Louis Berger



## First Wetland Mitigation Bank in New York City Assessing Potential Contaminant Removal

from Sediments

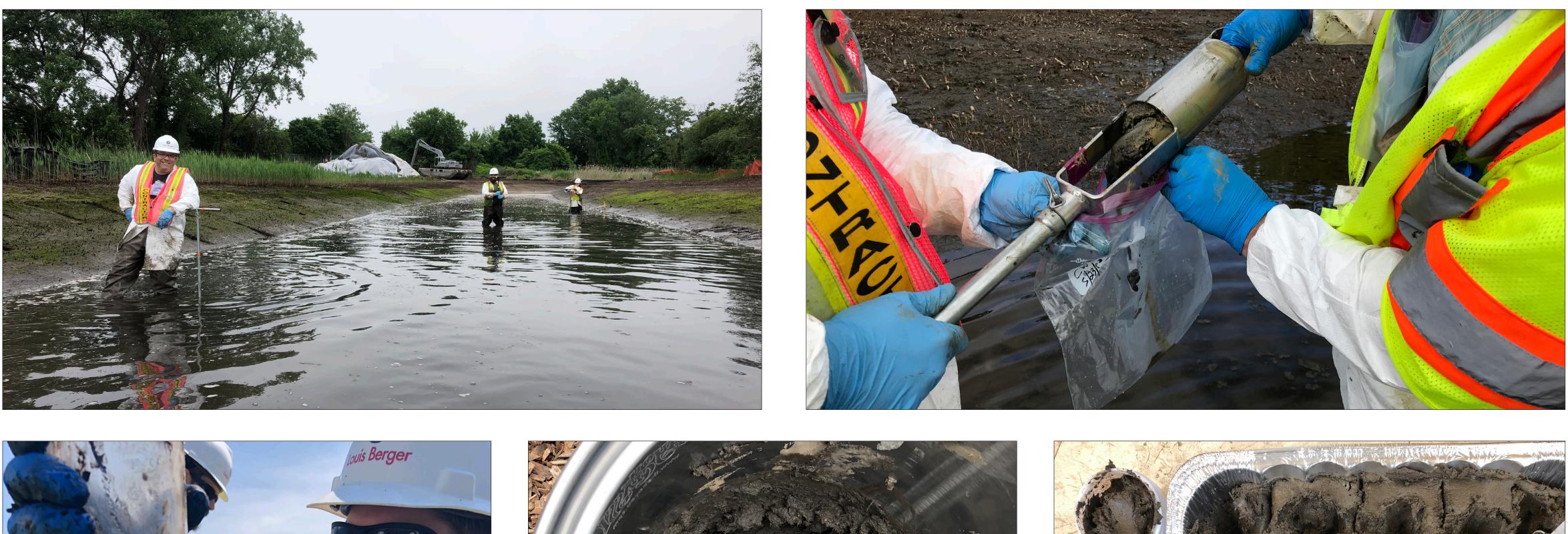
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## Background

Louis Berger is assisting the New York City Economic Development Corporation in the development of the Saw Mill Creek Pilot Wetland Mitigation Bank project, the first wetland mitigation bank in New York City. The project area consists of 68.9 acres of previously filled and degraded urban wetlands and upland buffers on Staten Island located along Saw Mill Creek, a tidal tributary of the Arthur Kill (see Figure 1, right). The project will restore or enhance tidal emergent wetlands, scrub shrub wetlands, freshwater forested wetlands, open water channels/pools, mudflats, and uplands habitats. The project performance will be measured by success criteria developed in collaboration with state and federal agencies.

This presentation focuses on the permit conditions that required the characterization of sediment concentrations at the post-grading (as-built) conditions and comparison to screening criteria. These requirements are based on agency concerns that wildlife attracted to the "clean" and newly established marshes could be exposed to contaminants that may accumulate at the site over time from other sources within the estuary.











## Activities

Wetland Disturbance Areas (WDAs) define areas where tidal marsh restoration activities occurred. Each habitat type (waterway, intertidal marsh, and high marsh) within the WDA is considered a Decision Unit. The purpose of the post-grade sediment sampling program was to characterize surface sediment (representing 0-15 cm depth) across a Decision Unit. In the field, a composite sample was created by compositing the discrete samples collected in the Decision Unit according to the 2012 Incremental Sampling Method (ISM) Manual and the project-specific requirements. Each ISM composite sample consisted of 20 discrete sediment samples (one discrete sample per grid cell for the Decision Unit). When required, three ISM composite samples were collected to account for possible sediment heterogeneity. Figure 2 shows the ISM grid cells in the Edward Curry WDA for the waterway, intertidal marsh, and high marsh Decision Units.

Post-grade sediment concentrations were compared to the New York State Department of Environmental Conservation (NYSDEC) guidance "2014 Screening and Assessment of Contaminated Sediment" to evaluate whether the post-grade sediment posed a potential ecological risk. This comparison was completed for nine TAL Metals, Total PCB Aroclor, Total DDT, Total Chlordane, and eight additional pesticides, yielding a comparison for 20 parameters for each Decision Unit. "Class C" was assigned to contaminants that had the potential to be toxic to aquatic life based on the Sediment Guidance Value (SGV) threshold value, and required corrective action (e.g., placement of clean sand) prior to planting of the wetland mitigation bank. "Class A" was assigned to contaminants that had potentially little to no risk to aquatic life based on the SGV threshold value. Contaminant concentrations between "Class A" and "Class C" were assigned the classification of "Class B" and managed per the project requirements.

The NYSDEC guidance also acknowledges that there can be numerous contaminants in a sediment samples from any particular sample, and that the overall classification of each sample is assigned based on best professional judgment, taking into account both the number of the individual contaminants and the magnitude of their concentration in the same sample. Therefore, a Mean SGV Quotient was calculated per Decision Unit using the results generated from the sediment classification of the individual 20 parameters. An example calculation of the Mean SGV Quotient is provided in Table 1, below.

All of the post-grade sediment samples had an overall classification of Class A or Class B, (refer to Table 2) and areas were planted with no further site preparation required.

Chemical Group	Parameter	Class C SGV (NYSDEC, 2014) [Project Action Level] at 2% TOC	Class A SGV (NYSDEC, 2014) [Project Quantitation Limit] at 2% TOC	Unit	Average Post-Grade Sediment Sample Concentration	Classification for Each Parameter	NYSDEC Individual Contaminant Quotient
Metal	Arsenic	70	8.2	mg/kg	25	Class B	0.36
Metal	Cadmium	9.6	1.2	mg/kg	0.33	Class A	0.034
Metal	Chromium	370	81	mg/kg	82	Class B	0.22
Metal	Copper	270	34	mg/kg	820	Class B	0.30
Metal	Lead	220	47	mg/kg	82	Class B	0.37
Metal	Mercury	0.71	0.15	mg/kg	0.86	Class C	1.2
Metal	Nickel	52	21	mg/kg	25	Class B	0.48
Metal	Silver	3.7	1.0	mg/kg	0.35	Class A	0.095
Metal	Zinc	410	150	mg/kg	84	Class A	0.20
PCB	Total PCB Aroclors	1,000	100	ug/kg	190	Class B	0.19
Pesticide	Total DDT	5,700	44	ug/kg	50	Class B	0.0088
Pesticide	Total Chlordane	1,400	63	ug/kg	2.5	Class A	0.0018
Pesticide	Dieldrin	2,300	6.0	ug/kg	3.1	Class A	0.0013
Pesticide	Endosulfan I	3.0	0.10	ug/kg	0.021	Class A	0.0070
Pesticide	Endosulfan II	3.0	0.10	ug/kg	0.045	Class A	0.015
Pesticide	Endrin	96	6.0	ug/kg	0.024	Class A	0.00025
Pesticide	gamma-BHC	7.0	1.0	ug/kg	0.052	Class A	0.0074
Pesticide	Heptachlor	1,100	71	ug/kg	0.0067	Class A	0.0000061
Pesticide	Heptachlor Epoxide	220	15	ug/kg	0.10	Class A	0.00045
Pesticide	Toxaphene	76	54	ug/kg	0.36	Class A	0.0047
	Mean SGV Quotient	<1.0	Not Applicable				0.18 Class B

Location	Mean SGV Quotient	Sediment Classification		
Edward Curry High Marsh	0.18	Class B		
Edward Curry Itertidal Marsh	0.19	Class B		
Edward Curry Waterway	0.070	Class B		
Bloomfield High Marsh	0.12	Class B		
Bloomfield Itertidal Marsh	0.054	Class B		
Bloomfield Waterway	0.037	Class A		
Sand representing Chelsea WDA	0.015	Class A		

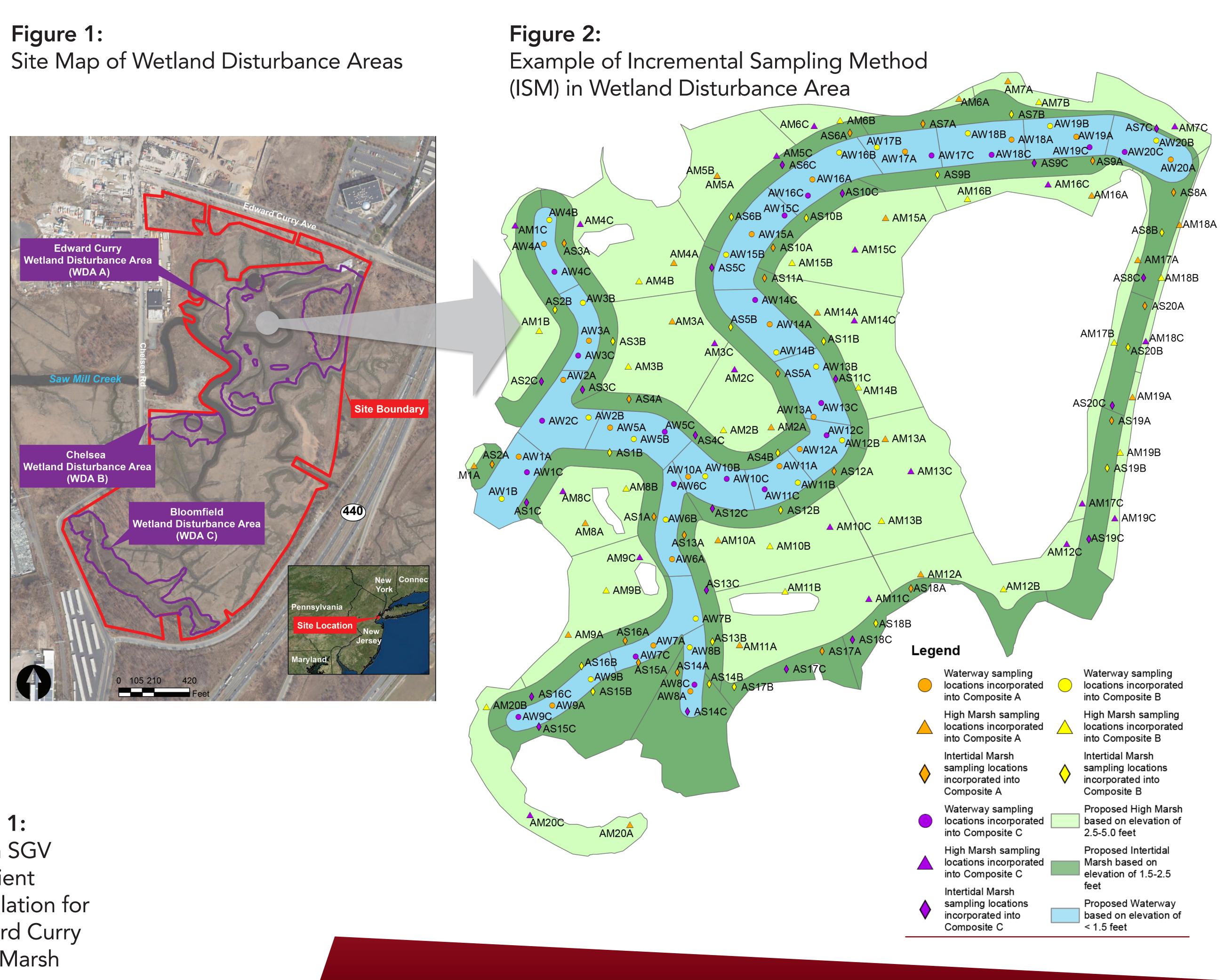


Table 1: Mean SGV Quotient Calculation for Edward Curry High Marsh

Planting of the wetland mitigation bank was substantially completed in 2018 and will be fully completed in the Spring of 2019. The next step of the program is to implement the sediment monitoring program. Louis Berger faced several challenges with the sampling program, including: working within a tidal system; conducting the post-grading sediment sampling in conjunction with ongoing construction activity and within restricted time frames to maintain the construction schedule to meet critical planting windows; and implementing the ISM. It is our hope that the findings of the sampling program will help demonstrate success of the Saw Mill Creek Pilot Wetland Mitigation Bank, which may facilitate larger wetland restoration projects in New York City's ecologically sensitive coastal areas, while also directing more public and private funds for restoration of damaged ecosystems.



Table 2: Summary Table of Mean SGV

Ouotients

## Lessons Learned

