



SPDES Permit No. NY0028410

Long Term Control Plan Semi-Annual Status Report
Reporting Period: *July through December 2017*

Amended Administrative Order

CWA-02-2014-3033

(Amends CWA-02-2012-3024)

March 2018

Long Term Control Plan Semi-Annual Status Report

Table of Contents

1. INTRODUCTION
2. REQUIREMENTS DUE IN REPORTING PERIOD
3. WORK COMPLETED IN CURRENT AND PROJECTION OF WORK TO BE PERFORMED IN NEXT REPORTING PERIODS
4. IMPLEMENTATION ISSUES
5. CHANGES IN KEY PERSONNEL
6. PUBLIC MEETINGS
7. MODEL MODIFICATIONS
8. GREEN PILOT RESULTS
9. CERTIFICATION STATEMENT

ATTACHMENT:

- A. Work Completed in Current Period/ Projection of Work to be Performed in Next Reporting Period
- B. Detailed Project Descriptions
- C. Public Meeting Materials
- D. Certificates of Acceptance and Occupancy

1. INTRODUCTION

The Buffalo Sewer Authority (Authority) received approval of its Long Term Control Plan (LTCP) from the United States Environmental Protection Agency (USEPA) and New York State Department of Environmental Conservation (NYSDEC) on March 18, 2014. The Authority entered into an Amended Administrative Order on April 16, 2014 (herein after referred to as the AO), with the USEPA. This AO establishes a schedule for implementation of the Authority's LTCP, approved by the USEPA and NYSDEC.

The AO in part requires that the Authority submit written Semi-Annual Status Reports to the USEPA and NYSDEC by September 1st for current year January 1– June 30 reporting period, and March 1st for the previous calendar year July 1 – December 31 reporting period. The AO requires that the following be provided in each Semi-Annual Status Report:

- The project milestones, deadlines and other terms that the Authority is required to meet since the date of the last Semi-Annual Status Report, whether and to what extent the Authority has met those requirements, and the reason for any anticipated delays and/or noncompliance.
- A general description of the work completed during the reporting period and the applicability of the work to meet indicated design criteria, as well as the projection of work to be performed during the next reporting period and any anticipated delays for the upcoming work. Any changes in key personnel must also be noted.
- Enclosure of public meeting (if held) materials including: advertisements, handouts, formal meeting notes, and a summary of the meeting (see Attachment C).
- Copies (to USEPA only) of all monthly monitoring reports or other reports pertaining to combined sewer overflows (CSOs) and bypasses that Authority submitted to the NYSDEC during the reporting period. Please note DMRs are now submitted electronically directly to the USEPA and no dry weather overflows occurred during this period, so this item does not apply during this reporting period.

This report covers July through December 2017 which serves as Semi-Annual Report No. 8.

2. REQUIREMENTS DUE IN REPORTING PERIOD

Attachment A provides the current status of all projects listed in the Administrative Order. Issues with implementing these projects are detailed in Section 4 of this document.

This document serves as the March 1, 2018 semi-annual report.

Certificates of Acceptance and Occupancy for fully completed projects for this reporting period are included in Attachment D.

3. WORK COMPLETED IN CURRENT REPORTING PERIOD AND PROJECTION OF WORK TO BE PERFORMED NEXT REPORTING PERIOD

A general description of the work completed on LTCP projects during the current reporting period and the work projected to be performed during the next reporting period is provided in Attachment A. Items that have been completed have been highlighted orange.

A more detailed description of each project including the location and the goal to be achieved through each project is provided in Attachment B.

4. IMPLEMENTATION ISSUES

4.1 Hamburg Drain Optimizations

Preliminary design for the Hamburg Drain Optimizations was begun prior to January 1, 2014; however detailed design was delayed due to high water levels in Lake Erie. As a result of this delay the March 18, 2016 Notice to Proceed deadline was exceeded. Upon further review of the proposed locations for sewer separation and/or green infrastructure, it was determined that sufficient sewer separation had already been conducted and/or extensive private investment requiring storm water detention/retention is expected in the drainage basins where this work was proposed. As a result, construction has commenced on the Louisiana and Miami Streets and the Willert Park Green Infrastructure project and is expected to be complete during the next reporting period.

4.2 WWTP Improvement Project Alternative C2

Design of this project has been delayed due to the need to remove extensive quantities of grit which have accumulated in the system reducing WWTP capacity. Before further upgrades are considered, the existing issues must first be rectified to allow for accurate measurements of existing capacity to be conducted. The cleaning of the A-side influent channels, aeration basin 3 and both the A-side and B-side effluent channels was completed in two separate contracts for the facility. Phase 1 removal of the grit in the secondary system included the removal and disposal of over 1,210 wet tons of grit. Phase 2 of the grit removal project continued with grit removal for the remaining influent and effluent channels and consisted of the removal of an additional 240 wet tons of grit. The Authority is now working on Phase 3 for the removal of grit from the aeration tanks in the secondary system.

The Authority is also working towards obtaining an Engineer to review and evaluate in further detail the hydraulics of the WWTP. The Authority will complete requests for proposals from engineering firms for the WWTP Project Alternative C2 and anticipates awarding that contract(s) by December 2018. The first notice to proceed for construction of Alternative C2 is expected to be issued in 2019.

4.3 North Relief-Interceptor

Preliminary subsurface investigation in conjunction with the North Relief-Interceptor concept has revealed concerns with the location of bedrock and the feasibility of the proposed tunnel location. Due to the noted concerns, the Authority has phased the proposed project. The Bird Avenue Underflow sewer project was bid in October 2017 and construction is expected to commence during the next reporting period. Engineering for the second phase is expected to begin March 2019.

5. CHANGES IN KEY PERSONNEL

No changes in key personnel occurred during this reporting period.

6. PUBLIC MEETINGS

Public information brochures and informal public meetings regarding Bird Underflow and Hazelwood RTC projects have taken place during the reporting period. Additionally, a series of educational sessions, entitled Water WORX, was held as part of the Willert Park Green Infrastructure project during the months of July and August 2017. Youth from the neighborhood, from kindergarten through grade 8, participated in a camp in order to engage and educate the community about the green infrastructure project happening in their neighborhood. Materials for these projects are included in Attachment C.

7. MODEL MODIFICATIONS

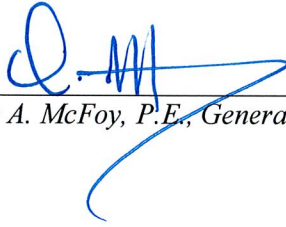
The process of converting the hydraulic model from XP-SWMM to PC-SWMM is continuing. The model is currently being calibrated and the process is expected to be completed during the next reporting period.

8. GREEN PILOT RESULTS

The Authority received proposals for the development and analysis of installed green infrastructure and awarded a contract in December 2017. We expect the report to be completed in the next reporting period.

9. CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."



Oluwale A. McFoy, P.E., General Manager

28 FEB 18

Date

Attachment A to the Semi-Annual Status Report: March 2018

Work Completed in Current Period/ Projection of Work to be Performed in Next Reporting Period

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<u>Phase I Projects</u>				
CSO 060 GI Project	---	---	Prior to 1/1/2014	Complete.
Bird/Lang RTC Projects	Construction Start	3/17/2014	2/24/2014	Complete
	Completion Date	9/2/2014	5/9/2016	Complete
	Operations/ Optimization (RTC)	9/3/2014 – 9/3/15	10/1/2016	Complete
Bird RTC Project	Construction Start	3/17/2014	2/24/2014	Complete
	Completion Date	9/2/2014	5/6/2016	Complete
	Operations/ Optimization (RTC)	9/3/2014 – 9/3/15	10/1/2016	Complete
Lang RTC Project	Construction Start	3/17/2014	2/24/2014	Complete
	Completion Date	9/2/2014	5/9/2016	Complete
	Operations/ Optimization (RTC)	9/3/2014 – 9/3/15	10/1/2016	Complete

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<u>Foundation Projects</u>				
Foundation 1 - Smith Street Storage	Engineering Start	3/18/2014	Prior to 1/1/2014	Complete
	Engineering Completion	3/18/2015	6/10/2015	Complete
	Notice to Proceed	3/18/2015		Complete
	Substantial Completion	3/18/2017	10/9/2017	Complete
<i>CSO No. 026 Sewer Separation</i>	Engineering Start	3/18/2014	Prior to 1/1/2014	Complete
	Engineering Completion	3/18/2015	4/3/2015	Complete
	Notice to Proceed	3/18/2015	7/8/2015	Complete
	Substantial Completion	3/18/2017	6/22/2016	Complete
<i>CSO No. 026 RTC Structure</i>	Engineering Start	3/18/2014	Prior to 1/1/2014	Complete
	Engineering Completion	3/18/2015	6/10/2015	Complete
	Notice to Proceed	3/18/2015	7/13/2016	Complete
	Substantial Completion	3/18/2017	10/9/2017	Complete
Foundation 2 - SPP Optimization (20 projects)	Engineering Start	3/1/2014	Prior to 1/1/2014	Complete
	Engineering Completion	3/18/2015	4/20/2015	Complete
	Notice to Proceed	3/1/2014	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2017		
<i>SPP 180 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	4/20/2015	Complete
	Notice to Proceed	---	9/8/2015	Complete
	Substantial Completion	3/18/2017	12/16/2015	Complete
<i>SPP 331 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	3/18/2015	4/20/2015	Complete
	Notice to Proceed	---	9/8/2015	Complete
	Substantial Completion	3/18/2017	12/16/2015	Complete

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<i>SPP 036 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	1/20/2014	Complete
	Notice to Proceed	---	5/30/2014	Complete
	Substantial Completion	3/18/2017	8/4/2014	Complete
<i>SPP 217 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	4/3/2015	Complete
	Notice to Proceed	---	7/8/2015	Complete
	Substantial Completion	3/18/2017	12/21/2015	Complete
<i>SPP 318 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	4/3/2015	Complete
	Notice to Proceed	---	7/8/2015	Complete
	Substantial Completion	3/18/2017	12/21/2015	Complete
<i>SPP 097A Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	4/20/2015	Complete
	Notice to Proceed	---	9/8/2015	Complete
	Substantial Completion	3/18/2017	12/16/2015	Complete
<i>SPP 122 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2017	Prior to 1/1/2014	Complete
<i>SPP 163 Optimization</i>	Engineering Start	---	3/1/2014	Complete
	Engineering Completion	---	11/25/2014	Complete
	Notice to Proceed	---	3/1/2015	Complete
	Substantial Completion	3/18/2017	8/6/2015	Complete
<i>SPP 165 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2017	Prior to 1/1/2014	Complete

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<i>SPP 165A Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	4/4/2014	Complete
	Notice to Proceed	---	7/25/2014	Complete
	Substantial Completion	3/18/2017	11/3/2014	Complete
<i>SPP 178 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2017	Prior to 1/1/2014	Complete
<i>SPP 335B Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2017	Prior to 1/1/2014	Complete
<i>SPP 336A Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	4/20/2015	Complete
	Notice to Proceed	---	9/8/2015	Complete
	Substantial Completion	3/18/2017	12/16/2015	Complete
<i>SPP 341A Optimization</i>	Engineering Start	---	1/1/2014	Complete
	Engineering Completion	---		This project is on hold pending the results of post-construction monitoring of Lang and Hazelwood RTCs.
	Notice to Proceed	---		
	Substantial Completion	3/18/2017		
<i>SPP 342B Optimization</i>	Engineering Start:	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2017	Prior to 1/1/2014	Complete
<i>SPP 001 Optimization</i>	Engineering Start:	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	3/27/2014	Complete
	Notice to Proceed	---	6/16/2014	Complete
	Substantial Completion	3/18/2017	12/12/2014	Complete

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<i>SPP 183 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2017	Prior to 1/1/2014	Complete
<i>SPP 283 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2017	Prior to 1/1/2014	Complete
<i>SPP 211 Optimization</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2017	Prior to 1/1/2014	Complete
Foundation 3 - Remaining RTC (14 sites)	Engineering Start	3/18/2016	8/9/2016	Ongoing
	Notice to Proceed	3/18/2017		
	Engineering Completion	3/18/2023		
	Substantial Completion	3/18/2024		
<i>Hertel Northwest In-Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>Hertel South In-Line Storage</i>	Engineering Start	---	1/19/2018	Complete
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>Hertel Northeast In-Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<i>Bird East In-Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>East Ferry In-Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>Colorado In-Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>North Bailey In-Line Storage</i>	Engineering Start	---	12/8/2017	Complete
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>South Bailey In-Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>Roslyn In-Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>Hazelwood (Kay) In-Line Storage</i>	Engineering Start	---	8/9/2016	Complete
	Engineering Completion	---	9/22/2017	Complete
	Notice to Proceed	---	2/2/2018	Complete
	Substantial Completion	3/18/2024		

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<i>Amherst Quarry Off-Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>Fillmore North In-Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>Gibson CSO Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
<i>Montgomery CSO Line Storage</i>	Engineering Start	---		
	Engineering Completion	---		
	Notice to Proceed	---		
	Substantial Completion	3/18/2024		
Foundation 4 - Hamburg Drain Optimizations	Engineering Start	3/18/2015	Prior to 1/1/2014	Complete
	Engineering Completion	3/18/2017	2/23/2017	Complete
	Notice to Proceed	3/18/2016	5/16/2017	Complete
	Substantial Completion	3/18/2018		
Foundation 4 - Hamburg Drain Storage	Engineering Start	3/18/2028		
	Engineering Completion	3/18/2030		
	Notice to Proceed	3/18/2030		
	Substantial Completion	3/18/2032		
<u>WWTP</u>				
WWTP Improvement Project Alternative C2	Engineering Start	3/18/2015		On hold; See 4.2.
	Engineering Completion	3/18/2019		
	Notice to Proceed	3/18/2017		
	Substantial Completion	3/18/2022		

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<u>Green Infrastructure Projects</u>				
Green 1 - Pilot Projects – 267-acres of GI control	Engineering Start	3/1/2014	Prior to 1/1/2014	Complete
	Engineering Completion	3/18/2016		Complete
	Substantial Completion	3/18/2018	12/31/2016	Complete
<i>2001-2016 Residential (traditional) Demolitions</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2018	12/31/2016	Complete
<i>2001 - 2016 Commercial and Industrial Demolitions</i>	Engineering Start	---	Prior to 1/1/2014	
	Engineering Completion	---	Prior to 1/1/2014	
	Substantial Completion	3/18/2018	12/31/2016	
Green 2 – 410 acres of GI Control	Engineering Start:	3/18/2019	Prior to 1/1/2014	
	Engineering Completion:	3/18/2023		
	Substantial Completion:	3/18/2024		
<i>2017 - 2024 Demolitions</i>	Engineering Start		Prior to 1/1/2014	Complete
	Engineering Completion:			
	Substantial Completion:	3/18/2018		
<i>Green Demolition Pilot Project</i>	Engineering Start		Prior to 1/1/2014	Complete
	Engineering Completion			Complete
	Substantial Completion		7/31/2017	Complete
<i>PUSH Blue Projects</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2018	7/1/2015	Complete
<i>Carlton Street Porous Asphalt</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2018	7/25/2014	Complete
<i>Fillmore Avenue Porous Parking Lots and Green Lots</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2018	4/23/2015	Complete

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<i>Ohio Street</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2018	12/1/2014	Complete
<i>Kenmore Avenue</i>	Engineering Start	---	4/30/2014	Complete
	Engineering Completion		4/20/2015	Complete
	Substantial Completion	3/18/2018	3/1/2017	Complete
<i>Genesee Street</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	6/8/2015	Complete
	Substantial Completion	3/18/2018	6/1/2017	Complete
<i>Allen Street</i>	Engineering Start	---	Prior to 1/1/2014	Green infrastructure will no longer be implemented as part of the Allen Street streetscape project due to site constraints.
	Engineering Completion	---		
	Substantial Completion	3/18/2018		
<i>Niagara Street Phase 1: Elmwood Street to Virginia Street</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	3/19/2014	Complete
	Substantial Completion	3/18/2018	12/1/2016	Complete
<i>Niagara Street Phase 2: Virginia Street to Porter Avenue</i>	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	6/3/2015	Complete
	Substantial Completion	3/18/2018	11/16/2017	Complete
<i>Niagara Street Phase 3: Hampshire Street to Scajaquada Expressway</i>	Engineering Start	---	10/28/2015	Complete
	Engineering Completion	---		Expected to be complete during the next reporting period
	Substantial Completion	3/18/2018		
<i>Niagara Street Phase 4: Scajaquada Expressway to Ontario Street</i>	Engineering Start	---	10/28/2015	Complete
	Engineering Completion	---		Expected to be complete during the next reporting period
	Substantial Completion	3/18/2018		

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<i>Niagara Street Phase 5: Porter Avenue to Hampshire Street</i>	Engineering Start	---	10/28/2015	Complete
	Engineering Completion	---		
	Substantial Completion	3/18/2018		
Green 3 – 375 acres of GI Control	Engineering Start:	3/18/2023		
	Engineering Completion:	3/18/2028		
	Substantial Completion:	3/18/2029		
Green 4 – 263 acres of GI Control	Engineering Start:	3/18/2028		
	Engineering Completion:	3/18/2033		
	Substantial Completion:	3/18/2034		

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
<u>Gray Projects</u>				
CSOs 014/15 – Erie Basin In-line storage and optimization projects	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	3/18/2014	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2015	12/29/2014	Complete
SPPs 206A&B	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	5/30/2014	Complete
	Substantial Completion	3/18/2015	12/29/2014	Complete
SPP 035	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	Prior to 1/1/2014	Complete
	Substantial Completion	3/18/2015	5/31/2014	Complete
SPP 036	Engineering Start	---	Prior to 1/1/2014	Complete
	Engineering Completion	---	Prior to 1/1/2014	Complete
	Notice to Proceed	---	5/30/2014	Complete
	Substantial Completion	3/18/2015	12/5/2014	Complete
CSO 013 – Satellite storage, conveyance, FM & PS	Engineering Start	3/18/2019		
	Engineering Completion	3/18/2020		
	Notice to Proceed	3/18/2020		
	Substantial Completion	3/18/2022		

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
North Relief – Interceptor	Engineering Start	3/18/2019	5/15/2015	Complete; See 4.3.
	Engineering Completion	3/18/2022		
	Notice to Proceed	3/18/2022		
	Substantial Completion	3/18/2026		
CSOs 010, 008/010, 061, 004 – Underflow capacity upsizing	Engineering Start	3/18/2021		
	Engineering Completion	3/18/2023		
	Notice to Proceed	3/18/2023		
	Substantial Completion	3/18/2024		
SPP 337 (CSO 053) – Satellite storage, conveyance, FM & PS	Engineering Start	3/18/2023		
	Engineering Completion	3/18/2025		
	Notice to Proceed	3/18/2025		
	Substantial Completion	3/18/2027		
SPP 336A&B (CSO 053) – Satellite storage, conveyance, FM & PS	Engineering Start	3/18/2024		
	Engineering Completion	3/18/2026		
	Notice to Proceed	3/18/2026		
	Substantial Completion	3/18/2029		
Jefferson Avenue & Florida Street (CSO 053) – Satellite storage, conveyance and FM	Engineering Start	3/18/2025		
	Engineering Completion	3/18/2027		
	Notice to Proceed	3/18/2027		
	Substantial Completion	3/18/2030		
CSO 055 – Satellite storage, conveyance, FM & PS	Engineering Start:	3/18/2027		
	Engineering Completion:	3/18/2030		
	Notice to Proceed:	3/18/2030		
	Substantial Completion:	3/18/2034		

Project Name	Project Milestone	AO Project Deadline	Actual Completion Dates	Project Status
CSOs 028/044/047 - Satellite storage, conveyance, FM & PS	Engineering Start:	3/18/2028		
	Engineering Completion:	3/18/2031		
	Notice to Proceed:	3/18/2031		
	Substantial Completion:	3/18/2034		
CSO 052 – Satellite storage, conveyance, FM & PS	Engineering Start:	3/18/2030		
	Engineering Completion:	3/18/2032		
	Notice to Proceed:	3/18/2032		
	Substantial Completion:	3/18/2034		
CSO 064 – Satellite storage, conveyance, FM & PS	Engineering Start:	3/18/2030		
	Engineering Completion:	3/18/2032		
	Notice to Proceed:	3/18/2032		
	Substantial Completion:	3/18/2034		

Attachment B to the Semi-Annual Status Report: March 2018

Detailed Project Descriptions

Project Name	Project Description	Project Purpose*
<u>Phase I Projects</u>		
CSO 060 GI Project	This project consisted of the construction of 4768 CF of rain garden on Windsor, Parkdale and Elmwood Avenues between Bird and Forest Avenues and 39,600 SF of permeable pavement on Clarendon and Claremont Avenues between Bird and Forest Avenues, installation of a Stormceptor unit at Bird Avenue and Granger Place and a total of 6,125 LF of 12-30 inch sewer designed to carry street flow to the existing storm overflow sewer on Forest Avenue from the above mentioned street segments. Additionally, weirs were raised in SPPs 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, and 240.	This project was designed to treat 13,600 cf of stormwater runoff from the 0.9 inch water quality storm event and remove 49.5 cfs of peak flow from the combined sewer system. Thereby reducing overflows through SPPs 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, and 241 to CSO 060. Together with other LTCP projects, this project is projected reduce CSO 060 discharges to Scajaquada Creek based on the 1993 Modified Typical Year (TY) to negligible activations and flow.
Bird/Lang RTC Projects	These RTC projects utilize available capacity of large sewers to provide flow control measures during wet weather events through the use of gates which allow continuous dry weather underflow.	
<i>Bird RTC Project</i>	The Bird RTC Project is located on Bird Avenue between Parkdale Avenue and Hoyt Street.	The Bird RTC project is designed to provide 1.01 MG of storage volume, thereby reducing discharges through SPP 013 to CSO 004. Together with other LTCP projects, this project is projected reduce CSO 004 discharges to the Black Rock Canal based on the TY to 3 activations.
<i>Lang RTC Project</i>	The Lang RTC Project is located on Lang Avenue between Courtland Avenue and Hagen Street.	The Lang RTC project is designed to have a storage volume of 0.84 MG, thereby reducing discharges through SPP 340 to CSO 053. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the 1993 Modified Typical Year (TY) to 4 activations.

Project Name	Project Description	Project Purpose*
<u>Foundation Projects</u>		
Foundation 1 - Smith Street Storage	Originally envisioned as a single project, these two projects have been separated to realize cost advantages due to the different levels of skill required for the projects and to expedite the sewer separation component.	
<i>CSO No. 026 Sewer Separation</i>	This project consisted of the installation of collection sewers for street receiver flows on Leddy Street, South Park Avenue, Owahn Place, Prenatt Street, Bolton Place, St. Stephen's Place, and Buffalo River Place, tributary to to SPP 88 and 90, in order to discharge these storm flows downstream of regulators, in conjunction with the optimization projects for SPP 217 and SPP 318.	Together with the Smith Street in-line storage project, the Smith Street partial sewer separation project is designed to divert storm flows directly to the Smith Street Drain thereby reducing CSO 026 discharges. Together with other LTCP projects, this project is projected to reduce CSO 026 discharges to the Buffalo River based on the TY to 6 activations or less.
<i>CSO No. 026 RTC Structure</i>	The second contract consists of an in-line storage project which is designed to detain wet weather flows along the western side of Smith Street using a weir structure between the I-190 and the I-190 off ramp within the Smith Street Drain for discharge to the South Interceptor thereby diverting combined sewer flows from CSO 026.	Together with the Smith Street partial sewer separation project, the Smith Street in-line storage project is designed to divert and detain the equivalent of a storage volume of 1.94 MG, thereby reducing CSO 026 discharges. Together with other LTCP projects, this project is projected to reduce CSO 026 discharges to the Buffalo River based on the TY to 6 activations or less.

Project Name	Project Description	Project Purpose*
Foundation 2 - SPP Optimization (20 projects)	Project consists of multiple smaller projects that will overlap in engineering and construction. SEE DETAILS FOLLOWING FOR SPECIFIC PROJECTS	In general, these projects will reduce discharges to the CSOs by detaining flows within the BSA's system through the modification of existing control structures.
<i>SPP 180 Optimization</i>	This project consisted of raising of the weir associated with SPP 180 by 2.0' along its entire length. SPP 180 is located on Delaware Avenue at the intersection with West Delavan. As part of the revised SPP 331 Optimization, this weir will be raised an additional 1.75' along its entire length.	The SPP 180 Optimization project was designed to increase the capacity of the CSS at SPP 180 thereby decreasing CSO 006 discharges. Together with other LTCP projects, this project is projected to reduce CSO 006 discharges to the Black Rock Canal based on the TY to 4 activations.
<i>SPP 331 Optimization</i>	SPP331 is located at the intersection of Elmwood Avenue and West Delavan Avenue. Preliminary plans were for the diversion of flows from this point through a new sewer to Bird Avenue along the centerline of Elmwood Avenue. This would have required major disruption of a very high traffic commercial area and was deemed impractical. Plans have been developed to instead divert the same flow that was to have been diverted through this project through a system of localized weir modifications rather than extensive pipe installation. These modifications include raising the weir at SPP 180 by 1.75' and the bench located in SPP 332 on the northeast quadrant of Gates Circle which currently directs dry weather flows into the interceptor will be removed and replaced with a 6.2' weir and restored sewer trough which will direct dry weather flows into the Bird Avenue trunk sewer.	The SPP 331 Optimization project is designed to increase the underflow capacity at SPP 331 thereby decreasing CSO 006 discharges. Together with other LTCP projects, this project is projected to reduce CSO 006 discharges to the Black Rock Canal based on the TY to 4 activations.

Project Name	Project Description	Project Purpose*
<i>SPP 036 Optimization</i>	This project consisted of the reconstruction of 35' of 30" sewer associated with SPP 036 to reverse the slope. It was located on Church Street between the off and on ramps of the Skyway (State Route 5).	The SPP 036 Optimization project was designed to increase the underflow capacity at SPP 036 thereby decreasing CSO 015 discharges. Together with other LTCP projects, this project is projected based on the TY to reduce discharges to the Erie Basin through CSO 015 to 0 activations.
<i>SPP 217 Optimization</i>	In association with the Smith Street partial sewer separation project, this project consisted of the removal of two bottom orifice plates totaling 1.42' in height, increasing the orifice size and conveyance capacity of the Emslie Street Sewer. SPP 217 is located on Emslie Street at its intersection with Eagle Street.	The SPP 217 Optimization project is designed to increase the underflow capacity at SPP 217 thereby decreasing CSO 026 discharges. Together with other LTCP projects, this project is projected to reduce CSO 026 discharges to the Buffalo River based on the TY to 3 activations.
<i>SPP 318 Optimization</i>	In association with the Smith Street partial sewer separation project, this project consisted of the removal of an orifice plate, increasing the orifice size and conveyance capacity of the Clinton Avenue Sewer. SPP 318 is located east of the intersection of Fillmore Avenue and Clinton Street.	The SPP 318 Optimization project is designed to increase the underflow capacity at SPP 318 thereby decreasing CSO 026 discharges. Together with other LTCP projects, this project is projected to reduce CSO 026 discharges to the Buffalo River based on the TY to 3 activations.
<i>SPP 097A Optimization</i>	This project consisted of abandoning an inactive combined sewer, converting another to a storm sewer and abandoning the underflow connection. SPP 097A is located at the intersection of the extension of Prenatt and Orlando Streets.	The SPP 097A Optimization project is designed to eliminate SPP 097A thereby decreasing CSO 026 discharges. Together with other LTCP projects, this project is projected to reduce CSO 026 discharges to the Buffalo River based on the TY to 3 activations.
<i>SPP 122 Optimization</i>	This project consisted of raising of the weir associated with SPP 122 by 0.5' along its entire length. SPP 122 is located on South Legion Drive just north of the intersection with Meriden Street.	The SPP 122 Optimization project was designed to increase the flow volume conveyed by the CSS at SPP 122 thereby decreasing CSO 037 discharges. Together with other LTCP projects, this project is projected to reduce CSO 037 discharges to the Buffalo River based on the TY to 3 activations.

Project Name	Project Description	Project Purpose*
<i>SPP 163 Optimization</i>	The SPP 163 Weir Optimization project consisted of replacing the existing weir with a new weir 0.75' higher. It is located to the East of the intersection of Fillmore Avenue and Northland on Northland Avenue.	The SPP 163 Optimization project is designed to increase the flow volume conveyed by the CSS at SPP 163 thereby decreasing CSO 053 discharges. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>SPP 165 Optimization</i>	This project consisted of raising of the weir associated with SPP 165 by 0.5' along its entire length. SPP 165 is located on Fillmore Avenue just north of the intersection with East Delavan Street.	The SPP 165 Optimization project was designed to increase the capacity of the CSS at SPP 165 thereby decreasing CSO 053 discharges. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>SPP 165A Optimization</i>	The weir associated with SPP 165A located at the intersections of Fillmore and Kensington Avenues.	The SPP 165A Optimization project was designed to increase the capacity of the CSS at SPP 165A by raising the weir by 0.75' and upsizing 675' of 15" pipe to 18" pipe to reduce CSOs in association with CSO 053. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>SPP 178 Optimization</i>	This project consisted of raising of the weir associated with SPP 178 by 0.5' along its entire length. SPP 178 is located on Masten Avenue just north of the intersection with Northland Avenue.	The SPP 178 Optimization project was designed to increase the flow volume conveyed by the CSS at SPP 178 thereby decreasing CSO 053 discharges. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>SPP 335B Optimization</i>	This project consisted of raising of the weir associated with SPP 335B by 1.0' along its entire length. SPP 335B is located on Hager Street just south of the intersection with Florida Street.	The SPP 335B Optimization project was designed to increase the flow volume conveyed by CSS at SPP 335B thereby decreasing CSO 053 discharges. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.

Project Name	Project Description	Project Purpose*
<i>SPP 336A Optimization</i>	This project has been constructed in association with the SPP 331 optimization. The project consist sof removing a sluice gate and orifice plate and modifying the existing structure by changing the existing side channel opening from 24" to 30". SPP 336A is located on Humboldt Parkway North of the Scajaquada Drain.	The SPP 336A Optimization project is designed to increase the underflow capacity of the CSS at SPP 336A thereby decreasing CSO 053 discharges. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>SPP 341A Optimization</i>	SPP 341A is located on Genesee Street east of Kerns Avenue. This project is on hold pending the results of post-construction monitoring of Lang and Hazelwood RTCs.	The SPP 341A Optimization project would increase the flow volume conveyed by the CSS at SPP 341A thereby decreasing CSO 053 discharges. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations. Field conditions may require modification to this planned optimization.
<i>SPP 342B Optimization</i>	This project consisted of raising of the weir associated with SPP 342B by 1.0' along its entire length. SPP 342B is located on Sprenger Avenue adjacent to Schiller Park.	The SPP 342B Optimization project was designed to increase the flow volume conveyed by the CSS at SPP 342B thereby decreasing CSO 053 discharges. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>SPP 001 Optimization</i>	The weir associated with SPP 001 located at the discharge of Cornelius Creek into the Niagara River and tributary to CSO 055 has been raised 1.0' to reduce CSOs.	The SPP 001 Optimization project was designed to increase the flow volume conveyed by the CSS at SPP 001 thereby decreasing CSO 055 discharges. Together with other LTCP projects, this project is projected to reduce CSO 055 discharges to the Niagara River based on the TY to 9 activations.
<i>SPP 183 Optimization</i>	This project consisted of raising of the weir associated with SPP 183 by 2.0' along its entire length. SPP 183 is located at the intersection of Bradley Avenue and Dewitt Street.	The SPP 183 Optimization project was designed to increase the flow volume conveyed by the CSS at SPP 183 thereby decreasing CSO 059 discharges. Together with other LTCP projects, this project is projected to reduce CSO 059 discharges to Scajaquada Creek based on the TY to 0 activations.

Project Name	Project Description	Project Purpose*
<i>SPP 283 Optimization</i>	SPP 283 is located in the median between the I-190 South ramp to Porter Avenue and a service road near the West Side Rowing Club. This project consisted of removing an orifice plate which restricted flows from entering the Swan Trunk and the installation of a new 1.0' tall weir to restrict flows from discharging through CSO 063.	The SPP 283 Optimization project was designed to increase the underflow capacity of the CSS at SPP 283 thereby decreasing CSO 063 discharges. Together with other LTCP projects, this project is projected to reduce CSO 063 discharges to the Niagara River based on the TY to 4 activations.
<i>SPP 211 Optimization</i>	This project consisted of constructing a weir to an elevation above the overflow raised pipe invert at SPP 211. SPP 211 is located at the South East corner of the intersection of Clinton and South Ogden Streets.	The SPP 211 Optimization project was designed to increase the flow volume conveyed by the CSS at SPP 211 thereby decreasing CSO 066 discharges. Together with other LTCP projects, this project is projected to reduce CSO 066 discharges to the Buffalo River based on the TY to 4 activations.

Project Name	Project Description	Project Purpose*
Foundation 3 - Remaining RTC (14 sites)	These RTC projects propose to utilize available capacity in the CSS to provide flow control measures during wet weather events through the use of active controls.	In general, these projects are designed to reduce discharges to the CSOs through the detention of flows within the BSA's CSS system.
<i>Hertel Northwest In-Line Storage</i>	This RTC project is proposed to utilize available capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. The proposed project location is within the northern of the two large combined sewers which are located under Hertel Avenue.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 055 discharges to the Niagara River based on the TY to 9 activations.
<i>Hertel South In-Line Storage</i>	This RTC project is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. The proposed project location is within the southern of the two large combined sewers which are located under Hertel Avenue.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 055 discharges to the Niagara River based on the TY to 9 activations.
<i>Hertel Northeast In-Line Storage</i>	This RTC project is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. This project will be located within the northern of the two large combined sewers which are located under Hertel Avenue.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 055 discharges to the Niagara River based on the TY to 9 activations.

Project Name	Project Description	Project Purpose*
<i>Bird East In-Line Storage</i>	This RTC project is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. This project will be located to the east of the above mentioned Bird RTC project along the same Bird Avenue sewer.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 004 discharges to the Black Rock Canal based on the TY to 3 activations.
<i>East Ferry In-Line Storage</i>	This RTC project is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. The proposed project location is along the Ferry Street sewer upstream of its leaping weir overflow to the Scajaquada Drain north of Florida Street.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>Colorado In-Line Storage</i>	This RTC project is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. The proposed project location is along the Colorado Avenue sewer which runs underneath the manufacturing facility located at 1001 East Delavan Avenue.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>North Bailey In-Line Storage</i>	This RTC project is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. The proposed project location is along Bailey Avenue north of Scajaquada Street.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.

Project Name	Project Description	Project Purpose*
<i>South Bailey In-Line Storage</i>	This RTC project is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. The proposed project location is along Bailey Avenue north of Scajaquada Street and south of the afore mentioned North Bailey In-Line Storage project.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>Roslyn In-Line Storage</i>	This RTC project is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. The proposed project location is near Roslyn Street on Lang Avenue.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>Hazelwood (Kay) In-Line Storage</i>	This RTC project, now known as Hazelwood, is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. The proposed project location is on Hazelwood Avenue between East Delavan and Easton Avenues.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.
<i>Amherst Quarry Off-Line Storage</i>	This RTC project proposes to utilize available capacity in the CSS capacity within the inactive Amherst Quarry to provide flow control measures during wet weather events, once downstream capacity is available, flows will then be pumped back into the system. The Amherst Quarry is located in an area bounded by Parkridge Avenue, East Amherst Street, and Hewitt Avenue.	This RTC project is proposed to utilize available capacity of the quarry to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 053 discharges to Scajaquada Creek based on the TY to 4 activations.

Project Name	Project Description	Project Purpose*
<i>Fillmore North In-Line Storage</i>	This RTC project is proposed to utilize available capacity in the CSS capacity of a large sewer to provide flow control measures during wet weather events while allowing continuous dry weather underflow. This project is proposed to be located on Fillmore Avenue, however pending the results of post-construction monitoring, it may be eliminated depending on the efficacy of the Smith Street Storage project.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 026 discharges to the Buffalo River based on the TY to 3 activations.
<i>Gibson CSO Line Storage</i>	This project is proposed to utilize the available capacity of the CSO pipe downstream of the SPP, but before the discharge point or outfall. It would be designed to convey water to prevent surface flooding and overflows through upstream SPPs. Once the storm event has subsided, it would be designed to dewater back into the combined system. The dewatering rate would be controlled so that it would not cause overflows downstream from the control structure. The proposed project location is on Gibson Street, however pending the results of post-construction monitoring, it may be eliminated depending on the efficacy of the Smith Street Storage project.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 026 discharges to the Buffalo River based on the TY to 3 activations.

Project Name	Project Description	Project Purpose*
<i>Montgomery CSO Line Storage</i>	This project is proposed to utilize the available capacity of the CSO pipe downstream of the SPP, but before the discharge point or outfall. It would be designed to convey water to prevent surface flooding and overflows through upstream SPPs. Once the storm event has subsided, it would be designed to dewater back into the combined system. The dewatering rate would be controlled so that it would not cause overflows downstream from the control structure. The proposed project location is along the railroad right-of-way near Montgomery Street, however pending the results of post-construction monitoring, it may be eliminated depending on the efficacy of the Smith Street Storage project.	This RTC project is proposed to utilize available capacity within the collection system to detain flows until downstream capacity becomes available. Together with other LTCP projects, this project is projected to reduce CSO 026 discharges to the Buffalo River based on the TY to 3 activations.
Foundation 4 - Hamburg Drain Optimizations	This project will entail several in-system optimizations, e.g. rerouting of flows, installation of weirs, partial sewer separations etc. and/or green infrastructure to reduce the overflow events at a number of upstream SPPs in order to control flows through CSOs 017, 022, and 064. These optimizations would be located within the Hamburg Basin.	These optimization projects are proposed to increase the flow volume conveyed by the CSS upstream of the SPPs and diverting stormwater flows out of the CSS thereby decreasing CSO 017, 022, and 064 discharges. Together with other LTCP projects, this project is projected based on the TY to reduce discharges to the Buffalo River through CSO 017 to 4 activations, CSO 022 to 5 activations, and CSO 064 to 3 activations.
Foundation 4 - Hamburg Drain Storage	Together with the Hamburg Drain Optimizations, this project would be designed to provide the equivalent of 5 MG of offline storage. This facility would be located within the Hamburg Basin and may involve the installation of RTCs.	This storage project is proposed to provide off-line storage thereby decreasing CSO 017, 022, and 064 discharges. Together with other LTCP projects, this project is projected based on the TY to reduce discharges to the Buffalo River through CSO 017 to 4 activations, CSO 022 to 5 activations, and CSO 064 to 3 activations.

[WWTP](#)

Project Name	Project Description	Project Purpose*
WWTP Improvement Project Alternative C2	The proposed project is expected to rehabilitate the existing primary clarifiers by adding high rate disinfection and provide additional secondary clarifiers at the Bird Island WWTP.	This project would be designed to provide treatment of wet weather flows and increased secondary treatment capacity.

Project Name	Project Description	Project Purpose*
<u>Green Infrastructure Projects</u>		
Green 1 - Pilot Projects – 267-acres of GI control	Projects consist of multiple green infrastructure projects that will overlap in engineering and construction.	In general, this phase is designed to control stormwater flow from 267 acres of impervious area in the various sewer sheds within the targeted areas.
<i>2001-2016 Residential Demolitions</i>	This project consists of the demolition of vacant houses thereby replacing impervious with pervious surfaces.	This project is designed to remove 256 total acres of impervious area and manage all subsequent stormwater on site.
<i>2001-2016 Commercial and Industrial Demolitions</i>	This project consists of the demolition of commercial and industrial structures thereby replacing impervious with pervious surfaces. .	This project is designed to control stormwater flow from 78 total acres of impervious area.
Green 2 – 410 acres of GI Control	These projects will consist of multiple green infrastructure projects that will overlap in engineering and construction. Details will be provided in the Phase 2 Green Infrastructure Master Plan.	In general, these projects would be designed to retain stormwater flow from 410 acres of impervious area in the various sewer sheds in the targeted areas.
<i>2017-2024 Demolitions</i>	This project consists of the demolition of vacant and dilapidated structures thereby replacing impervious surface with pervious surface	This project is designed to control stormwater flow for each post demolition vacant lot. Total acreage TBD on a rolling basis depending upon demolitions completed.
<i>Green Demolition Pilot Project</i>	A three year pilot study where the City of Buffalo's demolition specifications were altered to allow for the use of shallow bioretention to increase onsite infiltration	Over the course of the pilot project the revised demolition specifications/bioretention approach was applied to 221 sites impacting a total of 19.03 acres.

Project Name	Project Description	Project Purpose*
<i>PUSH Blue Projects</i>	PUSH-Buffalo will install rain gardens, porous pavement and a green roof and distribute rain barrels within the CSO 012 sewershed.	This project is designed to control stormwater flow from 1 acre of impervious area.
<i>Carlton Street Porous Asphalt</i>	This project consisted of the installation of pervious pavement to retain stormwater from the area tributary to the Right-of-Way on Carlton Street between Michigan and Jefferson Avenues in the City of Buffalo as part of the City's streetscape project.	This project is designed to control stormwater flow from a 5.9 acre sewershed.

Project Name	Project Description	Project Purpose*
<i>Fillmore Avenue Porous Parking Lots and Green Lots</i>	This project consisted of the installation of porous pavement parking lots and modified rain gardens to retain stormwater from the area tributary to the Right-of-Way of Fillmore Avenue in the City of Buffalo as part of the City's streetscape project.	This project is designed to control stormwater flow from 0.4 total acres of impervious area.
<i>Ohio Street</i>	This project consisted of the installation of green infrastructure to retain stormwater from the area tributary to the Right-of-Way on Ohio Street in the City of Buffalo as part of the City's streetscape project.	This project is designed to control stormwater flow from 6.1 total acres of impervious area.
<i>Kenmore Avenue</i>	This project consists of the installation of green infrastructure to retain stormwater from the area tributary to the Right-of-Way on Kenmore Avenue in the City of Buffalo as part of the City's streetscape project.	This project is designed to control stormwater flow from 5.17 total acres of impervious area.
<i>Genesee Gateway Project</i>	This project consists of the installation of green infrastructure to retain stormwater from the area tributary to the Right-of-Way on Genesee Street in the City of Buffalo as part of the City's streetscape project.	This project is designed to control stormwater flow from 2.8 total acres of impervious area.
<i>Allen Street</i>	This project will consist of the installation of green infrastructure to retain stormwater from the area tributary to the Right-of-Way for the portion of Allen Street between Main Street and Elmwood Avenue in the City of Buffalo as part of the City's streetscape project.	This project is designed to control stormwater flow from 2.5 total acres of impervious area.
<i>Niagara Street Phase 1: Elmwood Street to Virginia Street</i>	This project consists of the installation of green infrastructure to retain stormwater from the area tributary to the Right-of-Way for the length of Niagara Street in the City of Buffalo as part of the City's streetscape project.	This project is designed to control stormwater flow from 2 total acres of impervious area.

Project Name	Project Description	Project Purpose*
<i>Niagara Street Phase 2: Virginia Street to Porter Avenue</i>	This project consists of the installation of green infrastructure to retain stormwater from the area tributary to the Right-of-Way for the length of Niagara Street in the City of Buffalo as part of the City's streetscape project.	This project is designed to control stormwater flow from 7.3 total acres of impervious area.
<i>Niagara Street Phase 3: Hampshire Street to Scajaquada Expressway</i>	This project consists of the installation of green infrastructure to retain stormwater from the area tributary to the Right-of-Way for the length of Niagara Street in the City of Buffalo as part of the City's streetscape project.	This project is designed to control stormwater flow from 15 total acres of impervious area in MS4 drainage areas and 25.5 in CSO drainage areas.
<i>Niagara Street Phase 4: Scajaquada Expressway to Ontario Street</i>		
<i>Niagara Street Phase 5: Porter Avenue to Hampshire Street</i>		
Green 3 – 375 acres of GI Control	These projects will consist of multiple green infrastructure projects that will overlap in engineering and construction. Details will be provided in the Phase 2 Green Infrastructure Master Plan.	In general, these projects would be designed to retain stormwater flow from 375 acres of impervious area in the various sewer sheds in the targeted areas.
Green 4 – 263 acres of GI Control	These projects will consist of multiple green infrastructure projects that will overlap in engineering and construction. Details will be provided in the Phase 2 Green Infrastructure Master Plan.	In general, these projects would be designed to retain stormwater flow from 263 acres of impervious area in the various sewer sheds in the targeted areas.

Project Name	Project Description	Project Purpose*
--------------	---------------------	------------------

[Gray Projects](#)

CSOs 014/15 – Erie Basin In-line storage and optimization projects SEE DETAILS FOLLOWING FOR SPECIFIC PROJECTS		
<i>SPPs 206A&B</i>	A new 113,000 gallon in-line storage facility was constructed in association with SPPs 206A&B to reduce CSOs at CSO 014. This site is located at Trenton Road/ Village Court north east of Fourth Street.	This project was designed to provide in-line storage thereby decreasing CSO 014 discharges through SPPs 206A&B. Together with other LTCP projects, this project is projected based on the TY to reduce discharges to the Erie Basin through CSO 014 to 2 activations.
<i>SPP 035</i>	A new 50,000 gallon in-line storage facility was constructed between the Genesee Trunk and Swan Trunk sewers to create additional storage capacity in association with SPP 035 (CSO 015). This project is located to the north west of the intersection of South Elmwood Avenue and West Genesee Street.	This project was designed to provide in-line storage thereby decreasing CSO 015 discharges through SPP 35. Together with other LTCP projects, this project is projected based on the TY to reduce discharges to the Erie Basin through CSO 015 to 0 activations.
<i>SPP 036</i>	This project consisted of the reconstruction of 35' of 30" sewer associated with SPP 036 to reverse the slope. This site is located on Church Street between the off and on ramps of the Skyway bridge (State Route 5).	This sewer reconstruction project was designed to increase the underflow capacity of the CSS thereby decreasing CSO 015 discharges. Together with other LTCP projects, this project is projected based on the TY to reduce discharges to the Erie Basin through CSO 015 to 0 activations.

Project Name	Project Description	Project Purpose*
CSO 013 – Satellite storage, conveyance, FM & PS	CSO 013 is located at the extension of Virginia Street into the Black Rock Canal, the structure is tentatively planned to be built between the last SPP structure and the Canal. The proposed satellite storage facility would consist of a covered, concrete, underground tank.	This storage project would provide off-line storage thereby decreasing CSO 013 discharges. Preliminary design is for a 0.3 MG offline storage facility. Together with other LTCP projects, this project is projected based on the TY to reduce discharges to the Black Rock Canal through CSO 013 to 4 activations.
North Relief – Interceptor	The original conception of this project was of a deep tunnel relief sewer to run in the vicinity of Niagara Street between Bird Avenue and Albany Street with an additional line connecting the tunnel to the WWTP influent siphon. Preliminary design is for 5,310' of 96" pipe and 571' of 120" pipe. Due to site constraints this project may be redesigned.	The purpose of this project is to reduce discharges through CSOs 004, 011, and 012, by creating a new relief sewer thereby creating offline storage capacity capacity in the CSS. Together with other LTCP projects, this project is projected based on the TY to reduce discharges to the Black Rock Canal through CSO 004 to 3 activations, CSO 011 to 4 activation, and CSO 012 to 2 activations.
CSOs 010, 008/010, 061, 004 – Underflow capacity upsizing	This project will consist of upsizing of underflow piping to maximize flow to the interceptors. This project is tentatively proposed for between Breckenridge Street and Brace Street along the I-190 with an extension along Brace Street across Niagara Street.	This underflow capacity upsizing project would increase the capacity of the CSS thereby decreasing CSO 010, 008, 061 and 004 discharges. Together with other LTCP projects, this project is projected based on the 1993 Modified Typical Year to reduce discharges to the Black Rock Canal through CSO 004 to 3 activations, CSO 010 to 1 activations, CSO 008 to 0 activations, and CSO 061 to 4 activations.
SPP 337 (CSO 053) – Satellite storage, conveyance, FM & PS	SPP 337 is located at Colorado Street North of Scajaquada Street. The proposed satellite storage facility would consist of a covered, concrete, underground tank.	The purpose of this project is to reduce discharges through CSO 53 to the Scajaquada Creek. Preliminary design is for a 0.7 MG off-line storage facility. Together with other LTCP projects, this project is projected reduce CSO discharges to Scajaquada Creek based on the TY to 4 activations.
SPP 336A&B (CSO 053) – Satellite storage, conveyance, FM & PS	SPP 336A&B are located on Humboldt Parkway on each side of the Scajaquada Drain. The proposed satellite storage facility would consist of a covered, concrete, underground tank.	The purpose of this project is to reduce discharges through CSO 53 to the Scajaquada Creek. Preliminary design is for a 4.2 MG off-line storage facility. Together with other LTCP projects, this project is projected reduce CSO discharges to Scajaquada Creek based on the TY to 4 activations.

Project Name	Project Description	Project Purpose*
Jefferson Avenue & Florida Street (CSO 053) – Satellite storage, conveyance and FM	The proposed location for this facility is in the vicinity of the intersection of Jefferson Avenue and Florida Street. The proposed satellite storage facility would consist of a covered, concrete, underground tank.	The purpose of this project is to reduce discharges through CSO 53 to the Scajaquada Creek. Preliminary design is for a 2.6 MG off-line storage facility. Together with other LTCP projects, this project is projected reduce CSO discharges to Scajaquada Creek based on the TY to 4 activations.
CSO 055 – Satellite storage, conveyance, FM & PS	For CSO 055, the proposed storage facility would be located upstream of the regulator, near Military Road. At this location, an offline facility would be constructed and flows above 26 MGD (instantaneous peak) would be diverted from the South Hertel Trunk sewer into the storage facility. The proposed satellite storage facility would consist of a covered, concrete, underground tank.	The purpose of this project is to reduce discharges through CSO 55 to the Niagara River. Preliminary design is for a 7.5 MG off-line storage facility. Together with other LTCP projects, this project is projected reduce CSO discharges to the Niagara River through CSO 55 based on the TY to 9 activations.
CSOs 028/044/047 – Satellite storage, conveyance, FM & PS	The proposed location for this facility is underneath the Tops parking lot between South Park Avenue and the Buffalo River. The proposed satellite storage facility would consist of a covered, concrete, underground tank.	The purpose of this project is to reduce discharges through CSO 28 to the Buffalo River and through CSOs 047 and 044 to Cazenovia Creek. Preliminary design is for a 2.3 MG off-line storage facility. Together with other LTCP projects, this project is projected reduce CSO discharges based on the TY to 6 activations through CSO 028, 2 activations through CSO 044 and 3 activations through CSO 047.
CSO 052 – Satellite storage, conveyance, FM & PS	The proposed location for this facility is in the vicinity of South Ogden Street between Mineral Springs Road and Cazenovia Creek. The proposed satellite storage facility would consist of a covered, concrete, underground tank.	The purpose of this project is to reduce discharges through CSO 52 to the Buffalo River. Preliminary design is for a 0.6 MG offline storage facility. Together with other LTCP projects, this project is projected reduce CSO discharges to the Buffalo River through CSO 052 based on the TY to 3 activations.

Project Name	Project Description	Project Purpose*
CSO 064 – Satellite storage, conveyance, FM & PS	The proposed location for this facility is in the vicinity of the confluence of Ohio, Louisiana and Saint Claire Streets. The proposed satellite storage facility would consist of a covered, concrete, underground tank.	The purpose of this project is to reduce discharges through CSO 064 to the Buffalo River. Preliminary design is for a 0.1 MG off-line storage facility. Together with other LTCP projects, this project is projected reduce CSO discharges to the Buffalo River through CSO 064 based on the TY to 3 activations.

***Note:** Black Rock Canal Performance Criterion is 4 Activations in the Typical Year
Buffalo River Performance Criterion is 6 Activations in the Typical Year
Cazenovia Creek - B Performance Criterion is 4 Activations in the Typical Year
Cazenovia Creek - C Performance Criterion is 6 Activations in the Typical Year
Erie Basin Performance Criterion is 2 Activations in the Typical Year
Niagara River Performance Criterion is 9 Activations in the Typical Year
Scajaquada Creek - Performance Criterion is 4 Activations in the Typical Year

Attachment C to the Semi-Annual Status Report: March 2018

Public Meeting Materials

What will change in my neighborhood once the project is completed?

The only thing visible from the surface following construction will be a new manhole cover at the intersection of Bird and Niagara (east side) and a second manhole cover and a small access hatch in the parking lot on the west side of Niagara Street.

Will this project increase the risk that my basement will backup?

No. While the project will modify the local sewer system, these modifications will not increase the likelihood of basement back-ups.

Will this project affect the integrity of the sewer system?

No. The existing sewer system is in excellent condition despite its age. The new sewer line has been designed and will be constructed using state of the art materials and construction methods.



Bird Avenue Underflow SPP 13 Improvement Project: Fact Sheet

B U F F A L O
SEWER AUTHORITY

Buffalo Sewer Authority

1038 City Hall
65 Niagara Square
Buffalo, NY
14202

Phone: 716-851-4664

Why is the Buffalo Sewer Authority doing this project?

The Buffalo Sewer Authority (BSA) is working together with the Environmental Protection Agency and the New York State Department of Environmental Conservation on a 20-year Long Term Control Plan (LTCP). The LTCP is focused on significantly improving water quality of the local water bodies. A portion of the LTCP involves upgrades to components of the existing sewer system.



Project Location Map



What does this project involve?

The Bird Avenue Underflow Sewer Patrol Point (SPP) 13 Improvement Project will decrease combined sewer overflows to the Black Rock Canal by increasing the flow directed to the North Interceptor, and ultimately to the Bird Island Wastewater Treatment Plant. The implementation of this project is estimated to cost approximately \$1,500,000.

How was this project designed?

This project was designed by local Licensed Professional Engineers who are highly proficient in water and wastewater conveyance and treatment.

Where can I find design details?

Plans and specifications are located at the BSA's office at 1038 City Hall.

When and what can I expect during construction?

Construction is expected to start in the Spring of 2018, and be completed by the Fall of 2018. An excavation will be required on the east side of Niagara Street at Bird Avenue for the construction of a new underground chamber. A second similar underground chamber will be constructed in the parking lot on the west side of Niagara Street. A large new sewer will be constructed beneath Niagara Street using jacking and boring methods to minimize traffic impacts. During construction, one block of Bird Avenue between West Avenue and Niagara Street will be closed to through traffic. Arrangements will be made for temporary two-way local traffic on that block so that all residences and businesses can be easily accessible during construction. Also, one northbound lane of Niagara Street will be closed in the area.

In addition to the traffic disturbances, other disturbances such as noise and dust will occur while heavy machinery is operated for the excavations. Odors from the sewer system may also be present during construction. These disturbances will be minimized as much as possible during construction. After the project is completed, these disturbances will be eliminated. The BSA will have a full-time representative onsite during construction to answer any questions or complaints. If you would like further information, please call or email Catherine Knab, P.E., BSA Principal Sanitary Engineer, at (716) 851-4664 or cknab@sa.ci.buffalo.ny.us.



WILLERT PARK COMMUNITY EDUCATION CAO AND BSA STORMWATER SUMMER EDUCATION *COMMUNITY FAIRE*

JULY 2017



Community
Action
Organization
of WNY

This report was prepared for the CAO and BSA for the Stormwater Summer Education sessions for the summer of 2017. Six full day sessions were conducted, teaching children the importance of stormwater management and all of the included components

Water Worx Community Faire

An opportunity to share what we've learned!

Introduction:

The Community Faire was an opportunity for the kids to present and share with family and friends what they learned from Water WORX! The event was held at JFK Community Center, with students from Pratt Willert walking over at the end of the day to participate.

Student Led Community Faire:

The students created interactive display booths for each topic, using posters to convey what they had learned, and then led younger kids, friends and family through the same experiments they had learned from in the six sessions:

- Big Picture
- Soils
- Plants
- Planting a Rain Garden
- Maintenance
- Careers

Through the creation of the poster materials and the re-creation of the experiments the students demonstrated the extent of their stormwater knowledge and had great fun!



FAIRE



Community
Action
Organization
of WNY



WILLERT PARK COMMUNITY EDUCATION CAO AND BSA STORMWATER SUMMER EDUCATION *SESSION 6: CAREER FAIR*

JULY 2017



This report was prepared for the CAO and BSA for the Stormwater Summer Education sessions for the summer of 2017. Six full day sessions were conducted, teaching children the importance of stormwater management and all of the included components

Day 6: Water Worx Career Fair

YOU can do important work when Water Worx!

Introduction:

For the benefit of the guests, have the students relate what they have learned from the previous 5 sessions. Prompt if needed:

- Day 1 - Water and the Big Picture
- Day 2 - Soils (not dirt!)
- Day 3 - Plants (and roots!)
- Day 4 - Planting/Painting Day
- Day 5 - Caring for our Garden

Conversation about Careers:

For the past 5 sessions we have talked about science, math, biology, design, creativity and solving problems. Today we are going to talk about how you could do all those things when you grow up and how you could consider one of these jobs as a career for yourself.

Guest Speakers (For Grades 4-8)

- Invite guests from various professions related to the lessons taught this week to talk about their variety of careers:
 - Landscape Architects
 - Engineers
 - Soil experts
 - Construction
 - Nurseryman and Plant trade
 - Others to consider if desired:
 - Water Scientists
 - Computer Scientists
 - Surveying and Mapping
 - Geologists
 - Meteorologists
- Set up stations for the kids to use the various items and to ask questions of the guests
- As the moderator, please introduce speakers and ask each one to tell the students a little bit about themselves



- Ask guests to bring various props to help illustrate their work:
 - drawings
 - renderings
 - trace paper
 - colored pencils
 - scales
 - templates
 - hard hats
 - books
 - professional journals
 - etc.

Guest Speakers (Continued)

- As moderator, you can consider the following questions to get things started and to supplement between the audience questions:
 - When did you first know you had interest in your chosen field?
 - How did you decide to study your field?
 - Where did you go to school and how long did it take you?
 - Can you give us an example of your work day?
 - Tell us something from your career that you're proud of
 - Tell us something from your career that you never expected



Careers Lesson (For Grades K-3)

- Prepare a simple power point with 2-3 slides for each of the careers noted above. Be sure slides have easy to see pictures: (See powerpoint provided in appendix xx)
 - Landscape Architect
 - Engineer
 - Construction worker
 - Horticulturist
- For each career, introduce some of the props and have the kids pass them around



Imagining Our Future Activity (For Grades K-3)

- Using a template, ask the kids to draw themselves in one of the careers
- Ask them why they selected the career they did



Wrap Up Discussion:

1. Ask for a minimum of three things they learned this week
2. What was your favorite part of the week?
3. What was the most fun?
4. What did you find challenging?
5. Are you ready to help our waterways?!

Materials Needed:

- Guest Volunteers from various career fields
- Powepoint for Grades K-3
- Coloring templates









WILLERT PARK COMMUNITY EDUCATION CAO AND BSA STORMWATER SUMMER EDUCATION *SESSION 1: PLANTS*

JULY 2017



This report was prepared for the CAO and BSA for the Stormwater Summer Education sessions for the summer of 2017. Six full day sessions were conducted, teaching children the importance of stormwater management and all of the included components

Day 3: Water Worx Through Plants

Let's Root for Roots!

Introduction:

Who are we and why are we here?

Do you remember what we talked about last time? Ask for a minimum of 3 things they learned from the previous session; coach if needed:

- Who can tell us something about water?
- What about soils?
- How long does it take the Earth to make 1" of soil?
- What is important about rain garden soil?

Start with a conversation about Plants:

Today we are going to talk about Plants! Because we can't have a garden and not have any plants, right?! But not just any plants - we need to be smart about the plants we have in our rain gardens!

Activity:

- Ask the following questions, using a flip chart to document student responses:
 1. Do we think there are more people, or more plants on the planet?
 2. Why are plants important? (Be sure each group is discovering/identifying at least the following):
 - Air we breathe through photosynthesis!
 - Plants are Food
 - We build houses and all sorts of things from wood
 - Paper
 - Cooling/shading
 - Helpful for birds and insects and mammals (we call this supporting habitats)
 - Absorbing a lot of water!
 3. Why do we need to be smart about the plants we choose for our rain gardens? (Be sure each group is discovering/identifying at least the following):
 - Hint: what did we learn about the last two days?
 - Rain gardens get a LOT of water and the plants have to be able to survive
 - The rain garden soil will have a lot of sand, so we have to make sure they can grow in the sandy soil
 - Plants can be all different sizes and some might be too big, and others too little



Plant and Garden Activities:

Role Play Game (For Grades K-2):

- Ask kids to come to center of the room and take a seat
- To start the game, ask what they know about seeds
- "Pretend you're a seed"
 - Ask the kids to curl up in a ball, representing the small seed
- Narrate the Spring Rains
 - Pretend to sprinkle water on them
- "Start to sprout"
 - Have kids wiggle their legs and arms



- Narrate the early summer sunshine
 - "The sun is shining - can you feel it's warmth?"
- "Start growing"
 - Have kids start to kneel and then slowly move to a standing position
- Narrate that wind is blowing
 - Have them wave back and forth in the wind
- Narrate summer rain

- Pretend to sprinkle rain again and have them wiggle in place
- Narrate warm summer sun
 - "Can you feel the warm sun on your face?"
- "Bloom for Summer"
 - Have them use their hands to frame their faces as the "pretty flowers" open up
- Narrate late summer
 - They are as tall as they will grow, have the kids reach to the sky as high as they can



- Narrate the weather getting cooler in Fall
 - Mention that the air is getting chilly and have kids wrap their arms around themselves
- "Wither and gently fall to the ground"
 - Slowly shrink back down to a kneeling, then laying down position
- Narrate that winter is arriving and snow falls on them
 - Pretend that snow is falling to the ground and covering them

- But the plant's roots are still strong
 - Have them curl up and snore like they are sleeping
- Narrate that early spring is arriving
- We start to "Wake Up"
 - Ask the kids to stand up and jump!
- "You did it! You've gone through the whole growing season!"



Paper Plate Plant Sorting Game (For Grades 3 and Up)

- Create collages on paper plates to represent types of plants to consider for a rain garden. Be sure to create enough for both groups to have a wide selection to choose from.

Recommended to create 3 of each for each group:

- Spring white flowers
- Spring red/pink flowers
- Spring yellow flowers
- Spring purple flowers
- Summer white flowers
- Summer red/pink flowers
- Summer yellow flowers
- Summer purple flowers
- Tall green plants
- Wide green plants
- Fall color plants
- Plants to attract birds and butterflies
- Plants to support animal habitat
- Separate students into 2 groups
- Spread the paper plates plants across long tables, and have the students each pick three plants for their rain garden; Encourage the students to work together to decide the overall garden design



- Each student will report which plants they selected and place them on the floor, making one large garden
- Based on their selections, have a conversation about value of diversity in rain gardens, and describe what kind of garden they created i.e.: A rain garden with mostly spring flowers, some green plants in the summer, with lots of plants for birds and insects
- Photograph the group next to their garden



Real Plants Activity Part 1 (For All Grades)

- Have a table of example plants to show the students a variety of leaves, blossoms and structures
- Use two plants to show variety of scent and textures
 - Bring a pot of Russian Sage around to each student, ask if the plant smells "Sweet or Spicy"?
 - Then bring a pot of Hyssop around to each student and ask if it smells "Sweet or Spicy"?
 - The kids will notice a large difference between the two



Let's Root for the Roots! Activity (For All Grades)

We've talked a lot about variety of plants, but next we should talk about what is going on below the ground...the roots!



- On a flip chart, have a simple tree drawn with a horizontal line on the middle of the page to represent the ground
- Ask a student volunteer to come up and draw the way they think tree roots grow
- Next, draw the way roots actually grow to show the difference, if any
- Discuss how large a tree is, and how they need roots that go very wide, so they can hold up and support the tree
- Ask the following question, using a flip chart to document responses:
 1. Who can tell me something they know about plant roots? Be sure each group is discovering/identifying at least the following:
 - Roots are how the plant absorbs water and nutrients
 - Roots keep the plant in the ground, especially during heavy rain and wind
 - Tree roots can absorb a LOT of water because their roots are so wide

Conversation about Pollution and Runoff:

We talked about polluted runoff water the other day. And we talked about how our rain gardens collect the polluted water on purpose. Ask the following questions:

1. Will the plants in our rain gardens die if the water is polluted?
 - Have a discussion on how important it is to select plants that will survive the pollution
2. Will the plants in our rain garden now be polluted since they are absorbing the polluted water?
 - Have a discussion on how the plant converts the pollution inside its stems and gives us oxygen through photosynthesis

Conversation about Roots:

Using laminated diagram of plants and roots (image provided in appendix XX), have a discussion on the wide variety of how plants look on the surface and how their roots look. Discuss how much water comes into a rain garden and discuss the benefits of deep roots over shallow roots. Plants can reach deep for water, have more roots to absorb more water, and can stay in place during a big storm.

Real Plants Activity Part 2 (For All Grades)

Now let's look at some roots!

- You'll Need:
 - One (1) potted perennial plant for each class session
- Over a container to capture the soil, pull the soil away from the roots to show the students how they look in real life
- Ask what they notice about the roots?
 - Are they long or short?
 - Are they thin or wide?
 - Are there a lot or only a few?
 - Etc.

TIPS & TRICKS:

We suggest using Monarda "Bee Balm" as it also has a unique scent, is a vigorous rooter and can easily be planted bare root after the demonstration!



Wrap Up Discussion:

1. Ask for a minimum of three things they learned today
2. Ask: Was today fun?
3. Briefly recap the two previous sessions and ask what they know about water and about soil
4. Next time we will be looking at how landscape architects draw a garden plan and how it gets built, and we will have a planting day!

Materials Needed for Plants Day:

- One "Spicy Smelling" and one "Sweet Smelling" plant for observation (can use the same two plants for all sessions)
- One plant for each session that will be used to demonstrate root systems
- Laminated plant root diagrams
- Paper-plate "plants" for game

TIPS & TRICKS:

We used Hyssop and Russian Sage for the sweet vs. spicy smelling plants which should be readily available at any nursery or garden center. For this activity, it is important that the scents of the two plants are distinct so that the students can easily tell the difference.







WILLERT PARK COMMUNITY EDUCATION CAO AND BSA STORMWATER SUMMER EDUCATION *SESSION 5: MAINTENANCE*

JULY 2017



This report was prepared for the CAO and BSA for the Stormwater Summer Education sessions for the summer of 2017. Six full day sessions were conducted, teaching children the importance of stormwater management and all of the included components

Day 5: Water Worx by Caring for our Gardens

What is a weed and how do we get rid of it?

Introduction:

Ask for a minimum of three things they learned from the previous session; coach if needed:

- How do we know how big to make the garden?
- What language was given to plant names?
- What information is given to us on a planting plan?
- Prompt with more questions from the "Planting Day" session as needed

Conversation about Weeds:

Ask the students the following questions, using flip chart paper to record responses:



1. What is a weed?
2. Do you think a weed is still a plant?
3. Does it still use its roots to soak up the polluted water?
4. Does it still perform photosynthesis and provide us oxygen?
5. So do you think weeds are bad?

A weed is simply a plant that is somewhere we do not want it to be!

- If a tree is growing in our rose garden, could we consider it a weed? It could be!
- If a rose is growing in the middle of a forest, is it a weed? It could be!
- Weeds are also a bully of the plant world; remember when we looked at the sheet with the plant roots? Those roots were deep! They are strong! And will push out other plants that we do want to have in our garden if we aren't careful

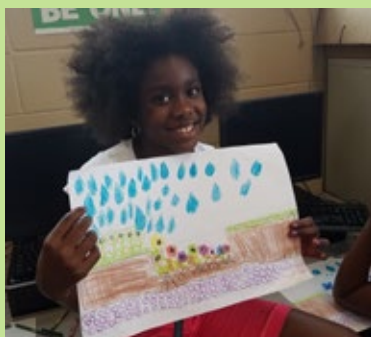
Drawing Our Rain Garden Activity (For Grades K-3)

- You'll Need:
 - White Board and markers (for teaching team)
 - 11 x 17 sheets of paper for students
 - Pencils with erasers
 - Crayons/colored pencils
- This will be a Cross-section/process drawing, so the kids will draw and erase for various actions
- Give each student a sheet of paper, a pencil, and an assortment of crayons
- Use a white board to have the students copy what they see you draw
- Start with a line in the middle of the page, all the way across
 - Explain this is the grass on the ground before we build our garden
- Draw a second line about 3" lower on the page
- Draw a third line 1" lower than that



Drawing Our Rain Garden Activity (Continued)

- Have the students erase part of the top line, in the middle
 - Explain that this represents the bulldozer excavating the ground for our garden
- Have them re-draw a line to create a bowl from the top line
 - This is where plants will be drawn
- Have the students color the top line green on either side of the bowl
 - Have them color small purple circles between lines 2 and 3 to be the gravel layer of their rain garden
 - Then have them use brown to color the rain garden soil mix between their bowl line and line 2
 - Be sure to talk about what they learned in the soil class
 - Then have them draw and color the plants in their rain garden
 - Be sure to have them draw in the roots as well
 - Have them discuss the role of plant roots
 - Next it will rain!
 - Have the students color blue rain drops all over the sky, falling on their garden
 - Be sure to talk about run-off and pollution
- After the rain storm comes the weeds!
- Have the kids draw big brown weeds in their gardens and be sure to draw the roots too
 - Many kids will not want to ruin their gardens with the weeds, but remind them they are telling a story with their picture and it is important for the weeds to arrive
- To remove the weeds, have the kids use red crayon to "X" out the weeds
- The kids can then embellish their gardens with any other things they'd like to add such as people, rainbows, butterflies, signs, etc.



Eye Spy Game

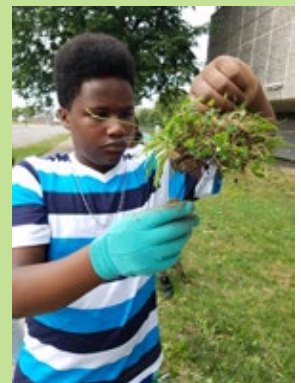
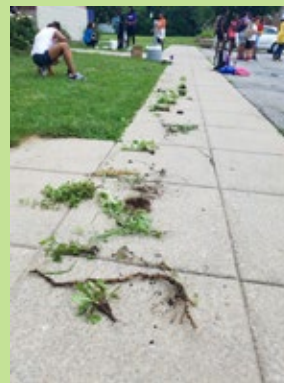
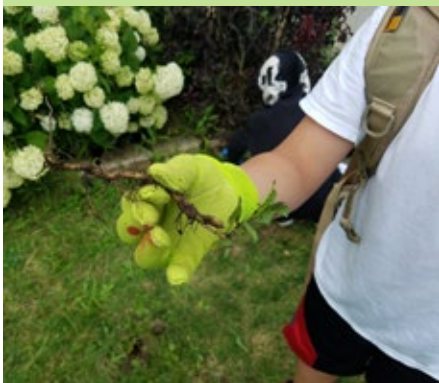
Running the Game for Grades K-3:

- Print out 5"x7" pictures of common weeds
 - Or weeds noted in the Rain Check "Rain Garden Maintenance" guidebook
- Prior to class, collect examples of each of the weeds you have pictures for
 - Be sure your samples have some roots to observe as well
- Have the students use the pictures to match to the actual sample



Running the Game for Grades 4-8:

- Print out 5"x7" pictures of common weeds
 - Or weeds noted in the Rain Check "Rain Garden Maintenance" guidebook
- Take a short walk to identify plants we consider weeds and match them to the pictures.
- Ask: "How do we manage the weeds in our gardens?"
 - Dig them out properly
 - Have the students use a variety of trowels and shovels to try and get as much of the root out as possible
- Have the students place what they've dug on the nearby sidewalk so group can examine and discuss similarities and differences in the roots
- Ask the following questions:
 1. Was it hard or easy to dig out the weed?
 2. Based on the picture of the plant roots do we think we got all the weed root?
 3. What about herbicides? (Chemicals that kill plants)
 - They would remove the weeds quickly, but how do they impact our goal of cleaning pollution?



Conversation about the Rain Garden Maintenance Guidebook

This guidebook is a way to teach our community all about how to take care of our healthy plants in the rain garden. Some of the important steps to keeping our rain garden plants healthy include:

- Sweep sediment
- Clean up trash
- Weeding
- Trimming and pruning as plants grow
- Cleaning up after winter
- Remember to water if there's been a drought!
- Keeping our rain gardens beautiful and functional ensures that water will always WORK here!

Wrap Up Discussion:

1. Ask for a minimum of three things they learned today
2. Ask: What was your favorite part about today?
3. The next time we meet it will be Career Fair day, and you'll be learning about all the different careers we've talked about this week and what they do!

Materials Needed:

- 2 copies of Rain Garden Maintenance Guidebook, laminated
- Laminated plant root sheet (Used for Plant Day)
- Shovels
- Trowels
- 5" x 7" photos, printed, of common weeds (from Rain Garden Maintenance Guidebook)
- 1 bucket for collecting weeds
- Garbage bags
- Gardening gloves (saved and reused from planting day)

TIPS & TRICKS:

If you have a garden space that needs to be weeded - use this for the demonstration! If not, most lawn areas should have enough examples of weeds for the students to pull











WILLERT PARK COMMUNITY EDUCATION CAO AND BSA STORMWATER SUMMER EDUCATION *SESSION 4: PLANTING A GARDEN*

JULY 2017



This report was prepared for the CAO and BSA for the Stormwater Summer Education sessions for the summer of 2017. Six full day sessions were conducted, teaching children the importance of stormwater management and all of the included components

Day 4: Water Worx by Planting a Garden

...a RAIN Garden! Let's Get Planting!

Introduction:

Ask for a minimum of three things they learned from the previous session; coach if needed:

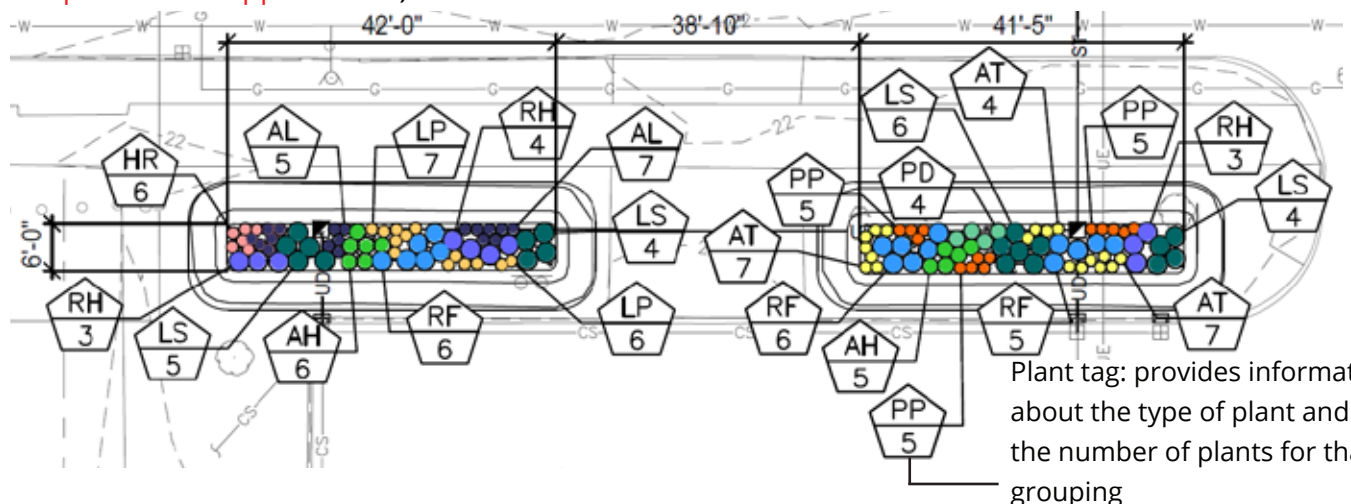
- What is important about the plants we choose for our rain gardens?
- What is the job of the roots?
- How can we add variety to our gardens? (scent, texture, size, flower color, etc.)
- Prompt with more questions from the 'Plants' session as needed

Conversation about our Unique Day:

Today we get to PLANT but in a unique way! Since the rain garden area is presently under construction we won't be able to use real plants like we had planned. But it is still important for you to understand how a garden is constructed, so we have a very unique day planned!

Conversation about the Planting Plan:

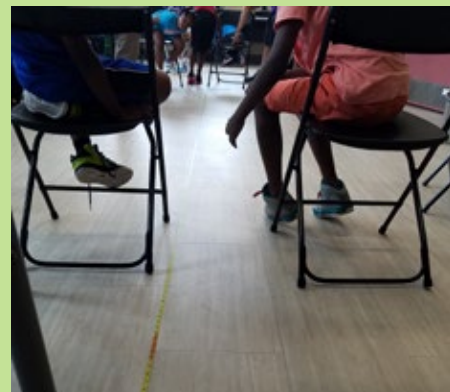
- Let's look at the planting plan (show the kids the drawing from the full set of engineering drawings, **provided in appendix xx**). The landscape architecture drawings for the engineering set typically show the plants and the size of the garden they will go into. For your project we created 10 drawings, but the engineers had to create more than 100 drawings to have enough information on how to build the entire project!
- On this plan sheet we show where the plants go, and their names! (Point out the plant list and mention how the plants have something called a Botanical Name) A long long time ago, a very smart person decided we should name all the plants in the world the same name, even though we all spoke different languages. That language used to name plants is called Latin, and we refer to them by what is known as a Botanical Name. Has anyone heard of the plant *Bellis perennis*? Probably not... but that is the name for a Daisy! And if you are in India, China, Africa or here in Buffalo, everyone who wants to talk about a Daisy, knows they are talking about the same plant *Bellis perennis*.
- In order to easily see how our garden will be organized, we color coded the plan (shown below). Here we have a plant tag for a grouping of plants; on the top is the two letter code for the name of the plant, which we saw on the big list a second ago. The bottom is the number of plants for that grouping. How many plants does this tag show we should have? Ask several kids to respond to various tags on the plan. (Colored plans for both community centers **provided in appendix xx**.)



Measuring Activity Part 1 (For Grades K-3)

The plan also shows us how big the garden is. Let's do some measuring so we can get an idea of how big our garden is.

- Before measuring anything, have students guess how big the room is
- Take up to three guesses
- Ask one volunteer to hold the tape measure in place at edge of wall and ask a second volunteer to walk with you as you pull the tape measure out
- Have that second volunteer announce the measurement at the other side of the room
- Next measure the distance between the kids outstretched arms, the length of their foot, and the length of their pointer finger
- Have a discussion comparing scale:
 - Compared to your finger is a popsicle stick big or small?
 - Compared to your arms, is a popsicle stick big or small?



Measuring Activity Part 2 (For Grades K-3)

Let's go outside and play Musical Garden!

- You'll need:
 - 'Plant templates' sized 12", 24", and 36" diameters, 3 each (we used foam poster boards)
 - Lots of volunteers!
- Tell the students that according to our planting plan, we have plants that will be 12" diameter, 24" diameter and 36" diameter
- Gardens can be arranged so that big plants are next to little plants
- Let's play "musical garden" and get some planting done!
- Have the students each hold one of the templates and move around in the garden area until you say "STOP"
- When the kids stop, take photos of their arrangement. This is "Garden 1"
- Repeat two more times for a total of three gardens

TIPS & TRICKS:

Play music while the kids are moving around if possible via cell phone or portable radio. Yell 'STOP' and stop the music, just like with musical chairs.



Measuring Planting Plan Activity (For Grades 4-8)

- You'll Need:
 - Circle templates (sized to match planting plan)
 - Spray chalk or spray paint
 - Gloves
 - Face Masks (if using spray paint)
 - Measuring tapes (at least 2)
 - Color coded planting plan
- Ask for a volunteer to use the plan drawing to orient the garden and get the initial location for the measuring
- Ask for one volunteer to hold the measuring tape, and one to walk with you and announce when the length has been determined to match the plan
- Have 2 more volunteers assist with finding the width
- ***This modified planting day will use circle templates and spray paint:*** Pass out gloves and face masks for kids that want them; students can remove shoes, ensuring they stay paint free, if desired as well

TIPS & TRICKS:

Have kids count off to determine groups. They will resist going into groups or will be unable group themselves into the right sizes. This will save you a lot of time!

- Break the students into the same number of groups as colors on the coded plan (for example, if you have 6 colors on the plan, break into 6 groups)
- Group 1 will look at the plan, determine which size template to use for the first color, and how to arrange them
- Take turns using the paint to outline the template (one student can also be holding the template down while the outline is being painted)
- Lift the template and move to it's next plant location
- Once all outlines for that color have been painted, have each student write their initials in the center of the circle they painted (there will be enough circles for each student to do more than one)
- Continue with group 2 for color 2, and so on until complete
- Be sure to take a group photo with their garden

TIPS & TRICKS:

Be sure you have enough helpers for this activity, particularly for grades 4-6. There should be one supervisor/counselor for each group, separate from the teaching team); space will be limited within the "garden", so it may be difficult to have more than one group painting at a time. While the groups are waiting, the group supervisor/counselor can have the students guess the lengths of various objects and then use the measuring tape to confirm their guess (finger, arm span, their height, a distance from point 'A' to point 'B', etc.)



Wrap Up Discussion:

1. Ask for a minimum of three things they learned today
2. Ask: What was your favorite part about today?
3. The next time we meet we'll be talking about how to take care of our garden
4. Then before you know it, we'll be here for Career Fair day!

TIPS & TRICKS:

Both gardens we 'planted' on this day were painted on to areas we knew would be temporary: On a small grassy area at JFK Community Center and in a corner of parking lot that was scheduled to be torn up at Pratt Willert Community Center, so we knew permanent spray paint was not going to be an issue. If this is not an option for you, consider spray chalk or a more temporary option.

Materials Needed:

- Printed planting plan laminated with colors, easy to read
- Printed planting plan from drawing set so they can see the difference
- Kid size gardening gloves for grades K-4
- Adult size gardening gloves for grades 4-8
- Spray paint to match the color coded sheet, so it is easy to read in the field (for 3 sessions, we went through ~20 cans of spray paint)
- **OR - Spray chalk (may need to ordered online - plan appropriately)**
- Foam-core templates for the various sizes of plants. Minimum 2 of each size
- Painters masks, goggles
- Tape Measur

Planting Day Option:

As we mentioned, this was a unique day. The original plan was to plant the rain gardens that were designed for the Willert Park Green Infrastructure Project. However, the construction schedule was a bit behind (which is not uncommon), forcing us to come up with a backup plan. If you are able to have a real planting day all measuring activities and discussions about the planting

Materials Needed:

- Printed planting plan laminated with colors, easy to read
- Printed planting plan from drawing set so they can see the difference
- Kids gardening gloves
- Kids gardening tools
- Adult gardening tools
- Tape measure
- Plant stakes
- Markers
- Kids kneeling pads
- Garbage bags
- Hose for watering after planting

plans created would remain the same! The difference of course will be the opportunity for the students to work with real plants and learn how to get them planted in the ground. Most rain garden plants will be small enough for all students to be able to handle and a good portion may even be able to be planted with a hand trowel (especially if there is new soil). While it will be important for the students to get hands on experience here, it will also be important to have a good number of supervisors/counselors on hand in addition to the teaching team to ensure that the plants are not too severely damaged in any way and that the students are caring for them properly.

GARDEN







WILLERT PARK COMMUNITY EDUCATION CAO AND BSA STORMWATER SUMMER EDUCATION *SESSION 1: WATER*

JULY 2017



This report was prepared for the CAO and BSA for the Stormwater Summer Education sessions for the summer of 2017. Six full day sessions were conducted, teaching children the importance of stormwater management and all of the included components

Day 1: Water Worx and the Big Picture

We are surrounded by water - why should we care about that?

Introduction:

Who are we and why are we here?

Start with a conversation about Rain:

"How many of you remember the last time it rained? Do you remember if it was a little rain, or a lot of rain? Now think back to the spring and when it rained a lot!"

Next, we'll talk about our location and surrounding waterways:

Use the map of the area (provided in appendix x) showing the Lakes and the River and ask the students:

"Do you know the name of the lakes and the river? Have you heard of Niagara Falls? Have you ever been to see any of these?"

Other water facts and observations:

How many of you turned on the sink to brush your teeth this morning? How many of you had a drink of water? Water is a pretty important part of our lives, right? In fact our bodies are 98% water, so we need it to live! So where does our water come from?

On the day we presented, we were in the middle of a very large storm. This gave us a great opportunity for the kids to observe the storm up close and allowed for some site specific questions:

"Let's look at the parking lot. What do we notice about the water on the pavement?"

"Now let's look at the park lawn. Do we see any difference from the pavement? What is the water doing and where do you think it is going?"



- Return to the map to talk about how our water in Buffalo comes from Lake Erie.
- Discuss briefly how the water is collected, goes to pumping facility, gets cleaned, put in the pipe underground and travels to their homes, schools, community center, etc.
- Also discuss what happens when you flush the toilet: Water leaves the house in a pipe, goes to a treatment building, gets cleaned and then returned to lake.
- So where does the water in the road go??

Where does the water in the road go?

Discuss the pipe in the road: The pipe from the toilet leaves your house and connects to the pipes under the road. The water from the toilet is joined with the water from the street and travels along the pipes to the treatment building.

But wait a minute...is that OK? ***That is an important question!*** Let's talk about WATER!

Today we are going to think BIG about water:
Over the next 5 sessions, we'll talk about the details.

Conversation about the Water Cycle:

Have you ever heard of something called the "Water Cycle" in school? While water cannot be created or destroyed we can certainly lack clean water. Over time our communities have grown, and so how the water cycle works now is very different than it did 100 years ago. Let's explore with our "water in a suitcase"!

TIPS & TRICKS:

Water Cycle Song

Can be used if time permits, particularly with younger students. Be sure to have a speaker that will allow all students to hear.

Stormwater Suitcase Experiment:

Running the Experiment for Grades 6-8:

- Borrow Stormwater Suitcase from Erie County
- Be sure to have a wide selection of pollutants: Soil erosion, pesticides, herbicides, oil and gas, trash and litter (should be included); Add 'leaf and organic litter' with dried parsley flakes if not included in kit.
- Ask for Volunteers to help set up the model. You'll need:
 - Architects to help place the buildings (2-3 kids)
 - Engineers to help place the bridges (1-2 kids)
 - Foresters to help place the trees (1 kid)
- Discuss the role of each of those professions briefly
- Next, ask the group about the kind of pollution they see and know about in their environment



- Ask students to name pollutants and have a discussion on each, asking them to help with the next step of the experiment
- Each volunteer should shake the pollutant from the kit on to the model in various places
- Be sure to talk through how pesticides and herbicides as used to support things like food crops, but also how their run off impacts us
- Once the model is adequately polluted, ask for volunteers to be the rain storm and hand out water bottles

- Have students spray a light rain, and discuss impacts of the light rain on the pollutants
- Then have volunteers spray more to create a heavy storm discussing the more significant outcomes
- Address the difference between run off that directly impacts waterways, and the impacts of combining the water in the sanitary and the stormwater sewer pipes which leads to a combined overflow that affects our waterways



See following page for tips on running this experiment with younger age groups!

Conversation about the Waterways Near us:

Based on our experiment, what do you think about the waterways near us? Show the map again and point out how the water is always shown as blue. Discuss the actual colors of Lake Erie, Niagara River, Lake Ontario, etc. Do you think they are clean or dirty?

How do we try to make them cleaner?

Brainstorm big ideas to make them cleaner, listing ideas on large flip chart paper as they are discussed. Introduce Green Infrastructure as a concept and note its alignment with the ideas they produced in their brainstorming.

Conversation about Green Infrastructure

Topics to discuss during this time include:

- The role of green infrastructure to catch the run off before it reaches the street
- The role of green infrastructure to take water rolling down the street and put it in the garden before it gets to the drain
- How we connect the garden and the street
- Introduce the specific green infrastructure projects going on around them [Willert Park Neighborhood, JFK and Pratt Willert Community Center projects]

Running experiment for Grades 3-6:

- Can be run similar to first group, but may need less volunteers to keep group focused and on track
- Have volunteers for setting up, adding 'pollutants', and creating rain storms
- Simply all discussions to match the grade level

Running experiment for Grades K-2:

- Set up the stormwater model yourself, but ask students what jobs create buildings and roads as you place items. Ask about trees and introduce landscape architecture
- Ask questions about pollutants. As kids name pollutants have them come up and shake onto model, one at a time - or you can opt for no volunteers, depending on your circumstances
- Reduce the number of volunteers for the rain as needed to maintain focus
- Discussion with this group will be very broad ideas:
 - Litter and pollution all around us
 - When it rains, that pollution goes to the lake unless we do something else
 - Rain gardens can catch the pollution before it gets to the lake

TIPS & TRICKS:

Be sure to have place to clean the model thoroughly between sessions. It is large and gets very messy!



Green Infrastructure Experiment:

"Let's do another experiment to see how green infrastructure works!"

Running the Experiment for Grades 6-8

- You'll need:
 - Pitcher with water
 - 2 easy to read measuring cups
 - Aluminum pan with concrete paver (be sure the paver is NOT POROUS in any way. This keeps the experiment simpler)
 - Aluminum pan with a sponge, elevated in some way so that the sponge will be out of the water resting on the bottom of the pan.
- Discuss the properties of the paver (hard, smooth, not porous) and how this represents the pavement in our communities



- Discuss the properties of sponge (bumpy, light weight, can hold water) and how this represents Green Infrastructure and Rain Gardens in our communities
- Ask for a hypothesis: "What do you think will happen to the water when poured over the paver and poured over the sponge?"
- Ask a volunteer to pour and measure, pouring one cup of water into each measuring cup
- Pour one cup of water over the paver and one cup of water over the sponge into the aluminum pans
- Volunteers will then pour water from the paver pan back into measuring cup, announcing amount out loud to the group; repeat for sponge pan
- Discuss: Does the outcome align with our hypotheses?

Conversation about the Pavement Around Us:

Now that we've done our experiment in a small amount, let's look at or think about the pavement surrounding us. Can you visualize how much water a storm might produce? How will the Willert Park Green Infrastructure Project act the same as the sponge? How will this project help the Big Picture for our Lakes and River?

Wrap Up Discussion:

- Ask for minimum of three things they learned today
- Ask: Was today fun?
- The next time we meet we're going to be talking about soil! It's not just **dirt** - soil is much cooler! And we'll do some experiments with soil to see how water acts
- After that we'll be talking about plants and their importance
- Before we are done for the summer, you'll know how to take care of your garden and maybe even have an idea of what you want to be when you grow up!

Materials Needed For Water Day:

- Stormwater Suitcase kit and any additional "pollution" materials
- Two aluminum pans 13" by 9"
- 2 multi-cup Measuring cups - glass or plastic, be sure they are easy to read
- 1 concrete paver (NON-POROUS)
- 1 dried and rinsed sponge per class session
- Support block for sponge in pan (should also be non-porous so that it does not interfere with the experiment)
- Large flip chart paper
- Crayons & markers
- Clean up sink, paper towels, sponges, etc (for stormwater suitcase - will need to be cleaned in between each session)

TIPS & TRICKS:

Sponges should be rinsed and dried before experiment. Just drying is not enough, you must rinse chemicals from the sponges first. Ideal to have a dry sponge for each group for maximum visual impact and continuity between experiments.







WILLERT PARK COMMUNITY EDUCATION CAO AND BSA STORMWATER SUMMER EDUCATION *SESSION 2: SOILS*

JULY 2017



This report was prepared for the CAO and BSA for the Stormwater Summer Education sessions for the summer of 2017. Six full day sessions were conducted, teaching children the importance of stormwater management and all of the included components

Day 2: Water Worx Through Soils

...but it's not by making mud!

Introduction:

Who we are and why we are here? (Also, remember us from last time?)

Ask for a minimum of three things they learned from the previous session; coach if needed:

- What is important about water?
- Where does our drinking water come from?
- When the rain picks up the pollution from the roadway, what is it called?
- Prompt with more questions from the 'Water' session as needed

Start with a conversation about Soil:

Today we are going to talk about soil and about the earth. Remember that we call it SOIL, but what don't we call it? DIRT!! Why? Because dirt is usually something not very nice or healthy for us, but SOIL... soil is pretty darn cool!

Activity:

- Ask the following questions:
 1. "What do we know about Soil?"
 - Use flip chart paper to record responses
 - Typical responses will include:
 - Food grows in it
 - Trees grow in it
 - Older kids will most likely know about the different rock types: Igneous, Metamorphic, Sedimentary
 2. "How long does it take the planet to make 1 inch of soil?"
 - Take a range of guesses
 - *Answer: it takes 500 years to make 1 inch of soil!*
- Introduce the different 'ingredients' that make up soil: Sand, Pea Stone, Clay, and Compost



Conversation about 'soil recipes':

Soil on the planet is made up of various amounts of these items and as landscape architects we can DESIGN the mix we want for our soils to do specific jobs! Think of them almost as the ingredients for a recipe. The landscape architect will create a recipe for the contractor to follow so that the rain garden works the way we want it to. Each of these 'ingredients' are found in nature and they each do a specific job to help filter and clean the run-off pollution we saw and talked about yesterday.

Exploring Soil Samples:

- Break kids up into groups, 4-5 kids per group
- Prepare samples in paper cups, one cup of each per group
- Give each group hand-lenses to observe the samples up close as well

TIPS & TRICKS:

Have kids count off to determine groups. They will resist going into groups or will be unable group themselves into the right sizes. This will save you a lot of time!



1. Sand Sample

- Where does sand come from?
- Discuss erosion. Wind and water wears away at rocks on the planet and erode other things in our environment that contribute to run-off and pollution
- Look at the sand sample with a hand lens
 - What do we see?
 - How does it Feel?
 - Where do we find sand most often?
 - Do we often see a lot of plants growing in sand?

2. Pea Stone Sample

- Where does pea-stone come from?
- Discuss dolomitic limestone in our area. Did you know that the rock is so hard they often have to use dynamite to blast it out of the ground?
- Let's look at it with a hand lens
 - What do we see?
 - How does it Feel?
 - Do we think plants would grow well in this?

3. Clay Sample

- Where does clay come from?
- For older kids, you can discuss the pre-historic tropical lake that was located where we are today and how the lake bottom gives us our clay soils
- Younger kids will recognize clay from art class at school.
- Let's look at it with a hand lens
 - What do we see?
 - How does it feel? How does it smell?
 - Do we think plants would grow well in this?

4. Leaf-Compost Sample (pre-shredded preferable, with leaves visible)

- Where does compost come from?
- Return to the conversation about the Earth taking 500 years to make 1 inch of soil and reference how compost is created.
- Let's look at it with a hand lens
 - What do we see?
 - How does it Feel? Smell?
 - Do we think plants would grow well in this?



Water Experiments:

Running Experiments for Grades 3-8

- You'll Need:
 - 4 strainers to act as sieves
 - 1/2 of water per each material (you'll need (2) 1/2 cup pours for the clay)
 - 8 volunteers (4 to hold sieves, 4 to pour water)
- Fill sieve with each of the 4 materials to the top of the sieve
- Ask for hypotheses for each material. "Do you think the water will move fast or slow?"
- Have student volunteer pour 1/2 cup of water **SLOWLY** through the materials, one at a time
- Discuss hypotheses and results

TIPS & TRICKS:

For Grades K-2 it is best to run this experiment for them from start to finish. Their enthusiasm to pour water may cause them to lose focus quickly and lose track of the lesson.

1. Clay Sample:

- Pour first ½ cup through sieve to get material moist
- With moistened material, gradually work wet clay into a bowl shape in the sieve (older kids can do this themselves; younger kids will want to, but can get out of focus quickly)
- Re-ask hypotheses question
- Re-pour second ½ cup of water, discuss observations
 - Can plant survive in this soil alone?
 - Can there be too much water?
 - Plants NEED some amount of clay to be able to transfer nutrients to their roots

2. Sand Sample:

- Pour the water through **slowly**
- Discuss the observations and hypotheses.
 - Can plant survive in this soil alone?
 - Discuss the role of the sand as the "Filtering" part of our rain garden mix

3. Gravel Sample:

- Pour the water through **slowly**
- Discuss the observations and hypotheses.
 - Can plants survive in this soil alone?
 - Discuss the role of gravel: this is the component that keeps water moving in rain garden soil
 - We put this at the bottom usually to help to keep water moving

4. Compost Sample:

- Pour the water through **slowly**
- Discuss the observations and hypotheses
 - Can a plant survive in this soil alone?



Let's Make Our Own Rain Garden Soil!

Ask: Can we create a soil recipe to do something specific?

Yes! By mixing specific soils and plants, we can make a Rain Garden! Remember what happened during the sponge experiment? (Give kids a chance to respond, prompt them if necessary: what happened to the water when poured over the concrete paver? How about over the sponge?)

By mixing soils in a certain recipe, we can create the sponge part of the rain garden!!

Rain Garden Soil Experiment:

Running Experiments for Grades 3-8

- You'll Need:
 - Soil sample 'ingredients'
 - Plastic scoops
 - Large plastic/tupperware containers or aluminum pans to mix 'ingredients'
 - Wooden paint stir sticks for mixing
- Break kids up into groups, 4-5 kids per group
- Ask: What do we want rain garden soil to do?
- Hypothesize about what may make a good rain garden soil recipe:
 - Remember how the water moved through each soil type
 - How much of each ingredient do we need?

TIPS & TRICKS:

For Grades K-2: Allow them to create/ scoop/mix their own ingredients but monitor closely so that they stay focused on the task at hand. When it is time to pour the water, again it may be best for an adult to do this step so that the kids can pay attention to what is happening and answer questions.



- Let's get mixing!
 - Have each group scoop different amounts of each soil type into the large plastic containers
 - Mix well!
- Test the recipe
 - Using the strainers as sieves again, scoop your rain garden soil into the sieve
 - Pour water slowly through the soil
- Discuss Observations
 - Did your soil work like you thought it would?
 - How do you think you could improve it?



Wrap Up Discussion:

1. Ask for minimum of three things they learned today
2. Ask: Was today fun?
3. Next time we meet we're going to be talking about PLANTS! Plants are important for our rain gardens **AND** for our communities. We'll be talking about a few of the reasons why
4. Then: we will actually have a planting day!

Materials Needed for Soils Day:

- Flip board paper and markers
- Soil samples
 - Sand
 - Clay
 - Compost
 - Gravel
- Plastic or Styrofoam cups
- Hand lens
- 4 strainers
- 4 aluminum pans
- 4 large plastic containers
- Plastic shovels or large scoopers
- Wooden paint stir sticks for mixing
- Latex gloves (some kids may want them for soil exploring/mixing)

TIPS & TRICKS:

While gardening gloves will work for those kids that prefer to keep their hands clean (and they can be re-used again on planting day as well as weeding day), latex gloves are preferred for soil day. They will keep their hands clean while still being able to feel the different textures of soil; gardening gloves may be too thick. But we do encourage the kids try to work **WITHOUT** gloves so they can really feel the different textures. It will wash off after all!





Will there be any odors once the project is completed?

No odors will be present upon completion of the project. BSA will employ a continuous flushing and cleaning program to diminish the number of leftover solids that may create odors.

Is there a higher risk that my basement will backup?

No. The system is designed to ensure the prevention of basement back-ups and damage to the Treatment Plant by providing flow relief in the combined sewer systems.

Are the sewers structurally capable of handling this material, despite their age?

Yes. The sewer systems are in excellent condition despite their age. They have been inspected, televised and reviewed for their structural capabilities.



Buffalo Sewer Authority

1038 City Hall
65 Niagara Square
Buffalo, NY
14202

Phone: 716-851-4664

Hazelwood Avenue Real Time Control System Project: Fact Sheet

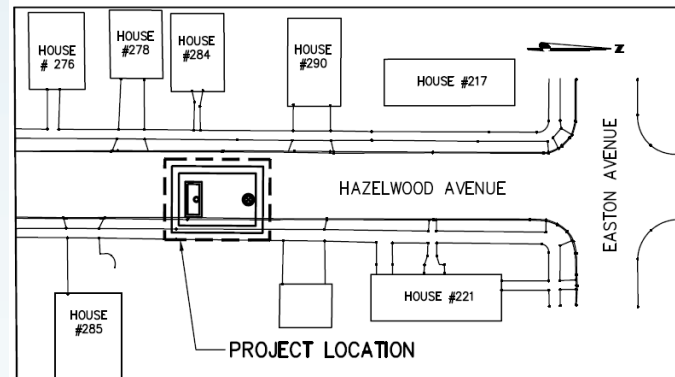
B U F F A L O
SEWER AUTHORITY

What is this project?

The Buffalo Sewage Authority (BSA) is working together with the Environmental Protection Agency and the New York State Department of Environmental Conservation on a 20-year Long Term Control Plan. This plan is focused on significantly improving water quality of the local water bodies and waterways.



Project Location Map



What does this project involve?

This project will install gated chambers inside of the existing sewer systems to control the flow to the treatment plant. The implementation of this project is estimated to cost \$1,500,000.

How was this project designed?

This project was designed by Licensed Professional Engineers who are highly proficient in water and wastewater conveyance and treatment.

Where can I find design details?

Plans and Specifications can be found at the BSA's office.

When and what can I expect during construction?

Construction is expected to start in the Winter of 2017, and conclude at the end of Summer of 2018. During construction, the street will be dug up to install the Real Time Control Chamber. There will be noise and dust while heavy machinery is operated for the excavation. One can also expect traffic disturbances and odors from the sewer system. These disturbances will be minimized as much as possible during construction. After the project is completed, these disturbances will be eliminated. The BSA will have a full-time representative onsite during construction to answer any questions or complaints. If you would like further information, please call or email Catherine Knab, Principal Sanitary Engineer, at the BSA at (716) 851-4664 or cknab@sa.ci.buffalo.ny.us.



Attachment D to the Semi-Annual Status Report: March 2018

Certificates of Acceptance and Occupancy

ITEM NO. 27

CONTRACT NO. 81600015

CERTIFICATE OF ACCEPTANCE AND OCCUPANCY

WORK: Post Demolition Green Infrastructure Study

COST: \$1,999,813.00

CONSULTANT: Buffalo Neighborhood Stabilization Corporation
271 Grant Street
Buffalo, New York 14213

WHEREAS: The Principal Sanitary Engineer of the Buffalo Sewer Authority has certified that the Contractor completed the work in accordance with the plans and specifications on August 25, 2017.

NOW THEREFORE
BE IT RESOLVED:

That the Board of the Buffalo Sewer Authority hereby finds and determines that:

- a. The work to be performed under the terms of the Contract has been complete and is accepted;
- b. The date of entrance and occupancy be fixed as of August 25, 2017;
- c. Final payment be made to the Contractor in the amount of \$71,536.08, decreased by \$569,091.50, making the final cost of the contract \$1,430,721.50.

MOTION TO APPROVEMADE BY MR. ROOSEVELT2ND BY MR. KENNEDYAYES 4 NOES 0

Board Meeting of September 20, 2017