DECISION DOCUMENT

Former General Motors North Tarrytown
Brownfield Cleanup Program
Sleepy Hollow, Westchester County
Site No. C360070
June 2012

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

DECLARATION STATEMENT - DECISION DOCUMENT

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Site No. C360070
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Statement of Purpose and Basis

This document presents the remedy for the Former General Motors North Tarrytown 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 Former General Motors North Tarrytown site and the public's input to the proposed remedy presented by the Department.

Description of Selected Remedy

For OU: 01 and 02

The elements of the selected remedy are as follows:

With the completion of interim remedial measures (IRMs) to address soil and groundwater contamination on the land-based portion of the site, this alternative relies on site-wide institutional and engineering controls (IC/EC) previously identified for the IRMs to address the remaining contamination in OUs 1 and 2 on-site and the dredging of an area of the Hudson River to address off-site metals contamination.

Specifically, this alternative consists of implementing site-wide ICs/ECs, as described in the July 2007 IRM Decision Document, to mitigate direct contact with soil and historic fill materials that exceed 6 NYCRR Part 375 SCOs for restricted residential use. This alternative builds on the remedial actions that have already been taken to remove contaminated soil and historic fill and address contaminated groundwater through in-situ treatment.

The elements of the proposed remedy are as follows:

1) A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial 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) Removal of sediment will occur over an approximately 0.8 acre portion of the Hudson River near Outfall OF-1 (Figure 3). The removal area will extend 150 feet upstream and downstream of the outfall and will be bounded by the shoreline and the existing Tarrytown Harbor channel. Removal will extend to cut elevations of approximately 17.5 feet below mean sea level. This dredging will maximize mass removal based on remedial investigation sampling results and a graphical evaluation of the data and will remove approximately 4,400 cubic yards of metals contaminated sediment. The freshwater lowest effect levels established in the NYSDEC Technical Guidance for Screening Contaminated Sediments would be met within the delineated removal area to a significant depth (4-10 ft). To provide environmental controls, turbidity curtains will be used and water quality monitoring will be conducted during the sediment removal operations. Verification samples will be collected to document the quality of sediments left in-place following dredging.

3) Following removal, dredged sediment will be placed on a pre-constructed staging area on the West Parcel. Dredged material will be segregated to remove debris and material not suitable for disposal and staged to facilitate dewatering, stabilization, and sampling for waste characterization and evaluation of treatment and disposal requirements. Water generated during the dredging and dewatering activities will be treated onsite using a portable water treatment system. Treated water will then be discharged to the Hudson River.

4) The dredged area of the Hudson River will be backfilled with in-kind material; likely sand to within 2 feet of the final grade and 2 feet of fine material to the final grade on top of the sand. The final elevations of the restored dredged area will be the same as it was prior to dredging activities. The habitat zones disturbed during these remedial activities will be restored to current conditions.

5) During the Hudson River sediment dredging, a 30 foot section of the 48-inch storm sewer that discharges at OF-1 will be cleaned out to remove accumulated sediments. It is estimated that this cleanout will extend from the outfall to the first upstream manhole (approximately 30 feet). The sediment will be placed in the West Parcel staging area where it will be sampled for waste characterization purposes prior to disposal. In addition, a site-wide storm sewer inspection, including the collection of any necessary sediment samples for laboratory analysis, will be completed during the cleanout of the 48-inch storm sewer to determine sediment removal from

other areas of the system that may be required to meet the remedial action objectives and avoid recontamination of the dredged area.

6) Until site redevelopment occurs, the existing building slabs and pavement at the site will form the site cover, where there is currently no exposed surface soil. A site cover will be maintained as a component of any future site development, which will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

7) Imposition of an institutional control in the form of an environmental easement for the controlled property that:
(a) 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);
(b) allows the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
(c) 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
(d) requires compliance with the Department approved Site Management Plan.

8) A Site Management Plan is required, 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 7 above.

Engineering Controls: The proposed remedy includes the Engineering Controls outlined in the July 2007 IRM Decision Document. This includes a demarcation barrier over soil or historic fill material that does not meet 6 NYCRR Part 375 SCOs for unrestricted use, a final barrier cap system, and mitigation measures to address potential intrusion of methane and volatile organic vapors into future overlying buildings.

This plan includes, but may not be limited to:
(a) an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
(b) descriptions of the provisions of the environmental easement including any land use and/or groundwater use restrictions;
(c) a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

(d) provisions for the management and inspection of the identified engineering controls;
(e) maintaining site access controls and Department notification; and
(f) 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:
(a) monitoring of groundwater to assess the performance and effectiveness of the remedy;
(b) a schedule of monitoring and frequency of submittals to the Department; and
(c) monitoring for vapor intrusion for any buildings occupied or developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

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.

6/8/2012

Date

Michael Cruden, Director
Remedial Bureau E

DECISION DOCUMENT

Former General Motors North Tarrytown
Sleepy Hollow, Westchester County
Site No. C360070
June 2012

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 comments 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:

Warner Library
Attn: Reference Librarian
121 North Broadway
Tarrytown, NY 10591
Phone: (914) 631-7734

NYSDEC Region 3 Office
Attn: Michael Knipfing
21 South Putt Corners Road
New Paltz, NY 12561
Phone: (845) 256-3154

Village of Sleepy Hollow
Attn: Village Clerk
28 Beekman Avenue
Sleepy Hollow, NY 10591
Phone: (914) 366-5106

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 Former General Motors North Tarrytown site is located at 199 Beekman Avenue in an urban area within the Village of Sleepy Hollow (Figure 1). The site occupies approximately 96.5 acres and is positioned along the eastern shore of the Hudson River. The site is approximately one-half mile west of the intersection of Beekman Avenue and New York State Route 9.

Site Features: The Site is comprised of three, non-contiguous parcels: 1) former main assembly plant area referred to as the West Parcel (approximately 66.2 acres); 2) eastern parking lot referred to as the East Parcel (approximately 28.3 acres); and 3) former salaried employee parking lot referred to as the South Parcel (approximately 1.7 acres). The West and East Parcels are bisected by an active passenger and freight rail corridor. Two large manufacturing buildings were demolished in 1999 from the West Parcel leaving two large concrete building slabs. The majority of the remainder of the site is covered with an asphalt parking surface. The Pocantico River borders the East Parcel to the north and discharges into the Hudson River approximately 1,000 feet upstream of the site.

Current Zoning/Use(s): The site is currently inactive and zoned for industrial land use. The site is located in a mixed industrial, commercial, residential, and parkland area. The commercial center for the Village of Sleepy Hollow is less than 0.5 miles east of the Site. Lands immediately southeast and east of the Site are primarily residential. Public parklands surround the northern borders of the Site. Kingsland Point Park of Westchester County abuts the northwest border of the Site. The Tarrytown Lighthouse, which is listed on the National Register of Historic Places, is located in the Hudson River immediately west of the Site and is accessible to the public through Kingsland Point Park.

Historic Use(s): Until approximately 1830 when a brickyard was established at the site, the property was undeveloped or used as farmland. In 1885, the Rand Drill Company acquired the

abandoned brickyard property and the facility was used to manufacture percussion rock drills until approximately 1909. Between 1899 and 1914 the north side of the property (adjacent to Kingsland Point) was used for vehicle manufacturing by the Mobile Company of America (Mobile) and the Maxwell Briscoe Company (Maxwell Briscoe). The Chevrolet Motor Company (which later became a division of GM) originally acquired the former Maxwell Briscoe Property and automobile manufacturing facility in 1914. Between 1914 and 1996, GM assembled automobiles at the Site. This included two manufacturing buildings (the Body Plant and the Chassis Plant) along with support operations consisting of a powerhouse, petroleum bulk storage tanks, a wastewater pretreatment facility, a water storage tank, and miscellaneous day shelters for equipment and personnel. Overall, approximately 90% of the site area has been developed on fill.

Operable Units: The site is divided into two operable units. Operable Unit 1 (OU1) includes the West Parcel (approximately 66.2 acres), the Hudson River, and the former salaried employee parking lot referred to as the South Parcel (approximately 1.7 acres). Operable Unit 2 (OU2) consists of the East Parcel (approximately 28.3 acres). The East Parcel was acquired by GM from the Village of North Tarrytown and was only used as a parking lot.

Site Geology and Hydrogeology: The majority of the site is developed on fill material with a highly variable composition and thickness. The fill is generally comprised of fine-to-coarse sand with lesser amounts of gravel, silt, and clay and varying amounts of coal cinder and ash fill cinders, along with brick fragments and other solid building materials. Areas of the site have also been filled in with Hudson River dredged material that consist of sand, silt, gravel, and shells. Fill, placed in a portion of the East Parcel by the Village of North Tarrytown, consists of municipal refuse and coal ash. The fill material is underlain in areas by soft organic clay and peat deposits associated with the Hudson and Pocantico Rivers. In other areas, layers of silt and clay underlies the fill. Beneath these deposits, a layer of compact granular glacial till (silty sand with gravel and occasional cobbles and boulders) overlies the bedrock with a thickness ranging from 1 foot to more than 10 feet. The underlying bedrock is a weathered to relatively sound gneiss. The depth to bedrock is extremely variable across the site, ranging from less than 20 feet below ground surface (bgs) to greater than 100 ft.

The groundwater table in the vicinity of the site is present in the fill and predominantly occurs at a depth of approximately 5 to 10 feet beneath the ground surface. In general, groundwater flow is to the west, toward the Hudson River.

Operable Unit (OU) Numbers 01 and 02 are the subject of this document.

A site location map is attached as Figure 1 and a map illustrating site features is attached as Figure 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, an

alternative that restricts the use of the site to restricted-residential use (which allows for commercial use and industrial use) as described in Part 375-1.8(g) was 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 Applicant under the Brownfield Cleanup Agreement is a Participant. The Applicant has an obligation to address on-site and off-site contamination. Accordingly, no enforcement actions are 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:

- groundwater
- surface water
- soil
- sediment
- soil vapor

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:

For OU: 01

LEAD	MERCURY
CHROMIUM	TRICHLOROETHENE (TCE)
COPPER	PETROLEUM PRODUCTS
ZINC	

For OU: 02

METHANE	MERCURY

The contaminants of concern exceed the applicable SCGs for:

- groundwater
- soil
- sediment
- soil vapor

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.

The following IRMs have been completed at this site based on conditions observed during the RI. Figure 2 illustrates the IRM locations.

IRM - Lead Impacted Soils (PAOC 7 & 29)

The IRM activities completed within potential area of concern (PAOC) 7 and PAOC 29 included excavation and offsite disposal of grossly contaminated soil containing elevated concentrations of lead. In total, approximately 4,800 cubic yards of lead contaminated soil (greater than 5,000 parts per million) were removed from the PAOC 7 and PAOC 29 areas.

Following excavation, a demarcation barrier consisting of a black geotextile fabric was placed in the excavation to delineate soil left in place from the material used as backfill. The demarcation barrier was installed at the completed depth and horizontal extent of the excavations.

Following placement of the demarcation barrier, the PAOC 7 and PAOC 29 excavation areas were backfilled with imported 2-inch minus stone. Above the water table, the backfill was placed in 1-foot lifts and compacted to a minimum of 95 percent of the Standard Proctor density.

IRM - Chromium & TCE Impacted Area (PAOC 47)

The IRM activities completed within PAOC 47 included excavation and offsite disposal of soil contaminated with chromium and TCE that exceeded restricted residential and protection of groundwater soil cleanup objectives respectively. In total, approximately 3,700 cubic yards of chromium and TCE contaminated soil were removed from the PAOC 47 area.

Following excavation, a demarcation barrier was placed in the excavation to delineate soil left in place from the material used as backfill. The demarcation barrier consisted of a black geotextile fabric and was installed at the completed depth and horizontal extent of the excavation.

Following placement of the demarcation barrier, the PAOC 47 excavation area was backfilled with imported 2-inch minus stone. Above the water table, the backfill was placed in 1-foot lifts and compacted to a minimum of 95 percent of the Standard Proctor density.

To address residual TCE groundwater contamination, a total of 65 in-situ chemical oxidation (ISCO) injection wells were installed in the PAOC 47 area. The injection wells were used to introduce approximately 40,500 gallons of sodium persulfate and sodium hydroxide between April 23 and May 1, 2008. Following injection, groundwater quality monitoring was completed to confirm the overall effectiveness of the ISCO injection. Based on this groundwater monitoring, it was determined that additional ISCO injections were not necessary to address TCE groundwater contamination.

IRM - Former UST Area

The IRM activities completed in the former underground storage tank (UST) area included excavation and offsite disposal of approximately 6,400 cubic yards of petroleum contaminated soil that exceeded restricted residential soil cleanup objectives. During excavation of petroleum contaminated soil, the remaining portion of a UST (that was partially removed in 1998) and two additional USTs were encountered within the excavation area and subsequently removed and properly disposed of as part of the IRM.

Following excavation, a demarcation barrier was placed in the excavation to delineate soil left in place from the material used as backfill. The demarcation barrier consisted of a black geotextile fabric and was installed at the completed depth and horizontal extent of the excavation.

Following placement of the demarcation barrier, the former UST excavation area was backfilled with imported 2-inch minus stone and concrete millings. Above the water table, the backfill was placed in 1-foot lifts and compacted to a minimum of 95 percent of the Standard Proctor density.

To address residual petroleum groundwater contamination, a total of approximately 3,300 gallons of in-situ chemical oxididant (ISCO) were introduced into the former UST area. Following injection, groundwater quality monitoring was completed to confirm the overall effectiveness of the ISCO injection. Based on this groundwater monitoring, it was determined that additional ISCO injections were not necessary to address petroleum contamination.

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.

Nature and Extent of Contamination:
Investigations have been completed to characterize the nature and extent of contamination associated with former industrial operations at the Former GM Assembly Plant site. The on-site investigations have focused on the west and east parcels and the off-site investigations have focused on the sediments and the benthic community adjacent to the site and residing in the Hudson River.

Investigations have identified widespread, low-level contamination across the Site at concentrations that exceed the standards, criteria, and guidance (SCGs) along with four specific areas containing significant levels of contamination. The contamination identified at the Site is associated with a combination of historical fill and past operations at the former GM Assembly Plant facility. The contaminants of concern on-site include metals (primarily lead and chromium), petroleum-derived VOCs and SVOCs, trichloroethene (TCE), and methane gas. The high concentrations of contaminants in the four areas of the site were addressed by a series of interim remedial measures (IRMs) in 2007. The cleanup goals for lead were 5,000 ppm for soil above the water table and 10,000 ppm below the water table and were based on an evaluation of site data. The cleanup goals for chromium and TCE were 180 ppm (restricted residential soil cleanup objective) and 0.47 ppm (protection of groundwater soil cleanup objective) respectively. The restricted residential soil cleanup objectives were used for the area with petroleum contamination. Contamination not exceeding the site specific cleanup goals remains at the site.

The off-site investigations in the Hudson River identified five metals, including chromium, copper, lead, mercury, and zinc as the primary contaminants of concern. These five metals were

detected in sediments at concentrations exceeding the respective sediment quality criteria. The highest concentrations were detected in the area of an outfall that historically discharged process water from the GM facility.

ON-SITE:
Soil:
Prior to remediation, lead contaminated soil was identified at two areas of the site at concentrations up to 167,000 ppm and above the restricted residential soil cleanup objective (400 ppm). The highest lead concentrations were consistently detected in areas referred to as Potential Area of Concern (PAOC) 7 and PAOC 29. Remediation activities completed as IRMs in these two areas removed approximately 4,800 cubic yards of lead constituting 74 percent of lead contamination. Lead remains in site soil/historic fill outside of the excavation areas at concentrations ranging from 26 ppm to 3,630 ppm above the water table and 80 ppm to 8,830 ppm below the water table. A final barrier cap system will be placed over the entire site to prevent direct contact with remaining lead contamination in soil.

Prior to remediation, chromium and TCE were detected at concentrations up to 3,750 ppm and 0.045 ppm respectively in soil samples collected from an area of the site formerly used as a process pit beneath the Body Plant (PAOC 47). IRM activities in 2007 removed approximately 3,700 cubic yards of chromium and TCE contaminated soil from the PAOC 47 area. Remaining at the site are chromium and TCE in site soil/historic fill outside of the excavation areas at concentrations ranging from 10.1 ppm to 94.6 ppm and 0.00037 ppm to 0.012 ppm respectively. The IRM effectively removed the contaminant source areas and met the cleanup objectives for chromium and TCE (180 ppm and 0.47 ppm respectively).

Prior to remediation in an area of a former 10,000 gallon No. 6 heating oil underground storage tank, viscous oil was present in the fill material and petroleum contaminants were present at concentrations significantly exceeding SCGs. The 2007 IRM removed three underground storage tanks and 6,400 cubic yards of petroleum contaminated soil from this area. No petroleum based volatile organic compounds or semi-volatile organic compounds were detected in soil samples collected outside of the excavation area at concentrations exceeding their respective soil cleanup objectives.

On the East Parcel, located on the eastern-side of the railroad corridor, mercury was detected at concentrations above the unrestricted soil cleanup objective of 0.18 ppm in 73 of 85 subsurface soil samples. In general, mercury was detected in soil from this part of the site at concentrations ranging from 0.05 ppm to 7.9 ppm, with one anomalous detection of 61.4 ppm. From the 85 soil samples collected from the East Parcel, mercury was detected at an average concentration of 1.58 ppm. The mercury detections occurred in an area of the site where the land was brought up to its current grade with material dredged from the Hudson River and other imported fill material. A final barrier cap system will be placed over the entire site to prevent direct contact with remaining mercury contamination in soil.

Groundwater:
Prior to remediation, TCE, chromium, and petroleum-derived VOCs and SVOCs were the primary contaminants of concern identified in site groundwater. TCE was detected beneath the

Body Plant (PAOC 47) at concentrations up to 75 ppb and exceeding the groundwater SCG of 5 ppb. Chromium was detected in groundwater from this area at concentrations up to 42,100 ppb and above the groundwater SCG of 50 ppb. The IRM in 2007 involved excavation of soil around the former process pit to remove the TCE and chromium source area, and the injection of chemical oxidants to reduce residual groundwater contamination. Following excavation and ISCO injection, TCE was detected at a maximum groundwater concentration of 8.5 ppb and slightly above the drinking water standard of 5 ppb. Chromium groundwater concentrations outside of the IRM treatment area range from non-detect to 466 ppb.

Groundwater sampling shows that petroleum-derived VOCs are no longer present in the remediated 10,000 gallon UST area and are present at low part-per-billion concentrations downgradient from this area. Natphalene, detected at a maximum concentration of 44 ppb and above the 10 ppb groundwater standard, was the VOC detected at the highest concentration downgradient of the former 10,000 gallon UST area. Fluoranthene was the SVOC detected at the highest concentration (68 ppb) and slightly above the groundwater standard of 50 ppb downgradient of the UST area. Overall, petroleum-derived VOCs and SVOCs, are effectively attenuated within the boundaries of the Site, approaching or meeting groundwater standards at the property line.

Although lead was a primary contaminant in site soil/fill material and required remediation, groundwater sampling across the site indicates that lead is not leaching from soil/fill material and impacting groundwater quality. Lead was detected at concentrations ranging from non-detect to 21.2 ppb in groundwater and below the groundwater standard of 25 ppb near PAOC 7 and PAOC 29 where lead contaminated soil/fill material was removed as part of IRMs.

Soil Vapor:
Methane gas was identified as a primary contaminant of concern for the East Parcel portion of the site due to the presence of the former village refuse area. Soil gas samples collected from the East Parcel area indicate the presence of high levels of methane beneath the asphalt covering the majority of the East Parcel. The overall distribution of the methane gas corresponds with the shape of the former municipal refuse area. Soil vapor sampling also identified elevated concentrations of methane in the northwest section of the West Lot (OU1). The presence of methane in this area is likely related to the decay of natural organic marsh deposits observed in soil borings advanced in this area.

OFF-SITE:
Sediments:
A series of investigations identified five metals, including chromium, copper, lead, mercury, and zinc in Hudson River sediments at concentrations exceeding the background screening levels and/or freshwater screening criteria. The highest concentrations were detected in a localized area near an outfall (OF-1) located along the southwest corner of the site. Specifically, in the immediate vicinity of OF-1, chromium, lead, and zinc were detected at the highest concentrations (148 ppm, 1,520 ppm, and 1,260 ppm respectively).

Special Resources Impacted/Threatened:
The Sediment Remedial Investigation (RI) report prepared by General Motors (GM) concluded that based on a weight-of-evidence evaluation the site contaminants present in Hudson River bulk sediments in close proximity to an outfall (OF-1), are not biologically available and are not toxic to the Hudson River benthic communities and no remedial action is necessary. The NYSDEC has reviewed the RI report and the sediment data, and does not agree with GM's conclusion. It is the Department's position that there is some impairment to fish and wildlife resources near the GM site. Although both parties still hold their position a settlement was negotiated agreeable to both the NYSDEC and GM that will allow this project to move forward. The settlement consists of GM's payment of $875,000 in damages for injuries to natural resources, pursuant to a settlement dated December 2010, and the removal of sediments at OF-1.

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.*

Access to the site is not restricted. Contact with contaminated soil or groundwater is unlikely unless an individual digs below the ground surface. Contaminated groundwater at the site is not used for drinking or other purposes and the surrounding community is served by a public water supply that obtains water from a distant source. People may come in contact with contaminants present in sediments while entering or exiting the river near the former outfall during recreational activities. Volatile organic compounds in the groundwater or soil may move into the soil vapor (air spaces within the soil), which in turn may move into overlying 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. Because there is no on-site building, inhalation of site contaminants in indoor air due to soil vapor intrusion does not represent a concern for the site in its current condition. However, the potential exists for the inhalation of site contaminants due to soil vapor for any future on-site development. Sampling indicates soil vapor intrusion is not a concern for off-site buildings.

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 summarized below. Table 1, included at the end of the Decision Document summarizes how each of the remedial action objectives will be achieved with the selected remedy.

For OU 01:

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

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- 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.

Sediment

RAOs for Public Health Protection

- Prevent direct contact with contaminated sediments.
- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of (ambient water quality criteria).
- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.
- Restore sediments to pre-release/background conditions to the extent feasible.

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.

For OU 02:

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

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- 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: Restricted use with site-specific soil cleanup objectives remedy.

For OU 01 and 02:

The elements of the selected remedy, as shown in Figure 3, for OU 01 and 02 are as follows:

With the completion of interim remedial measures (IRMs) to address soil and groundwater contamination on the land-based portion of the site, this alternative relies on site-wide institutional and engineering controls (IC/EC) previously identified for the IRMs to address the remaining contamination in OUs 1 and 2 on-site and the dredging of an area of the Hudson River to address off-site metals contamination.

Specifically, this alternative consists of implementing site-wide ICs/ECs, as described in the July 2007 IRM Decision Document, to mitigate direct contact with soil and historic fill materials that exceed 6 NYCRR Part 375 SCOs for restricted residential use. This alternative builds on the remedial actions that have already been taken to remove contaminated soil and historic fill and address contaminated groundwater through in-situ treatment.

The elements of the selected remedy are as follows:

1) A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial 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) Removal of sediment will occur over an approximately 0.8 acre portion of the Hudson River near Outfall OF-1 (Figure 3). The removal area will extend 150 feet upstream and downstream of the outfall and will be bounded by the shoreline and the existing Tarrytown Harbor channel. Removal will extend to cut elevations of approximately 17.5 feet below mean sea level. This dredging will maximize mass removal based on remedial investigation sampling results and a graphical evaluation of the data and will remove approximately 4,400 cubic yards of metals contaminated sediment. The freshwater lowest effect levels established in the NYSDEC Technical Guidance for Screening Contaminated Sediments would be met within the delineated removal area to a significant depth (4-10 ft). To provide environmental controls, turbidity curtains will be used and water quality monitoring will be conducted during the sediment removal operations. Verification samples will be collected to document the quality of sediments left in-place following dredging.

3) Following removal, dredged sediment will be placed on a pre-constructed staging area on the West Parcel. Dredged material will be segregated to remove debris and material not suitable for disposal and staged to facilitate dewatering, stabilization, and sampling for waste characterization and evaluation of treatment and disposal requirements. Water generated during the dredging and dewatering activities will be treated onsite using a portable water treatment system. Treated water will then be discharged to the Hudson River.

4) The dredged area of the Hudson River will be backfilled with in-kind material; likely sand to within 2 feet of the final grade and 2 feet of fine material to the final grade on top of the sand. The final elevations of the restored dredged area will be the same as it was prior to dredging activities. The habitat zones disturbed during these remedial activities will be restored to current conditions.

5) During the Hudson River sediment dredging, a 30 foot section of the 48-inch storm sewer that discharges at OF-1 will be cleaned out to remove accumulated sediments. It is estimated that this cleanout will extend from the outfall to the first upstream manhole (approximately 30 feet). The sediment will be placed in the West Parcel staging area where it will be sampled for waste characterization purposes prior to disposal. In addition, a site-wide storm sewer inspection, including the collection of any necessary sediment samples for laboratory analysis, will be completed during the cleanout of the 48-inch storm sewer to determine sediment removal from other areas of the system that may be required to meet the remedial action objectives and avoid recontamination of the dredged area.

6) Until site redevelopment occurs, the existing building slabs and pavement at the site will form the site cover, where there is currently no exposed surface soil. A site cover will be maintained as a component of any future site development, which will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

7) Imposition of an institutional control in the form of an environmental easement for the controlled property that:
(a) 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);
(b) allows the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
(c) 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
(d) requires compliance with the Department approved Site Management Plan.

8) A Site Management Plan is required, 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 7 above.

Engineering Controls: The proposed remedy includes the Engineering Controls outlined in the July 2007 IRM Decision Document. This includes a demarcation barrier over soil or historic fill material that does not meet 6 NYCRR Part 375 SCOs for unrestricted use, a final barrier cap system, and mitigation measures to address potential intrusion of methane and volatile organic vapors into future overlying buildings.

This plan includes, but may not be limited to:
(a) an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
(b) descriptions of the provisions of the environmental easement including any land use and/or groundwater use restrictions;
(c) a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
(d) provisions for the management and inspection of the identified engineering controls;
(e) maintaining site access controls and Department notification; and
(f) 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:
(a) monitoring of groundwater to assess the performance and effectiveness of the remedy;
(b) a schedule of monitoring and frequency of submittals to the Department; and
(c) monitoring for vapor intrusion for any buildings occupied or developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., WHITE PLAINS, NY, 1967, PHOTOREVISED 1979.

2000' 0 2000'

Approximate Scale: 1" = 2000'

Area Location

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

ALTERNATIVES ANALYSIS REPORT

SITE LOCATION MAP

ARCADIS

FIGURE
1

08/17/2010 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0000/00029/CDR/64462N01.CDR

FIGURE 2
Site Features and Interim Remedial Measure Location Map

New York State
Department of Environmental Conservation

Division of Environmental Remediation

Map Details

Created in ArcGIS 9.3

Created by J. Pelton

Date of Last Revision: 6/6/2012

UNAUTHORIZED DUPLICATION
IS A VIOLATION OF APPLICABLE LAWS

Former GM Assembly Plant
Site # C360070

Westchester County
Village of Sleepy Hollow

DEC Contact:
J. Pelton

DOH Contact:
F. Navratil

Spring 2003
Aerial Photography

N
W E
S

North American Datum 1983
UTM Zone 18N

FIGURE 3
Conceptual Illustration of Selected Remedial Alternative

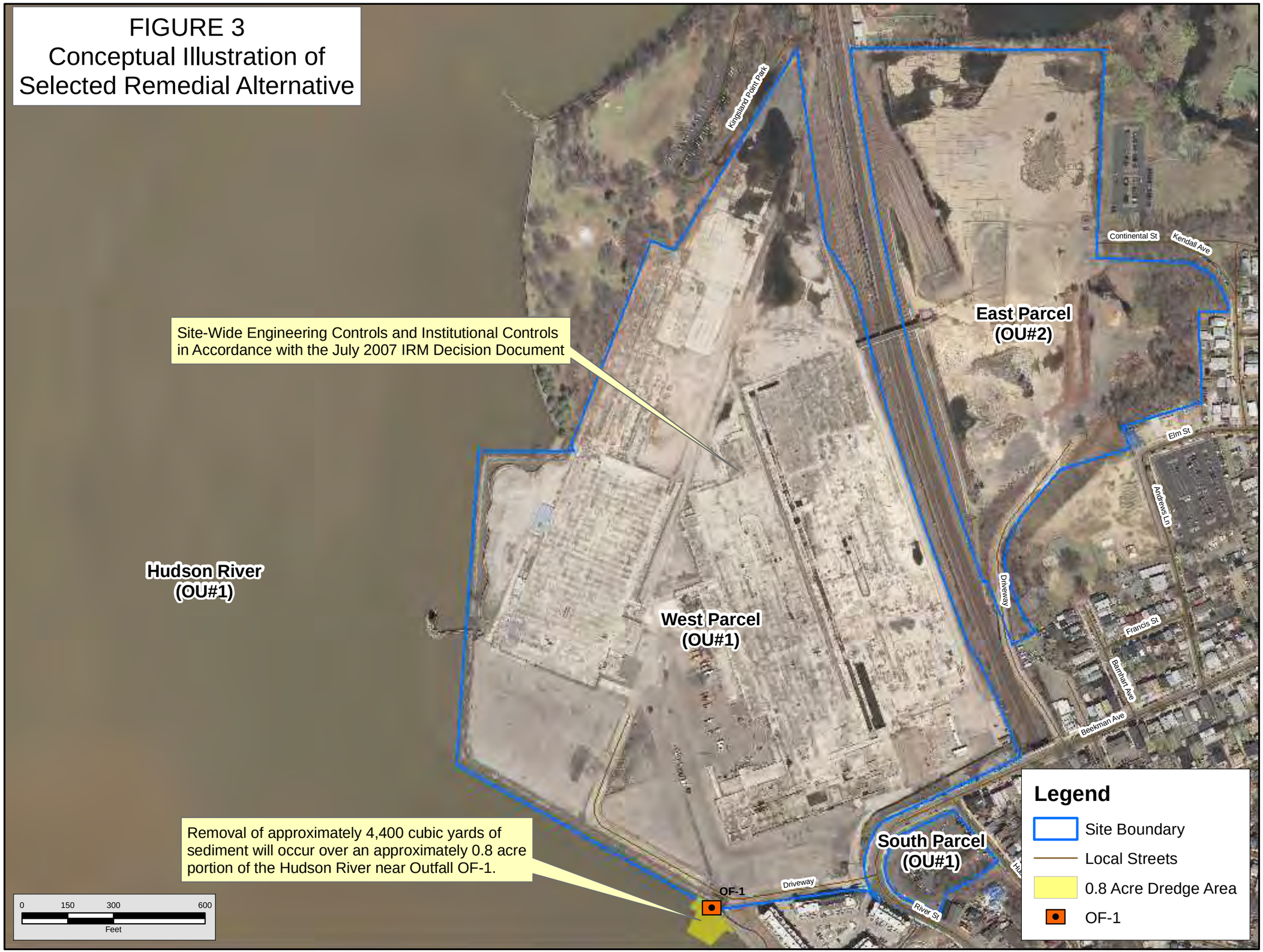

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TABLE 1

SUMMARY OF SELECTED REMEDIAL ACTIONS TO MEET REMEDIAL OBJECTIVES

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FINAL DECISION DOCUMENT
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE

Remedial Action Objectives (RAOs) for Protection of Public Health and the Environment	Selected Remedial Actions for Protection of Public Health and the Environment
Groundwater RAOs for Protection of Public Health	
Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards	- Prohibit groundwater use as an Institutional Control - A Site Management Plan will include protocols to safely handle groundwater encountered during excavation activities.
Prevent contact with, or inhalation of volatiles, from contaminated groundwater	- Achieved by excavating source areas and injecting in-situ chemical oxidants as Interim Remedial Measures (July 2007 IRM Decision Document). - Institutional Controls/Engineering Controls with requirement that all buildings constructed on the site be designed and constructed to address potential for VOC vapors and methane intrusion and demonstrate effectiveness of mitigation controls. - A Site Management Plan will address inspection, testing and O&M of any active mitigation systems.
Groundwater RAOs for Environmental Protection	
Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable	- Achieved by excavating source areas and injecting in-situ chemical oxidants as Interim Remedial Measures (July 2007 IRM Decision Document).
Remove the source of ground or surface water contamination	- Achieved by excavating source areas and injecting in-situ chemical oxidants as Interim Remedial Measures (July 2007 IRM Decision Document).
Soil RAOs for Protection of Public Health	
Prevent ingestion/direct contact with contaminated soil	- Achieved by excavating source areas and injecting in-situ chemical oxidants as Interim Remedial Measures (July 2007 IRM Decision Document). - Implement Institutional Controls/Engineering Controls to cover the affected soil and fill with hard surfaces or a soil cap meeting applicable SCOs. - A Site Management Plan will include protocols to safely handle soil and fill materials that reside under the cover system to prevent future exposure potential.
Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.	- Achieved by excavating source areas and injecting in-situ chemical oxidants as Interim Remedial Measures (July 2007 IRM Decision Document). - Institutional Controls/Engineering Controls with requirement that all buildings constructed on the site be designed and constructed to address potential for VOC vapors and methane intrusion and demonstrate effectiveness of mitigation controls. - A Site Management Plan will address inspection, testing and O&M of any active mitigation systems.

TABLE 1
SUMMARY OF SELECTED REMEDIAL ACTIONS TO MEET REMEDIAL OBJECTIVES

FINAL DECISION DOCUMENT
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE

Soil RAOs for Environmental Protection	
Prevent migration of contaminants that would result in groundwater or surface water contamination	- Achieved by excavating source areas and injecting in-situ chemical oxidants as Interim Remedial Measures (July 2007 IRM Decision Document). - Natural attenuation of onsite residual contamination. - A Site Management Plan will include groundwater monitoring.
Sediment RAOs for Protection of Public Health	
Prevent direct contact with contaminated sediments	- Achieved by excavating 4,400 cubic yards of metals contaminated sediments from the Outfall-1 (OF-1) area and restoring the dredged area with in-kind material.
Prevent surface water contamination which may result in fish advisories	- Achieved by excavating 4,400 cubic yards of metals contaminated sediments from the OF-1 area.
Sediment RAOs for Environmental Protection	
Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of (ambient water quality criteria)	- Achieved by excavating 4,400 cubic yards of metals contaminated sediments from the OF-1 area and restoring the habitat zones with in-kind material.
Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain	- Achieved by excavating 4,400 cubic yards of metals contaminated sediments from the OF-1 area and restoring the habitat zones with in-kind material.
Restore sediments to pre-release/background conditions to the extent feasible	- Achieved by excavating 4,400 cubic yards of metals contaminated sediments from the OF-1 area and restoring the habitat zones with in-kind material. - Achieved by removing potentially contaminated sediments from 48-inch storm sewer that discharges at OF-1.
Soil Vapor RAOs for Protection of Public Health	
Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site	- Achieved by excavating source areas and injecting in-situ chemical oxidants as Interim Remedial Measures (July 2007 IRM Decision Document). - Institutional Controls/Engineering Controls with requirement that all buildings constructed on the site be designed and constructed to address potential for VOC vapors and methane intrusion and demonstrate effectiveness of mitigation controls. - A Site Management Plan will address inspection, testing and O&M of any active mitigation systems.