NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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April 20, 2018

Mr. Paul Neureuter
Elk Street Commerce Park, LLC/The Krog Group
4 Centre Drive
Orchard Park, New York 14127

RE: ExxonMobil Former Buffalo Refinery OU-3 Site
Site ID No. C915201D, City of Buffalo, Erie County
Remedial Alternative Analysis & Decision Document

Dear Mr. Neureuter:

The New York State Department of Environmental Conservation (Department) and the New York State Department of Health (NYSDOH) have reviewed the Remedial Investigation – Alternative Analysis Report (RI-AAR) for the ExxonMobil Former Buffalo Refinery OU-3 Site dated April 2018. The RI-AAR is hereby approved. Please ensure that a copy of the approved RI-AAR is placed in the document repository.

Enclosed is a copy of the Department's Decision Document for the site. The remedy is to be implemented in accordance with this Decision Document. Please ensure that a copy of the Decision Document is placed in the document repository.

Please contact the Department's Project Manager, Eugene Melnyk, P.E., at 716-851-7220 or eugene.melnyk@dec.ny.gov at your earliest convenience to discuss next steps. Please recall the Department requires seven days' notice prior to the start of field work.

Sincerely,

Michael J. Cruden, P.E.
Director
Remedial Bureau E
Division of Environmental Remediation

Enclosure
ec: M. Ryan - NYSDEC
C. Staniszewski/E. Melnyk/J. Dougherty – Region 9, NYSDEC
K. Anders/C. Bethoney/R. Jones - NYSDOH
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DECISION DOCUMENT

ExxonMobil Oil Former Buffalo Terminal OU-3
Brownfield Cleanup Program
Buffalo, Erie County
Site No. C915201D
April 2018

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - DECISION DOCUMENT

ExxonMobil Oil Former Buffalo Terminal OU-3
Brownfield Cleanup Program
Buffalo, Erie County
Site No. C915201D
April 2018

Statement of Purpose and Basis

This document presents the remedy for the ExxonMobil Oil Former Buffalo Terminal OU-3 site, a brownfield cleanup site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the ExxonMobil Oil Former Buffalo Terminal OU-3 site and the public's input to the proposed remedy presented by the Department.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. REMEDIAL DESIGN
A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remediation program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. DEMOLITION
Demolition of a former pump house structure and abandoned aboveground process piping in

specific areas of OU-3 that were not previously removed. The pipe will be removed, drained of contents and removed from the site for either proper disposal or recycling. Also, unnecessary above ground protrusions, and abandoned tank and structure foundations encountered during site preparation will be removed and processed during the execution of the site preparation phase. The existing well point system and appurtenances will also be removed. Concrete materials which can't be beneficially reused on site will be taken off-site for proper disposal in order to implement the remedy.

3. EXCAVATION

Excavation and off-site disposal of contaminant source areas, including:

- concentrated solid or semi-solid hazardous substances per 6 NYCRR Part 375-1.2(au)(1). Specifically, this applies to a limited shallow excavation outside the proposed hydraulic containment barrier (see discussion below) on the western end of OU-3. Approximately 100 cubic yards of contaminated soil that potentially exceeds hazardous waste criteria will be removed from the site for offsite disposal.

4. BACKFILL

On-site soil which does not exceed the above excavation criteria, or is considered grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u), may be used below the cover system described in remedy element 8 to backfill the excavation.

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for commercial use will be brought in to complete backfilling of the excavation, as necessary, and establish the designed grades at the site.

The site will be re-graded to accommodate installation of a cover system as described in remedy element 8**.**

5. IN-SITU STABILIZATION

In-situ stabilization (ISS) will be implemented on soil grossly contaminated with petroleum, as defined in 6 NYCRR Part 375 1.2(u), in a limited area near the western end of OU-3 that is situated outside the proposed hydraulic containment remedy discussed remedial element 6. ISS is a process that uses a stabilizing agent which chemically changes contamination to make it less soluble. The contaminated soil will be mixed in place with stabilizing agents, such as Portland cement, using an excavator or augers. The stabilized soil will then be covered with a cover system as described in remedial element 8 to prevent direct exposure. This treatment changes/reduces the gross characteristics of the petroleum contaminated soil (i.e., odors, sheen, photoionization detector readings, etc.) and eliminate the matrix as a source of groundwater contamination.

6. HYDRAULIC CONTAINMENT

Hydraulic containment of groundwater and petroleum non-aqueous phase liquid (NAPL) to minimize groundwater migration from the site will be accomplished by installing interconnected vertical groundwater barriers. Cement bentonite slurry walls will be installed along the eastern and western borders of the site with a sealed steel bulkhead wall facing the Buffalo River. The cement bentonite slurry walls will extend a minimum of three feet into the low permeability clay layer that underlies the site, and the steel bulkhead will extend down to bedrock below the low

permeability clay layer at the site. The western cement bentonite slurry wall will tie into the stabilized soil at the perimeter of OU-2 East (BCP Site C915201B) which extends into the low permeability clay layer along the up-gradient areas of the site. The eastern cement bentonite slurry wall will tie into the soil bentonite slurry wall installed along the western end of OU-4 (BCP Site C915201E). The cement bentonite slurry will be a minimum of two feet wide and will achieve an effective hydraulic conductivity of $1x10^{-7}$ centimeters/second (cm/sec). Due to constructability issues, a small section of the cement bentonite wall will be constructed by jet grouting and will achieve an effective hydraulic conductivity of $1x10^{-6}$ cm/sec. The sealed steel bulkhead will be constructed with interlocking steel sheet piles and steel king piles. The interlocking joints between the steel piles will be sealed with an interlock sealant.

7. GROUNDWATER EXTRACTION AND TREATMENT

The existing well point system installed along the Buffalo River for groundwater extraction will be decommissioned and a new groundwater extraction system will be implemented for continued removal of petroleum NAPL in groundwater and to maintain a hydraulic gradient into the containment system. The groundwater extraction system will operate in conjunction with the hydraulic control barrier system discussed in Paragraph 6 to prevent the off-site migration of contaminants. The groundwater extraction system will consist of six new groundwater extraction wells. The extraction wells will be designed and installed so that the capture zone is sufficient to cover the areal and vertical extent of the site that contains separate phase petroleum adjacent to the Buffalo River and maintain an inward gradient within the hydraulic containment area. The extraction system will create a depression in the water table so that contaminated groundwater and separate phase petroleum is directed toward the extraction wells within the plume area.

The extracted groundwater will be processed through the existing groundwater treatment system at the site to remove petroleum NAPL and treat contaminated groundwater by oil/water separation and air sparging to strip away contaminants from the water. The groundwater will be discharged to the local publicly owned treatment works. The exhaust air is treated using activated carbon technology.

The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

8. COVER SYSTEM

A site cover will be required to allow for commercial and industrial use of the site in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

Further, to reduce the infiltration of precipitation and thus limit the volume of groundwater requiring extraction and treatment, a low permeability cover will be required within the hydraulic containment area of OU-3 discussed in paragraph 7. This will be accomplished by installing low permeability covers consisting of either new pavement, rehabilitated pavement or low permeable geosynthetic liners covered with the required minimum 1-foot of cover soil.

9. ENGINEERING AND INSTITUTIONAL CONTROLS

Imposition of an institutional control in the form of an environmental easement and a Site Management Plan, as described below, will be required. The remedy will achieve a Track 4 commercial cleanup at a minimum and will include an environmental easement and site management plan as described below.

Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the Department approved Site Management Plan.

10. SITE MANAGEMENT PLAN

A Site Management Plan, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The environmental easement discussed in Paragraph 9 above.

Engineering Controls: The hydraulic containment system discussed in Paragraph 6, the groundwater extraction system discussed in Paragraph 7 and the site cover discussed in Paragraph 8.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any existing and new buildings on the site, including provision for implementing actions recommended

to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- a provision that should an existing or future building or building foundation be demolished in the future, a cover system consistent with that described in Paragraph 8 above will be placed in any areas where the upper one foot of exposed surface soil exceed the applicable SCOs;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
- monitoring of groundwater to assess the performance and effectiveness of the remedy; and
- a schedule of monitoring and frequency of submittals to the Department, and
- monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- procedures for operating and maintaining the remedy;
- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

Declaration

The remedy conforms with promulgated standards and criteria that are directly applicable, or that are relevant and appropriate and takes into consideration Department guidance, as appropriate. The remedy is protective of public health and the environment.

Michael J Cruden

Digitally signed by Michael J Cruden
DN: cn=Michael J Cruden, o=DER, ou=RBE, email=mjcruden@gw.dec.state.ny.us, c=US
Date: 2018.04.19 12:47:07 -04'00'

Date

Michael Cruden, Director
Remedial Bureau E

DECISION DOCUMENT

ExxonMobil Oil Former Buffalo Terminal OU-3
Buffalo, Erie County
Site No. C915201D
April 2018

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of contaminants at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of contaminants at this site, as more fully described in this document, has contaminated various environmental media. Contaminants include hazardous waste and/or petroleum.

The New York State Brownfield Cleanup Program (BCP) is a voluntary program. The goal of the BCP is to enhance private-sector cleanups of brownfields and to reduce development pressure on "greenfields." A brownfield site is real property, the redevelopment or reuse of which may be complicated by the presence or potential presence of a contaminant.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repositories:

Valley Community Center
93 Leddy Street
Buffalo, NY 14210
Phone: 716-823-4707

Buffalo and Erie County Public Library
1 Lafayette Square
Buffalo, NY 14203
Phone: 716-858-8900

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location:
The site is located in an urban area off of Elk Street in the City of Buffalo. The site is bordered on the north by Prenatt Street (a paper street) and mostly vacant property (ExxonMobil Operable Unit (OU)-2 East and OU-2 West); on the east by a commercial business and major oil storage facility (ExxonMobil OU-4 eastern tank yard area); and on the west by a chemical manufacturing plan and south by the Buffalo River.

Site Features:
This site is located within the footprint of a larger former ExxonMobil petroleum refining facility. The larger former refinery and storage facility (previously defined as BCP site C915201) was segregated into five smaller individual BCP sites/operable units (OUs) for remediation and redevelopment purposes. An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. The five BCP sites include: OU-1 (BCP Site 915201), OU-2 East (BCP Site C915201B), OU-2 West (BCP Site 915201C), OU-3 (BCP Site C915201D) and OU-4 (BCP Site C915201E). The OU-3 site, the subject of this Decision Document, is 34.3 acres in size and is comprised of three separate parcels owned by differing entities as follows:

- a 16.7 acre parcel owned by Buckeye Terminal Inc. that contains a major oil storage facility (MOSF) and petroleum distribution terminal. This parcel occupies the eastern end of the site. The MOSF includes multiple large above ground petroleum storage tanks;
- a 10.9 acre mostly vacant parcel retained by ExxonMobil in the central area of the site that contains a small building for the existing groundwater treatment system; and
- a 6.8 acre parcel on the western end of the site owned by a construction company that contains an occupied building (Bldg. 135) for office use and storage, and a yard area for equipment and material storage.

The ground surface is relatively flat. An inactive northeasterly-trending railroad right-of-way separates Buckeye's eastern tank yard area (OU-4) from the OU-3. The area bordering the Buffalo River was improved with a wood and concrete bulkhead for marine commercial access to the river. A well point system (WPS) is situated near the river bulkhead to intercept and collect separate phase petroleum from the site.

Current Zoning and Land Use:
The entire site is currently zoned industrial and is generally surrounded by a mixture of industrial and commercial properties. There are a few isolated residential parcels located north of Elk Street.

Past Use of the Site:
The site is a portion of a larger former petroleum refinery facility. Since the 1880s, the site has been used for petroleum refining and storage. Refining operations terminated in the 1980s. Former refinery, lubricant production and terminal activities have impacted this site.

Site Geology and Hydrogeology:
Three unconsolidated deposits exist throughout the majority of the site including a fill layer (cinders, ash, slag, sand, brick, concrete, etc.) ranging in thickness from 5 to 10 feet, underlain by an alluvial deposit layer consisting of silt, sands, gravel and clay 5 to 20 feet in thickness, and a glacio-lacustrine clay layer that acts as a confining layer. Depth to clay is approximately 10 to 20 feet below ground surface.

Groundwater is approximately 3 to 20 feet below ground surface and generally flows southwest toward the Buffalo River. Groundwater gradient is influenced to a limited degree by the WPS.

A site location map is attached as Figures 1 and 2.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives that restrict the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) were evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the Remedial Investigation (RI) to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is available in the RI Report.

SECTION 5: ENFORCEMENT STATUS

The Applicants under the Brownfield Cleanup Agreement is a Volunteer. The Applicant does not have an obligation to address off-site contamination. However, the Department has determined that this site does not pose a significant threat to public health or the environment; accordingly, no enforcement actions are necessary. The only potential off-site impacts are being investigated and remediated, if necessary, under NYSDEC Spill No. 1705188; accordingly, enforcement actions are not necessary.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A remedial investigation (RI) serves as the mechanism for collecting data to:

- characterize site conditions;
- determine the nature of the contamination; and
- assess risk to human health and the environment.

The RI is intended to identify the nature (or type) of contamination which may be present at a site and the extent of that contamination in the environment on the site, or leaving the site. The RI reports on data gathered to determine if the soil, groundwater, soil vapor, indoor air, surface water or sediments may have been contaminated. Monitoring wells are installed to assess groundwater and soil borings or test pits are installed to sample soil and/or waste(s) identified. If other natural resources are present, such as surface water bodies or wetlands, the water and sediment may be sampled as well. Based on the presence of contaminants in soil and groundwater, soil vapor will also be sampled for the presence of contamination. Data collected in the RI influence the development of remedial alternatives. The RI report is available for review in the site document repository and the results are summarized in section 6.3.

The analytical data collected on this site includes data for:

- air
- groundwater
- soil
- soil vapor
- crawl space air

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a contaminant that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants

of concern. The nature and extent of contamination and environmental media requiring action are summarized below. Additionally, the RI Report contains a full discussion of the data. The contaminants of concern identified at this site are:

petroleum products	cadmium
1,2,4-trimethylbenzene	lead
1,3,5-trimethylbenzene	mercury
benzene	arsenic
ethylbenzene	chrysene
toluene	pyrene
xylene (mixed)	barium
isopropylbenzene	fluorene
n-propylbenzene	naphthalene
benzo(a)anthracene	phenanthrene
benzo(a)pyrene	anthracene
benzo(b)fluoranthene	fluoranthene
dibenz[a,h]anthracene	benzo[k]fluoranthene
indeno(1,2,3-CD) pyrene	chromium

The contaminants of concern exceed the applicable SCGs for:

- groundwater
- soil

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Decision Document.

There were no IRMs performed at this site during the RI.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water. The RI report presents a detailed discussion of any existing and potential impacts from the site to fish and wildlife receptors.

The primary sources of contamination in OU-3 are the historical petroleum refining, storage and distribution operations that have taken place across the majority of the site since the late 1800s. Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals are present in the soil at shallow and deep intervals, often exceeding one or more of the criteria across OU-3.

Due to common historic operation and ownership of adjoining areas, the OU-2 East (C915201B), OU-2 West (C915201C) and OU-4 (C915201E) sites have similar petroleum contaminants in soil and groundwater. These areas are being evaluated and remediated under respective site brownfield remediation programs.

SOIL:
Petroleum Impacted Soil: Petroleum impacted soil is widespread throughout OU-3. Black staining, petroleum odor, and elevated PID readings were observed in multiple soil borings from grade to the bottom of the boring in OU-3 during previous investigations. The petroleum contaminated soil in these areas meets the definition of grossly contaminated media.

Surface/Near Surface Soil:
The surface (0-0.5 feet) and near surface (0.5-2 feet) soil/fill interval was sampled for metals, VOCs, SVOCs, polychlorinated biphenyls (PCBs) and pesticides/herbicides.

VOC exceedances for commercial use soil cleanup objectives (CSCOs) in the surface soil interval occurred at one sample location only for 1,2,4-trimethylbenzene (400 milligrams per kilogram or parts per million (ppm)/190 ppm CSCO). VOC CSCO exceedances in the near surface soil interval include: 1,2,4-trimethylbenzene (up to 1,200 ppm/190 ppm CSCO), 1,3,5-trimethylebenzene (up to 470 ppm/190 ppm CSCO), benzene (up to 48 ppm/44 ppm CSCO), ethylbenzene (up to 530 ppm/390 ppm CSCO), toluene up to 790 ppm/500 ppm CSCO, and total xylenes (up to 1,700 ppm/500 ppm CSCO).

SVOC CSCO exceedances in the surface soil interval include: benzo[a]anthracene (up to 25 ppm/5.6 ppm CSCO), benzo[a]pyrene (up to 53 ppm/1.0 ppm CSCO), benzo[b]fluoranthene (up to 25 ppm/5.6 ppm CSCO), dibenz[a,h]anthracene (up to 14 ppm/0.56 ppm CSCO), and indeno[1,2,3-cd]pyrene (up to 15 ppm/5.6 ppm CSCO). SVOC CSCO exceedances in the near surface soil interval include: benzo[a]anthracene (up to 26 ppm/5.6 ppm CSCO), benzo[a]pyrene (up to 22 ppm/1.0 ppm CSCO), benzo[b]fluoranthene (up to 33 ppm/5.6 ppm CSCO), dibenz[a,h]anthracene (up to 2.6 ppm/0.56 ppm CSCO), and indeno[1,2,3-cd]pyrene (up to 8.6 ppm/5.6 ppm CSCO).

Metal exceedances varied throughout OU-3. Metal CSCO exceedances in the surface interval include: cadmium (up to 24.8 ppm/9.3 ppm CSCO), lead (up to 99,000 ppm/1000 ppm CSCO); mercury (up to 26 ppm/2.8 ppm CSCO). Metal CSCO exceedances in the near surface interval include the following: arsenic (up to 30.3 ppm/16 ppm CSCO) cadmium (up to 10.4 ppm/9.3 ppm CSCO), lead (up to 11,200 ppm/1000 ppm CSCO); mercury (up to 111 ppm/2.8 ppm CSCO).

PCBs and pesticides/herbicides did not exceed CSCOs in surface or near surface soil at the site.

Subsurface Soil/Deep Interval:
Subsurface soil/fill up to 20 feet below ground surface (fbgs), was sampled for metals, VOCs, SVOCs, PCBs and pesticides/herbicides.

VOC CSCO exceedances in the deep interval include the following: 1,2,4-trimethylbenzene (up to 470 ppm/190 ppm) and total xylenes (up to 1,700 ppm/500 ppm).

SVOC exceedances in the deep interval above the CSCOs include the following: benzo[a]anthracene (up to 960 ppm/5.6 ppm CSCO), benzo[a]pyrene (up to 1,600 ppm/1.0 ppm CSCO), benzo[b]fluoranthene (up to 430 ppm/5.6 ppm CSCO), chrysene (up to 1,400 ppm/56 ppm CSCO), dibenz[a,h]anthracene (up to 220 ppm/0.56 ppm CSCO), indeno[1,2,3-cd]pyrene (up to 170 ppm/5.6 ppm CSCO), and pyrene (up to 1,400 ppm/500 ppm CSCO).

Metal CSCO exceedances in the deep interval include: arsenic (up to 54.5ppm/16 ppm CSCO), barium (up to 2160 ppm/590 ppm CSCO), copper (up to 236,000 ppm/270 ppm CSCO), and lead (up to 111,000 ppm/1000 ppm CSCO).

PCBs, pesticides and herbicides did not exceed the CSCO criteria.

Off-site impacts to soil from contaminants that have migrated from this site were not identified, except on the adjacent BCP sites as noted above. Potential off-site impacts to near shore sediments in the Buffalo River are being handled under NYSDEC Spill No. 1705188.

GROUNDWATER:
Separate-phase petroleum product, identified as a sheen and/or as a layer of product floating on the groundwater, exists across the majority of the eastern and central portion of OU3. Historically, the separate-phase product within OU-3 has resulted in sheens within the Buffalo River. The WPS provides hydraulic control of separate-phase product, limiting the seepage of product into the Buffalo River.

VOCs: The concentrations of VOCs and SVOCs are lower along the up-gradient (or northern) portion of the site and higher towards the southern border of the site. VOC groundwater contaminants that exceed NYSDEC Ambient Water Quality Standards and Guidance Values (AWQSGV) for Class GA groundwater include benzene up to 1,030 micrograms per liter (ug/l or ppb) (1 ppb); toluene up to 23 ppb (5 ppb); ethylbenzene up to 44 ppb (5 ppb); xylenes (total) up to 148 ppm (5 ppb); 1,2,4-trimethylbenzene up to 22.2 ppb (5 ppb); 1,3,5-trimethylbenzene up to 16.8 ppb (5 ppb); isopropylbenzene up to 33.3 ppm (5 ppb); and n-propylbenzene up to 62.5 ppb (5 ppb).

SVOCs: SVOCs above AWQSGV include: benzo[b]fluoranthene at 2.7 ppb (0.002 ppb), benzo[k]fluoranthene at 2.3 ppb (0.002 ppb), naphthalene 3,900 ppb (10 ppb), acenaphthene up to 36 ppb (20 ppb), chrysene up to 530 ppb (0.002), fluorene up to 760 ppb (50 ppb), phenanthrene up to 3,400 ppb (50 ppb), pyrene up to 1,400 ppb (50 ppb), anthracene up to 540 ppb (50 ppb) and flouranthene up to 1,900 ppb (50 ppb).

Metals: The AWQSGV were exceeded for the following metals including: cadmium up to 0.0718 ppm (0.005 ppm), chromium up to 2.21 ppm (0.05 ppm), lead up to 929 ppm (0.025 ppm), manganese up to 3.1 ppm (0.3 ppm), mercury up to 0.0905 ppm (0.0007 ppm), nickel up to 3.49 ppm (0.10 ppm), and selenium up to 0.207 ppm (0.01 ppm).

Off-site impacts to groundwater from contaminants that have migrated from this site were not identified, except on the two adjacent BCP sites as noted above.

SOIL VAPOR, CRAWL SPACE VAPOR AND INDOOR AIR
Exterior soil vapor and crawl space air sampling was conducted during several sampling events in 2008, 2009 and 2013. Building 135 is the only occupied building situated in OU-3 and is constructed with a crawl space foundation with the ground floor constructed of concrete above the crawl space. Air from the crawl space below the ground floor was sampled. No indoor air sampling was performed. The 2009 crawl space air sample results revealed trace levels of petroleum constituents. Since the building is located in an area where separate phase petroleum has been observed, soil vapor samples collected adjacent to the building detected petroleum related compounds including benzene up to 26,520 micrograms per cubic meter (ug/m^3), hexane up to 38,770 ug/m^3, and 2,2,4-trimethylpentane up 144,830 ug/m^3. A soil vapor sample situated in the central part of the site near former and current storage tanks revealed benzene up to 58,000 ug/m^3, ethylbenzene up to 8,700 ug/m^3, hexane up to 6,000,000 ug/m^3, cyclohexane up 2,500,000 ug/m^3, heptane up 860,000 ug/m^3 and 2,2,4-trimethylpentane up 3,100,000 ug/m^3. The soil vapor samples adjacent to Building 135 also detected methane ranging from 160,528 parts per million per volume (ppmv) to 412,500 ppmv (12,500 ppmv lower explosive level). Methane in the building crawl space was detected at 1.62 ppmv.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains its water from a source not affected by site contamination. The site is fenced on three sides and the Buffalo River, on the fourth side, thus restricting public access. Persons who enter the site can contact contaminants in the soil or groundwater by walking on the site, digging below the surface, or otherwise disturbing the soil. Volatile organic compounds in soil vapor (air spaces within the soil), may move into buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Sampling identified the potential for impacts to indoor air quality in the existing on-site building and additional evaluation of the indoor air quality is needed.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

SECTION 7: ELEMENTS OF THE SELECTED REMEDY

The alternatives developed for the site and the evaluation of the remedial criteria are presented in the Alternative Analysis. The remedy is selected pursuant to the remedy selection criteria set forth in DER-10, Technical Guidance for Site Investigation and Remediation and 6 NYCRR Part 375.

The selected remedy is a Track 4 commercial use cleanup remedy.

The elements of the selected remedy, as shown in Figure 3, are as follows:

1. REMEDIAL DESIGN

A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remediation program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;

- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. DEMOLITION

Demolition of a former pump house structure and abandoned aboveground process piping in specific areas of OU-3 that were not previously removed. The pipe will be removed, drained of contents and removed from the site for either proper disposal or recycling. Also, unnecessary above ground protrusions, and abandoned tank and structure foundations encountered during site preparation will be removed and processed during the execution of the site preparation phase. The existing well point system and appurtenances will also be removed. Concrete materials which can't be beneficially reused on site will be taken off-site for proper disposal in order to implement the remedy.

3. EXCAVATION

Excavation and off-site disposal of contaminant source areas, including:

- concentrated solid or semi-solid hazardous substances per 6 NYCRR Part 375-1.2(au)(1). Specifically, this applies to a limited shallow excavation outside the proposed hydraulic containment barrier (see discussion below) on the western end of OU-3. Approximately 100 cubic yards of contaminated soil that potentially exceeds hazardous waste criteria will be removed from the site for offsite disposal.

4. BACKFILL

On-site soil which does not exceed the above excavation criteria, or is considered grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u), may be used below the cover system described in remedy element 8 to backfill the excavation.

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for commercial use will be brought in to complete backfilling of the excavation, as necessary, and establish the designed grades at the site.

The site will be re-graded to accommodate installation of a cover system as described in remedy element 8**.**

5. IN-SITU STABILIZATION

In-situ stabilization (ISS) will be implemented on soil grossly contaminated with petroleum, as defined in 6 NYCRR Part 375 1.2(u), in a limited area near the western end of OU-3 that is situated outside the proposed hydraulic containment remedy discussed in remedial element 6. ISS is a process that uses a stabilizing agent which chemically changes contamination to make it less soluble. The contaminated soil will be mixed in place with stabilizing agents, such as Portland cement, using an excavator or augers. The stabilized soil will then be covered with a cover system as described in remedial element 8 to prevent direct exposure. This treatment

changes/reduces the gross characteristics of the petroleum contaminated soil (i.e., odors, sheen, photoionization detector readings, etc.) and eliminate the matrix as a source of groundwater contamination.

6. HYDRAULIC CONTAINMENT

Hydraulic containment of groundwater and petroleum non-aqueous phase liquid (NAPL) to minimize groundwater migration from the site will be accomplished by installing interconnected vertical groundwater barriers. Cement bentonite slurry walls will be installed along the eastern and western borders of the site with a sealed steel bulkhead wall facing the Buffalo River. The cement bentonite slurry walls will extend a minimum of three feet into the low permeability clay layer that underlies the site, and the steel bulkhead will extend down to bedrock below the low permeability clay layer at the site. The western cement bentonite slurry wall will tie into the stabilized soil at the perimeter of OU-2 East (BCP Site C915201B) which extends into the low permeability clay layer along the upgradient areas of the site. The eastern cement bentonite slurry wall will tie into the soil bentonite slurry wall installed along the western end of OU-4 (BCP Site C915201E). The cement bentonite slurry will be a minimum of two feet wide and will achieve an effective hydraulic conductivity of $1x10^{-7}$ centimeters/second (cm/sec). Due to constructability issues, a small section of the cement bentonite wall constructed by jet grouting will achieve an effective hydraulic conductivity of $1x10^{-6}$ cm/sec. The sealed steel bulkhead will be constructed with interlocking steel sheet piles and steel king piles. The interlocking joints between the steel piles will be sealed with an interlock sealant.

7. GROUNDWATER EXTRACTION AND TREATMENT

The existing well point system installed along the Buffalo River for groundwater extraction will be decommissioned and a new groundwater extraction system will be implemented for continued removal of petroleum NAPL in groundwater and to maintain a hydraulic gradient into the containment system. The groundwater extraction system will operate in conjunction with the hydraulic control barrier system discussed in Paragraph 6 to prevent the off-site migration of contaminants. The groundwater extraction system will consist of six new groundwater extraction wells. The extraction wells will be designed and installed so that the capture zone is sufficient to cover the areal and vertical extent of the site that contains separate phase petroleum adjacent to the Buffalo River and maintain an inward gradient within the hydraulic containment area. The extraction system will create a depression in the water table so that contaminated groundwater and separate phase petroleum is directed toward the extraction wells within the plume area.

The extracted groundwater will be processed through the existing groundwater treatment system at the site to remove petroleum NAPL and treat contaminated groundwater by air sparging to strip away contaminants from the water. The groundwater is discharged to the local publicly owned treatment works. The exhaust air is treated using activated carbon technology.

The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

8. COVER SYSTEM

A site cover will be required to allow for commercial and industrial use of the site in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

Further, to reduce the infiltration of precipitation and thus limit the volume of groundwater requiring extraction and treatment, a low permeability cover will be required within the hydraulic containment area of OU-3 discussed in paragraph 7. This will be accomplished by installing low permeability covers consisting of either new pavement, rehabilitated pavement or low permeable geosynthetic liners covered with the required minimum 1-foot of cover soil.

9. ENGINEERING AND INSTITUTIONAL CONTROLS

Imposition of an institutional control in the form of an environmental easement and a Site Management Plan, as described below, will be required. The remedy will achieve a Track 4 commercial cleanup at a minimum and will include an environmental easement and site management plan as described below.

Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the Department approved Site Management Plan.

10. SITE MANAGEMENT PLAN

A Site Management Plan, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The environmental easement discussed in Paragraph 9 above.

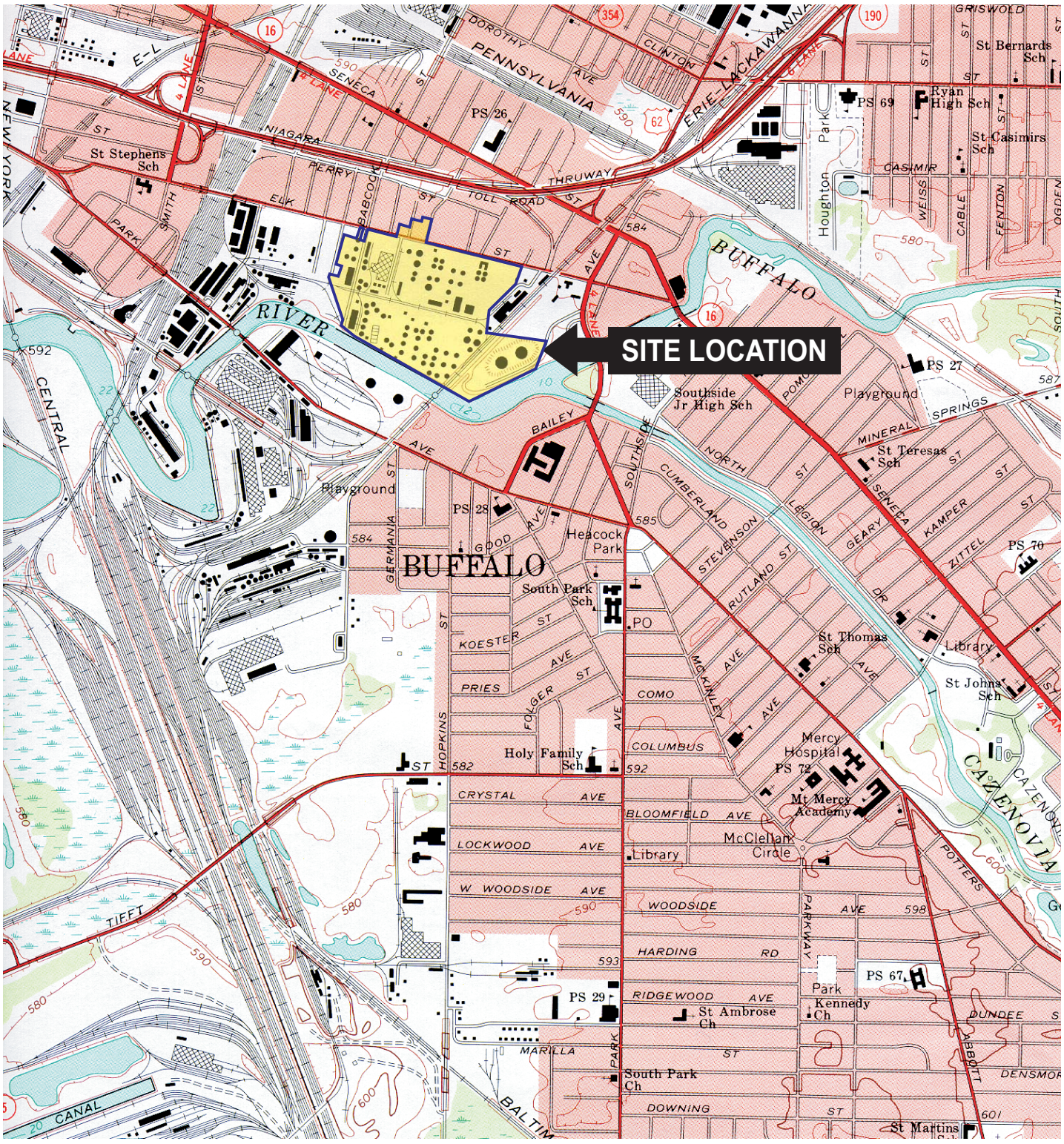
Engineering Controls: The hydraulic containment system discussed in Paragraph 6, the groundwater extraction system discussed in Paragraph 7 and the site cover discussed in Paragraph 8.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any existing and new buildings on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- a provision that should an existing or future building or building foundation be demolished in the future, a cover system consistent with that described in Paragraph 8 above will be placed in any areas where the upper one foot of exposed surface soil exceed the applicable SCOs;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
   - monitoring of groundwater to assess the performance and effectiveness of the remedy;
   - a schedule of monitoring and frequency of submittals to the Department; and
   - monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
   - procedures for operating and maintaining the remedy;
   - compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
   - maintaining site access controls and Department notification; and
   - providing the Department access to the site and O&M records.



QUADRANGLE LOCATION

SOURCE:
USGS; 1965, Buffalo SE, New York
7.5 Minute Topographic Quadrangle

N

0 2000'

Title:

SITE LOCATION MAP

EXXONMOBIL FORMER BUFFALO TERMINAL, BUFFALO, NEW YORK

Prepared for:

EXXONMOBIL OIL CORPORATION

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: W.K.	Date: 29AUG12	FIGURE
Prepared by: J.A.D.	Scale: AS SHOWN	1
Project Mgr.: N.C.	Project No.: 0172.0052Y015	
File No.: 0172.0052Y441.02.CDR		

V:\CAD\PROJECTS\0172\Y0052Y441\0172.0052Y441.02.CDR

Existing
OU-1 Site
C915201

0.3 ac.

OU-2 West
Site
C915201 C

OU-2 East Site
C915201B

22.7 ac.

4.1 ac.

6.7 ac.

OU-3 Site
C915201D

6.8 ac.

16.7 ac.

OU-4 Site
C915201E

17.0 ac.

Exhibit C:
Current Proposed BCA Divisions
as of Feb. 20, 2017

- Original Exxon-Mobil BCA (OU-1)
- New ESCP BCA Application (OU-2, partial)
- New ESCP BCA Application (OU-2, partial)
- New ESCP BCA Application (OU-3)
- New Exxon-Mobil BCA Application (OU-4)

Elk Street
Commerce Park, LLC

Figure 2

2/20/17

ORLANDO AVENUE

FORMERLY BABCOCK STREET

FORMERLY PRENATT STREET

OU-2 West

OU-2 East

OU-3

OU-4

HOT SPOT EXCAVATION

PAVEMENT COVER

LIMIT OF PROPOSED PAVEMENT (TYP)

LIMIT OF LINED STONE COVER (TYP)

LINER ANCHOR TRENCH

EXISTING OIL/WATER SEPARATOR

EXISTING TREATMENT BUILDING

LINED STONE COVER

LINER ANCHOR TRENCH

In-situ Soil Stabilization

REPLACE PAVEMENT DISTRURBED DURING ISS WORK

PAVEMENT COVER

PROPOSED SLURRY WALL (WEST)

JET GROUT WALL

PROPOSED BULKHEAD WALL
FINAL GRADE ELEV 584.0 AT WALL

BUFFALO RIVER

EXISTING SLURRY WALLS (TYP)

LEGEND

- EXISTING PAVED AREA
- PROPOSED PAVED AREA
- EXISTING LINED COVER
- LINED STONE COVER
- EXISTING PIPE RACKS
- 12-IN CLEAN COVER
- SLURRY WALL
- SEALED SHEETPILE BULKHEAD

0 40 80 160
SCALE IN FEET

Prepared/Date: WJW 01/29/18
Checked/Date: RES 01/29/18

REMEDIAL DESIGN
ELK STREET PROPERTY
BUFFALO, NEW YORK

amec foster wheeler

REMEDIAL ALTERNATIVE 4

Project 3617-16-7397

Figure 3

Z:\Projects\ExxonMobil-KRGC-Elk Street\OU3 Design\Figures\Remedial Alt 4 - Cover Areas - Plate 10.dwg Mon, 29 Jan 2018 - 1:01pm william.whitten