FIRST FIVE-YEAR REVIEW REPORT
WASTEBEDS 1-8 SUBSITE
ONONDAGA LAKE SITE
ONONDAGA COUNTY, NEW YORK

Prepared by

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

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

AWQC	Ambient Water Quality Criteria
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BOH	Back of House
BTEX	Benzene, toluene, ethylbenzene, and xylene
CFR	Code of Federal Regulations
COC	chemical of concern
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
ICs	Institutional Controls
IRM	Interim Remedial Measure
LOAEL	Lowest-observed-adverse-effect-level
NOAEL	No-observed-adverse-effect-level
MSL	Mean Sea Level
mg/L	Milligram per Liter
mg/kg	Milligrams per Kilogram
NMCSG	Ninemile Creek Sand and Gravel
NPL	National Priorities List
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SEMS	Superfund Enterprise Management System
SGV	Standard or Guidance Value
SMP	Site Management Plan
SVI	Soil Vapor Intrusion
UU/UE	Unlimited Use/Unrestricted Exposure
VOCs	Volatile Organic Compounds
VP	Vegetation Plot

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 FYRs 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 U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, Section 121, consistent with the National Contingency Plan (40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

The Onondaga Lake Superfund site 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 consists of one or more operable units (OUs). This FYR report evaluates the Wastebeds 1-8 subsite (Subsite).

This is the first FYR for the Subsite. The triggering action for this statutory review is the start of the OU1 remedial action, which commenced on January 15, 2015. The FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the Subsite above levels that allow for unlimited use/unrestricted exposure (UU/UE).

The Subsite consists of two OUs: OU1, which addresses the Solvay waste and contaminated soil/fill materials, and OU2, which will address impacted shallow, intermediate, and deep groundwater (NYSDEC and EPA, 2014). Impacted media in a surface water drainage ditch, Ditch A, is addressed under OU1 and an interim remedial measure (IRM)[1] as discussed below. A Record of Decision (ROD) was signed for OU1, while a remedial investigation (RI)[2] has been completed and a feasibility study (FS)[3] is currently underway for OU2. A Proposed Plan for OU2 will be released following the development of the OU2 FS. Therefore, remedial action for OU2 is not included in this FYR. For purposes of consistency with site documents, the Subsite will be discussed in the context of OU1 and OU2. However, to support tracking in EPA's Superfund Enterprise Management System (SEMS), the protectiveness determination for OU1 will be referred to as "OU22 of the Onondaga Lake site."[4]

This FYR was led by the EPA remedial project manager (RPM) and lead author, Robert Nunes. Participants included New York State Department of Environmental Conservation (NYSDEC) project manager Tracy Smith, EPA hydrogeologist Kathryn Flynn, EPA human health risk

[1] An IRM is an action taken at a contaminated site in order to reduce the chances of human or environmental exposure to site contaminants.
[2] An RI determines the nature and extent of the contamination at a site and evaluates the associated human health and ecological risks.
[3] An FS identifies and evaluates remedial alternatives to address the contamination at a site.
[4] OU1 (Solvay waste, contaminated soil/fill) of the Subsite is being tracked in EPA's SEMS database as OU22 of the Onondaga Lake National Priorities List (NPL) site.

assessor Michael Sivak, EPA ecological risk assessor Nicholas Mazziotta, and EPA community involvement coordinator Larisa Romanowski. The potentially responsible party, Honeywell International Inc. (Honeywell), was notified of the initiation of the FYR. The review began on May 3, 2019.

Site Background

The 404-acre Subsite includes eight irregularly shaped wastebeds that extend roughly 1.5 miles along the shore, with a maximum width of 0.5 miles. The wastebeds consist, primarily, of inorganic waste materials (Solvay waste) from the production of soda ash (sodium carbonate) using the Solvay process. Other contaminants (*e.g.,* benzene, toluene, ethylbenzene, and xylene [BTEX], naphthalene and assorted polycyclic aromatic hydrocarbons [PAHs], phenolic compounds, polychlorinated biphenyls [PCBs], pesticides, and inorganics), which are not related to soda ash production, are also present at the Subsite. A surface water drainage ditch, Ditch A, runs along the southern and eastern Subsite boundaries and discharges stormwater from roads, parking areas, and overland surface flow from the Subsite to Ninemile Creek and Onondaga Lake. Subsite elevations range from approximately 363 feet above mean sea level (MSL) at the shores of Onondaga Lake to 430 feet above MSL. The Subsite location is shown on Figure 1 and a Subsite plan view is included as Figure 2.

The lowering of the lake level in 1822 to the same level as the Seneca River resulted in the formation of Geddes Marsh. The wastebeds were constructed and operated on the Geddes Marsh by a series of companies, of which Honeywell International Inc. is the successor. Wastebeds 1-6 were in use before 1926 and may have become operational as early as 1916, although no definitive construction information is available. Ninemile Creek was rerouted to the north to permit the construction of Wastebeds 5 and 6, and the former creek channel was buried. Wastebeds 7 and 8 were not utilized until after 1939 and remained in use with Wastebeds 1-6 until 1943. An approximate 17-acre Biosolids Area used by the City of Syracuse and Onondaga County for sewage sludge disposal, is located near the southeastern end of the Subsite over portions of Wastebeds 1 and 2. A 20-acre permitted, closed landfill, formerly operated by Crucible Specialty Metals (Crucible), is located on Wastebed 5. Lakeview Point, which generally comprises Wastebed 6, forms one of the Subsite's more prominent features--a peninsula that extends into Onondaga Lake near the northern end of the Subsite.

A portion of the property that is developed as parking lots and roadways is owned by New York State (NYS), and there are property easements for highway and stormwater drainage features. Interstate 690 (I-690) and interchanges associated with NYS Route 695, NYS Fairgrounds parking lots, access roads for the parking lots, and foot bridges are present and in use at the Subsite. The NYS Fairgrounds parking lots (approximately 77 acres) include between two and seven feet of gravel and fill material placed over the Subsite's soil/fill/Solvay waste material.

The remaining portion of the Subsite is owned by Onondaga County. The St. Joseph's Health Amphitheater at Lakeview (Lakeview Amphitheater), an outdoor music venue with covered seating and an open lawn accommodating 17,500 people, was constructed on the County-owned property in 2015 as part of planned redevelopment for the Subsite. The Onondaga County West Shore Trail Extension, an approximately 2.5-mile (9-acre) public recreation trail, has also been

constructed at the Subsite by Onondaga County. The remaining County-owned portion includes undeveloped areas characterized by varying degrees of vegetation ranging from sparsely vegetated areas to stands of mature trees. The County-owned property is deed-restricted for "park purposes" use. Figure 2 depicts the approximate property boundaries.

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

WASTEBEDS 1-8 FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Wastebeds 1-8/Onondaga Lake		
EPA ID: NYD986913580		
Region: 2	**State:** NY	**City/County:** Town of Geddes, Onondaga County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the 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: 1/16/2015 – 1/15/2020		
Date of site inspection: 8/7/2019		
Type of review: Statutory		
Review number: 1		
Triggering action date: 1/15/2015		
Due date *(five years after triggering action date)*: 1/15/2020		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

As part of the RI, a baseline risk assessment was conducted for the Subsite 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 baseline ecological risk assessment (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 the Subsite.

The HHRA concluded that contamination at the Subsite presented noncancer human health risks that were above EPA guidelines for recreational receptors engaging in specific activities (*e.g.*, All-Terrain-Vehicle recreators), or receptors such as a construction worker that would be involved in intrusive work. The hazards are primarily driven by inhalation exposure to nickel and manganese in particulate matter in outdoor air (OBG, 2011b; NYSDEC and EPA, 2014). Subsite-wide groundwater was also evaluated under the hypothetical scenario that future residents and commercial/industrial workers could use the groundwater as a potable water source. Future use of Subsite groundwater as a potable water source is extremely unlikely due to its saline nature. Benzene, and to a lesser extent, PAHs and arsenic, in groundwater drove cancer and noncancer risks when Subsite groundwater was considered a source of potable water (OBG, 2016a). Qualitative evaluations of shallow groundwater and soil vapor indicated some constituents at levels above screening values. Based on these evaluations, a vapor intrusion evaluation for the Lakeview Amphitheater was performed. A summary of the evaluation findings is discussed in the "Data Review" section, below.

The majority of the ecological risk at the Subsite is associated with terrestrial exposure. Potential unacceptable risks to terrestrial ecological receptors (American robin, shrew, red-tailed hawk and fox) were associated with potential exposures to metals (*e.g.*, chromium, cadmium, vanadium, thallium, and mercury), pesticides, semivolatile organic compounds, and PCBs in soil/fill/Solvay waste material. The calculated risk estimates (*i.e.*, ecological hazard quotients [HQs]) for ecological receptors were based on both the no-observed-adverse-effect level (NOAEL), representing the highest chemical of concern (COC) concentration at which no adverse effects are seen, and the lowest-observed-adverse-effect level (LOAEL), representing the lowest COC concentration shown to produce adverse effects. Food chain calculations yielded 56 NOAEL-based ecological HQs and 32 LOAEL-based ecological HQs that were greater than one, which is the threshold value above which adverse ecological effects may occur. The majority of the metals contamination is associated with the Biosolids Area. To a lesser extent than metals, organic constituents including BTEX compounds, naphthalene, phenols, and several other compounds detected at low frequencies but retained for their bioaccumulative properties presented potential risk to terrestrial ecological receptors exposed to soil/fill/Solvay waste (OBG, 2016a).

Based upon the results of the RI, HHRA, and BERA, NYSDEC and EPA determined that a response action was necessary to protect public health or welfare and the environment from actual and threatened releases of hazardous substances into the environment.

Response Actions

Honeywell entered into a consent order with NYSDEC on January 22, 2004 to perform an IRM to develop and evaluate IRM alternatives to mitigate groundwater flow, seep discharge, and shoreline soil/fill material erosion from the Subsite to Onondaga Lake, and groundwater and seep discharge from the Subsite to Ninemile Creek. The IRM, which was documented in an August 2011 Response Action Document issued by NYSDEC and EPA, included the collection of groundwater and seeps along Ninemile Creek and the eastern lakeshore of Onondaga Lake, with treatment of the collected groundwater and seeps at Honeywell's Willis Avenue Groundwater Treatment Plant. The response action also included the placement of a vegetative cover over a 14.4-acre area along the eastern lakeshore, sediment removal from the lower reach of Ditch A, rehabilitation of water conveyance pipes at the upper reach of Ditch A, and stabilization of the lakeshore soils (NYSDEC and EPA, 2011). Construction of these actions was performed between 2011 and 2016 in conjunction with the removal of additional sediment/substrate and the installation of substrate check dams to mitigate transport of Solvay Waste substrate and sediment from the middle reach of Ditch A to its lower reach; construction of a hydraulic control system on the Subsite northern shore to address Subsite groundwater discharging to Onondaga Lake Remediation Area A to mitigate potentially unacceptable upwelling velocities and to minimize to the extent practicable the migration of impacted groundwater (*e.g.,* benzene, toluene, xylenes, phenol) to Onondaga Lake, and construction of 9.5 acres of mitigation wetlands that includes a 2.3-acre connected wetland and 7.2 acres of inland wetlands within the low-lying Eastern Shoreline, in what was collectively referred to as the "Integrated IRM."[5] The areas addressed under the Integrated IRM are depicted on Figure 3.

The following Remedial Action Objectives (RAOs) have been established for OU1:

- Prevent ingestion/direct contact with soil/fill material/Solvay waste in surface and subsurface soil above levels that would result in unacceptable human exposure.
- Prevent or minimize inhalation of or exposure to contaminants volatilizing from contaminated soil/fill material/Solvay waste that would result in unacceptable human exposure. In the event that buildings are constructed, mitigate impacts to public health resulting from soil vapor intrusion (SVI) into those buildings, as may be warranted.
- Prevent or minimize, adverse ecological impacts to biota from ingestion/direct contact with soil/fill material/Solvay waste causing toxicity or impacts from bioaccumulation through the terrestrial food chain.
- Prevent or minimize, the further migration of contaminants that would result in groundwater, sediment, or surface water contamination.

In December 2014, a ROD was issued for OU1 of the Subsite. OU1 includes the Solvay waste and contaminated soil/fill materials present at the Subsite. OU1 also includes the shoreline stabilization system, mitigation wetlands, vegetative cover and access roads constructed to support part of the IRM described above. The ROD calls for placement of a cover system in Subsite areas that will be protective for current and/or reasonably anticipated future land uses (*e.g.,* active and

[5] The mitigation wetlands will mitigate open water aquatic habitat lost from implementation of the Willis/Semet IRM (2.3 acres) and wetland habitat disturbed as a result of implementation of the Wastebed B/Harbor Brook IRM (6.5 acres), and Wastebeds 1 through 8 Integrated IRM (0.7 acres).

passive recreational uses). The remedy includes the placement of a two-foot thick soil cover over areas where active recreation is planned or where appropriate to protect ecological resources and a one-foot thick soil cover where passive recreation is planned. Other areas of the Subsite are to be covered with a vegetation enhancement layer to promote growth of vegetation. A Site Management Plan (SMP) and institutional controls (ICs) to ensure that intrusive activities in areas with remaining contamination are performed in accordance with the plan are also included in the ROD remedy.

Status of Implementation

As noted above, the Integrated IRM for the Subsite includes shallow and intermediate groundwater (and seep) hydraulic control. A summary of the status of the implementation of the groundwater hydraulic control systems of the Eastern Shoreline, Northern Shoreline, and Ninemile Creek systems is provided below.

The Eastern Shoreline system consists of two sections--the Lakefront section and the Lower Ditch A section. The Lakefront section was constructed between June 2013 and October 2014. The Lakefront system includes an approximately 6,400-foot long shallow groundwater collection trench that contains a 12-inch slotted high-density polyethylene (HDPE) pipe installed at approximately eight feet below ground surface (bgs) surrounded by sand backfill and 216 passive recovery wells screened below the trench to collect shallow and intermediate groundwater. Seep discharge occurring inland is intercepted via a seep apron that diverts flow to a collection trench to mitigate discharge to Onondaga Lake and the mitigation wetlands. This trench contains a six-inch perforated HDPE pipe installed at a varying depth (a minimum of 4.5 feet bgs) surrounded by stone backfill. The interim startup phase for the Lakefront section was completed in late 2014 and the system is undergoing initial performance. The Lower Ditch A section collection trench is approximately 300 feet long and includes seven passive recovery wells screened below the trench. Construction of the Lower Ditch A section collection system was completed in summer 2015.

During the construction of the IRM, additional sediment/substrate was removed from the middle section of Ditch A and substrate check dams were installed to manage stormwater flow. Sampling activities conducted in 2014 and 2015 in the vicinity of and within middle Ditch A identified contaminants in shallow/intermediate groundwater and surface water at levels above standards or guidance values (OBG, 2016b). Based on this information and consistent with an Integrated IRM Construction Work Plan addendum approved in 2017 by NYSDEC, additional measures were implemented in and under Middle Ditch A. These additional measures, which included the installation of a seep collection trench approximately 5,400 feet long, geosynthetic lining systems, and seep aprons, commenced in late summer 2017 and were completed in fall 2018. Startup of the middle Ditch A seep collection system was initiated in fall 2018.

Installation of the Northern Shoreline hydraulic control system was completed in October 2013. This system includes an approximately 1,050-foot long shallow collection trench located approximately eight feet bgs with 44 passive recovery wells screened below the trench to collect intermediate groundwater. Following completion of the interim startup of the system in November 2013, it was observed that the geochemical variability within the formation screened by the recovery wells and trench created fouling of the trench sand and well sand pack that limited

recovery well discharge rates outside design expectations. To achieve hydraulic control and maintain the capping schedule for the lake remedy, a temporary vacuum extraction system was installed; operational verification was achieved between August 2014 and January 2015 (Parsons and OBG, 2017b). Additional field modifications were also performed between 2014 and 2018 to help address scale buildup and sediment accumulation with the pump station and force main, limit inflow of lake water into the system, and achieve long-term hydraulic control. These modifications included the installation of a dedicated collection pipe adjacent to the existing North Shoreline groundwater collection trench to connect the passive recovery wells and convey the intermediate groundwater from those wells to the Northern Shoreline pump station, installation of a smaller scale version of the vacuum extraction mobilized in 2014, online placement of an acid delivery system at the pump station wet well, and the construction of a physical barrier of steel sheet piling with hydrophilic sealed joints in the area and past the depth where the majority of the influence from lake water occurs. The Northern Shoreline hydraulic control system is undergoing initial performance verification.

The Ninemile Creek hydraulic control system includes a collection trench that is approximately 1,800 feet long and ranges in depth from 12 to 15 feet. There are also 53 passive recovery wells screened in and below the trench to collect intermediate groundwater. Seventeen of these wells are specifically designed and installed to address the Ninemile Creek Sand and Gravel (NMCSG) unit that occurs near the southern end of the system at a depth below the Solvay waste and marl geologic units. The NMCSG unit includes fine to coarse grained sand and gravel deposits that are likely deltaic deposits related to glacial and post-glacial fluvial discharges from historic Ninemile Creek prior to its 1926 rerouting to its current location to accommodate the construction of Wastebed 5 (OBG, 2013a). The NMCSG unit is approximately 370 feet wide and may be a preferential pathway for intermediate groundwater flow. The 17 passive recovery wells installed within it are more closely spaced and generally deeper than the 36 recovery wells installed in and below the rest of the collection trench. The interim startup phase (*i.e.,* operational verification) of the Ninemile Creek hydraulic control system was performed from July to November 2013. The system has been undergoing performance verification since the interim startup phase. To date, seep discharge from shallow soil to Ninemile Creek has not been observed when the hydraulic system is in operation; however, the IRM objective to mitigate the discharge of NMCSG unit groundwater (intermediate) to Ninemile Creek is still under evaluation. Since interim startup, additional evaluations and maintenance, including sampling for geochemical parameters, redevelopment of recovery wells and piezometers, and well pump testing have been performed to better understand and optimize its effectiveness. These efforts are ongoing.

Currently, groundwater being collected at the Northern Shoreline and Ninemile Creek Hydraulic control systems is conveyed to the Willis Avenue Groundwater Treatment Plant where it is pretreated and discharged to the Onondaga County Metropolitan Wastewater Treatment Plant. Under an Integrated IRM Construction Work Plan addendum approved by NYSDEC in 2017, an alternate pH adjustment and discharge option was established for groundwater being collected by the IRM in lieu of treatment at the Willis Avenue Groundwater Treatment Plant. This addendum included construction of a 32-foot by 32-foot pre-engineered metal building, wet well, acid and pH adjustment tanks, and pumps for discharge into the County storm sewer system (OBG, 2017c). Seep water collected from the upper portion of Ditch A is currently being treated by the pH

adjustment system. Groundwater from the Ninemile Creek and Northern Shoreline hydraulic control systems could be treated by this system.

A vegetated on-shore revetment was constructed along approximately 1,700 feet of steep cliff area at Lakeview Point. The revetment consists of stone to provide protection from erosion caused by wind-wave action. Soil and live plant stakes provide added habitat enhancement. A seeded erosion control blanket was used for the upper portion of the steep cliff area at elevations above the expected wave action to provide protection from wind erosion and to provide habitat enhancement (OBG, 2014).

The OU1 remedy is being implemented in multiple phases because of cover material availability, material placement productivity rates, planting seasons for the optimal establishment of vegetation enhancements, and site usage. Between 2015 and 2019, approximately 52 acres of vegetative enhancement cover, nine acres of one-foot vegetative structural fill cover, and five acres of one-foot vegetative cover were placed on the Site (see Figure 4). Construction in the area of the NYS Fair Orange Parking Lot entrance area (see Figure 4) was completed in January 2019. The steep bank slopes where exposed Solvay waste was present were cut back and regraded. Topsoil cover was subsequently placed and vegetated. Design and construction of the Lakeview Amphitheater and related buildings, sidewalks, cover systems, retention basins, and other surface and subsurface features were implemented consistent with the OU1 remedy (OBG, 2017a; OBG, 2018). In addition to the amphitheater construction, several other projects have been undertaken at the Subsite that have resulted in the placement of cover, either over previously-covered areas or where cover was necessary under the ROD. These projects are noted on Figure 4 and include:

- Orange Parking Lot upgrades: In 2017 and 2018, upgrades to the NYS Fair Orange Lot parking area were performed. This included paving of approximately 70 acres and the installation of stormwater infrastructure including five lined retention basins and associated piping/swales. The paved area included the nine-acre vegetative structural fill cover area noted above.
- Onondaga County Lakeview Point Landing boat dock: In 2017, an approximate 1,000-foot trail extension to access a seasonal boat dock on Onondaga Lake was constructed. This work covered approximately one and a half acres and included a paved footpath and placement of clean fill adjacent to the trail in accordance with the ROD.
- Onondaga County trail extension: In 2019, an approximately 2,000-foot trail extension was constructed from the existing west shore trail to the future NYSDEC boat launch. This work covered approximately two acres and included a paved footpath, installation of a precast concrete culvert in Ditch A and placement of clean fill adjacent to the trail in accordance with the ROD.

Consistent with the OU1 ROD remedy, there are approximately 65 acres remaining on the Subsite that require cover material--the biosolids area (two-foot cover); limited areas along the trail (one-foot cover); and vegetative enhancement in several areas (these areas are shown on Figure 4). It is anticipated that placement of cover materials in these remaining areas will occur during the 2020 construction season. The details regarding the placement of cover materials in these areas will be provided in a future work plan or work plan addendums.

The ROD included an RAO to prevent or minimize inhalation of or exposure to contaminants volatilizing from contaminated soil/fill material/Solvay waste that would result in unacceptable human exposure, and to mitigate impacts to public health resulting from SVI into any buildings constructed on the Site.

The ROD required an evaluation of the need for SVI mitigation systems and/or installation of such systems to service new buildings on the property. The amphitheater construction included a cover with open sides, stage area (front of house), back of house (BOH) building, and a small number of outbuildings (restrooms and box office). The site usage is planned to be seasonal (warmer weather between late spring and early fall) for concert performances.

Institutional Controls Summary Table

Table 1, below, summarizes the status of the institutional controls.

Table 1: **Summary of Planned and/or Implemented Institutional Controls for Wastebeds 1-8 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)
Soils/fill material	Yes	Yes	Sitewide	Requires that intrusive activities be conducted in accordance with the SMP	Declaration of Covenants and Restrictions & Environmental Easement, September 2024
Vapor Intrusion	Yes	Yes	Sitewide	Require vapor intrusion investigation and/or mitigation measures be conducted for future on-site structures, as appropriate, in accordance with the SMP	Declaration of Covenants and Restrictions & Environmental Easement, September 2024

Systems Operations/Operation & Maintenance

As noted above, the Eastern Shoreline, Ditch A, Northern Shoreline, and Ninemile Creek hydraulic control systems are in the startup and/or initial performance verification phase. Operational data (*e.g.,* wet well elevations, pump data) and monitoring data (*e.g.,* groundwater elevations, surface water elevations) have been and are being collected. This information is being evaluated and used to aid in hydraulic control system operation process refinement and enhancement. These activities are ongoing. Performance/verification activities associated with the hydraulic control systems installed at the Subsite will be reported annually upon completion of the startup phase in accordance with the Wastebeds 1-8 Integrated IRM Start-Up Plan (OBG, 2013b).

As part of the IRM, the inland wetlands were constructed between 2013 and 2015. The connected wetland was constructed in 2016. Vegetation monitoring for the wetlands includes quantitative vegetation sampling at six vegetative plot (VP) locations, including two each in Inland Wetlands A and B, and one each in Inland Wetland C and the connected wetland (see Figure 5). At each station, 100-square foot sample plots were established to evaluate herbaceous and woody vegetation. Overall plant cover at the Subsite is 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 draft Performance Verification and Monitoring Plan and draft Wastebeds 1-8 OU1 Interim Site Management Plan. In addition to vegetative cover, indicators of wetland hydrology, hydric soil, and wildlife utilization were evaluated within each VP.

Except for VP-A2 in 2018, the total absolute ground cover within the plots have equaled or exceeded the 80% absolute vegetative cover target in each of the six vegetative plots during Years 2-4 (2016-2018). The total absolute ground cover in VP-A2 in 2018 was 62%. The decline in absolute ground cover in VP-A2 in 2018 relative to prior years is likely attributable to the presence of muskrats (*Ondatra zibethicus*) which feed on cattails (*Typha* spp.) The vegetation is expected to reestablish naturally as other emergent species and submerged aquatic vegetation fill in the newly opened water areas (OBG and Parsons, 2019). Vegetative cover for each of the inland wetlands and the connected wetland was qualitatively estimated to be greater than 95%, which exceeded the 80% performance target for Years 1-4 (2015-2018) of the five-year monitoring period. Additionally, cover of invasive plant species has been below the 5% performance target for most of the restored areas during Years 1-4 of the five-year monitoring period. Vegetation cover within the turtle nesting zones constructed on the northern wetland berms was generally within the 20% to 40% cover target. Forty percent was selected as a reasonable maximum vegetative cover for the nesting zones as increased cover could inhibit the turtles from selecting these areas for nesting. Qualitative observations were also performed to evaluate the vegetative cover present on the restored non-wetland areas including the vegetated wet swales, seep aprons, access pathways, and areas adjacent to access pathways. The 80% vegetative coverage target has generally been met in these areas.

Some Subsite areas and engineering controls are potentially vulnerable to severe storms and weather events that may increase in both severity and frequency as a result of global climate change. Areas that may be affected include portions of the Subsite located in the 100-year floodplain and shoreline areas susceptible to erosion during severe rain and flooding events. Engineering controls that may be adversely impacted by severe weather events and flooding include site drainage and stormwater management features. These areas and engineering controls will be assessed periodically and immediately following severe weather events. Any damaged areas or engineering controls will be evaluated and, as warranted, undergo corrective actions consistent with the SMPs (there are multiple plans).

III. PROGRESS SINCE THE LAST REVIEW

This is the first FYR for the Subsite.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On October 1, 2019, 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 US Virgin Islands, including the Subsite of the Onondaga Lake Superfund Site. The announcement can be found at the following web address: https://www.epa.gov/aboutepa/fiscal-year-2020-five-year-reviews

In addition to this notification, a notice of the commencement of the FYR was sent to local public officials. The notice was provided to the town of Geddes by email on September 18, 2019 with a request that the notice be posted in town hall and on the town webpage. In addition, on September 18, 2019, the notice was distributed via the NYSDEC's Onondaga Lake News email listserv, which includes approximately 11,000 subscribers. The purpose of the public notice was to inform the community that the EPA would be conducting a FYR to ensure that the remedy implemented at the Subsite remains protective of public health and is functioning as designed. In addition, the notice included contact information, including addresses and telephone numbers, for questions related to the FYR process for the Subsite.

Once this FYR is completed, the results will be made available at the Site information repositories maintained at the NYSDEC Region 7 Office, 615 Erie Boulevard West, Syracuse, New York; NYSDEC Central Office, 625 Broadway, Albany, New York; Onondaga County Public Library, Syracuse Branch at the Galleries, 447 South Salina Street, Syracuse, New York; and the Atlantic States Legal Foundation, 658 West Onondaga Street, Syracuse, New York; and online on EPA's public site page: https://www.epa.gov/superfund/onondaga-lake. In addition, efforts will be made to reach out to local public officials to inform them of the results of the FYR.

No interviews were conducted for this FYR.

Data Review

Post-construction data relating to remedy effectiveness for OU1 of the Subsite include results pertaining to SVI and surface water monitoring in the inland wetlands and vegetated wet swales. These results are discussed below.

Soil Vapor Intrusion

As part of the Lakeview Amphitheater building construction, a soil vapor mitigation system was installed to protect the occupants from potential SVI. Initial sampling was conducted in August 2015 to assess the BOH building of the Lakeview Amphitheater. The BOH building represents the area most susceptible to SVI concerns due to the enclosed nature of the structure and the potential for increased human occupancy during seasonal venues. Three samples were collected using Summa air collection canisters over an approximate 24-hour period from the building maintenance room. The samples included one sub-slab air sample collected from a sub-slab

sampling port, one interior sample collected proximate to the sub-slab location, and one outdoor ambient air sample collected from the loading dock area. Samples were analyzed for volatile organic compounds (VOCs) in accordance with EPA TO-15 methodology (Gilbane, 2018). These samples did not indicate the presence of indoor air contaminants at levels of concern or a specific indoor source. Consistent with state and EPA guidance, however, additional samples were collected during the heating season as discussed below.

Samples to evaluate SVI were collected during the heating season in 2016, 2017, and 2018. During each of these years, one sub-slab sample was collected from the BOH maintenance closet, five indoor air samples were collected from the BOH maintenance closet, BOH office, BOH kitchen [artist lounge], BOH stage, ticket box office, and concession stand and two outdoor air samples (near the ticket box office and stage). The sample locations are shown in Figures 6 and 7. In 2018, one additional indoor air sample was collected from the concession stand and one additional outdoor air sample was collected near the concession stand (see Figure 8).

While 33 VOCs were detected in either the sub-slab, indoor air, and/or outdoor air samples, as shown in Table 1, all of the detected levels for the 28 VOCs for which commercial use vapor intrusion screening levels are available were well below the screening levels. The screening levels are based on the most stringent value between a cancer risk of $1x10^{-6}$ or noncancer hazard quotient of 1.

Surface Water Monitoring

Surface water quality sampling was performed annually beginning in 2015 in the Inland Wetlands at three locations, one location for each wetland, and in the vegetated wet swales at 13 locations. Wetland surface water samples were analyzed for chloride and vegetated wet swale samples were analyzed for BTEX, naphthalene, phenol, inorganics, and cyanide. Beginning in 2016, chloride was added to the vegetated wet swale parameters list, and beginning in 2017, the analytical parameters for wetland surface water samples were expanded to include BTEX, naphthalene, phenol, inorganics and cyanide. All surface water samples were analyzed for field parameters (*i.e.,* temperature, pH, turbidity, conductivity, oxidation-reduction potential, and dissolved oxygen). The analytical results were compared to NYSDEC Class C standards or guidance values (SGVs) where available. For chloride, which does not have an NYSDEC Class C SGV, the results were compared to the EPA ambient water quality criteria (AWQC) aquatic life freshwater chronic criterion of 230 milligrams per liter (mg/L). Sampling locations are presented on Figure 9 and the sampling results are discussed below.

Toluene was detected in Inland Wetlands A and B in 2016 and in Inland Wetland B in 2017 at levels below the surface water criterion. No other VOCs were detected in the wetland surface water samples. In 2017, toluene was detected in three vegetated swale samples and benzene was detected in one vegetated wet swale sample. All four of these detections were below SGVs. No VOCs were detected in the vegetated wet swale samples in 2015, 2016, and 2018. Naphthalene and phenol were not detected in the wetland or vegetated wet swale surface water samples.

Chloride and inorganic surface water exceedances for the inland wetlands and vegetated wet swales are presented on Figures 10 through 13. In 2015, chloride was detected at 245 mg/L in the sample collected from Wetland C. This level exceeded the EPA AWQC aquatic life freshwater

chronic criterion of 230 mg/L. Chloride levels in all of the other wetland samples collected between 2015 and 2018 were below the AWQC criterion. Chloride was detected in one location (CB-03) of the 13 vegetated wet swale sample locations above the AWQC criterion in both 2016 (503 mg/L) and 2017 (1,090 mg/L). The 2017 sample was collected from pooled water adjacent to the catch basin with low flow present. Chloride was not detected above the criterion in any of the 2018 vegetated wet swale samples.

In 2017 and 2018, several inorganics were detected in at least one of the three Inland Wetland samples, including aluminum, arsenic, barium, calcium, iron, magnesium, manganese, mercury, potassium, sodium, and zinc. Exceedances of SGVs in 2017 were aluminum (SGV is 0.1 mg/L) at Inland Wetland A (0.228 mg/L) and Inland Wetland C (0.287 mg/L), and iron (SGV is 0.3 mg/L) at Inland Wetland A (2.25 mg/L) and Inland Wetland B (13.6 mg/L). Exceedances of SGVs in 2018 were aluminum at Inland Wetland A (0.218 mg/L), Inland Wetland B (0.9 mg/L) and Inland Wetland C (0.38 mg/L), and iron at Inland Wetland A (2.48 mg/L), Inland Wetland B (2.6 mg/L), and Inland Wetland C (0.332 mg/L). Aluminum and iron were also detected above their respective SGVs between 2015 and 2018 in a majority of the vegetated wet swale surface water samples. Other inorganics (*i.e.,* cobalt, selenium, silver, thallium, and vanadium) and cyanide were detected at levels above their respective SGVs in some vegetated wet swale surface samples**.**

The observed aluminum and iron concentrations exceeding SGVs may be related to Subsite particulates deposited within the inland wetlands via wind. Another potential source of inorganic constituents to Subsite surface waters is the fill material used in the construction of the inland wetlands (and vegetated wet swales). For example, imported fill used during the construction of the inland wetlands was sampled for the presence of aluminum and iron and in four samples, aluminum averaged 22,425 milligrams per kilogram (mg/kg) and iron averaged 27,550 mg/kg. These concentrations are within or near the reported ranges of background concentrations for aluminum and iron for uncontaminated soils in New York.

It should be noted that SGVs are based on reported effects to aquatic fauna, including fish, but the inland wetlands were designed to be disconnected from the lake to avoid migration to and inhabitation by fish. Fish are predators of amphibians and, therefore, undesirable in the inland wetlands because amphibians are target organisms for utilization/inhabitation of the wetlands. There is a lack of criteria or guidance values on the effects of aluminum or iron in surface water specific to amphibians in available literature. Based on a literature review conducted to evaluate the potential effects of aluminum and iron in surface water on aquatic plants, levels of aluminum and iron found, to date, in the inland wetlands do not appear to be at levels of concern to the floral community. It is also worth noting that both the floral and faunal communities of the wetlands and swales, including amphibians, are diverse and thriving. The restored plant communities in the lakeshore area continually meet or exceed established performance targets for vegetative cover and diversity. Site inspections have found that amphibian species were observed in and around the wetlands and significant evidence exists suggesting that these species are successfully breeding and recruiting new individuals to their population. Based on the above, the presence of aluminum and iron at levels above SGVs in some samples is not believed to resulting in adverse effects on the floral and faunal communities of the wetlands and swales.

Site Inspection

An inspection of the Subsite was conducted on August 7, 2019. In attendance were Robert Nunes, Thomas Mongelli (RPM for the Semet Residue Ponds subsite, which was also inspected that day), and Nicholas Mazziotta of EPA, Don Hesler and Tracy Smith of NYSDEC, Shane Blauvelt representing Honeywell, and Stephen Miller of Honeywell, Alma Lowry representing the Onondaga Nation, and Travis Glazier of the Onondaga County Office of the Environment.

The mitigation wetlands, Orange Parking Lot outfall, one-foot cover, revetment, seep apron, and Ditch A areas were observed. No significant issues were noted. Leaching/staining that was observed by NYSDEC in April along the eastern shoreline, specifically in the vicinity of a discharge pipe from the Orange Parking lot, the connected wetland and the inland wetlands was not present during the inspection. Some calcium carbonate seepage in the vicinity of the lakeview dock was observed. Repair work in a culverted section of Ditch A to address a damaged/defective culverted section has been completed. Check dams in Ditch A were observed downstream of this section. The check dams facilitated removal of any Solvay waste that infiltrated into the damaged culvert and Ditch A.

V. TECHNICAL ASSESSMENT

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

All implemented construction-related components of the OU1 remedy are consistent with the OU1 ROD and are functioning as intended. A remedy for OU2 for the Subsite, which will address the impacted groundwater and impacted media in a surface water drainage ditch, will be developed following completion of the OU2 FS.

Post-remediation maintenance of the wetlands habitats, as well as planting of appropriate species of wetland and upland vegetation is being conducted in accordance with the interim SMPs. ICs, such as environmental easements, will be used to ensure that any intrusive activities in areas where contamination remains are implemented in accordance with the final SMP.

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?*

Human Health

There have been no changes in the physical conditions of the Subsite since the remedy was selected that would change the protectiveness of the remedy. The HHRA conducted for OU1 concluded that there was potential unacceptable risk for recreational receptors engaging in certain activities such as riding all-terrain vehicles and to construction workers. The risks were driven by exposure to particulates in air and to dust generated during these activities and to direct contact with shallow groundwater through construction activities (OBG, 2011b). The exposure assumptions and

pathways assessed in the ROD followed the Risk Assessment Guidance for Superfund used by EPA and remain valid. Although specific parameters may have changed since the time the risk assessment was completed, the process that was used remains valid. In addition, some of the toxicity values that were used in the HHRA have changed; however, the changes would not impact the remedial decision that was made for the Subsite.

The RAOs remain valid and the selected remedy is protective of human health. The implementation of the OU1 remedy will effectively interrupt potential exposures to the recreational receptors and construction workers. Once established, the ICs noted in Section II, Table I will continue to restrict site use and prevent exposure to contamination remaining on-site. In the interim, general security measures are being implemented in work areas to restrict access and protect the general public. The measures include the placement of temporary fencing and signage, and providing security surveillance.

Cleanup goals identified in the ROD and which are identified as the NYSDEC Soil Cleanup Objectives contained in 6 NYCRR Part 375 remain valid.

Soil Vapor Intrusion

SVI testing has been performed at several locations at the amphitheater over the past several years and the data indicate that there are no indoor air impacts that would be associated with unacceptable levels of risk. Additionally, the ROD for OU1 included a provision that future on-site buildings should be evaluated for the potential for SVI and that any impacts to public health resulting from SVI into those buildings should be mitigated, as warranted. Therefore, this pathway is also sufficiently addressed by the remedy.

Ecological

Although the values and methodologies used may have changed since the BERA was performed, the risk assessment remains valid. The BERA concluded that ecological risk was primarily associated with exposure to metals, pesticides, semivolatile organic compounds, and PCBs in soil, fill and Solvay material by terrestrial receptors (*i.e.*, American robin, shrew, red-tailed hawk and fox). The majority of risk was related to soil in the Biosolids Area, however, the RI identified contaminant concentrations in soil and Solvay material above ecological criteria across the Subsite (OBG, 2011a).

The RAOs and goals established at the time of the ROD are still valid. The Integrated IRM included the placement of vegetative cover material over a 14.4-acre area along the eastern lakeshore and the construction of 9.5 acres of mitigation wetlands (Wetlands A, B, C and the connected wetland). The shoreline cover successfully interrupts exposure to terrestrial receptors in this part of the Subsite. Furthermore, annual vegetation monitoring has indicated that the total absolute ground cover within each plot location has primarily met the performance target during years 1-4 of the five-year monitoring period. Vegetative growth is expected to continue improving into the next monitoring period. Although the Integrated IRM included various sediment removal actions within Ditch A, impacted media associated with this site feature are being further evaluated as part of OU2. Several inorganics, primarily aluminum and iron, have been detected in surface water samples above SGVs protective of aquatic fauna, including fish, from Wetlands A, B, and

C between 2015-2018. These concentrations, however, may be attributable to particulates deposited within the inland wetlands via wind or to imported fill used during construction which contained aluminum and iron within background ranges. The concentrations of aluminum and iron in surface water are not considered to be at levels of concern as the inland wetlands are disconnected from the lake, designed to prohibit the inhabitation of fish. Both the floral and faunal communities of the wetlands and swales are diverse and thriving.

As stated in Section II, the vegetative cover is being implemented in multiple phases. When completed, the cover will include a two-foot thick layer placed in areas of ecological significance, which is expected to successfully interrupt exposure to terrestrial ecological receptors in upland areas relative to the eastern lakeshore. The extent of areas receiving the two-foot cover will include the Biosolids Area, which comprised the majority of risk in the BERA. Other areas where a two-foot or one-foot soil cover have been placed are being used for active and passive recreational purposes, respectively, and are not expected to generate extensive wildlife activity. In addition, large portions of former Wastebeds 1, 2, 3, and 4 have been paved and are currently being used for parking, which also interrupts exposure. Therefore, the actions performed to date as part of the Integrated IRM and selected remedy are protective of ecological receptors and will continue to be protective as additional phases of remedy implementation are completed.

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 remedy.

VI. ISSUES/RECOMMENDATIONS

As can be seen in Table 2, below, there are no recommendations or follow-up actions for this FYR.

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU22

OTHER FINDINGS

The following suggestion stems from the FYR:

- The hydraulic control systems are currently undergoing startup and/or initial performance verification. As noted in Section II, performance/verification activities associated with the hydraulic control systems installed at the Subsite will be reported annually upon completion of the startup phase in accordance with the Wastebeds 1-8 Integrated IRM Start-Up Plan (OBG, 2013b). In the interim, an annual status update that includes historic

and current activities associated with startup of, modifications to, and performance testing of these systems should be developed and provided to NYSDEC and EPA.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 22	*Protectiveness Determination:* Will be Protective	*Planned Addendum Completion Date:* N/A
Protectiveness Statement: The remedy at Operable Unit 22 is expected to be protective of human health and the environment upon its completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks.		

VIII. NEXT REVIEW

The next FYR report for the Subsite is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

Gilbane Building Company. 2018. *Construction Completion Report, Lakeview Amphitheater Project,* September.

NYSDEC and EPA. 2011. *Response Action Document, Wastebeds 1-8 Site, Subsite of the Onondaga Lake Site.* August.

NYSDEC and EPA. 2014. *Record of Decision. Operable Unit 1 of the Wastebeds 1-8 Subsite, Onondaga Lake Superfund Site*. December.

OBG. 2011a. *Baseline Ecological Risk Assessment, Wastebeds 1 through 8 Site*. March.

OBG. 2011b. *Human Health Risk Assessment, Wastebeds 1 through 8 Site*. April.

OBG. 2013a. *Integrated IRM, Mitigation Wetlands, and Remediation Area A Hydraulic Control System, 100% Design Report.* January.

OBG. 2013b. *Wastebeds 1-8 Integrated IRM Start-Up Plan*. June.

OBG. 2014. *Draft Wastebeds 1-8 Integrated IRM Performance Verification and Monitoring Plan.* April.

OBG. 2016a. *Draft Feasibility Study Report, Wastebeds 1-8, Operable Unit 2*. December.

OBG. 2016b. *Wastebeds 1-8, Ditch A Pre-Design Investigation Summary*. December.

OBG. 2017a. *Phase 1 – 2015 Remedial Action Construction Completion Report, Wastebeds 1 – 8 Operable Unit 1 (OU-1)*. June.

OBG. 2017b. *Phase 3-2017 Remedial Action Work Plan, Wastebeds 1-8 Operable Unit 1 (OU-1).* September.

OBG. 2017c. *Construction Work Plan. Onondaga Lake Wastebeds 1-8 Integrated IRM Addendum No. 4*, November 6.

OBG. 2018. *Phase 2 - 2016 Remedial Action Construction Completion Report Wastebeds 1-8 Operable Unit 1 (OU-1).* March.

OBG and Parsons. 2019. *Draft Honeywell Lakeshore Upland Sites, Performance Verification 2018 Annual Reports.* April.

Parsons and OBG. 2017. *2015 and 2016 Source Control Summary for the Onondaga Lake Bottom Subsite*. May.

APPENDIX B – TABLES

Table 1: Onondaga Lakeview Amphitheater - Summary of 2016-2018 Air Sampling Analytical Results

	Sub-slab Max	Sub-slab RSL	Indoor Air Max	Outdoor Air Max	Indoor Air RSL
Volatile Organic Compounds (VOCs)	***µg/m3 (micrograms per cubic meter)***				
1,2,4-Trimethylbenzene	9.8	8760	0.79	0.64J	263
1,3,5-Trimethylbenzene	3	8760	0.49J	ND	263
1,4-Dioxane	1.3	82	ND	ND	2
2,2,4-Trimethylpentane	1		0.7	0.47J	
4-Ethyltoluene	1.5		ND	ND	
Acetone	590	4510000	28	26	135000
Benzene	2	52	1.3	1.1	2
Carbon disulfide	98	102000	0.47	ND	3070
Carbon tetrachloride	ND	68	0.63	0.63	2
Chloroform	4.2	18	ND	ND	1
Chloroethane	1.3	1460000	1.5	ND	43800
Chloromethane	91	13100	2	1.8	394
Cyclohexane	4	876000	ND	ND	26300
Ethyl acetate	3.7	10200	19	1.6	307
Ethylbenzene	7.8	164	0.48J	ND	5
Freon 11	2.9		3.1	2.8	
Freon 113	0.84J		0.92J	1J	
Freon 12	2.8		4.2	4.2	
Heptane	30	58400	0.98	0.82	1750
Hexane	1.7	102000	1.2	0.46J	3070
Isopropyl alcohol	14	29200	4.5	7.9	876
Methyl butyl ketone	ND	4380	0.57J	ND	131
Methyl ethyl ketone	170	730000	3.4	1.9	21900
Methyl tert-butyl ether	ND	1570	0.66J	ND	47
Methylene Chloride	30	40900	5.5	2.7	1230
Styrene	1.4	39000	4.1	ND	4380
Tetrachloroethylene	0.81J	1570	0.81J	ND	47
Tetrahydrofuran	800	292000	2.3	ND	8760
Toluene	2000	730000	2.3	0.64	21900
Trichloroethene	2.1	100	ND	ND	3
o-Xylene	9.6	14600	0.96	ND	438
p/m-Xylene	26	14600	1.6	ND	438
Vinyl acetate	ND	29200	1.1	ND	876

Notes

1. Only those parameters detected above the method detection limit, at a minimum of one location, are presented.
2. ND = Parameter not detected above laboratory detection limit.
3. J = Estimated value; result is less than the sample quantitation limit but greater than zero.
4. Max = Maximum detected value at any location over 3 seasons.
5. RSL = Regional Screening Level based on the most stringent value between a cancer risk of 1E-6 or noncancer hazard quotient of 1 for a commercial use scenario (see https://www.epa.gov/risk/regional-screening-levels-rsls).

APPENDIX C – FIGURES

FIGURE 1

This document was developed in color. Reproduction in B/W may not represent the data as intended.

ADAPTED FROM: SYRACUSE WEST, NY USGS QUADRANGLE.

QUADRANGLE LOCATION

HONEYWELL
WASTEBEDS 1 - 8
REMEDIAL INVESTIGATION
GEDDES, NEW YORK

N

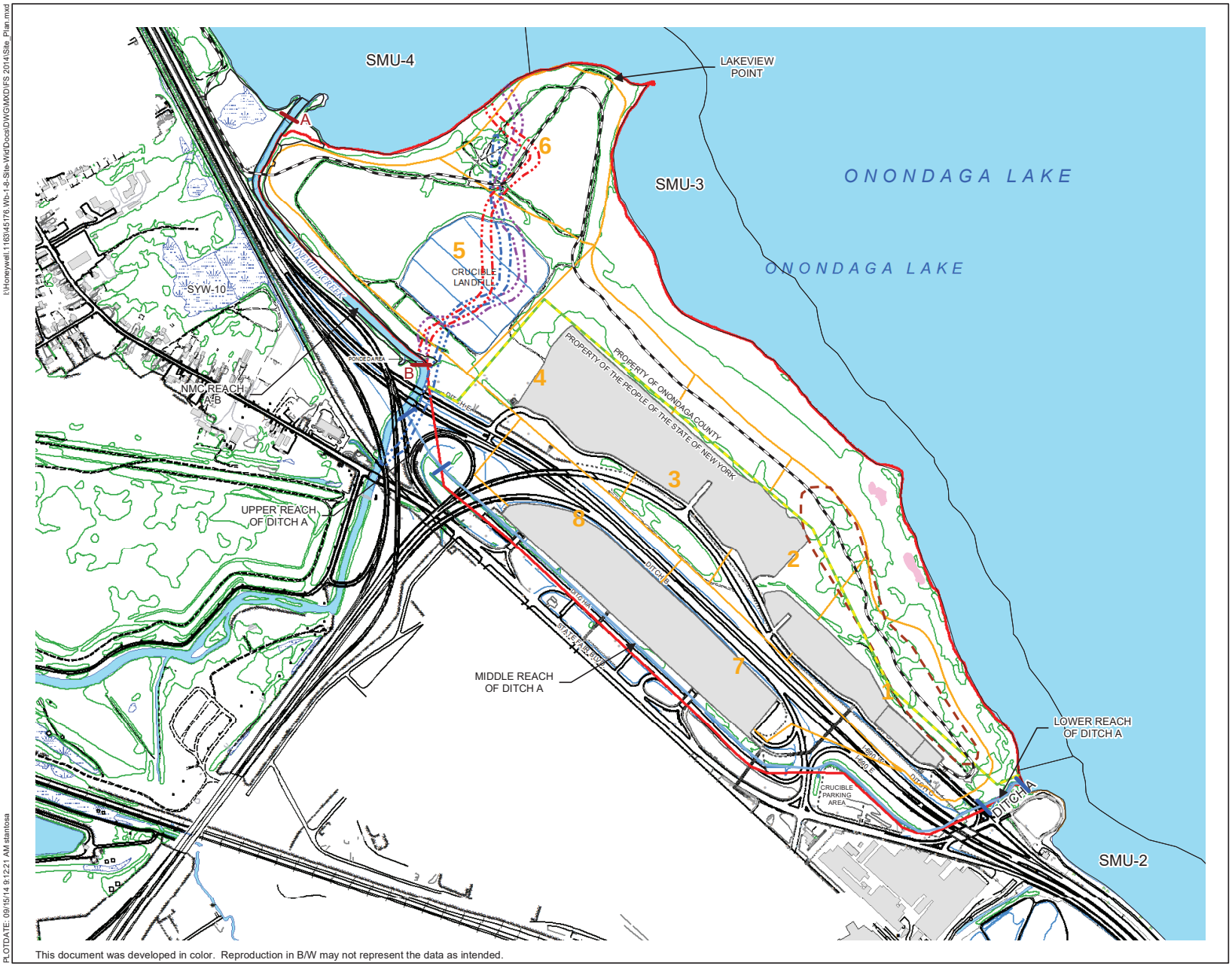
SITE LOCATION

0 1,000 2,000 4,000 6,000 8,000
Feet

APRIL 2014
1163.39642

1:24,000

O'BRIEN & GERE



This document was developed in color. Reproduction in B/W may not represent the data as intended.

FIGURE 2

N

LEGEND

- ONONDAGA COUNTY WEST SHORE TRAIL
- SMU-2 ONONDAGA LAKE SEDIMENT MANAGEMENT UNIT BOUNDARY
- DELINEATED WETLANDS
- PARKING LOT
- WASTEBEDS 1-8 PROPERTY BOUNDARY (PEOPLE OF THE STATE OF NY AND ONONDAGA COUNTY)
- APPROXIMATE WASTEBED BOUNDARY
- WASTEBEDS 1-8 SITE
- BIOSOLIDS AREA

FORMER NINEMILE CREEK CHANNEL

- USGS TOPO MAP 1898
- THOMSEN ASSOCIATES
- ALLIED DRAWING 1937

HONEYWELL
INTERNATIONAL INC.
OU-1 FEASIBILITY STUDY
WASTEBEDS 1- 8
GEDDES, NEW YORK

SITE PLAN

0 400 800 1,600
Feet

SEPTEMBER 2014
1163.45176

O'BRIEN & GERE

I:\Honeywell.1163\45176.Wb-1-8-Site-Wide\Docs\DWG\MXD\FS 2014\Site_Plan.mxd
PLOTDATE: 09/15/14 9:12:21 AM stantosa

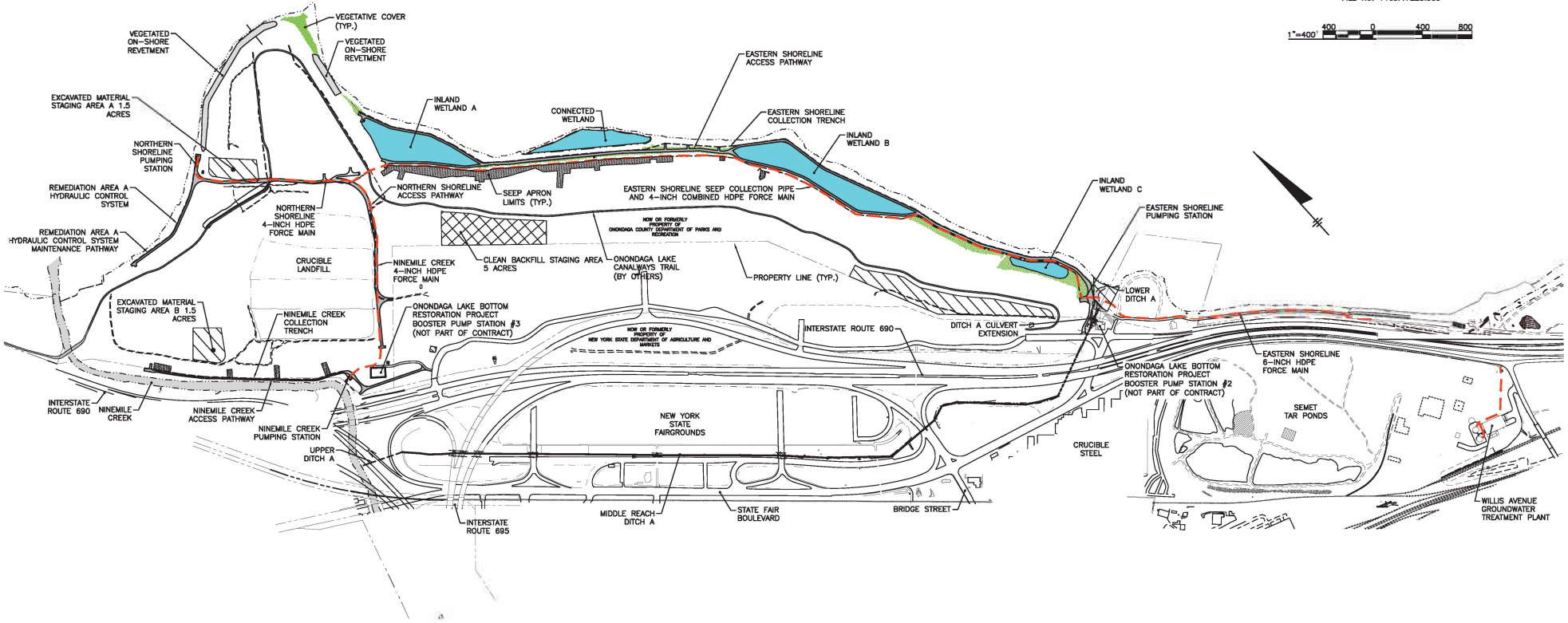
HONEYWELL WASTEBEDS 1–8
REMEDIAL INVESTIGATION
GEDDES, NEW YORK

OVERALL INTEGRATED IRM PLAN

FIGURE 3

MARCH 2014
FILE NO. 1163.47228.003

1"=400' 400 0 400 800



OVERALL PLAN
SCALE: 1"=400'

O'BRIEN & GERE

ONONDAGA LAKE

LAKEVIEW DOCK

INLAND WETLAND A

CONNECTED WETLAND

INLAND WETLAND B

INLAND WETLAND C

LAKEVIEW AMPHITHEATER

ONONDAGA COUNTY WEST SHORE TRAIL

CRUCIBLE LANDFILL

STAGING AREA-B

STAGING AREA-C

NINEMILE CREEK

DITCH E

DITCH B

DITCH A

DITCH D

DITCH C

I-690 W

I-690 E

LOWER REACH OF DITCH A

STATE FAIR BLVD.

1

2

3

4

5

6

7

LEGEND

- ACCESS PATHWAYS
- ONONDAGA COUNTY AMPHITHEATER FOORPRINT
- CRUCIBLE LANDFILL
- ONONDAGA COUNTY WEST SHORE TRAIL
- BIOSOLIDS AREA FOOTPRINT
- LAKEVIEW DOCK ACCESS CONSTRUCTION BOUNDARY

PV PROJECT AREAS

- MITIGATION WETLANDS
- VEGETATIVE COVER / SHORELINE ENHANCEMENT AREAS/ VEGETATED WET SWALE
- REVETMENT
- SEEP APRON
- APPROXIMATE LOCATION OF VEGETATED WET SWALE
- PHASE 1 VEGETATED SOIL COVER
- PHASE 1VEGETATION ENHANCEMENT COVER
- PHASE 2 STRUCTURAL FILL PARKING AREA
- PHASE 2 VEGETATION ENHANCEMENT COVER
- PHASE 3 VEGETATION ENHANCEMENT COVER (2018)
- PHASE 3 VEGETATION ENHANCEMENT COVER (2017)
- PHASE 3 STABILIZED VEGETATED SOIL COVER (2018)
- PHASE 3 1-FT VEGETATED SOIL COVER (2017)
- Addendum DP#4 Cover
- COVER REMAINING[1]

NOTES:
1. COVER REMAINING EXTENTS ARE FROM THE SELECTED REMEDY IN THE DECEMBER 2014 RECORD OF DECISION AND MAY BE MODIFIED AS PART OF FUTURE REMEDIAL DESIGNS.

HONEYWELL INTERNATIONAL
WASTEBEDS 1-8
SYRACUSE, NEW YORK

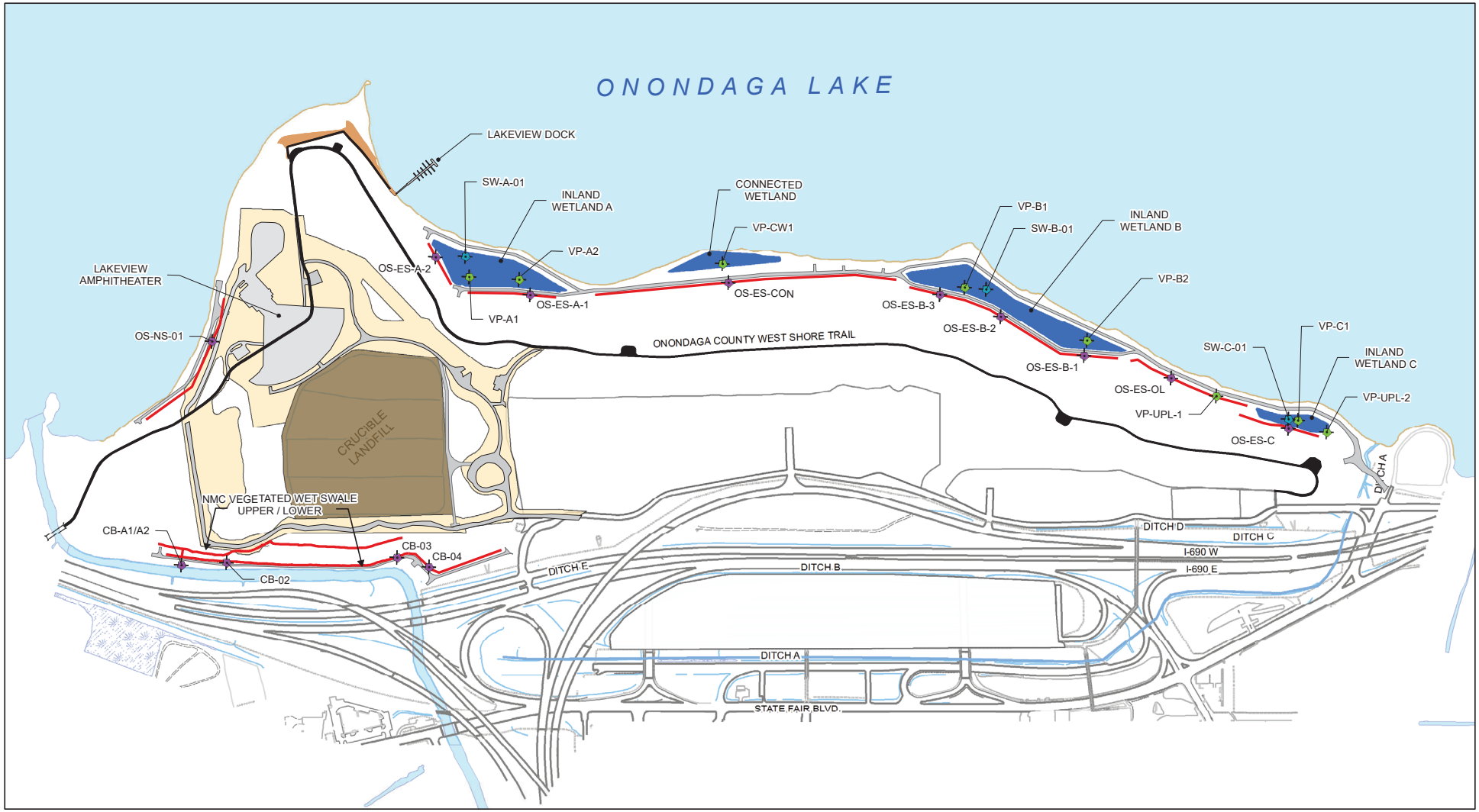
0 250 500 1,000 1,500 2,000
Feet

SITE PLAN WITH COVER TYPES AND EXTENT

1163.71536
MARCH 2020

N

O'BRIEN & GERE ENGINEERS, INC.



LEGEND

- STORMWATER SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- VEGETATION PLOT LOCATION
- APPROXIMATE LOCATION OF VEGETATED WET SWALE
- MITIGATION WETLAND
- ACCESS PATHWAYS
- ONONDAGA COUNTY WEST SHORE TRAIL
- LAKEVIEW DOCK ACCESS CONSTRUCTION BOUNDARY
- ONONDAGA COUNTY AMPHITHEATER FOOTPRINT
- CRUCIBLE LANDFILL

HONEYWELL WASTEBEDS 1-8 2017 ANNUAL REPORT SYRACUSE, NEW YORK

0 250 500 1,000 1,500 2,000
Feet

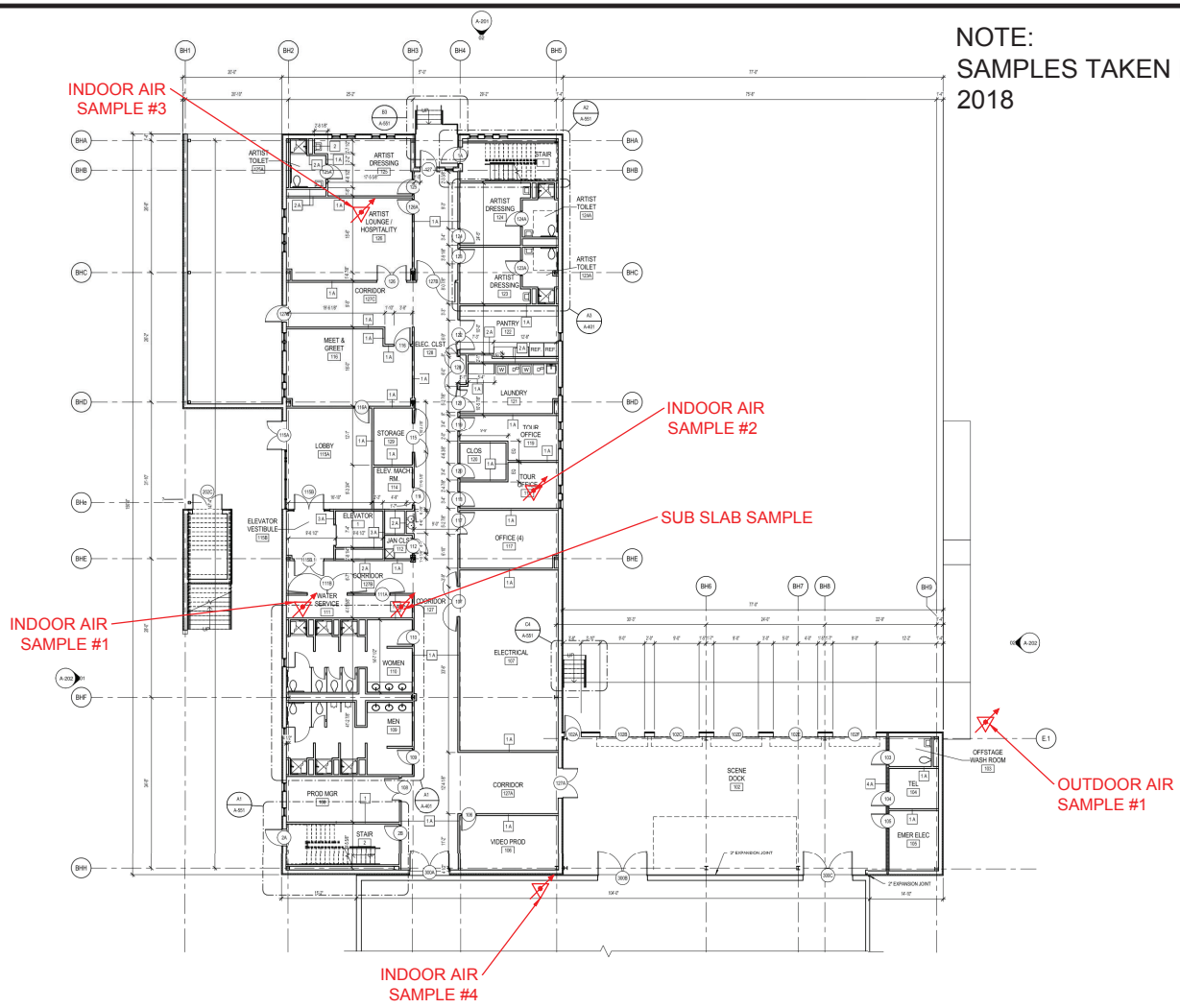
CB = CATCH BASIN STORMWATER SAMPLE
OS = OUTLET STRUCTURE STORMWATER SAMPLE
SW = SURFACE WATER SAMPLE
VP = VEGETATIVE PLOT

PERFORMANCE VERIFICATION SAMPLING LOCATIONS

1163.65387
DECEMBER 2017

O'BRIEN & GERE ENGINEERS, INC.

NOTE:
SAMPLES TAKEN FEBRUARY 28- MARCH 1, 2018



BACK OF HOUSE
NTS

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

PROJECT NO.: 0374-016-001
DATE: MARCH 2018
DRAFTED BY: RFL / NAS

AIR SAMPLING LOCATIONS

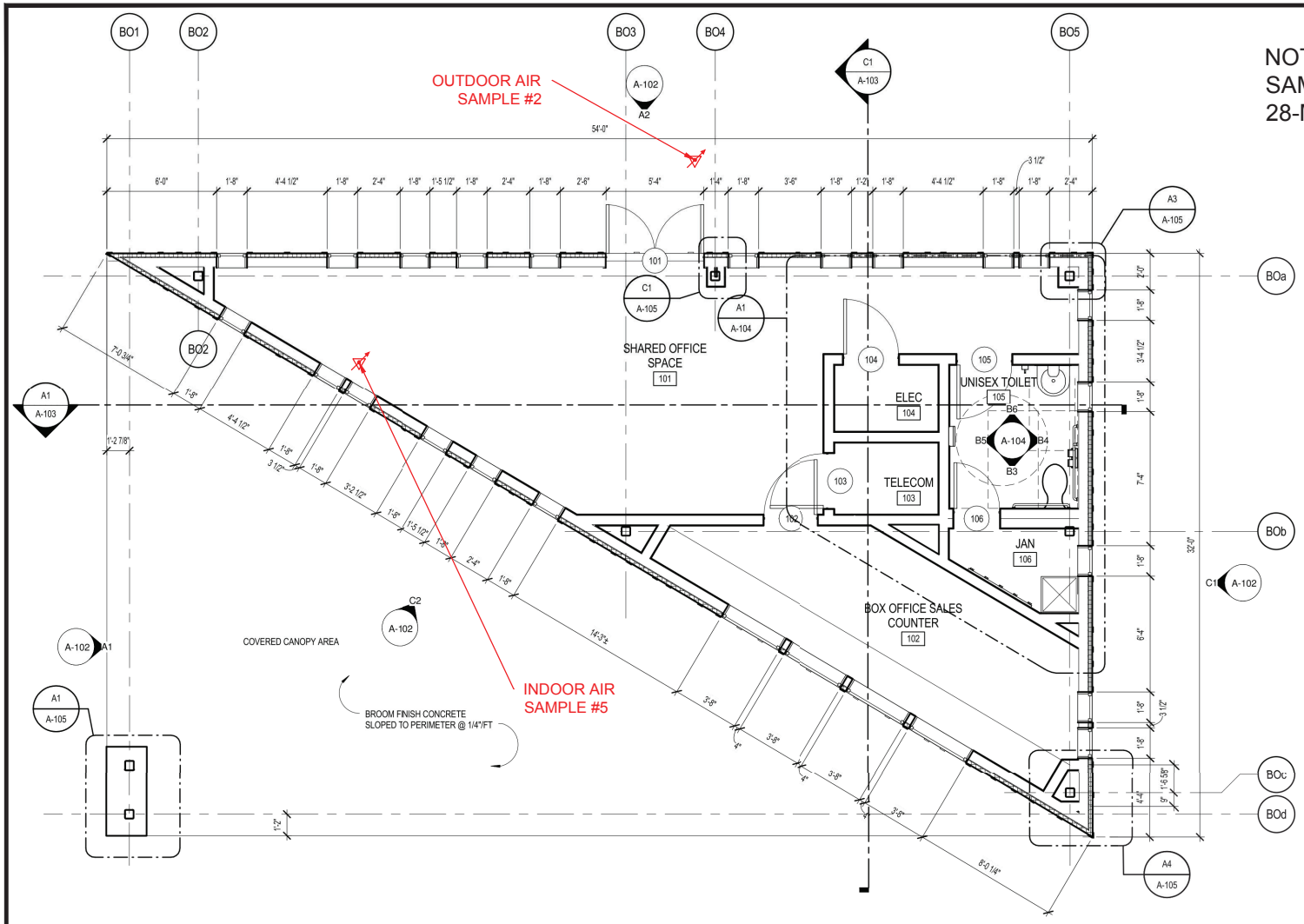
SOIL VAPOR MITIGATION TESTING

ONONDAGA LAKEVIEW AMPHITHEATER
490 RESTORATION WAY
GEDDES, NEW YORK

PREPARED FOR
ONONDAGA COUNTY

FIGURE 6

F:\CAD\Benchmark\Onondaga County\2017 Air Sampling Report\Fig 3; Air Sample Locations Box Office.dwg



NOTE:
SAMPLES TAKEN FEBRUARY 28-MARCH 1, 2018

TICKET BOX OFFICE
NTS

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

PROJECT NO.: 0374-016-001

DATE: MARCH 2018

DRAFTED BY: RFL/ NAS

AIR SAMPLING LOCATIONS

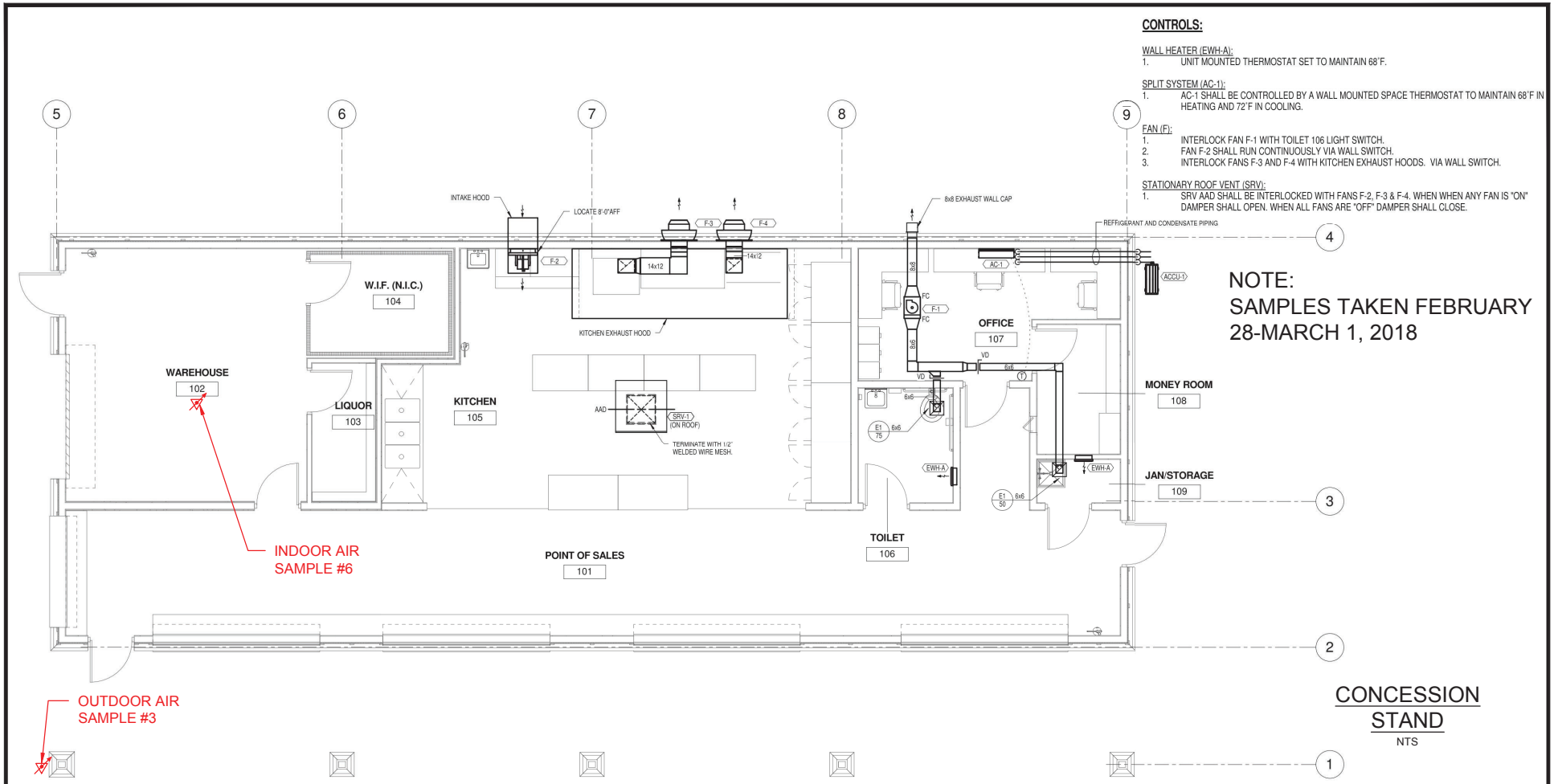
SOIL VAPOR MITIGATION TESTING

ONONDAGA LAKEVIEW AMPHITHEATER
490 RESTORATION WAY
GEDDES, NEW YORK

PREPARED FOR
ONONDAGA COUNTY

FIGURE 7

F:\CAD\Benchmark\Onondaga County\2017 Air Sampling Report\Fig 4; Air Sample Locations Concession Stand.dwg



BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

PROJECT NO.: 0374-016-001

DATE: MARCH 2018

DRAFTED BY: CMS

AIR SAMPLING LOCATIONS

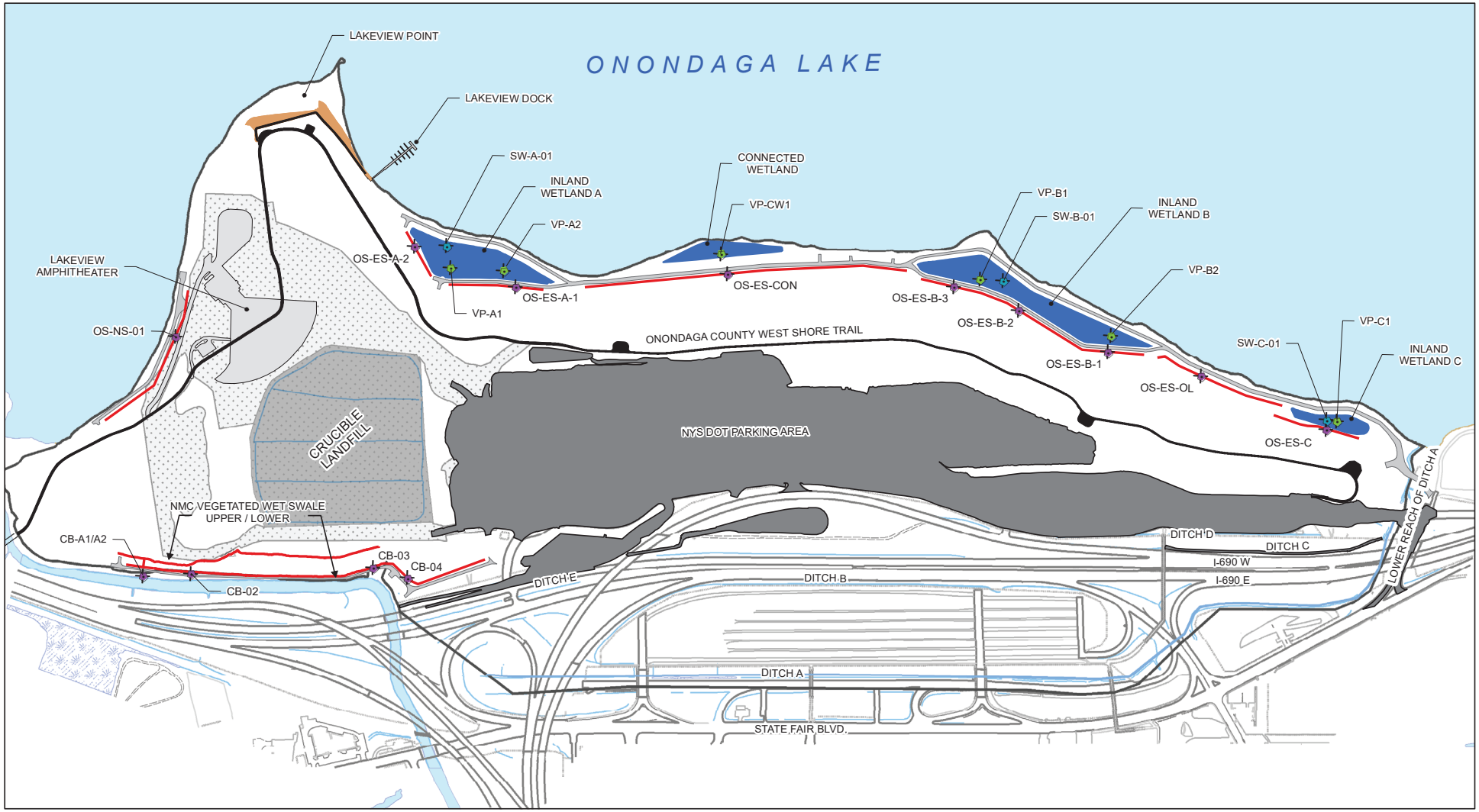
SOIL VAPOR MITIGATION TESTING

ONONDAGA LAKEVIEW AMPHITHEATER
490 RESTORATION WAY
GEDDES, NEW YORK

PREPARED FOR

ONONDAGA COUNTY

FIGURE 8



LEGEND

- STORMWATER SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- VEGETATION PLOT LOCATION
- APPROXIMATE LOCATION OF VEGETATED WET SWALE
- MITIGATION WETLAND
- ONONDAGA COUNTY WEST SHORE TRAIL
- LAKEVIEW DOCK ACCESS CONSTRUCTION BOUNDARY
- ONONDAGA COUNTY AMPHITHEATER FOOTPRINT
- CRUCIBLE LANDFILL

HONEYWELL
OU-1 COVER SYSTEM INSPECTION
2018 ANNUAL REPORT
WASTEBEDS 1-8
SYRACUSE, NEW YORK

0 250 500 1,000 1,500 2,000
Feet

CB = CATCH BASIN STORMWATER SAMPLE
OS = OUTLET STRUCTURE STORMWATER SAMPLE
SW = SURFACE WATER SAMPLE
VP = VEGETATIVE PLOT

INTEGRATED IRM COVER SYSTEMS SAMPLING LOCATIONS

N

1163.69551
JANUARY 2019

O'BRIEN & GERE ENGINEERS, INC.

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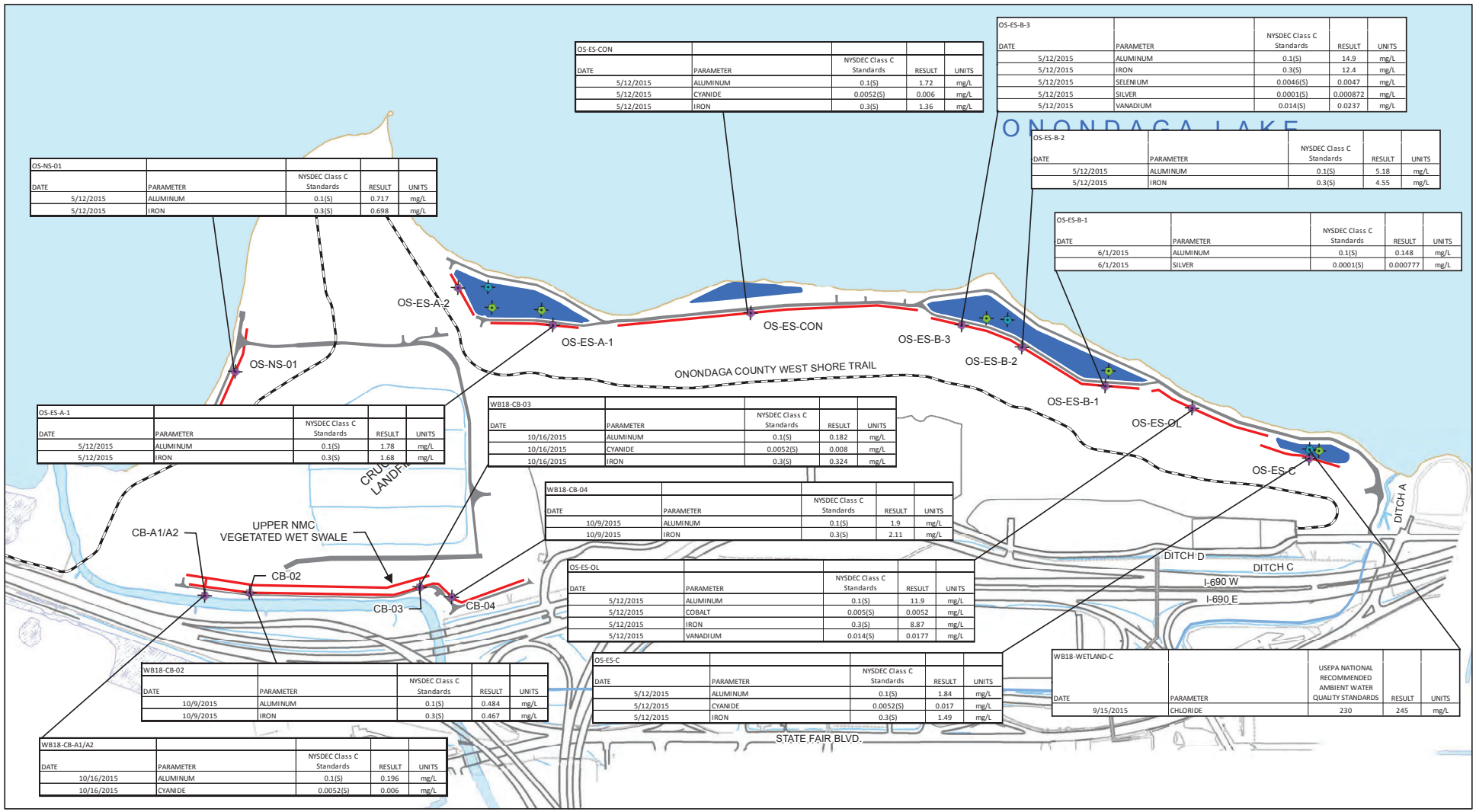

OS-NS-01

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
5/12/2015	ALUMINUM	0.1(S)	0.717	mg/L
5/12/2015	IRON	0.3(S)	0.698	mg/L

OS-ES-CON

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
5/12/2015	ALUMINUM	0.1(S)	1.72	mg/L
5/12/2015	CYANIDE	0.0052(S)	0.006	mg/L
5/12/2015	IRON	0.3(S)	1.36	mg/L

OS-ES-B-3

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
5/12/2015	ALUMINUM	0.1(S)	14.9	mg/L
5/12/2015	IRON	0.3(S)	12.4	mg/L
5/12/2015	SELENIUM	0.0046(S)	0.0047	mg/L
5/12/2015	SILVER	0.0001(S)	0.000872	mg/L
5/12/2015	VANADIUM	0.014(S)	0.0237	mg/L

OS-ES-B-2

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
5/12/2015	ALUMINUM	0.1(S)	5.18	mg/L
5/12/2015	IRON	0.3(S)	4.55	mg/L

OS-ES-B-1

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
6/1/2015	ALUMINUM	0.1(S)	0.148	mg/L
6/1/2015	SILVER	0.0001(S)	0.000777	mg/L

OS-ES-A-1

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
5/12/2015	ALUMINUM	0.1(S)	1.78	mg/L
5/12/2015	IRON	0.3(S)	1.68	mg/L

WB18-CB-03

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
10/16/2015	ALUMINUM	0.1(S)	0.182	mg/L
10/16/2015	CYANIDE	0.0052(S)	0.008	mg/L
10/16/2015	IRON	0.3(S)	0.324	mg/L

WB18-CB-04

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
10/9/2015	ALUMINUM	0.1(S)	1.9	mg/L
10/9/2015	IRON	0.3(S)	2.11	mg/L

OS-ES-OL

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
5/12/2015	ALUMINUM	0.1(S)	11.9	mg/L
5/12/2015	COBALT	0.005(S)	0.0052	mg/L
5/12/2015	IRON	0.3(S)	8.87	mg/L
5/12/2015	VANADIUM	0.014(S)	0.0177	mg/L

WB18-CB-02

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
10/9/2015	ALUMINUM	0.1(S)	0.484	mg/L
10/9/2015	IRON	0.3(S)	0.467	mg/L

OS-ES-C

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
5/12/2015	ALUMINUM	0.1(S)	1.84	mg/L
5/12/2015	CYANIDE	0.0052(S)	0.017	mg/L
5/12/2015	IRON	0.3(S)	1.49	mg/L

WB18-WETLAND-C

DATE	PARAMETER	USEPA NATIONAL RECOMMENDED AMBIENT WATER QUALITY STANDARDS	RESULT	UNITS
9/15/2015	CHLORIDE	230	245	mg/L

WB18-CB-A1/A2

DATE	PARAMETER	NYSDEC Class C Standards	RESULT	UNITS
10/16/2015	ALUMINUM	0.1(S)	0.196	mg/L
10/16/2015	CYANIDE	0.0052(S)	0.006	mg/L

LEGEND

- STORMWATER SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- VEGETATION PLOT LOCATION
- APPROXIMATE LOCATION OF STORMWATER SWALE
- MITIGATION WETLAND
- ONONDAGA COUNTY WEST SHORE TRAIL

(S) = CRITERIA STANDARD
(GV) = GUIDANCE VALUE (NONE SHOWN)

HONEYWELL INTERNATIONAL INC.
2015 ANNUAL REPORT
WASTEBEDS 1-8
SYRACUSE, NY

0 300 600 1,200 1,800 2,400
Feet

2015 SURFACE WATER SAMPLE EXCEEDANCES

JUNE 2016
1163.61068

O'BRIEN & GERE ENGINEERS, INC.

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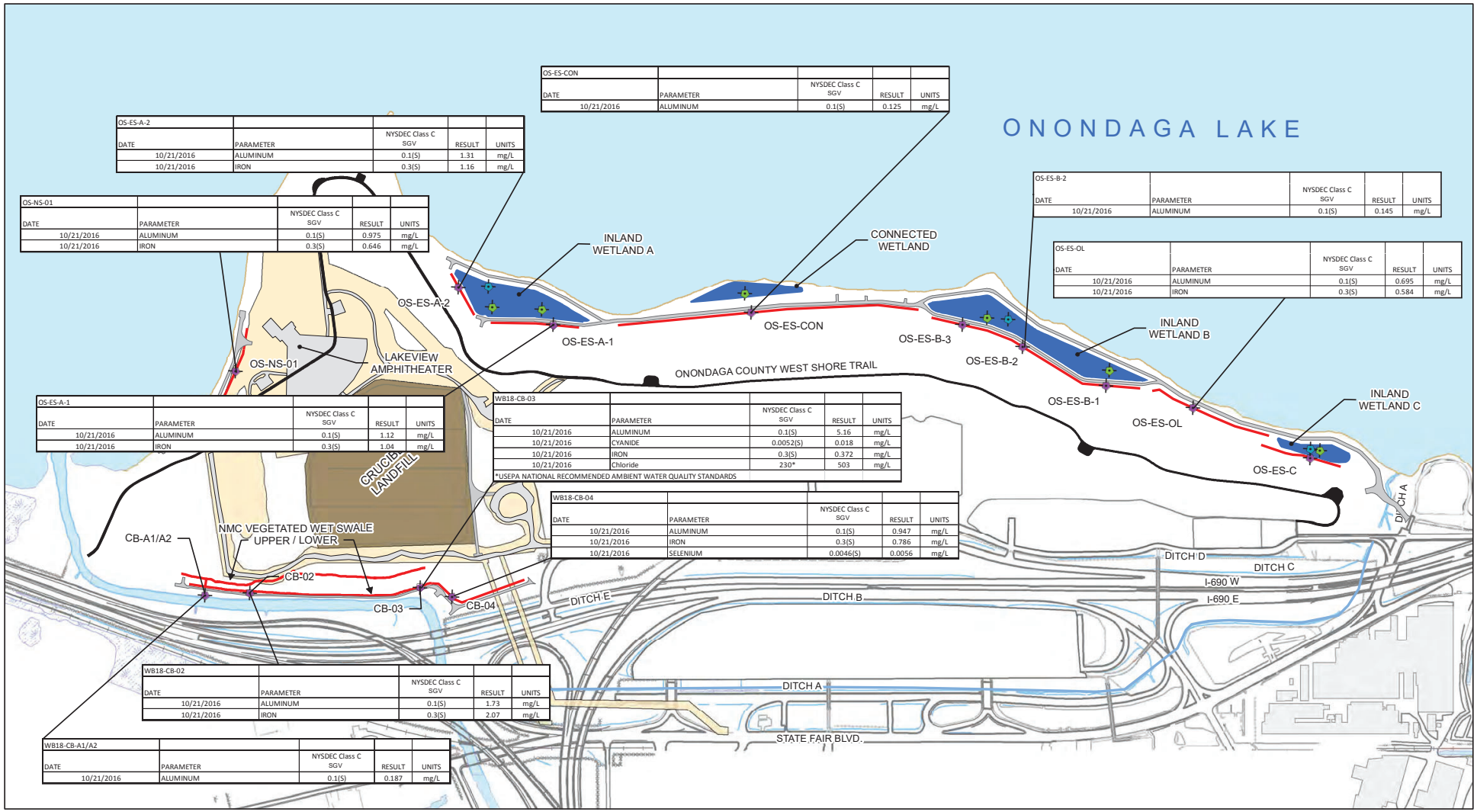

OS-ES-A-2				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	1.31	mg/L
10/21/2016	IRON	0.3(S)	1.16	mg/L

OS-ES-CON				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	0.125	mg/L

OS-ES-B-2				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	0.145	mg/L

OS-NS-01				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	0.975	mg/L
10/21/2016	IRON	0.3(S)	0.646	mg/L

OS-ES-OL				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	0.695	mg/L
10/21/2016	IRON	0.3(S)	0.584	mg/L

OS-ES-A-1				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	1.12	mg/L
10/21/2016	IRON	0.3(S)	1.04	mg/L

WB18-CB-03				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	5.16	mg/L
10/21/2016	CYANIDE	0.0052(S)	0.018	mg/L
10/21/2016	IRON	0.3(S)	0.372	mg/L
10/21/2016	Chloride	230*	503	mg/L

*USEPA NATIONAL RECOMMENDED AMBIENT WATER QUALITY STANDARDS

WB18-CB-04				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	0.947	mg/L
10/21/2016	IRON	0.3(S)	0.786	mg/L
10/21/2016	SELENIUM	0.0046(S)	0.0056	mg/L

WB18-CB-02				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	1.73	mg/L
10/21/2016	IRON	0.3(S)	2.07	mg/L

WB18-CB-A1/A2				
DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/21/2016	ALUMINUM	0.1(S)	0.187	mg/L

LEGEND

- STORMWATER SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- VEGETATION PLOT LOCATION
- APPROXIMATE LOCATION OF VEGETATED WET SWALE
- MITIGATION WETLAND
- ACCESS PATHWAYS/ AMPHITHEATER
- ONONDAGA COUNTY WEST SHORE TRAIL
- ONONDAGA COUNTY AMPHITHEATER FOOTPRINT
- CRUCIBLE LANDFILL

SGV = STANDARDS AND GUIDANCE VALUES
(S) = CLASS C CRITERIA STANDARD
(G) = CLASS C GUIDANCE VALUE (NONE SHOWN)

HONEYWELL
WASTEBEDS 1-8
2016 ANNUAL REPORT
SYRACUSE, NEW YORK

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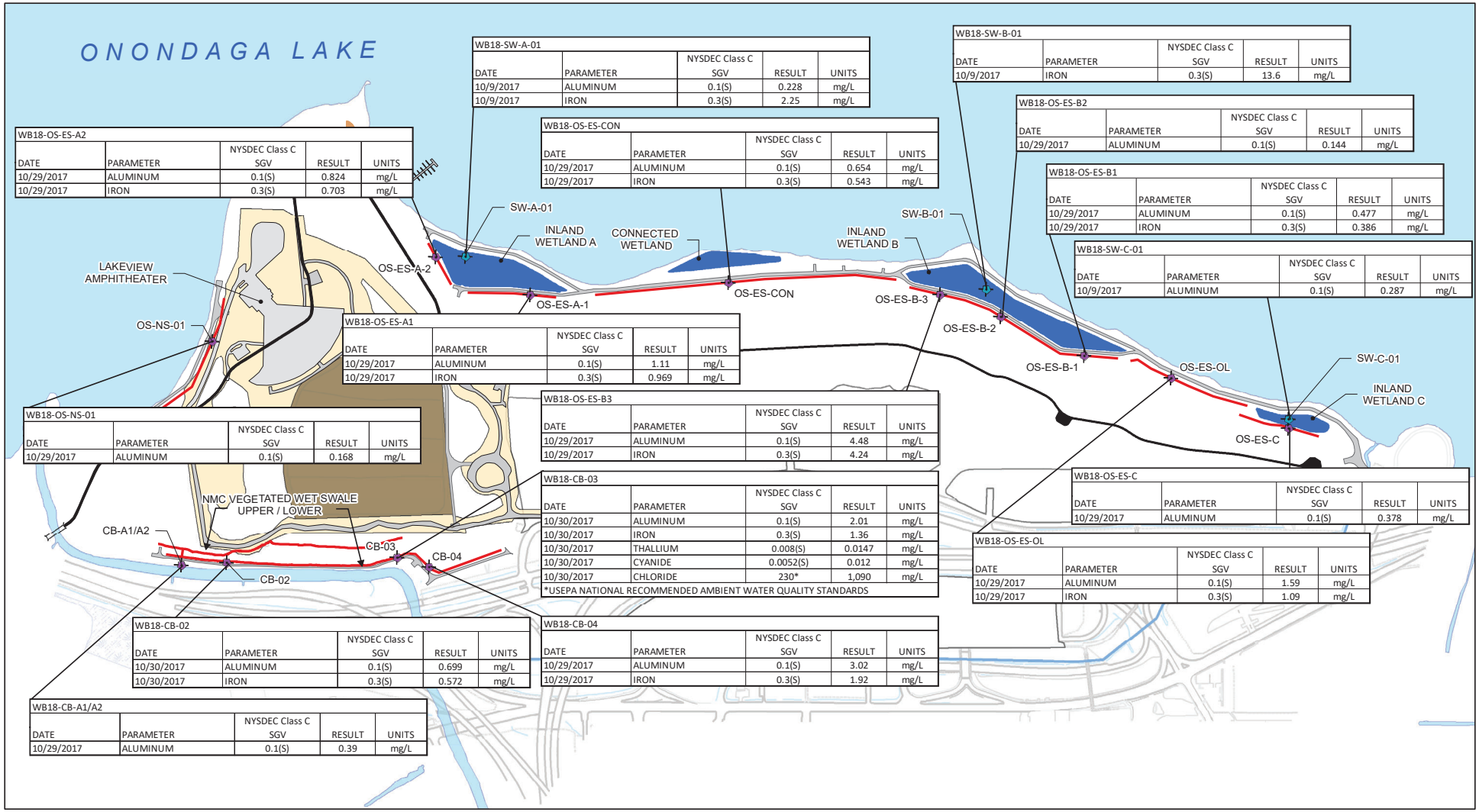
Feet

2016 SURFACE WATER SAMPLE EXCEEDANCES

MARCH 2017
1163.62958

O'BRIEN & GERE ENGINEERS, INC.



WB18-SW-A-01

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/9/2017	ALUMINUM	0.1(S)	0.228	mg/L
10/9/2017	IRON	0.3(S)	2.25	mg/L

WB18-SW-B-01

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/9/2017	IRON	0.3(S)	13.6	mg/L

WB18-OS-ES-A2

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	0.824	mg/L
10/29/2017	IRON	0.3(S)	0.703	mg/L

WB18-OS-ES-CON

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	0.654	mg/L
10/29/2017	IRON	0.3(S)	0.543	mg/L

WB18-OS-ES-B2

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	0.144	mg/L

WB18-OS-ES-B1

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	0.477	mg/L
10/29/2017	IRON	0.3(S)	0.386	mg/L

WB18-SW-C-01

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/9/2017	ALUMINUM	0.1(S)	0.287	mg/L

WB18-OS-ES-A1

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	1.11	mg/L
10/29/2017	IRON	0.3(S)	0.969	mg/L

WB18-OS-NS-01

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	0.168	mg/L

WB18-OS-ES-B3

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	4.48	mg/L
10/29/2017	IRON	0.3(S)	4.24	mg/L

WB18-CB-03

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/30/2017	ALUMINUM	0.1(S)	2.01	mg/L
10/30/2017	IRON	0.3(S)	1.36	mg/L
10/30/2017	THALLIUM	0.008(S)	0.0147	mg/L
10/30/2017	CYANIDE	0.0052(S)	0.012	mg/L
10/30/2017	CHLORIDE	230*	1,090	mg/L

*USEPA NATIONAL RECOMMENDED AMBIENT WATER QUALITY STANDARDS

WB18-OS-ES-C

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	0.378	mg/L

WB18-OS-ES-OL

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	1.59	mg/L
10/29/2017	IRON	0.3(S)	1.09	mg/L

WB18-CB-02

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/30/2017	ALUMINUM	0.1(S)	0.699	mg/L
10/30/2017	IRON	0.3(S)	0.572	mg/L

WB18-CB-04

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	3.02	mg/L
10/29/2017	IRON	0.3(S)	1.92	mg/L

WB18-CB-A1/A2

DATE	PARAMETER	NYSDEC Class C SGV	RESULT	UNITS
10/29/2017	ALUMINUM	0.1(S)	0.39	mg/L

LEGEND

- STORMWATER SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- APPROXIMATE LOCATION OF VEGETATED WET SWALE
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- ACCESS PATHWAYS
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HONEYWELL
WASTEBEDS 1-8
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0 250 500 1,000 1,500 2,000
Feet

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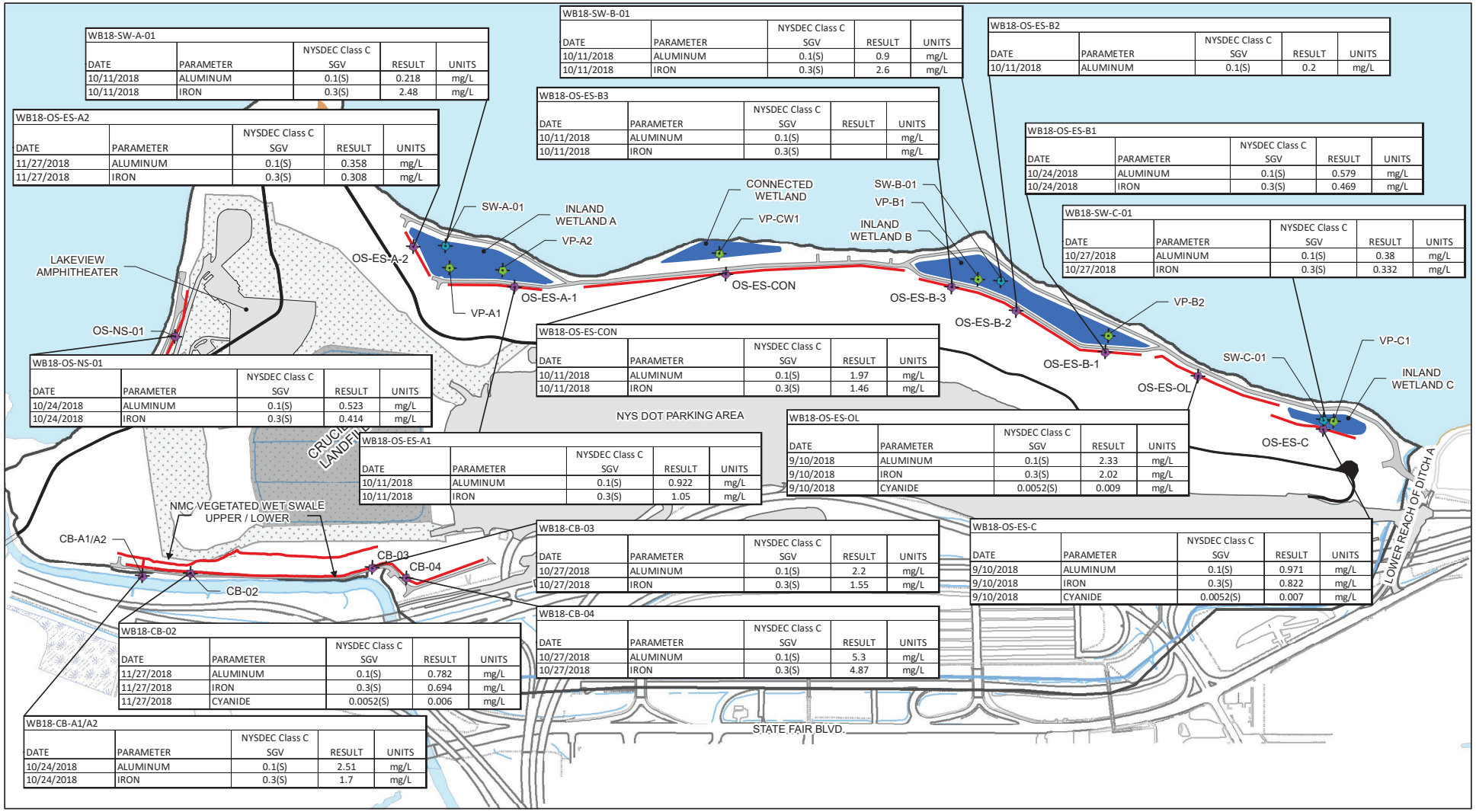
2017 SURFACE WATER SAMPLE EXCEEDANCES

1163.65387
FEBRUARY 2018

O'BRIEN & GERE ENGINEERS, INC.



LEGEND

- STORMWATER SAMPLE LOCATION
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2018 SURFACE WATER SAMPLE EXCEEDANCES

1163.69551
JANUARY 2019

O'BRIEN & GERE ENGINEERS, INC.

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