

PERIODIC REVIEW REPORT

FOR

**PORT-GREENBELT
SHORELINE IMPROVEMENT PROJECT
CITY OF BUFFALO, ERIE COUNTY, NEW YORK**

SITE No. B-00149-9

Prepared by:



C&S ENGINEERS, INC.
141 ELM STREET, SUITE 100
BUFFALO, NEW YORK 14203

Prepared on Behalf of:

ERIE CANAL HARBOR DEVELOPMENT CORPORATION
95 PERRY STREET
BUFFALO, NEW YORK 14203

FEBRUARY 2017

EXECUTIVE SUMMARY

The Port-Greenbelt Project (Site) is 15.83 acres within a 164.48-acre parcel on Buffalo's Outer Harbor Area adjacent to Fuhrmann Boulevard. The Site runs parallel to the shoreline from the Buffalo Harbor Slip to the Terminal B building.

Previous site investigations determined that both surface and subsurface soils exceeded Part 375 Soil Cleanup Objectives for Commercial Use. A subsequent remedial program was designed to keep contaminated soil/fill from washing into Lake Erie and to prevent direct human contact. The remedial efforts that consisted of the removal of contaminated soil along the shoreline, shoreline stabilization, installation of a soil cover, and the institutional controls that were put in place are meeting this goal.

This is the third annual review of the Site Management Plan.

The Port Greenbelt project is in compliance with all major elements of the Site Management Plan, except for soil sloughing/erosion occurring beyond the stone revetment in a portion of the Bell Slip. A Corrective Measures Work Plan has been prepared for this area. No changes to the Site Management Plan are needed or recommended at this time.

1 INTRODUCTION

On November 18, 2011 the Niagara Frontier Transportation Authority (NFTA) received a Certificate of Completion for the remedial program at the Port-Greenbelt Shoreline Improvement Program. The Port-Greenbelt Project (Site) is 15.83 acres within a 164.48-acre parcel on Buffalo's Outer Harbor Area adjacent to Fuhrmann Boulevard. The Site runs parallel to the shoreline from the Buffalo Harbor Slip to the Terminal B building.

This is the third Periodic Review Report required as part of the Site Management Plan prepared on behalf of the Erie Canal Harbor Development Corporation (ECHDC), the new Site owner, and submitted to the New York State Department of Environmental Conservation (NYSDEC). This report was prepared in accordance with the requirements in the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation.

2 SITE OVERVIEW

The Site is located adjacent to Lake Erie and parallel to Fuhrmann Boulevard, in the City of Buffalo, Erie County (Figure 1). The adjoining property is generally undeveloped.

The Site and the majority of the land surrounding it was created as a result of land reclamation and filling starting in 1874 and continuing for nearly 100 years. The land is generally composed of heterogeneous fill including dredged materials from the shipping channel, construction fill, concrete, stone, slag and other materials.

Most of the 164-acre Buffalo Outer Harbor was once listed as a Class 2 Inactive Hazardous Waste Disposal Site based on preliminary site assessments. Following further investigation, most of the site was delisted with only the area named the "Radio Tower Area" remaining classified as a Class 2 Inactive Hazardous Waste Site. However, previous Remedial and Site Investigations determined that both surface and subsurface soils exceeded Part 375 Soil Cleanup Objectives for Commercial Use. Based on these findings, NFTA subsequently submitted a Remedial Alternatives Report in support of a Brownfield Cleanup Application for the redevelopment of the Site.

In 2002, an Environmental Record of Decision (ROD) was issued by the New York State Department of Environmental Conservation which identified the remedial actions necessary for the Site. The specific actions that were taken to implement the remedy in accordance with the ROD included:

- Along the shoreline concrete, marble, and other stone rubble was removed.
- Contaminated fill and soil was excavated and the slopes were re-graded.
- For the shoreline, excluding portions of the Bell Slip, a geotextile fabric was installed and a heavy, armor stone revetment was constructed.
- Within the Bell Slip, not stabilized by heavy stone, two lengths of approximately 150 feet in length were partially stabilized using jute fiber matting, a toe sock, plantings and soil/stone mix.

- The upland area was re-graded with soil excavated from the shoreline and a geotextile fabric was installed.
- A soil cover system was constructed consisting of a minimum of 12 inches of clean soil and/or an asphalt bicycle/pedestrian trail along the entire upland area of the Site.
- An environmental easement was placed on the property which included the implementation of a Site Management Plan and annual certification of the engineering and institutional controls.

In 2014, the Niagara Frontier Transportation Authority (NFTA) officially transferred the property to Erie Canal Development Corporation (ECHDC). As such, ECHDC assumed the responsibility to implement the ongoing obligations described in the environmental easement.

3 REMEDY PERFORMANCE, EFFECTIVENESS AND PROTECTIVENESS EVALUATION

As described in the sections below, the remedy selected for the Site, construction and maintenance of shoreline stabilization and a soil cover system, is effective in ensuring that site soil/fill does not enter Lake Erie and limiting human contact with soil/fill in all areas of the Site, except for one location within the Bell Slip. To adequately ensure that soil is not leaving the site, corrective measures should be implemented in an approximately 100-foot section of the Bell Slip. A Corrective Measures Work Plan is attached as **Attachment A**.

The institutional controls will limit future impacts. No further remedial goals were established for the Site.

4 EVALUATION OF ENGINEERING AND INSTITUTIONAL CONTROLS

Engineering Controls

The specific engineering controls for the Site are:

- The stone revetment along the shoreline and underlying geotextile fabric
- The stone berm in the Bell Slip and topsoil/soil cover
- The asphalt pathway
- The soil cover system and underlying geotextile fabric

No long-term treatment systems were installed.

Institutional Controls

To ensure ongoing effectiveness of the remedy, the NFTA executed an Environmental Easement to restrict land use and prevent future exposure to any remaining contamination at the Site. Development of a Site Management Plan (SMP), which included plans for Institutional and Engineering Controls, Monitoring, and Reporting, was required to evaluate and monitor the remedy.

Specific institutional controls were required to ensure the remedial program continues to prohibit the remaining contamination from entering Lake Erie or coming into contact with humans, including:

- Compliance with the Environmental Easement and the SMP by the NFTA and any successors;
- All Engineering Controls must be maintained as specified by the SMP;
- All Engineering Controls must be inspected as required by the SMP;
- Reporting to the NYSDEC must be done annually for the first three years.

In addition, the Institutional Controls called for site use restrictions within the boundaries of the Greenbelt, pursuant to the Environmental Easement, which include the following:

- The property may only be used for public passive recreation use provided that the long-term engineering and institutional controls are employed.
- A higher level of use, such as unrestricted or restricted residential, may not occur on the site without additional remediation and amendment of the Environmental Easement and approval by the NYSDEC.
- Future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the Site Management Plan.
- The use of groundwater is prohibited without treatment rendering it safe for the intended use.
- Vegetable gardens and farming on the property are prohibited.
- The site owner or remedial party will submit to NYSDEC a written statement the certifies, under penalty of perjury, that (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access the Site at any time in order to evaluate the continued maintenance or any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

Site Visit

The annual Site Visit was conducted June 9, 2016. In general, the site was in good condition and in compliance with the requirements of the Environmental Easement, except for erosion occurring in the Bell Slip. Site visit notes are included as **Appendix B** and selected photos are included as **Appendix C**.

Soil Cover

The soil cover is still in good condition. There were no indications of additional erosion or depressions.

Revetment and Armor Stones

The armor stone revetment was in very good condition and showed no signs of failure or slipping. No stones were displaced or showed any signs of disintegration.

There were no sites along the edge of the revetment where geotextile fabric is visible.

Asphalt Pathway

The asphalt path is in good condition and is lightly showing signs of wear.

Bell Slip – Stone Berm and Soil/Topsoil

Generally, the slip looked to be in good condition with significant portions of the area covered with stones and grass cover. There were occasional animal burrows near trees located in the Bell Slip area. There was also some debris along the water's edge.

No geotextile fabric was exposed at the Bell Slip. However, there is evidence of soil erosion/sloughing in one approximately 100-foot area of the Slip, which is shown in **Figure 2**. A portion of the slope in this location has a vertical face where there is no soil or vegetation in an area behind a portion of the stone revetment. The soil cover in this portion of the Bell Slip appeared darker due to possible ponding from water that has overtopped the stone barrier during periods of high lake levels. There is also erosion from water scouring the soil behind the revetment and also slight damage to the gravel-filled bag which was displaced and tangled with some netting on shore.

Throughout the remainder of the Bell Slip, the geotextile sock along the water's edge showed some minor signs of damage. However, the contents of the sock were still in place and no erosion or sloughing was observed adjacent to the sock. Therefore, the sock is considered to be acting as designed.

A Corrective Measures Work Plan designed to stop further erosion is attached to this PRR as **Attachment A**.

5 MONITORING PLAN COMPLIANCE

Annual monitoring of the Site is required to evaluate:

- Whether engineering controls continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of the Site Management Plan and the Environmental Easement;
- Are site records complete and up to date; and
- Changes to the remedy or monitoring system.

A visual inspection of the soil cover system must be conducted annually in late spring. The soil cover will be monitored for signs of erosion, settlement, denuded areas, subsidence along the edges of the stone revetment and any other signs of damage. The form to be completed during this inspection was included in the SMP and is included in **Appendix B**.

Site-wide Inspections must also be performed at least once a year and after all severe weather conditions that may affect the Engineering Controls. The inspections must assess:

- Compliance with all Institutional Controls, including site usage;
- The condition and continued effectiveness of Engineering Controls;
- General site conditions;
- Site management activities being conducted; and
- Confirm site records are up to date.

The Site Monitoring Plan was undertaken as required in the Site Management Plan, specifically:

- A visual inspection of the soil cover system was undertaken in June of 2016;
- A site-wide inspection was completed at the same time; and
- The approved site inspection forms were used.

During the transfer of the Site, there was a delay in the site-wide inspection and visual inspection of the soil cover; however, there were no further deficiencies in the monitoring plan.

6 OPERATIONS AND MAINTENANCE PLAN

Not Applicable.

7 CONCLUSION AND RECOMMENDATIONS

Compliance with Site Management Plan

Institutional/Engineering Controls

The Site is in compliance with all items with all requirements of the SMP, except for erosion occurring in the Bell Slip. As previously discussed, a Corrective Measures Work Plan is attached.

Monitoring Plan

Site is in compliance will all aspects of the monitoring plan.

Performance and Effectiveness of Remedy

The remedy is acting as designed, with the exception of one portion of the Bell Slip, effectively limiting human exposure to buried contaminants and preventing contaminated soil from entering Lake Erie.

Future Periodic Review Report Submittals

No changes are proposed to the submission of review reports, and they will continue to be submitted annually.

8 CERTIFICATION

The PE Certification will be submitted when the Corrective Measures included in the attached plan are implemented.

FIGURES

APPENDICES

APPENDIX A
CORRECTIVE MEASURES WORK PLAN – BELL SLIP



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January 25, 2017

David Szymanski
Project Manager
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

Re: *Greenbelt Periodic Review Report – Corrective Measures Work Plan*
NYSDEC Site No. B-00149-9

Dear Mr. Szymanski:

As requested, C&S Engineers (C&S) is providing this Corrective Measures Work Plan on behalf of the Erie Canal Harbor Development Corporation (ECHDC) for shoreline erosion noted in one area of the Bell Slip (the “Site”) during the annual site inspection of the Port-Greenbelt Shoreline Improvement Project (the “Greenbelt”) on June 9, 2016. **Figure 1** shows the Site and area of erosion.

I. PROJECT UNDERSTANDING

A Corrective Measures Work Plan is required by the Site Management Plan (SMP) when engineering controls have been found to be insufficient or failing. The plan must explain the failure and provide the details and schedule for performing work necessary to correct the failure.

At the Greenbelt Site, initially, engineering controls consisting of a soil cover were installed over the entire Site to limit human exposure to fill material. During the design of the corrective measures, NYSDEC strongly indicated a preference to avoid the use of stone revetments within the limits of the Bell Slip and maximize plantings as erosion control and provide habitat. At that time, it was understood that, given the severe conditions of Lake Erie, some future scouring/erosion could recur if the designs avoiding the use of stone revetment. The soil cover was therefore constructed using only soil and ‘soft’ erosion control techniques, including plantings and toe socks.

However, as detailed in the SMP, several storm and seiche events have impacted portions of the Site and caused significant erosion. For example, in the winter of 2008-2009, storms with strong wave action in the Bell Slip caused erosion at the top of the slope in several areas of the Site. As such, the initially constructed soft erosion control techniques were found to be unsuccessful in stabilizing the slopes and were destroyed by the strong seiches.

In these areas, which are different locations from the current erosion, stone revetment was determined to be necessary to inhibit erosion. Per the SMP, based on discussions between the property owner, Niagara Frontier Transit Authority (NFTA); NFTA’s consultant; and the NYSDEC, it was agreed that a more “substantial” form of erosion control would be necessary to protect the Bell Slip from future storm events than what was incorporated in the initial repair design. The NYSDEC concurred that some type of stone revetment would most likely be required, as part of the solution. Appendix I of the SMP identifies the designs for the stone revetments.

The subsequent corrective actions resulted in the successful use of heavy armor stone in 800 feet of slope where scarps had formed due to erosion. A stone toe-berm was also constructed to extend to the water’s

edge, comprised of one or two rows of armor stone placed on the bench, adjacent to the scarp. A ‘chinking’ mixture comprised of well graded cobbles, gravel, and sand was installed in the void spaces between the larger armor stones. Willow stakes were also installed with the intent of fostering vegetative growth along the slopes.

Within a week of completion of this corrective measure in spring 2010, another strong storm occurred and a majority of the willow stakes was lost and the soil/stone mix was removed via erosion. This erosion occurred near the location of the currently observed erosion, but is not the same exact location.

In 2014, the Niagara Frontier Transportation Authority (NFTA) officially transferred the property to ECHDC. As such, ECHDC assumed the responsibility to implement the ongoing obligations described in the environmental easement.

During a recent site visit, erosion was observed in one area of the Bell Slip. This Corrective Measures Work Plan was prepared to address this area.

II. ENGINEERING CONTROLS

As noted in the Periodic Review Report (PRR), the Site generally looked to be in good condition with significant portions of the area covered with stones and grass cover. There was substantial bird habitat and many species of birds were observed during the inspection. There were occasional animal burrows near trees located in the area. There was also some debris observed along the water’s edge.

No geotextile fabric was exposed at the Site. However, there is evidence of soil erosion/sloughing in one area, approximately 100 lineal feet, of the Site, which is shown in **Figure 1**. A portion of the slope in this location has a vertical face where there is no soil or vegetation in an area behind a portion of the stone revetment. The soil cover in this portion of the Site appeared darker due to possible ponding from water that has overtopped the stone revetment during periods of high lake levels. There is also erosion from water scouring the soil behind the revetment. The toe stabilization in this area appeared to be functioning correctly, with some slight damage to the gravel-filled bag, which was displaced and tangled with some netting on shore. Photographs were taken during the Site inspection and are attached to this work plan as **Attachment A**.

This brief work plan describes the actions proposed to address the concerns identified above.

III. CORRECTIVE MEASURES

The final corrective measures that were implemented prior to this annual inspection included one or two rows of armor stone adjacent to the scarp with a ‘chinking’ mixture comprised of well graded cobbles, gravel, and sand that was installed in the void spaces between the larger armor stones. As noted above, the failure occurred behind this row of stone revetment. In this area, soil erosion occurred and vertical slopes were observed.

It is assumed that the severity of storms on Lake Erie, the orientation of the Lake with respect to predominant wind patterns, and the resulting seiche events are the cause of the constant erosion at the Site. This has historically been observed with the dismantlement and complete failure of previous corrective measures following seiches. In addition, it’s assumed that the frequency and severity of seiches events and strong storms will increase with climate change.

In order to reduce or eliminate erosion due to this wave action from storm surges, an area of medium stone fill with possible chinking mixture will be added in the area of slope erosion. This will build up the height of the revetment in this area to match or slightly exceed the ground level between the pathway and the shoreline. The stone in this upper row will take the brunt of the force from storm surges and wave action,

while acting as a barrier to not allow water to flow between the stones and erode from behind. A chinking mixture may be used which would be primarily cobbles and gravel, instead of the cobble, gravel and sand mixture in the former design, in order to prevent erosion of this material during storms.

Because the corrective measures are to only add material, the work will not be intrusive and will not encounter or disturb remaining contamination. As such, the work will be performed independent of the full excavation work plan in Appendix C of the SMP. For the safety of worker's at the Site, the work will be performed in accordance with a contractor's health and safety plan.

IV. SCHEDULE

These corrective measures will be implemented in Spring of 2018, pending approval of this work plan. ECHDC will need time to procure contractors and materials for the measures. Historically, measures implemented in the summer have been destroyed by winter storms. Giving this corrective measure the longest amount of time to settle prior to potentially strong storms and the chance for the chinking mixture to solidify will help prevent future erosion.

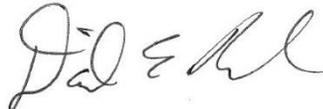
V. REPORTING

Following successful completion of this activity, a revised Certification of Engineering and Institutional Controls at the Site will be resubmitted to the NYSDEC. The corrective measures would be discussed in the next Periodic Review Report.

Should you have any questions regarding this work plan, please feel free to contact me at (716) 847-1630.

Sincerely,

C&S ENGINEERS, INC.



Daniel E. Riker, P.G.

Managing Geologist



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

LEGEND

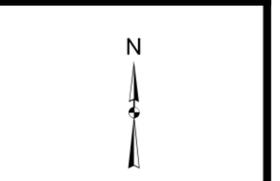
 APPROXIMATE GREENBELT BOUNDARY

NOTES

1) COORDINATE SYSTEM: NAD 1983 STATEPLANE NY
 WEST FIPS 3103
 PROJECTION: TRANSVERSE MERCATOR
 DATUM: NORTH AMERICAN 1983
 UNITS: FOOT US




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**PORT-GREENBELT
 PERIODIC REVIEW REPORT**

BUFFALO, NEW YORK

MARK	DATE	DESCRIPTION
REVISIONS		
PROJECT NO: H34004001		
DATE: JUNE 16 2016		
DRAWN BY: A. DEMARCHI		
DESIGNED BY: A. DEMARCHI		
CHECKED BY: D. RIKER		
NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK EDUCATION LAW		

SITE DETAIL

FIGURE 1

Exhibit:

Date:

Port-Greenbelt PRR

1

6/9/2016

Description:

Looking south along eastern bank of Bell Slip (see Figure 1). Vertical banks are visible above stone revetment.



Exhibit:

Date:

Port-Greenbelt PRR

2

6/9/2016

Description:

Looking north along eastern bank of Bell Slip (see Figure 1). Fabric and soil erosion visible above stones.



Exhibit:	Date:
3	6/9/2016

Port-Greenbelt PRR

Description:

Looking south along eastern bank of Bell Slip (see Figure 1). Vertical banks are visible above stone revetment.



Exhibit:	Date:
4	6/9/2016

Port-Greenbelt PRR

Description:

Netting and part of toe sock visible on eastern bank of Bell Slip



Exhibit: 5	Date: 6/9/2016	Port-Greenbelt PRR
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Description:

Looking north along path near eastern bank of Bell Slip. Darker grass and apparent depression near bench.



Engineer's Opinion of Probable Cost



Bell Slip Coastal Erosion
 Buffalo, NY
 Prepared For Erie Canal Harbor Development
 December 19, 2016

Project No. H34.004.001
 Project Name: Bell Slip Coastal Erosion
 Location: Buffalo, NY

ITEM CODE	ITEM DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	EST QTY x UNIT PRICE
1	Medium Stone Fill	20	CY	60.00	1,200.00
2	Mobilization and Labor	1	LS	4,000.00	4,000.00

Alt Sub-Total	\$4,200.00
10% Contingency	\$420.00
TOTAL	\$4,620.00

Assumptions:

- 2.5ft deep x 4.0ft wide triangular shaped fill area, 100ft long
- Includes mobilization and 1 day of work for (1) operator and (1) laborer

APPENDIX B
SITE INSPECTION FORMS

NFTA PORT-GREENBELT SHORELINE IMPROVEMENT PROJECT
SITE MANAGEMENT PLAN

NYSDEC SITE NO. B-00149-9

SITE-WIDE INSPECTION FORM

Date: 06/09/2016

Inspector: Alayna DeMarchi

Weather: Sunny/Partly Cloudy

Signature: 

Temperature: 65 Degrees Fahrenheit

Company: C&S Engineers, Inc.

Quarter: First Second Third Fourth
(Circle One)

Item Inspected	Maintenance Needed (Y/N)	Comments
General Site Access	N	Very good
Soil Cover/Grass Cover	N	Good
Asphalt Pedestrian/Bicycle Pathway	N	Good
Stone Revetment	N	Very good
Drainage Swales/Channels	N	Good
Bell Slip Slopes	Y	Erosion along bank. See Photo Log.
Trees, Bushes, Other Vegetation	N	Good

APPENDIX C
SITE VISIT PHOTOGRAPHS

Exhibit:

Date:

Port-Greenbelt

6/9/2016

Description:

Looking north along stone revetment from southern portion of Greenbelt, south of Bell Slip.



Exhibit:

Date:

Port-Greenbelt PRR

1

6/9/2016

Description:

Looking south from northern portion of Greenbelt



Exhibit:	Date:
2	6/9/2016

Port-Greenbelt PRR

Description:

Looking south along bike/pedestrian path



Exhibit:	Date:
3	6/9/2016

Port-Greenbelt PRR

Description:

Looking north from middle of Greenbelt. Stone revetment has some soil/grass on top.



Exhibit:	Date:
4	6/9/2016

Port-Greenbelt PRR

Description:

Looking south at entrance of Bell Slip



Exhibit:	Date:
5	6/9/2016

Port-Greenbelt PRR

Description:

Looking east along northern bank of Bell Slip. Netting from erosion control is visible.



Exhibit:	Date:
6	6/9/2016

Port-Greenbelt PRR

Description:

animal burrows near tree east of Bell Slip



Exhibit:	Date:
7	6/9/2016

Port-Greenbelt PRR

Description:

Looking south along eastern bank of Bell Slip (see Figure 2). Vertical banks are visible above stone revetment.



Exhibit:	Date:
8	6/9/2016

Port-Greenbelt PRR

Description:

Looking north along eastern bank of Bell Slip (see Figure 2). Fabric and soil erosion visible above stones.



Exhibit:	Date:
9	6/9/2016

Port-Greenbelt PRR

Description:

Looking south along eastern bank of Bell Slip (see Figure 2). Vertical banks are visible above stone revetment.



Exhibit:	Date:
10	6/9/2016

Port-Greenbelt PRR

Description:

Netting and part of toe sock visible on eastern bank of Bell Slip



Exhibit:	Date:
11	6/9/2016

Port-Greenbelt PRR

Description:

Looking north along path near eastern bank of Bell Slip. Darker grass and apparent depression near bench.



Exhibit:	Date:
12	6/9/2016

Port-Greenbelt PRR

Description:

Looking north at
entrance to Bell Slip

