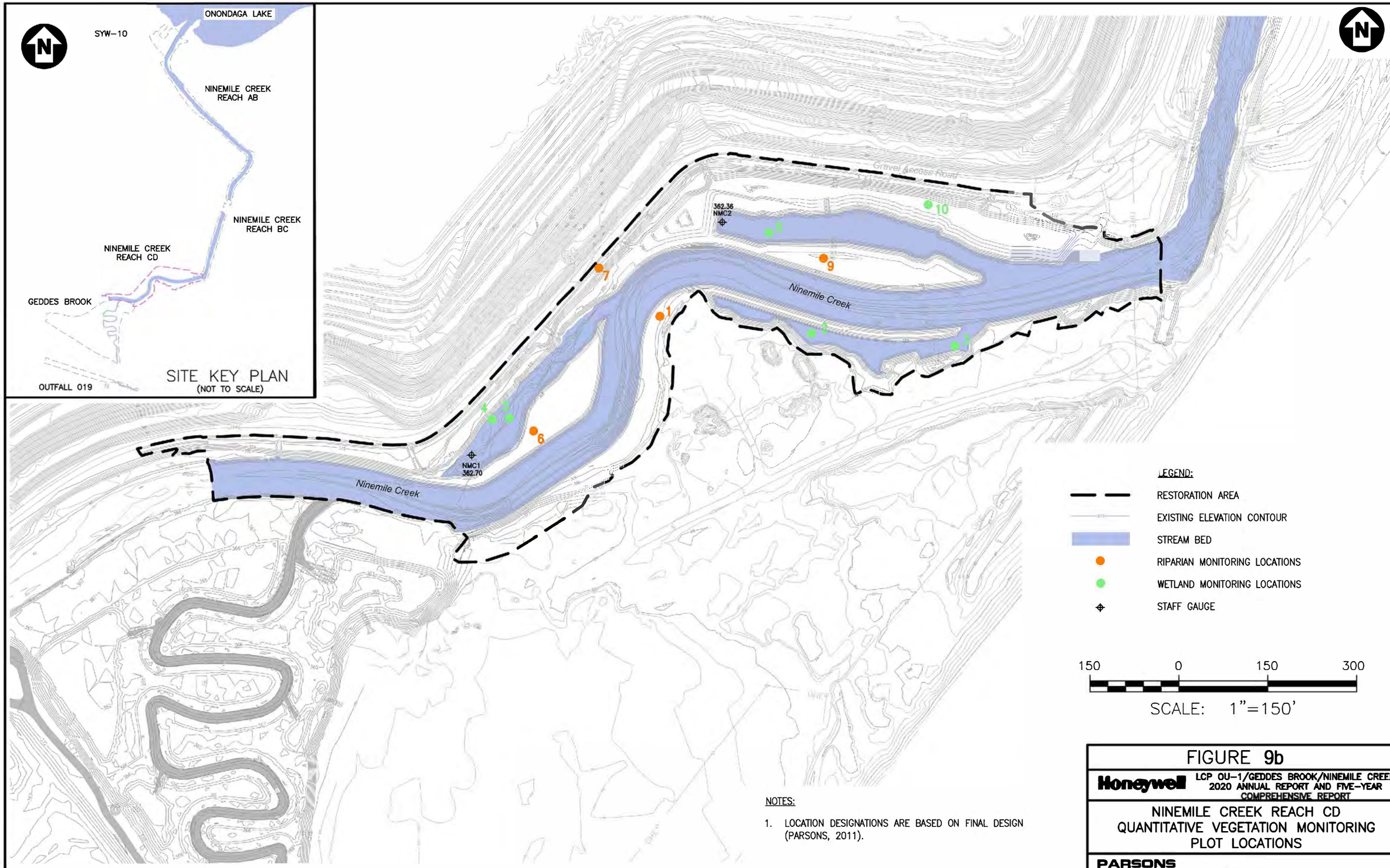


LEGEND:

- RESTORATION AREA
- EXISTING ELEVATION CONTOUR
- STREAM BED
- RIPARIAN MONITORING LOCATIONS
- WETLAND MONITORING LOCATIONS
- STAFF GAUGE

150 0 150 300

SCALE: 1"=150'

NOTES:

1. LOCATION DESIGNATIONS ARE BASED ON FINAL DESIGN (PARSONS, 2011).

FIGURE 9b

Honeywell

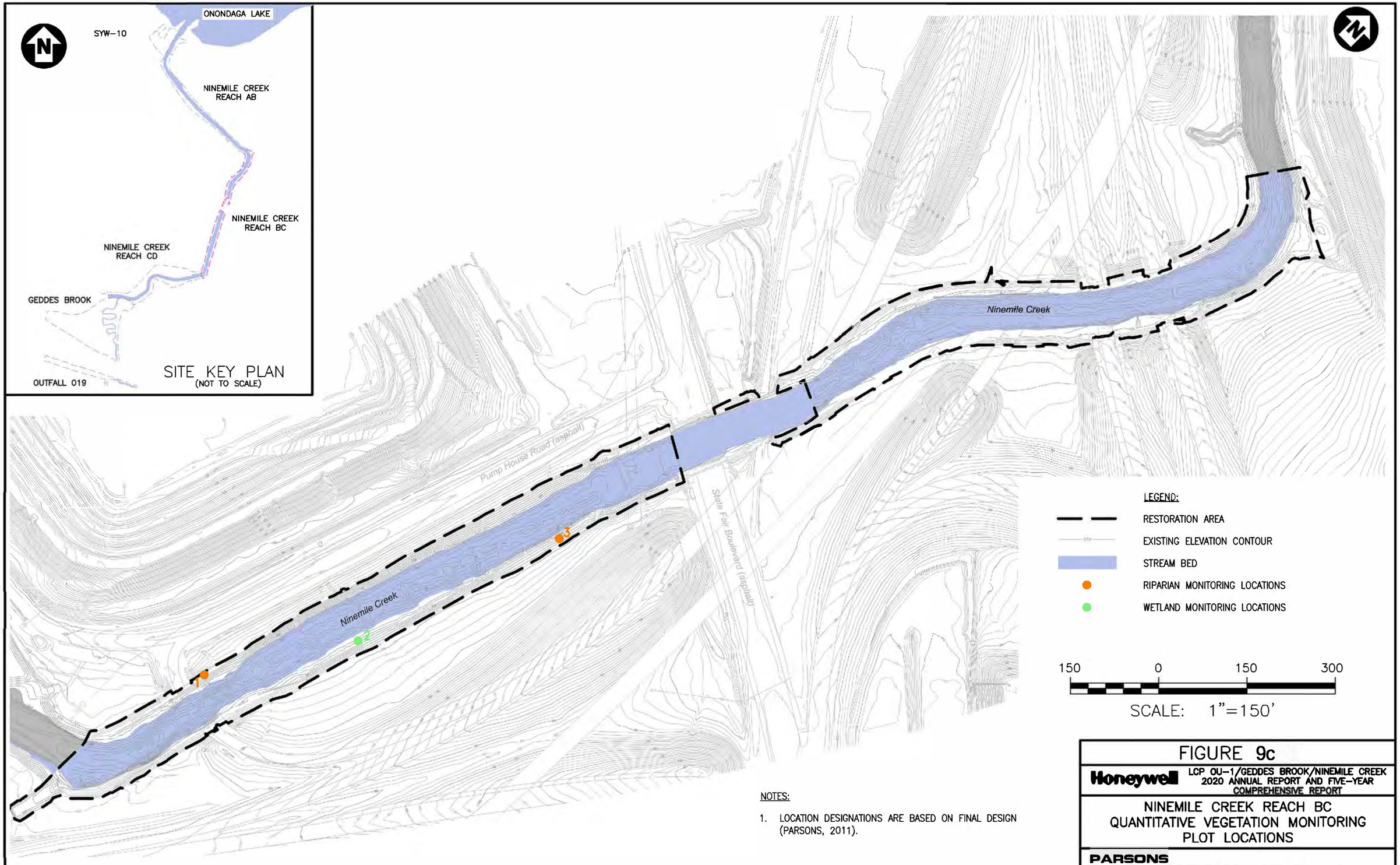
LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

NINEMILE CREEK REACH CD QUANTITATIVE VEGETATION MONITORING PLOT LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-NMC-VEGPLOT OMM 2020.DWG
PLOT DATE: 11/2/2021 3:51 PM PLOTTED BY: RUSSO, JILL

SITE KEY PLAN
(NOT TO SCALE)



LEGEND:

- RESTORATION AREA
- EXISTING ELEVATION CONTOUR
- STREAM BED
- RIPARIAN MONITORING LOCATIONS
- WETLAND MONITORING LOCATIONS

150 0 150 300

SCALE: 1"=150'

NOTES:

1. LOCATION DESIGNATIONS ARE BASED ON FINAL DESIGN (PARSONS, 2011).

FIGURE 9c

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

NINEMILE CREEK REACH BC QUANTITATIVE VEGETATION MONITORING PLOT LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL - SYR\452663 GB-NMC 2021 PWM\10 TECHNICAL CATEGORIES\2020 5-YR REVIEW\452663-NMC-VEGPLOT OMM 2020.DWG
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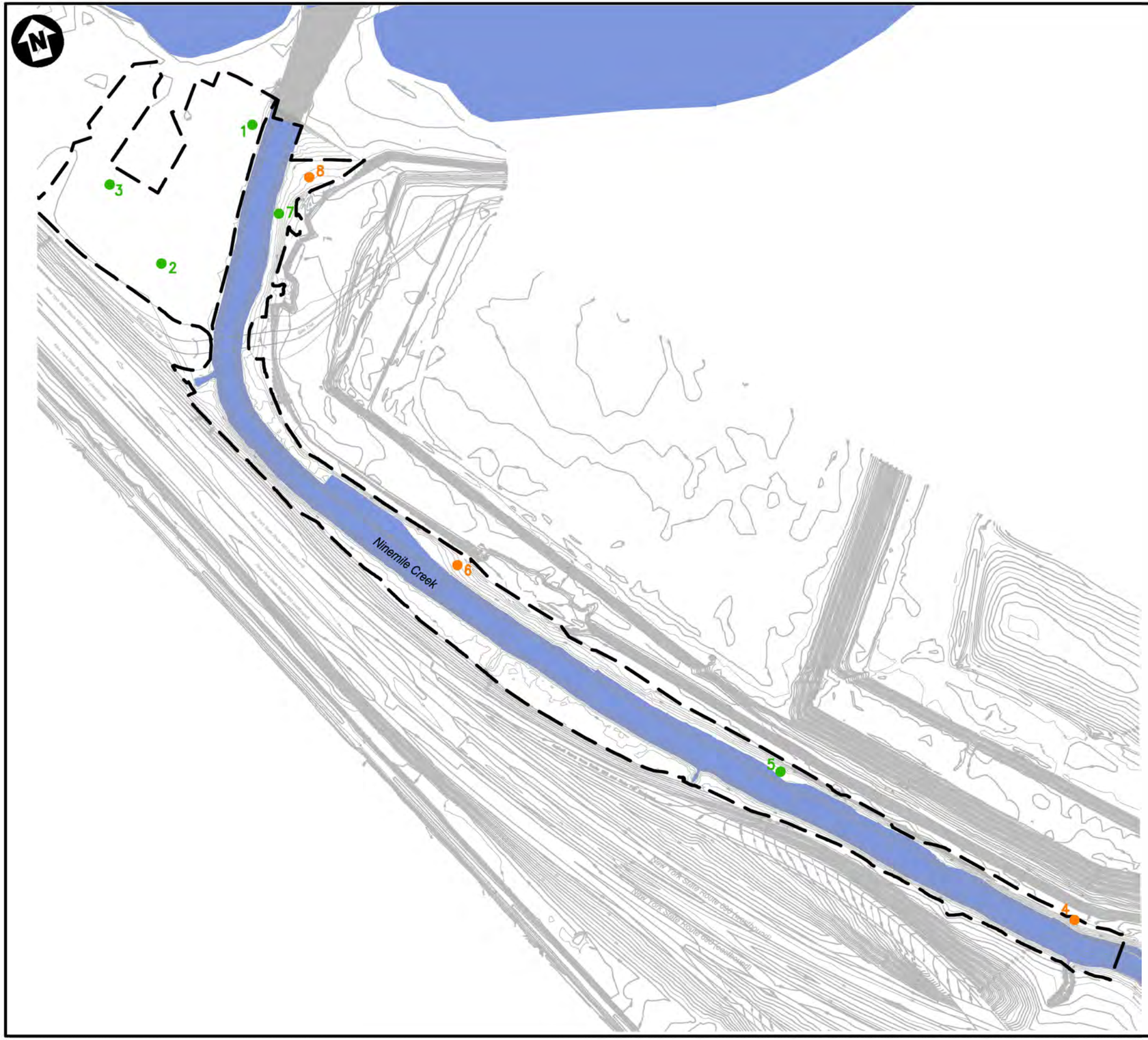

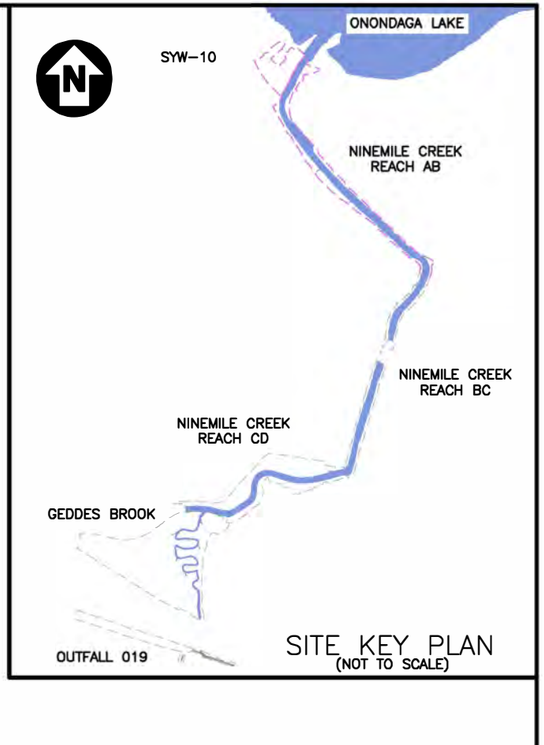

SITE KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- EXISTING ELEVATION CONTOUR
- STREAM BED
- RIPARIAN MONITORING LOCATIONS
- WETLAND MONITORING LOCATIONS

200 100 0 200 400

SCALE: 1"=200'

FIGURE 9d

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

SYW-10 AND NINEMILE CREEK REACH AB QUANTITATIVE VEGETATION MONITORING PLOT LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\450564-GB-NMC OMM 2017-2018\10 TECHNICAL CATEGORIES\2018-ANNUAL\450564-SYW-10-VEGPLOT OMM 2018.DWG
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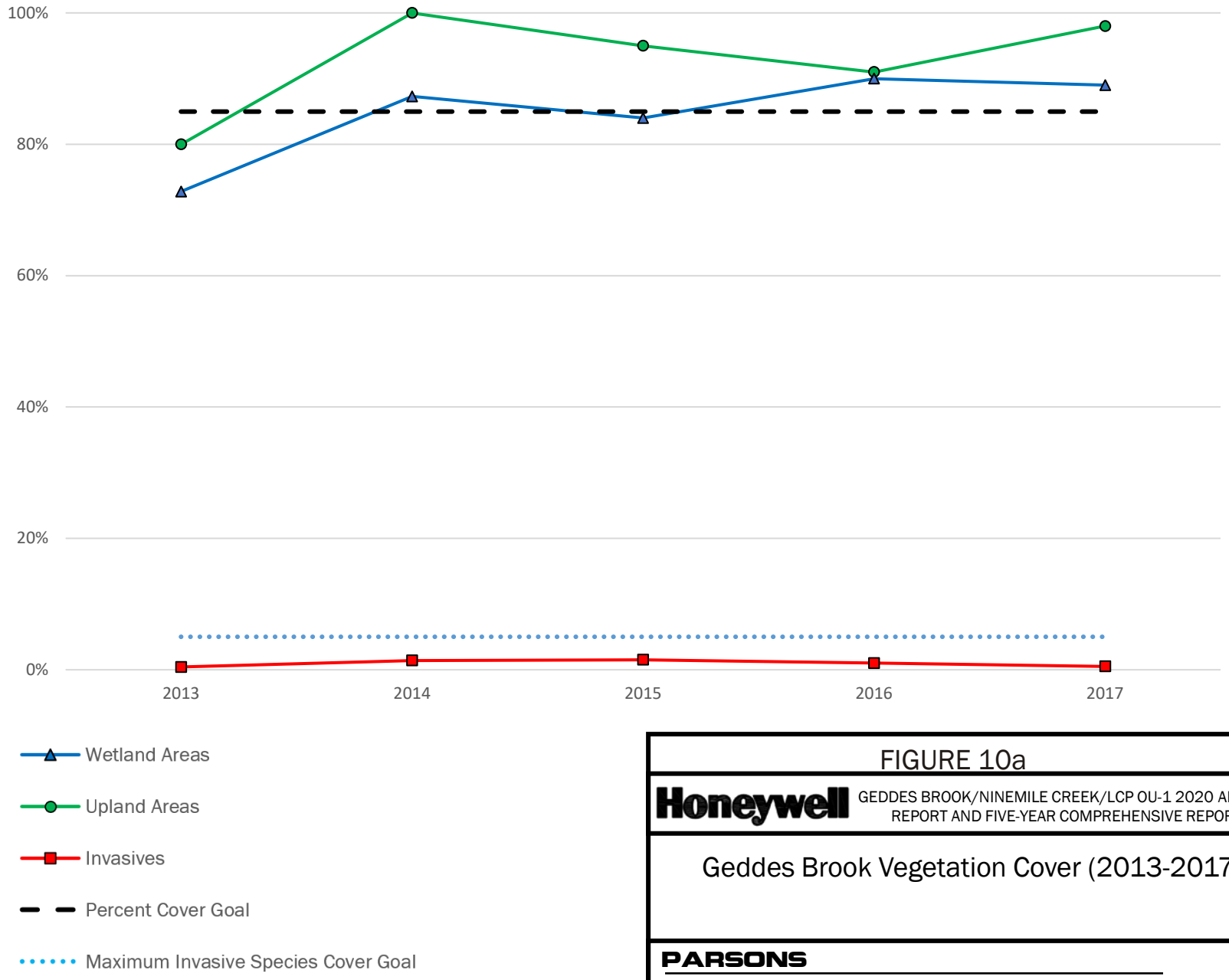


FIGURE 10a

Honeywell

GEDDES BROOK/NINEMILE CREEK/LCP OU-1 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Geddes Brook Vegetation Cover (2013-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

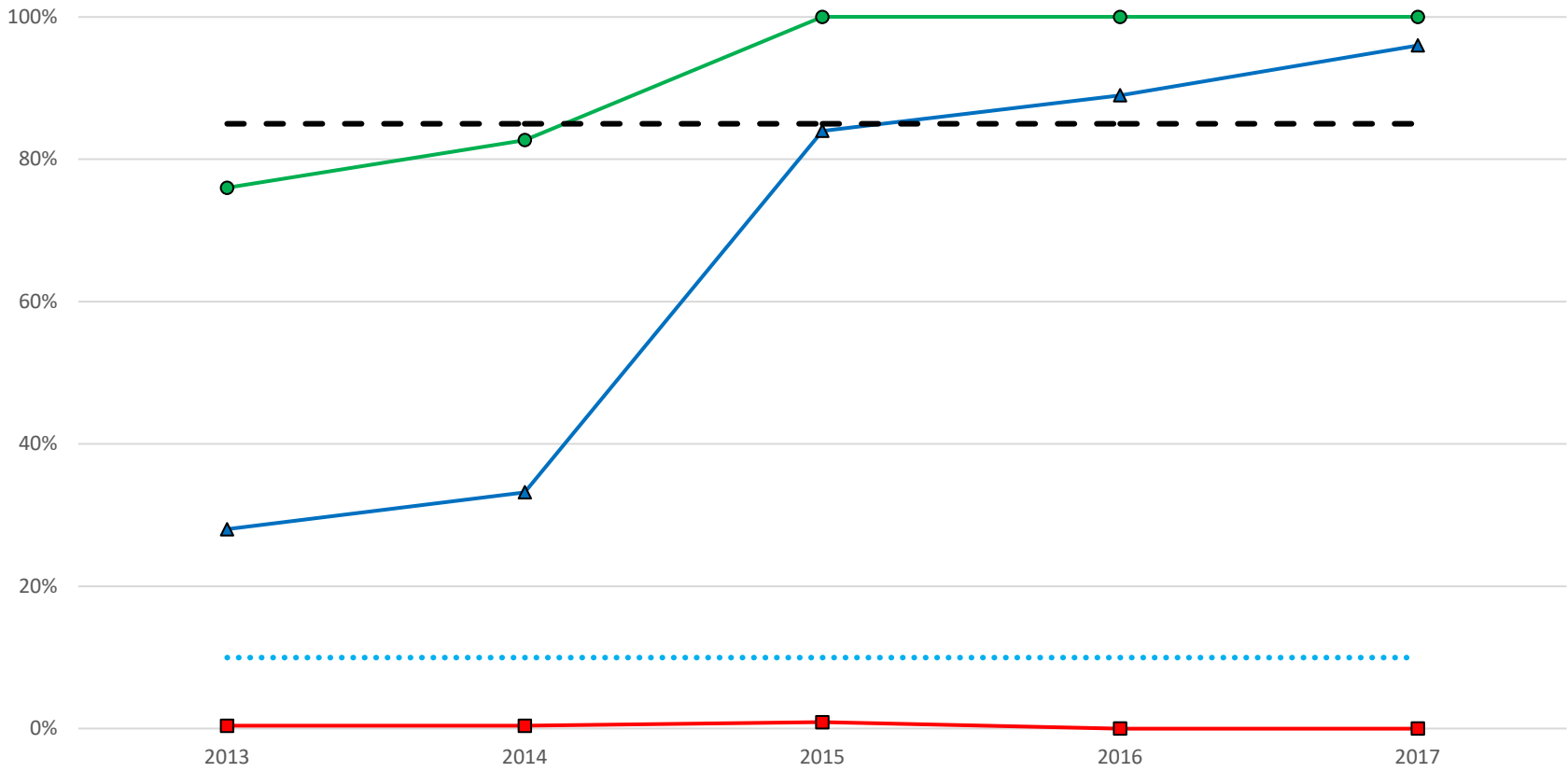


FIGURE 10b

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Ninemile Creek Reach CD Vegetation Cover (2013-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

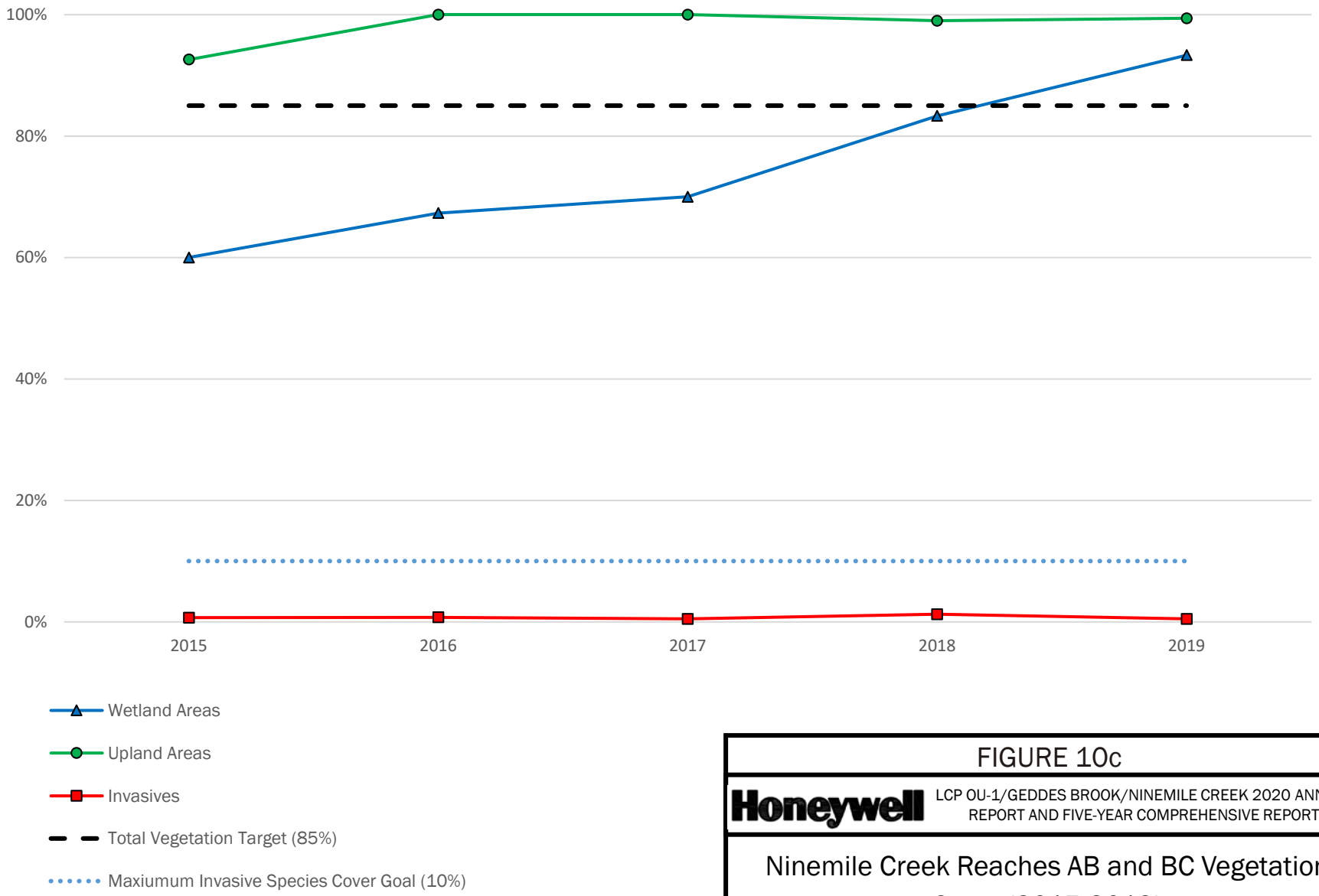


FIGURE 10c

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Ninemile Creek Reaches AB and BC Vegetation Cover (2015-2019)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

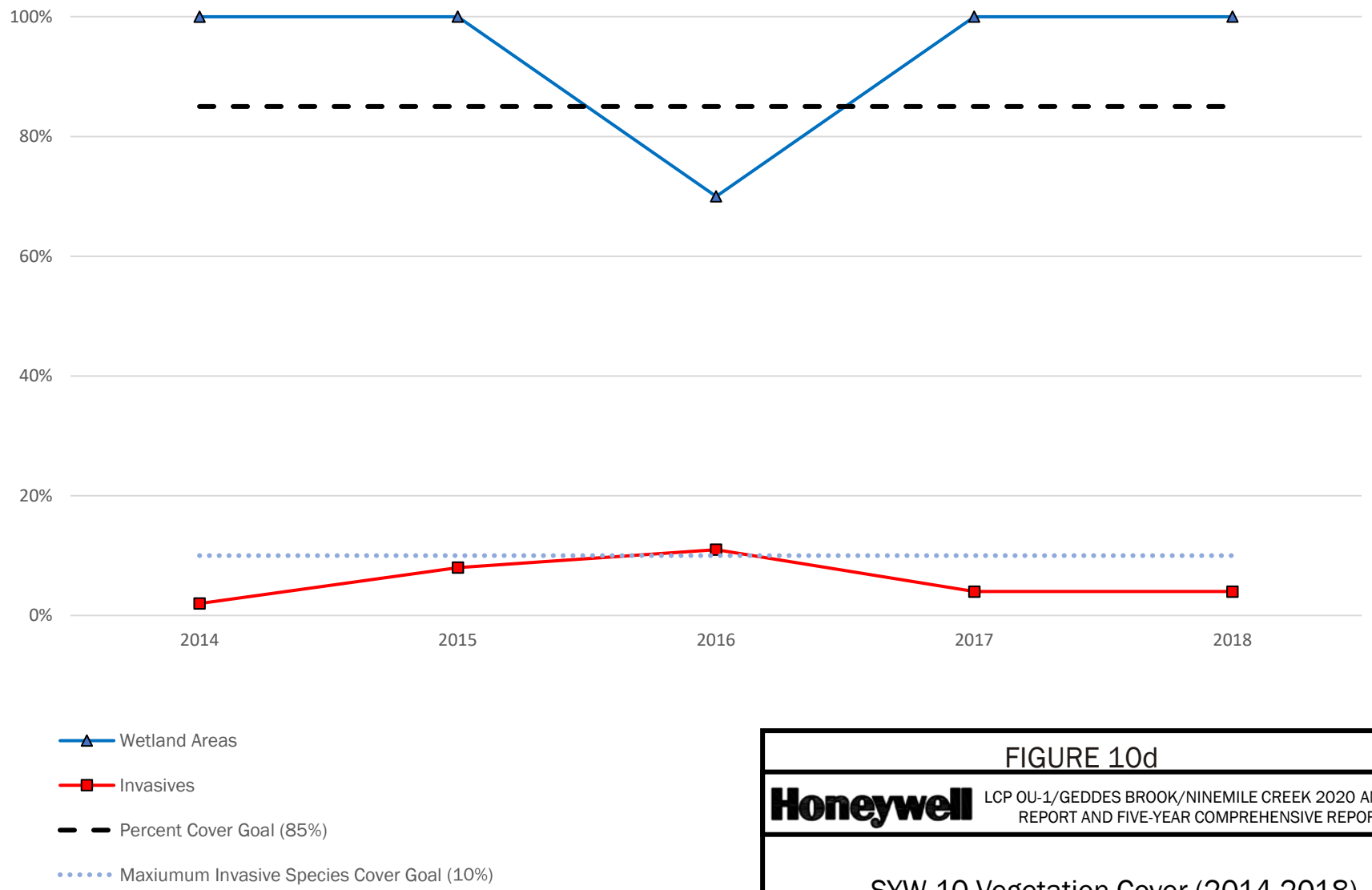


FIGURE 10d

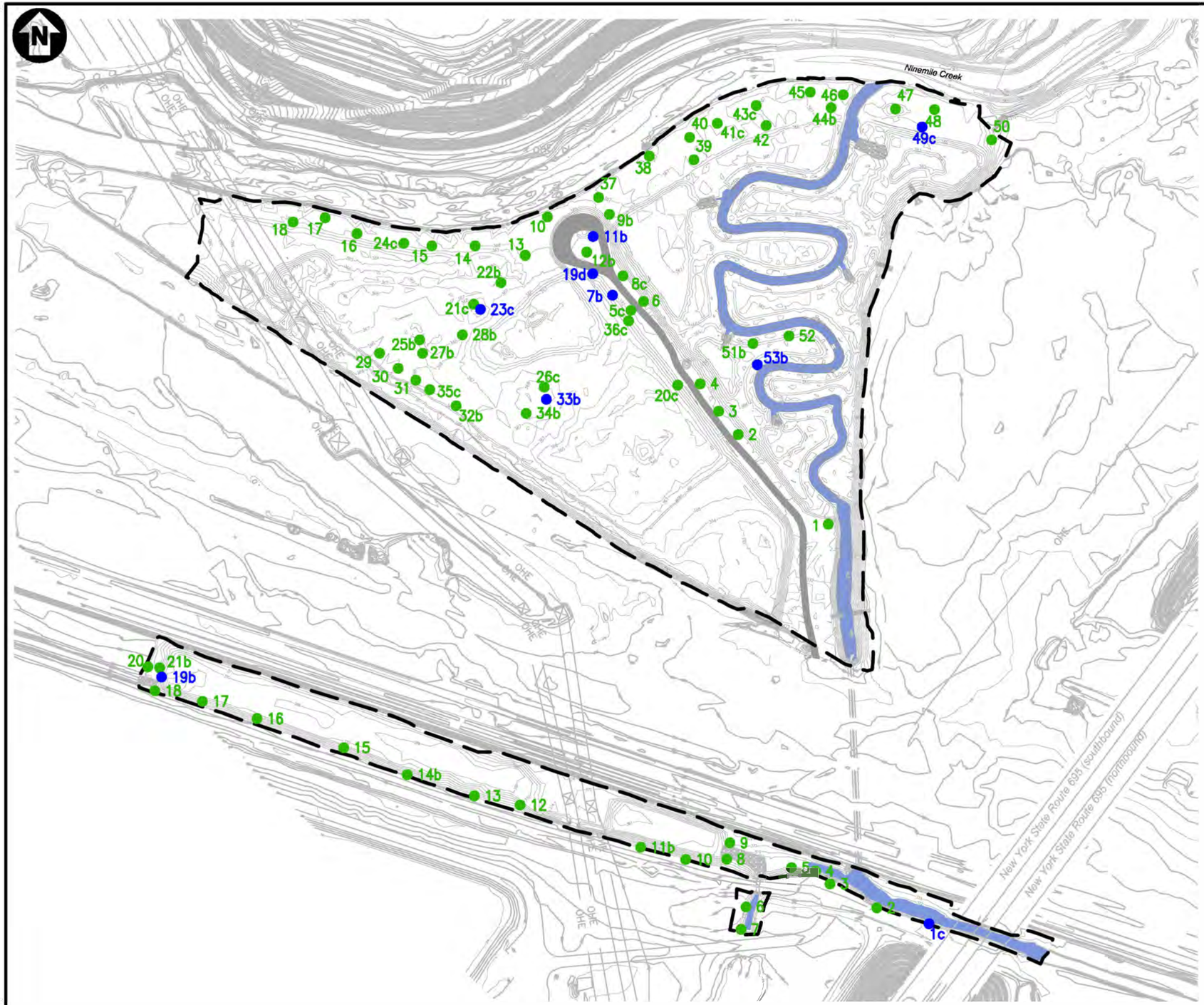
Honeywell

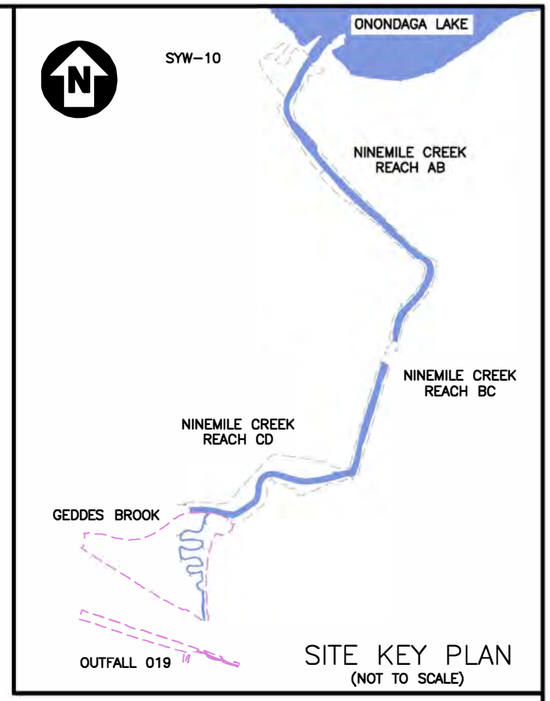
LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

SYW-10 Vegetation Cover (2014-2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560





LEGEND:

- RESTORATION AREA
- EXISTING ELEVATION CONTOUR
- STREAM BED
- VEGETATED TRAFFICABLE LANE
- TREE LOCATIONS
- TREE MONITORED IN 2018 AND 2019

NOTES:

1. TREE NUMBERS WHICH INCLUDE "b", "c" OR "d" DENOTE PREVIOUSLY REPLACED TREES.

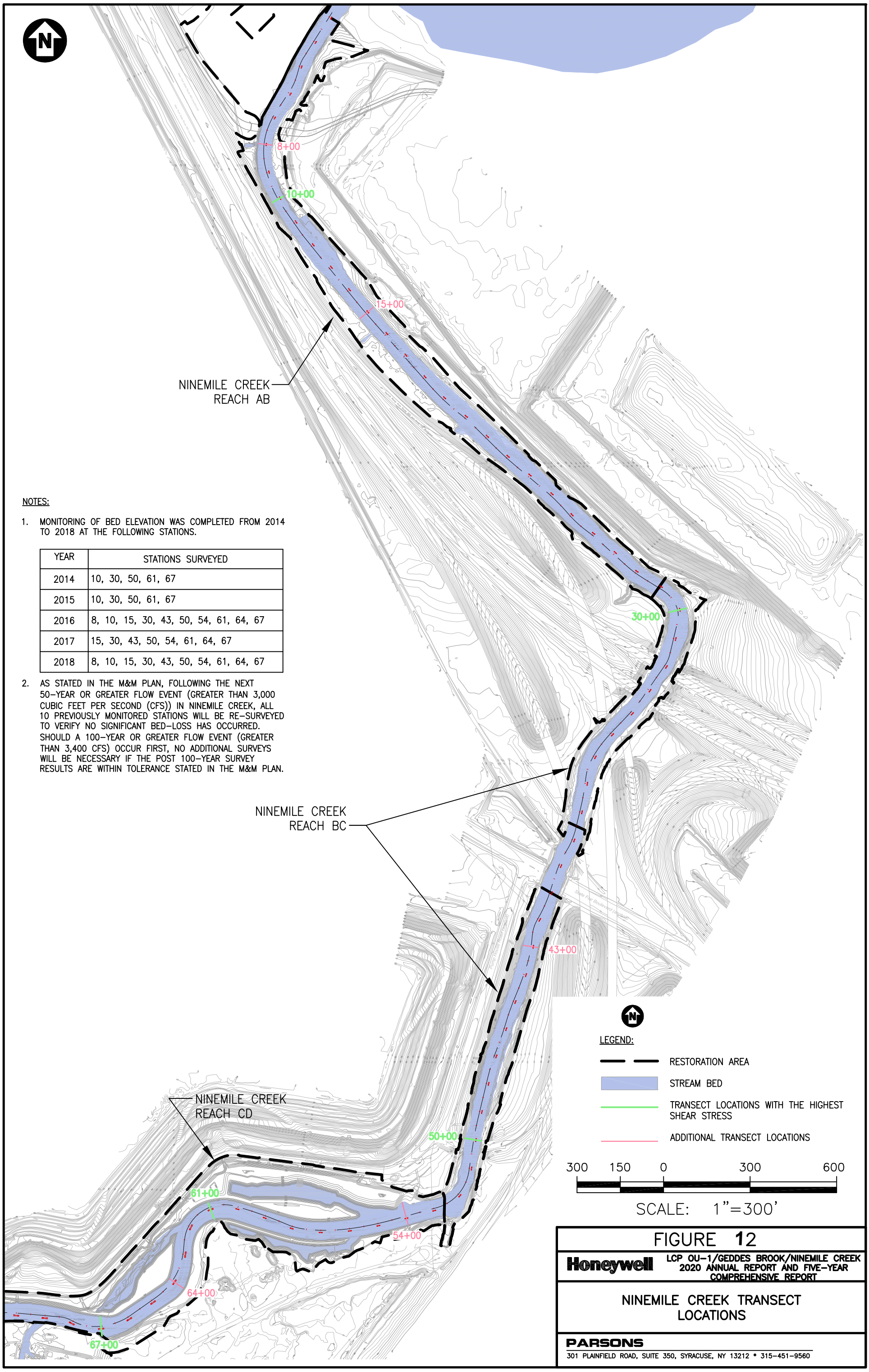
FIGURE 11

Honeywell 2019 ANNUAL OM&M REPORT

GEDDES BROOK AND OUTFALL 019
LARGE TREE LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\450564-GB-NMC OMM 2017-2018\10 TECHNICAL CATEGORIES\2019-ANNUAL OMM\450564-GB-LG TREE OMM 2019.DWG
PLOT DATE: 7/23/2020 12:47 PM PLOTTED BY: RUSSO, JILL



NOTES:

1. MONITORING OF BED ELEVATION WAS COMPLETED FROM 2014 TO 2018 AT THE FOLLOWING STATIONS.

YEAR	STATIONS SURVEYED
2014	10, 30, 50, 61, 67
2015	10, 30, 50, 61, 67
2016	8, 10, 15, 30, 43, 50, 54, 61, 64, 67
2017	15, 30, 43, 50, 54, 61, 64, 67
2018	8, 10, 15, 30, 43, 50, 54, 61, 64, 67

2. AS STATED IN THE M&M PLAN, FOLLOWING THE NEXT 50-YEAR OR GREATER FLOW EVENT (GREATER THAN 3,000 CUBIC FEET PER SECOND (CFS)) IN NINEMILE CREEK, ALL 10 PREVIOUSLY MONITORED STATIONS WILL BE RE-SURVEYED TO VERIFY NO SIGNIFICANT BED-LOSS HAS OCCURRED. SHOULD A 100-YEAR OR GREATER FLOW EVENT (GREATER THAN 3,400 CFS) OCCUR FIRST, NO ADDITIONAL SURVEYS WILL BE NECESSARY IF THE POST 100-YEAR SURVEY RESULTS ARE WITHIN TOLERANCE STATED IN THE M&M PLAN.

FIGURE 12

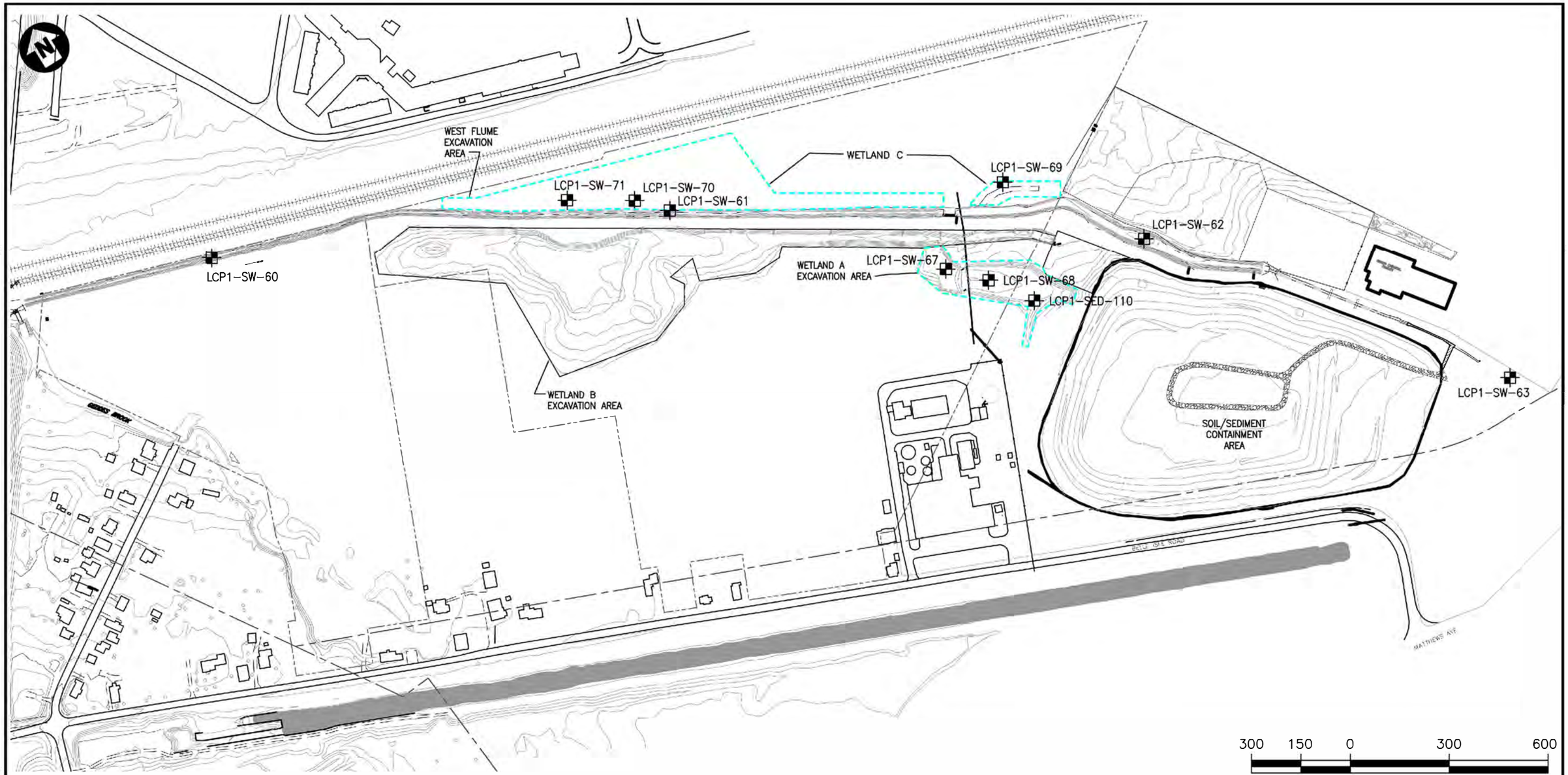
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

NINEMILE CREEK TRANSECT LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\448443 GB-NMC OMM\10.0 TECHNICAL CATEGORIES\10.2 CAD\2016 FIGURES\NMC\448443-NMC-SW & SED TRANSECT-2016.DWG
PLOT DATE: 3/29/2022 8:59 AM PLOTTED BY: RUSSO, JILL [US-US]



LEGEND

- RESTORATION AREA LIMIT
- EXISTING CONTOURS
- SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

NOTE: LCP1-SED-110 COLLECTED IN 2019 AND 2020.

FIGURE 13

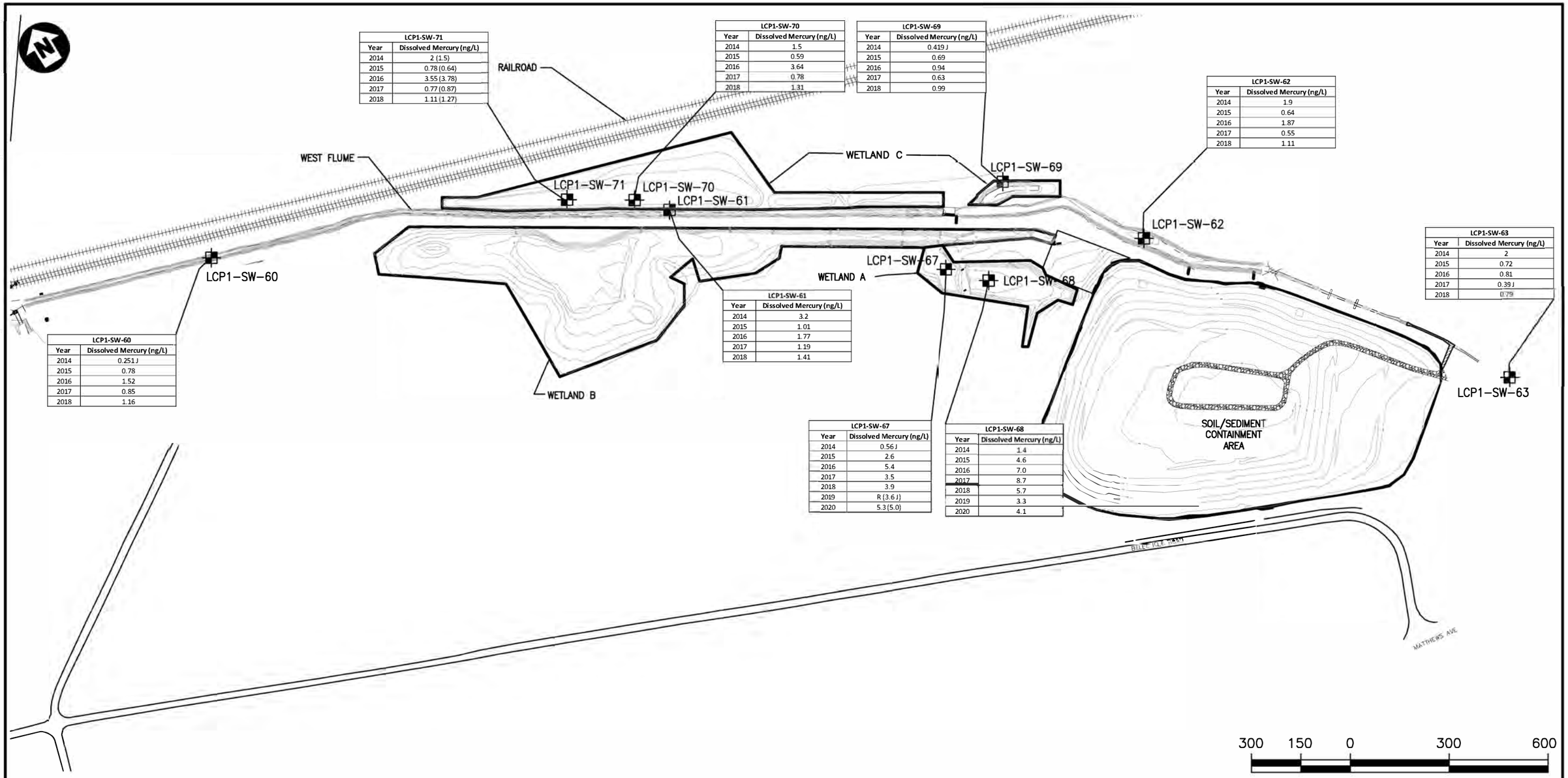
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

LCP ANNUAL SURFACE WATER/SEDIMENT SAMPLING LOCATION

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-LCP-SWSS OMM 2020.DWG
PLOT DATE: 10/29/2021 12:08 PM PLOTTED BY: RUSSO, JILL



LCP1-SW-71	
Year	Dissolved Mercury (ng/L)
2014	2 (1.5)
2015	0.78 (0.64)
2016	3.55 (3.78)
2017	0.77 (0.87)
2018	1.11 (1.27)

LCP1-SW-70	
Year	Dissolved Mercury (ng/L)
2014	1.5
2015	0.59
2016	3.64
2017	0.78
2018	1.31

LCP1-SW-69	
Year	Dissolved Mercury (ng/L)
2014	0.419 J
2015	0.69
2016	0.94
2017	0.63
2018	0.99

LCP1-SW-62	
Year	Dissolved Mercury (ng/L)
2014	1.9
2015	0.64
2016	1.87
2017	0.55
2018	1.11

LCP1-SW-63	
Year	Dissolved Mercury (ng/L)
2014	2
2015	0.72
2016	0.81
2017	0.39 J
2018	0.79

LCP1-SW-61	
Year	Dissolved Mercury (ng/L)
2014	3.2
2015	1.01
2016	1.77
2017	1.19
2018	1.41

LCP1-SW-60	
Year	Dissolved Mercury (ng/L)
2014	0.251 J
2015	0.78
2016	1.52
2017	0.85
2018	1.16

LCP1-SW-67	
Year	Dissolved Mercury (ng/L)
2014	0.56 J
2015	2.6
2016	5.4
2017	3.5
2018	3.9
2019	R (3.6 J)
2020	5.3 (5.0)

LCP1-SW-68	
Year	Dissolved Mercury (ng/L)
2014	1.4
2015	4.6
2016	7.0
2017	8.7
2018	5.7
2019	3.3
2020	4.1

300 150 0 300 600

SCALE: 1"=300'

LEGEND

EXISTING CONTOURS

SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

NOTE:
FIELD DUPLICATES SHOWN IN PARENTHESIS.

FIGURE 14

Honeywell

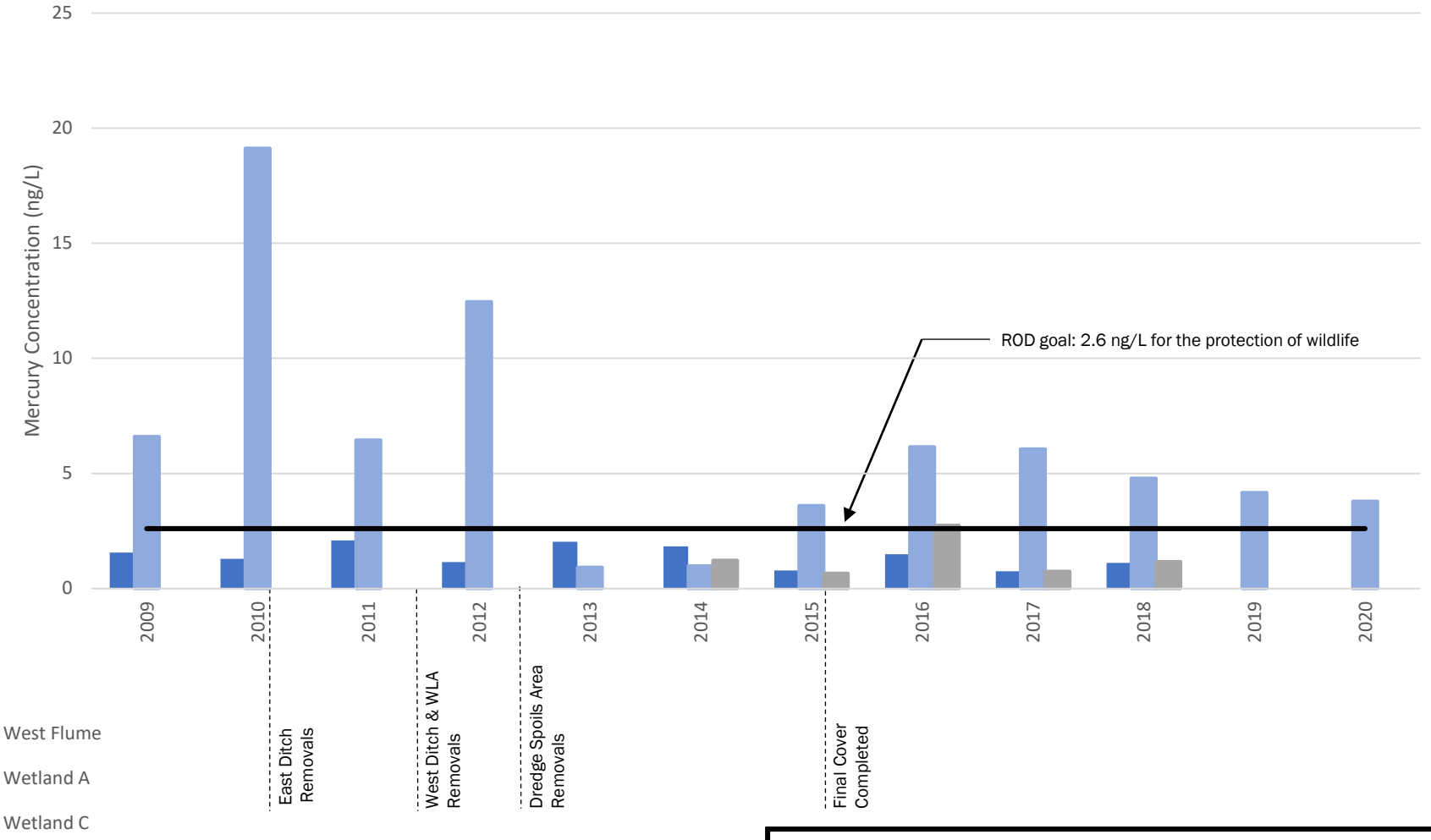
LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

LCP SURFACE WATER DISSOLVED MERCURY CONCENTRATIONS (2014-2020)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, N.Y. 13212, PHONE: 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-LCP-2014-2020-TAGS.DWG
PLOT DATE: 10/29/2021 4:24 PM PLOTTED BY: RUSSO, JILL



Notes:
(a) Data collection at Wetland C began in 2014
(b) Data displayed only from annual monitoring locations
(c) West Flume and Wetland C annual monitoring concluded in 2018
(d) Baseline averages for West Flume, Wetland A, and Wetland C were 1,285 ng/L, 1,998 ng/L, and 1,998 ng/L (NYSDEC & TAMS, 1998)
(e) Field duplicates are averaged together for all calculations

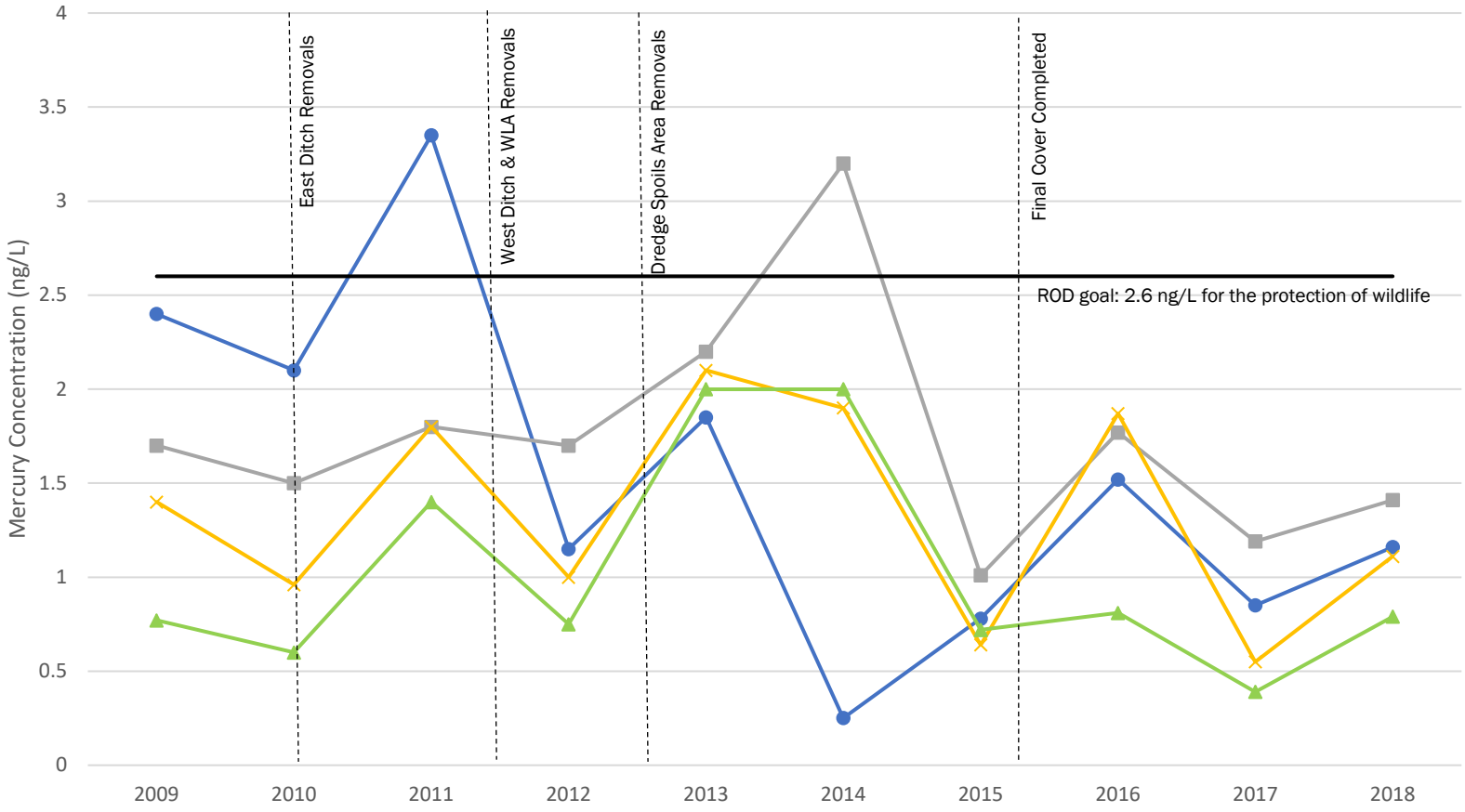
FIGURE 15

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Average Dissolved Mercury by Area in Surface Water of LCP (2009-2020)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Sample Locations

- LCP1-SW-60
- LCP1-SW-61
- LCP1-SW-62
- LCP1-SW-63

Notes:

a) Field duplicates are averaged together for all calculations

FIGURE 16a

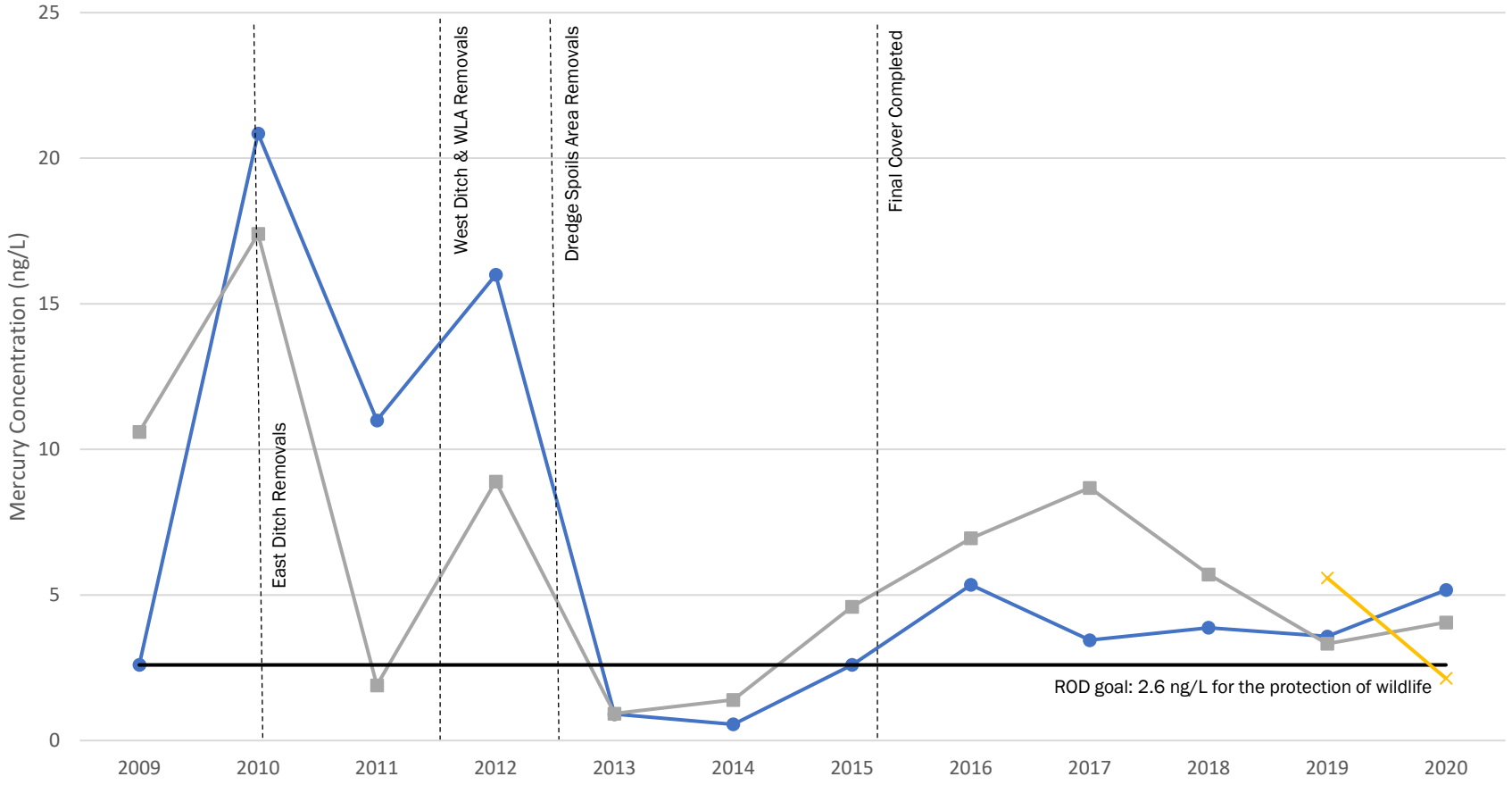
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Dissolved Mercury in Surface Water of LCP West Flume (2009-2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Sample Locations

- LCP1-SW-67
- LCP1-SW-68
- LCP1-SED-110

Notes:

a) Field duplicates are averaged together for all calculations

b) LCP1-SED-110 only collected in 2019 and 2020

FIGURE 16b

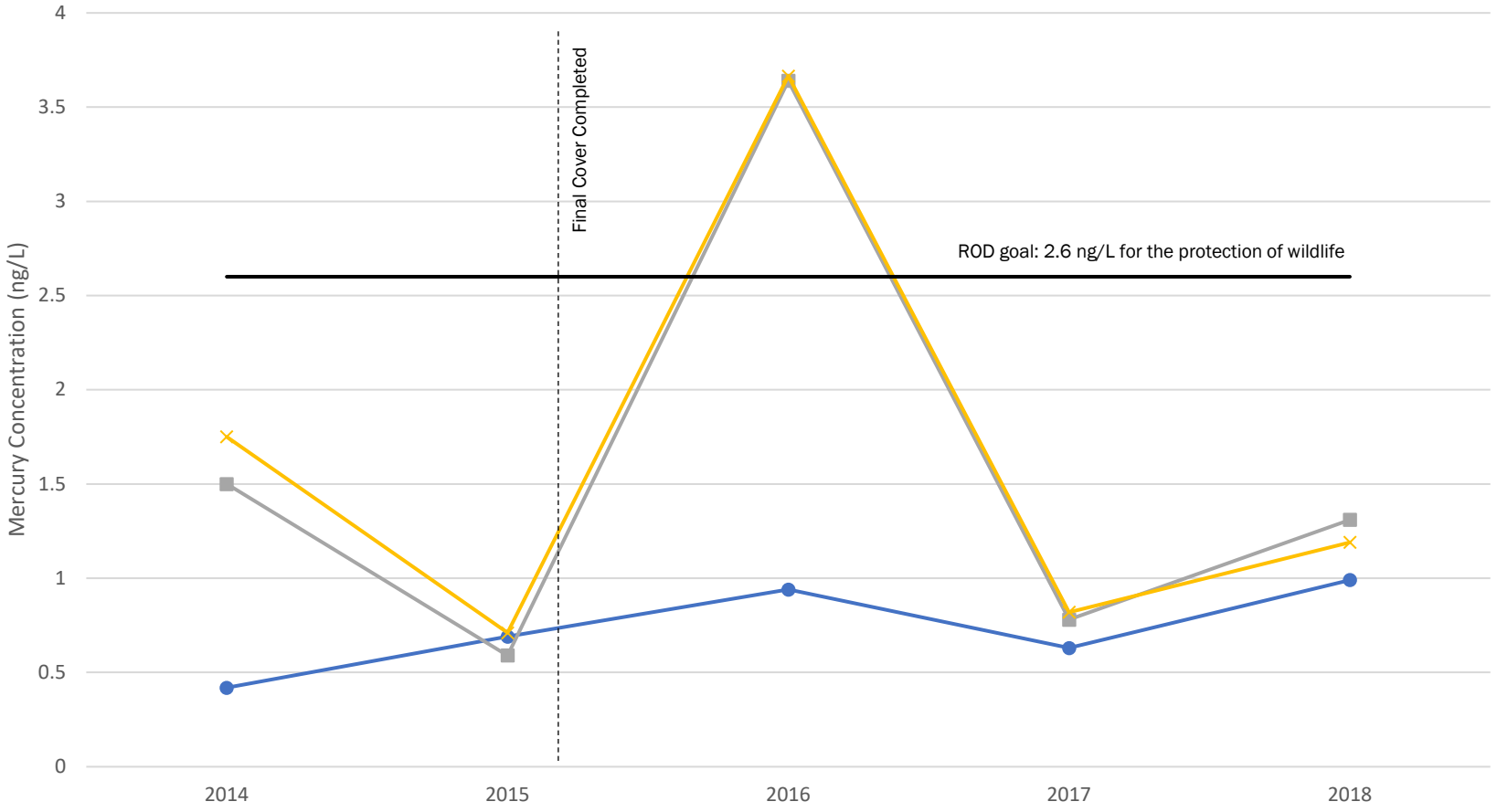
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Dissolved Mercury in Surface Water of LCP Wetland A (2009-2020)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Sample Locations

- LCP1-SW-69
- LCP1-SW-70
- LCP1-SW-71

Notes:

(a) Data collection at Wetland C began in 2014

(b) Field duplicates are averaged together for all calculations

FIGURE 16c

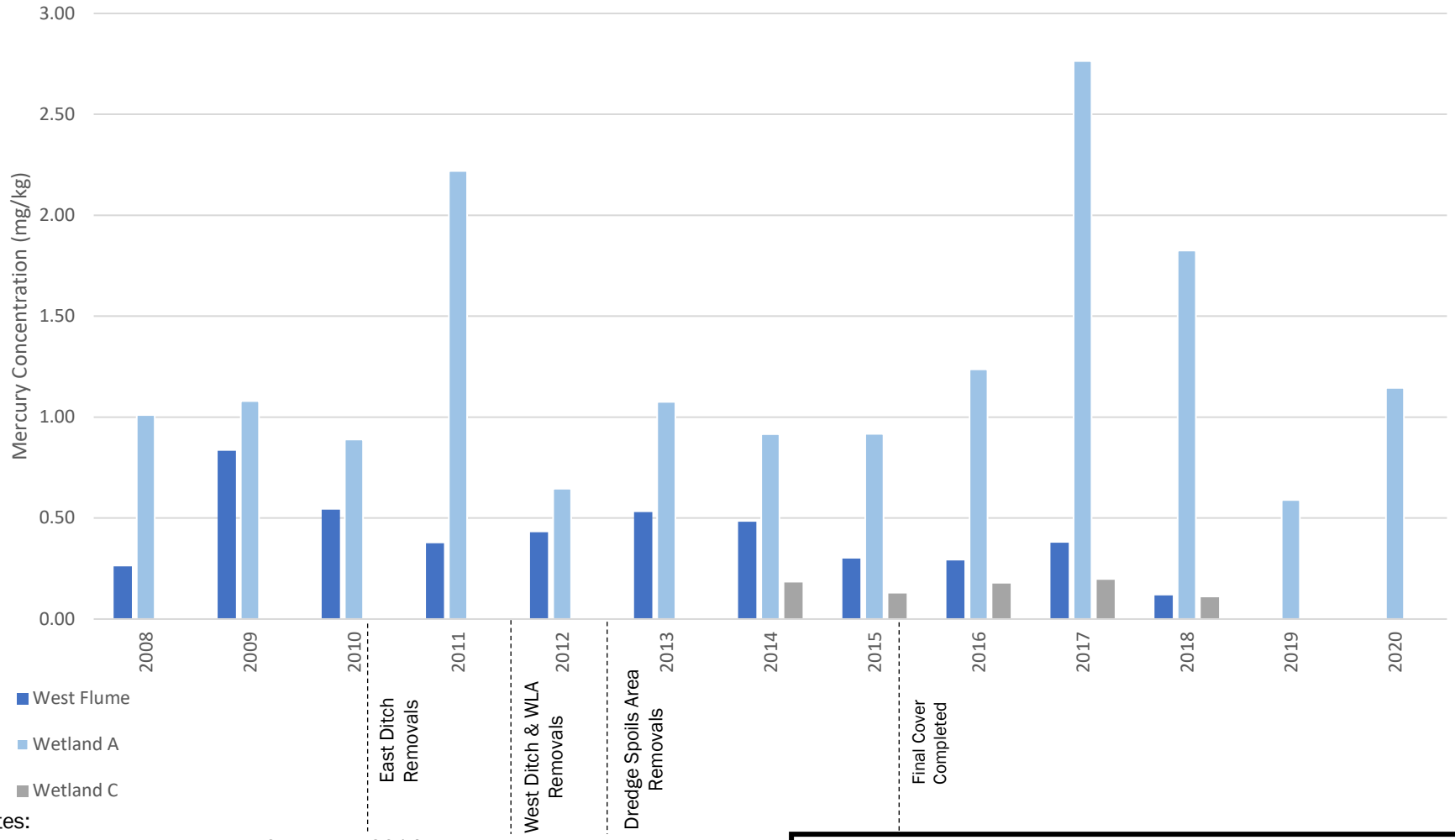
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Dissolved Mercury in Surface Water of LCP Wetland C (2014-2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

(a) Data collection at Wetland C began in 2014

(b) Data displayed only from annual monitoring locations

(c) West Flume and Wetland C annual monitoring concluded in 2018

(d) Baseline averages for West Flume, Wetland A, and Wetland C were 33 mg/kg, 18 mg/kg, and 18 mg/kg (NYSDEC & TAMS, 1998)

(e) Field duplicates are averaged together for all calculations

(f) There are no long-term sediment goals established in the LCP OU-1 ROD or OM&M Plan. The site specific background sediment concentration identified in the ROD was 0.2 mg/kg. Downstream Ninemile Creek Site goal of 0.8 mg/kg (mercury in sediments for the protection of wildlife consumption of fish) used as benchmark for evaluating the LCP OU-1 sediment results.

FIGURE 17

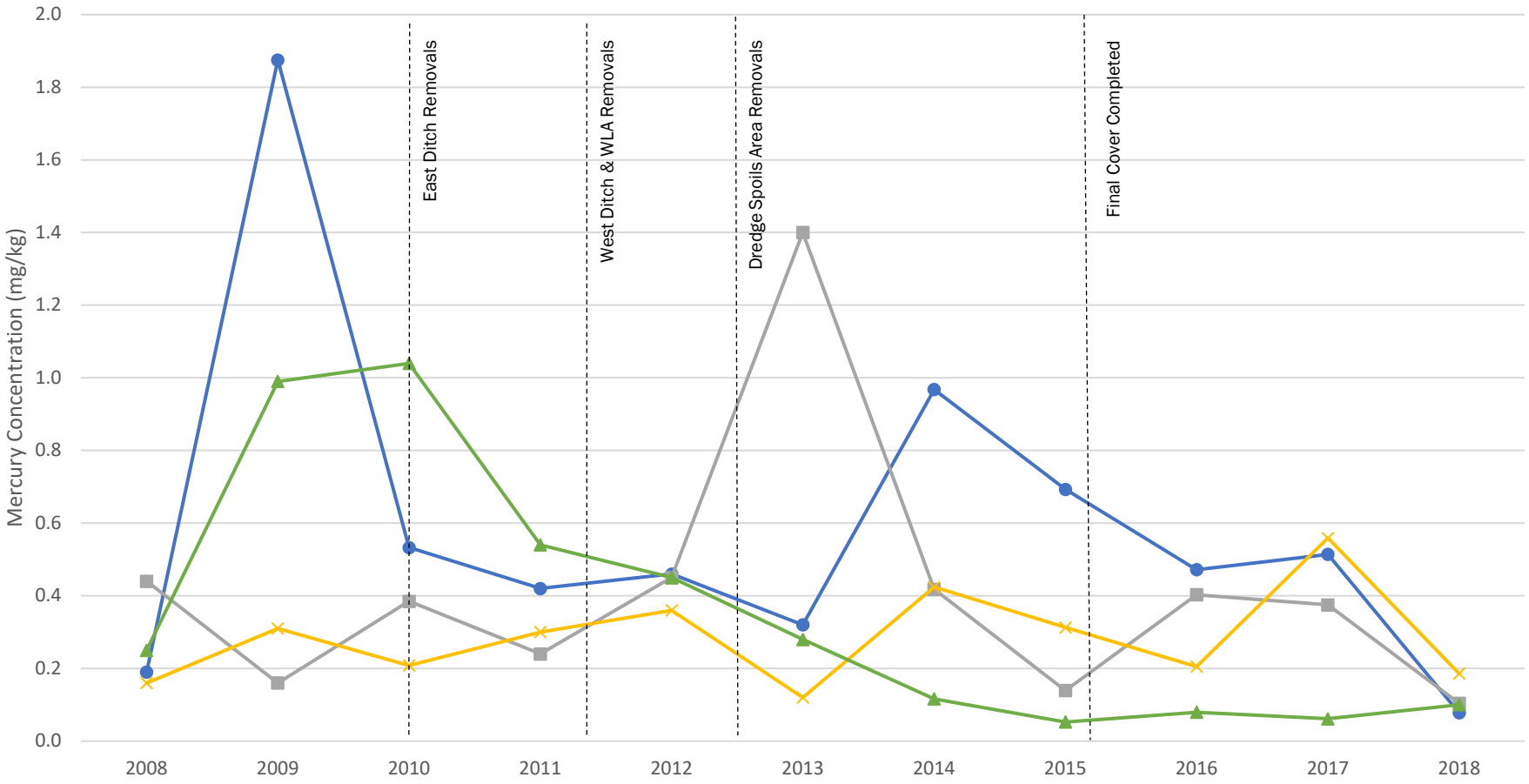
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

LCP Average Total Mercury by Area in Sediment (2008-2020)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Sample Locations

- LCP1-SW-60
- LCP1-SW-61
- LCP1-SW-62
- LCP1-SW-63

Notes:

(a) Data displayed only from annual monitoring locations

(b) Field duplicates are averaged together for all calculations

FIGURE 18a

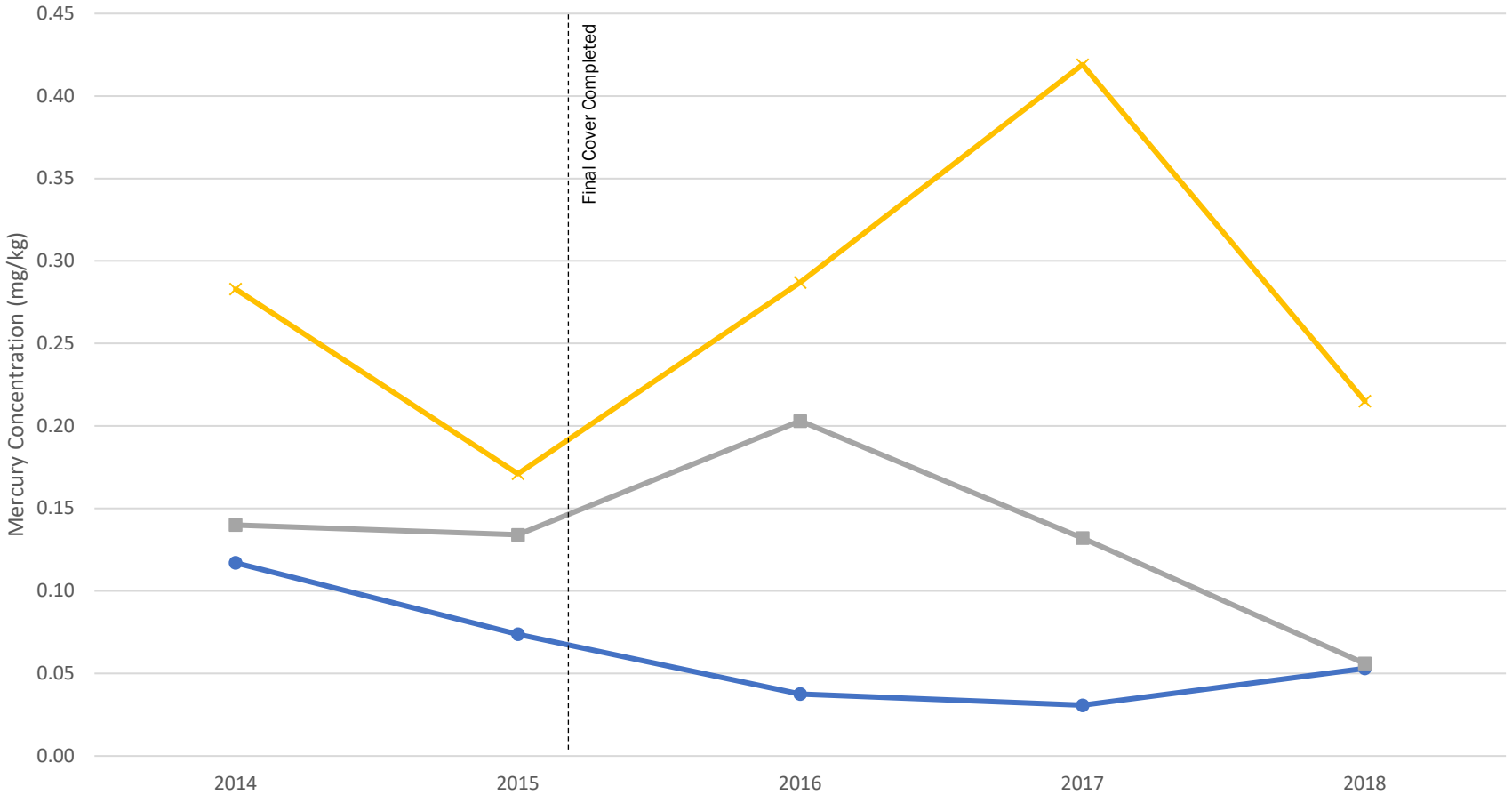
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

LCP West Flume Total Mercury in Sediment (2008-2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Sample Locations

- LCP1-SW-69
- LCP1-SW-70
- LCP1-SW-71

Notes:

(a) Data collection at Wetland C began in 2014

(b) Data displayed only from annual monitoring locations

(c) Field duplicates are averaged together for all calculations

FIGURE 18b

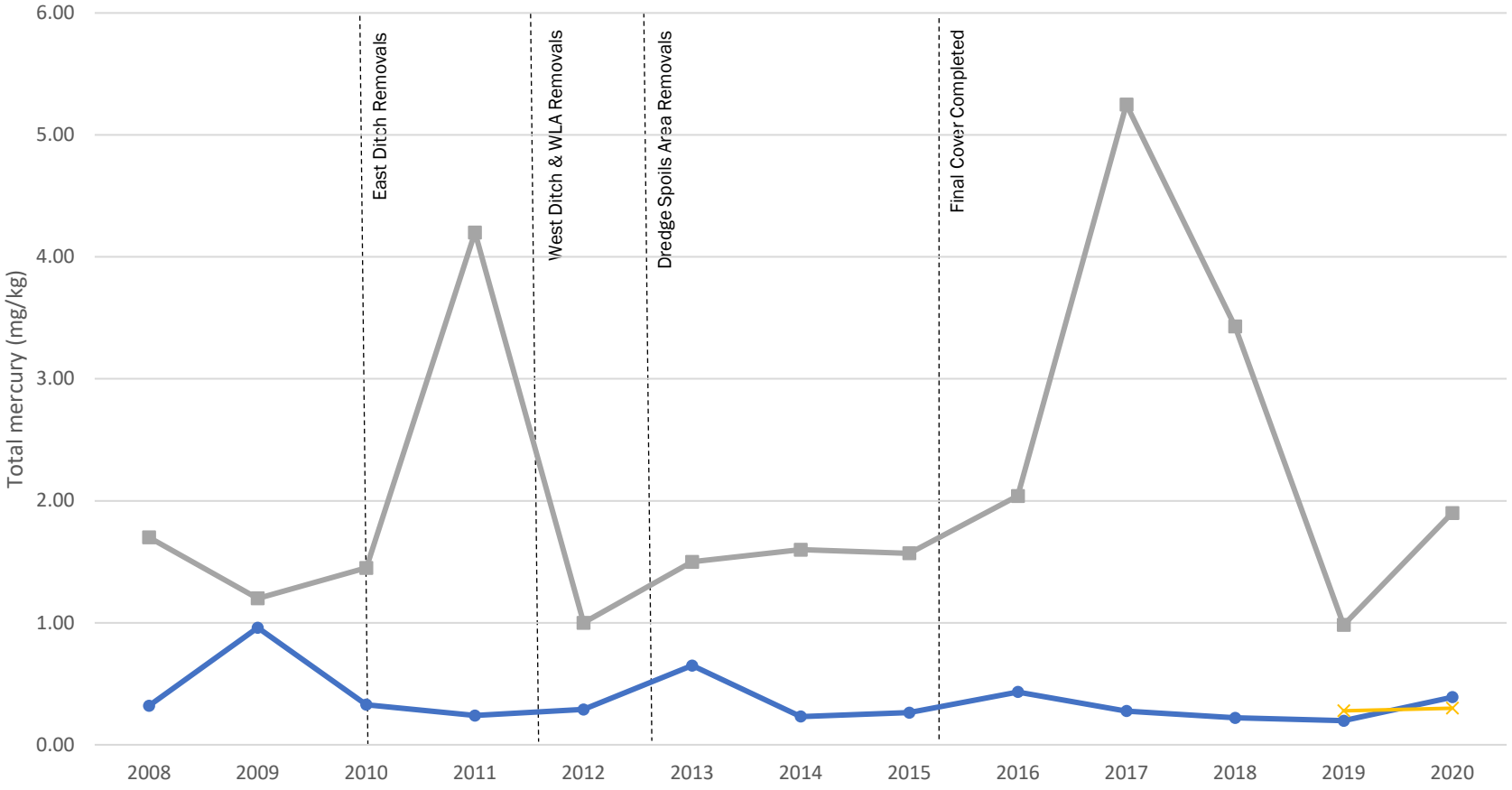
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

LCP Wetland C Total Mercury in Sediment (2014-2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Sample Locations

- LCP1-SW-67
- LCP1-SW-68
- LCP1-SED-110

Notes:

(a) Data displayed only from annual monitoring locations

(b) Field duplicates are averaged together for all calculations

(c) LCP1-SED-110 only collected in 2019 and 2020

FIGURE 18c

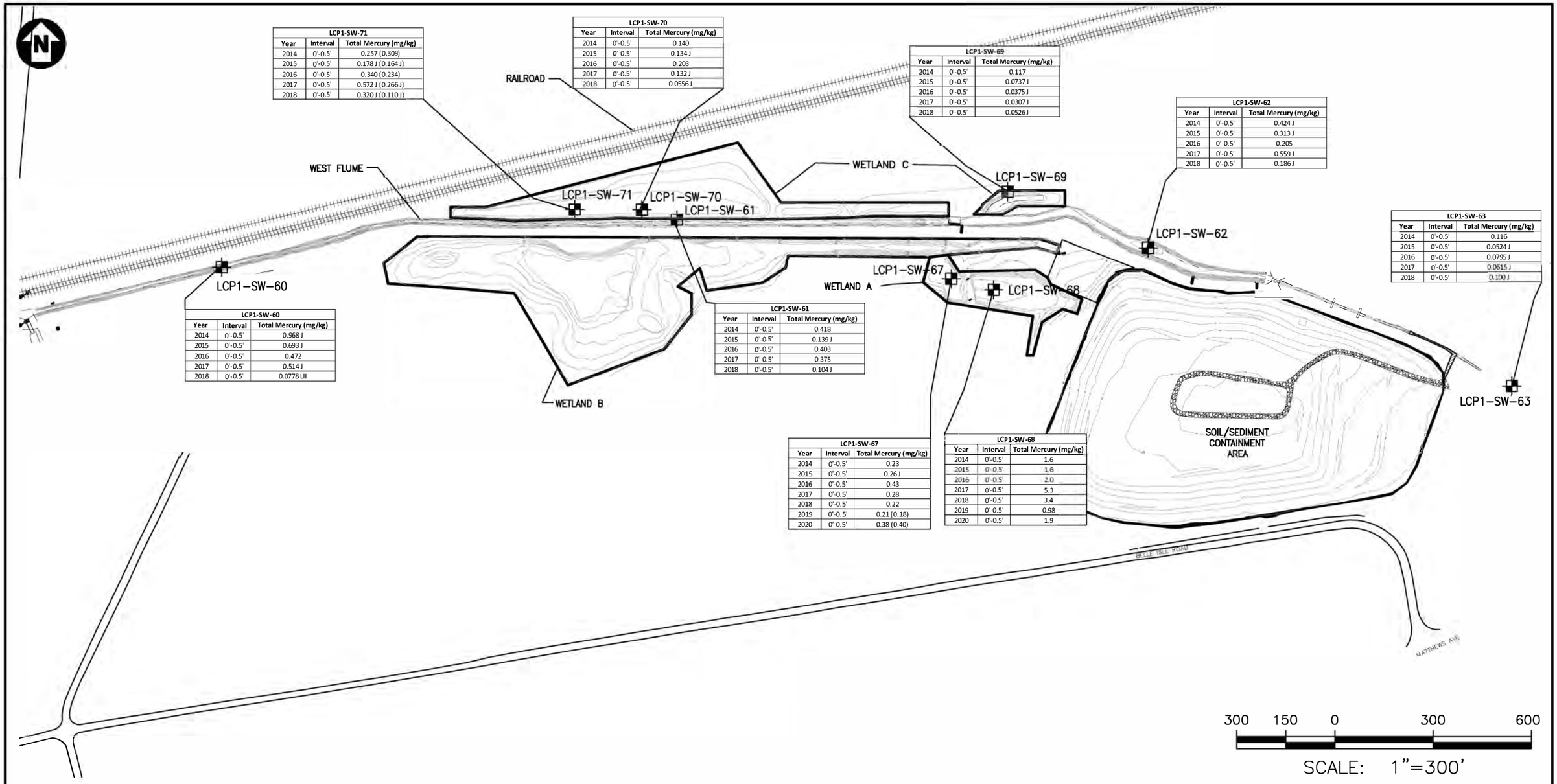
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

LCP Wetland A Total Mercury in Sediment (2008-2020)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



LCP1-SW-71		
Year	Interval	Total Mercury (mg/kg)
2014	0'-0.5'	0.257 (0.309)
2015	0'-0.5'	0.178 J (0.164 J)
2016	0'-0.5'	0.340 (0.234)
2017	0'-0.5'	0.572 J (0.266 J)
2018	0'-0.5'	0.320 J (0.110 J)

LCP1-SW-70		
Year	Interval	Total Mercury (mg/kg)
2014	0'-0.5'	0.140
2015	0'-0.5'	0.134 J
2016	0'-0.5'	0.203
2017	0'-0.5'	0.132 J
2018	0'-0.5'	0.0556 J

LCP1-SW-69		
Year	Interval	Total Mercury (mg/kg)
2014	0'-0.5'	0.117
2015	0'-0.5'	0.0737 J
2016	0'-0.5'	0.0375 J
2017	0'-0.5'	0.0307 J
2018	0'-0.5'	0.0526 J

LCP1-SW-62		
Year	Interval	Total Mercury (mg/kg)
2014	0'-0.5'	0.424 J
2015	0'-0.5'	0.313 J
2016	0'-0.5'	0.205
2017	0'-0.5'	0.559 J
2018	0'-0.5'	0.186 J

LCP1-SW-63		
Year	Interval	Total Mercury (mg/kg)
2014	0'-0.5'	0.116
2015	0'-0.5'	0.0524 J
2016	0'-0.5'	0.0795 J
2017	0'-0.5'	0.0615 J
2018	0'-0.5'	0.100 J

LCP1-SW-60		
Year	Interval	Total Mercury (mg/kg)
2014	0'-0.5'	0.968 J
2015	0'-0.5'	0.693 J
2016	0'-0.5'	0.472
2017	0'-0.5'	0.514 J
2018	0'-0.5'	0.0778 UJ

LCP1-SW-61		
Year	Interval	Total Mercury (mg/kg)
2014	0'-0.5'	0.418
2015	0'-0.5'	0.139 J
2016	0'-0.5'	0.403
2017	0'-0.5'	0.375
2018	0'-0.5'	0.104 J

LCP1-SW-67		
Year	Interval	Total Mercury (mg/kg)
2014	0'-0.5'	0.23
2015	0'-0.5'	0.26 J
2016	0'-0.5'	0.43
2017	0'-0.5'	0.28
2018	0'-0.5'	0.22
2019	0'-0.5'	0.21 (0.18)
2020	0'-0.5'	0.38 (0.40)

LCP1-SW-68		
Year	Interval	Total Mercury (mg/kg)
2014	0'-0.5'	1.6
2015	0'-0.5'	1.6
2016	0'-0.5'	2.0
2017	0'-0.5'	5.3
2018	0'-0.5'	3.4
2019	0'-0.5'	0.98
2020	0'-0.5'	1.9

300 150 0 300 600

SCALE: 1"=300'

NOTE:
FIELD DUPLICATES SHOWN IN PARENTHESIS.

LEGEND

EXISTING CONTOURS

SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

FIGURE 19

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

LCP SEDIMENT
TOTAL MERCURY CONCENTRATIONS
(2014-2020)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, N.Y. 13212, PHONE: 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-LCP-2014-2020-TAGS.DWG
PLOT DATE: 10/29/2021 4:27 PM PLOTTED BY: RUSSO, JILL

LCP-SED-127
LCP-SED-123
LCP-SED-122
MW-26
LCP1-SW-67
LCP1-SED-113
LCP-SED-121
LCP-SED-124
LCP-SED-120
LCP-SED-128
LCP1-SED-97
LCP1-SW-68
LCP-SED-119
LCP-SED-126
LCP1-SED-110
LCP1-SED-96
LCP-SED-118
LCP-SED-125
LCP-SED-117
LCP-SED-116
WETLAND A
LCP1-SED-98
LCP1-SED-99
WEST DITCH CENTERLINE
LCP1-SED-100
SOIL/SEDIMENT CONTAINMENT AREA
WEST DITCH CENTERLINE
LCP1-SED-101
LCP1-SED-103
LCP1-SS-120
EXTRACTION SYSTEM BLDG
LCP1-SED-102
BELLE ISLE ROAD

LEGEND

- WETLAND A
- WEST DITCH CENTERLINE
- EXISTING CONTOURS
- 2018 SEDIMENT AND SOIL SAMPLE LOCATIONS
- OMM SAMPLE LOCATION
- SEDIMENT AND SOIL RESAMPLE LOCATIONS (LOCATIONS SAMPLED 2011)
- SEDIMENT AND SOIL RESAMPLE LOCATION (LOCATION SAMPLED 2011) AND NEW SURFACE WATER LOCATION
- ADDITIONAL REMOVAL AREAS (2011)
- WEST DITCH ADDITIONAL REMOVAL AREAS (2011)

100 50 0 100 200

SCALE: 1"=100'

FIGURE 20

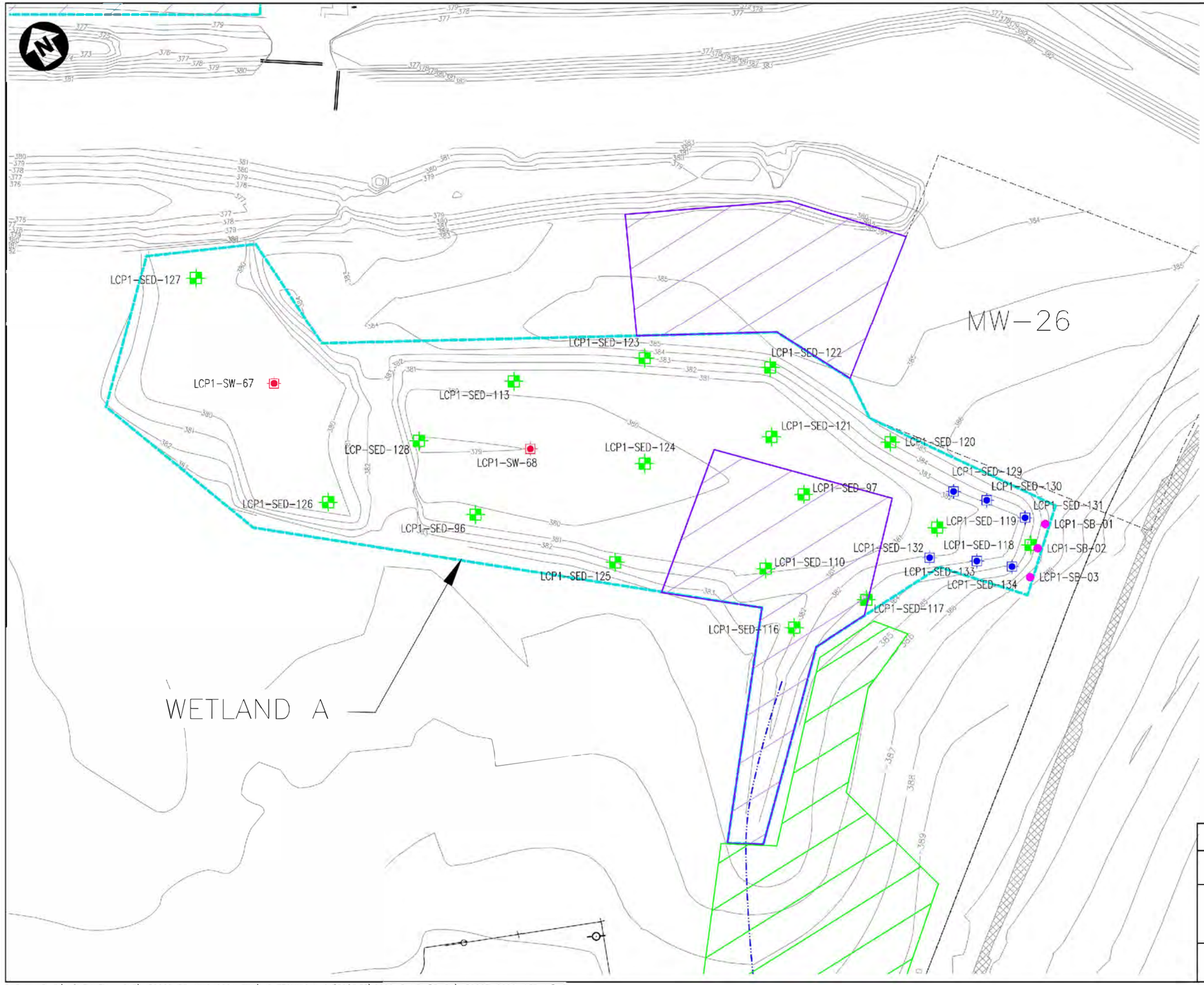
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

2018 SUPPLEMENTAL SEDIMENT AND SOIL SAMPLING LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, N.Y. 13212, PHONE: 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-LCP-OMMSUPP-SED-2020.DWG
PLOT DATE: 11/8/2021 11:53 AM PLOTTED BY: RUSSO, JILL



LEGEND

- WETLAND A
- WEST DITCH CENTERLINE
- EXISTING CONTOURS
- 2018 SEDIMENT SAMPLE LOCATION
- OMM SAMPLE LOCATION
- 2020 SEDIMENT SAMPLE LOCATION
- 2020 SEDIMENT CORE SAMPLE LOCATION

NOTE: ALL LOCATIONS WERE SAMPLED IN 2020.

- ADDITIONAL REMOVAL AREAS (2011)
- WEST DITCH ADDITIONAL REMOVAL AREAS (2011)

50 25 0 50 100

SCALE: 1"=50'

FIGURE 21

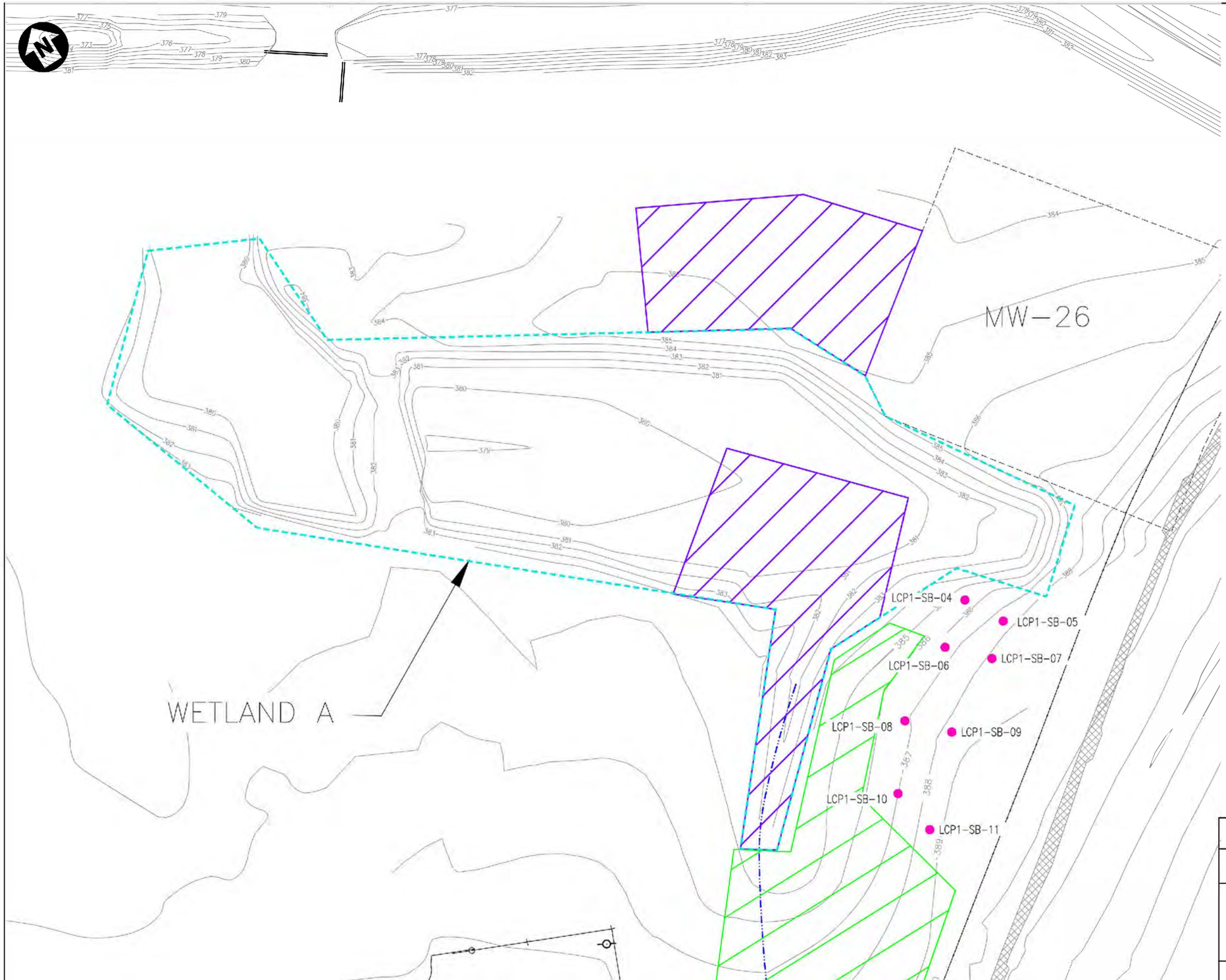
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

2020 SUPPLEMENTAL SEDIMENT AND SOIL SAMPLING LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-2020-WET-A.DWG
PLOT DATE: 3/25/2022 4:11 PM PLOTTED BY: RUSSO, JILL [US-US]



LEGEND

- WETLAND A
- WEST DITCH CENTERLINE
- EXISTING CONTOURS
- ADDITIONAL REMOVAL AREAS (2011)
- WEST DITCH ADDITIONAL REMOVAL AREAS (2011)
- 2021 SOIL SAMPLE LOCATION

50 25 0 50 100

SCALE: 1"=50'

FIGURE 22

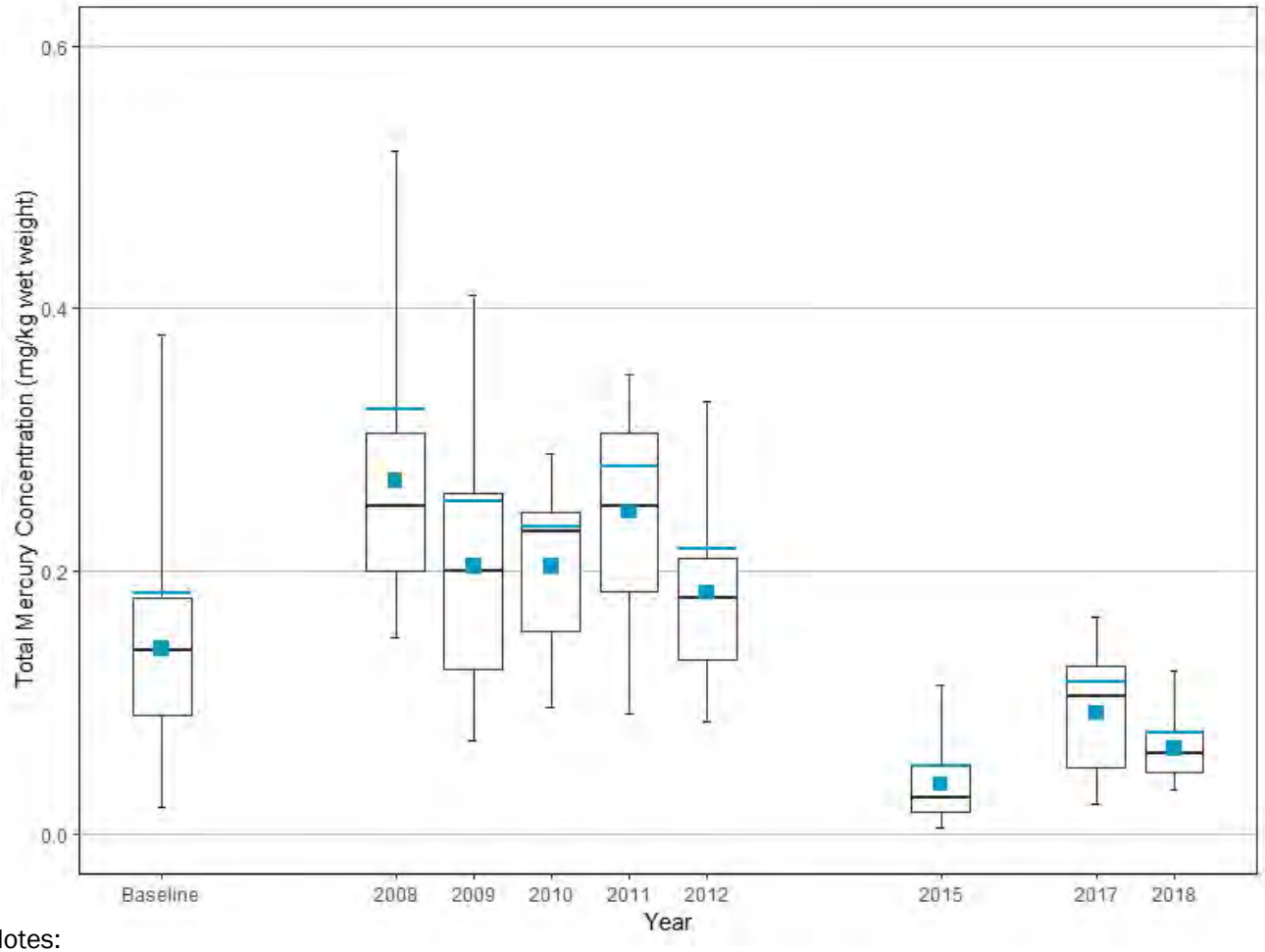
Honeywell

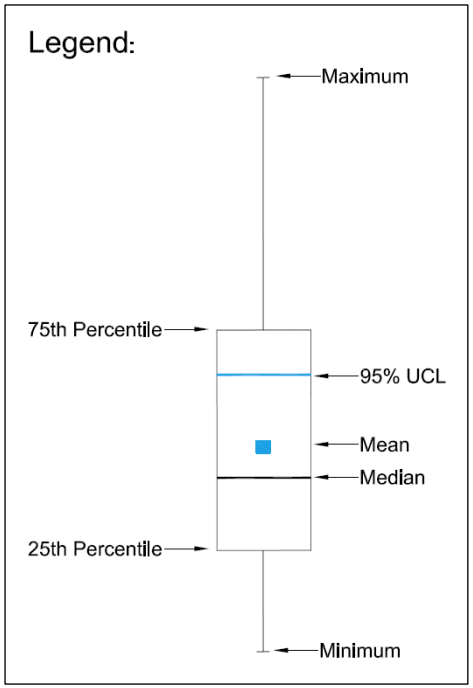
LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

2021 SUPPLEMENTAL SOIL SAMPLING LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, N.Y. 13212, PHONE: 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\450564-GB-NMC OMM 2017-2018\10 TECHNICAL CATEGORIES\2020-ANNUAL OMM\450564-LCP-SK001.DWG
PLOT DATE: 11/8/2021 12:08 PM PLOTTED BY: RUSSO, JILL





Notes:

(a) 95% UCL: estimate of the upper bound for the true population mean; calculated using ProUCL Version 5.1. For data sets with NDs, ProUCL selected the statistical method.

(b) Mean concentration calculated by ProUCL using the same statistical method used for 95% UCL, unless 3 or fewer results were detected. In that case, for plots showing the 95% UCL, the arithmetic mean was calculated with non-detects substituted for ½ the MDL.

(c) There are no long-term prey fish goals established in the LCP OU-1 ROD or OM&M Plan. Ninemile Creek Site prey fish goal of 0.1 mg/kg for the protection of ecological receptors is used as benchmark for evaluating the LCP OU-1 prey fish results.

FIGURE 23

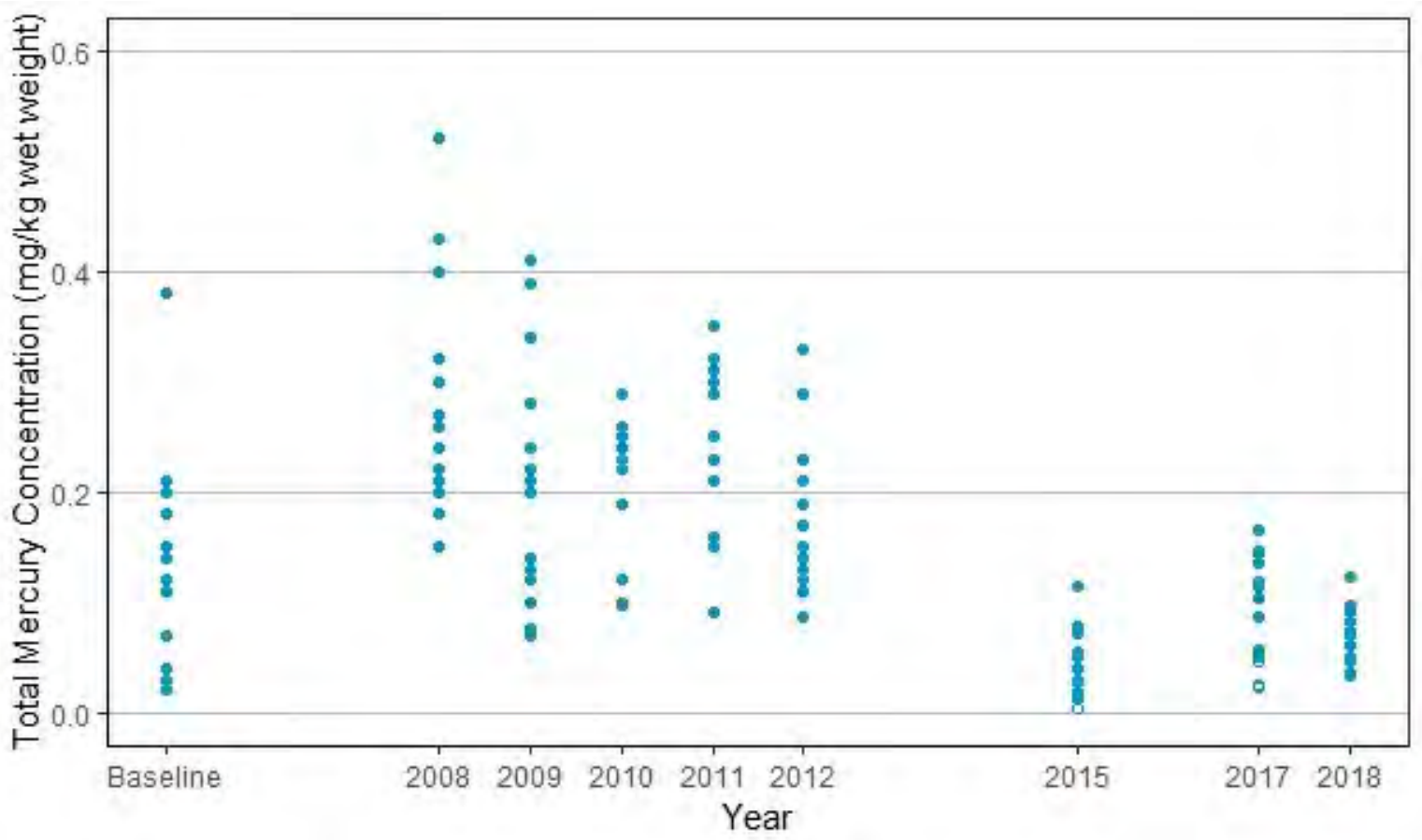
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Box and Whisker Plots of Mercury Concentrations in LCP OU-1 (West Flume) Prey Fish (2008-2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

(a) Open symbol indicates a non-detect
(b) Individual non-detects are plotted using ½ the MDL
(c) There are no long-term prey fish goals established in the LCP OU-1 ROD or OM&M Plan. Ninemile Creek Site prey fish goal of 0.1 mg/kg for the protection of ecological receptors is used as benchmark for evaluating the LCP OU-1 prey fish results.

FIGURE 24a

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Scatter Plots of Mercury Concentrations in LCP (West Flume) Prey Fish (2008-2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

RAILROAD

WEST FLUME

WETLAND C

WETLAND A

WETLAND B

SOIL/SEDIMENT CONTAINMENT AREA

BELLE ISLE ROAD

MATTHEWS AVE

Reach A

Year	Species	Mercury (mg/kg)
2015	Creek Chub	0.0784 J
	Creek Chub	0.114 J
	Creek Chub	0.0093 U
	Fathead Minnow	0.0305 J
	Fathead Minnow	0.028 J
2017	Bluntnose Minnow	0.0574 J
	Bluntnose Minnow	0.086 J
	Lepomis spp.	0.165 J
	Lepomis spp.	0.119 J
	Lepomis spp.	0.136 J
2018	Creek Chub	0.0725 J
	Bluntnose Minnow	0.0482 J
	Brook Stickleback	0.0918 J
	Creek Chub	0.0973 J
	Creek Chub	0.124 J

Reach B

Year	Species	Mercury (mg/kg)
2015	Fathead Minnow	0.051 J
	Fathead Minnow	0.0731 J
	Fathead Minnow	0.0118 J
	Fathead Minnow	0.0409 J
	Fathead Minnow	0.0556 J
2017	Bluntnose Minnow	0.0505 J
	Bluntnose Minnow	0.0462 U
	Bluntnose Minnow	0.0513 J
	Bluntnose Minnow	0.0938 U
	Bluntnose Minnow	0.05 U
2018	Bluntnose Minnow	0.0501 J
	Creek Chub	0.0462 J
	Creek Chub	0.0819 J
	Lepomis spp.	0.0697 J
	Creek Chub	0.0745 J

Reach C

Year	Species	Mercury (mg/kg)
2015	Fathead Minnow	0.0187 J
	Fathead Minnow	0.0188 J
	Fathead Minnow	0.0159 J
	Fathead Minnow	0.0172 J
	Fathead Minnow	0.0128 J
2017	Bluntnose Minnow	0.105 J
	Lepomis spp.	0.114 J
	Lepomis spp.	0.146 J
	Lepomis spp.	0.118 J
	Lepomis spp.	0.144 J
2018	*Lepomis spp.*	0.0464 J
	Lepomis spp.	0.0365 J
	Creek Chub	0.0622 J
	Bluntnose Minnow	0.0469 J
	Creek Chub	0.0343 J

300 150 0 300 600

SCALE: 1"=300'

NOTE:
PREYFISH WERE SAMPLED FROM AREAS IN THE DESIGNATED STATIONS WHERE ACCESS AND FLOW CONDITIONS ALLOWED.

LEGEND

EXISTING CONTOURS

PREYFISH STATION REACH A

PREYFISH STATION REACH B

PREYFISH STATION REACH C

FIGURE 24b

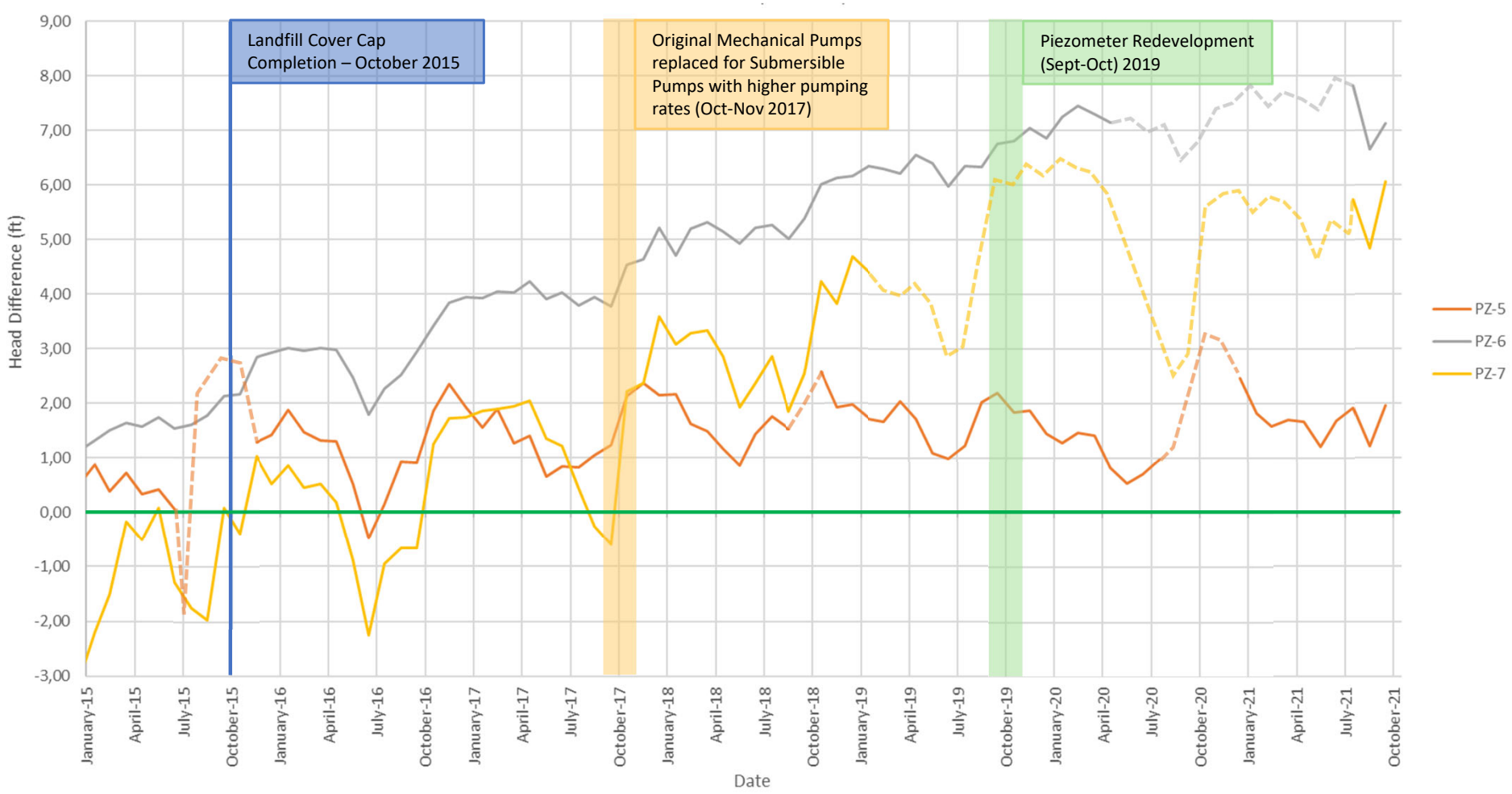
Honeywell LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

LCP PREY FISH MERCURY CONCENTRATIONS (2015-2018)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, N.Y. 13212, PHONE: 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-LCP-2014-2020-TAGS.DWG
PLOT DATE: 10/29/2021 4:29 PM PLOTTED BY: RUSSO, JILL

Upgradient Piezometer Horizontal Gradient: PZ-5, PZ-6, PZ-7
Shallow Outside versus Shallow Inside Head Difference (S_B vs S_A)



NOTE:

- Head differentials greater than zero indicate an inward horizontal gradient
- Dotted line indicates that the water elevation measured in the interior piezometer was below the bottom of the screened interval and therefore is representative of the water level within the piezometer sump below the screened interval, not the water level in the surrounding area. Therefore, the head difference is equal to or greater than what is shown by the dotted line.

FIGURE 25a

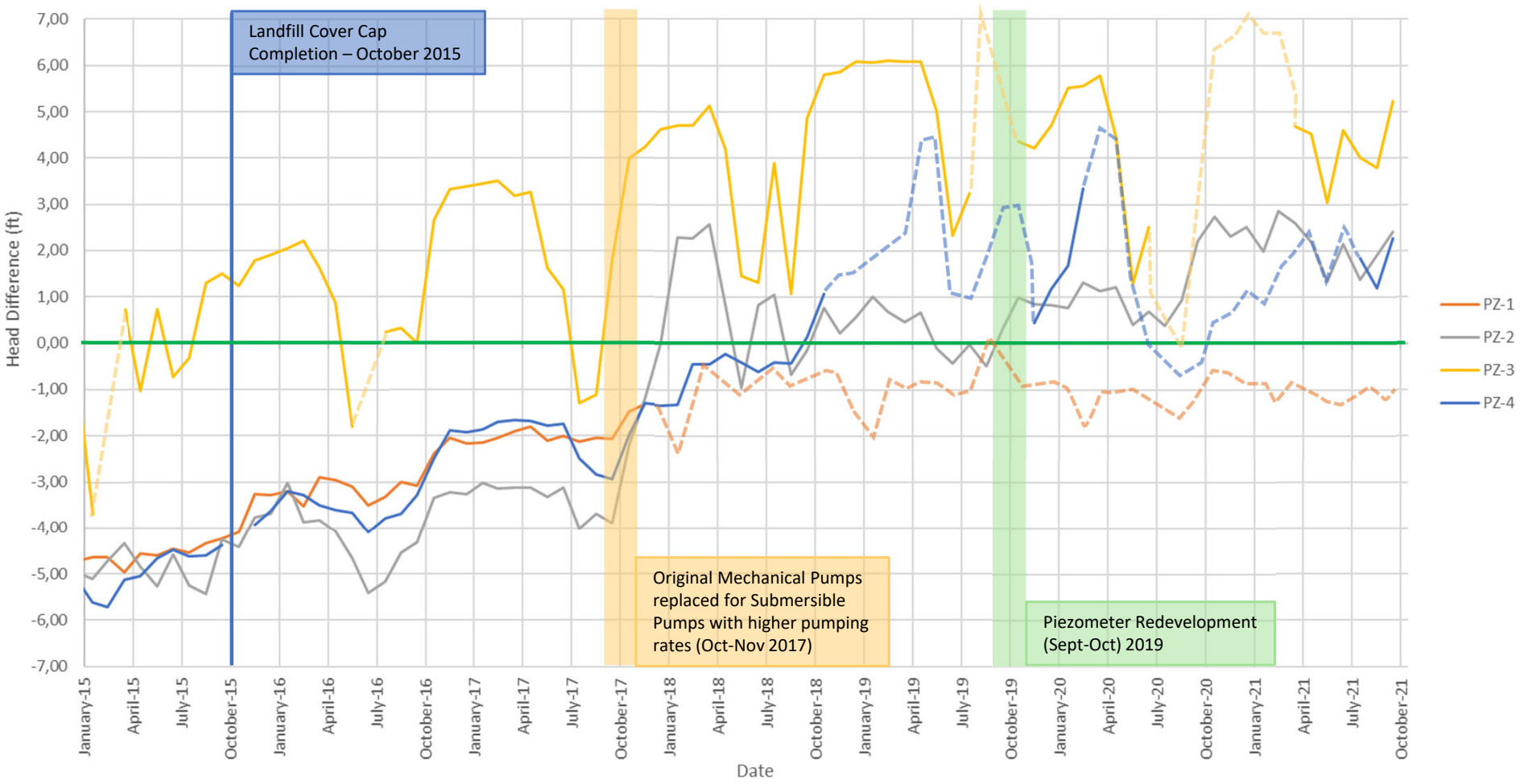
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Upgradient Piezometer
Shallow Horizontal Gradient

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

Downgradient Piezometer Horizontal Gradient: PZ-1, PZ-2, PZ-3, PZ-4
Shallow Outside versus Shallow Inside Head Difference (S_B vs S_A)



NOTE:

- Head differentials greater than zero indicate an inward horizontal gradient
- Dotted line indicates that the water elevation measured in the interior piezometer was below the bottom of the screened interval and therefore is representative of the water level within the piezometer sump below the screened interval, not the water level in the surrounding area. Therefore, the head difference is equal to or greater than what is shown by the dotted line.

FIGURE 25b

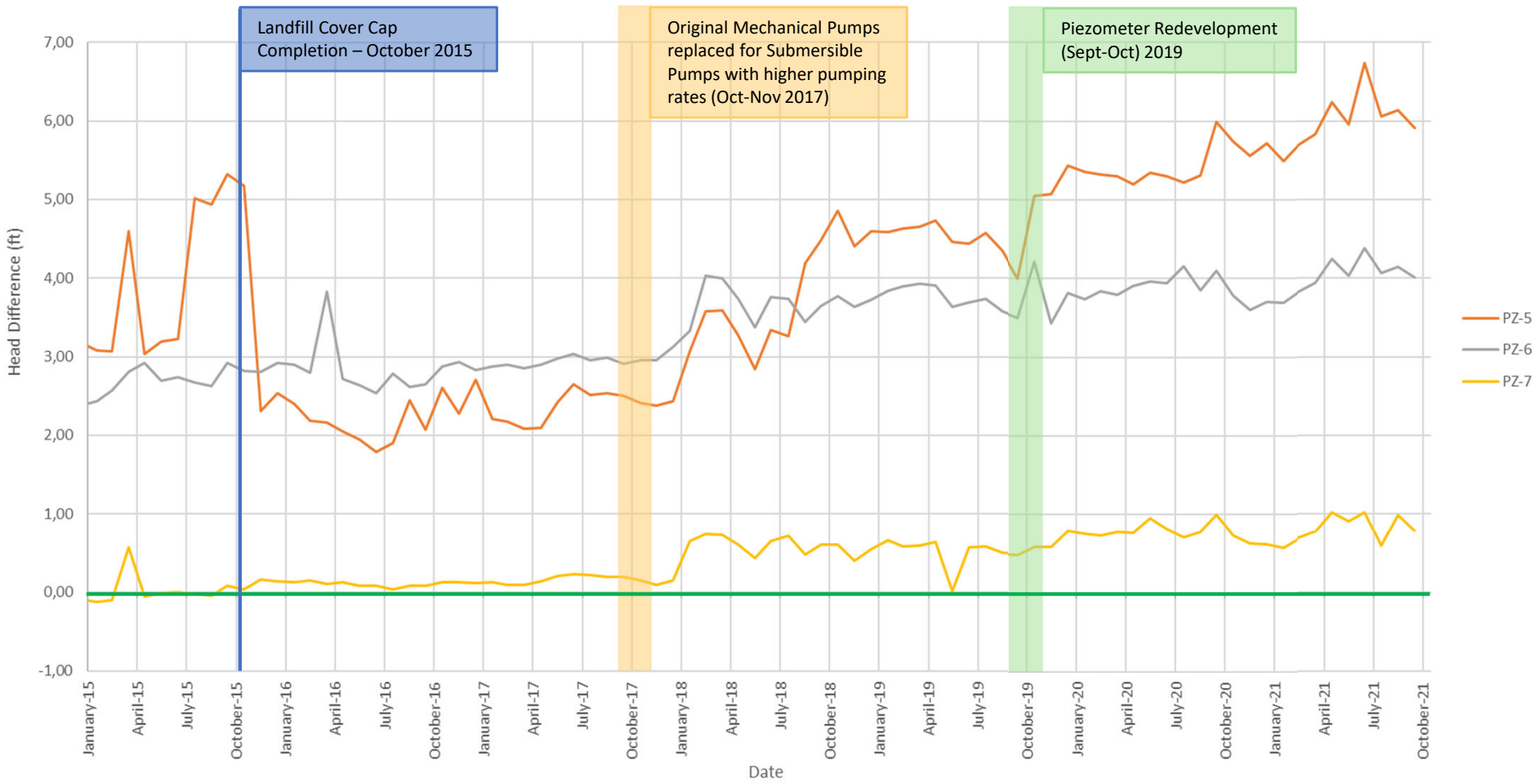
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Downgradient Piezometer
Shallow Horizontal Gradient

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

Upgradient Piezometer Horizontal Gradient: PZ-5, PZ-6, PZ-7
Intermediate Outside versus Intermediate Inside Head Difference (I_B vs I_A)



NOTE:
- Head differentials greater than zero indicate an inward horizontal gradient

FIGURE 25c

Honeywell

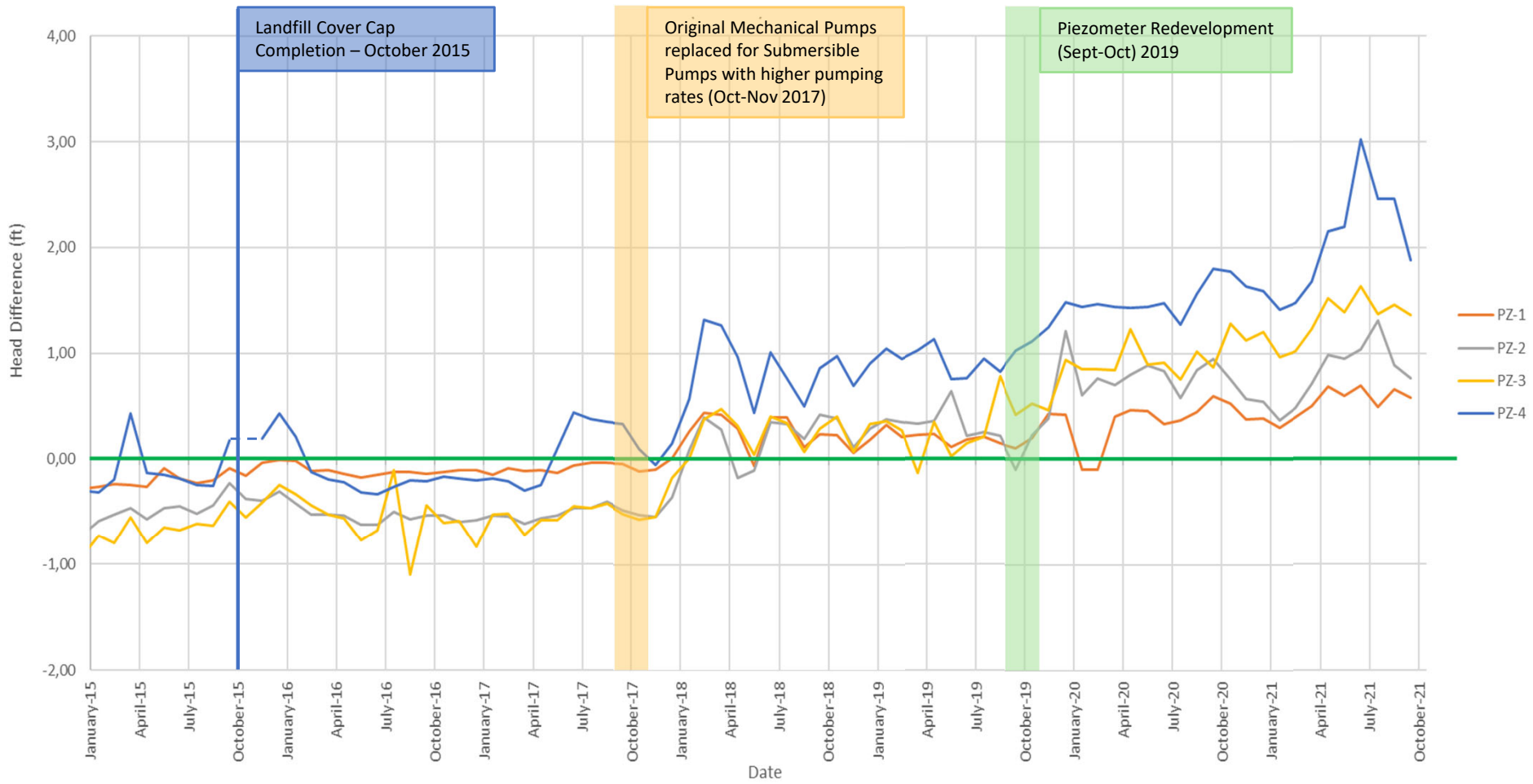
LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

Upgradient Piezometer
Intermediate Horizontal Gradient

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

Downgradient Piezometer Horizontal Gradient: PZ-1, PZ-2, PZ-3, PZ-4
Intermediate Outside versus Intermediate Inside Head Difference (I_B vs I_A)



NOTE:

- Head differentials greater than zero indicate an inward horizontal gradient
- Dotted line indicates that the water elevation measured in the interior piezometer was below the bottom of the screened interval and therefore is representative of the water level within the piezometer sump below the screened interval, not the water level in the surrounding area. Therefore, the head difference is equal to or greater than what is shown by the dotted line.

FIGURE 25d

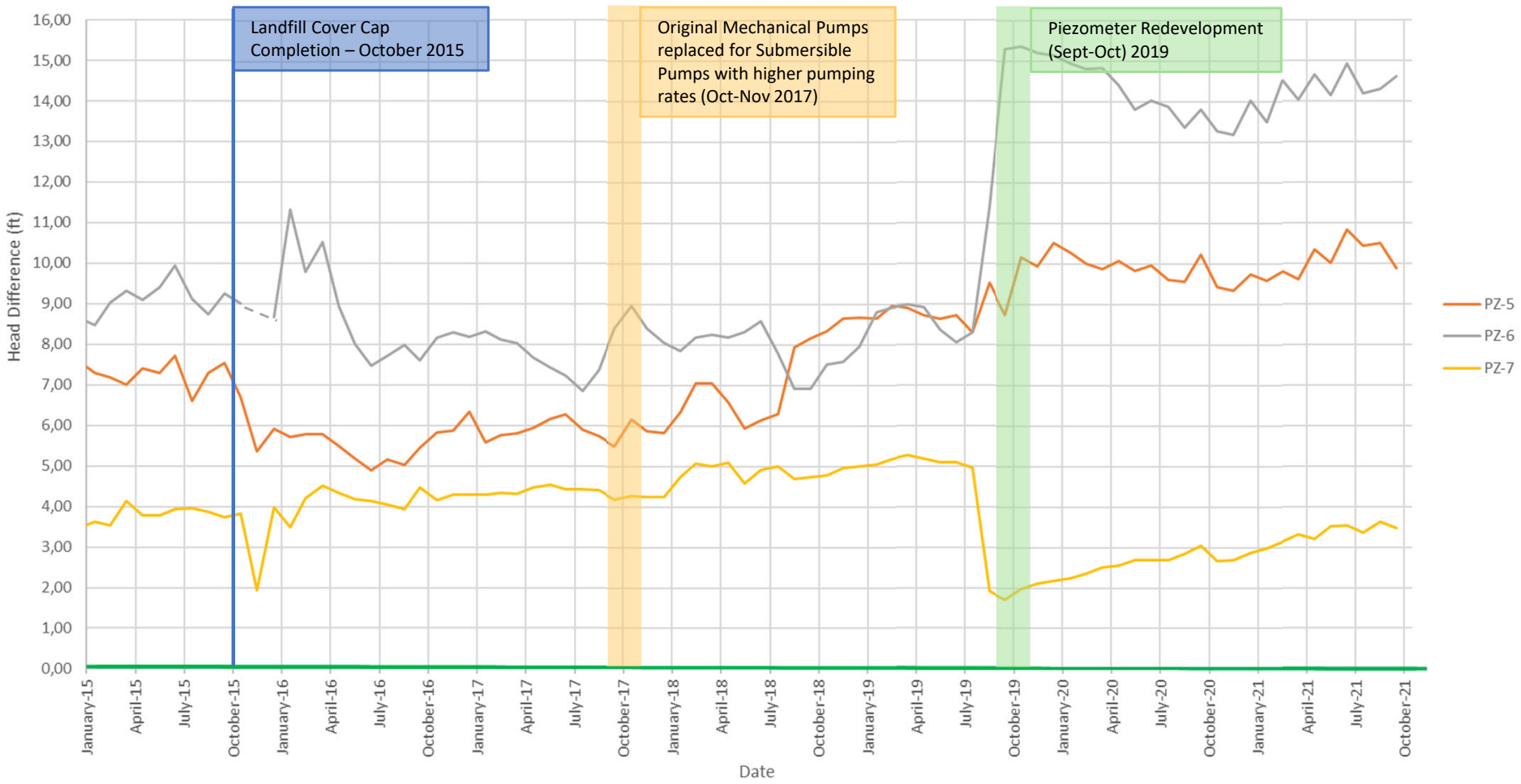
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Downgradient Piezometer
Intermediate Horizontal Gradient

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

Upgradient Piezometer Vertical Gradient: PZ-5, PZ-6, PZ-7
Deep Inside versus Intermediate Inside Head Difference (D_A vs I_A)



NOTE:
- Head differentials greater than zero indicate an inward horizontal gradient
- Dotted line indicates that the water elevation measured in the interior piezometer was below the bottom of the screened interval and therefore is representative of the water level within the piezometer sump below the screened interval, not the water level in the surrounding area. Therefore, the head difference is equal to or greater than what is shown by the dotted line.

FIGURE 25e

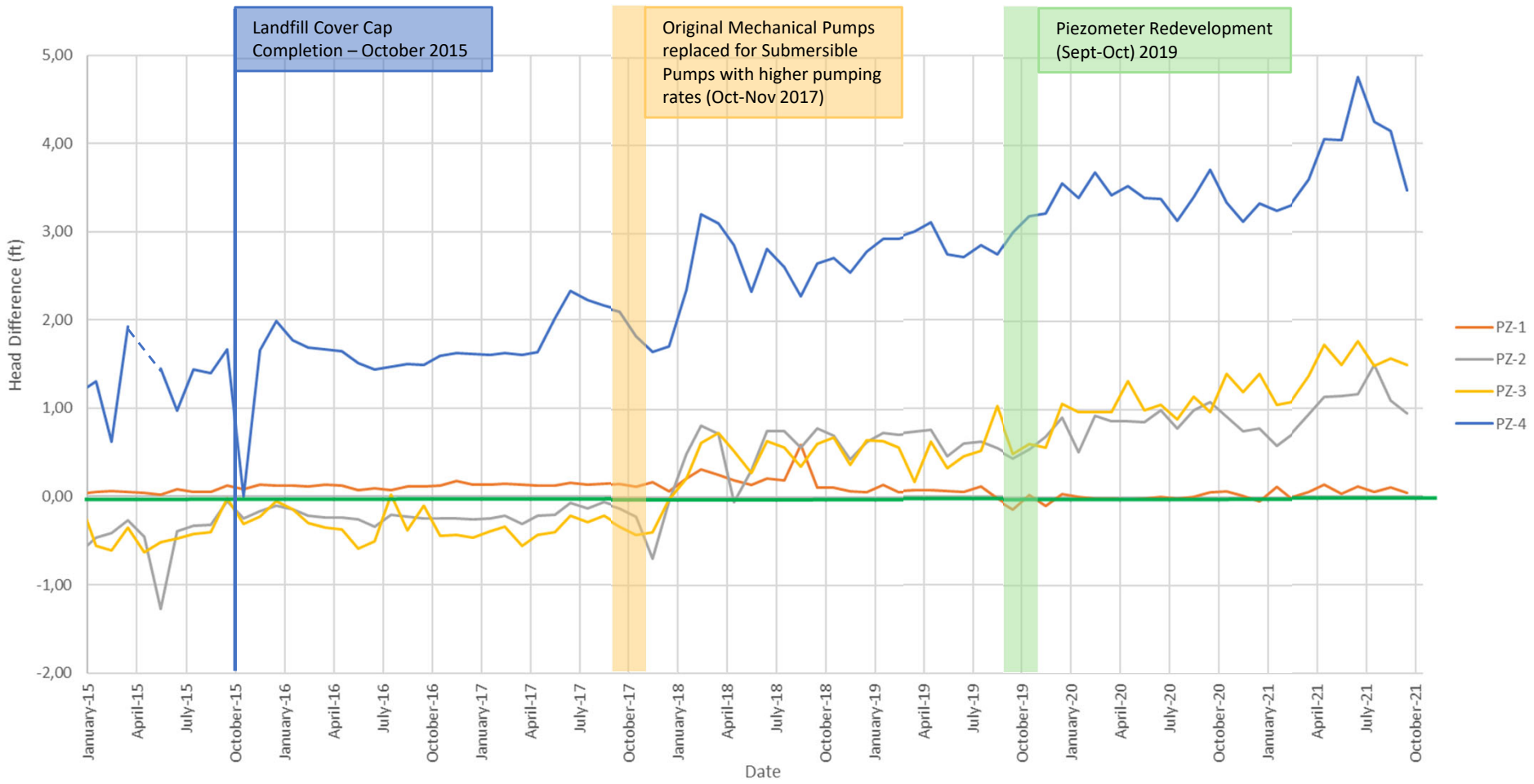
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Upgradient Piezometer Vertical Gradient

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

Downgradient Piezometer Vertical Gradient: PZ-1, PZ-2, PZ-3, PZ-4
Deep Inside versus Intermediate Inside Head Difference (D_A vs I_A)



NOTE:
- Head differentials greater than zero indicate an inward horizontal gradient
- Dotted line indicates that the water elevation measured in the interior piezometer was below the bottom of the screened interval and therefore is representative of the water level within the piezometer sump below the screened interval, not the water level in the surrounding area. Therefore, the head difference is equal to or greater than what is shown by the dotted line.

FIGURE 25f

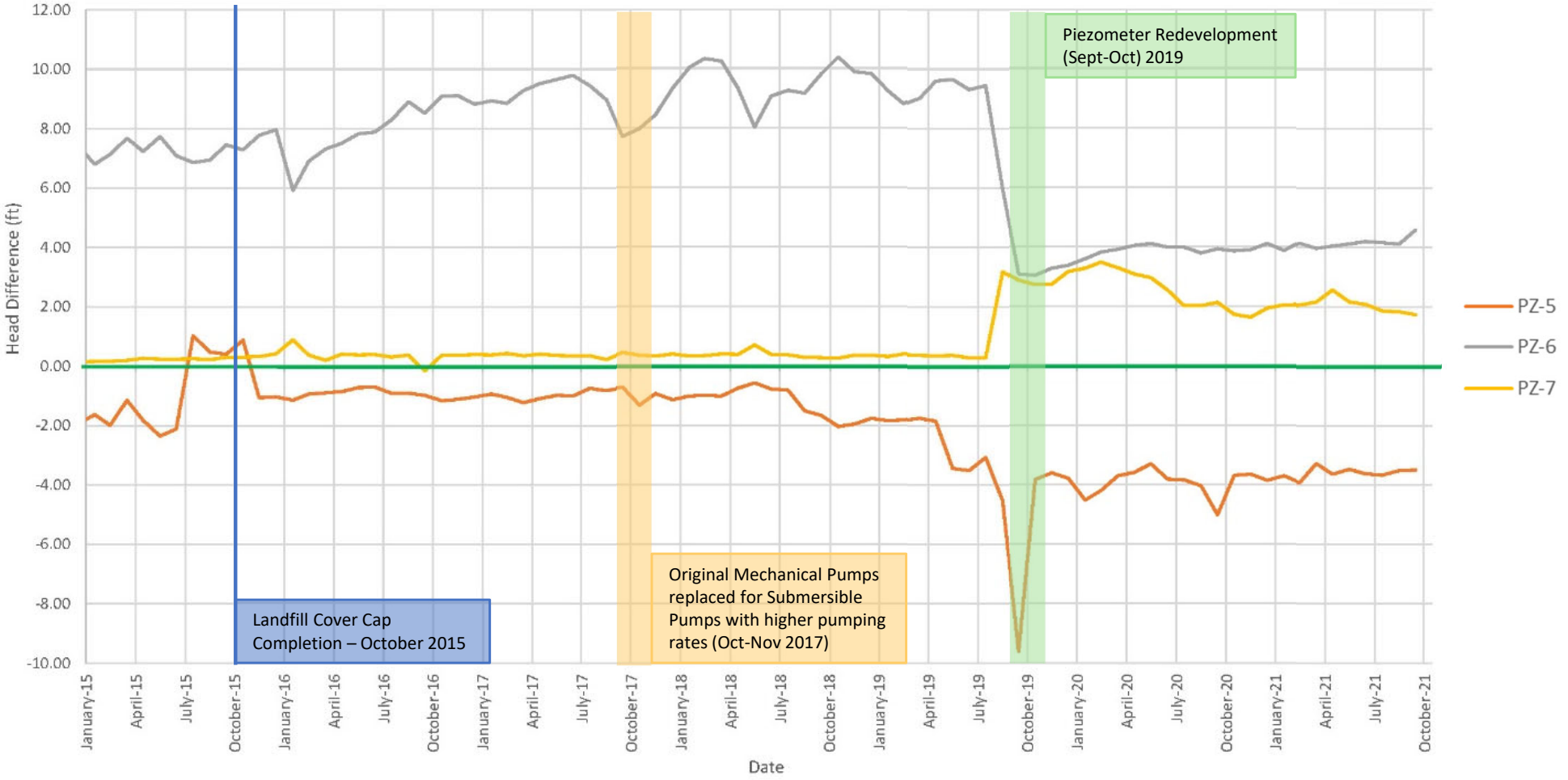
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Downgradient Piezometer Vertical Gradient

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

Upgradient Piezometer Horizontal Gradient: PZ-5, PZ-6, PZ-7
Deep Outside versus Deep Inside Head Difference (I_B vs I_A)



NOTE:
- Head differentials greater than zero indicate an inward horizontal gradient

FIGURE 25g

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

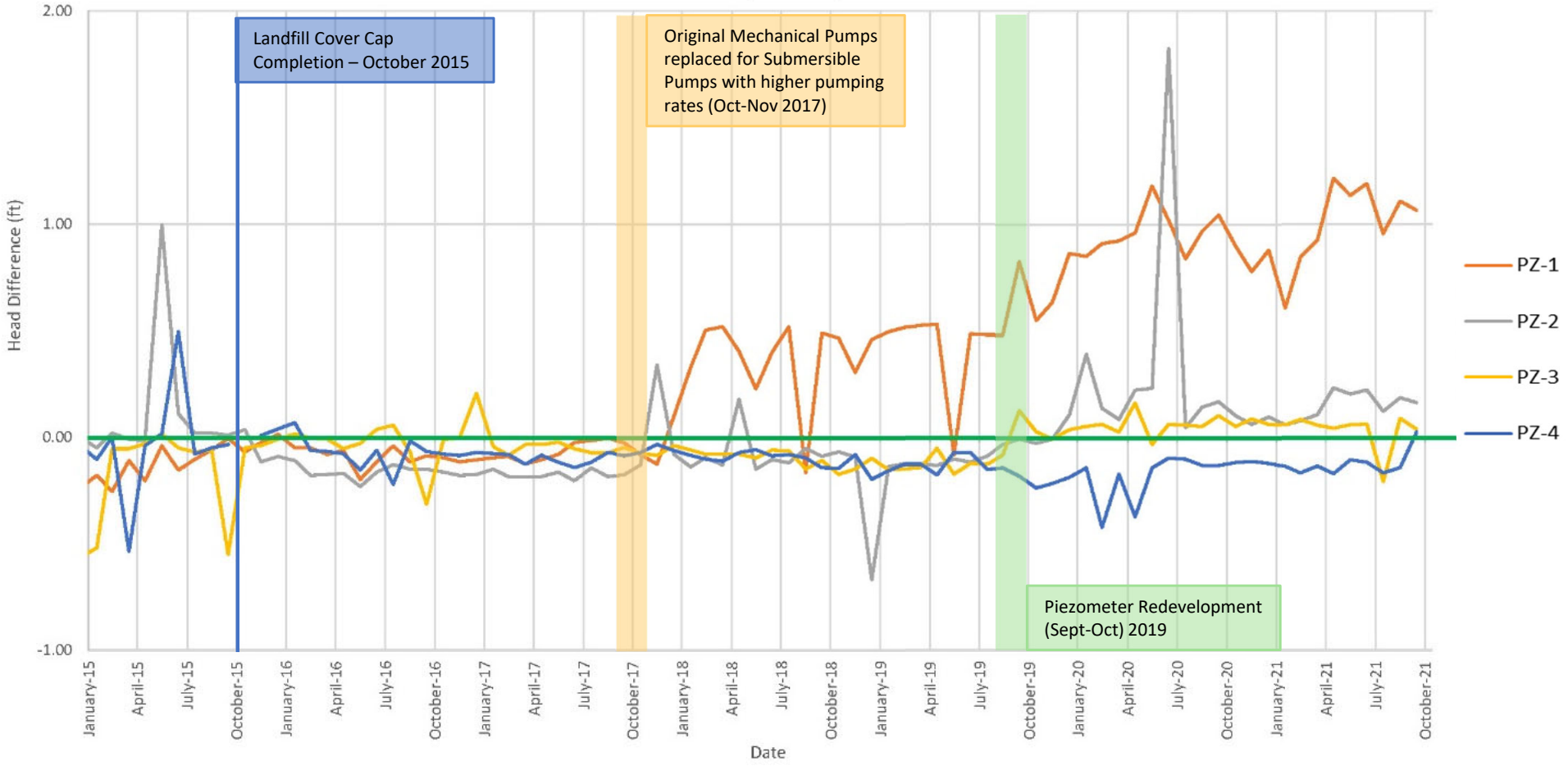
Upgradient Piezometer
Deep Horizontal Gradient

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

P:\Honeywell -SYR\452663 GB-NMC 2021 PVM\09 Reports\9.1 2021 GB_NMC 5-Year Comprehensive\Rev 2\Appendix A Figures 9-22

Downgradient Piezometer Horizontal Gradient: PZ-1, PZ-2, PZ-3, PZ-4
Deep Outside versus Deep Inside Head Difference (I_B vs I_A)



NOTE:
- Head differentials greater than zero indicate an inward horizontal gradient

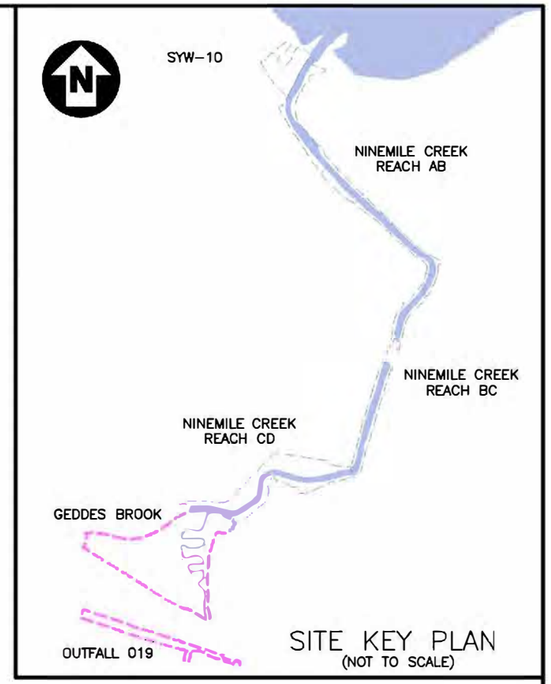
FIGURE 25h

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

Downgradient Piezometer
Deep Horizontal Gradient

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



SITE KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- SEDIMENT SAMPLING LOCATIONS
- SURFACE WATER SAMPLE LOCATIONS

200 100 0 200 400

SCALE: 1"=200'

FIGURE 26

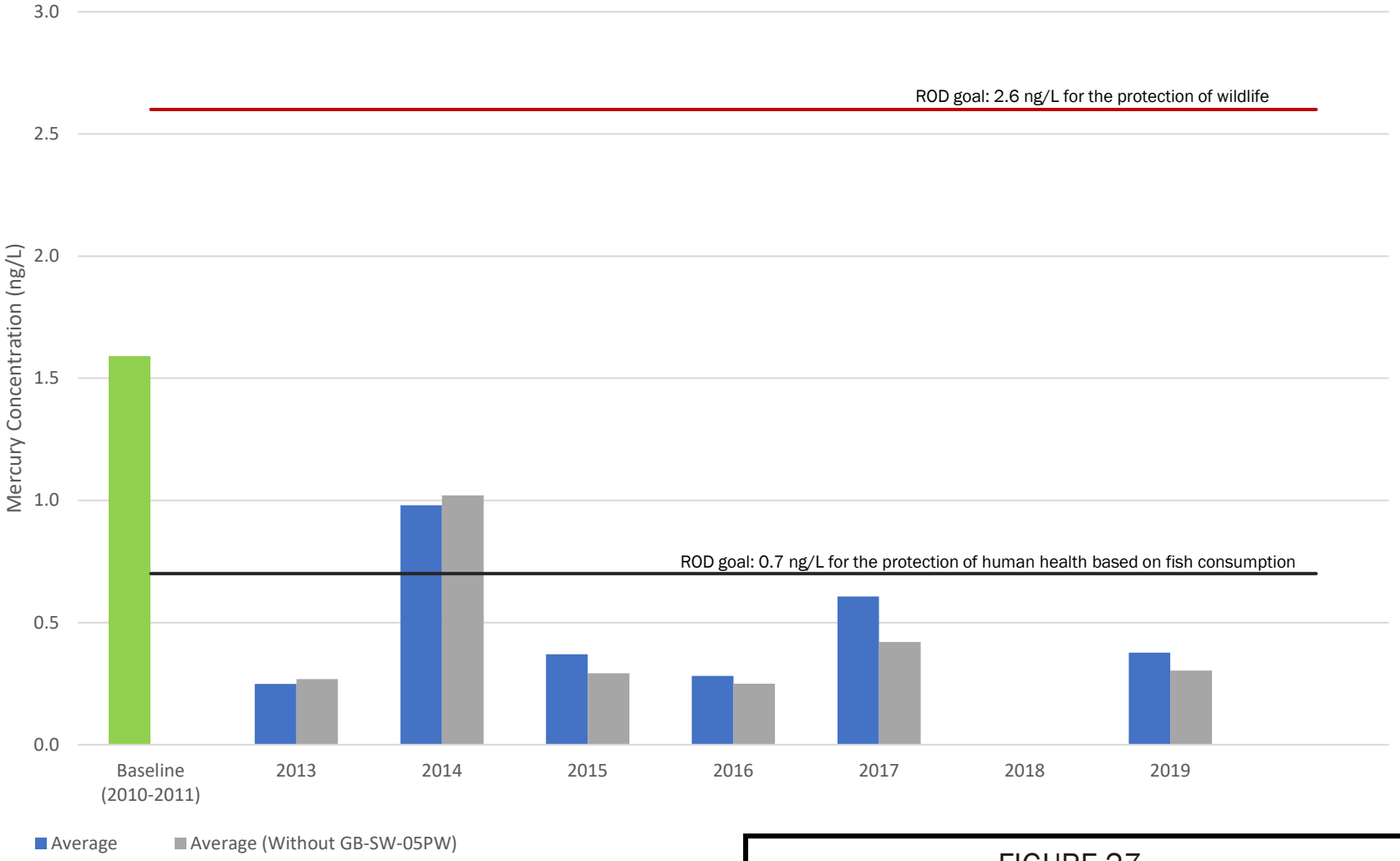
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

GEDDES BROOK SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 • 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-GB-SED AND SW-OMM-2020.DWG
PLOT DATE: 10/26/2021 3:49 PM PLOTTED BY: RUSSO, JILL



Notes:
(a) Each column represents the sitewide average
(b) No data collected in 2018 as approved by NYSDEC
(c) Field duplicates are averaged together for all calculations
(d) The human health fish consumption goal for dissolved mercury concentrations (0.7 ng/L) does not apply to GB-SW-05PW, as it is located in the perched wetland and only intermittently contains standing water. Therefore, averages for dissolved mercury are displayed both with and without GB-SW-05PW.

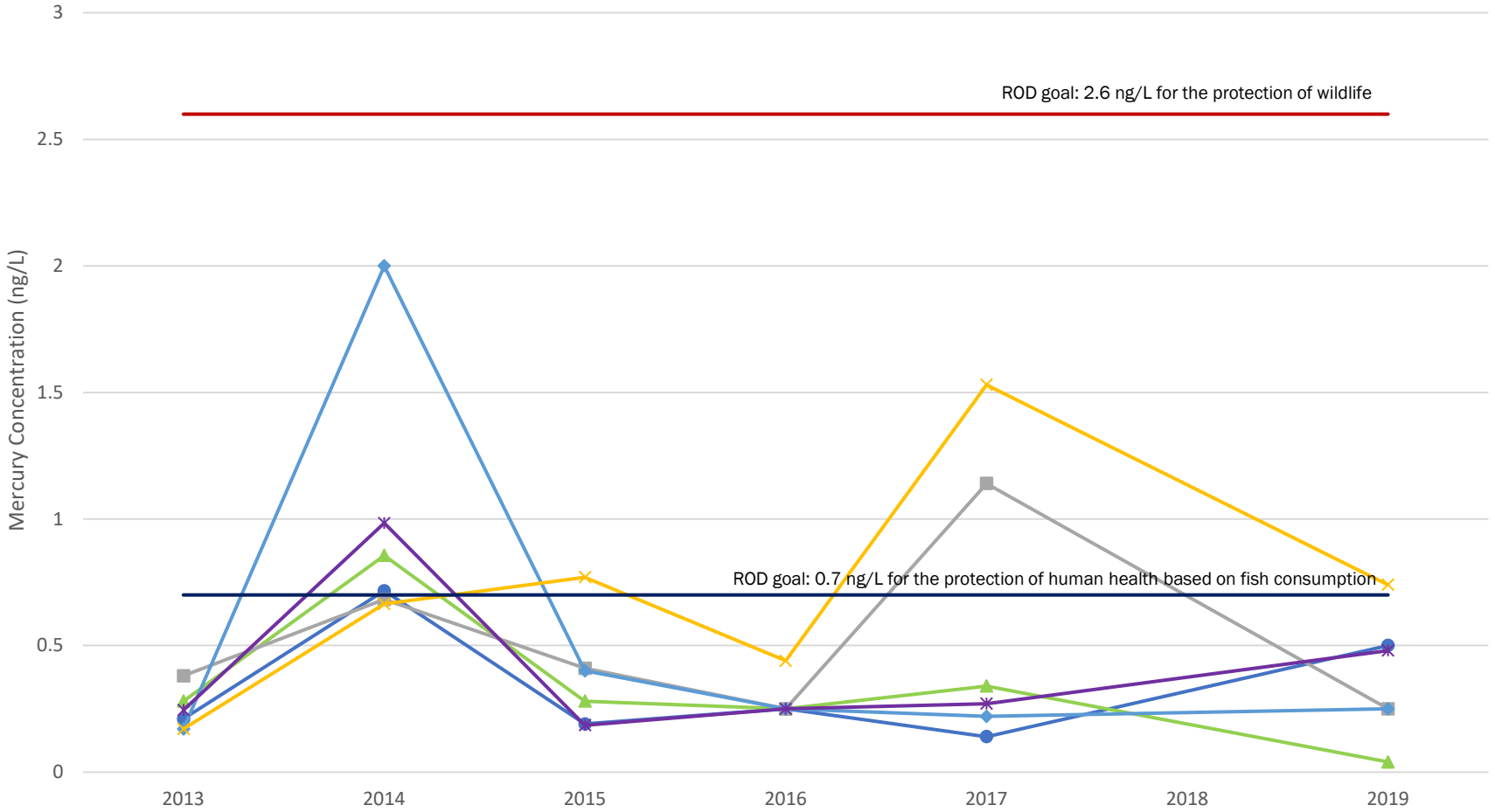
FIGURE 27

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Average Dissolved Mercury in Surface Water of Geddes Brook (2013-2019)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

(a) No data collected in 2018 as approved by NYSDEC

(b) Field duplicates are averaged together for all calculations

(c) The human health fish consumption goal for dissolved mercury concentrations (0.7 ng/L) does not apply to GB-SW-05PW, as it is located in the perched wetland and only intermittently contains standing water.

FIGURE 28

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Dissolved Mercury in Surface Water of Geddes Brook (2013-2019)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

GB-SW-03CGW		GB-SED-03CGW	
Year	Dissolved Mercury (ng/L)	Year	Total Mercury (mg/kg)
2013	0.17 J	2013	0.028 J
2014	0.68 J	2014	0.025 J
2015	0.41 J	2015	0.040 J
2016	0.50 U	2016	0.014 J
2017	1.14	2017	0.021 J
2019	0.50 U		

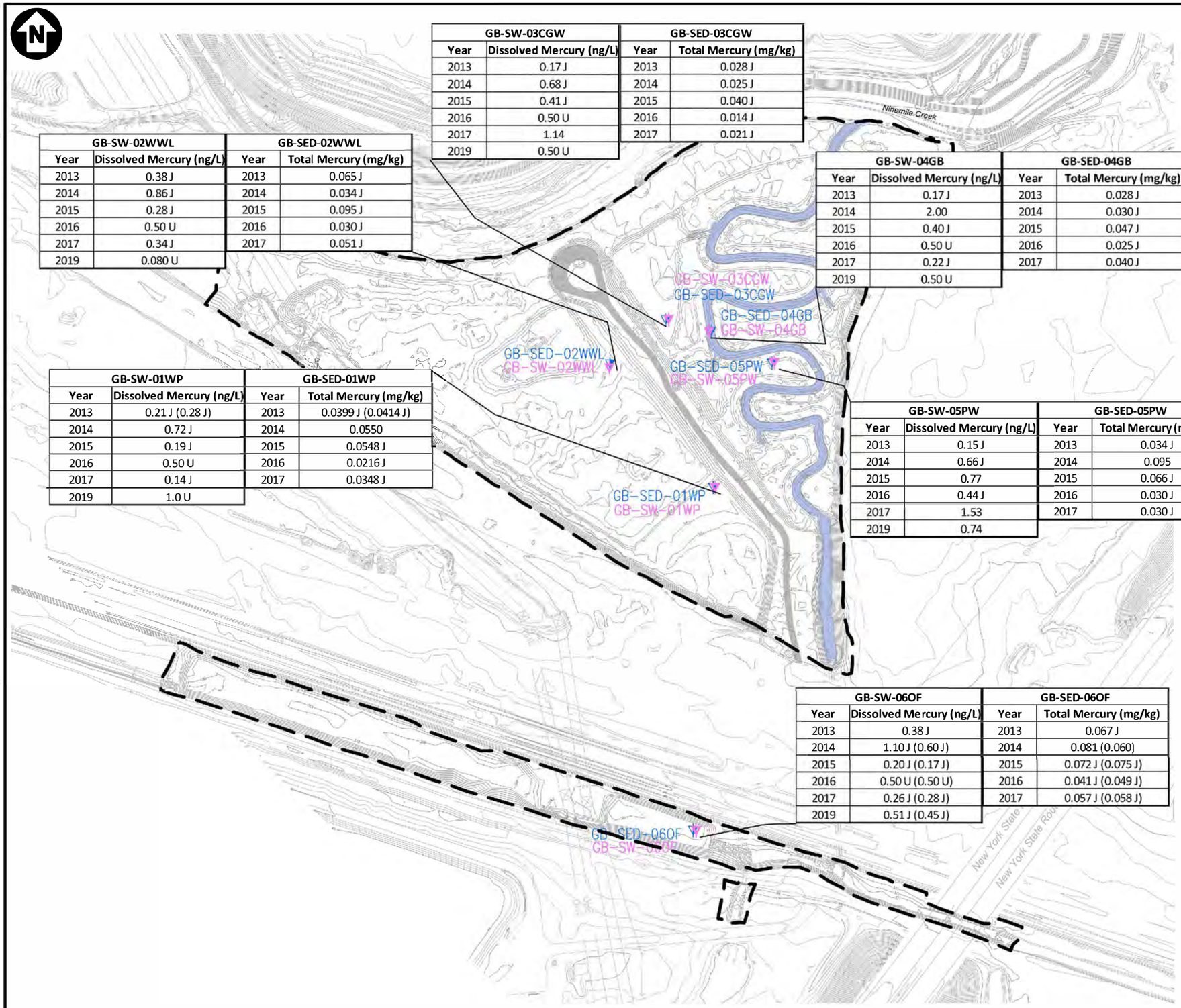
GB-SW-02WWL		GB-SED-02WWL	
Year	Dissolved Mercury (ng/L)	Year	Total Mercury (mg/kg)
2013	0.38 J	2013	0.065 J
2014	0.86 J	2014	0.034 J
2015	0.28 J	2015	0.095 J
2016	0.50 U	2016	0.030 J
2017	0.34 J	2017	0.051 J
2019	0.080 U		

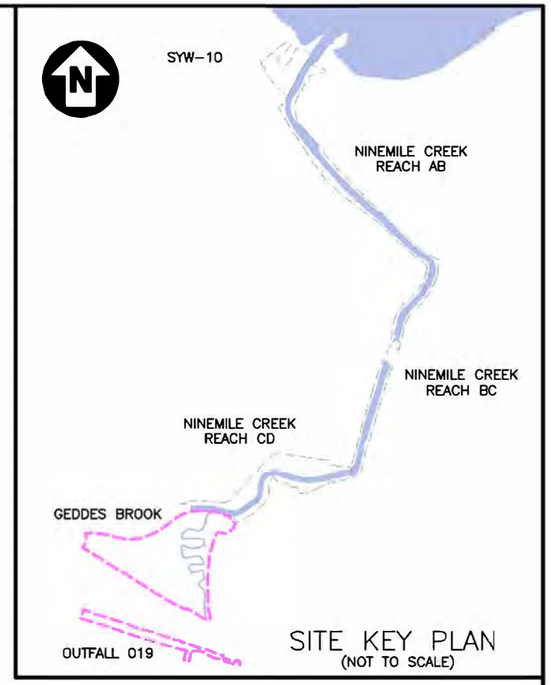
GB-SW-04GB		GB-SED-04GB	
Year	Dissolved Mercury (ng/L)	Year	Total Mercury (mg/kg)
2013	0.17 J	2013	0.028 J
2014	2.00	2014	0.030 J
2015	0.40 J	2015	0.047 J
2016	0.50 U	2016	0.025 J
2017	0.22 J	2017	0.040 J
2019	0.50 U		

GB-SW-01WP		GB-SED-01WP	
Year	Dissolved Mercury (ng/L)	Year	Total Mercury (mg/kg)
2013	0.21 J (0.28 J)	2013	0.0399 J (0.0414 J)
2014	0.72 J	2014	0.0550
2015	0.19 J	2015	0.0548 J
2016	0.50 U	2016	0.0216 J
2017	0.14 J	2017	0.0348 J
2019	1.0 U		

GB-SW-05PW		GB-SED-05PW	
Year	Dissolved Mercury (ng/L)	Year	Total Mercury (mg/kg)
2013	0.15 J	2013	0.034 J
2014	0.66 J	2014	0.095
2015	0.77	2015	0.066 J
2016	0.44 J	2016	0.030 J
2017	1.53	2017	0.030 J
2019	0.74		

GB-SW-06OF		GB-SED-06OF	
Year	Dissolved Mercury (ng/L)	Year	Total Mercury (mg/kg)
2013	0.38 J	2013	0.067 J
2014	1.10 J (0.60 J)	2014	0.081 (0.060)
2015	0.20 J (0.17 J)	2015	0.072 J (0.075 J)
2016	0.50 U (0.50 U)	2016	0.041 J (0.049 J)
2017	0.26 J (0.28 J)	2017	0.057 J (0.058 J)
2019	0.51 J (0.45 J)		





LEGEND:

- RESTORATION AREA
- SEDIMENT SAMPLING LOCATIONS
- SURFACE WATER SAMPLE LOCATIONS

200 100 0 200 400

SCALE: 1"=200'

FIGURE 29

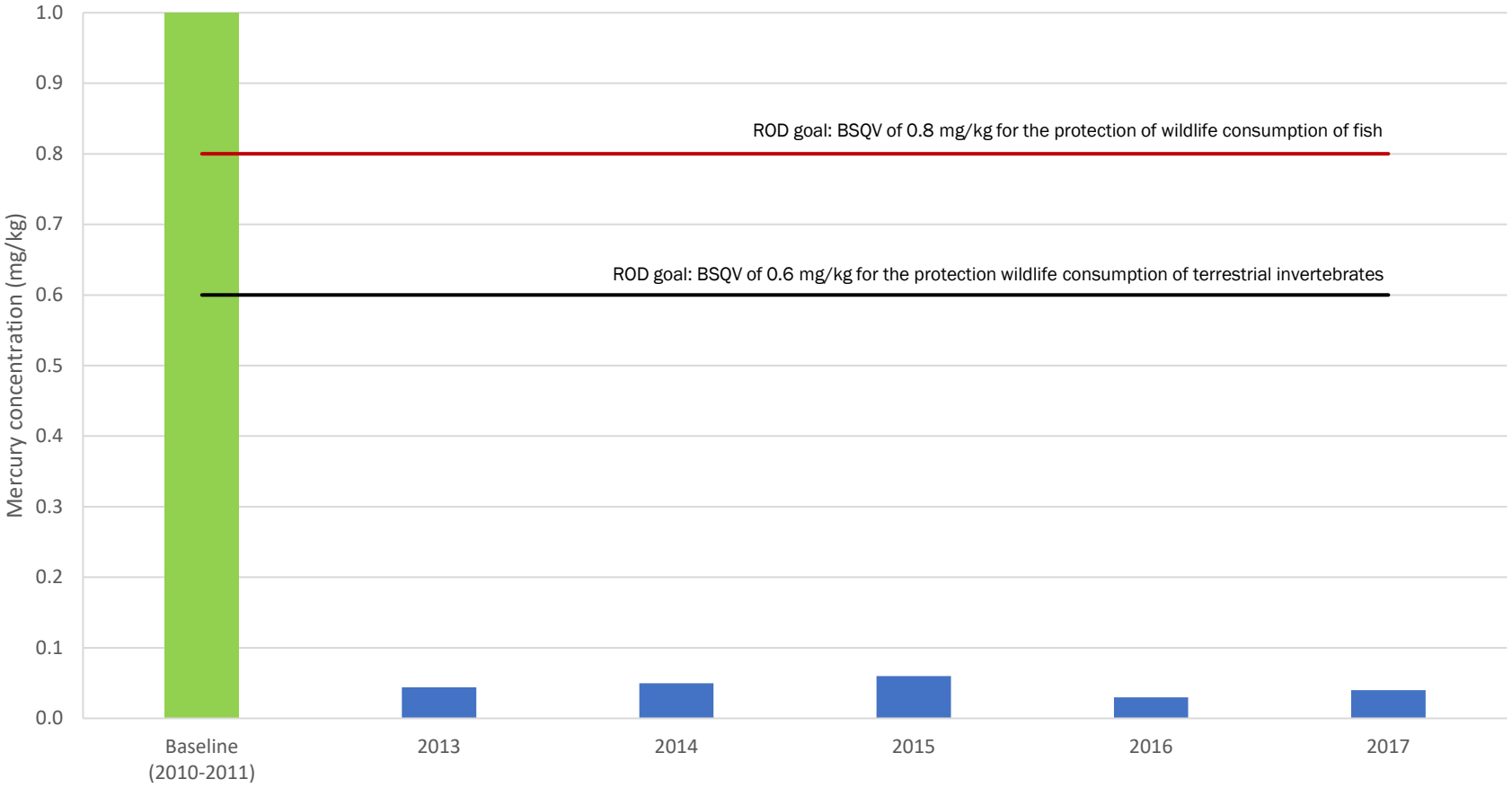
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

GEDDES BROOK SURFACE WATER AND SEDIMENT MERCURY CONCENTRATIONS (2013-2019)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 • 315-451-9560

FILE NAME: P:\HONEYWELL - SYR\452863 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452863-GB-SED AND SW-OMM-2020.DWG
PLOT DATE: 11/3/2021 2:12 PM PLOTTED BY: RUSSO, JILL



Notes:
(a) Each column represents the sitewide average
(b) Baseline average is 5.5 mg/kg. The axis was scaled to better represent data from later years.
Field duplicates are averaged together for all calculations

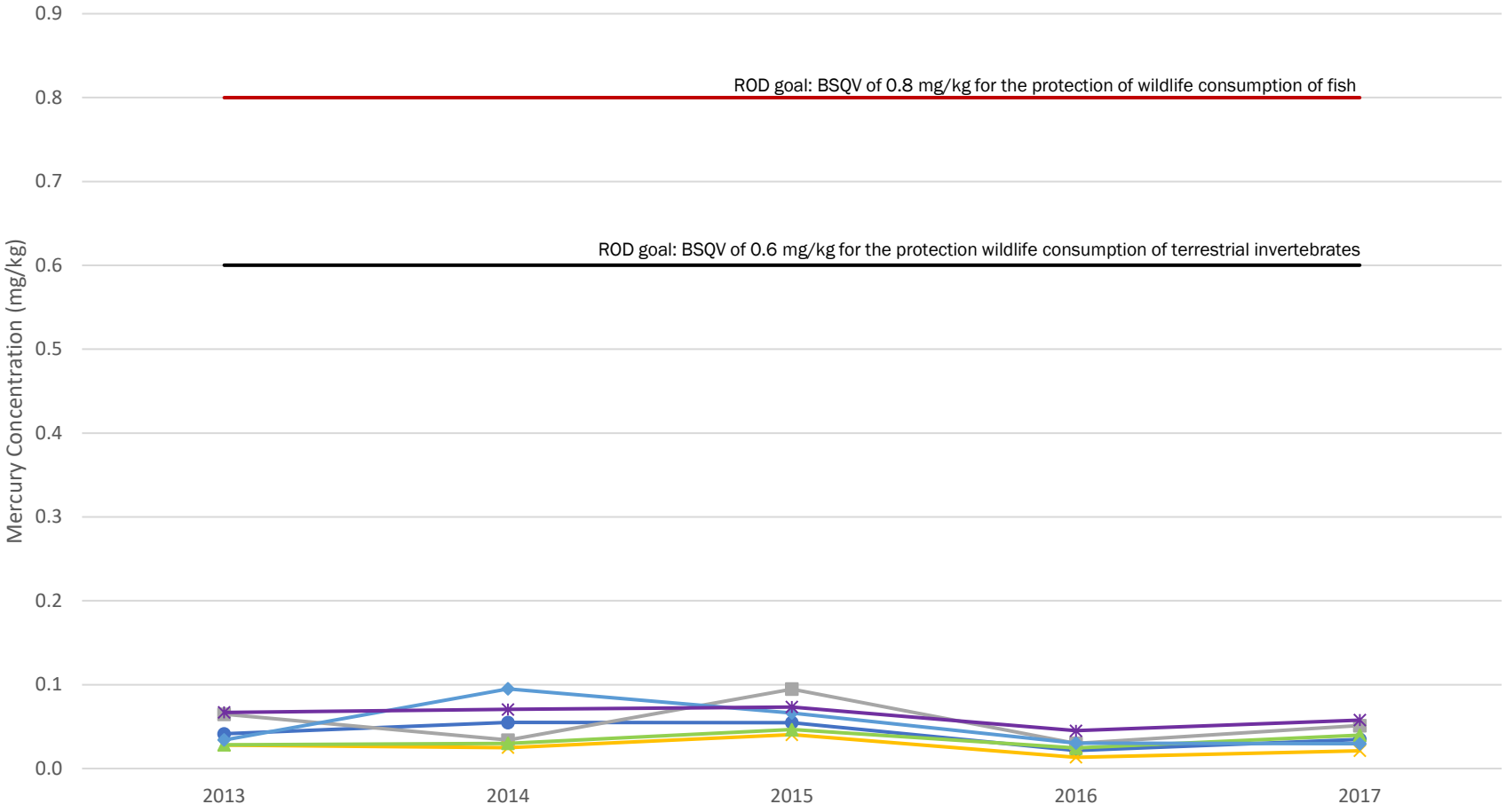
FIGURE 30

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Geddes Brook Sitewide Average Total Mercury in Sediment (2013-2017)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Sample Locations

- GB-SED-01WP
- GB-SED-02WWL
- GB-SED-03CGW
- GB-SED-04GB
- GB-SED-05PW
- GB-SED-06OF

Notes:

a) Field duplicates are averaged together for all calculations

FIGURE 31

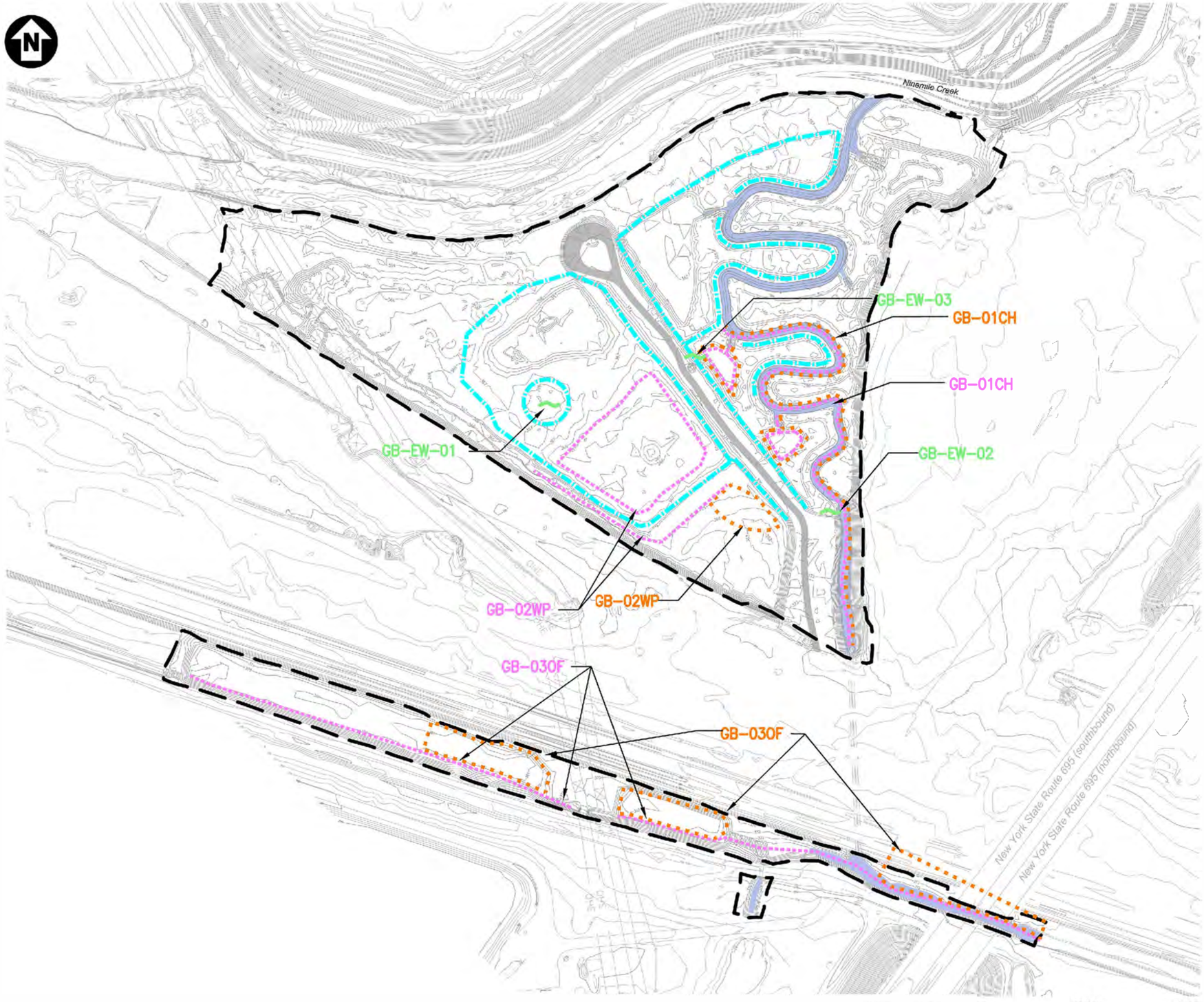
Honeywell

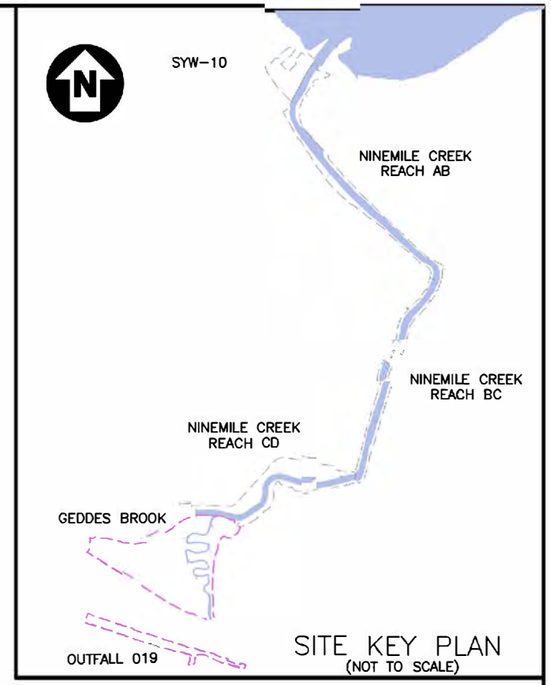
LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Geddes Brook Total Mercury in Sediment (2013-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560





SITE KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- BENTHIC MACROINVERT SAMPLING AREAS
- FISH SAMPLING AREAS
- SMALL MAMMAL SAMPLING AREAS
- EARTHWORM SAMPLES

NOTES:

1. SAMPLE AREAS FOR FISH, MACROINVERTEBRATES AND SMALL MAMMALS DEPICT THE RANGE WHERE SAMPLING OCCURED.
2. FISH SAMPLING AREAS IN THE EAST FLOODPLAIN WERE INTENDED TO MINIMIZE THE CHANCE THAT FISH FROM NINEMILE CREEK WERE INADVERTENTLY COLLECTED.
3. SMALL MAMMAL SAMPLING AREAS FOCUSED ON INTERIOR PORTIONS OF THE SITE TO MINIMIZE THE CHANCE THAT MIGRANTS FROM OFF SITE WERE COLLECTED.

FIGURE 32

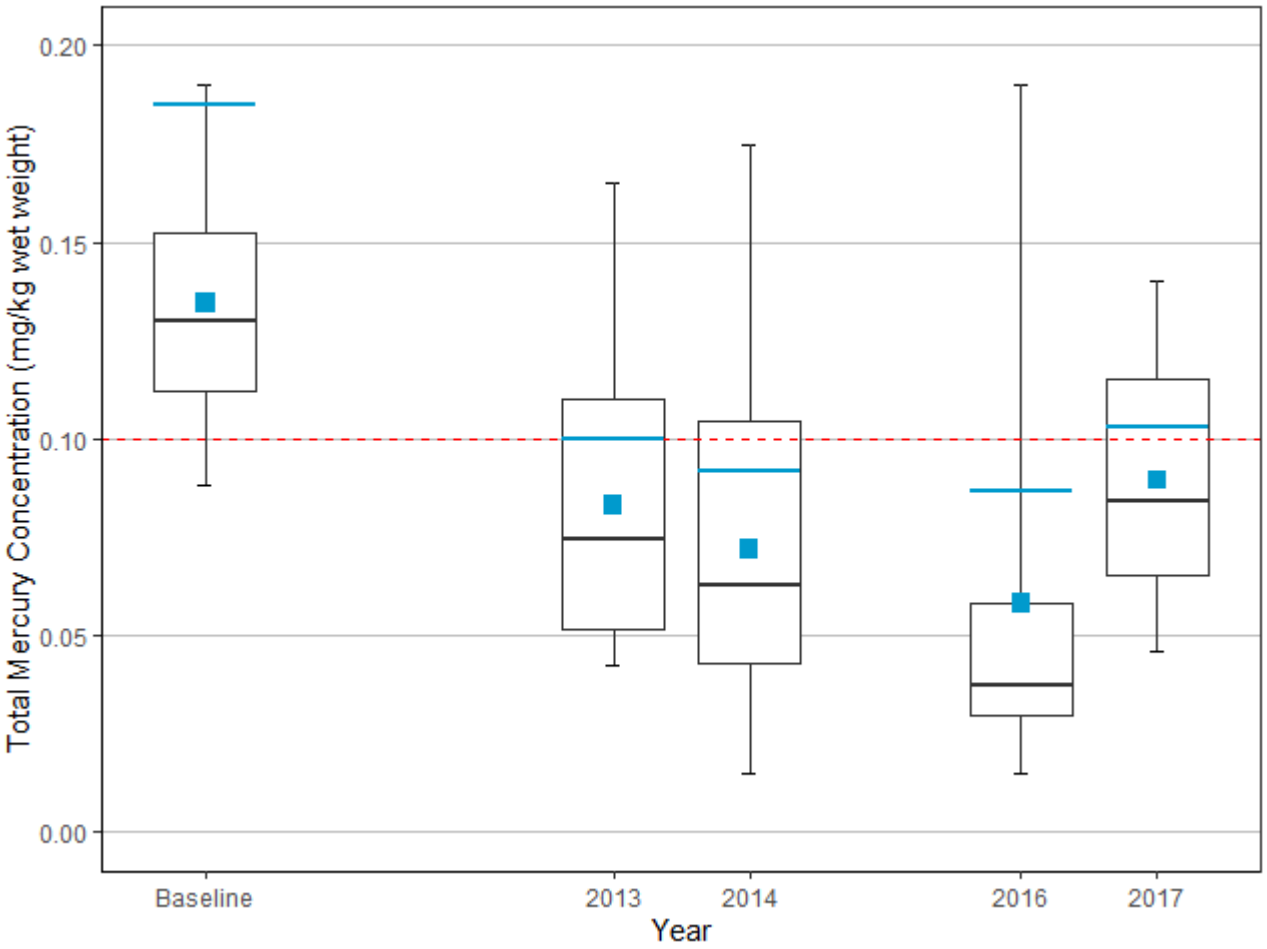
Honeywell

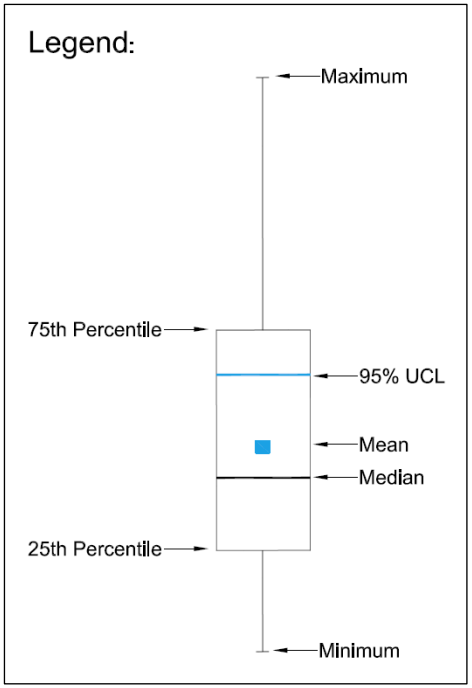
LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

GEDDES BROOK
BIOTA SAMPLE
LOCATIONS

PARSONS
301 PLAINFIELD ROAD SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL - SYR\452663 GB-NMC 2021 PWA\10 TECHNICAL CATEGORIES\2020 5 YR REVIEW\452663 GB B07A MONIT QWW 2020.DWG
PLOT DATE: 3/25/2022 4:16 PM PLOTTED BY: RUSSO, JILL [US-US]





Notes:

(a) 95% UCL: estimate of the upper bound for the true population mean; calculated using ProUCL Version 5.1. For data sets with NDs, ProUCL selected the statistical method.

(b) Mean concentration calculated by ProUCL using the same statistical method used for 95% UCL, unless 3 or fewer results were detected. In that case, for plots showing the 95% UCL, the arithmetic mean was calculated with non-detects substituted for ½ the MDL.

FIGURE 33

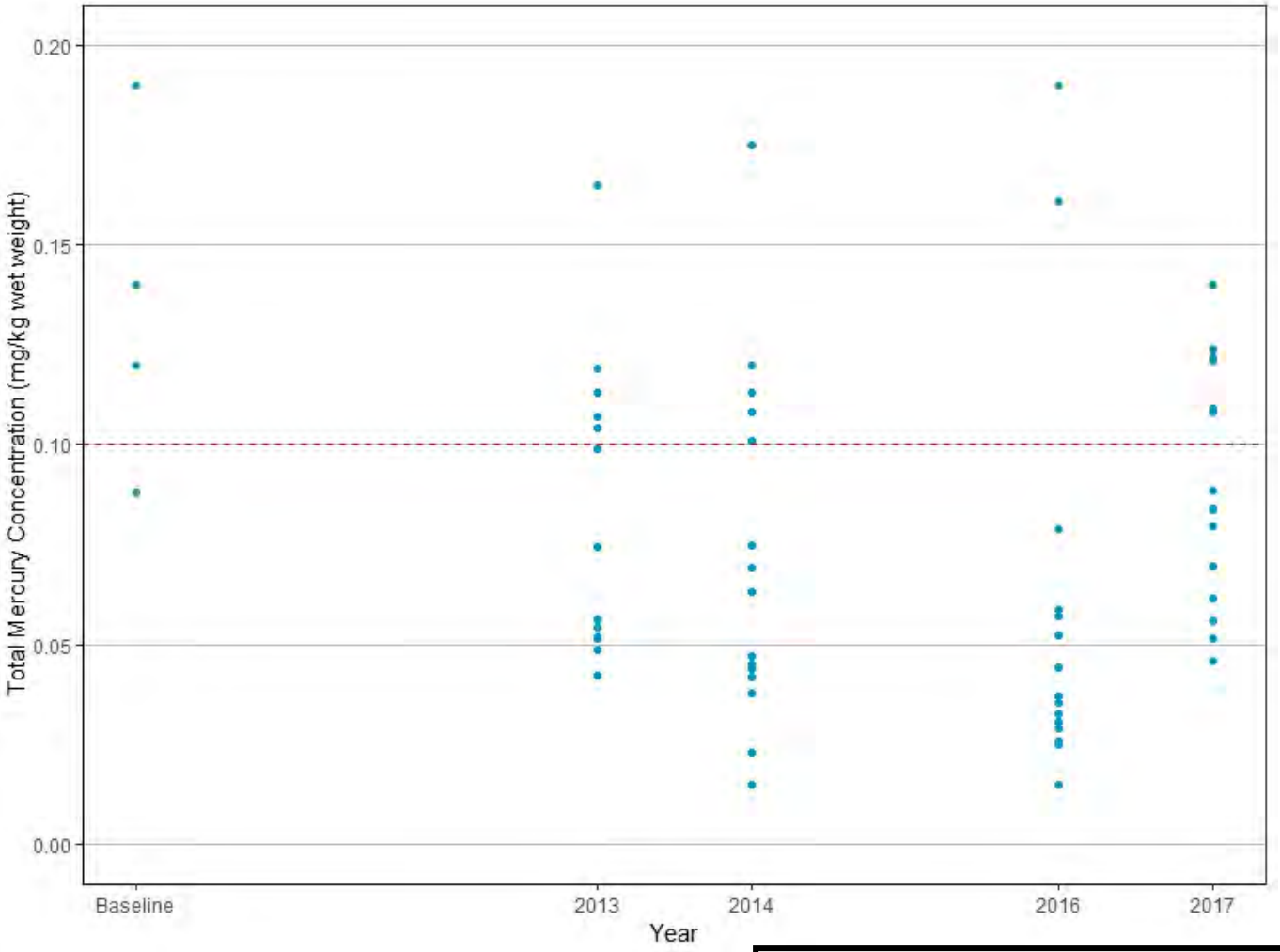
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Box and Whisker Plots of Mercury Concentrations in Geddes Brook Prey Fish (2013-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Legend:
- - - - Ecological performance criterion for protection of ecological receptors (0.1 mg/kg)

FIGURE 34

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Scatter Plot of Mercury Concentrations in Geddes Brook Prey Fish (2013-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

02WP		
Year	Species	Mercury (mg/kg)
2013	Lepomis	0.055 J
2013	Shorthead Redhorse	0.042 J
2013	Lepomis	0.075 J
2013	Lepomis	0.049 J
2013	Lepomis	0.052 J
2014	White Sucker	0.023
2014	White Sucker	0.015
2014	Lepomis	0.038
2014	Lepomis	0.045
2014	Lepomis	0.042
2016	Lepomis	0.033
2016	Lepomis	0.025 J
2016	Lepomis	0.029 J
2016	Lepomis	0.037 J
2016	Lepomis	0.079 J
2017	Lepomis	0.124
2017	Lepomis	0.109
2017	Lepomis	0.121
2017	Lepomis	0.122
2017	Lepomis	0.140

02WP		
Year	Species	Mercury (mg/kg)
2013	Dragonfly Nymphes	0.042 J
2013	Dragonfly Nymphes	0.015 J
2013	Dragonfly Nymphes	0.056 J
2014	Crayfish	0.040
2014	Crayfish	0.030
2014	Dragonfly Nymphes	0.230
2016	Dragonfly Nymphes	0.017 J
2016	Dragonfly Nymphes	0.010 U
2016	Damsel Fly	0.010 J
2017	Dragonfly Nymphes	0.010 U
2017	Dragonfly Nymphes	0.010 U
2017	Dragonfly Nymphes	0.010 U

GB-MAM-05		
Year	Species	Mercury (mg/kg)
2013	White Footed Mouse	0.010 U
2014	Meadow Vole	0.020 U
2016	Meadow Vole	0.110
2017	Northern Short-tailed Shrew	0.132

01CH		
Year	Species	Mercury (mg/kg)
2013	Crayfish	0.015 J
2013	Dragonfly Nymphes	0.041 J
2013	Dragonfly Nymphes	0.040 J
2014	Crayfish	0.070
2014	Crayfish	0.060
2014	Dragonfly Nymphes	0.360
2016	Dragonfly Nymphes	0.020 J
2016	Crayfish	0.022 J
2016	Amphipod	0.011 U
2017	Crayfish	0.013 J
2017	Crayfish	0.013 J
2017	Dragonfly Nymphes	0.019 J

01CH		
Year	Species	Mercury (mg/kg)
2013	Round Goby	0.052 J
2013	Round Goby	0.11
2013	Sunfish	0.057 J
2013	Pumpkinseed	0.10
2013	Lepomis	0.049 J
2014	Round Goby	0.075
2014	Round Goby	0.044
2014	Lepomis	0.069
2014	Sunfish	0.063
2014	Pumpkinseed	0.047
2016	Creek chub	0.161
2016	Creek chub	0.015 J
2016	Round goby	0.052 J
2016	Round goby	0.059 J
2016	Round goby	0.057 J
2017	Round goby	0.061 J
2017	Round goby	0.108
2017	Round goby	0.046 J
2017	Round goby	0.070 J
2017	Round goby	0.056 J

GB-EW-03		
Year	Species	Mercury (mg/kg)
2013	Earthworm	0.015 J
2014	Earthworm	0.230
2016	Earthworm	0.047 J
2017	Earthworm	0.083 J

GB-EW-01		
Year	Species	Mercury (mg/kg)
2013	Earthworm	0.010 J
2014	Earthworm	0.080
2016	Earthworm	0.030 J
2017	Earthworm	0.048 J

GB-EW-02		
Year	Species	Mercury (mg/kg)
2013	Earthworm	0.050 J
2014	Earthworm	0.210
2016	Earthworm	0.042 J
2017	Earthworm	0.063 J

03OF		
Year	Species	Mercury (mg/kg)
2013	Longnose Dace	0.165
2013	Longnose Dace	0.113
2013	Longnose Dace	0.113
2013	Longnose Dace	0.099
2013	Longnose Dace	0.119
2014	Longnose Dace	0.108
2014	Longnose Dace	0.120
2014	Longnose Dace	0.101
2014	Longnose Dace	0.113
2014	Longnose Dace	0.175
2016	Longnose Dace	0.190
2016	Bluntnose Minnow	0.026 J
2016	Brook Stickleback	0.044 J
2016	Brook Stickleback	0.035 J
2016	Bluntnose Minnow	0.031 J
2017	Bluntnose Minnow	0.052 J
2017	Brook Stickleback	0.084 J
2017	Brook Stickleback	0.089 J
2017	Brook Stickleback	0.084 J
2017	Bluntnose Minnow	0.080 J

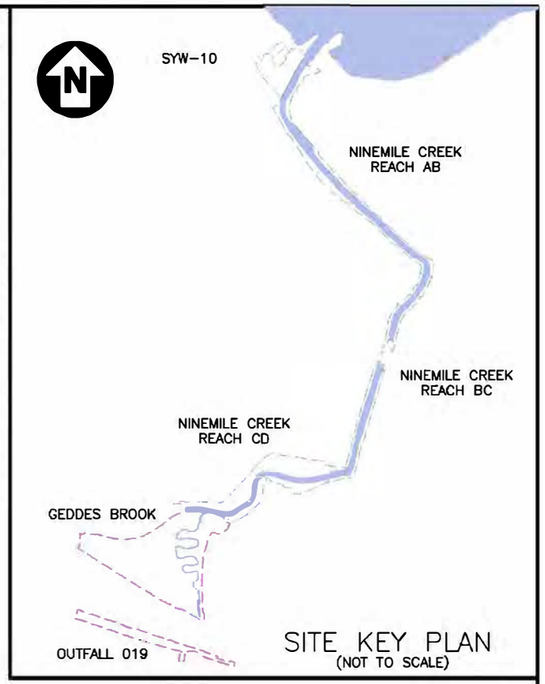
03OF		
Year	Species	Mercury (mg/kg)
2013	Amphipod	0.019 J
2013	Dragonfly Nymphes	0.030 J
2013	Dragonfly Nymphes	0.017 J
2014	Dragonfly Nymphes	0.100
2014	Dragonfly Nymphes	0.170
2014	Crayfish	0.090
2016	Dragonfly Nymphes	0.014 J
2016	Crayfish	0.028 J
2016	Amphipod	0.019 J
2017	Crayfish	0.017 J
2017	Crayfish	0.017 J
2017	Dragonfly Nymphes	0.046 J

GB-MAM-01		
Year	Species	Mercury (mg/kg)
2013	White Footed Mouse	0.012 J
2014	Meadow Vole	0.020 U
2016	Meadow Vole	0.010 U
2017	White Footed Mouse	0.009 U

GB-MAM-02		
Year	Species	Mercury (mg/kg)
2013	White Footed Mouse	0.013 J
2014	White Footed Mouse	0.020
2016	Meadow Vole	0.010 U
2017	Meadow Vole	0.010 U

GB-MAM-03		
Year	Species	Mercury (mg/kg)
2013	White Footed Mouse	0.025 J
2014	Meadow Vole	0.020 U
2016	White Footed Mouse	0.009 U
2017	White Footed Mouse	0.010 U

GB-MAM-04		
Year	Species	Mercury (mg/kg)
2013	White Footed Mouse	0.025 J
2014	Meadow Vole	0.020 U
2016	Northern Short-tailed Shrew	0.076 J
2017	Northern Short-tailed Shrew	0.070 J



SITE KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- BENTHIC MACROINVERTEBRATE SAMPLING AREAS
- FISH SAMPLING AREAS
- SMALL MAMMAL SAMPLING AREAS
- EARTHWORM SAMPLES

NOTES:

1. SAMPLE AREAS FOR FISH, MACROINVERTEBRATES AND SMALL MAMMALS DEPICT THE RANGE WHERE SAMPLING OCCURED.
2. FISH SAMPLING AREAS IN THE EAST FLOODPLAIN WERE INTENDED TO MINIMIZE THE CHANCE THAT FISH FROM NINEMILE CREEK WERE INADVERTENTLY COLLECTED.
3. SMALL MAMMAL SAMPLING AREAS FOCUSED ON INTERIOR PORTIONS OF THE SITE TO MINIMIZE THE CHANCE THAT MIGRANTS FROM OFF SITE WERE COLLECTED.

200 100 0 200 400

SCALE: 1"=200'

FIGURE 35

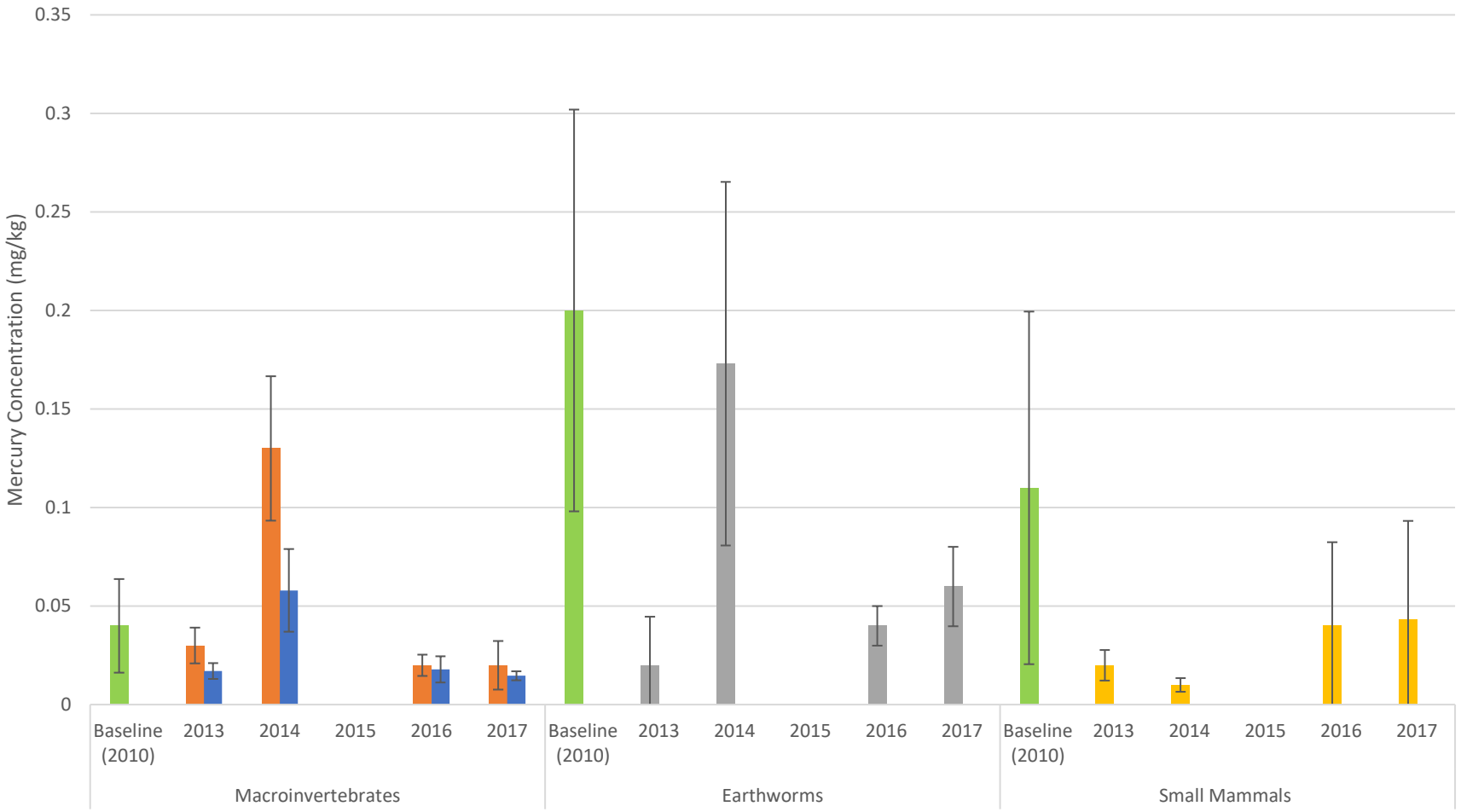
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

GEDDES BROOK BIOTA
MERCURY CONCENTRATIONS
(2013-2017)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL - SYR\452663 GB NMC 2021 PWA\10 TECHNICAL CATEGORIES\2020 - 5 YR REVIEW\452663 GB BIOTA- MON.T QWW 2020.DWG
PLOT DATE: 11/1/2021 2:52 PM PLOTTED BY: RUSSO, JILL



Notes:
(a) Error bars represent the 95% confidence interval
(b) Each column represents the sitewide average
(c) Per the Geddes Brook OM&M Plan, no data was collected in 2015
(d) Dragonfly nymphs composed a large proportion of post-remedy samples but were not part of baseline sampling, therefore results are depicted with and without dragonfly nymphs

Represents all macroinvertebrate data

Represents macroinvertebrate data excluding dragonfly nymphs

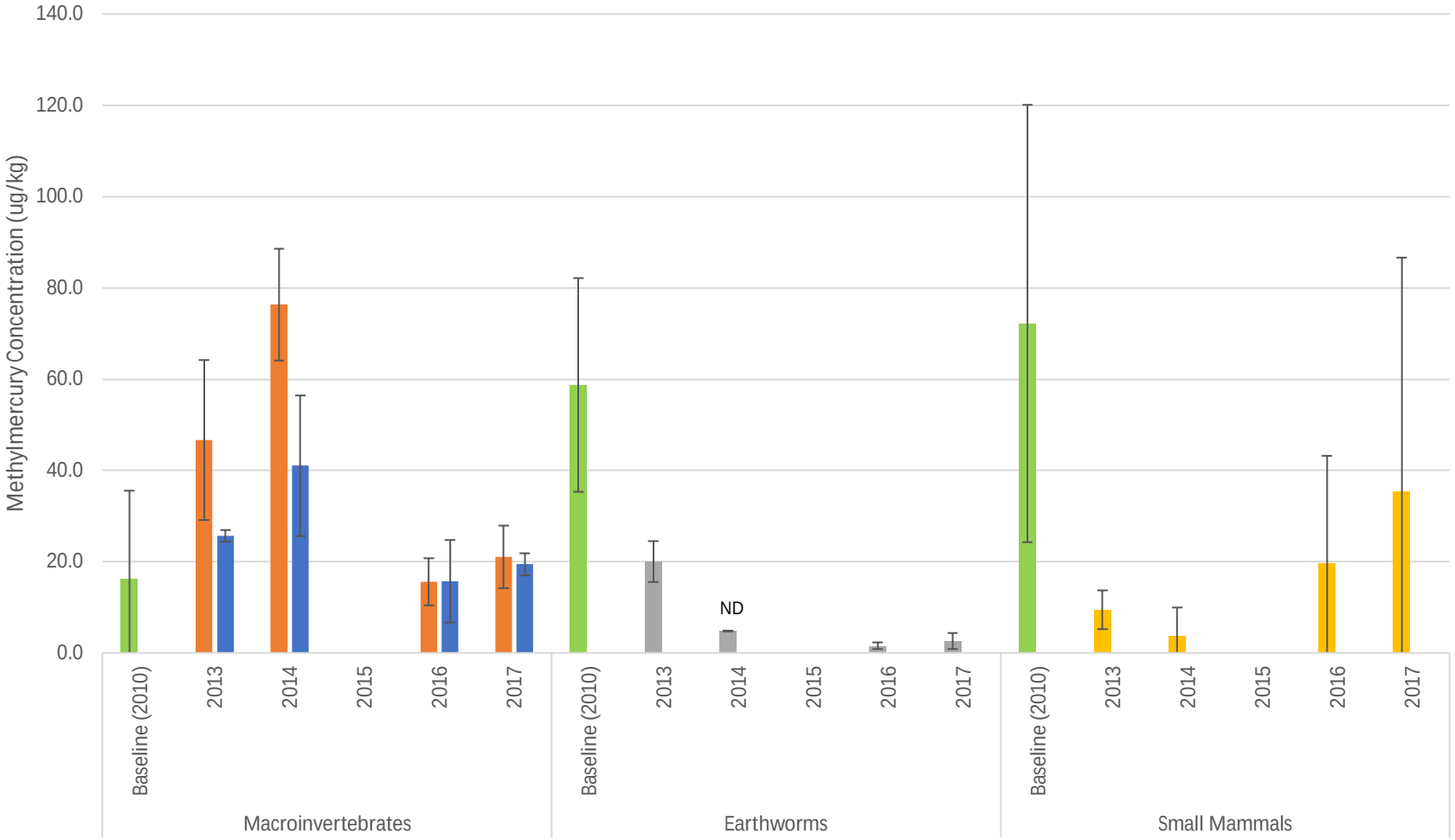
FIGURE 36a

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Geddes Brook Mercury Concentrations in Biota Other than Fish (2013-2017)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

(a) Error bars represent the 95% confidence interval
(b) Each column represents the sitewide average
(c) Per the Geddes Brook OM&M Plan, no data was collected in 2015
(d) Dragonfly nymphs composed a large proportion of post-remedy samples but were not part of baseline sampling, therefore results are depicted with and without dragonfly nymphs
(e) ND= non-detect

Represents all macroinvertebrate data

Represents macroinvertebrate data excluding dragonfly nymphs

FIGURE 36b

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Geddes Brook Methylmercury Concentrations in Biota Other than Fish (2013-2017)

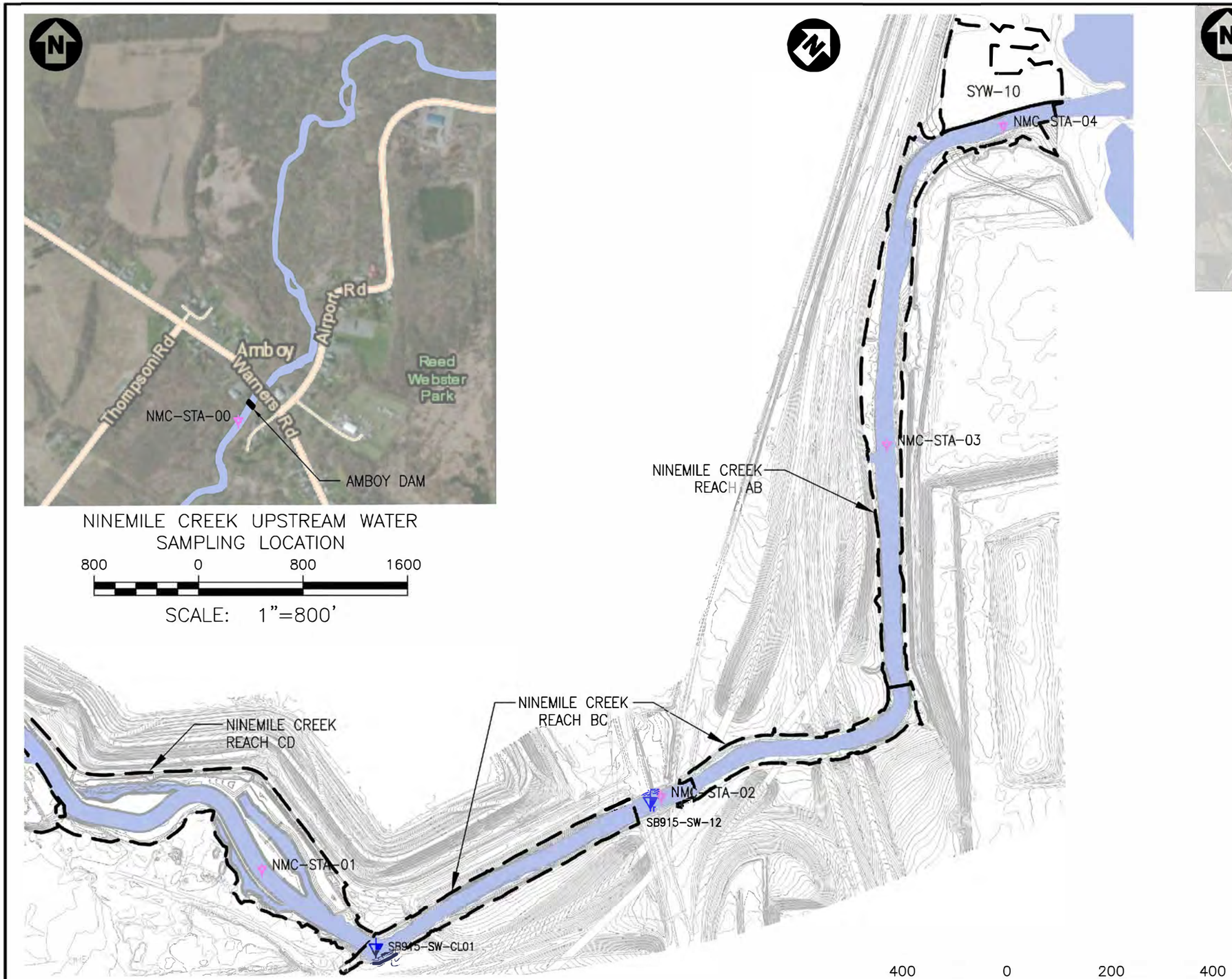
PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

NINEMILE CREEK UPSTREAM WATER SAMPLING LOCATION

800 0 800 1600

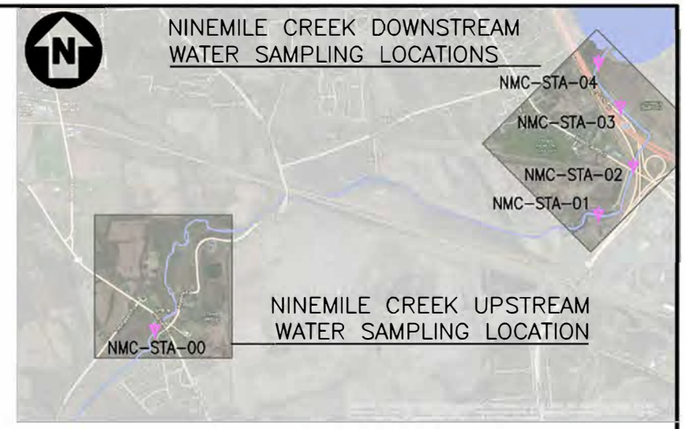
SCALE: 1"=800'



NINEMILE CREEK DOWNSTREAM WATER SAMPLING LOCATIONS

400 0 200 400

SCALE: 1"=400'



NINEMILE CREEK KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- STREAM BED
- NINEMILE CREEK SURFACE WATER SAMPLING LOCATION
- SURFACE WATER SAMPLE LOCATIONS (CHLORIDE, SODIUM, TDS)

NOTES:

1. SURFACE WATER SAMPLING WAS CONDUCTED IN 2015, 2016, AND 2017 AT 5 SAMPLING LOCATIONS. ONE SAMPLING EVENT OCCURRED DURING HIGH FLOW CONDITIONS (FLOW >200cfs., USGS STATION 04240300 NINEMILE CREEK LAKELAND, 70th PERCENTILE FLOW 2010–2014) AND ANOTHER DURING LOW FLOW CONDITIONS (FLOW <65cfs., USGS STATION 04240300 NINEMILE CREEK LAKELAND, 30th PERCENTILE FLOW 210–2014). TOTAL OF 10 SAMPLES WERE COLLECTED IN EACH SAMPLE YEAR.
2. DOWNSTREAM SURFACE WATER SAMPLING LOCATIONS ARE CONSISTENT WITH BASELINE SURFACE WATER SAMPLING LOCATIONS (GEDDES BROOK/NINEMILE CREEK BASELINE MONITORING DATA SUMMARY REPORT, MARCH 2013).
3. SURFACE WATER SAMPLING INCLUDED RECORDING THE FOLLOWING FIELD PARAMETERS: DO, pH, TEMPERATURE AND CONDUCTIVITY.

FIGURE 37

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

NINEMILE CREEK SURFACE WATER SAMPLING LOCATIONS

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

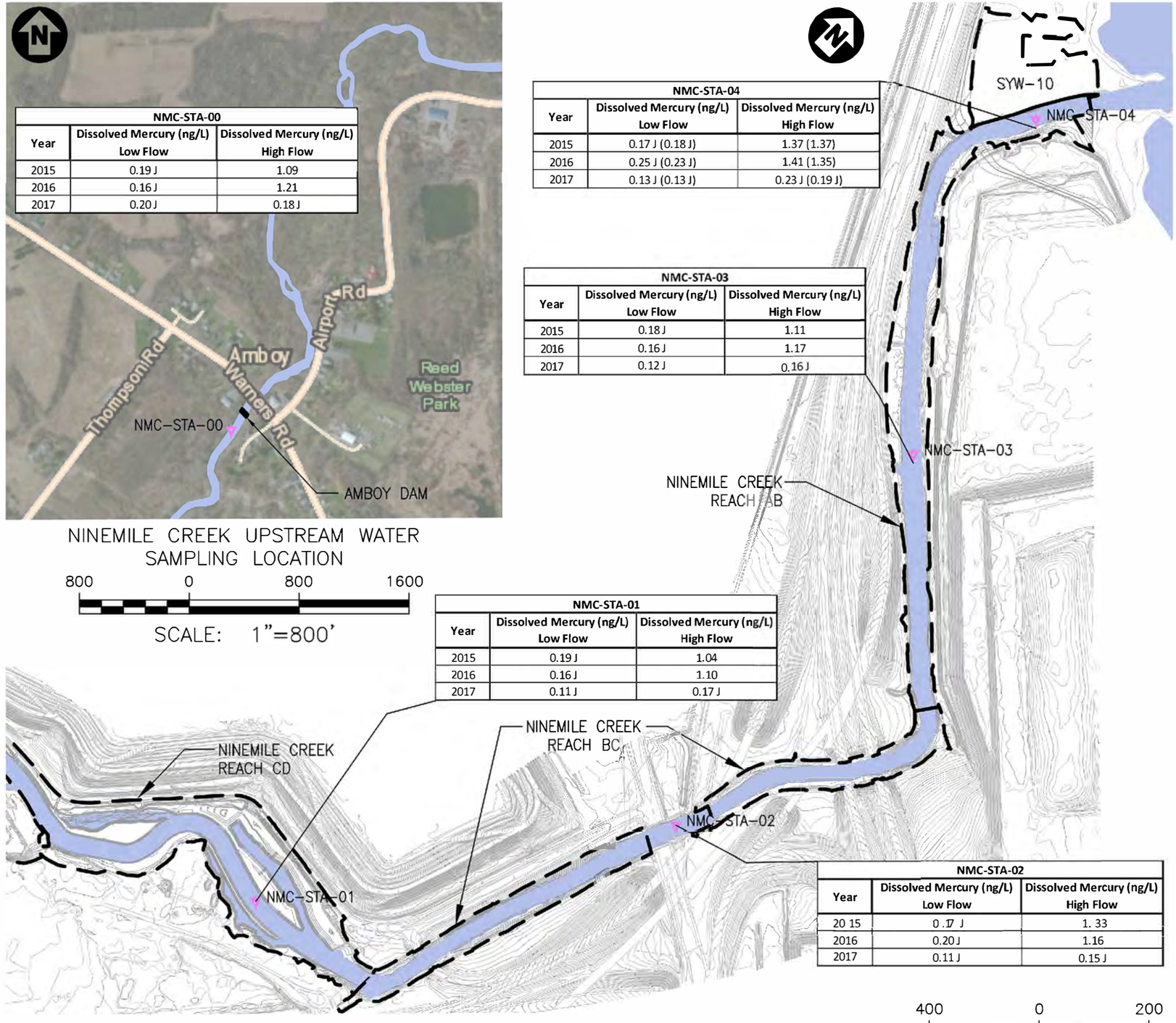
FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-NMC-SW-SED SAMP-OMM 2020.DWG
PLOT DATE: 11/2/2021 12:38 PM PLOTTED BY: RUSSO, JILL

NMC-STA-00		
Year	Dissolved Mercury (ng/L) Low Flow	Dissolved Mercury (ng/L) High Flow
2015	0.19 J	1.09
2016	0.16 J	1.21
2017	0.20 J	0.18 J

NINEMILE CREEK UPSTREAM WATER SAMPLING LOCATION

800 0 800 1600

SCALE: 1"=800'



NMC-STA-04		
Year	Dissolved Mercury (ng/L) Low Flow	Dissolved Mercury (ng/L) High Flow
2015	0.17 J (0.18 J)	1.37 (1.37)
2016	0.25 J (0.23 J)	1.41 (1.35)
2017	0.13 J (0.13 J)	0.23 J (0.19 J)

NMC-STA-03		
Year	Dissolved Mercury (ng/L) Low Flow	Dissolved Mercury (ng/L) High Flow
2015	0.18 J	1.11
2016	0.16 J	1.17
2017	0.12 J	0.16 J

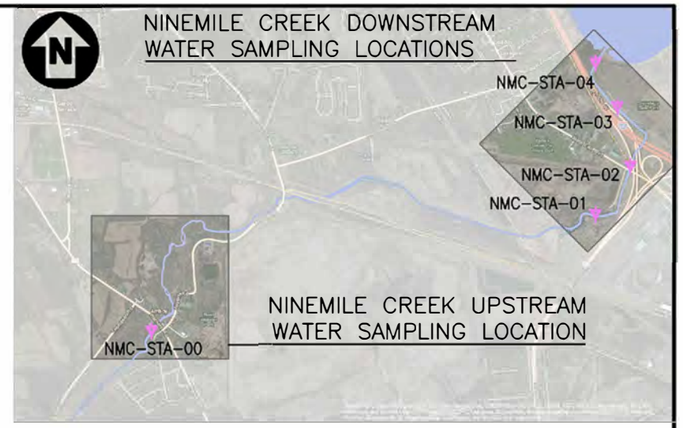
NMC-STA-01		
Year	Dissolved Mercury (ng/L) Low Flow	Dissolved Mercury (ng/L) High Flow
2015	0.19 J	1.04
2016	0.16 J	1.10
2017	0.11 J	0.17 J

NMC-STA-02		
Year	Dissolved Mercury (ng/L) Low Flow	Dissolved Mercury (ng/L) High Flow
20 15	0 .17 J	1. 33
2016	0.20 J	1.16
2017	0.11 J	0.15 J

400 0 200 400

SCALE: 1"=400'

NINEMILE CREEK DOWNSTREAM WATER SAMPLING LOCATIONS



NINEMILE CREEK KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- STREAM BED
- NINEMILE CREEK SURFACE WATER SAMPLING LOCATION

NOTES:

1. SURFACE WATER SAMPLING WAS CONDUCTED IN 2015, 2016, AND 2017 AT 5 SAMPLING LOCATIONS. ONE SAMPLING EVENT OCCURRED DURING HIGH FLOW CONDITIONS (FLOW >200cfs., USGS STATION 04240300 NINEMILE CREEK LAKELAND, 70th PERCENTILE FLOW 2010–2014) AND ANOTHER DURING LOW FLOW CONDITIONS (FLOW <65cfs., USGS STATION 04240300 NINEMILE CREEK LAKELAND, 30th PERCENTILE FLOW 210–2014). TOTAL OF 10 SAMPLES WERE COLLECTED IN EACH SAMPLE YEAR.
2. DOWNSTREAM SURFACE WATER SAMPLING LOCATIONS ARE CONSISTENT WITH BASELINE SURFACE WATER SAMPLING LOCATIONS (GEDDES BROOK/NINEMILE CREEK BASELINE MONITORING DATA SUMMARY REPORT, MARCH 2013).
3. SURFACE WATER SAMPLING INCLUDED RECORDING THE FOLLOWING FIELD PARAMETERS: DO, pH, TEMPERATURE AND CONDUCTIVITY.

FIGURE 38

Honeywell

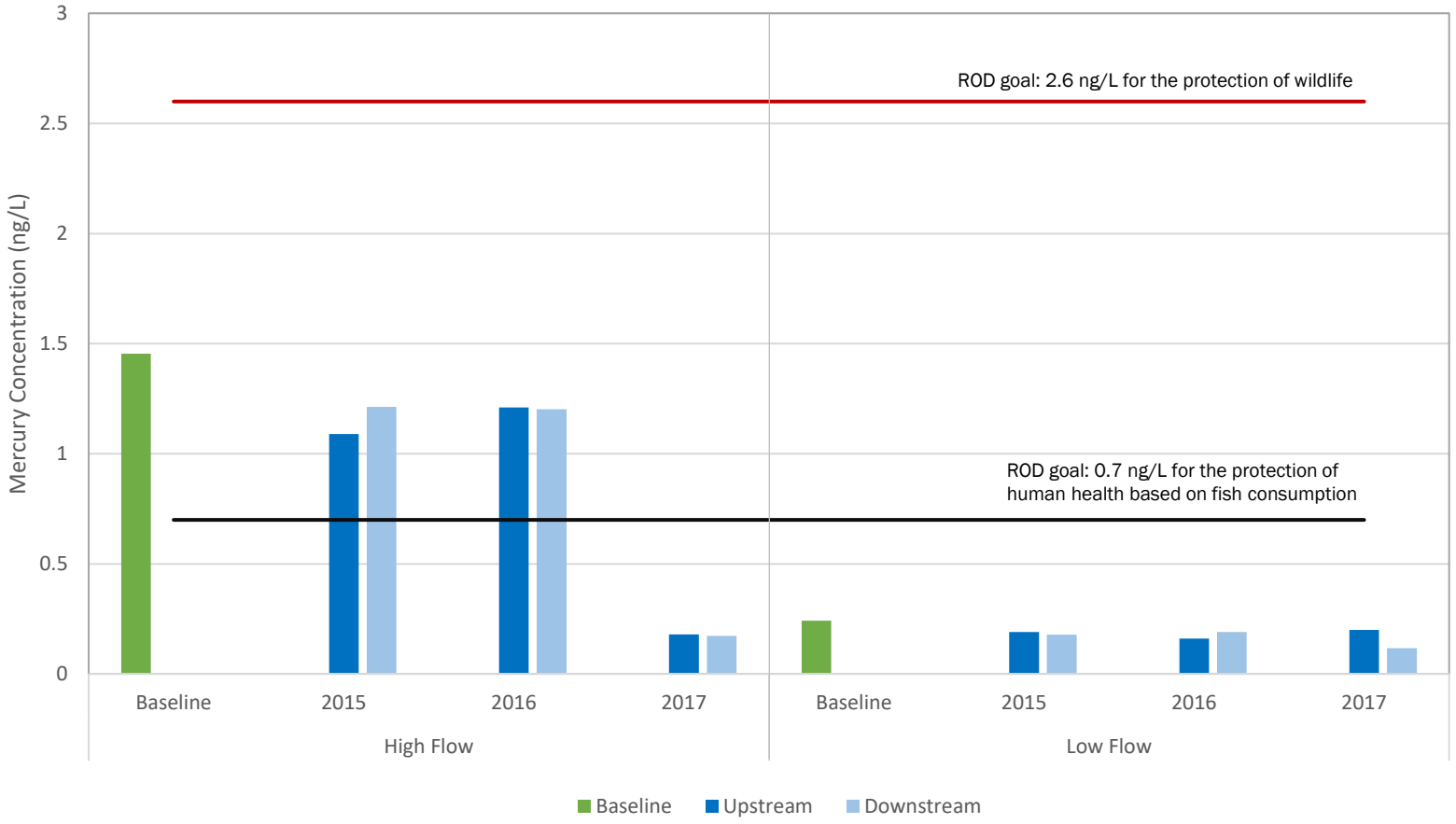
LCP OU–1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE–YEAR COMPREHENSIVE REPORT

NINEMILE CREEK SURFACE WATER DISSOLVED MERCURY CONCENTRATIONS (2015–2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315–451–9560

FILE NAME: P:\HONEYWELL –SYR\452663 GB–NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020–5–YR–REVIEW\452663–NMC–SW–SED SAMP–OMM 2020.DWG
PLOT DATE: 4/25/2022 2:16 PM PLOTTED BY: RUSSO, JILL [US–US]



Notes:
(a) Each column represents the sitewide average
(b) Upstream locations are outside the remediation area and are used for reference
(c) Downstream locations are within the remediation area and consistent with baseline locations
(d) Field duplicates are averaged together for all calculations

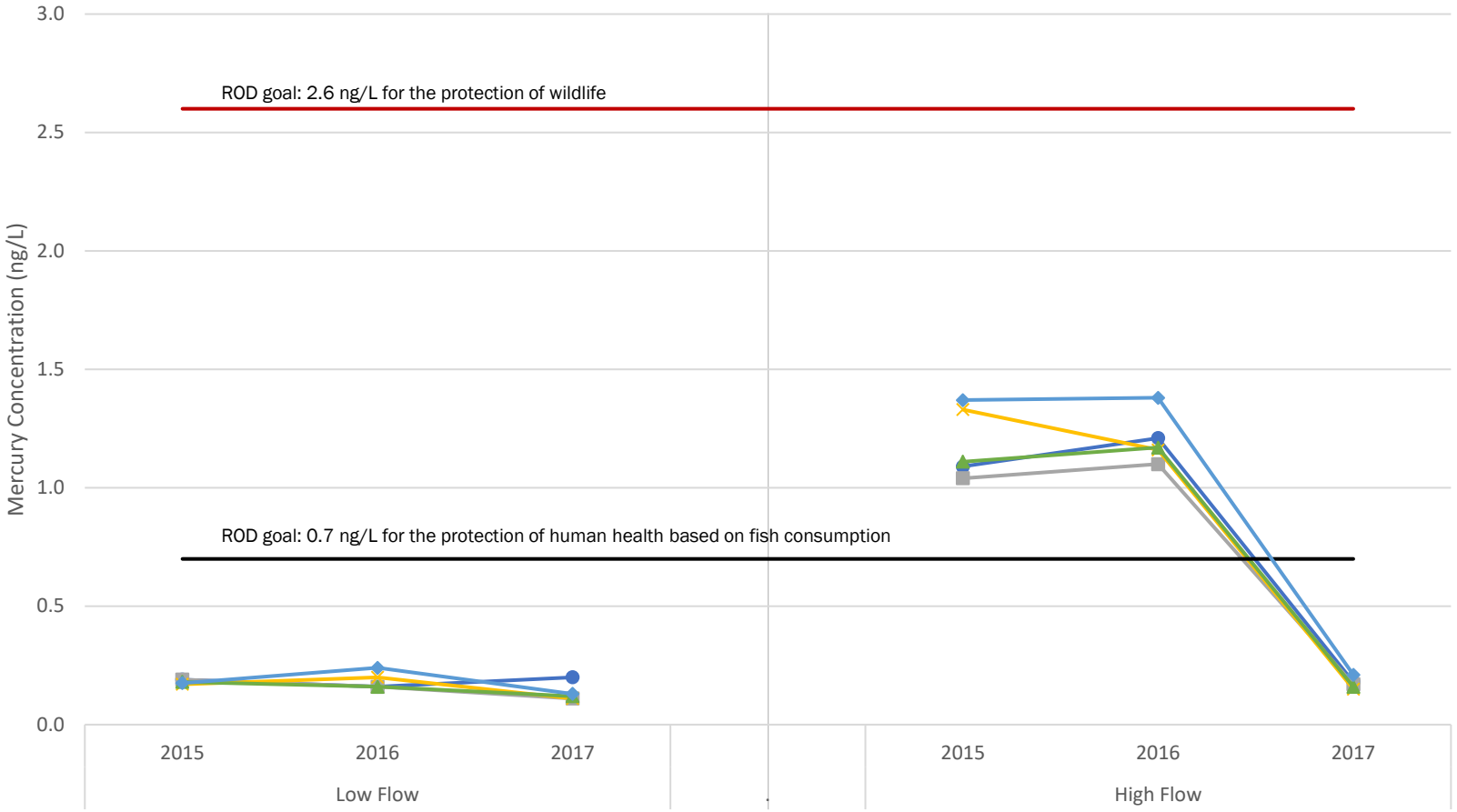
FIGURE 39a

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Ninemile Creek Average Dissolved Mercury Concentrations in Surface Water (2015-2017)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Sample Locations

- NMC-STA-00
- NMC-STA-01
- NMC-STA-02
- NMC-STA-03
- NMC-STA-04

Notes:

a) Field duplicates are averaged together for all calculations

FIGURE 39b

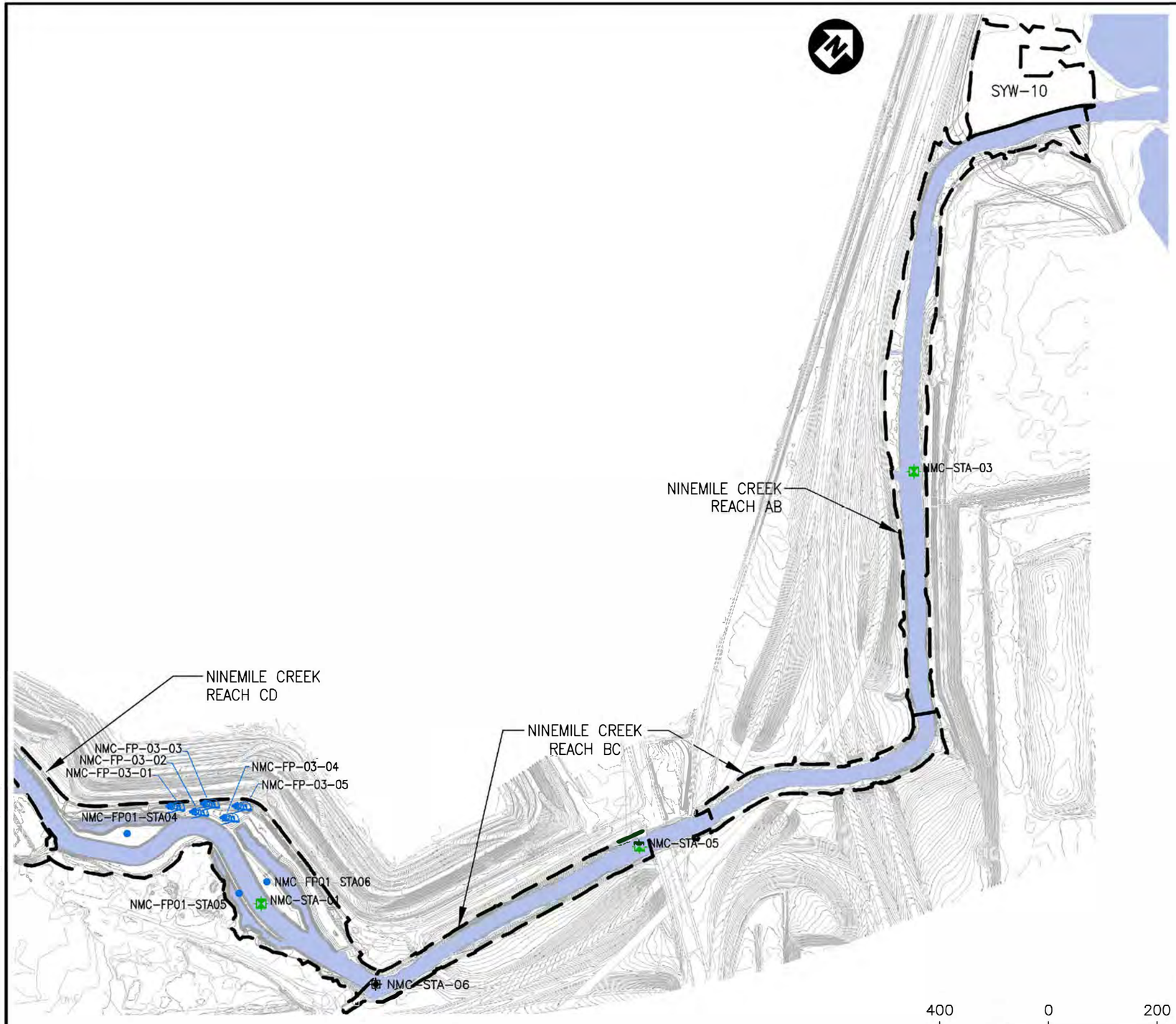
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Ninemile Creek Dissolved Mercury Concentrations in Surface Water (2015-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



NINEMILE CREEK KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- STREAM BED
- SEDIMENT SAMPLE LOCATION
- CO-LOCATED MACROINVERTEBRATE AND SEDIMENT SAMPLE LOCATION
- CO-LOCATED FLOODPLAIN SOIL/SEDIMENT AND EARTHWORM SAMPLE LOCATION
- SMALL MAMMAL SAMPLING LOCATION
- 2016 SMALL MAMMAL SAMPLES

SOIL AND SEDIMENT NOTES:

1. CHANNEL AND FLOODPLAIN SOIL/SEDIMENT SAMPLING WERE CONDUCTED IN 2016 AND 2018 AS PART OF A POST-REMEDIATION BASELINE EVALUATION.
2. EACH FLOODPLAIN SOIL SAMPLE WAS A COMPOSITE CONSISTING OF FIVE GRAB SAMPLES FROM THE TOP SIX INCHES OF SOIL/SEDIMENT. GRAB SAMPLES WERE COLLECTED WITHIN A TEN FOOT RADIUS OF THE DESIGNATED SAMPLE LOCATION.
3. EACH CHANNEL SEDIMENT SAMPLE WAS A COMPOSITE CONSISTING OF FIVE GRAB SAMPLES FROM THE TOP SIX INCHES OF THE FINE MATERIAL THAT IS OVERLYING ON THE COARSE CHANNEL BED.

BIOTA NOTES:

1. FIVE SMALL MAMMAL SAMPLES WERE COLLECTED WITHIN THE HIGHLIGHTED STATION.
2. EARTHWORM SAMPLING WAS CARRIED OUT AT 3 STATIONS (SHOWN) WHERE ONE SAMPLE PER STATION WAS COLLECTED RESULTING IN 3 SAMPLES.
3. MACROINVERTEBRATE SAMPLING WAS CARRIED OUT AT 3 STATIONS (SHOWN) WHERE ONE SAMPLE PER STATION WAS COLLECTED RESULTING IN 3 SAMPLES.

400 0 200 400

SCALE: 1"=400'

FIGURE 40

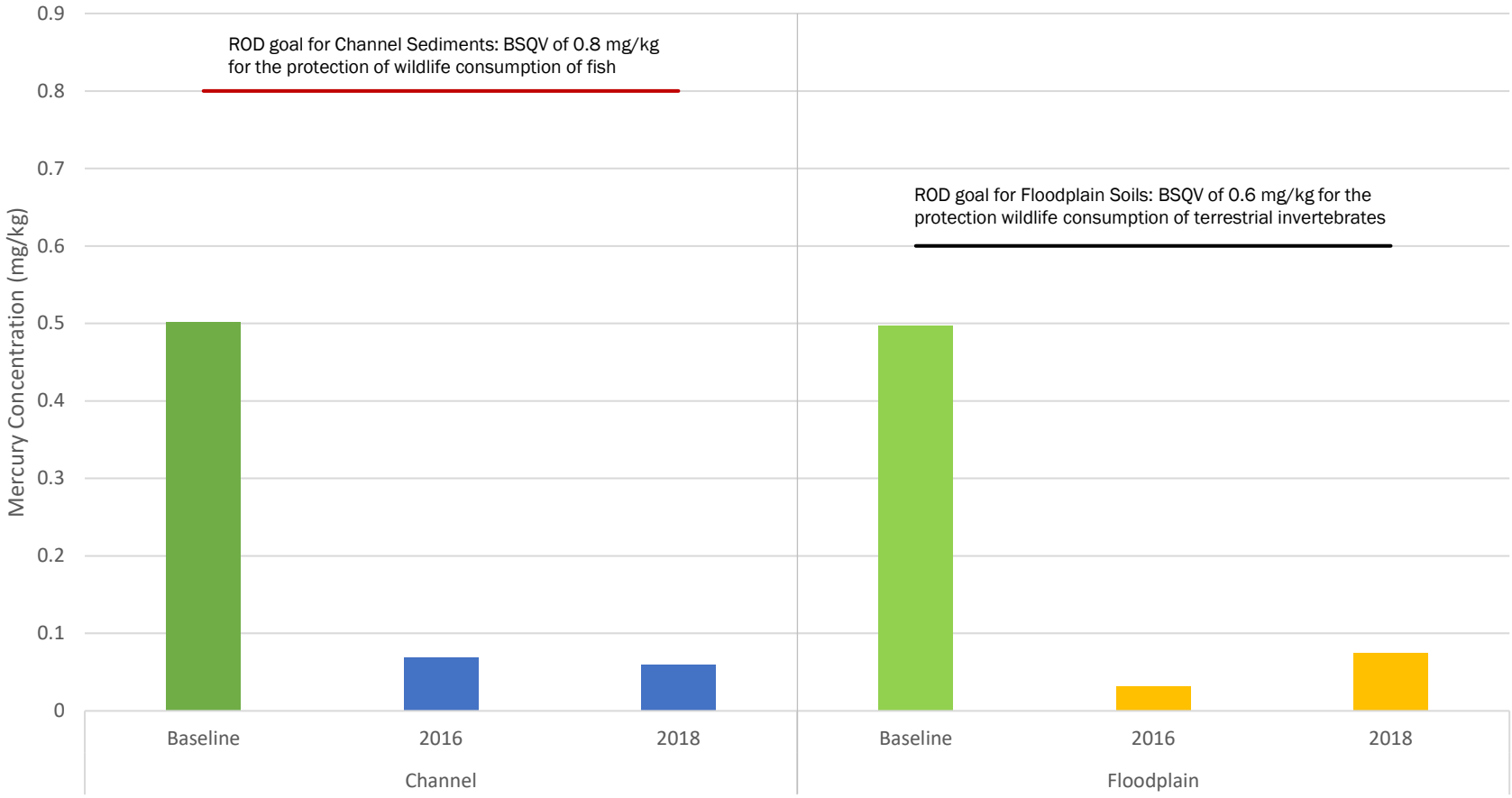
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR
COMPREHENSIVE REPORT

NINEMILE CREEK
SOIL/SEDIMENT AND BIOTA
SAMPLING LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-NMC-SW & SED SAMPLOCS-2020.DWG
PLOT DATE: 11/2/2021 1:30 PM PLOTTED BY: RUSSO, JILL



Notes:
(a) Field duplicates are averaged together for all calculations

FIGURE 41

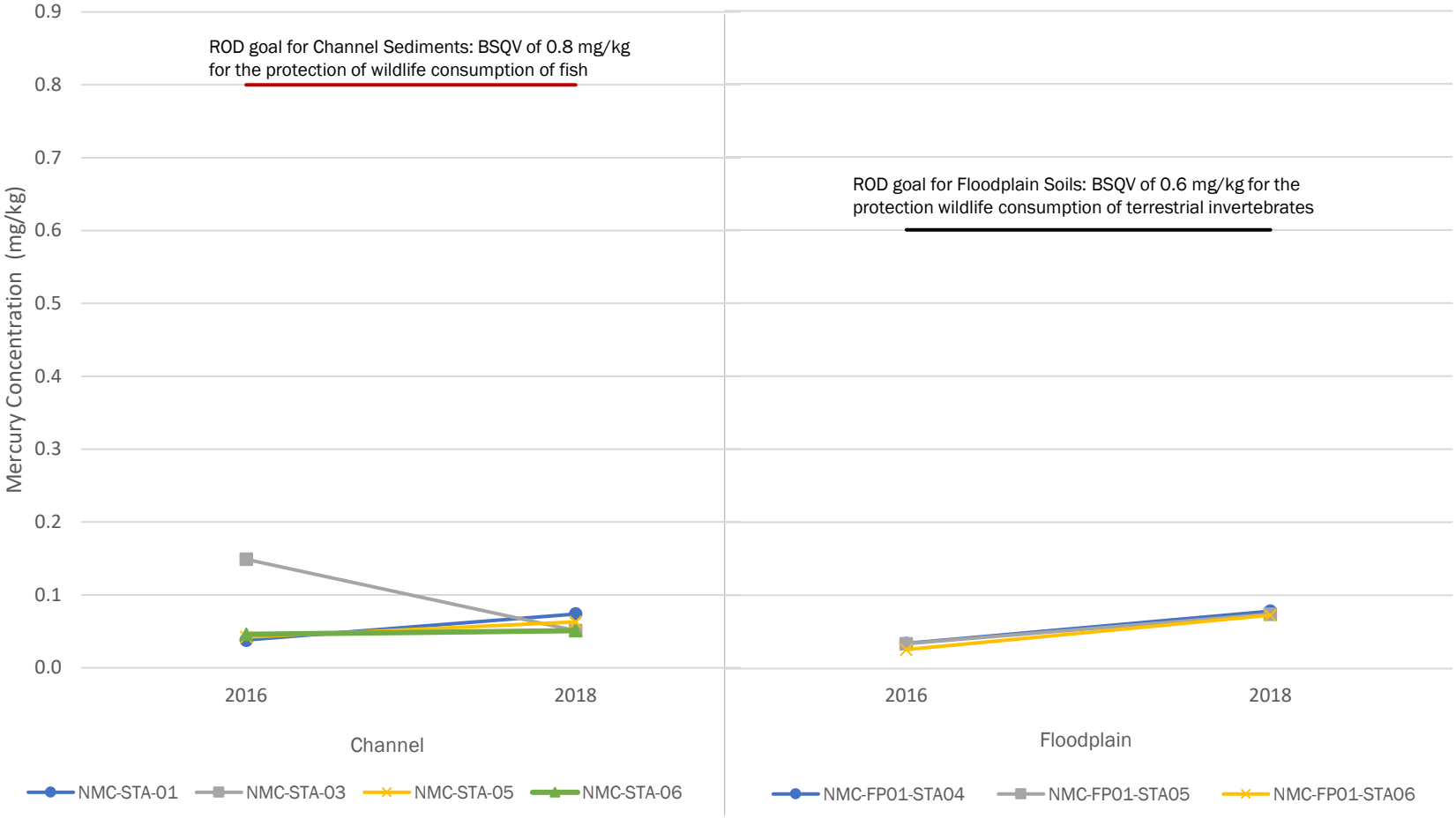
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Ninemile Creek Average Mercury Concentration In Floodplain Soils and Channel Sediments (2016 and 2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

a) Field duplicates are averaged together for all calculations

FIGURE 42a

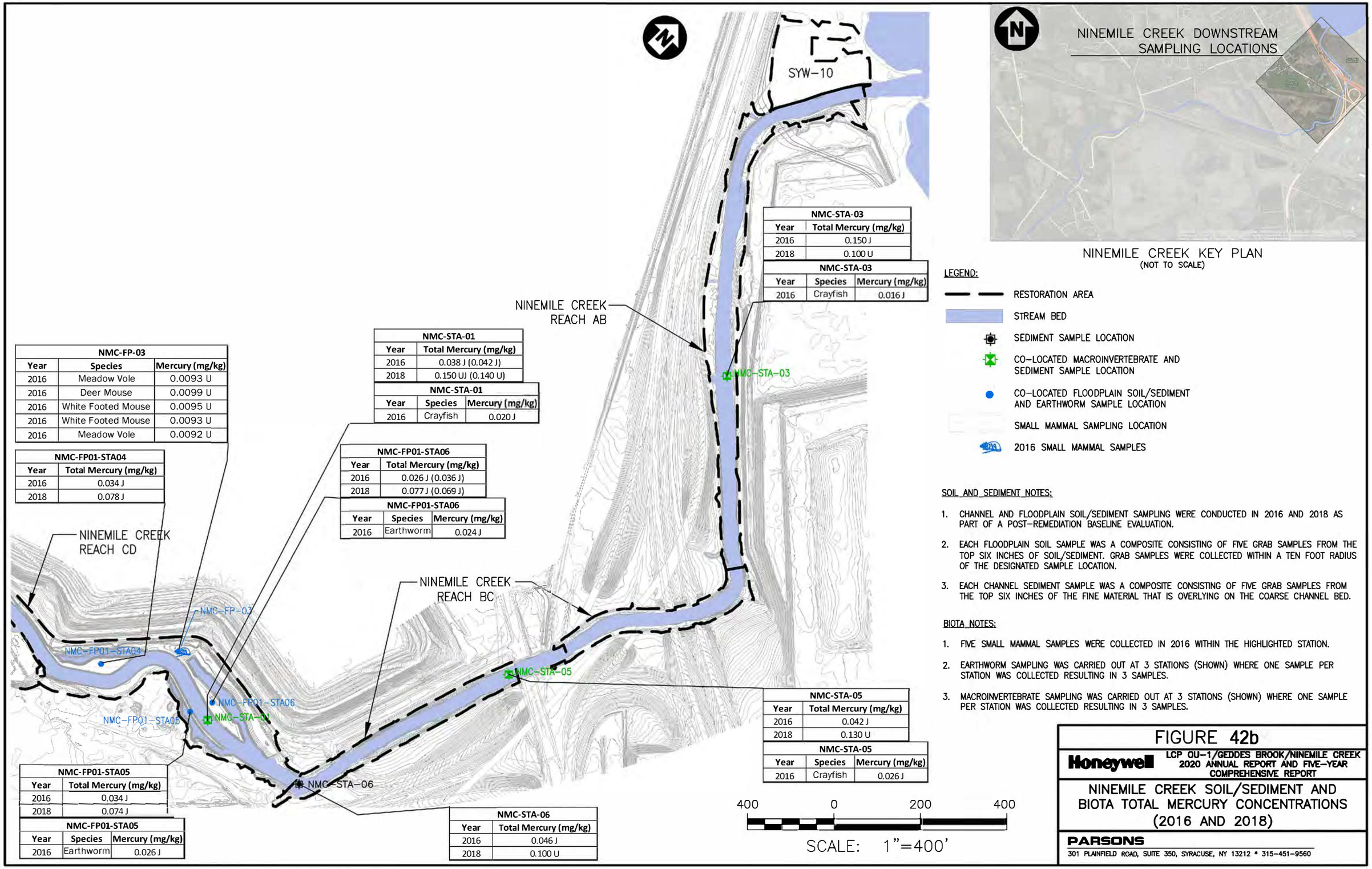
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Ninemile Creek Mercury Concentration In Floodplain Soils and Channel Sediments (2016 and 2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



NMC-FP-03		
Year	Species	Mercury (mg/kg)
2016	Meadow Vole	0.0093 U
2016	Deer Mouse	0.0099 U
2016	White Footed Mouse	0.0095 U
2016	White Footed Mouse	0.0093 U
2016	Meadow Vole	0.0092 U

NMC-FP01-STA04	
Year	Total Mercury (mg/kg)
2016	0.034 J
2018	0.078 J

NMC-FP01-STA05	
Year	Total Mercury (mg/kg)
2016	0.034 J
2018	0.074 J

NMC-FP01-STA05		
Year	Species	Mercury (mg/kg)
2016	Earthworm	0.026 J

NMC-STA-01	
Year	Total Mercury (mg/kg)
2016	0.038 J (0.042 J)
2018	0.150 UJ (0.140 U)

NMC-STA-01		
Year	Species	Mercury (mg/kg)
2016	Crayfish	0.020 J

NMC-FP01-STA06	
Year	Total Mercury (mg/kg)
2016	0.026 J (0.036 J)
2018	0.077 J (0.069 J)

NMC-FP01-STA06		
Year	Species	Mercury (mg/kg)
2016	Earthworm	0.024 J

NMC-STA-03	
Year	Total Mercury (mg/kg)
2016	0.150 J
2018	0.100 U

NMC-STA-03		
Year	Species	Mercury (mg/kg)
2016	Crayfish	0.016 J

NMC-STA-05	
Year	Total Mercury (mg/kg)
2016	0.042 J
2018	0.130 U

NMC-STA-05		
Year	Species	Mercury (mg/kg)
2016	Crayfish	0.026 J

NMC-STA-06	
Year	Total Mercury (mg/kg)
2016	0.046 J
2018	0.100 U

NINEMILE CREEK KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- STREAM BED
- SEDIMENT SAMPLE LOCATION
- CO-LOCATED MACROINVERTEBRATE AND SEDIMENT SAMPLE LOCATION
- CO-LOCATED FLOODPLAIN SOIL/SEDIMENT AND EARTHWORM SAMPLE LOCATION
- SMALL MAMMAL SAMPLING LOCATION
- 2016 SMALL MAMMAL SAMPLES

SOIL AND SEDIMENT NOTES:

1. CHANNEL AND FLOODPLAIN SOIL/SEDIMENT SAMPLING WERE CONDUCTED IN 2016 AND 2018 AS PART OF A POST-REMEDIATION BASELINE EVALUATION.
2. EACH FLOODPLAIN SOIL SAMPLE WAS A COMPOSITE CONSISTING OF FIVE GRAB SAMPLES FROM THE TOP SIX INCHES OF SOIL/SEDIMENT. GRAB SAMPLES WERE COLLECTED WITHIN A TEN FOOT RADIUS OF THE DESIGNATED SAMPLE LOCATION.
3. EACH CHANNEL SEDIMENT SAMPLE WAS A COMPOSITE CONSISTING OF FIVE GRAB SAMPLES FROM THE TOP SIX INCHES OF THE FINE MATERIAL THAT IS OVERLYING ON THE COARSE CHANNEL BED.

BIOTA NOTES:

1. FIVE SMALL MAMMAL SAMPLES WERE COLLECTED IN 2016 WITHIN THE HIGHLIGHTED STATION.
2. EARTHWORM SAMPLING WAS CARRIED OUT AT 3 STATIONS (SHOWN) WHERE ONE SAMPLE PER STATION WAS COLLECTED RESULTING IN 3 SAMPLES.
3. MACROINVERTEBRATE SAMPLING WAS CARRIED OUT AT 3 STATIONS (SHOWN) WHERE ONE SAMPLE PER STATION WAS COLLECTED RESULTING IN 3 SAMPLES.

FIGURE 42b

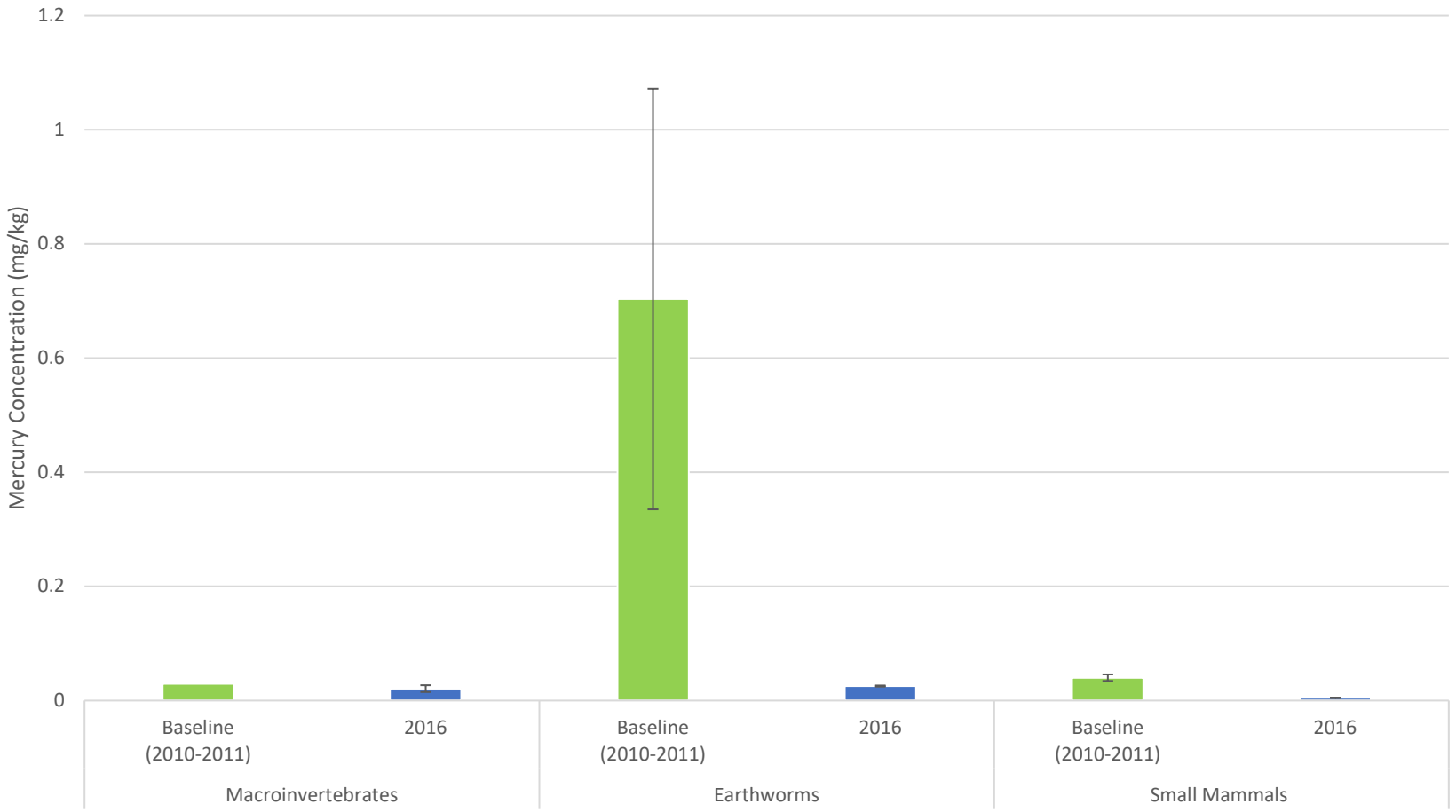
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

NINEMILE CREEK SOIL/SEDIMENT AND BIOTA TOTAL MERCURY CONCENTRATIONS (2016 AND 2018)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-NMC-SW & SED SAMPLOCS-2020.DWG
PLOT DATE: 11/1/2021 1:11 PM PLOTTED BY: RUSSO, JILL



Notes:
(a) Error bars represent the 95% confidence interval
(b) Each column represents the sitewide average
(c) Only one sample collected for macroinvertebrate baseline

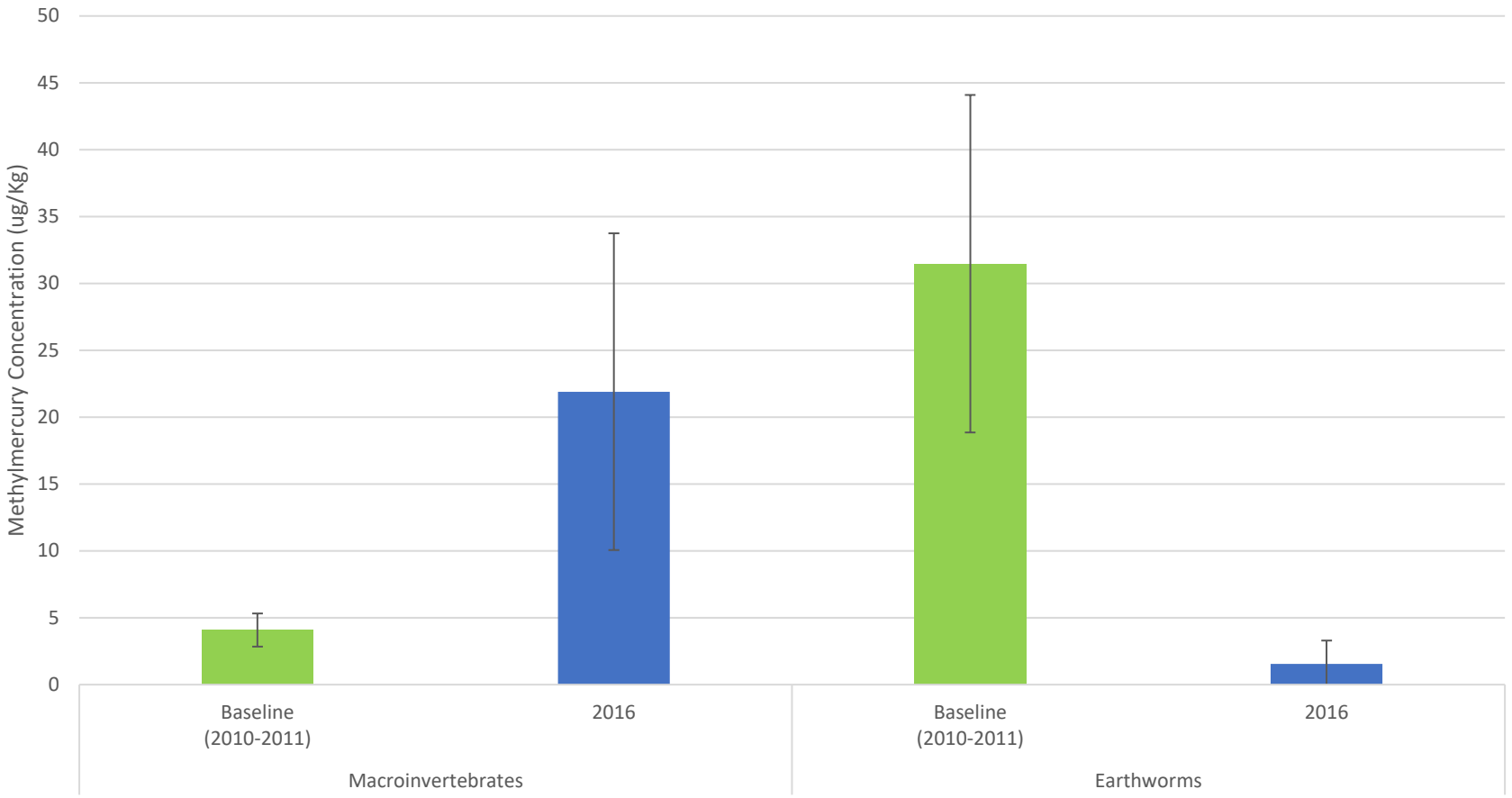
FIGURE 43a

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Ninemile Creek Mercury Concentrations in Biota Other than Fish (Baseline and 2016)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:
(a) Error bars represent the 95% confidence interval
(b) Each column represents the sitewide average
(c) Macroinvertebrate baseline sampling was limited to amphipods and chironomids; 2016 was limited to crayfish.

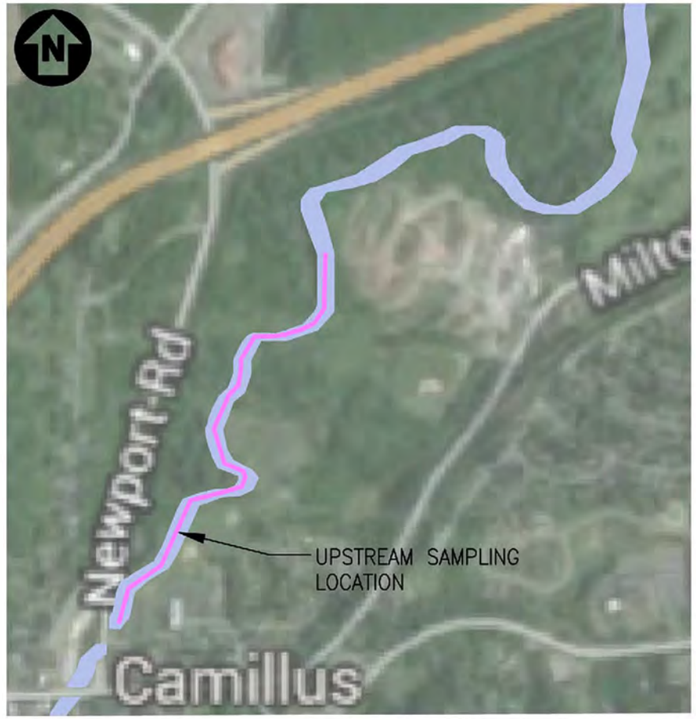
FIGURE 43b

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Ninemile Creek Methylmercury Concentrations in Biota Other than Fish (Baseline and 2016)

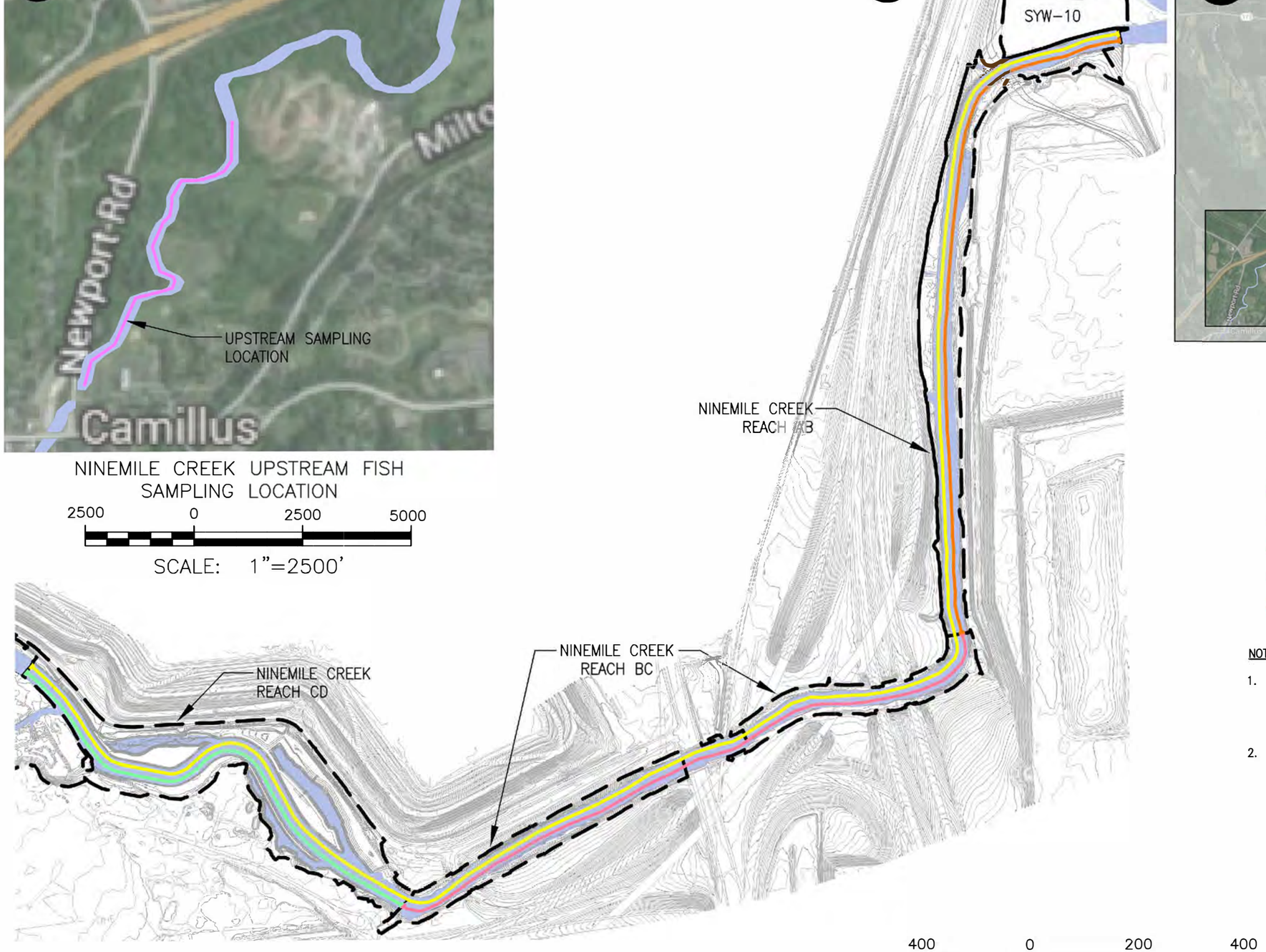
PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



NINEMILE CREEK UPSTREAM FISH SAMPLING LOCATION

2500 0 2500 5000

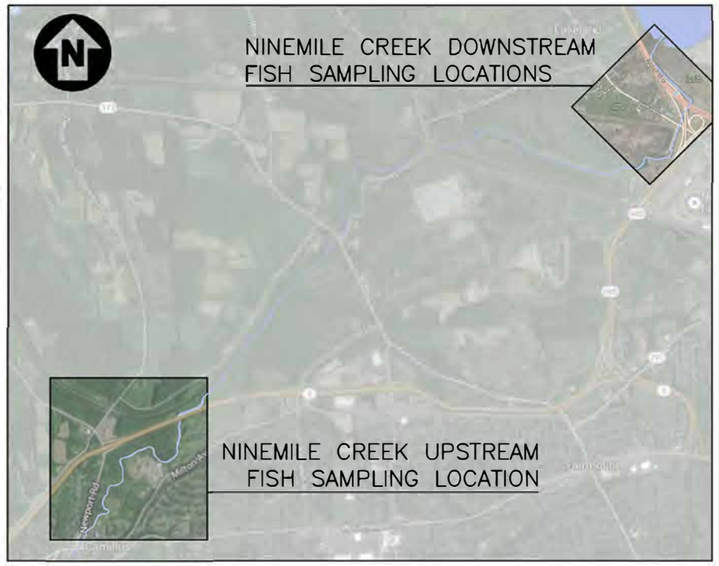
SCALE: 1"=2500'



NINEMILE CREEK DOWNSTREAM FISH SAMPLING LOCATIONS

400 0 200 400

SCALE: 1"=400'



NINEMILE CREEK KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- STREAM BED
- SPORTFISH/PREYFISH STATION 1 – (UPSTREAM)
- SPORTFISH STATION 2 (DOWNSTREAM)
- PREYFISH STATION 2 (REACH CD)
- PREYFISH STATION 3 (REACH BC)
- PREYFISH STATION 4 (REACH AB)

NOTES:

1. DOWNSTREAM SAMPLING STATION LOCATIONS ARE CONSISTENT WITH BASELINE SAMPLING STATION LOCATIONS (GEDDES BROOK/NINEMILE CREEK BASELINE MONITORING DATA SUMMARY REPORT, MARCH 2013).
2. PREYFISH AND SPORTFISH WERE SAMPLED FROM ACCESSIBLE AREAS IN THE DESIGNATED STATIONS WHERE ACCESS AND FLOW CONDITIONS ALLOWED.

FIGURE 44

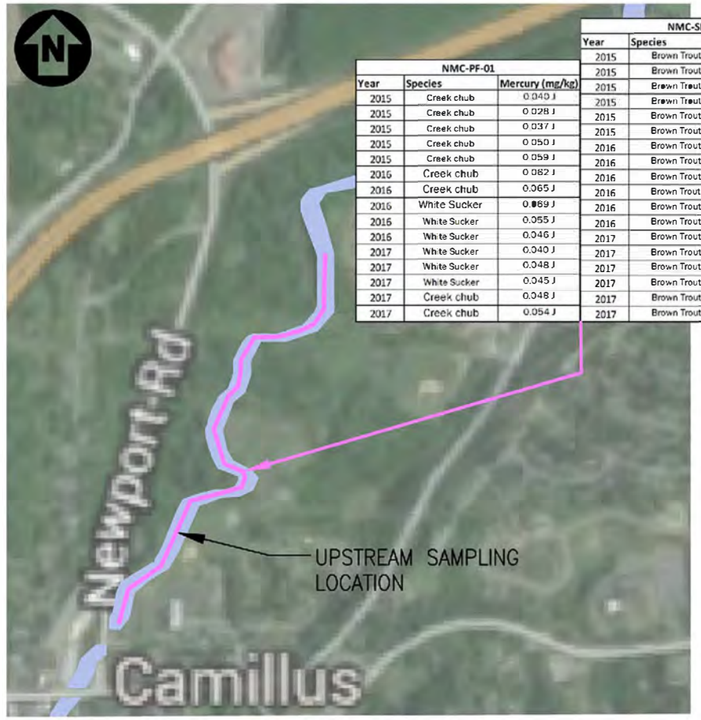
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR MPR

NINEMILE CREEK PREYFISH AND SPORTFISH SAMPLING LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -5YR\452663 GE-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-NMC-PREYFISH SAMPLE LOC CMM 2020.DWG
PLOT DATE: 10/27/2021 1:07 PM PLOTTED BY: RUSSO, JILL



NMC-PF-01

Year	Species	Mercury (mg/kg)
2015	Creek chub	0.040 J
2015	Creek chub	0.028 J
2015	Creek chub	0.037 J
2015	Creek chub	0.050 J
2015	Creek chub	0.059 J
2016	Creek chub	0.082 J
2016	Creek chub	0.065 J
2016	White Sucker	0.089 J
2016	White Sucker	0.055 J
2016	White Sucker	0.046 J
2017	White Sucker	0.040 J
2017	White Sucker	0.048 J
2017	White Sucker	0.045 J
2017	Creek chub	0.048 J
2017	Creek chub	0.054 J

NMC-SF-01

Year	Species	Mercury (mg/kg)
2015	Brown Trout	0.045 J
2015	Brown Trout	0.042 J
2015	Brown Trout	0.042 J
2015	Brown Trout	0.066 J
2015	Brown Trout	0.066 J
2015	Brown Trout	0.072 J
2016	Brown Trout	0.050 J
2016	Brown Trout	0.044 J
2016	Brown Trout	0.042 J
2016	Brown Trout	0.041 J
2016	Brown Trout	0.020 J
2016	Brown Trout	0.047 J
2017	Brown Trout	0.110
2017	Brown Trout	0.130
2017	Brown Trout	0.077 J
2017	Brown Trout	0.041 J
2017	Brown Trout	0.110
2017	Brown Trout	0.100

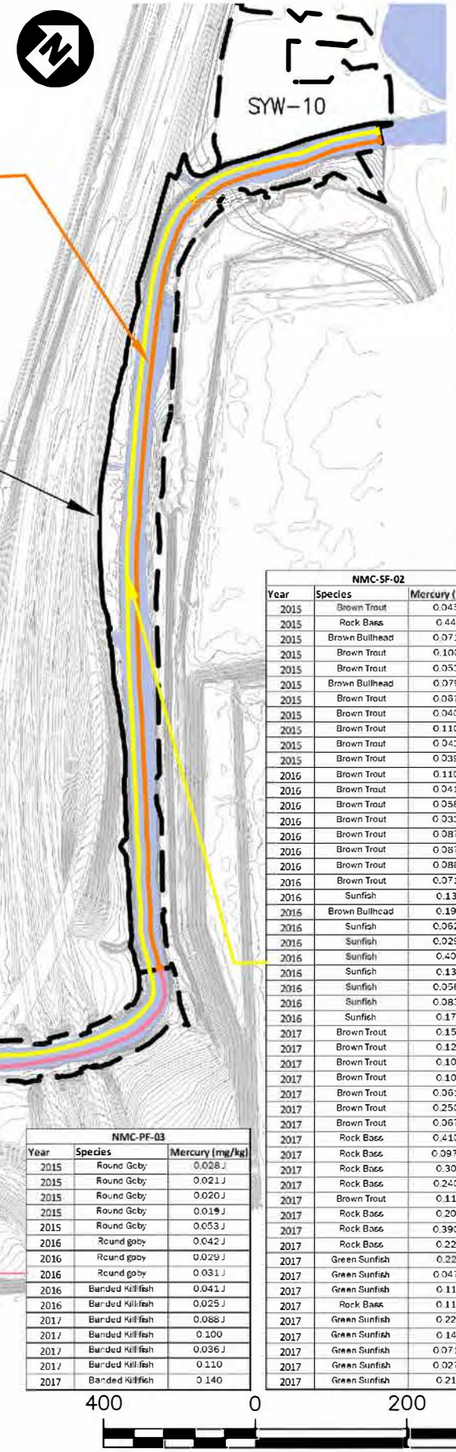
NINEMILE CREEK UPSTREAM FISH SAMPLING LOCATION

2500 0 2500 5000

SCALE: 1"=2500'

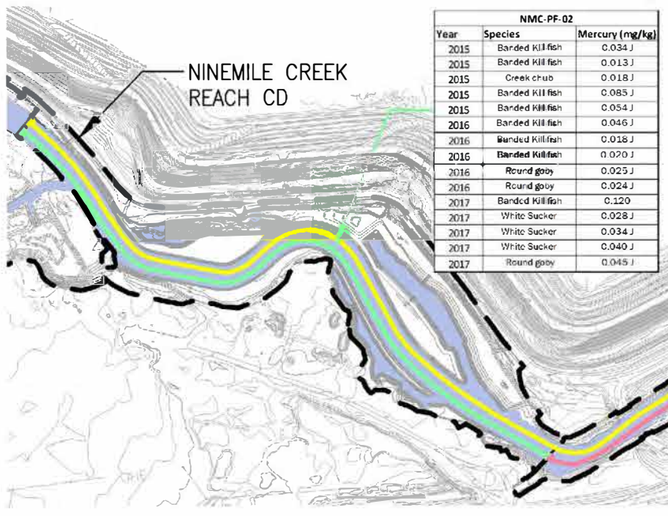
NMC-PF-04

Year	Species	Mercury (mg/kg)
2015	Banded Killifish	0.120 J
2015	Banded Killifish	0.170 J
2015	Banded Killifish	0.120 J
2015	Banded Killifish	0.072 J
2015	Banded Killifish	0.150 J
2016	Banded Killifish	0.086 J
2016	Banded Killifish	0.053 J
2016	Banded Killifish	0.085 J
2016	Banded Killifish	0.140
2016	Banded Killifish	0.098 J
2017	Banded Killifish	0.075 J
2017	Banded Killifish	0.100
2017	Banded Killifish	0.100
2017	Banded Killifish	0.130
2017	Banded Killifish	0.130



NMC-SF-02

Year	Species	Mercury (mg/kg)
2015	Brown Trout	0.045 J
2015	Rock Bass	0.440
2015	Brown Bullhead	0.071 J
2015	Brown Trout	0.100 J
2015	Brown Trout	0.053 J
2015	Brown Bullhead	0.079 J
2015	Brown Trout	0.087 J
2015	Brown Trout	0.040 J
2015	Brown Trout	0.110 J
2015	Brown Trout	0.043 J
2015	Brown Trout	0.039 J
2016	Brown Trout	0.110 J
2016	Brown Trout	0.041 J
2016	Brown Trout	0.058 J
2016	Brown Trout	0.033 J
2016	Brown Trout	0.087 J
2016	Brown Trout	0.087 J
2016	Brown Trout	0.086 J
2016	Brown Trout	0.071 J
2016	Sunfish	0.130
2016	Brown Bullhead	0.190
2016	Sunfish	0.062 J
2016	Sunfish	0.029 J
2016	Sunfish	0.400
2016	Sunfish	0.130
2016	Sunfish	0.056 J
2016	Sunfish	0.083 J
2016	Sunfish	0.170
2017	Brown Trout	0.150
2017	Brown Trout	0.120
2017	Brown Trout	0.100
2017	Brown Trout	0.100
2017	Brown Trout	0.061 J
2017	Brown Trout	0.250 J
2017	Brown Trout	0.067 J
2017	Rock Bass	0.410 J
2017	Rock Bass	0.097 U
2017	Rock Bass	0.300
2017	Rock Bass	0.240 J
2017	Brown Trout	0.110
2017	Rock Bass	0.200
2017	Rock Bass	0.390 J
2017	Rock Bass	0.220
2017	Green Sunfish	0.220
2017	Green Sunfish	0.047 J
2017	Green Sunfish	0.110
2017	Rock Bass	0.110
2017	Green Sunfish	0.220
2017	Green Sunfish	0.140
2017	Green Sunfish	0.071 J
2017	Green Sunfish	0.027 J
2017	Green Sunfish	0.210



NMC-PF-02

Year	Species	Mercury (mg/kg)
2015	Banded Killfish	0.034 J
2015	Banded Killfish	0.013 J
2015	Creek chub	0.018 J
2015	Banded Killfish	0.085 J
2015	Banded Killfish	0.054 J
2016	Banded Killfish	0.046 J
2016	Banded Killfish	0.018 J
2016	Banded Killfish	0.020 J
2016	Round goby	0.025 J
2016	Round goby	0.024 J
2017	Banded Killfish	0.120
2017	White Sucker	0.028 J
2017	White Sucker	0.034 J
2017	White Sucker	0.040 J
2017	Round goby	0.045 J

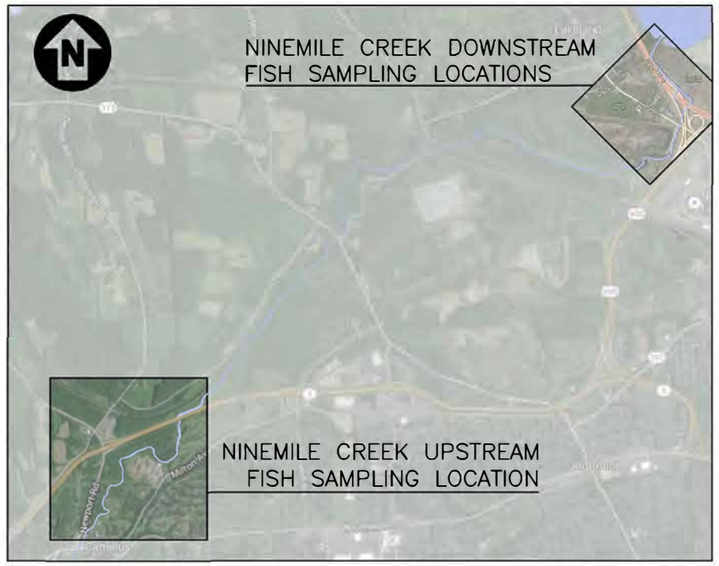
NMC-PF-03

Year	Species	Mercury (mg/kg)
2015	Round Goby	0.028 J
2015	Round Goby	0.021 J
2015	Round Goby	0.020 J
2015	Round Goby	0.019 J
2015	Round Goby	0.053 J
2016	Round goby	0.042 J
2016	Round goby	0.029 J
2016	Round goby	0.031 J
2016	Banded Killfish	0.041 J
2016	Banded Killfish	0.025 J
2017	Banded Killfish	0.088 J
2017	Banded Killfish	0.100
2017	Banded Killfish	0.036 J
2017	Banded Killfish	0.110
2017	Banded Killfish	0.140

NINEMILE CREEK DOWNSTREAM FISH SAMPLING LOCATIONS

400 0 200 400

SCALE: 1"=400'



NINEMILE CREEK KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- STREAM BED
- SPORTFISH/PREYFISH STATION 1 – (UPSTREAM)
- SPORTFISH STATION 2 (DOWNSTREAM)
- PREYFISH STATION 2 (REACH CD)
- PREYFISH STATION 3 (REACH BC)
- PREYFISH STATION 4 (REACH AB)

NOTES:

1. DOWNSTREAM SAMPLING STATION LOCATIONS ARE CONSISTENT WITH BASELINE SAMPLING STATION LOCATIONS (GEDDES BROOK/NINEMILE CREEK BASELINE MONITORING DATA SUMMARY REPORT, MARCH 2013).
2. PREYFISH AND SPORTFISH WERE SAMPLED FROM ACCESSIBLE AREAS IN THE DESIGNATED STATIONS WHERE ACCESS AND FLOW CONDITIONS ALLOWED.

FIGURE 45

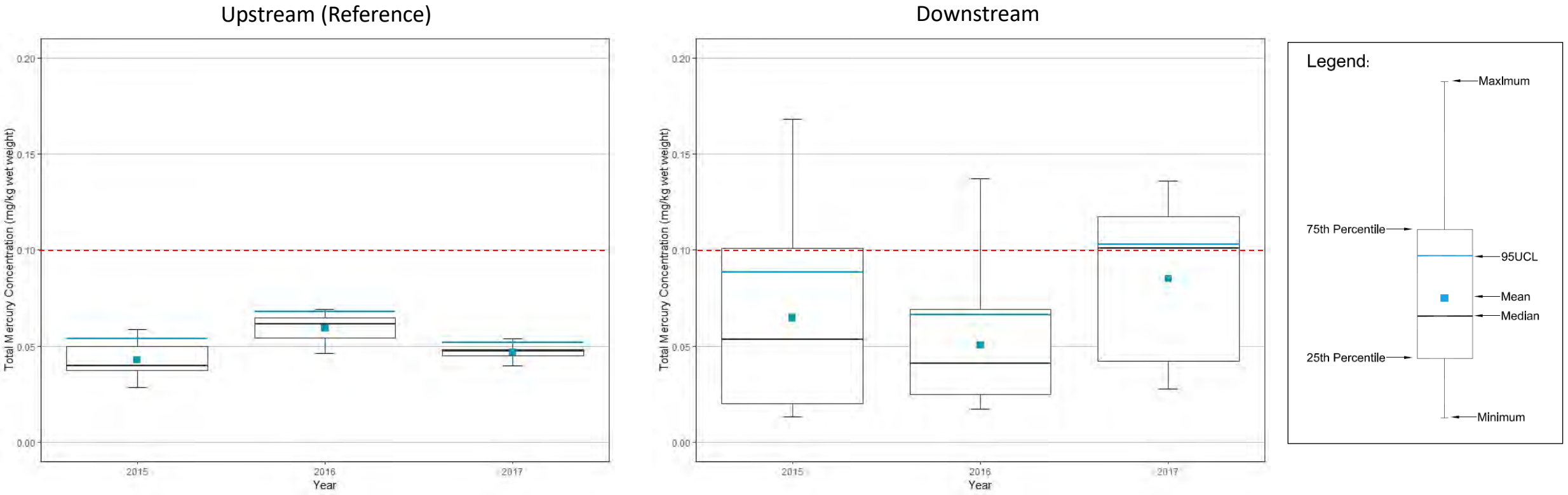
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

NINEMILE CREEK PREYFISH AND SPORTFISH MERCURY CONCENTRATIONS (2015–2017)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GE-NMC 2021 PVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-NMC-PREYFISH SAMPLE LOC MXD 2020.DWG
PLOT DATE: 11/1/2021 12:22 PM PLOTTED BY: RUSSO, JILL



Legend:

- - - - Ecological performance criterion for protection of ecological receptors (0.1 mg/kg)

Notes:

(a) 95% UCL: estimate of the upper bound for the true population mean; calculated using ProUCL Version 5.1. For data sets with NDs, ProUCL selected the statistical method.

(b) Mean concentration calculated by ProUCL using the same statistical method used for 95% UCL, unless 3 or fewer results were detected. In that case, for plots showing the 95% UCL, the arithmetic mean was calculated with non-detects substituted for ½ the MDL.

Figure 46

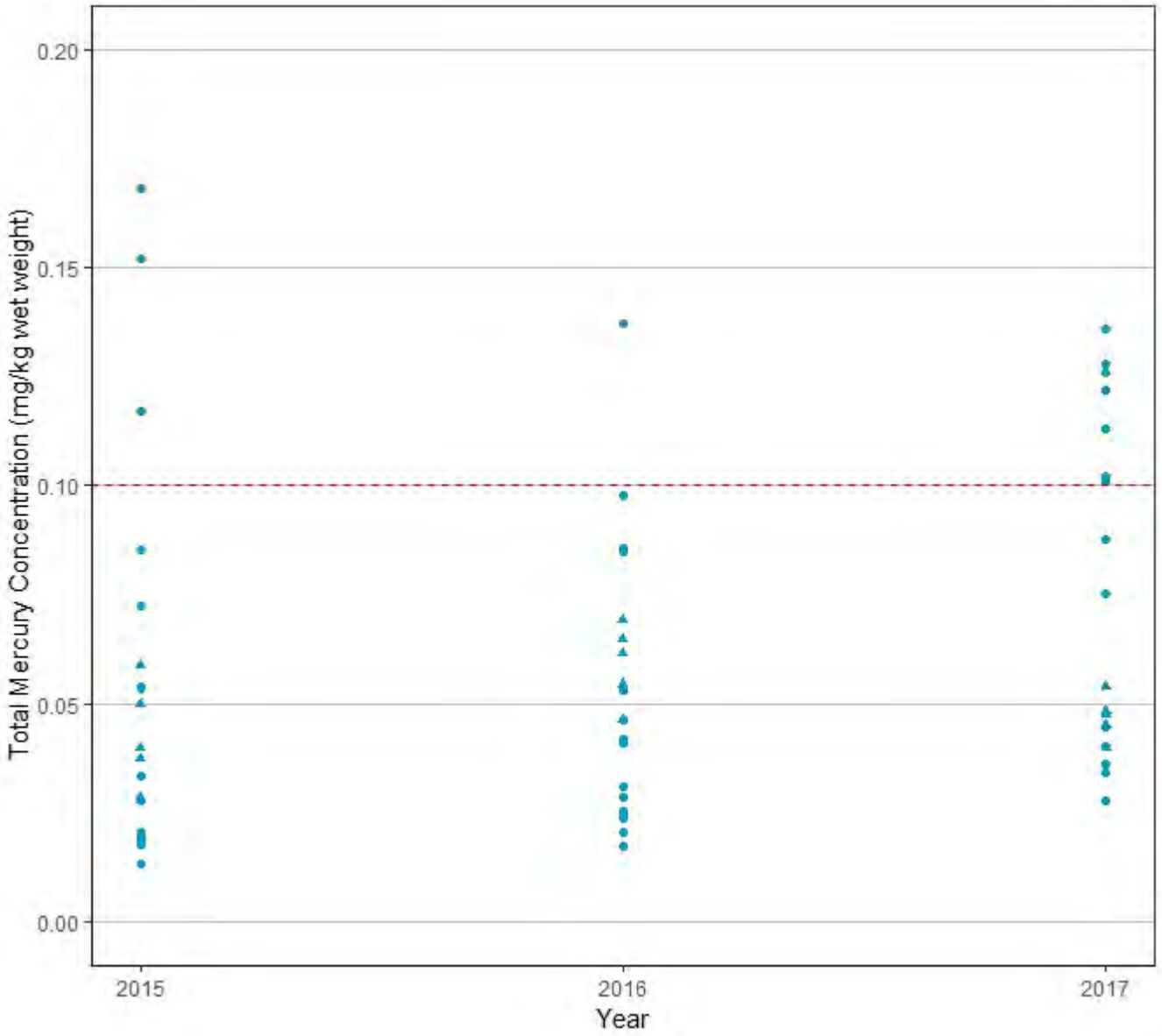
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Box and Whisker Plot of Mercury Concentrations in Ninemile Creek Prey Fish (2015-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Legend:
- - - - Ecological performance criterion for protection of ecological receptors (0.1 mg/kg)

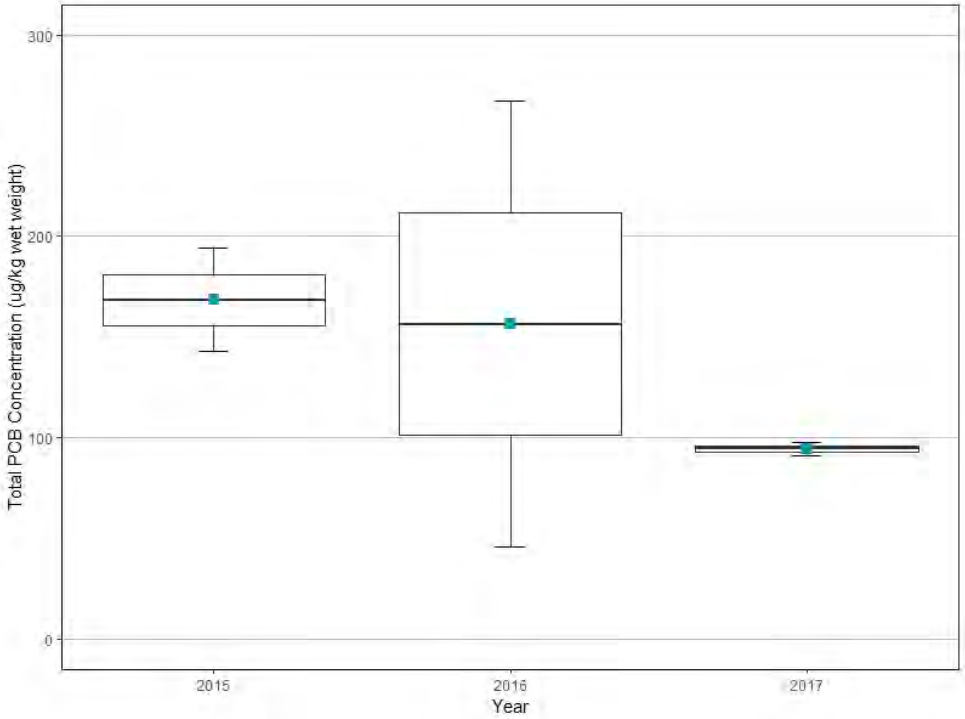
Figure 47

Honeywell LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

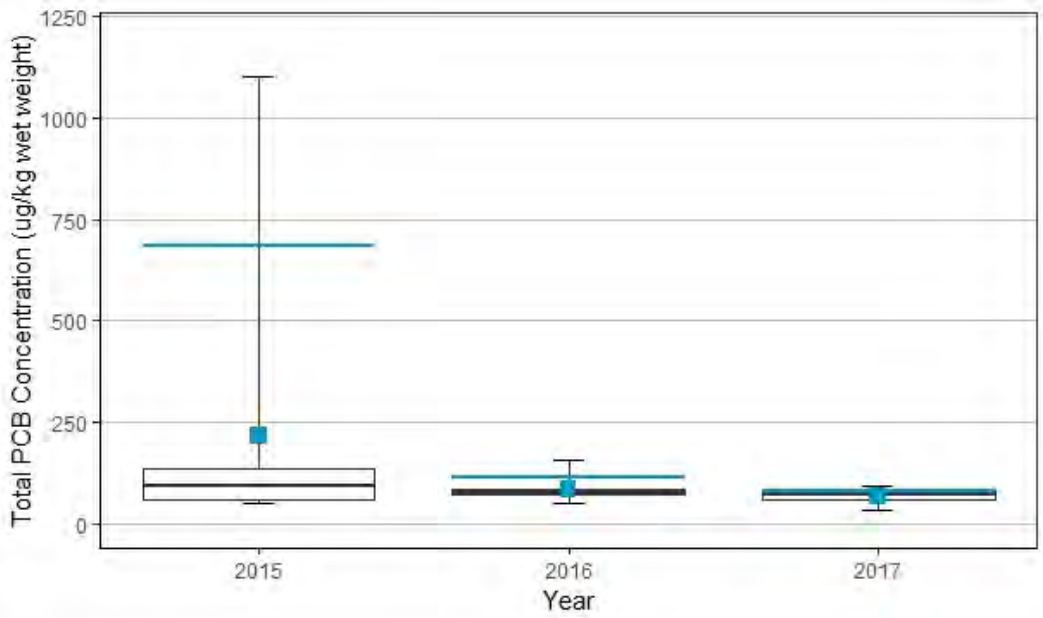
Scatter Plot of Mercury Concentrations in Ninemile Creek Prey Fish (2015-2017)

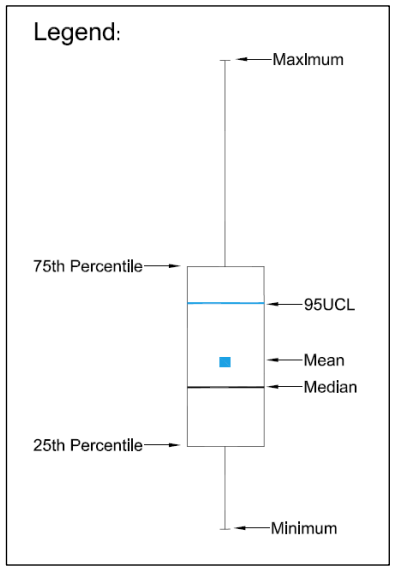
PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

Upstream (Reference)



Downstream





Notes:

(a) 95% UCL: estimate of the upper bound for the true population mean; calculated using ProUCL Version 5.1. For data sets with NDs, ProUCL selected the statistical method.

(b) Mean concentration calculated by ProUCL using the same statistical method used for 95% UCL, unless 3 or fewer results were detected. In that case, for plots showing the 95% UCL, the arithmetic mean was calculated with non-detects substituted for ½ the MDL.

(c) PCB analysis for upstream (reference) prey fish in 2015, 2016, and 2017 limited to two composite samples per year

Figure 48a

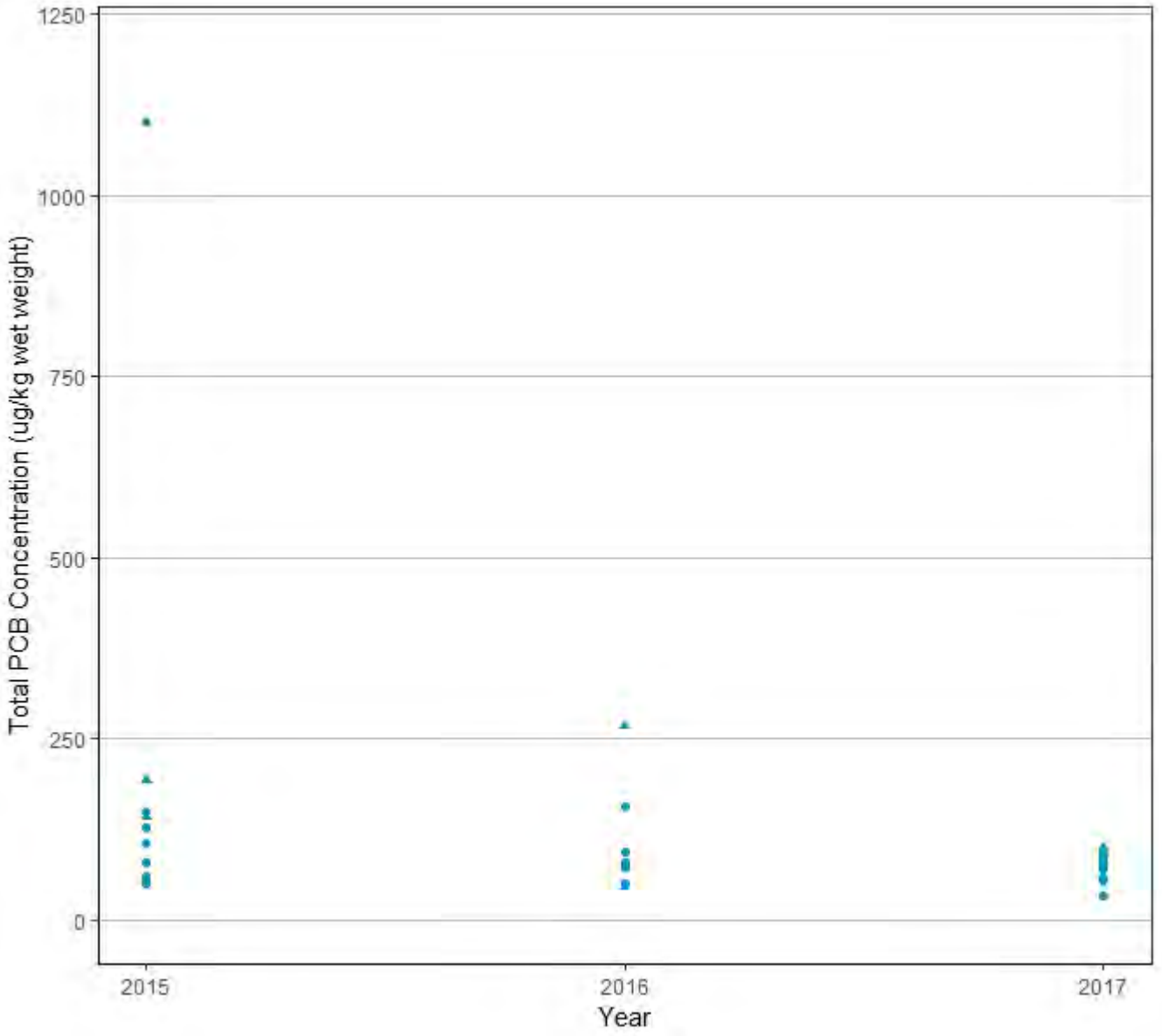
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Box and Whisker Plot of PCB Concentrations in Ninemile Creek Prey Fish (2015-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

(a) PCB analysis for upstream (reference) prey fish in 2015, 2016, and 2017 limited to two composite samples per year

Figure 48b

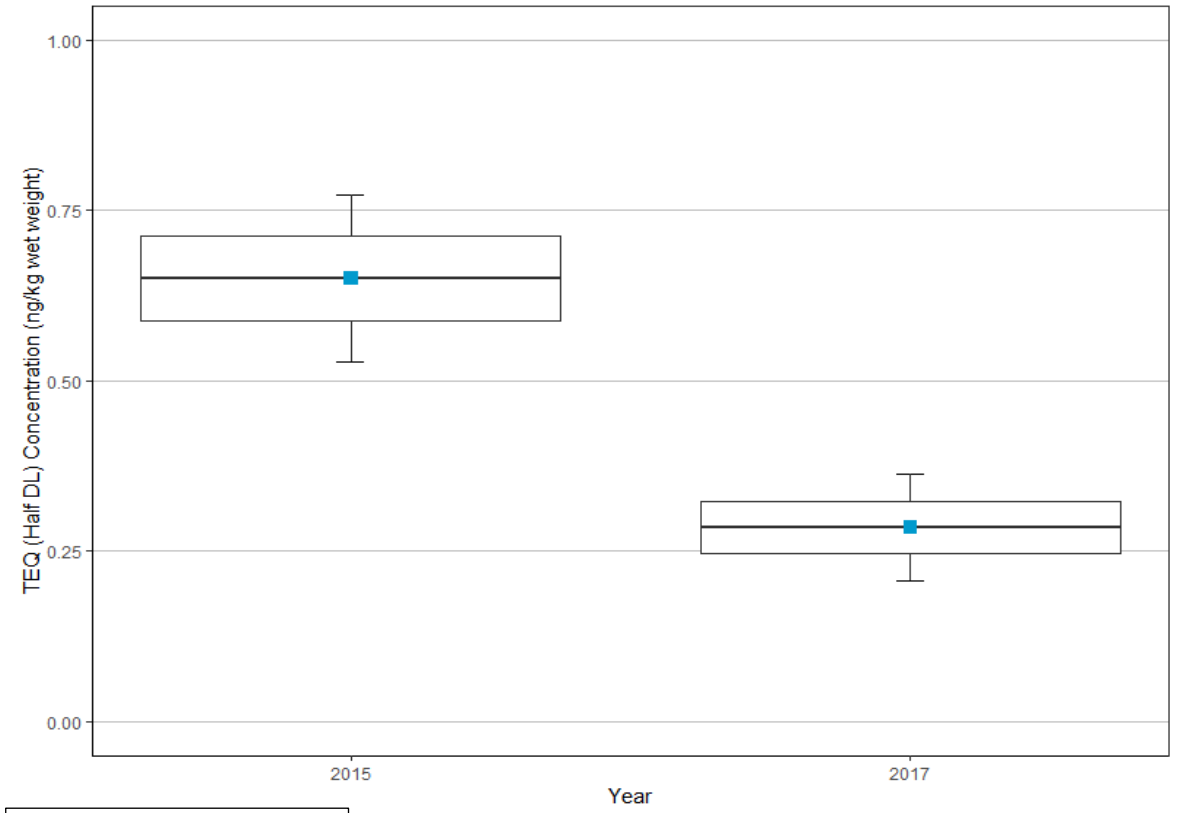
Honeywell

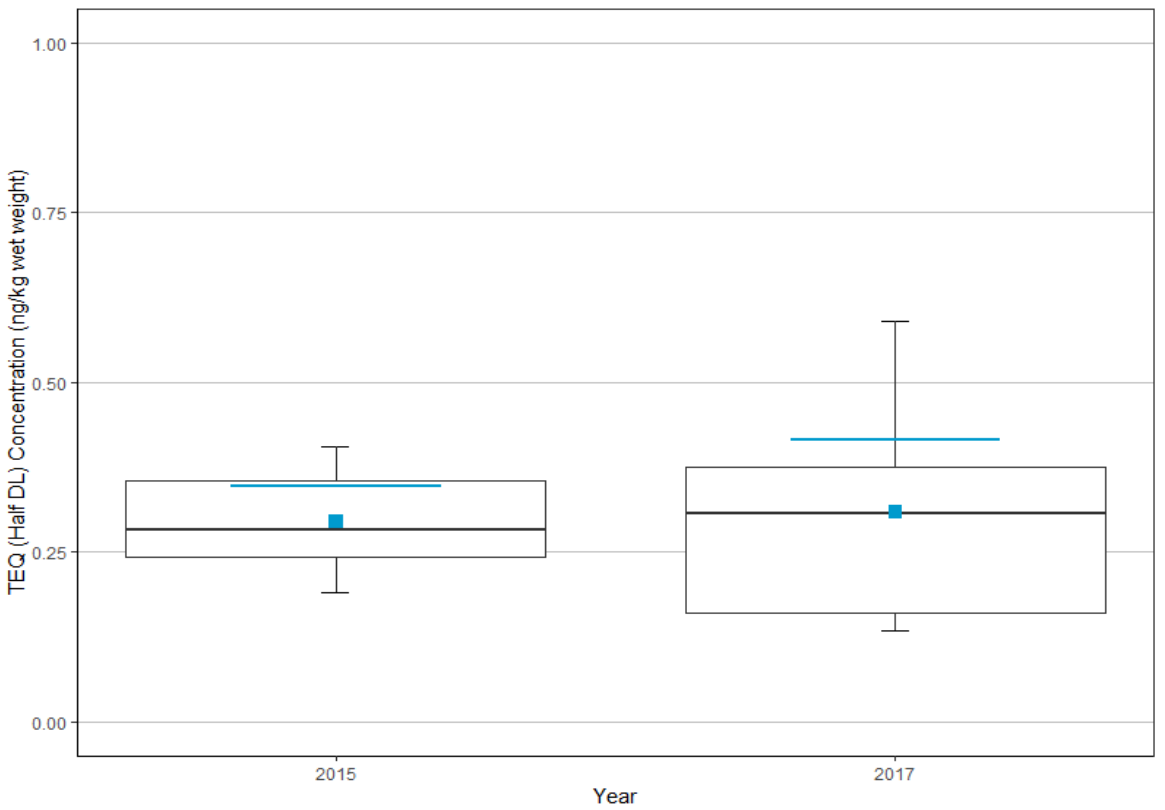
LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

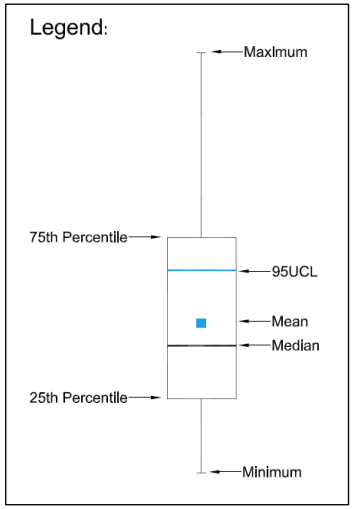
Scatter Plot of PCB Concentrations in Ninemile Creek Prey Fish (2015-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560







Notes:

(a) Dioxin/Furan Total TEQ was calculated as a sum of congeners; ½ the method detection limit was used for non-detects

(b) 95% UCL: estimate of the upper bound for the true population mean; calculated using ProUCL Version 5.1. For data sets with NDs, ProUCL selected the statistical method. 95% UCL not shown for data sets with 3 or fewer samples

Figure 48c

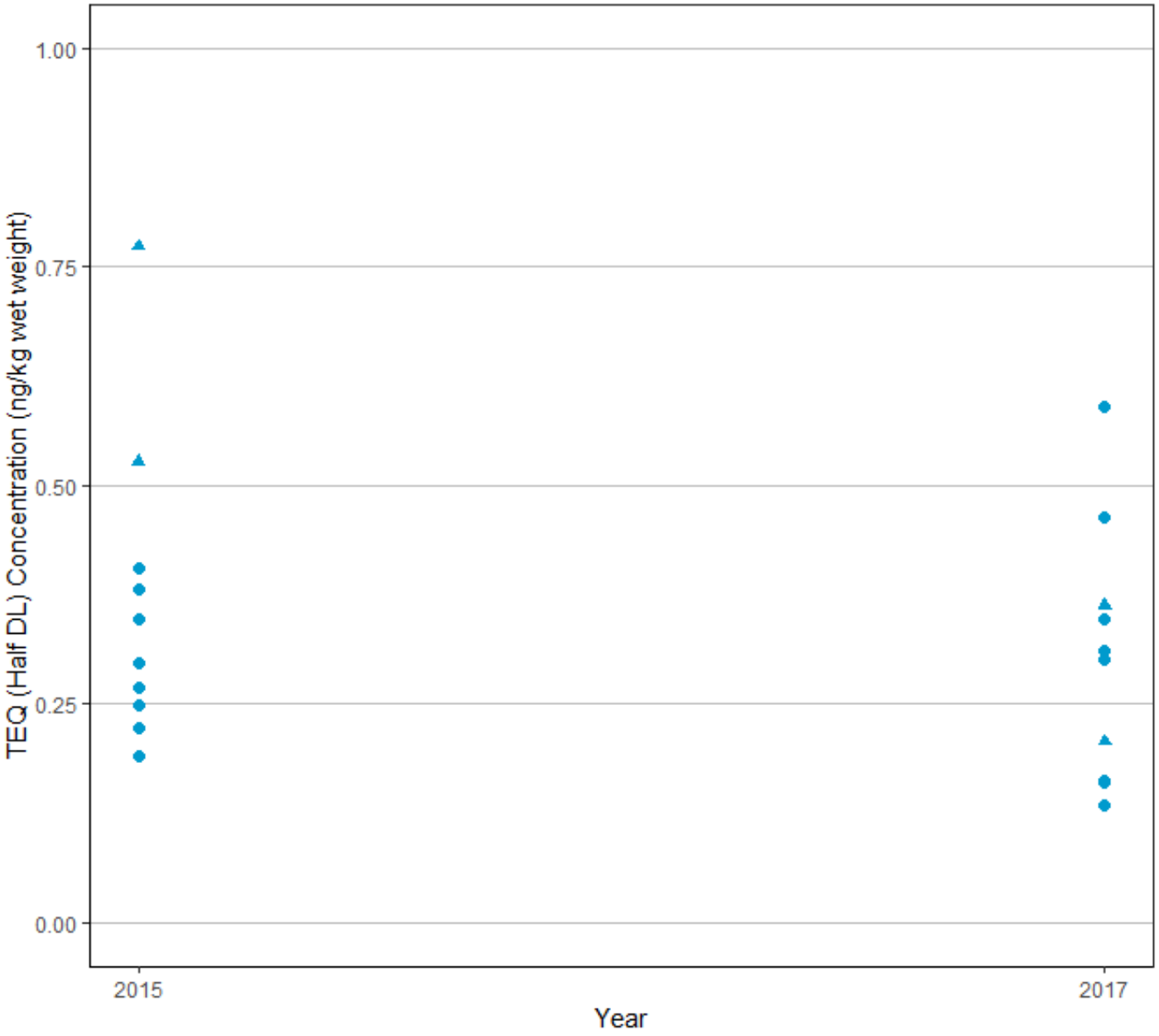
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Box and Whisker Plot of Dioxin/Furan TEQs in Ninemile Creek Prey Fish (2015-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Location
- Downstream
- Upstream

Notes:
(a) Dioxin/Furan Total TEQ was calculated as a sum of congeners; ½ the method detection limit was used for non-detects

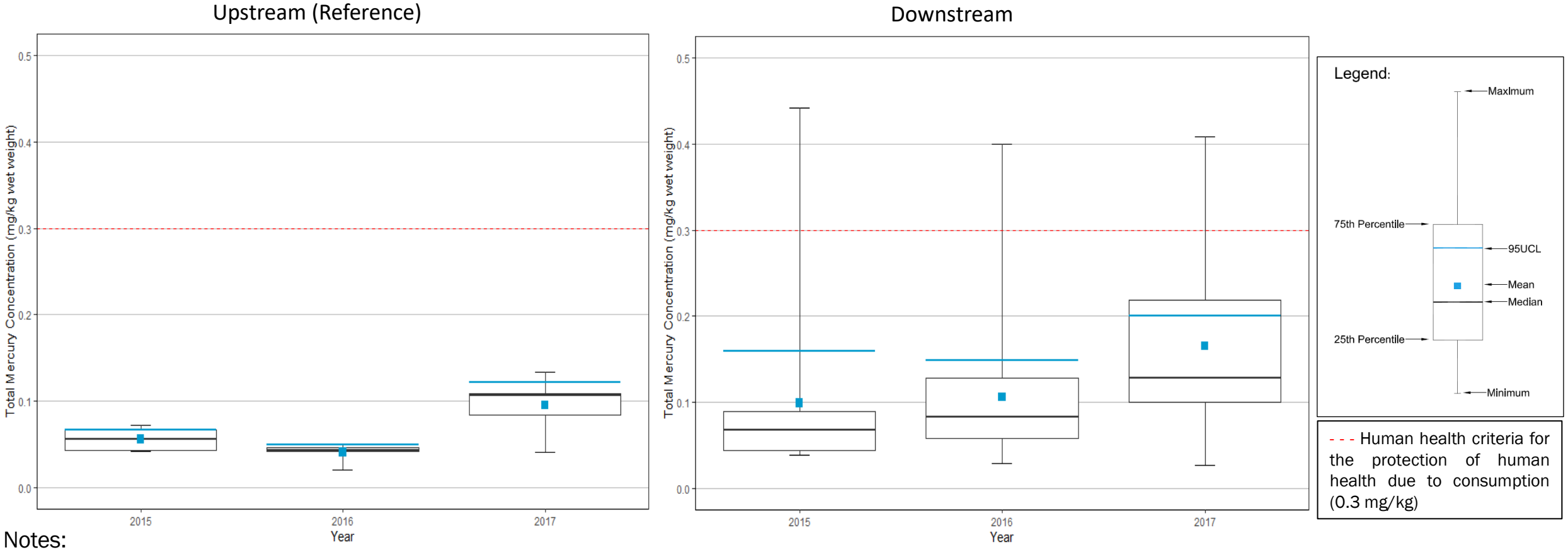
Figure 48d

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Scatter Plot of Dioxin/Furan TEQs in Ninemile Creek Prey Fish (2015-2017)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

(a) Upstream (Reference) collection limited to Brown Trout only

(b) Downstream collection consisted of Brown Trout (2015, 2016, 2017), Rock Bass (2015, 2017), Brown Bullhead (2015, 2016), and Green Sunfish (2016, 2017). Averages presented in downstream box plot are representative of all downstream species combined

(c) 95% UCL: estimate of the upper bound for the true population mean; calculated using ProUCL Version 5.1. For data sets with NDs, ProUCL selected the statistical method.

(d) Mean concentration calculated by ProUCL using the same statistical method used for 95% UCL, unless 3 or fewer results were detected. In that case, for plots showing the 95% UCL, the arithmetic mean was calculated with non-detects substituted for ½ the MDL.

Figure 49a

Honeywell

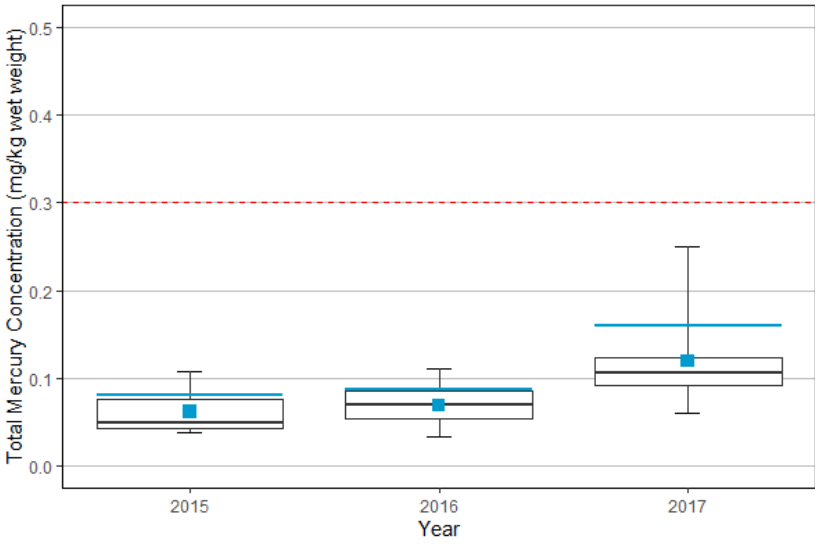
LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Box and Whisker Plot of Mercury Concentrations in Ninemile Creek Sport Fish: Upstream vs. Downstream (2015-2017)

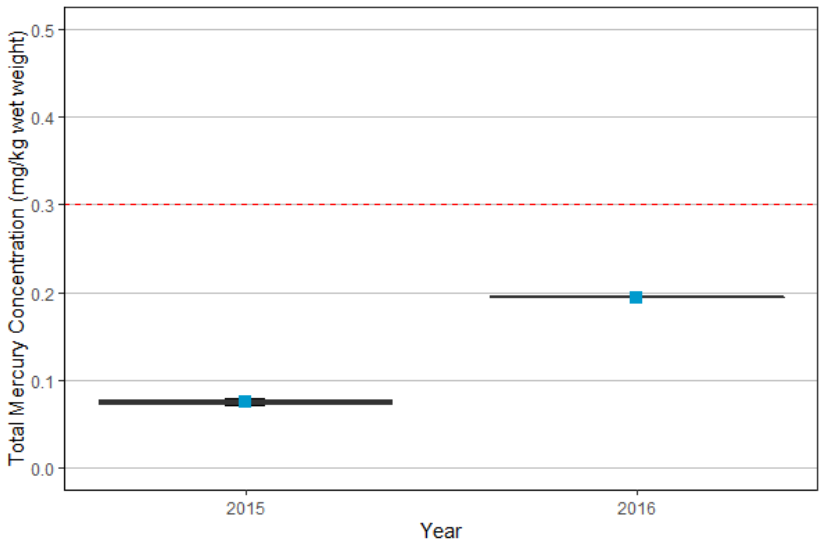
PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

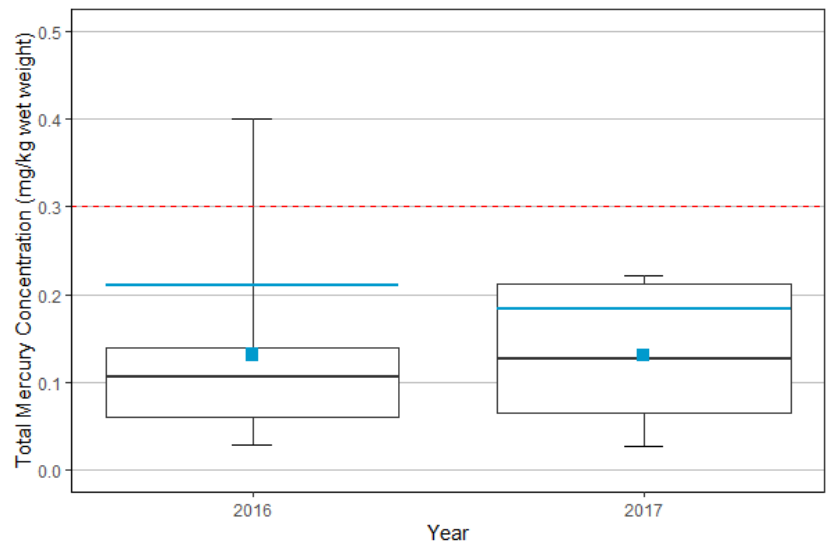
Downstream Brown Trout



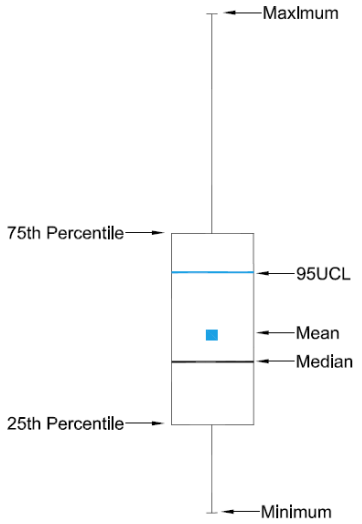
Downstream Brown Bullhead



Downstream Green Sunfish

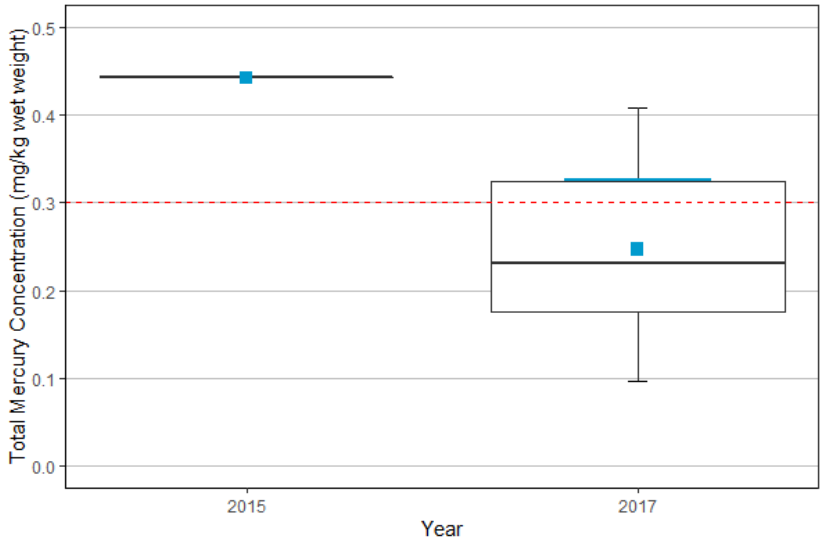


Legend:



- - - Human health criteria for the protection of human health due to consumption (0.3 mg/kg)

Downstream Rock Bass



Notes:

(a) Downstream collection consisted of Brown Trout (2015, 2016, 2017), Brown Bullhead (2015, 2016), Green Sunfish (2016, 2017) and Rock Bass (2015, 2017)
- Brown Bullhead collection limited to two individuals in 2015, one individual in 2016
- Rock Bass collection limited to one individual in 2015

(b) 95% UCL: estimate of the upper bound for the true population mean; calculated using ProUCL Version 5.1. For data sets with NDs, ProUCL selected the statistical method.

(c) Mean concentration calculated by ProUCL using the same statistical method used for 95% UCL, unless 3 or fewer results were detected. In that case, for plots showing the 95% UCL, the arithmetic mean was calculated with non-detects substituted for ½ the MDL.

Figure 49b

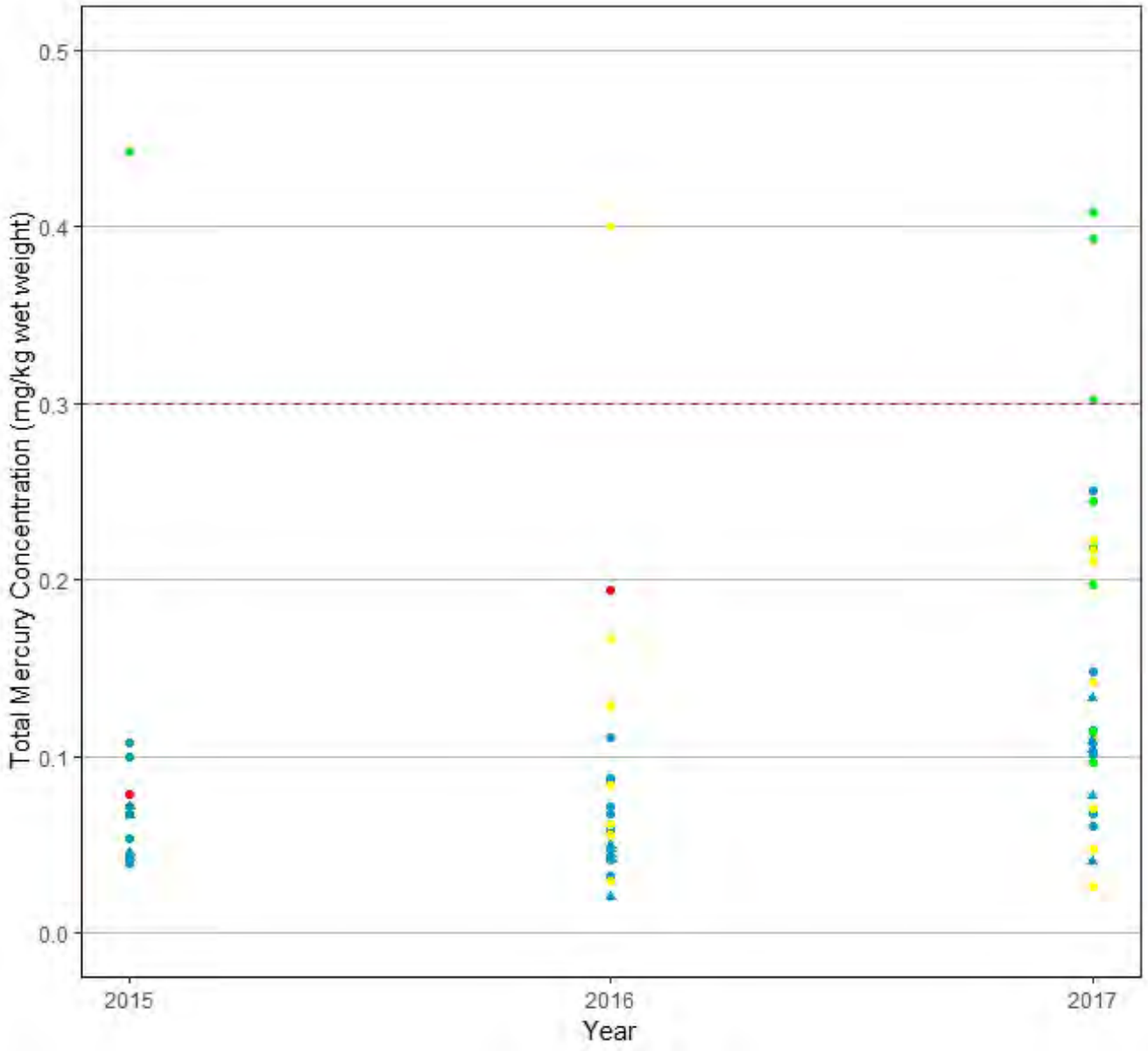
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Box and Whisker Plot of Mercury Concentrations in Ninemile Creek Sport Fish: Downstream Species (2015-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

(a) Downstream collection consisted of Brown Trout (2015, 2016, 2017), Brown Bullhead (2015, 2016), Green Sunfish (2016, 2017) and Rock Bass (2015, 2017)
- Brown Bullhead collection limited to two individuals in 2015, one individual in 2016
- Rock Bass collection limited to one individual in 2015

(b) Open symbol indicates a non-detect

(c) Individual non-detects are plotted using ½ the MDL

Legend:

- - - - Human health criteria for the protection of human health due to consumption (0.3 mg/kg)

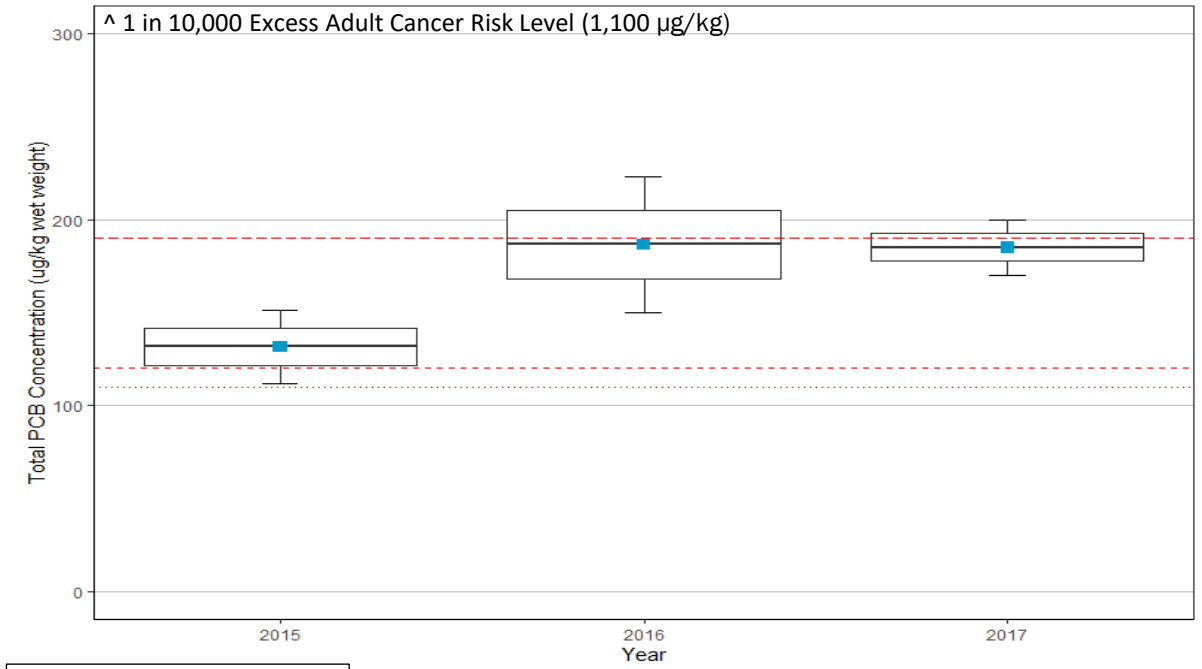
Figure 49c

Honeywell LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

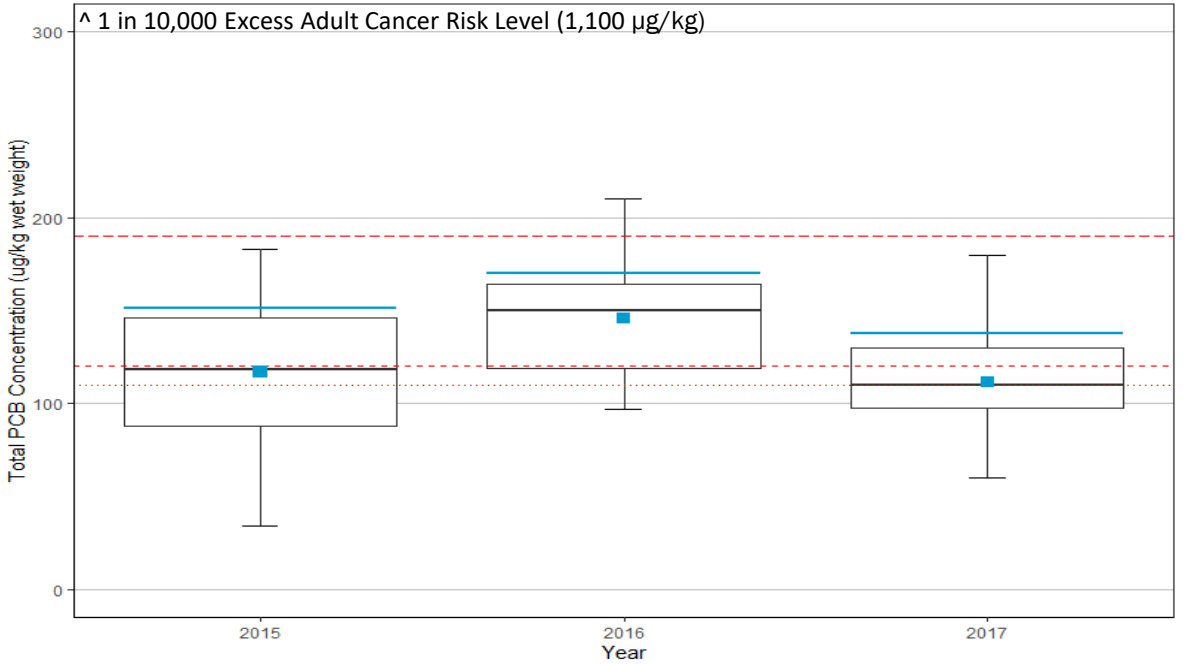
Scatter Plot of Mercury Concentrations in Ninemile Creek Sport Fish (2015-2017)

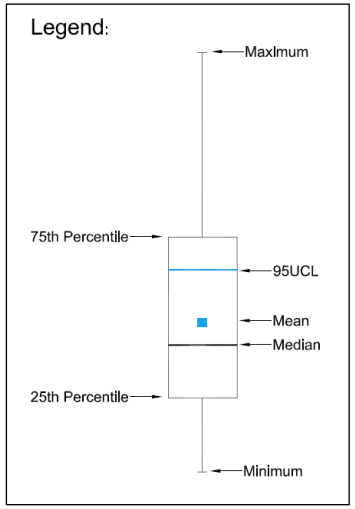
PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

Upstream (Reference)



Downstream





Notes:

(a) Subset of fish collected analyzed for PCBs consisted only of Brown Trout for both Upstream and Downstream

(b) 95% UCL: estimate of the upper bound for the true population mean; calculated using ProUCL Version 5.1. For data sets with NDs, ProUCL selected the statistical method.

(c) Mean concentration calculated by ProUCL using the same statistical method used for 95% UCL, unless 3 or fewer results were detected. In that case, for plots showing the 95% UCL, the arithmetic mean was calculated with non-detects substituted for ½ the MDL.

..... 1 in 100,000 Excess Adult Cancer Risk Target Level (110 µg/kg)
- - - - Noncancer risk level in children (120 µg/kg)
-- -- -- Noncancer risk level in adults (190 µg/kg)

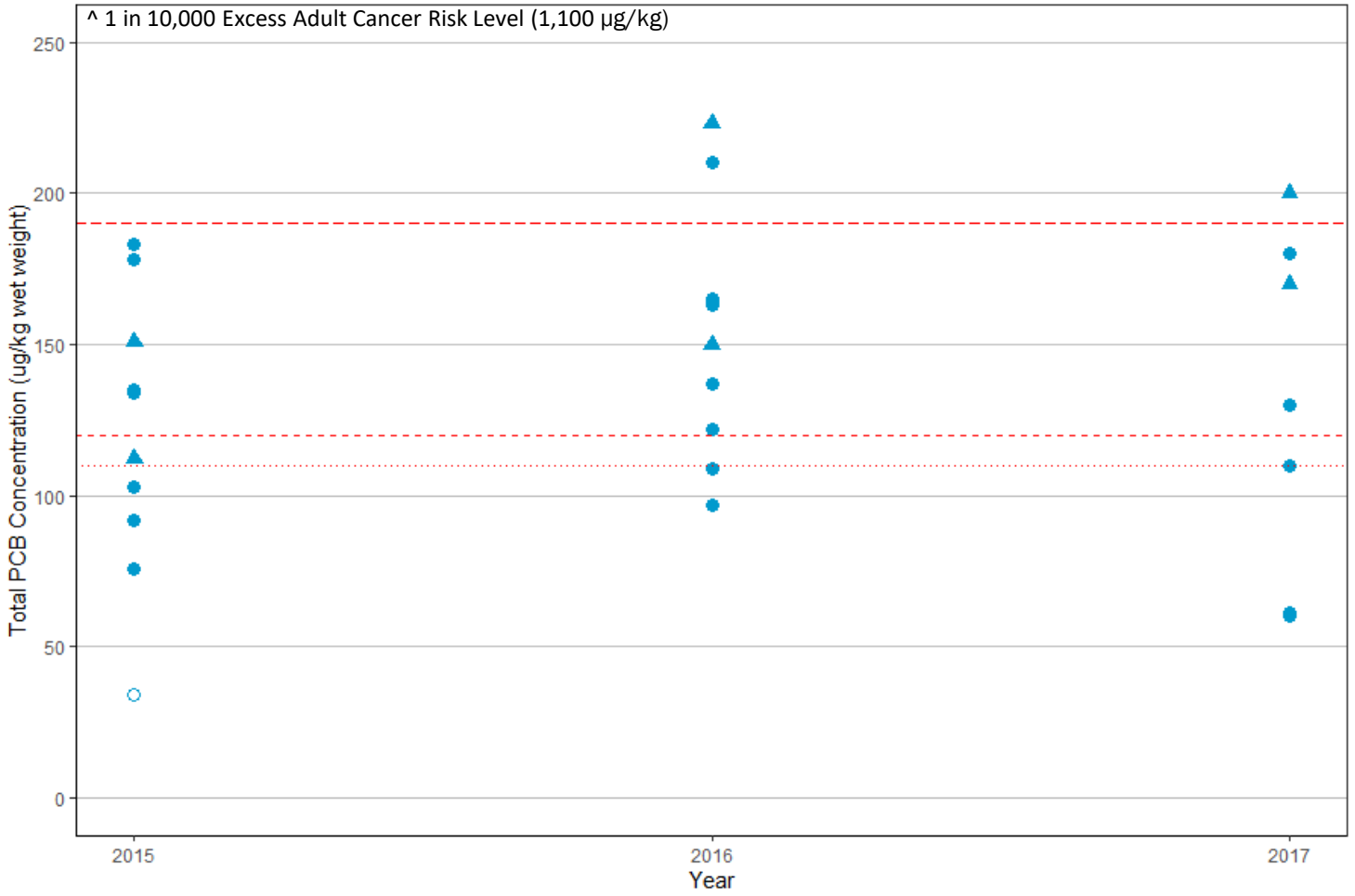
Figure 50a

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Box and Whisker Plot of PCB Concentrations in Ninemile Creek Sport Fish (2015-2017)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Location
- Downstream
- Upstream

Species
- Brown Trout

..... 1 in 100,000 Excess Adult Cancer Risk Target Level (110 µg/kg)
- - - - Noncancer Target level in children (120 µg/kg)
– – – Noncancer Target level in adults (190 µg/kg)

Notes:
(a) Subset of fish collected analyzed for PCBs consisted only of Brown Trout for both Upstream and Downstream
(b) Open symbol indicates a non-detect
(c) Individual non-detects are plotted using ½ the MDL

Figure 50b

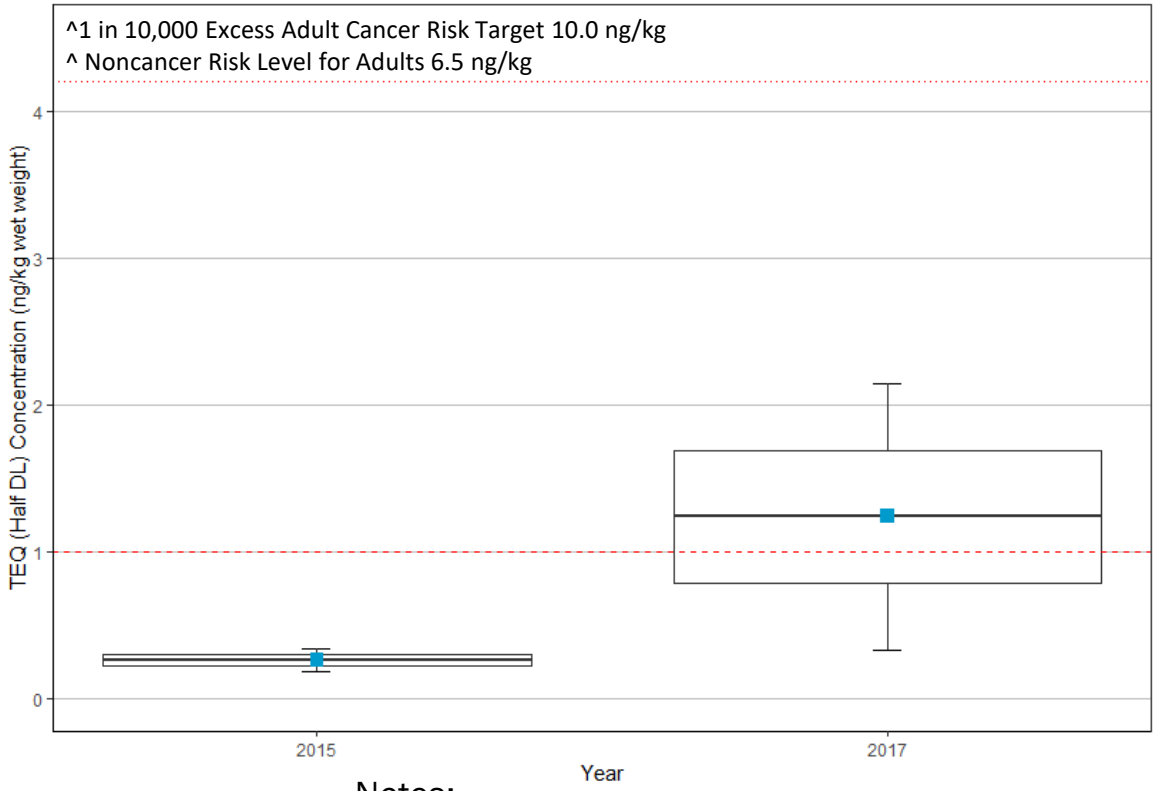
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

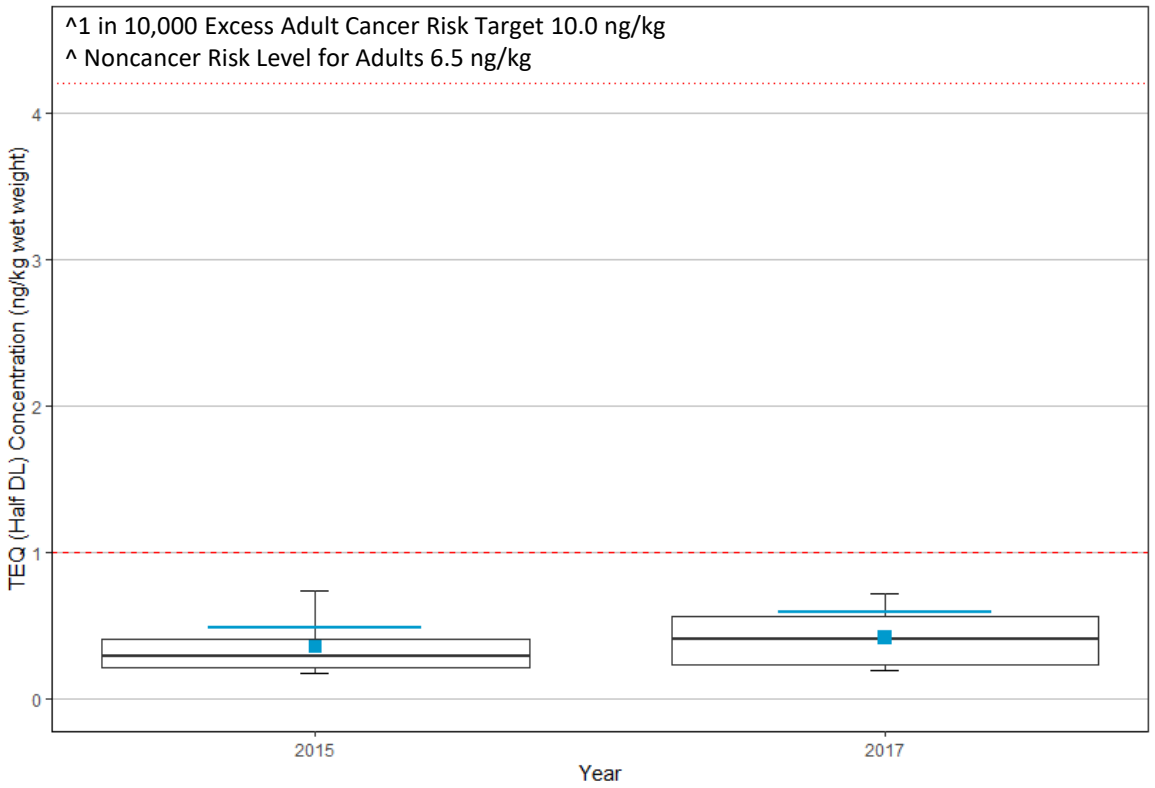
Scatter Plot of PCB Concentrations in Ninemile Creek Sport Fish (2015-2017)

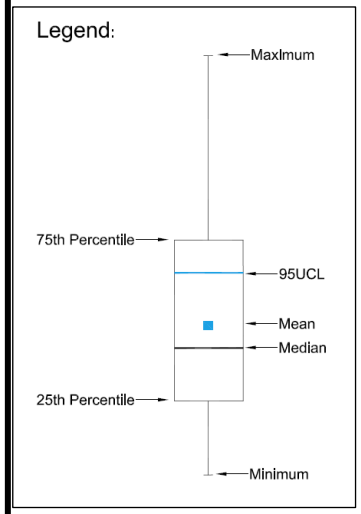
PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560

Upstream (Reference)



Downstream





Notes:

(a) Subset of fish collected analyzed for dioxin/furans consisted only of Brown Trout for both Upstream and Downstream

(b) Dioxin/Furan Total TEQ was calculated as a sum of congeners; ½ the method detection limit was used for non-detects

(c) 95% UCL: estimate of the upper bound for the true population mean; calculated using ProUCL Version 5.1. For data sets with NDs, ProUCL selected the statistical method. 95% UCL not shown for data sets with 3 or fewer samples

- - - - 1 in 100,000 Excess Adult Cancer Risk Target Level (1.0 ng/kg)

..... Noncancer Risk level in children (4.2 ng/kg)

Figure 50c

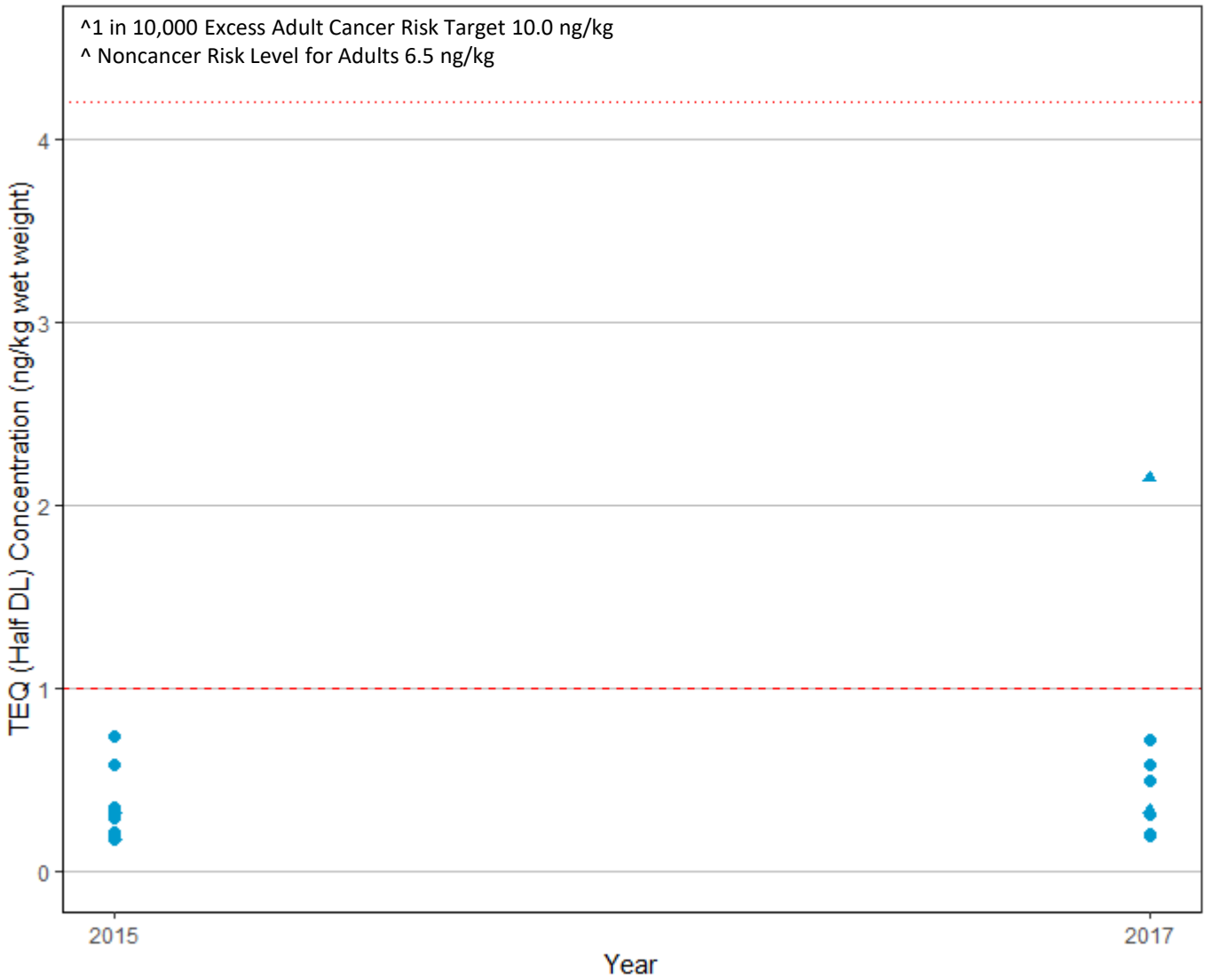
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Box and Whisker Plot of Dioxin/Furan TEQs in Ninemile Creek Sport Fish (2015-2017)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Location
- Downstream
- Upstream

---- 1 in 100,000 Excess Adult Cancer Risk Target Level (1.0 ng/kg)
..... Noncancer Risk Level in children (4.2 ng/kg)

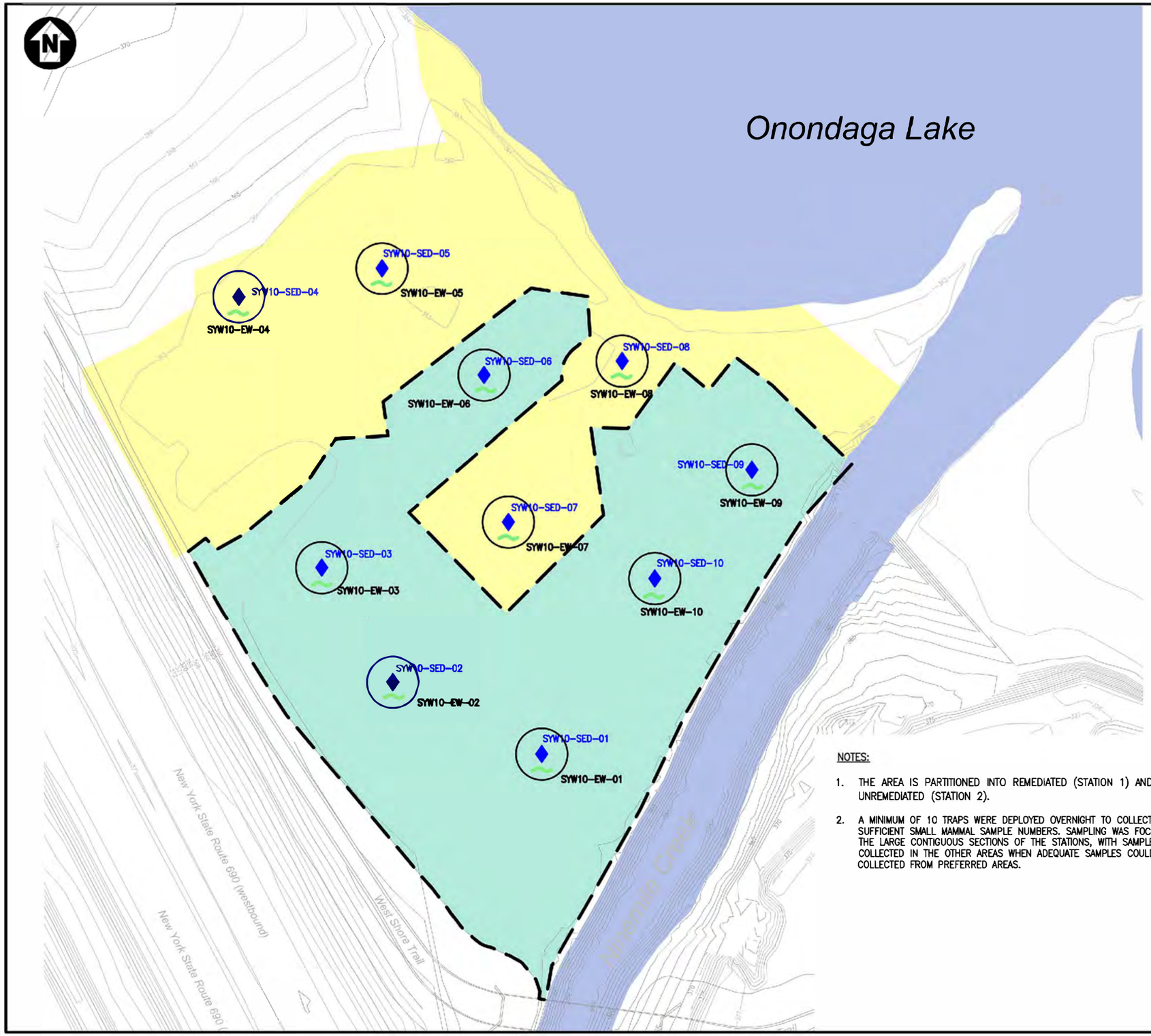
Notes:
(a) Subset of fish collected analyzed for dioxin/furans consisted only of Brown Trout for both Upstream and Downstream
(b) Dioxin/Furan Total TEQ was calculated as a sum of congeners; ½ the method detection limit was used for non-detects

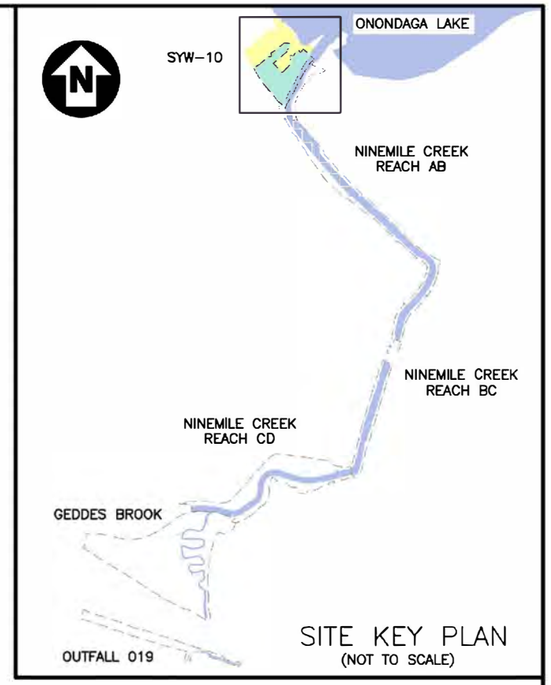
Figure 50d

Honeywell LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

Scatter Plot of Dioxin/Furan TEQs in Ninemile Creek Sport Fish (2015-2017)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560





LEGEND:

- RESTORATION AREA
- EXISTING ELEVATION CONTOUR
- STREAM BED
- SMALL MAMMAL REMEDIATED AREA, STATION 1
- SMALL MAMMAL UNREMEDIATED AREA, STATION 2
- SEDIMENT SAMPLING LOCATION
- DESIGNATED EARTHWORM SAMPLING AREA STATION
- EARTHWORM SAMPLES

NOTES:

1. THE AREA IS PARTITIONED INTO REMEDIATED (STATION 1) AND UNREMEDIATED (STATION 2).
2. A MINIMUM OF 10 TRAPS WERE DEPLOYED OVERNIGHT TO COLLECT SUFFICIENT SMALL MAMMAL SAMPLE NUMBERS. SAMPLING WAS FOCUSED IN THE LARGE CONTIGUOUS SECTIONS OF THE STATIONS, WITH SAMPLES COLLECTED IN THE OTHER AREAS WHEN ADEQUATE SAMPLES COULD NOT BE COLLECTED FROM PREFERRED AREAS.

80 40 0 80 160

SCALE: 1"=80'

FIGURE 51

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

SYW-10 BIOTA AND SEDIMENT SAMPLING LOCATIONS

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GP-NMC 2021 PYM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-SYW-10-2016-BIOTA SAMPLING LOCATIONS.DWG
PLOT DATE: 5/9/2022 1:34 PM PLOTTED BY: RUSSO, JILL [US-US]

Onondaga Lake

SYW10-EW-05		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.20 J
2016	Earthworm	0.39
2018	Earthworm	0.39

SYW10-SED-05	
Year	Total Mercury (mg/kg)
2015	4.09 J
2016	2.86 J
2018	2.51 J

SYW10-EW-04		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.26 J+
2016	Earthworm	0.43
2018	Earthworm	0.59

SYW10-SED-04	
Year	Total Mercury (mg/kg)
2015	3.24 J
2016	0.47
2018	3.53 J

SYW10-EW-06		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.18 J
2016	Earthworm	0.16
2018	Earthworm	0.13 J

SYW10-SED-06	
Year	Total Mercury (mg/kg)
2015	0.03 J
2016	0.03 J
2018	0.11 U

SYW10-EW-08		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.31
2016	Earthworm	0.48
2018	Earthworm	0.67

SYW10-SED-08	
Year	Total Mercury (mg/kg)
2015	2.97 J
2016	7.87 J
2018	3.31 J

SYW10-SM-01-04		
Year	Species	Mercury (mg/kg)
2015	White Footed Mouse	0.010 J
2016	Deer Mouse	0.009 U
2018	Deer Mouse	0.073 U

SYW10-SM-01-05		
Year	Species	Mercury (mg/kg)
2015	Meadow Vole	0.015 J
2016	Deer Mouse	0.010 U
2018	Deer Mouse	0.030 U

SYW10-SM-02-04		
Year	Species	Mercury (mg/kg)
2015	White Footed Mouse	0.036 J
2016	Deer Mouse	0.027 J
2018	White Footed Mouse	0.076 U

SYW10-SM-02-05		
Year	Species	Mercury (mg/kg)
2015	Meadow Vole	0.029 J
2016	White Footed Mouse	0.021 J
2018	White Footed Mouse	0.061 J

SYW10-EW-09		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.17 J
2016	Earthworm	0.13
2018	Earthworm	0.09 J

SYW10-SED-09	
Year	Total Mercury (mg/kg)
2015	0.08 J
2016	0.04 J
2018	0.10 U

SYW10-EW-03		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.04 J
2016	Earthworm	0.08 J
2018	Earthworm	0.11 J

SYW10-SED-03	
Year	Total Mercury (mg/kg)
2015	0.03 J
2016	0.04 J
2018	0.09 U

SYW10-EW-10		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.19 J
2016	Earthworm	0.084 J
2018	Earthworm	0.17

SYW10-SED-10	
Year	Total Mercury (mg/kg)
2015	0.09 J (0.11 J)
2016	0.10 J (0.12 J)
2018	0.14 J (0.14 J)

SYW10-EW-02		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.06 J
2016	Earthworm	0.12
2018	Earthworm	0.11 J

SYW10-SED-02	
Year	Total Mercury (mg/kg)
2015	0.07 J
2016	0.06 J
2018	0.11 U

SYW10-EW-01		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.14 J
2016	Earthworm	0.19
2018	Earthworm	0.13

SYW10-SED-01	
Year	Total Mercury (mg/kg)
2015	0.13 J
2016	0.11 J
2018	0.11 J

SYW10-EW-07		
Year	Species	Mercury (mg/kg)
2015	Earthworm	0.49
2016	Earthworm	1.25
2018	Earthworm	1.23

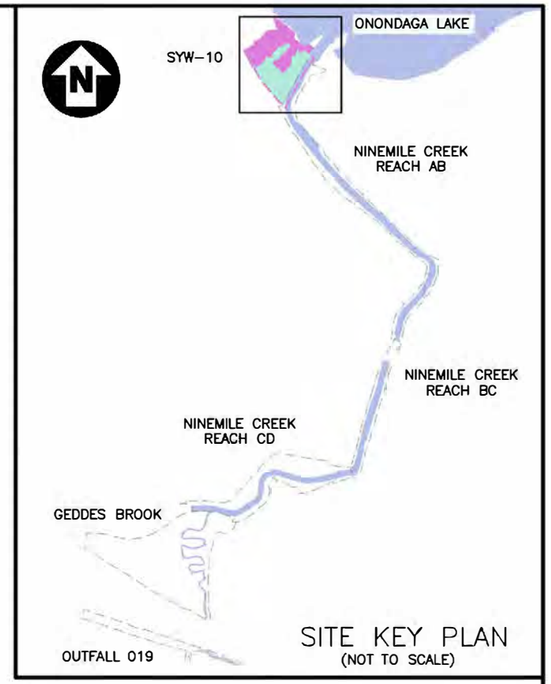
SYW10-SED-07	
Year	Total Mercury (mg/kg)
2015	3.92
2016	7.45
2018	4.69 J

SYW10-SED-04 SYW10-EW-04 SYW10-SED-05 SYW10-EW-05 SYW10-SED-06 SYW10-EW-06 SYW10-SED-08 SYW10-EW-08 SYW10-SED-09 SYW10-EW-09 SYW10-SED-07 SYW10-EW-07 SYW10-SED-03 SYW10-EW-03 SYW10-SED-10 SYW10-EW-10 SYW10-SED-02 SYW10-EW-02 SYW10-SED-01 SYW10-EW-01

Nine Mile Creek

New York State Route 690

Onondaga Lake Shore Trail



SITE KEY PLAN
(NOT TO SCALE)

LEGEND:

- RESTORATION AREA
- EXISTING ELEVATION CONTOUR
- STREAM BED
- SMALL MAMMAL REMEDIATED AREA, STATION 1
- SMALL MAMMAL UNREMEDIATED AREA, STATION 2
- SEDIMENT SAMPLING LOCATION
- DESIGNATED EARTHWORM SAMPLING AREA STATION
- EARTHWORM SAMPLES

80 40 0 80 160

SCALE: 1"=80'

NOTES:

1. THE AREA IS PARTITIONED INTO REMEDIATED (STATION 1) AND UNREMEDIATED (STATION 2).
2. A MINIMUM OF 10 TRAPS WERE DEPLOYED OVERNIGHT TO COLLECT SUFFICIENT SMALL MAMMAL SAMPLE NUMBERS. SAMPLING WAS FOCUSED IN THE LARGE CONTIGUOUS SECTIONS OF THE STATIONS, WITH SAMPLES COLLECTED IN THE OTHER AREAS WHEN ADEQUATE SAMPLES COULD NOT BE COLLECTED FROM PREFERRED AREAS.

FIGURE 52

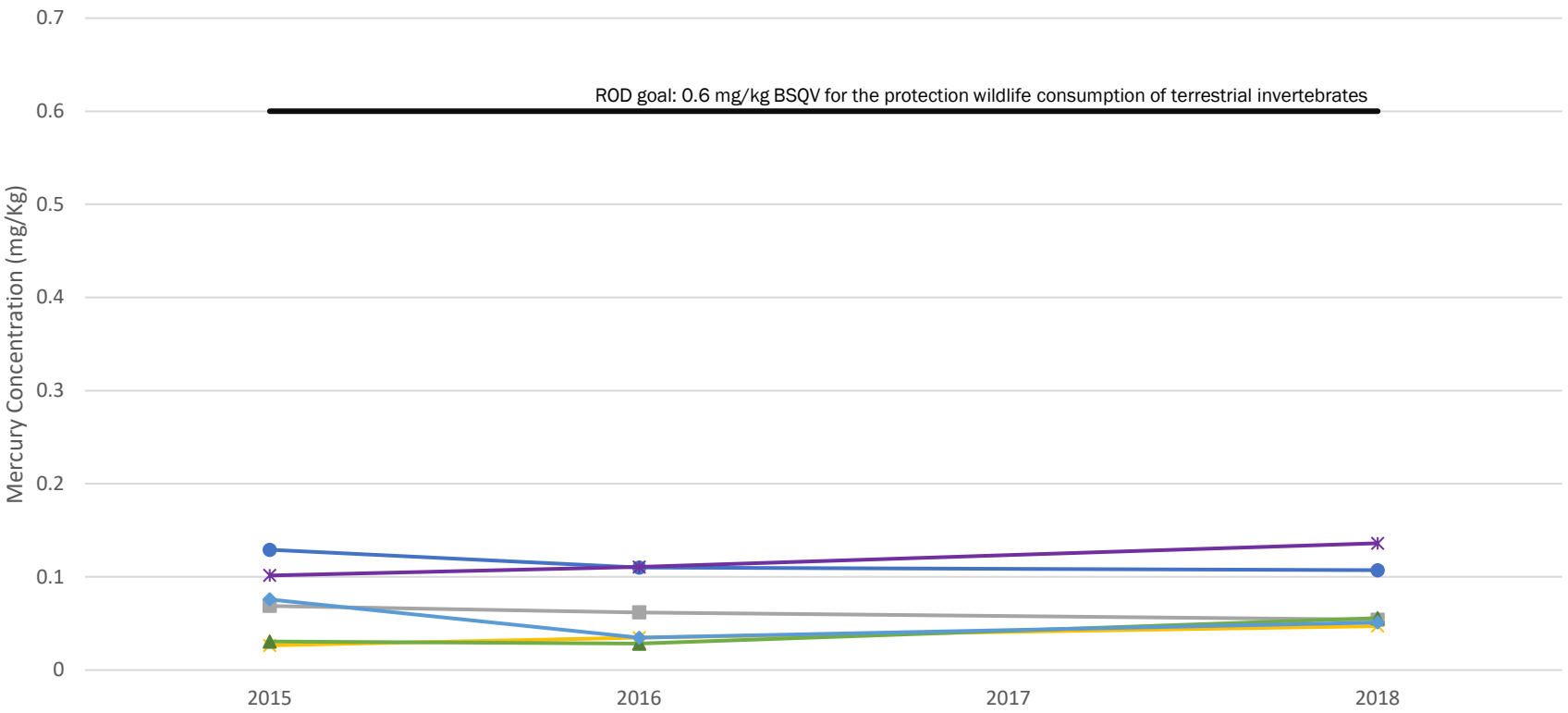
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK
2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

SYW-10 BIOTA AND SEDIMENT TOTAL MERCURY CONCENTRATIONS (2015, 2016, AND 2018)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\HONEYWELL -SYR\452663 GB-NMC 2021 FVM\10 TECHNICAL CATEGORIES\2020-5-YR-REVIEW\452663-SYW-10-2016-BIOTA SAMPLING LOCATIONS.DWG
PLOT DATE: 11/1/2021 2:17 PM PLOTTED BY: RUSSO, JILL



Notes:
(a) Soils within remediated areas were sampled in 2015, 2016, and 2018 in accordance with the Ninemile Creek M&M Plan
(b) Field duplicates are averaged together for all calculations

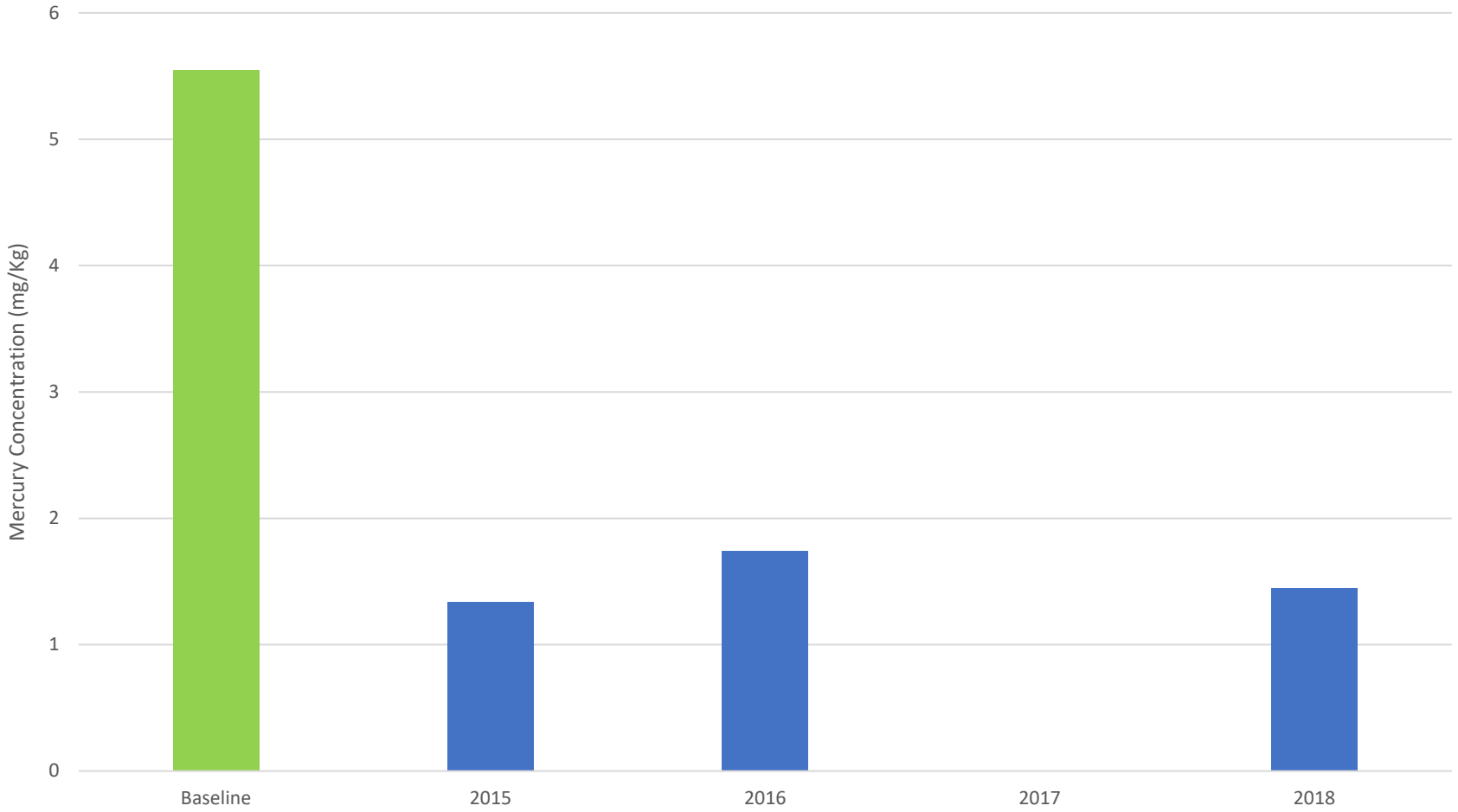
FIGURE 53

Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

SYW-10 Mercury Concentrations in Soil within Remediated Areas (2015-2018)

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

a) Floodplain soils were sampled in 2015, 2016, and 2018 in accordance with the Ninemile Creek M&M Plan
b) Field duplicates are averaged together for all calculations

FIGURE 54

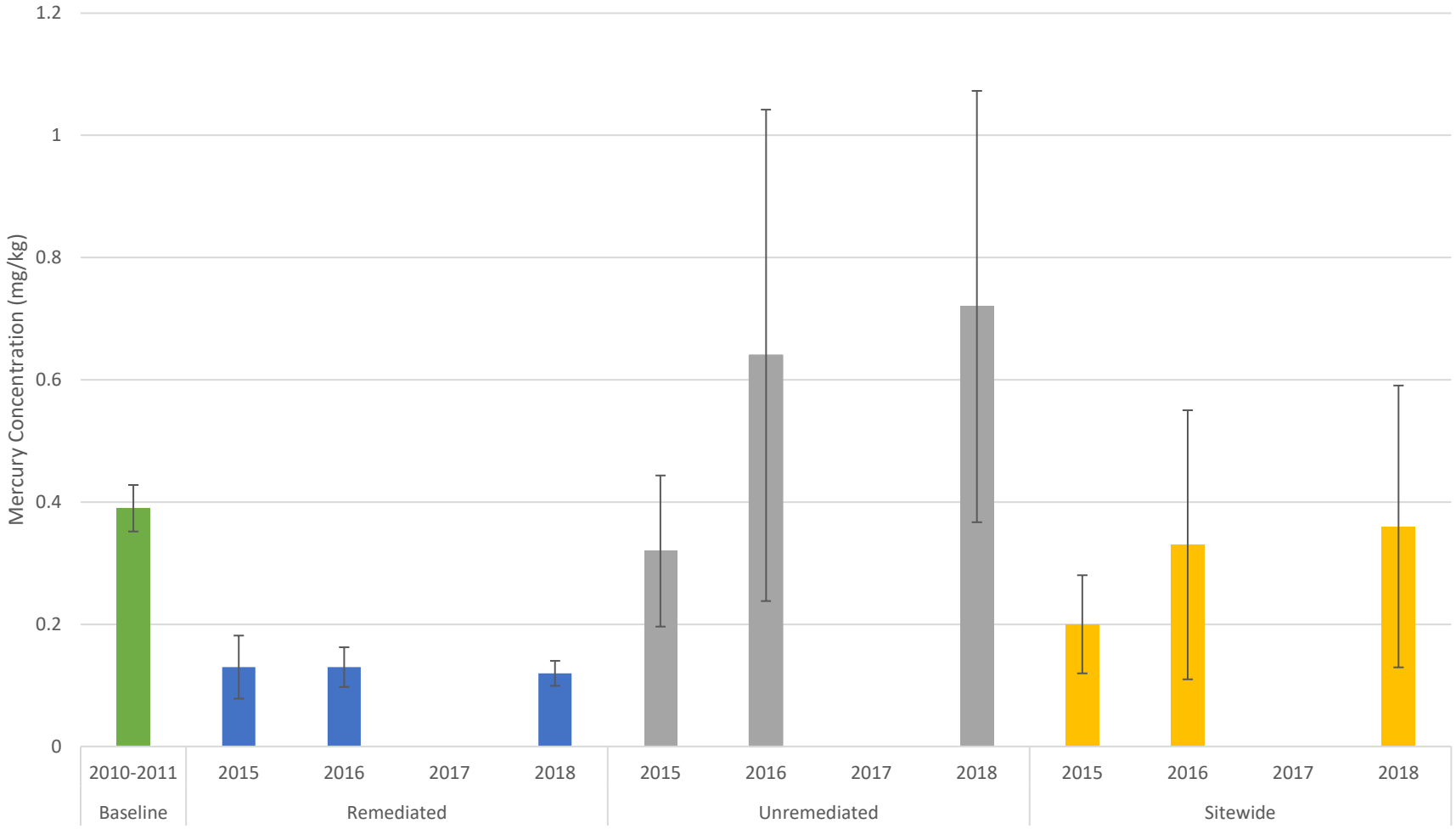
Honeywell

LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

SYW-10 Sitewide Average Mercury Concentrations in Floodplain Soil (2015-2018)

PARSONS

301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 PHONE: (315) 451-9560



Notes:

a) Earthworms were collected in 2015, 2016, and 2018 in accordance with the Ninemile Creek M&M Plan

b) Error bars represent the 95% confidence interval

FIGURE 55

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LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

SYW-10 Mercury Concentrations in Earthworms (2015-2018)

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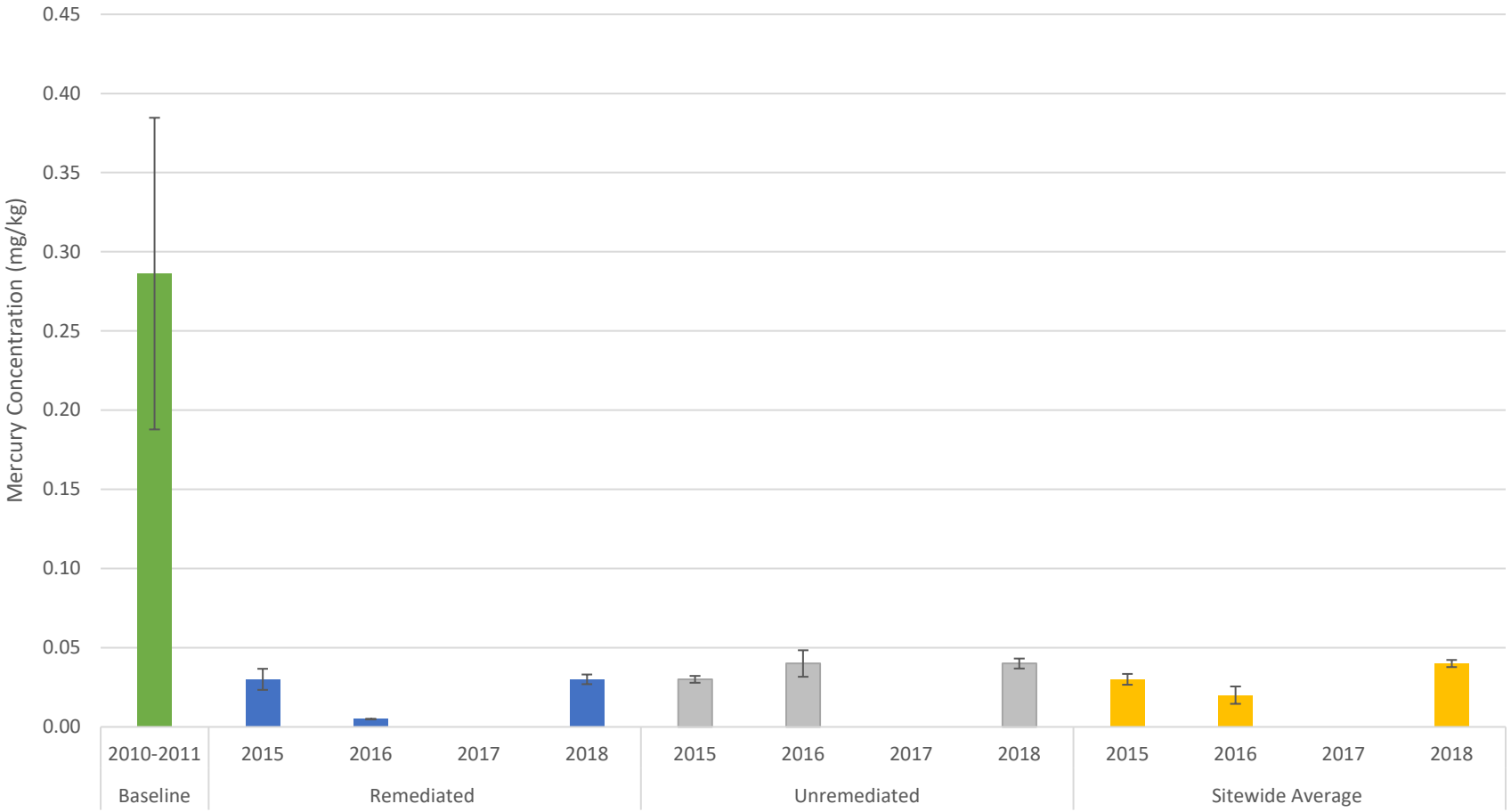

Notes:

a) Small mammals were collected in 2015, 2016, and 2018 in accordance with the Ninemile Creek M&M Plan
b) Error bars represent the 95% confidence interval

FIGURE 56

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LCP OU-1/GEDDES BROOK/NINEMILE CREEK 2020 ANNUAL REPORT AND FIVE-YEAR COMPREHENSIVE REPORT

SYW-10 Average Mercury Concentrations in Small Mammals (2015-2018)

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APPENDIX B – TABLES

Table 1: Target Tissue Concentrations for Geddes Brook/Ninemile Creek Fish (all concentrations in mg/kg wet weight)		
Contaminants of Concern	**Target Tissue Concentrations**	
Human Health – Fish Fillets	**Reasonable Maximum Exposure**	
Mercury (as MeHg)[3]	0.3	
Total PCBs[4]	0.11 to 1.1	
PCDD/PCDFs (TEQ as 2,3,7,8-TCDD)[5]	1×10^{-6} to 1×10^{-5}	
Ecological Exposure Small Fish (3-18 cm) - Whole Fish[1,2]	**NOAEL**	**LOAEL**
Mercury (as MeHg)	0.009	0.187
Ecological Exposure Large Fish (18-60 cm) - Whole Fish[1,2]	**NOAEL**	**LOAEL**
Mercury (as MeHg)	0.014	0.345

Table 1 Notes:

1. NOAEL = no-observed-adverse-effect-level; LOAEL = lowest-observed-adverse-effect-level.

2. NOAELs and LOAELs for small (3 to 18 cm) fish are based on the belted kingfisher and mink. NOAELs and LOAELs for large (18 to 60 cm) fish are based on the great blue heron and river otter.

3. The human health target tissue concentration for mercury (0.3 mg/kg ww) is based on EPA's National Recommended Water Quality Criterion for methylmercury, as measured in fish tissue. Under the Reasonable Maximum Exposure scenario, human health mercury target fish tissue concentrations range from 0.6 to 0.9 mg/kg ww with the lower end of the range based on young children and the upper end of the range based on adults.

4. The human health target tissue concentrations for total PCBs are based on RME carcinogenic risks at risk targets ranging from 1E-05 (0.11 mg/kg) to 1E-04 (1.1 mg/kg). The RME targets based on non-cancer effects of PCBs (0.12 mg/kg ww and 0.19 mg/kg ww for children and adults, respectively), fall within the range based on carcinogenic risks. A target concentration based on the 1E-06 risk level may not be achievable since it is much lower than mean background concentration (0.04 mg/kg ww) in U.S. waters.

5. TEQ = toxicity equivalent (toxicity-weighted mass of dioxin mixtures). The human health target tissue concentrations for PCDD/PCDFs are based on RME carcinogenic risks at risk targets ranging from 1E-05 (1E-06 mg/kg ww) to 1E-04 (1E-05 mg/kg ww). Non-carcinogenic targets were not developed for PCDD/PCDFs prior to the issuance of the GBNMC RODs. Subsequent to their issuance, a RME noncancer endpoint target of 4.2E-06 mg/kg was developed using the parameters presented in Appendix I of the FS for a target concentration for the non-cancer endpoint, and using the EPA 2012 reference dose of 7E-10 mg/kg-day. The RME target based on non-cancer effects PCDD/PCDFs fall within the range based on carcinogenic risks. A target concentration based on the 1E-06 risk level is much lower than mean background concentration (8E-07 mg/kg ww) in US waters and may not be achievable.

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TABLE 2: GEDDES BROOK, NINEMILE CREEK, AND SYW-10 WETLAND ACREAGES

Site	Pre-Remedy Acreages	Post Remedy Delineated Acreages
Geddes Brook	12.20[1]	11.78[2]
Outfall-019	2.16[3]	2.19[4]
Ninemile Creek Reach AB	0.93[5]	0.97[6]
Ninemile Creek Reach BC	1.20[5]	0.68[6]
Ninemile Creek Reach CD	1.55[5]	1.94[2]
SYW-10	2.02[5]	2.79[7]
Totals	**20.06**	**20.35**

Notes:

[1] Appendix E - Geddes Brook and Floodplain Restoration Design 100% Design Report (Parsons 2013). Includes the open water channel of Geddes Brook.

[2] Appendix D- 2017 Annual Report (Parsons 2020b). Geddes Brook acreage includes the open water channel of Geddes Brook. Ninemile Creek Reach CD includes aquatic bed.

[3] Calculated from Wetland/Floodplain Assessment, NMC and Lower Reach of Geddes Brook 2009, Figures 8 and E-8 (TES 2009). Includes the open water channel of Outfall 019.

[4] Appendix D- 2017 Annual Report (Parsons 2020b). Includes the open water channel of Outfall 019.

[5] Appendix E - Ninemile Creek 100% Design Report Reaches BC and AB (Parsons 2011).

[6] Appendix F- 2019 Annual Report (Parsons 2021b).

[7] Appendix C- 2018 Annual Report (Parsons 2021a).

Table 3: Summary of LCP/GB/NMC Post-Remedy Sampling (2013-2020)

Matrix	Parameter		2013				2014				2015				2016				2017				2018				2019				2020			
			GB	NMC	SYW 10	LCP OU1	GB	NMC	SYW 10	LCP OU1	GB	NMC	SYW 10	LCP OU1	GB	NMC	SYW 10	LCP OU1	GB	NMC	SYW 10	LCP OU1	GB	NMC	SYW 10	LCP OU1	GB	NMC	SYW 10	LCP OU1	GB	NMC	SYW 10	LCP OU1
Sport Fish	Total Hg PCBs and PCDD/Fs PCBs	(♦) (●) (*)										♦ ●				♦ *				♦ ●								♦ ●						
Prey Fish	Total Hg PCBs and PCDD/Fs PCBs	(♦) (●) (*)	♦				♦					♦ ●		♦	♦	♦ *			♦	♦ ●		♦				♦	♦	♦ ●						
Benthic Invertebrates	Total Hg and MeHg	(■)	■				■								■	■			■															
Earthworms	Total Hg and MeHg	(■)	■				■						■		■	■	■		■						■									
Small Mammals	Total Hg Total Hg and MeHg	(♦) (■)	■				■						♦		■	♦	♦		■						♦									
Surface Water	Total Dissolved Hg Total Hg and MeHg	(◊) (■)	■ ◊				■ ◊			■ ◊	■ ◊	■ ◊		■ ◊	■ ◊	■ ◊		■ ◊	■ ◊	■ ◊		■ ◊				■ ◊	■ ◊			■ ◊				■ ◊
Soil/Sediment Sampling	Total Hg and MeHg	(■)	■				■			■	■		■	■	■	■	■	■	■			■		■	■	■				■				■
Groundwater Quality	Total Hg	(♦)				♦				♦				♦				♦				♦				♦				♦				♦

Notes:

1. Post-remedy sampling from 2013 to 2020 is based on the 2017 GBNMC FYR Report, 2020 LCP Bridge Street subsite FYR Report, GBNMC/LCP Bridge Street subsite M&M Annual Reports for 2017, 2018, and 2019, and GBNMC/LCP Bridge Street subsite 2020 Sampling Scope.

2. GB IRM remedial construction completed in 2012. SYW-10 remedial construction completed in 2013 and restoration in 2014. NMC remedial construction completed in 2014 and restoration in 2015.

3. For fish samples, PCBs, dioxins/furans (PCDD/PCDFs), and lipids are a subset of the mercury samples.

4. For LCP Bridges Street Subsite and GB post-remedy sampling, surface water was sampled during low-flow events each year that samples were collected. For NMC post-remedy sampling, surface water was sampled in two events each year (one low flow and one high flow) that samples were collected.

5. Groundwater data collected quarterly at LCP at 4 exterior piezometer locations downgradient of slurry wall and 3 interior monitoring wells.

6. Sampling events shown in blue represent data that were reported in the 2017 GBNMC FYR Report or the 2020 LCP Bridge Street Subsite FYR Report. These data are also discussed in the 2022 GBNMC - LCP Bridge Street FYR Report along with the subsequent data to support the evaluation of the more recent results and provide additional context.

7. Data for the 2019 fish sampling events (shown in red) were determined not to be usable. It is anticipated that fish monitoring will be conducted in 2022.

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TABLE 4: AVERAGE LCP SURFACE WATER ANALYTICAL RESULTS 2014-2020

Location	Baseline Results[2,3]						October 2014						September 2015					
	Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury	
	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]
Remedial Goal	*None*		*None*		*2.6 ng/L* [1]													
West Flume																		
LCP1-SW-60	9050 (Max)		19 (Max)		2,252 (Max)		6.90		0.16		0.25	J	3.81		0.15		0.78	
LCP1-SW-61							3.10		0.09	J	3.20		12.70		0.17		1.01	
LCP1-SW-62							3.50		0.21		1.90		8.30		0.17		0.64	
LCP1-SW-63							3.50		0.05	J	2.00		4.33		0.11		0.72	
Average	**6042**		**12**		**1,285**		**4.25**		**0.13**		**1.84**		**7.29**		**0.15**		**0.79**	
Wetland A																		
LCP1-SW-67	104,904 (Max)		420 (Max)		2,838 (Max)		1.20		0.03	U	0.56	J	23.50		4.90		2.60	
LCP1-SW-68							2.80		0.03	U	1.40		8.94		4.20		4.60	
Average	**59404**		**144**		**1,998**		**2.00**		**0.02**		**0.98**		**16.22**		**4.55**		**3.60**	
Wetland C																		
LCP1-SW-69	104,904 (Max)		420 (Max)		2,838 (Max)		1.40		0.13		0.42	J	5.38		0.44		0.69	
LCP1-SW-70							6.00		0.30		1.50		16.60		0.91		0.59	
LCP1-SW-71							12.80/7.60[6]	J	0.32/0.29[6]		2.00/1.50[6]		16.80/11.70[6]	J	0.98/1.09[6]		0.78/0.64[6]	
Average	**59404**		**144**		**1,998**		**5.87**		**0.25**		**1.22**		**12.08**		**0.79**		**0.66**	

Location	November 2016						October 2017						October 2018					
	Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury	
	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]
West Flume																		
LCP1-SW-60	39.80		0.21	J+	1.52		10.40		0.10		0.85		8.21		0.21		1.16	
LCP1-SW-61	19.30		0.23	J+	1.77		28.30		0.11		1.19		21.00		0.20		1.41	
LCP1-SW-62	8.42		0.11	J+	1.87		5.02		0.11		0.55		15.90		0.16		1.11	
LCP1-SW-63	2.75		0.08	J+	0.81		2.16		0.09		0.39	J	3.12		0.12		0.79	
Average	**17.57**		**0.16**	**J+**	**1.49**		**11.47**		**0.10**		**0.75**		**12.06**		**0.17**		**1.12**	
Wetland A																		
LCP1-SW-67	8.84		3.07	J+	5.35		6.17		2.42		3.45		5.91		1.05		3.88	
LCP1-SW-68	23.90		3.94	J+	6.95		27.40		7.27		8.68		12.70		1.32		5.71	
Average	**16.37**		**3.51**	**J+**	**6.15**		**16.79**		**4.85**		**6.07**		**9.31**		**1.19**		**4.80**	
Wetland C																		
LCP1-SW-69	6.32		0.27	J+	0.94		3.06		0.03	U	0.63		4.01		0.13		0.99	
LCP1-SW-70	16.00		0.24	J+	3.64		10.30		0.33		0.78		5.01		0.14		1.31	
LCP1-SW-71	16.90/21.30[6]		0.28/0.21[6]	J+	3.55/3.78[6]		16.00/15.90[6]		0.36/0.39[6]		0.77/0.87[6]		55.00/7.98[6]	J	0.22/0.21[6]		1.11/1.27[6]	
Average	**13.81**		**0.25**	**J+**	**2.75**		**9.77**		**0.14**		**0.74**		**13.50**		**0.16**		**1.16**	
West Ditch																		
LCP1-SED-10[7]	NA		NA		NA		NA		NA		NA		7.48/12.4[6]	J	1.15/1.20[6]		0.64/0.62[6]	

[1]Remedial Goal for the protection of wildlife.

[2] Baseline results are from Table 4.2-1 of the Remedial Investigation (NYSDEC & TAMS, 1998).

[3]Wetlands A and C were created following the remedy so the baseline results are for Ponded/Wetland Areas sampled during the Remedial Investigation.

[4] J: Result is considered an estimate; J+: Result is considered estimated biased high at the value given; U: Not detected; R: Unusable value.

[5] For individual non-detects (U), ND=1/2 the MDL was used in calculations.

[6] Field Duplicate are averaged together for all calculations

[7] Part of the 2018 supplemental sampling

[8] Per recommendations made in the 2018 Annual Report, samples were not collected in the West Flume and Wetland C in 2019 and 2020

[9] Per recommendations made in the 2018 and 2019 Annual Reports, location LCP-SED-110 was also sampled in 2019 and 2020

NA: Not analyzed

TABLE 4: AVERAGE LCP SURFACE WATER ANALYTICAL RESULTS 2014-2020 (CONTINUED)

Location	November 2019						December 2020					
	Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury	
	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[4,5]	Result ng/L	Qualifier[14,5]	Result ng/L	Qualifier[4,5]
Wetland A[8]												
LCP1-SW-67	4.65/5.03[6]		1.94/1.37[6]		R/3.58[6]	R/J	8.34/5.80[6]	J	0.75/0.56[6]		5.32/5.03[6]	
LCP1-SW-68	11.10		1.37		3.33		32.40	J	4.25	J	4.06	
LCP1-SED-110[9]	6.10		0.70	J	5.59	J	15.10		0.14		2.14	
Average	**7.35**		**1.24**		**4.17**		**18.19**		**1.68**		**3.79**	

[1]Remedial Goal for the protection of wildlife.

[2] Baseline results are from Table 4.2-1 of the Remedial Investigation (NYSDEC & TAMS, 1998).

[3]Wetlands A and C were created following the remedy so the baseline results are for Ponded/Wetland Areas sampled during the Remedial Investigation.

[4] J: Result is considered an estimate; J+: Result is considered estimated biased high at the value given; U: Not detected; R: Unusable value.

[5] For individual non-detects (U), ND=1/2 the MDL was used in calculations.

[6] Field Duplicate are averaged together for all calculations

[7] Part of the 2018 supplemental sampling

[8] Per recommendations made in the 2018 Annual Report, samples were not collected in the West Flume and Wetland C in 2019 and 2020

[9] Per recommendations made in the 2018 and 2019 Annual Reports, location LCP-SED-110 was also sampled in 2019 and 2020

NA: Not analyzed

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TABLE 5 LCP SEDIMENT ANALYTICAL RESULTS 2014-2020

Site Goal [1]	Total Mercury		Methylmercury	
	0.8		*None*	

Location	Baseline Results[2,8]				October 2014[9]			
	Total Mercury		Methylmercury		Total Mercury		Methylmercury	
	Result mg/kg	Qualifier[3]	Result ug/kg	Qualifier[3]	Result mg/kg	Qualifier[3]	Result ug/kg	Qualifier[3]
West Flume								
LCP1-SW-60	Max (48)		Max (11)		0.97	J	0.49	J
LCP1-SW-61					0.42		1.62	
LCP1-SW-62					0.42	J	1.46	J
LCP1-SW-63					0.12		0.36	J
Average	**33**		**9.0**		**0.48**		**0.98**	
Wetland A [4]								
LCP1-SW-67	Max (131)		Max (74)		0.23		1.24	
LCP1-SW-68					1.60		1.75	
Average	**18**		**22**		**0.92**		**1.50**	
Wetland C [4]								
LCP1-SW-69	Max (131)		Max (74)		0.12		1.30	
LCP1-SW-70					0.14		1.71	
LCP1-SW-71					0.26/0.31[5]		0.87/1.16[5]	
Average	**18**		**22**		**0.18**		**1.34**	

Location	September 2015[9]				November 2016[9]			
	Total Mercury		Methylmercury		Total Mercury		Methylmercury	
	Result mg/kg	Qualifier[3]	Result ug/kg	Qualifier[3]	Result mg/kg	Qualifier[3]	Result ug/kg	Qualifier[3]
West Flume								
LCP1-SW-60	0.69	J	1.16	J	0.47		1.87	J
LCP1-SW-61	0.14	J	0.99		0.40		1.96	
LCP1-SW-62	0.31	J	1.30	J	0.21		1.41	
LCP1-SW-63	0.05	J	0.26		0.08	J	0.34	
Average	**0.30**		**0.93**		**0.29**		**1.40**	
Wetland A								
LCP1-SW-67	0.26	J	0.95		0.43		3.37	
LCP1-SW-68	1.57		10.20		2.04		6.48	
Average	**0.92**		**5.57**		**1.24**		**4.93**	
Wetland C								
LCP1-SW-69	0.07	J	1.30		0.04	J	1.46	
LCP1-SW-70	0.13	J	1.86		0.20		2.43	
LCP1-SW-71	0.18/0.16[5]	J	3.16/1.65[5]	J	0.34/0.23[5]		2.32/2.55[5]	
Average	**0.13**		**1.86**		**0.18**		**2.11**	

[1] There are no long-term sediment goals established in the LCP OU-1 ROD or OM&M Plan. The site specific background sediment concentration identified in the ROD was 0.2 mg/kg. Downstream Ninemile Creek Site goal of 0.8 mg/kg (mercury in sediments for the protection of wildlife consumption of fish) used as benchmark for evaluating the LCP OU-1 sediment results.

[2] Baseline results are from Table 4.2-4 of the Remedial Investigation (NYSDEC & TAMS, 1998).

[3] J: Result is considered an estimate; U: Not detected.

[4] Wetlands A and C were created following the remedy so the baseline results are for all "Ponded/Wetland Areas" sampled during the Remedial Investigation.

[5] Field Duplicate are averaged together for all calculations.

[6] Per recommendations made in the Draft 2018 Annual Report, samples were not collected in the West Flume and Wetland C in 2019 and 2020.

[7] Per recommendations made in the Draft 2018 and Draft 2019 Annual Reports, location LCP-SED-110 was also sampled in 2019 and 2020.

[8] Sample depths: range from both 0.0' - 0.5' and 0.5' - 2.0'

[9] Sample depth: 0.0' - 0.5'

TABLE 5 LCP SEDIMENT ANALYTICAL RESULTS 2014-2020 (CONTINUED)

Location	October 2017[9]						October 2018[9]					
	Total Mercury		Methylmercury		TOC by Lloyd Kahn		Total Mercury		Methylmercury		TOC by Lloyd Kahn	
	Result mg/kg	Qualifier[3]	Result ug/kg	Qualifier[3]	Result mg/kg	Qualifier[3]	Result mg/kg	Qualifier[3]	Result ug/kg	Qualifier[3]	Result mg/kg	Qualifier[3]
West Flume												
LCP1-SW-60	0.51	J	3.08	J	60700.0	J	0.08	UJ	1.73	J	49300.0	
LCP1-SW-61	0.38		0.89		40900.0	J	0.10	J	1.26		52200.0	
LCP1-SW-62	0.56	J	2.58	J	80700.0	J	0.19	J	1.91	J	48500.0	
LCP1-SW-63	0.06	J	0.10		68000.0	J	0.10	J	0.26	J	99200.0	
Average	**0.38**		**1.66**		**62575.0**		**0.12**		**1.29**		**62300.0**	
Wetland A												
LCP1-SW-67	0.28		1.63		14000.0	J	0.22		2.54		37900.0	
LCP1-SW-68	5.25		8.72		16000.0	J	3.43		7.22		37700.0	
Average	**2.76**		**5.18**		**15000.0**		**1.83**		**4.88**		**37800.0**	
Wetland C												
LCP1-SW-69	0.03	J	1.32		11400	J	0.05	J	0.42	J	15100	
LCP1-SW-70	0.13	J	2.58		41300		0.06	J	1.61		32900	
LCP1-SW-71	0.57/0.27[5]	J	2.34/1.55[5]		29300.0/16800.0	J	0.32/0.11[5]	J	0.18/1.41[5]	J	57800/14300[5]	J
Average	**0.19**		**1.9**		**25250.0**		**0.11**		**0.94**		**28017**	

Location[6]	November 2019[9]						December 2020[9]					
	Total Mercury		Methylmercury		TOC by Lloyd Kahn		Total Mercury		Methylmercury		TOC by Lloyd Kahn	
	Result mg/kg	Qualifier[3]	Result ug/kg	Qualifier[3]	Result mg/kg	Qualifier[3]	Result mg/kg	Qualifier[3]	Result ug/kg	Qualifier[3]	Result mg/kg	Qualifier[3]
Wetland A												
LCP1-SW-67	0.211/0.184[5]		0.155/0.797[5]	J	15700/13900[5]		0.38/0.4[5]		1.07/1.73[5]		9500/10000[5]	
LCP1-SW-68	0.98		1.63		17000		1.90		2.51	J	19000	
LCP1-SED-110[7]	0.28		1.20		25400		0.30		0.38	J	14000	
Average	**0.49**		**1.10**		**19067**		**0.86**		**1.43**		**14250**	

[1] There are no long-term sediment goals established in the LCP OU-1 ROD or OM&M Plan. The site specific background sediment concentration identified in the ROD was 0.2 mg/kg. Downstream Ninemile Creek Site goal of 0.8 mg/kg (mercury in sediments for the protection of wildlife consumption of fish) used as benchmark for evalutating the LCP OU-1 sediment results.

[2] Baseline results are from Table 4.2-4 of the Remedial Investigation (NYSDEC & TAMS, 1998).

[3] J: Result is considered an estimate; U: not detected

4 Wetlands A and C were created following the rememdy so the baseline results are for all "Ponded/Wetland Areas" sampled during Remedial Investigation.

[5] Field Duplicate are averaged together for all calculations.

[6] Per recommendations made in the Draft 2018 Annual Report, samples were not collected in the West Flume and Wetland C in 2019 and 2020.

[7] Per recommendations made in the Draft 2018 and Draft 2019 Annual Reports, location LCP-SED-110 was also sampled in 2019 and 2020.

[8] Sample depths: average from both 0.0' - 0.5' and 0.5' - 2.0'

[9] Sample depth: 0.0' - 0.5'

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TABLE 6 - LCP SEDIMENT RESULTS FROM SUPPLEMENTAL SAMPLING CONDUCTED IN 2018

Location	October 2018	
	Total Mercury	
	Result mg/kg	Qualifier[1]
LCP1-SED-96	0.86	J
LCP1-SED-97	0.13	J
LCP1-SED-98	0.21	J
LCP1-SED-98 (Field Dup)	0.22	
LCP1-SED-99	0.11	J
LCP1-SED-100	0.25	J
LCP1-SED-101A	0.38	J
LCP1-SED-102	0.21	J
LCP1-SED-103	0.08	J
LCP1-SED-110	0.24	
LCP1-SED-113	0.46	
LCP1-SED-116	0.12	J
LCP1-SED-117	0.85	
LCP1-SED-118	3.37	
LCP1-SED-119	5.92	
LCP1-SED-120	0.25	
LCP1-SED-121	1.29	
LCP1-SED-122	0.07	J
LCP1-SED-123	0.15	J
LCP1-SED-124	3.56	
LCP1-SED-125	0.16	J
LCP1-SED-126	0.08	J
LCP1-SED-127	0.59	J
LCP1-SED-128	3.75	
LCP1-SS-120	0.18	J
LCP1-SW-67	0.23	
LCP1-SW-68	2.26	

[1]J: Result is considered an estimate.

TABLE 7a LCP SEDIMENT RESULTS FROM SUPPLEMENTAL SAMPLING CONDUCTED IN 2020

Location	October 2020		
	Depth Interval (ft)	Total Mercury	
		Result mg/kg	Qualifier[1]
LCP1-SB-01	0 - 0.5	1.8	
	0.5 - 1.0	3.0	
	1.0 - 1.5	NA	
LCP1-SB-02	0 - 0.5	2	
	0.5 - 1.0	2.4	
	1.0 - 1.5	NA	
LCP1-SB-02 (Field Dup)	0 - 0.5	1.9	
	0.5 - 1.0	2.3	
	1.0 - 1.5	NA	
LCP1-SB-03	0 - 0.5	2.8	
	0.5 - 1	4.6	
	1.0 - 1.5	NA	
LCP1-SED-96	0 - 0.5	0.63	
	0.5 - 1.0	0.28	
	1.0 - 1.5	0.42	
LCP1-SED-97	0 - 0.5	0.34	
	0.5 - 1.0	0.21	
	1.0 - 1.5	0.17	
LCP1-SED-110	0 - 0.5	0.30	
	0.5 - 1.0	0.12	
	1.0 - 1.5	0.10	
LCP1-SED-113	0 - 0.5	0.50	
	0.5 - 1.0	0.40	
	1.0 - 1.5	1.1	
LCP1-SED-116	0 - 0.5	0.12	
	0.5 - 1.0	0.15	
	1.0 - 1.5	NA	
LCP1-SED-117	0 - 0.5	0.42	
	0.5 - 1.0	1.4	
	1.0 - 1.5	NA	
LCP1-SED-118	0 - 0.5	5.7	
	0.5 - 1.0	1.3	
	1.0 - 1.5	NA	
LCP1-SED-119	0 - 0.5	5.7	
	0.5 - 1.0	1.3	
	1.0 - 1.5	0.51	
LCP1-SED-119 (Field Dup)	0 - 0.5	8.9	
	0.5 - 1.0	1.9	
	1.0 - 1.5	0.53	
LCP1-SED-120	0 - 0.5	0.39	J
	0.5 - 1.0	0.78	
	1.0 - 1.5	0.53	
LCP1-SED-121	0 - 0.5	1.7	
	0.5 - 1.0	0.13	
	1.0 - 1.5	0.11	
LCP1-SED-122	0 - 0.5	0.10	
	0.5 - 1.0	0.088	
	1.0 - 1.5	0.11	
LCP1-SED-123	0 - 0.5	0.13	
	0.5 - 1.0	0.14	
	1.0 - 1.5	0.19	
LCP1-SED-123 (Field Dup)	0 - 0.5	0.13	
	0.5 - 1.0	0.12	
	1.0 - 1.5	0.26	
LCP1-SED-124	0 - 0.5	4	
	0.5 - 1.0	2.6	
	1.0 - 1.5	1.8	
LCP1-SED-125	0 - 0.5	0.16	
	0.5 - 1.0	0.19	
	1.0 - 1.5	0.083	

1J: Result is considered an estimate. U: Not detected.

TABLE 7a LCP SEDIMENT RESULTS FROM SUPPLEMENTAL SAMPLING CONDUCTED IN 2020

Location	October 2020		
	Depth Interval	Total Mercury	
		Result mg/kg	Qualifier[1]
LCP1-SED-125 (Field Dup)	0 - 0.5	0.18	
	0.5 - 1.0	0.17	
	1.0 - 1.5	0.088	
LCP1-SED-126	0 - 0.5	0.32	
	0.5 - 1.0	0.09	
	1.0 - 1.5	0.052	J
LCP1-SED-127	0 - 0.5	0.26	
	0.5 - 1.0	0.22	
	1.0 - 1.5	0.21	
LCP1-SED-128	0 - 0.5	1.6	
	0.5 - 1.0	1.4	
	1.0 - 1.5	1.4	
LCP1-SED-129	0 - 0.5	5.8	
	0.5 - 1.0	0.29	
	1.0 - 1.5	0.39	
LCP1-SED-130	0 - 0.5	1.7	J
	0.5 - 1.0	0.78	
	1.0 - 1.5	0.42	
LCP1-SED-131	0 - 0.5	1.9	
	0.5 - 1.0	1.6	
	1.0 - 1.5	NA	
LCP1-SED-132	0 - 0.5	7.5	
	0.5 - 1.0	2.7	
	1.0 - 1.5	3.4	
LCP1-SED-133	0 - 0.5	14	
	0.5 - 1.0	2.3	
	1.0 - 1.5	2.2	
LCP1-SED-134	0 - 0.5	9.2	
	0.5 - 1.0	1.1	
	1.0 - 1.5	0.69	
LCP1-SW-67	0 - 0.5	1	
	0.5 - 1.0	0.23	
	1.0 - 1.5	0.17	
LCP1-SW-68	0 - 0.5	3.6	
	0.5 - 1.0	4	J
	1.0 - 1.5	2.3	J

[1]J: Result is considered an estimate. U: Not detected.

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TABLE 7b LCP SOIL RESULTS FROM SUPPLEMENTAL SAMPLING CONDUCTED IN 2021

Location	July 2021		
	Depth Interval (ft)	Total Mercury	
		Result mg/kg	Qualifier[1]
LCP1-SB-04	0 - 0.5	41	
	0.5 - 1.0	9.6/1.6	J
	1.0 - 2	16	J
LCP1-SB-05	0 - 0.5	65	
	0.5 - 1.0	15	
	1.0 - 2	1.7	
LCP1-SB-06	0 - 0.5	24	
	0.5 - 1.0	9.2	
	1.0 - 2	4.6	
LCP1-SB-07	0 - 0.5	30	
	0.5 - 1.0	11	
	1.0 - 2	1.5	
LCP1-SB-08	0 - 0.5	11	
	0.5 - 1.0	5.9	
	1.0 - 2	8.2	
LCP1-SB-09	0 - 0.5	65	
	0.5 - 1.0	0.4	
	1.0 - 2	6.9	
LCP1-SB-10	0 - 0.5	23	
	0.5 - 1.0	0.29	
	1.0 - 2	4.3	
LCP1-SB-11	0 - 0.5	24	
	0.5 - 1.0	0.32	
	1.0 - 2	1.9	

[1]J: Result is considered an estimate. U: Not detected.

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TABLE 8 SUMMARY OF LCP FISH TISSUE CHEMICAL CONCENTRATIONS: PREY FISH WHOLE BODY (2008-2018)

Taxon	Chemical Name	Year	Sample Size	Number of Detections	Mean[1]	Min	Max	95% UCL Value[1]	95% UCL Calculation Type
Small Prey Fish	Mercury [2] (mg/kg)	1995 (Remedial Investigation)			0.82				
		2005 (Baseline)	15	15	0.14	0.02	0.38	0.18	95% Student's-t UCL
		2008	15	15	0.28	0.15	0.52	0.32	95% Student's-t UCL
		2009	15	15	0.20	0.071	0.41	0.25	95% Student's-t UCL
		2010	15	15	0.20	0.10	0.29	0.23	95% Student's-t UCL
		2011	15	15	0.25	0.092	0.35	0.28	95% Student's-t UCL
		2012	14	14	0.18	0.086	0.33	0.22	95% Student's-t UCL
		2015	15	14	0.041	0.012	0.11	0.052	95% KM (t) UCL
		2017	15	12	0.11	0.051	0.17	0.12	95% KM (t) UCL
		2018	15	15	0.066	0.034	0.12	0.077	95% Student's-t UCL

Notes:

1. Mean and 95% UCL were calculated using ProUCL version 5.1 and were not calculated when 3 or fewer results were detects (USEPA 2015). 95% UCL is an estimate of the upper bound for the true population mean. For data sets with NDs, the stated statistical method was used for handling NDs rather than the substitution method (i.e., one-half of the detection/reporting limit).
2. There are no long-term prey fish goals established in the LCP OU-1 ROD or OM&M Plan. Geddes Brook and Ninemile Creek prey fish goal of 0.1 mg/kg for the protection of ecological receptors is used as benchmark for evaluating the LCP OU-1 prey fish results.

Abbreviations:

KM: Kaplan-Meier

mg/kg: milligrams per kilogram

ND: non-detect

UCL: upper confidence limit

Reference:

USEPA, 2015. ProUCL Version 5.1 User Guide. EPA/600/R-07/041 https://www.epa.gov/sites/production/files/2016-05/documents/proucl_5.1_user-guide.pdf Accessed May 22, 2020.

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TABLE 9 LCP PIEZOMETER ANALYTICAL RESULTS 2014-2020

Location	1st Quarter (March) 2014		2nd Quarter (April) 2014		3rd Quarter (September) 2014		4th Quarter (November) 2014	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]
PZ-1B-S	Note 3		Note 3		ND (0.038)	U	0.038	J
PZ-1B-I	ND (0.038)	U	ND (0.038)	U	ND (0.038)	U	ND (0.038)	U
PZ-1B-D	ND (0.038/0.038)[4]	U	ND (0.038/0.038)[4]	U	ND (0.038/0.038)[4]	U	ND (0.038/0.038)[4]	U
PZ-2B-S	1.8		1.7		1.4		1.5	
PZ-2B-I	0.063	J	ND (0.038)	U	ND (0.038)	U	0.076	J
PZ-2B-D	ND (0.038)	U	ND (0.038)	U	ND (0.038)	U	ND (0.038)	U
PZ-3B-S	Note 3		ND (0.038)	U	ND (0.038)	U	ND (0.038)	U
PZ-3B-I	ND (0.038)	U	ND (0.038)	U	ND (0.038)	U	0.041	J
PZ-3B-D	ND (0.038)	U	ND (0.038)	U	ND (0.038)	U	ND (0.038)	U
PZ-4B-S	Note 3		Note 3		ND (0.038)	U	Note 3	
PZ-4B-I	ND (0.038)	U	0.043	J	ND (0.038)	U	ND (0.038)	U
PZ-4B-D	ND (0.038)	U	ND (0.038)	U	ND (0.038)	U	ND (0.038)	U
Location	1st Quarter (March) 2015		2nd Quarter 2015		3rd Quarter 2015		4th Quarter (October) 2015	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]
PZ-1B-S	Note 3		Note 5		Note 5		ND (0.12)	U
PZ-1B-I	ND (0.038)	U	Note 5		Note 5		ND (0.12)	U
PZ-1B-D	ND (0.038/0.038)[4]	U	Note 5		Note 5		ND (0.12/0.12)[4]	U
PZ-2B-S	1.9		Note 5		Note 5		1.9	
PZ-2B-I	ND (0.038)	U			Note 5		ND (0.12)	U
PZ-2B-D	ND (0.038)	U	Note 5		Note 5		ND (0.12)	U
PZ-3B-S	Note 3		Note 5		Note 5		ND (0.12)	U
PZ-3B-I	0.058	J	Note 5		Note 5		ND (0.12)	U
PZ-3B-D	ND (0.038)	U	Note 5		Note 5		ND (0.12)	U
PZ-4B-S	Note 3	U	Note 5		Note 5		ND (0.12)	U
PZ-4B-I	0.046	J	Note 5		Note 5		ND (0.12)	U
PZ-4B-D	ND (0.038)	U	Note 5		Note 5		ND (0.12)	U
Location	1st Quarter (March) 2016		2nd Quarter (June) 2016		3rd Quarter (August) 2016		4th Quarter (October) 2016	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]
PZ-1B-S	ND (0.052)	U	Note 3		Note 3		Note 3	
PZ-1B-I	ND (0.052)	U	ND (0.052)	U	ND (0.052)	U	ND (0.052)	U
PZ-1B-D	ND (0.052/0.052)[4]	U	ND (0.052/0.052)[4]	U	ND (0.052/0.052)[4]	U	ND (0.052/0.052)[4]	U
PZ-2B-S	1.8		1.5		1.5		1.8	
PZ-2B-I	0.150	J	ND (0.2)	U	0.094	J	ND (0.052)	U
PZ-2B-D	ND (0.052)	U	ND (0.052)	U	ND (0.052)	U	ND (0.052)	U
PZ-3B-S	Note 3		0.058	J	ND (0.052)	U	ND (0.052)	U
PZ-3B-I	0.079	J	ND (0.2)	U	0.080	J	ND (0.052)	U
PZ-3B-D	ND (0.052)	U	ND (0.052)	U	ND (0.052)	U	ND (0.052)	U
PZ-4B-S	Note 3		0.053	J	ND (0.052)	U	ND (0.052)	U
PZ-4B-I	ND (0.052)	U	0.080	J	ND (0.052)	U	ND (0.052)	U
PZ-4B-D	0.063	J	ND (0.052)	U	ND (0.052)	U	ND (0.052)	U
Location	1st Quarter (March) 2017		2nd Quarter (June) 2017		3rd Quarter (August) 2017		4th Quarter (October) 2017	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]
PZ-1B-S	ND (0.065)	U	ND (0.12)	U	ND (0.065)	U	ND (0.083)	U
PZ-1B-I	ND (0.065)	UJ	ND (0.12)	U	ND (0.065)	U	ND (0.083)	U
PZ-1B-D	ND (0.065/0.065)[4]	UJ	ND (0.12/0.12)[4]	U	ND (0.065/0.065)[4]	U	ND (0.083/0.083)[4]	U
PZ-2B-S	1.2		1.4		1.7		2.1	
PZ-2B-I	ND (0.065)	UJ	ND (0.12)	U	ND (0.065)	U	ND (0.083)	U
PZ-2B-D	ND (0.065)	UJ	ND (0.12)	U	ND (0.065)	U	ND (0.083)	U
PZ-3B-S	ND (0.065)	U	ND (0.12)	U	ND (0.065)	U	ND (0.083)	U
PZ-3B-I	0.077	J	ND (0.12)	U	ND (0.065)	U	0.25	J
PZ-3B-D	ND (0.065)	UJ	ND (0.12)	U	ND (0.065)	U	ND (0.083)	U
PZ-4B-S	ND (0.065)	U	ND (0.12)	U	ND (0.065)	U	ND (0.083)	U
PZ-4B-I	ND (0.065)	UJ	ND (0.12)	U	ND (0.065)	U	0.26	J
PZ-4B-D	ND (0.065)	UJ	ND (0.12)	U	ND (0.065)	U	ND (0.083)	U

[1] J: Result is considered an estimate. U: Not detected.

[2] ND: Non-Detect, method detection limit shown in parenthesis.

[3] Not sampled due to low water level.

[4] Field Duplicate are averaged together for all calculations.

[5] Not sampled due to construction activities on the Landfill

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TABLE 9 LCP PIEZOMETER ANALYTICAL RESULTS 2014-2020

Location	1st Quarter (February) 2018		2nd Quarter (May) 2018		3rd Quarter (August) 2018		4th Quarter (October) 2018	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]
PZ-1B-S	ND (0.083)	U	ND (0.13)	U	ND (0.095)	U	ND (0.095)	U
PZ-1B-I	ND (0.083)	U	ND (0.13)	U	ND (0.095)	U	ND (0.095)	U
PZ-1B-D	ND (0.083/0.083)[4]	U	ND (0.13/0.13)[4]	U	ND (0.095/0.095)[4]	U	ND (0.095/0.095)[4]	U
PZ-2B-S	2.0		2.0		2.1		2.5	
PZ-2B-I	ND (0.083)	U	ND (0.13)	U	ND (0.095)	U	0.098	J
PZ-2B-D	ND (0.083)	U	ND (0.13)	U	ND (0.095)	U	ND (0.092)	U
PZ-3B-S	ND (0.083)	U	ND (0.13)	U	ND (0.095)	U	ND (0.095)	U
PZ-3B-I	0.25	U	ND (0.4)	U	0.11	J	ND (0.190)	U
PZ-3B-D	ND (0.083)	U	ND (0.13)	U	ND (0.095)	U	ND (0.092)	U
PZ-4B-S	ND (0.083)	U	ND (0.13)	U	ND (0.095)	U	ND (0.095)	U
PZ-4B-I	ND (0.083)	U	ND (0.13)	U	ND (0.095)	U	ND (0.095)	U
PZ-4B-D	ND (0.083)	U	ND (0.13)	U	ND (0.095)	U	ND (0.095)	U

Location	1st Quarter (March) 2019		2nd Quarter (May) 2019		3rd Quarter (August) 2019		4th Quarter (October) 2019	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]
PZ-1B-S	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-1B-I	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-1B-D	ND (0.095/0.095)[4]	U	ND (0.095/0.095)[4]	U	ND (0.095/0.095)[4]	U	ND (0.095/0.095)[4]	U
PZ-2B-S	1.9		2		1.7		1.9	
PZ-2B-I	ND (0.095)	U	ND (0.095)	U	0.15	J	ND (0.095)	U
PZ-2B-D	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-3B-S	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-3B-I	0.1	J	0.12	J	0.15	J	ND (0.29)	U
PZ-3B-D	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-4B-S	ND (0.095)	U	ND (0.095)	U	0.11	J	ND (0.095)	U
PZ-4B-I	ND (0.095)	U	ND (0.095)	U	0.11	J	ND (0.095)	U
PZ-4B-D	0.13	J	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U

Location	1st Quarter (January) 2020		2nd Quarter (April) 2020		3rd Quarter (July) 2020		4th Quarter (October) 2020	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]	Result ug/L	Qualifier[1,2]
PZ-1B-S	ND (0.095)	U	0.13	J	ND (0.095)	U	ND (0.095)	U
PZ-1B-I	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-1B-D	ND (0.095/0.095)[4]	U	ND (0.095/0.095)[4]	U	ND (0.095/0.095)[4]	U	ND (0.095/0.095)[4]	U
PZ-2B-S	2.4		2.4		2.5		1.9	
PZ-2B-I	ND (0.095)	U	0.097	J	ND (0.095)	U	ND (0.095)	U
PZ-2B-D	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-3B-S	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-3B-I	0.098	J	0.15	J	0.095	J	0.11	J
PZ-3B-D	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-4B-S	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	0.16	J
PZ-4B-I	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U
PZ-4B-D	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U	ND (0.095)	U

[1] J: Result is considered an estimate. U: Not detected.

[2] ND: Non-Detect, method detection limit shown in parenthesis.

[3] Not sampled due to low water level.

[4] Field Duplicate are averaged together for all calculations.

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TABLE 10 - LCP MONITORING WELL ANALYTICAL RESULTS 2014-2020

Location	1st Quarter 2014[1]		2nd Quarter 2014[1]		3rd Quarter 2014[1]		4th Quarter 2014[1]	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]
MW-34D	Not Sampled		Not Sampled		Not Sampled		Not Sampled	
MW-35D	Not Sampled		Not Sampled		Not Sampled		Not Sampled	
MW-36D	Not Sampled		Not Sampled		Not Sampled		Not Sampled	
Location	1st Quarter 2015[1]		2nd Quarter 2015[1]		3rd Quarter 2015[1]		4th Quarter 2015[1]	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]
MW-34D	Not Sampled		Not Sampled		Not Sampled		Not Sampled	
MW-35D	Not Sampled		Not Sampled		Not Sampled		Not Sampled	
MW-36D	Not Sampled		Not Sampled		Not Sampled		Not Sampled	
Location	1st Quarter (March) 2016		2nd Quarter (June) 2016		3rd Quarter (August) 2016		4th Quarter (October) 2016	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]
MW-34D	0.8	J	0.46		0.31		0.29	
MW-35D	3.7		3.8		3.1		3.9	
MW-36D	3.9		1.0	J	1.2	J	1.1	
Location	1st Quarter (March) 2017		2nd Quarter (June) 2017		3rd Quarter (August) 2017		4th Quarter (October) 2017	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]
MW-34D	0.26		0.2		0.29		0.69	J
MW-35D	1.9		2.3		2.5		3.3	
MW-36D	1.4		1.3		1.0		1.7	
Location	1st Quarter (February) 2018		2nd Quarter (May) 2018		3rd Quarter (August) 2018		4th Quarter (October) 2018	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]
MW-34D	0.28	J	0.65		0.45		0.53	
MW-35D	2.5		3.6		3.5		3.5	
MW-36D	3.6		ND (0.13)	U	2.2		2.0	

[1] Not sampled due to ongoing construction activities

[2] J: Result is considered an estimate. U: Not detected.

[3] ND: Non-Detect, method detection limit shown in parenthesis.

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TABLE 10 - LCP MONITORING WELL ANALYTICAL RESULTS 2014-2020 (CONTINUED)

Location	1st Quarter (March) 2019		2nd Quarter (June) 2019		3rd Quarter (August) 2019		4th Quarter (October) 2019	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]
MW-34D	0.77		0.39		0.39		0.92	
MW-35D	3.5		4.9		4.2		3.5	
MW-36D	2.3		0.95		1.7		1.1	
Location	1st Quarter (February) 2020		2nd Quarter (April) 2020		3rd Quarter (July) 2020		4th Quarter (October) 2020	
	Mercury		Mercury		Mercury		Mercury	
	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]	Result ug/L	Qualifier[2,3]
MW-34D	0.4		0.63		0.59		0.33	
MW-35D	2.6		2.8		3.4		2.5	
MW-36D	0.7		1.6		1.3		2	

[1] Not sampled due to ongoing construction activities

[2] J: Result is considered an estimate. U: Not detected.

[3] ND: Non-Detect, method detection limit shown in parenthesis.

TABLE 11 AVERAGE GEDDES BROOK SURFACE WATER ANALYTICAL RESULTS 2013-2019

ROD Remedial Goals [1]	Total Mercury	Methylmercury	Dissolved Mercury
	None	*None*	*2.6 ng/L* [2]
	None	*None*	*0.7 ng/L* [3]

Location	Baseline Results[4]						October 2013						September 2014					
	Total Mercury		Methylmercury[5]		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury	
	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]
GB-SW-01WP	(2.7 to 89.4)		(0.08 to 1.83)		(0.6 to 2.88)		1.01/1.13		0.096/0.087	J	0.21/0.28	J	1.1		0.06	J	0.716	J
GB-SW-02WWL							1.79		0.17	J	0.38	J	1.2		0.23		0.856	J
GB-SW-03CGW							0.74		0.07	J	0.17	J	1.1		0.06	J	0.682	J
GB-SW-04GB							0.81		0.032	J	0.17	J	1.8		0.05	J	2.0	
GB-SW-05PW							0.15	J	0.026	UJ	0.15	J	2.3		0.33		0.664	J
GB-SW-06OF							1.2		0.07	J	0.38	J	0.755/0.701	J	0.05/0.04	J	1.1/0.6	J
Average[8,9]	**23.9**		**0.62**		**1.59**		**0.96**		**0.074**		**0.25/0.27[9]**		**1.37**		**0.13**		**0.96/1.02[9]**	

Location	September 2015						October 2016						October 2017					
	Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury	
	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]
GB-SW-01WP	1.84		0.101		0.19	J	0.5	U	0.026	U	0.50	U	0.55		0.125		0.14	J
GB-SW-02WWL	0.62		0.171		0.28	J	0.79		0.04	J	0.50	U	1.13		1.29		0.34	J
GB-SW-03CGW	1.19		0.143		0.41	J	0.50	U	0.026	U	0.50	U	1.54		0.525		1.14	
GB-SW-04GB	2.46		0.053		0.4	J	0.66		0.026	U	0.50	U	1.26		0.089		0.22	J
GB-SW-05PW	3.77		0.499		0.77		3.91		0.258		0.44	J	4.21		1.66		1.53	
GB-SW-06OF	0.42/0.33	J	0.026/0.026	U	0.2/0.17	J	0.56/0.68		0.064/0.089		0.5/0.5	U	1.24/1.7	J	0.249/0.169	J	0.26/0.28	J
Average[8,9]	**1.71**		**0.163**		**0.37/0.29[9]**		**1.10**		**0.069**		**0.28/0.25[9]**		**1.69**		**0.65**		**0.61/0.42[9]**	

Location	October 2019					
	Total Mercury		Methylmercury		Dissolved Mercury	
	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]	Result ng/L	Qualifier[6,7]
GB-SW-01WP	0.50	U	0.10	J	1.0	U
GB-SW-02WWL	0.50	U	0.12		0.08	U
GB-SW-03CGW	0.55	J	0.079		0.50	U
GB-SW-04GB	1.51		0.026	U	0.50	U
GB-SW-05PW	2.21		0.208		0.74	
GB-SW-06OF	0.86/0.79		0.239/0.097	J	0.51/0.45	J
Average[8,9]	**0.95**		**0.11**		**0.39/0.30[9]**	

[1] NYSDEC/United States Environmental Protection Agency, 2009.

[2] Remedial Goal for the protection of wildlife.

[3] Remedial Goal for the protection of human health based on consumption of fish.

[4] Values observed during 2010/2011 baseline sampling conducted during low flow and high flow conditions.

[5] Methylmercury was not analyzed for during 2010/2011 baseline sampling Data from Honeywell/PTI 1992 (NYSDEC, 2003).

[6] J: Result is considered an estimate; U: Not detected

[7] For individual non-detects, ND=1/2 the MDL was used in calculations.

[8] Field Duplicate are averaged together for all calculations

[9] The human health fish consumption goal for dissolved mercury concentrations (0.7 ng/L) does not apply to GB-SW-05PW, as it is located in the perched wetland and only intermittently contains standing water. Therefore, averages for dissolved mercury are displayed both with and without GB-SW-05PW.

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TABLE 12 - AVERAGE GEDDES BROOK SEDIMENT ANALYTICAL RESULTS 2013-2017

ROD Remedial Goals [1]	Total Mercury		Methylmercury									
	Note 2, 3		*None*									
Location	Baseline Results[4]				October 2013				September 2014			
	Total Mercury		Methylmercury		Total Mercury		Methylmercury		Total Mercury		Methylmercury	
	Result mg/kg	Qualifier[5,6]	Result ug/kg	Qualifier[5,6]	Result mg/kg	Qualifier[5,6]	Result ug/kg	Qualifier[5,6]	Result mg/kg	Qualifier[5,6]	Result ug/kg	Qualifier[5,6]
GB-SED-01WP	(0.8 to 14.2)		(0.3 to 8.7)		0.0399/0.0414	J	0.422/1.15	J	0.055			
GB-SED-02WWL					0.0647	J	0.953		0.034	J	0.43	J
GB-SED-03CGW					0.0279	J	0.097		0.025	J	0.12	J
GB-SED-04GB					0.0284	J	0.027	J	0.03	J	0.05	U
GB-SED-05PW					0.0341	J	0.031	J	0.095		0.71	
GB-SED-06OF					0.067	J	0.062	J	0.081/0.06		0.75/0.53	
Average[7]	**5.37**		**4.31**		**0.04379**		**0.326**		**0.052**		**0.39**	
Location	September 2015				October 2016				October 2017			
	Total Mercury		Methylmercury		Total Mercury		Methylmercury		Total Mercury		Methylmercury	
	Result mg/kg	Qualifier[5,6]	Result ug/kg	Qualifier[5,6]	Result mg/kg	Qualifier[5,6]	Result ug/kg	Qualifier[5,6]	Result mg/kg	Qualifier[5,6]	Result ug/kg	Qualifier[5,6]
GB-SW-01WP	0.0548	J	0.14		0.0216	J	1.44	J-	0.0348	J	0.091	
GB-SW-02WWL	0.0947	J	0.476	J	0.03	J	0.162		0.0512	J	0.203	
GB-SW-03CGW	0.0404	J	0.307		0.0135	J	0.061	J	0.0212	J	0.055	J
GB-SW-04GB	0.0465	J	0.019	U	0.0245	J	0.03	J	0.0399	J	0.028	J
GB-SW-05PW	0.0663	J	0.563		0.0304	J	0.236		0.0296	J	0.348	
GB-SW-06OF	0.0719/0.0749	J	0.714/1.11	J	0.0412/0.0492	J	0.468/0.528		0.0573/0.0582	J	0.517/0.807	
Average[7]	**0.0627**		**0.401**		**0.0275**		**0.405**		**0.0391**		**0.231**	

[1] NYSDEC/United States Environmental Protection Agency, 2009.

[2] As stated in the Response Action Document (RAD), "The remediation of the floodplain pursuant to this IRM will result in the removal of 100% of mercury above the sediment toxicity targets (0.15, 0.5, 1.3 and 2.0 mg/kg) in the sediment/soil located above the clay layer in the Geddes Brook floodplain."

[3] The BSQV for mercury in sediments for the protection of wildlife consumption of fish is 0.8 mg/kg and the BSQV for mercury in floodplain soils for protection of wildlife consumption of terrestrial invertebrates is 0.6 mg/kg on a surface-weighted- average basis.

[4] Baseline averages based on 2010/2011 Baseline Monitoring Program.

[5] J: Result is considered an estimate. U: Not detected. J-: Result is considered estimated biased low at the given value.

[6] For individual non-detects, ND=1/2 the MDL was used in calculations.

[7] Field Duplicate are averaged together for all calculations

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TABLE 13 - SUMMARY OF GEDDES BROOK FISH TISSUE CHEMICAL CONCENTRATIONS: PREY FISH WHOLE BODY (2013-2017)

Taxon	Chemical Name	Year	Sample Size	Number of Detections	Mean[1]	Min	Max	95% UCL Value[1]	95% UCL Calculation Type
Small Prey Fish	Mercury (mg/kg)	2010 (Baseline)	4	4	0.135	0.088	0.19	0.185	95% Student's-t UCL
		2013	15	15	0.083	0.042	0.17	0.10	95% Modified-t UCL
		2014	15	15	0.072	0.015	0.18	0.09	95% Student's-t UCL
		2016	15	15	0.058	0.015	0.19	0.09	95% Adjusted Gamma UCL
		2017	15	15	0.090	0.046	0.14	0.10	95% Student's-t UCL

Notes:
1. Mean and 95% UCL were calculated using ProUCL version 5.1 and were not calculated when 3 or fewer results were detects (USEPA 2015). 95% UCL is an estimate of the upper bound for the true population mean. For data sets with NDs, the stated statistical method was used for handling NDs rather than the substitution method (i.e., one-half of the detection/reporting limit).

Abbreviations:
mg/kg: milligrams per kilogram
ND: non-detect
UCL: upper confidence limit

Reference:
USEPA, 2015. ProUCL Version 5.1 User Guide. EPA/600/R-07/041 https://www.epa.gov/sites/production/files/2016-05/documents/proucl_5.1_user-guide.pdf

TABLE 14a: 2013 - 2017 GEDDES BROOK MACROINVERTEBRATE ANALYTICAL RESULTS

ROD Remedial	Total Mercury	Methylmercury
	None	*None*

Baseline[1]					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
01CH	0.11 / (0.021 to 0.030)		75.4 / (4.54 to 9.1)		Crayfish / Amphipod
01CH					
01CH					
02WP					
02WP					
02WP					
03OF					
03OF					
03OF					
Average	0.11/0.03		75.4/6.3		Crayfish/Amphipod

2013					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
01CH	0.0151	J	25	J	Crayfish
01CH	0.0409	J	70.3	J	Dragonfly Nymphs
01CH	0.0404	J	46.6	J	Dragonfly Nymphs
02WP	0.0418	J	61.3	J	Dragonfly Nymphs
02WP	0.0153	J	45.7	J	Dragonfly Nymphs
02WP	0.0555	J	78.5	J	Dragonfly Nymphs
03OF	0.0192	J	26.3	J	Amphipod
03OF	0.0296	J	45.1	J	Dragonfly Nymphs
03OF	0.0165	J	21.1	J	Dragonfly Nymphs
Average	0.0305		46.7		

2014					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
01CH	0.07		52.7		Crayfish
01CH	0.06		39.7		Crayfish
01CH	0.36		148		Dragonfly Nymphs
02WP	0.04		24.4		Crayfish
02WP	0.03		24.1		Crayfish
02WP	0.23		144		Dragonfly Nymphs
03OF	0.1		77.3		Dragonfly Nymphs
03OF	0.17		113		Dragonfly Nymphs
03OF	0.09		64.2		Crayfish
Average	0.13		76.4		

2016					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
01CH	0.0202	J	21.6		Dragonfly Nymphs
01CH	0.0218	J	24.7		Crayfish
01CH	0.0106	U	4.4		Amphipod
02WP	0.0171	J	11.5		Dragonfly Nymphs
02WP	0.0097	U	10.5		Dragonfly Nymphs
02WP	0.0102	J	9.6	J+	Damsel Fly
03OF	0.0136	J	18.2		Dragonfly Nymphs
03OF	0.0281	J	28.3		Crayfish
03OF	0.0189	J	11.5		Amphipod
Average	0.0156		15.6		

2017					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
01CH	0.0127	J	19.2		Crayfish
01CH	0.0126	J	16.7		Crayfish
01CH	0.0186	J	30.9		Dragonfly Nymphs
02WP	0.0098	U	11.7		Dragonfly Nymphs
02WP	0.0097	U	16.2		Dragonfly Nymphs
02WP	0.0095	U	15.7		Dragonfly Nymphs
03OF	0.0166	J	19		Crayfish
03OF	0.0168	J	22.8		Crayfish
03OF	0.0463	J	37.5		Dragonfly Nymphs
Average	0.0154		21.1		

[1] Macroinvertebrate baseline average based on seven samples (one crayfish and six amphipods) from two stations sampled in 2010.

[2] Wet weight.

[3] J: Result is considered an estimate. U: Not detected. J+: Result is considered estimated biased high at the given value.

[4] For individual non-detects, ND=1/2 the MDL was used in calculations.

[5] Not sampled in 2015 in accordance with the Geddes Brook OM&M Plan

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TABLE 14b 2013 - 2017 GEDDES BROOK EARTHWORM ANALYTICAL RESULTS

ROD Remedial	Total Mercury	Methylmercury
	None	*None*

Baseline[1]					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
GB-EW-01	(0.036 to 0.38)		(28.7 to 97.8)		Earthworms
GB-EW-02					Earthworms
GB-EW-03					Earthworms
Average	0.2		59		

2013					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
GB-EW-01	0.0103	J	20.2		Earthworms
GB-EW-02	0.0499	J	23.7		Earthworms
GB-EW-03	0.0146	J	16		Earthworms
Average	0.0249		20.0		

2014					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
GB-EW-01	0.08		9.9	U	Earthworms
GB-EW-02	0.21		9.8	U	Earthworms
GB-EW-03	0.23		9.6	U	Earthworms
Average	0.17		4.9		

2016					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
GB-EW-01	0.0295	J	0.8	J	Earthworms
GB-EW-02	0.0418	J	2.1		Earthworms
GB-EW-03	0.0468	J	1.8	J	Earthworms
Average	0.0394		1.6		

2017					
Location	Mercury		Methylmercury		Organism
	Result[2]	Qualifier[3,4]	Result[2]	Qualifier[3,4]	
	mg/kg		ug/kg		
GB-EW-01	0.0476	J	1.4	J	Earthworms
GB-EW-02	0.063	J	4.4		Earthworms
GB-EW-03	0.0831	J	2.1		Earthworms
Average	0.0646		2.6		

[1] Earthworm baseline average based on six samples from two stations sampled in 2010. Note that earthworms were depurated for 24 hours during baseline in 2010 and for 48 hours in 2013 and 2014. Samples from Geddes Brook in 2016 and 2017 did not include the depuration step, at the request of the NYSDEC.

[2] Wet weight

[3] J = Result is considered an estimate; U = Not detected.

[4] For individual non-detects, ND=1/2 the reporting limit was used in calculations.

[5] Not sampled in 2015 in accordance with the Geddes Brook OM&M Plan

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TABLE 14c: 2013 - 2017 GEDDES BROOK SMALL MAMMAL ANALYTICAL RESULTS

ROD Remedial	Total Mercury		Methylmercury		
	None		*None*		
Baseline[1]					
Location	**Mercury**		**Methylmercury**		**Organism**
	Result[2] mg/kg	**Qualifier[3,4]**	**Result[2] ug/kg**	**Qualifier[3,4]**	
GB-MAM-01	(0.011 to 0.400)		(11.5 to 225.0)		(Deer Mouse, White Footed Mouse)
GB-MAM-02					
GB-MAM-03					
GB-MAM-04					
GB-MAM-05					
Average	0.11		72.2		

2013					
Location	**Mercury**		**Methylmercury**		**Organism**
	Result[2] mg/kg	**Qualifier[3,4]**	**Result[2] ug/kg**	**Qualifier[3,4]**	
GB-MAM-01	0.0123	J	14.0		White Footed Mouse
GB-MAM-02	0.0125	J	3.4		White Footed Mouse
GB-MAM-03	0.0251	J	12.1		White Footed Mouse
GB-MAM-04	0.0252	J	12.6		White Footed Mouse
GB-MAM-05	0.0097	U	5.1		White Footed Mouse
Average	0.0160		9.44		

2014					
Location	**Mercury**		**Methylmercury**		**Organism**
	Result[2] mg/kg	**Qualifier[3,4]**	**Result[2] ug/kg**	**Qualifier[3,4]**	
GB-MAM-01	0.02	U	9.8	U	Meadow Vole
GB-MAM-02	0.02		16.4		White Footed Mouse
GB-MAM-03	0.02	U	9.9	U	Meadow Vole
GB-MAM-04	0.02	U	9.5	U	Meadow Vole
GB-MAM-05	0.02	U	9.8	U	Meadow Vole
Average	0.01		7.20		

2016					
Location	**Mercury**		**Methylmercury**		**Organism**
	Result[2] mg/kg	**Qualifier[3,4]**	**Result[2] ug/kg**	**Qualifier[3,4]**	
GB-MAM-01	0.01	U	0.40	U	Meadow Vole
GB-MAM-02	0.0099	U	0.50	U	Meadow Vole
GB-MAM-03	0.0093	U	0.40	U	White Footed Mouse
GB-MAM-04	0.0763	J	44.7	J+	Northern Short-tailed Shrew
GB-MAM-05	0.11		53.2	J+	Meadow Vole
Average	0.0394		19.7		

2017					
Location	**Mercury**		**Methylmercury**		**Organism**
	Result[2] mg/kg	**Qualifier[3,4]**	**Result[2] ug/kg**	**Qualifier[3,4]**	
GB-MAM-01	0.0092	U	1.5	J	White Footed Mouse
GB-MAM-02	0.0095	U	1.0	J	Meadow Vole
GB-MAM-03	0.0098	U	2.6		White Footed Mouse
GB-MAM-04	0.0698	J	34.6		Northern Short-tailed Shrew
GB-MAM-05	0.132		137		Northern Short-tailed Shrew
Average	0.0432		35.3		

[1] Small mammal baseline average based on eight samples from two stations sampled in 2010.

[2] Wet weight.

[3] J: Result is considered an estimate.U: Not detected. J+: Result is considered estimated biased high at the given value.

[4] For individual non-detects, ND=1/2 the MDL was used in calculations.

[5] Not sampled in 2015 in accordance with the Geddes Brook OM&M Plan

TABLE 15 - AVERAGE NINEMILE CREEK SURFACE WATER ANALYTICAL RESULTS 2015-2017

	Total Mercury	Methylmercury	Dissolved Mercury
ROD Remedial Goals [1]	*None*	*None*	*2.6* [2]
			0.7 [3]

Location ID	Baseline - Low Flow						2015 - Low Flow						2016 - Low Flow					
	Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury	
	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]
	ng/L		ng/L		ng/L		ng/L		ng/L		ng/L		ng/L		ng/L		ng/L	
NMC-STA-00[5]	(1.05 to 1.48)[6]		(0.11 to 0.20)[7,8]		(0.18 to 0.32)[6]		1.09		0.06		0.19	J	1.20		0.05	J+	0.16	J
NMC-STA-01							0.82		0.053		0.19	J	1.39		0.04	J	0.16	J
NMC-STA-02							5.1		0.06		0.17	J	4.60		0.07	J+	0.20	J
NMC-STA-03							2.87		0.103		0.18	J	2.63		0.10	J+	0.16	J
NMC-STA-04							1.18/1.24		0.069/0.058		0.17/0.18	J	2.23/1.89		0.18/0.40	J	0.25/0.23	J
Average[9]	**1.26**		**0.15**		**0.24**		**2.50**		**0.07**		**0.18**		**2.67**		**0.12**		**0.19**	

Location ID	Baseline - High Flow						2015 - High Flow						2016- High Flow					
	Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury		Total Mercury		Methylmercury		Dissolved Mercury	
	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]
	ng/L		ng/L		ng/L		ng/L		ng/L		ng/L		ng/L		ng/L		ng/L	
NMC-STA-00[5]	(8.35 to 18.70)[5]		(0.13 to 1.44)[6,7]		(1.13 to 2.46)[5]		50.1		0.864		1.09		78.4		1.55		1.21	
NMC-STA-01							52.7		0.701		1.04		67.2		1.53		1.10	
NMC-STA-02							47.3		0.605		1.33		67.7		1.32		1.16	
NMC-STA-03							15.7		0.397		1.11		61.7		1.17		1.17	
NMC-STA-04							75.1/35.7	J	0.557/0.664		1.37/1.37		73.2/65.3		1.31/1.24		1.41/1.35	
Average[9]	**14.9**		**0.45**		**1.45**		**42.8**		**0.58**		**1.21**		**66.46**		**1.32**		**1.2**	

Notes:

[1] NYSDEC/United States Environmental Protection Agency, 2009.

[2] Remedial Goal for the protection of wildlife.

[3] Remedial Goal for the protection of human health based on consumption of fish.

[4] J: Result is considered an estimate. U: Not detected. J+: Result is considered estimated biased high at the given value.

[5] Upstream Reference location

[6] Values observed during 2010/2011 baseline sampling conducted during low flow and high flow conditions.

[7] Methylmercury was not analyzed for during 2010/2011 baseline sampling.

[8] Data from Honeywell/PTI 1992 (NYSDEC, 2003).

[9] Averages only include downstream sample locations (NMC-STA-01 through NMC-STA-04)

[10] Field Duplicates are averaged together for all calculations.

TABLE 15 - AVERAGE NINEMILE CREEK SURFACE WATER ANALYTICAL RESULTS 2015-2017
(continued)

	Total Mercury		Methylmercury		Dissolved Mercury	
ROD Remedial Goals [1]	*None*		*None*		*2.6* [2]	
					0.7 [3]	
Location ID	**Baseline - Low Flow**					
	Total Mercury		Methylmercury		Dissolved Mercury	
	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]
	ng/L		ng/L		ng/L	
NMC-STA-00[5]	(1.05 to 1.48)[6]		(0.11 to 0.20)[7,8]		(0.18 to 0.32)[6]	
NMC-STA-01						
NMC-STA-02						
NMC-STA-03						
NMC-STA-04						
Average[9]	**1.26**		**0.15**		**0.24**	
Location ID	**Baseline - High Flow**					
	Total Mercury		Methylmercury		Dissolved Mercury	
	Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]
	ng/L		ng/L		ng/L	
NMC-STA-00[5]	(8.35 to 18.70)[5]		(0.13 to 1.44)[6,7]		(1.13 to 2.46)[5]	
NMC-STA-01						
NMC-STA-02						
NMC-STA-03						
NMC-STA-04						
Average[9]	**14.9**		**0.45**		**1.45**	

2017 - Low Flow					
Total Mercury		Methylmercury		Dissolved Mercury	
Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]
ng/L		ng/L		ng/L	
1.42		0.05	J	0.20	J
0.64		0.04	J	0.11	J
0.87		0.04	J	0.11	J
0.69		0.03	J	0.12	J
1.78/0.61	J	0.03/0.04	J	0.13/0.13	J
0.85		**0.04**		**0.12**	
2017- High Flow					
Total Mercury		Methylmercury		Dissolved Mercury	
Result	Qualifier[4]	Result	Qualifier[4]	Result	Qualifier[4]
ng/L		ng/L		ng/L	
2.44		0.05		0.18	J
2.73		0.06		0.17	J
2.77		0.07		0.15	J
3.1		0.06		0.16	J
2.98/2.55		0.07/0.06		0.23/0.19	J
2.77		**0.06**		**0.17**	

Notes:

[1] NYSDEC/United States Environmental Protection Agency, 2009.

[2] Remedial Goal for the protection of wildlife.

[3] Remedial Goal for the protection of human health based on consumption of fish.

[4] J: Result is considered an estimate. U: Not detected. J+: Result is considered estimated biased high at the given value.

[5] Upstream Reference location

[6] Values observed during 2010/2011 baseline sampling conducted during low flow and high flow conditions.

[7] Methylmercury was not analyzed for during 2010/2011 baseline sampling.

[8] Data from Honeywell/PTI 1992 (NYSDEC, 2003).

[9] Averages only include downstream sample locations (NMC-STA-01 through NMC-STA-04)

[10] Field Duplicates are averaged together for all calculations.

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TABLE 16 - NINEMILE CREEK FLOODPLAIN SOIL AND CHANNEL SEDIMENT ANALYTICAL RESULTS 2016 AND 2018

	Total Mercury		Methylmercury									
ROD Remedial Goals [1]	*Note 2*		*None*									
Location ID	Baseline[3]				2016				2018			
	Total Mercury		Methylmercury		Total Mercury		Methylmercury		Total Mercury		Methylmercury	
	Result mg/kg	Qualifier[4]	Result ug/kg	Qualifier[4]	Result mg/kg	Qualifier[4]	Result ug/kg	Qualifier[4]	Result mg/kg	Qualifier[4]	Result ug/kg	Qualifier[4]
NMC CHANNEL												
NMC-STA-01	(0.04 - 1.1)		(0.3 - 1.35)		0.0384/0.0421	J	0.018/0.824	UJ/J	0.152/0.143	UJ/U	0.788/1.05	
NMC-STA-03					0.149	J	0.692	J	0.102	U	0.373	
NMC-STA-05					0.0419	J	0.396		0.126	U	1.01	
NMC-STA-06					0.0457	J	0.22		0.102	U	0.101	
Average	**0.50**		**0.66**		**0.0692**		**0.431**		**0.060**		**0.601**	
NMC FLOODPLAIN												
NMC-FP01-STA04	(0.13 - 0.71)		(1.57 - 2.34)		0.0343	J	0.413		0.0784	J	0.675	J
NMC-FP01-STA05					0.0339	J	0.46		0.0744	J	0.601	
NMC-FP01-STA06					0.0258/0.0356	J	0.417/0.369		0.0771/0.0688	J	0.371/0.303	
Average	**0.50**		**2.07**		**0.0330**		**0.422**		**0.0753**		**0.538**	

Notes:

[1]NYSDEC/United States Environmental Protection Agency, 2009.

[2]The BSQV for mercury in sediments for the protection of wildlife consumption of fish is 0.8 mg/kg, the BSQV for mercury in floodplain soils for protection of wildlife consumption of terrestrial invertebrates is 0.6 mg/kg on a surface-weighted-average basis, and the LEL of 0.15 mg/kg. These three values represent a range of remedial goals for soil/sediment.

[3]Values observed during 2010/2011 baseline sampling

[4]J: Result is considered an estimate. U: Not detected.

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TABLE 17 - 2016 NINEMILE CREEK MACROINVERTEBRATE ANALYTICAL RESULTS

Location	Baseline[1]			2016				
	Mercury	Methylmercury	Organism	Mercury		Methylmercury		Organism
	Result[2] mg/kg	Result[2] ug/kg		Result[2] mg/kg	Qualifier[3]	Result[2] ug/kg	Qualifier[3]	
NMC-STA-01	0.029	(2.4 - 6.1)	(Amphipod/ Chironomid)	0.020	J	18.7		Crayfish
NMC-STA-03				0.016	J	33.6	J+	Crayfish
NMC-STA-05				0.026	J	13.4	J+	Crayfish
Average	**0.029**	**4.08**		**0.021**		**21.9**		

[1] Values observed during 2010/2011 baseline sampling

[2] Wet weight

[3] J = estimated value. U = Compound was not detected

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TABLE 18

FISH TISSUE REMEDIAL GOALS (MERCURY) AND TARGET CONCENTRATIONS (ORGANIC CHEMICALS)

LCP OU-1[1]					
	Human Health				Ecological
Remedial Goals					
Mercury (mg/kg)	None				None
Geddes Brook					
	Human Health				Ecological
Remedial Goals					
Mercury (mg/kg)	None				0.1
Ninemile Creek					
	Human Health				Ecological
Remedial Goals					
Mercury (mg/kg)	0.3				0.1
Target Concentrations					
	1 in 100,000 Excess Adult Cancer Risk	1 in 10,000 Excess Adult Cancer Risk	Noncancer Target (Child)	Noncancer Target (Adult)	
Total PCBs (µg/kg) [2]	110	1,100	120	190	NA
Dioxin/Furan TEQ (ng/kg) [3]	1.0	10.0	4.2	6.5	NA

Notes:

1. No long-term prey fish goals were established in the LCP OU-1 ROD or OM&M Plan. Goals established for Geddes Brook and Ninemile Creek prey fish are useful benchmarks for evaluating the LCP OU-1 results.
2. The human health target tissue concentrations for total PCBs based on RME carcinogenic risks at risk targets of 10^{-5} and 10^{-4} for adults are 110 µg/kg and 1100 µg/kg, respectively. The RME targets based on non-cancer effects of 120 to 190 µg/kg fall within the range based on the carcinogenic risk target of 10^{-5}. A target concentration based on the 10^{-6} risk level (0.011 mg/kg) is much lower than mean background concentrations in U.S. water and may not be achievable.
3. Although non-carcinogenic targets were not developed for dioxin/furans at the time of the ROD (2009), using the parameters presented in Appendix I of the FS (Parsons 2005) for a target concentration for the non-cancer endpoint, and using the USEPA 2012 reference dose of 7E-10 mg/kg-day, the non-cancer target at a hazard quotient of 1 was determined by USEPA to be 6.5 ng/kg for adults and 4.2 ng/kg for children. These RME targets based on non-cancer effects of PCDD/PCDFs fall within the range based on carcinogenic risks at the 10^{-5} (1 ng/kg) and 10^{-4} (10 ng/kg) levels.

TABLE 19a SUMMARY OF NINEMILE CREEK FISH TISSUE CHEMICAL CONCENETRATIONS: PREY FISH WHOLE BODY (2015-2017)

Taxon	Chemical Name	Location	Year	Sample Size	Number of Detections	Mean[1]	Min	Max	95% UCL Value[1]	95% UCL Calculation Type
Small Prey Fish	Mercury (mg/kg)	Upstream	2015	5	*5*	0.043	0.028	0.059	0.054	95% Student's-t UCL
			2016	5	*5*	0.059	0.046	0.069	0.068	95% Student's-t UCL
			2017	5	*5*	0.047	0.040	0.054	0.052	95% Student's-t UCL
		Downstream	2010 (Baseline)	9	3	0.0127	0.011	0.015	0.0116	95% KM(t) UCL
			2015	15	*15*	0.065	0.013	0.168	0.088	95% Student's-t UCL
			2016	15	*15*	0.051	0.018	0.137	0.067	95% Student's-t UCL
			2017	15	*15*	0.085	0.028	0.136	0.103	95% Student's-t UCL
	Total PCBs[2] (µg/kg)	Upstream	2015	2	*2*	168.5	143.0	194.0	NA	Fewer than 3 detections
			2016	2	*2*	156.5	46.0	267.0	NA	Fewer than 3 detections
			2017	2	*2*	94.5	91.0	98.0	NA	Fewer than 3 detections
		Downstream	2015	8	*8*	216.6	52.0	1100.0	684.3	95% H-UCL
			2016	8	*8*	85.1	51.0	157.0	115.3	95% Adjusted Gamma UCL
			2017	8	*8*	68.4	34.0	91.0	80.8	95% Student's-t UCL
	Dioxin/Furan Total TEQ[3] (ng/kg)[2, 3,4]	Upstream	2015	2	2 (32/34)	0.650	0.527	0.773	NA	Fewer than 3 detections
			2017	2	*2 (19/34)*	0.285	0.207	0.363	NA	Fewer than 3 detections
		Downstream	2015	8	*8 (119/136)*	0.295	0.19	0.406	0.347	95% Student's-t UCL
			2017	8	*8 (88/136)*	0.309	0.134	0.591	0.416	95% Student's-t UCL
	Percent Lipid (% by weight)	Upstream	2015	2	*2*	4.30	4.30	4.30	NA	Fewer than 3 detections
			2016	2	*2*	1.75	1.40	2.10	NA	Fewer than 3 detections
			2017	2	*2*	5.30	5.00	5.60	NA	Fewer than 3 detections
		Downstream	2010 (Baseline)	9	9	0.83	0.27	1.3	1.03	95% Student's-t UCL
			2015	8	*8*	4.51	3.20	7.10	5.40	95% Student's-t UCL
			2016	8	*8*	4.03	2.10	8.70	5.48	95% Student's-t UCL
			2017	8	*8*	3.00	2.30	3.70	3.27	95% Student's-t UCL

Notes:
1. Mean and 95% UCL were calculated using ProUCL version 5.1 and were not calculated when 3 or fewer results were detects (USEPA 2015). 95% UCL is an estimate of the upper bound for the true population mean. For data sets with NDs, the stated statistical method was used for handling NDs rather than the substitution method (i.e., one-half of the detection/reporting limit).
2. Baseline organic fish data from 2010 not used due to organic data quality issues. Prey fish not analyzed for organics in 2011 baseline.
3. TEQ: Toxic Equivalent Quotient - calculated using human and mammalian toxic equivalency factors (TEFs) from Van den Berg et al. (2006)
4. Dioxin/Furan Total TEQ was calculated as a sum of congeners; 1/2 the method detection limit was used for non-detects.
5. Number of detection is total TEQ detections; number in parentheses are number of congeners detected/congeners analyzed (i.e., 17 congeners times 8 samples).

Abbreviations:
-- Insufficient data to calculate Mean or 95% UCL; 3 or fewer results were detects
KM: Kaplan-Meier
mg/kg: milligrams per kilogram
ng/kg: nanograms per kilogram
ND: non-detect
PCB: polychlorinated biphenyl
TEQ: toxicity equivalent quotient
UCL: upper confidence limit

Reference:
USEPA, 2015. ProUCL Version 5.1 User Guide. EPA/600/R-07/041 https://www.epa.gov/sites/production/files/2016-05/documents/proucl_5.1_user-guide.pdf

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TABLE 19b SUMMARY OF NINEMILE CREEK FISH TISSUE CHEMICAL CONCENTRATIONS: SPORTFISH FILLET (2015-2017)

Taxon	Chemical Name	Location	Year	Sample Size	Number of Detections	Mean[1]	Min	Max	95% UCL Value[1]	95% UCL Calculation Type
Channel Catfish	Mercury (mg/kg)	Downstream	2011 (Baseline)	3	3	1.047	0.94	1.2	1.276	95% Student's-t UCL
	Total PCBs (µg/kg)			3	3	1107	650	1700	2014	95% Student's-t UCL
	Dioxin/Furan Total TEQ[2] (ng/kg)[3,4]			3	3 (13/51)	1.801	1.347	2.324	2.630	95% Student's-t UCL
	Percent Lipid (% by weight)			3	3	2.267	1.3	3.5	4.162	95% Student's-t UCL
Brown Trout	Mercury (mg/kg)	Upstream	2015	6	*6*	0.056	0.042	0.072	0.067	95% Student's-t UCL
			2016	6	*6*	0.041	0.020	0.050	0.049	95% Student's-t UCL
			2017	6	*6*	0.096	0.041	0.133	0.122	95% Student's-t UCL
		Downstream	2015	8	*8*	0.062	0.039	0.108	0.080	95% Student's-t UCL
			2016	8	*8*	0.069	0.033	0.111	0.087	95% Student's-t UCL
			2017	8	*8*	0.119	0.061	0.250	0.159	95% Student's-t UCL
	Total PCBs (µg/kg)	Upstream	2015	2	*2*	131.5	112.0	151.0	NA	Fewer than 3 detections
			2016	2	*2*	186.5	150.0	223.0	NA	Fewer than 3 detections
			2017	2	*2*	185.0	170.0	200.0	NA	Fewer than 3 detections
		Downstream	2015	8	*7*	128.7	76.0	183.0	151.3	95% KM (t) UCL
			2016	8	*8*	145.9	97.0	210.0	170.5	95% Student's-t UCL
			2017	8	*8*	111.4	60.0	180.0	137.4	95% Student's-t UCL
	Dioxin/Furan Total TEQ[2] (ng/kg)[3,4]	Upstream	2015	2	*2 (25/34)*	0.262	0.186	0.337	NA	Fewer than 3 detections
			2017	2	*2 (33/34)*	1.238	0.331	2.144	NA	Fewer than 3 detections
		Downstream	2015	8	*8 (99/136)*	0.353	0.169	0.734	0.487	95% Student's-t UCL
			2017	6	*6 (88/102)*	0.414	0.188	0.715	0.591	95% Student's-t UCL
	Percent Lipid (% by weight)	Upstream	2015	2	*2*	1.355	0.410	2.300	NA	Fewer than 3 detections
			2016	2	*2*	1.350	1.100	1.600	NA	Fewer than 3 detections
			2017	2	*2*	1.550	1.000	2.100	NA	Fewer than 3 detections
		Downstream	2015	8	*8*	1.049	0.160	2.300	1.568	95% Student's-t UCL
			2016	8	*8*	2.201	0.660	8.900	5.268	95% H-UCL
			2017	8	*8*	0.880	0.260	2.100	1.299	95% Student's-t UCL
Rock Bass	Mercury (mg/kg)	Downstream	2015	1	*1*	0.442	0.442	0.442	NA	Fewer than 3 detections
			2017	8	*7*	0.268	0.114	0.408	0.325	95% KM (t) UCL
Brown Bullhead	Mercury (mg/kg)	Downstream	2015	2	*2*	0.075	0.071	0.079	NA	Fewer than 3 detections
			2016	1	*1*	0.194	0.194	0.194	NA	Fewer than 3 detections
Green Sunfish	Mercury (mg/kg)	Downstream	2016	8	*8*	0.132	0.029	0.400	0.210	95% Student's-t UCL
			2017	8	*8*	0.131	0.027	0.222	0.184	95% Student's-t UCL

Notes:

1. Mean and 95% UCL were calculated using ProUCL version 5.1 and were not calculated when 3 or fewer results were detects (USEPA,2015). 95% UCL is an estimate of the upper bound for the true population mean. For data sets with NDs, the stated statistical method was used for handling NDs rather than the substitution method (i.e., one-half of the detection/reporting limit).
2. TEQ: Toxic Equivalent Quotient - calculated using human and mammalian toxic equivalency factors (TEFs) from Van den Berg et al. (2006)
2. Dioxin/Furan Total TEQ was calculated as a sum of congeners; 1/2 the method detection limit was used for non-detects.
4. Number of detection is total TEQ detections; number in parentheses are number of congeners detected/congeners analyzed (i.e., 17 congeners times 8 samples).

Abbreviations:

-- Insufficient data to calculate Mean or 95% UCL; 3 or fewer results were detects
KM: Kaplan-Meier
mg/kg: milligrams per kilogram
ng/kg: nanograms per kilogram
ND: non-detect
PCB: polychlorinated biphenyl
TEQ: toxicity equivalent quotient
UCL: upper confidence limit

Reference:

USEPA, 2015. ProUCL Version 5.1 User Guide. EPA/600/R-7/041 https://www.epa.gov/sites/production/files/2016-05/documents/proucl_5.1_user-guide.pdf Accessed May 22, 2020.

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TABLE 20 - 2016 NINEMILE CREEK EARTHWORM ANALYTICAL RESULTS

Location	Baseline[1]			2016				
	Mercury	Methylmercury	Organism	Mercury		Methylmercury		Organism
	Result[2] mg/kg	Result[2] ug/kg		Result[2] mg/kg	Qualifier[3]	Result[2] ug/kg	Qualifier[3]	
NMC-FP01-STA04	(0.34 - 0.97)	(21 - 43.2)	Earthworm	0.026	J	3.3		Earthworm
NMC-FP01-STA05				0.026	J	0.9	J	Earthworm
NMC-FP01-STA06				0.024	J	0.4	J	Earthworm
Average	**0.7**	**31.5**		**0.025**		**1.5**		

[1] Values observed during 2010/2011 baseline sampling

[2] Wet weight

[3] J = estimated value. U = Compound was not detected

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TABLE 21 - 2016 NINEMILE CREEK SMALL MAMMAL ANALYTICAL RESULTS

Location	Baseline[1]		2016		
	Mercury	Organism	Mercury		Organism
	Result[2] mg/kg		Result[2] mg/kg	Qualifier[3,4]	
NMC-FP-03	(0.037 - 0.048)	(Deer Mouse/White Footed Mouse)	0.009	U	Meadow Vole
NMC-FP-03			0.010	U	Deer Mouse
NMC-FP-03			0.010	U	White Footed Mouse
NMC-FP-03			0.009	U	White Footed Mouse
NMC-FP-03			0.009	U	Meadow Vole
Average	**0.040**		**0.005**		

[1] Values observed during 2010/2011 baseline sampling

[2] Wet weight

[3] J = estimated value. U = Compound was not detected

[4] For individual non-detects, ND=1/2 the MDL was used in calculations.

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TABLE 22 2015 - 2018 SYW-10 FLOODPLAIN SOIL ANALYTICAL RESULTS

ROD Remedial Goals	**Total Mercury**		**Methylmercury**					
	Note 1		*None*					
Location ID	**Baseline[2,3]**				**2015**			
	Mercury		**Methylmercury**		**Mercury**		**Methylmercury**	
	Result[4]	**Qualifier[5]**	**Result[4]**	**Qualifier[5]**	**Result[4]**	**Qualifier[5]**	**Result[4]**	**Qualifier[5]**
	mg/kg		**ug/kg**		**mg/kg**		**ug/kg**	
SYW10-SED-01 (Remediated)	(3.2 to 13.4)		(1.34 to 8.45)		0.129	J	3.70	
SYW10-SED-02 (Remediated)					0.069	J	0.80	
SYW10-SED-03(Remediated)					0.026	J	0.71	
SYW10-SED-06 (Remediated)					0.030	J	1.97	
SYW10-SED-09 (Remediated)					0.076	J	2.46	
SYW10-SED-10 (Remediated)					0.094/0.109	J	2.49/1.77	
SYW10-SED-04 (Unremediated)	(0.24 to 4.1)		(1.98 to 13.6)		3.240	J	6.39	J
SYW10-SED-05 (Unremediated)					4.090	J	12.20	J
SYW10-SED-07 (Unremediated)					3.920		17.60	
SYW10-SED-08 (Unremediated)					2.970	J	13.60	J
Remediated Average	**7.58**		**4.37**		**0.072**		**1.96**	
Unremediated Average	**2.49**		**7.85**		**3.555**		**12.45**	
Sitewide Average	**5.54**		**5.76**		**1.465**		**6.16**	
Location ID	**2016**				**2018**			
	Mercury		**Methylmercury**		**Mercury**		**Methylmercury**	
	Result[4]	**Qualifier[5]**	**Result[4]**	**Qualifier[5]**	**Result[4]**	**Qualifier[5]**	**Result[4]**	**Qualifier[5]**
	mg/kg		**ug/kg**		**mg/kg**		**ug/kg**	
SYW10-SED-01 (Remediated)	0.110	J	2.30	J	0.107	J	1.62	
SYW10-SED-02 (Remediated)	0.062	J	0.35		0.108	U	1.76	
SYW10-SED-03(Remediated)	0.035	J	0.73		0.0942	U	1.00	
SYW10-SED-06 (Remediated)	0.028	J	1.09		0.111	U	1.84	
SYW10-SED-09 (Remediated)	0.035	J	1.24		0.102	U	2.57	
SYW10-SED-10 (Remediated)	0.104/0.117	J	2.23/1.81		0.135/0.137	J	2.05/1.22	J
SYW10-SED-04 (Unremediated)	0.467		4.77		3.53	J	9.28	J
SYW10-SED-05 (Unremediated)	2.860	J	11.50	J	2.51	J	9.48	J
SYW10-SED-07 (Unremediated)	7.450		19.70		4.69	J	13.50	
SYW10-SED-08 (Unremediated)	7.870	J	22.80	J	3.31	J	31.50	J
Remediated Average	**0.063**		**1.29**		**0.08**		**1.74**	
Unremediated Average	**4.662**		**14.69**		**3.51**		**15.94**	
Sitewide Average	**1.903**		**6.65**		**1.45**		**7.42**	

[1] Site specific BSQV for mercury in sediments for the protection of wildlife consumption of fish of 0.8 mg/kg and a site specific BSQV for mercury in floodplain soils for protection of wildlife consumption of terrestrial invertebrates of 0.6 mg/kg.

[2] Sediment average calculated using surface sediment data from locations with co-located earthworm samples.

[3] Baseline averages based on 2010/2011 Baseline

[4] For individual nondetects, ND=1/2 the MDL was used in calculations.

[5] J = estimated value; U = compound was not detected

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TABLE 23: 2015 - 2018 SYW-10 EARTHWORM ANALYTICAL RESULTS

Location ID	Baseline[1]				2015[2]			
	Mercury		Methylmercury		Mercury		Methylmercury	
	Result[3]	Qualifier[4]	Result[3]	Qualifier[4]	Result[3]	Qualifier[4]	Result[3]	Qualifier[4]
	mg/kg		ug/kg		mg/kg		ug/kg	
SYW10-EW-01 (Remediated)	(0.34 to 0.77)		(56 to 486)		0.139	J	69.30	
SYW10-EW-02 (Remediated)					0.055	J	42.70	
SYW10-EW-03 (Remediated)					0.043	J	26.80	
SYW10-EW-06 (Remediated)					0.177	J	167.00	
SYW10-EW-09 (Remediated)					0.174	J	181.00	
SYW10-EW-10 (Remediated)					0.188	J	181.00	
SYW10-EW-04 (Unremediated)	(0.093 to 0.52)		(11.6 to 125)		0.264	J+	14.30	
SYW10-EW-05 (Unremediated)					0.195	J	98.50	
SYW10-EW-07 (Unremediated)					0.490		515.00	
SYW10-EW-08 (Unremediated)					0.309		279.00	
Remediated Average	**0.465**		**201.23**		**0.130**		**111.30**	
Unremediated Average	**0.297**		**59.94**		**0.320**		**226.70**	
Sitewide Average	**0.390**		**137.00**		**0.200**		**157.50**	

Location ID	2016				2018			
	Mercury		Methylmercury		Mercury		Methylmercury	
	Result[3]	Qualifier[4]	Result[3]	Qualifier[4]	Result[3]	Qualifier[4]	Result[3]	Qualifier[4]
	mg/kg		ug/kg		mg/kg		ug/kg	
SYW10-EW-01 (Remediated)	0.185		50.70		0.130		37.00	
SYW10-EW-02 (Remediated)	0.123		28.60		0.109	J	36.00	
SYW10-EW-03 (Remediated)	0.084	J	22.80		0.109	J	40.50	
SYW10-EW-06 (Remediated)	0.161		39.70		0.132	J	18.30	
SYW10-EW-09 (Remediated)	0.131		61.10		0.092	J	36.80	
SYW10-EW-10 (Remediated)	0.084	J	34.90		0.165		54.90	
SYW10-EW-04 (Unremediated)	0.431		122.00		0.586		192.00	
SYW10-EW-05 (Unremediated)	0.391		86.90		0.391		186.00	
SYW10-EW-07 (Unremediated)	1.250		506.00		1.230		549.00	
SYW10-EW-08 (Unremediated)	0.476		318.00		0.668		534.00	
Remediated Average	**0.130**		**39.63**		**0.123**		**37.25**	
Unremediated Average	**0.640**		**258.23**		**0.719**		**365.25**	
Sitewide Average	**0.330**		**127.07**		**0.361**		**168.45**	

[1] Baseline averages based on 2010/2011

[2] Earthworm samples were depurated for 48 hours in 2015, and were not depurated in 2016 and 2018.

[3] For individual nondetects, ND=1/2 the MDL was used in calculations.

[4] J = estimated value; J+: Result is considered estimated biased high at the given value; U = compound was not detected

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TABLE 24: 2015-2018 SYW-10 SMALL MAMMAL ANALYTICAL RESULTS

Location ID	Baseline[1]			2015		
	Mercury		Species	Mercury		Species[4]
	Result[2]	Qualifier[3]		Result[2]	Qualifier[3]	
	mg/kg			mg/kg		
SYW10-SM-01-01 (Remediated)	(0.034 to 0.54)		White Footed Mouse, Northern Short-Tailed Shrew	0.010	J	Meadow Vole
SYW10-SM-01-02 (Remediated)				0.063	J	White Footed Mouse
SYW10-SM-01-03 (Remediated)				0.026	J	White Footed Mouse
SYW10-SM-01-04 (Remediated)				0.010	J	White Footed Mouse
SYW10-SM-01-05 (Remediated)				0.015	J	Meadow Vole
SYW10-SM-02-01 (Unremediated)	(0.009 to 1.6)			0.021	J	White Footed Mouse
SYW10-SM-02-02 (Unremediated)				0.025	J	White Footed Mouse
SYW10-SM-02-03 (Unremediated)				0.038	J	Meadow Vole
SYW10-SM-02-04 (Unremediated)				0.036	J	White Footed Mouse
SYW10-SM-02-05 (Unremediated)				0.029	J	Meadow Vole
Remediated Average	**0.174**			**0.030**		
Unremediated Average	**0.381**			**0.030**		
Sitewide Average	**0.290**			**0.030**		

Location ID	2016			2018		
	Mercury		Species[4]	Mercury		Species[4]
	Result[2]	Qualifier[3]		Result[2]	Qualifier[3]	
	mg/kg			mg/kg		
SYW10-SM-01-01 (Remediated)	0.010	U	Deer Mouse	0.077	U	White Footed Mouse
SYW10-SM-01-02 (Remediated)	0.010	U	Deer Mouse	0.074	U	Deer Mouse
SYW10-SM-01-03 (Remediated)	0.009	U	Deer Mouse	0.074	U	White Footed Mouse
SYW10-SM-01-04 (Remediated)	0.009	U	Deer Mouse	0.073	U	Deer Mouse
SYW10-SM-01-05 (Remediated)	0.010	U	Deer Mouse	0.030	U	Deer Mouse
SYW10-SM-02-01 (Unremediated)	0.088	J	Deer Mouse	0.073	U	White Footed Mouse
SYW10-SM-02-02 (Unremediated)	0.033	J	Deer Mouse	0.077	U	White Footed Mouse
SYW10-SM-02-03 (Unremediated)	0.026	J	White Footed Mouse	0.075	U	White Footed Mouse
SYW10-SM-02-04 (Unremediated)	0.027	J	Deer Mouse	0.076	U	White Footed Mouse
SYW10-SM-02-05 (Unremediated)	0.021	J	White Footed Mouse	0.061	J	White Footed Mouse
Remediated Average	**0.005**			**0.030**		
Unremediated Average	**0.040**			**0.040**		
Sitewide Average	**0.020**			**0.040**		

[1] Baseline averages based on 2010/2011

[2] For individual nondetects, ND=1/2 the MDL was used in calculations.

[3] J = estimated value; U = compound was not detected

[4] Small mammals are collected based on available species during the year collected.

APPENDIX C – REFERENCES

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