PREASSESSMENT SCREEN
for
NEWTOWN CREEK,

BROOKLYN AND QUEENS, NEW YORK

Issued by:

The United States Department of the Interior, New York State Department of Environmental Conservation, and National Oceanic and Atmospheric Administration in their capacity as Trustees of Natural Resources

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I. INTRODUCTION, AUTHORITIES, AND DELEGATIONS

This determination concerns potential claims for damages pertaining to injured natural resources of Newtown Creek and adjacent ecosystems (referred to herein as the "Newtown Creek Superfund Site" or the "Site"), as authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 *et seq*., as amended; the Oil Pollution Act of 1990 (OPA), 33 U.S.C. §2701 *et seq*.; and the Clean Water Act (CWA), 33 U.S.C. §1251 *et seq*. Based on their review of relevant information gathered as of this date, the U.S. Department of the Interior (DOI), acting through the U.S. Fish and Wildlife Service (USFWS), the New York State Department of Environmental Conservation (NYSDEC), and the Department of Commerce, acting through the National Oceanic and Atmospheric Administration (NOAA) (collectively referred to as the "Trustees") have determined that there is a strong probability that a claim for damages to natural resources under their trusteeship exists for this case. This determination was prepared by the Trustees under the authority of Section 107(f) of CERCLA, as amended, 42 U.S.C. §9607(f); the National Contingency Plan, 40 CFR Part 300; the DOI Natural Resource Damage Assessment Regulations, 43 CFR Part 11; Section 1006 of OPA, 33 U.S.C. §2706, and other applicable Federal and State laws, regulations, and directives that serve to designate Federal, Tribal, and State natural resource Trustees and that authorize the recovery of natural resource damages.

43 CFR Part 11 provides that the first step in developing a natural resource damage claim is preparation of a Preassessment Screen. The purpose of a Preassessment Screen is to provide a review of readily available information on hazardous substance releases and potential impacts of those releases on natural resources under the trusteeship of Federal, Tribal, and State authorities. The review should ensure there is a reasonable probability of making a successful claim against the parties responsible for releasing hazardous substances into the environment (hereinafter referred to as the "Potentially Responsible Parties" or "PRPs"). Specifically, the Trustees have determined that:

- ❒ A discharge of petroleum and a release of hazardous substances have occurred.

- ❒ Natural resources for which the Trustees may assert trusteeship under CERCLA, OPA, CWA, or State statutory and common law claims are likely to have been adversely affected by the discharge or release.

- ❒ The quantity and concentration of the discharged oil and/or released hazardous substances is sufficient to potentially cause injury to those natural resources.

- ❒ Data sufficient to pursue an assessment are readily available or likely to be obtained at reasonable cost.

- ❒ Response actions, carried out or planned, do not or will not sufficiently remedy the injury to natural resources without further action.

II. INFORMATION ON THE NEWTOWN CREEK SITE AND DISCHARGE OR RELEASE

A. Newtown Creek Background and History

The Newtown Creek Superfund Site was added to the National Priority List in 2010. Newtown Creek forms a portion of the boundary between the Boroughs of Brooklyn and Queens, in Kings and Queens Counties, New York. Newtown Creek includes the tributaries of Dutch Kills, Maspeth Creek, Whale Creek, East Branch, and English Kills. The entire Creek system is approximately 3.8 miles in length and discharges to the East River near Hunter's Point and Roosevelt Island (USEPA 2009) (Figure 1). It flows through a highly industrialized area, is estuarine, and experiences tidal fluctuations of approximately two to six feet (New York City Department of Environmental Protection [NYCDEP] 2011). Newtown Creek is classified by the NYSDEC as Class SD saline water, a NYSDEC classification that indicates the best use of this Creek is fishing and that the waters should be suitable for fish survival. However, since 2004, Newtown Creek has been listed on the U.S. Environmental Protection Agency (USEPA) Clean Water Act 303(d) list as impaired due to oxygen depletion.

Figure 1. Newtown Creek Assessment Area

Since at least 1996, the New York State Department of Health (NYSDOH) has issued fish consumption advisories that include the East River. The 1996/1997 fish consumption advisory was to eat no more than one meal per week of striped bass from the East River. The 2011-2012 NYSDOH fish consumption advisory for the East River and its tributaries (including Newtown Creek and Gowanus Canal) is to eat no channel catfish, gizzard shad, white catfish, crab tomalley, and crab cooking liquid. The 2011-2012 NYSDOH Advisory also advises eating no more than one meal per month of Atlantic needlefish, bluefish, rainbow smelt, striped bass, white perch, carp, and goldfish from the East River and its tributaries (NYSDOH 2011). The contaminants of concern for these waters are polychlorinated biphenyls (PCBs) and dioxin in fish, and cadmium, dioxin, and PCBs in crab and lobster. Women under 50 years of age and children under 15 years of age eat no fish or crabs from Newtown Creek.

In April of 2012, the NYSDOH and Agency for Toxic Substances and Disease Registry released a Newtown Creek Public Health Assessment. This document advised that swimming, scuba diving, and wind surfing (with full body immersion) could harm people's health due to biological contaminants and physical hazards (underwater debris, commercial boat traffic) http://www.health.ny.gov/environmental/investigations/newtown/.

The freshwater contribution to flow in Newtown Creek is primarily from groundwater, stormwater, combined sewer overflows, and wastewater discharges. Stream velocity ranges from 0.4 feet/sec to 1.2 feet/sec (NYCDEP 2007). A 2004 SF_6 (sulfur hexafluoride) tracer study indicated that chemical contaminants in Newtown Creek surface water had travelled up to 15 km (to the Verrazano Bridge) within one day of release into the Creek (Schmieder et al. 2004).

Historically, Newtown Creek flowed through wetlands, with a depth of twelve feet at its mouth and four feet at the head of navigation (Weston 2009). Historical records and photographs indicate that Newtown Creek has an industrial legacy going back at least 150 years. By the early 1900s, the banks of Newtown Creek supported oil refineries, petrochemical plants, fertilizer and glue factories, sawmills, lumber and coal yards, copper smelters, ship builders, tanning works, canneries, and paint works (USEPA 2011; Weston 2009). Newtown Creek historically supported significant commercial vessel traffic, with the influx of raw materials and outflow of manufactured or refined products. Newtown Creek has been subjected to inputs of municipal sewage at least since the mid-1800s. It has also been widened, deepened, and lined with bulkheads.

B. Hazardous Waste Discharges

Information on some of the more significant hazardous waste and petroleum discharges is summarized here and can be reviewed in greater detail in the 2011 Remedial Investigation Work Plan (AECOM 2011). See Figure 1 for some hazardous waste site locations.

Greenpoint Energy Center – National Grid

This site, also known as KeySpan and Brooklyn Union Gas, is approximately 119 acres in size and was a manufactured gas plant and coking operation from approximately 1928-1952. It was converted to an LNG plant in 1968, and is currently functioning as an energy supplier.

Groundwater and soil at the site are contaminated with metals, polychlorinated biphenyls (PCBs), petroleum products, and chlorinated solvents (AECOM 2011; Weston 2009).

Quanta Resources (formerly Hudson Oil)

This site was operated as a waste oil storage and processing facility along Newtown Creek until approximately 1982. The Newtown Refining Corporation also operated a facility at approximately the same location. Floating petroleum was found in the groundwater at this site in 1971. The following hazardous substances have been detected at the site and in the site's groundwater: PCBs, cyanide, waste oil, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs) (Anchor 2007a). The NYCDEP performed an emergency removal action in 1982 (AECOM 2011). The NYSDEC subsequently determined that hazardous wastes remaining in soil, groundwater, and soil gas on site (such as VOCs, SVOCs, PCBs, metals, and Light Non-Aqueous Phase Liquid (LNAPL)) pose a threat to public health and/or the environment (Weston 2009). A strategy for LNAPL recovery has been proposed (Weston 2009).

Greenpoint Petroleum Spill and Remediation Project (ExxonMobil)

The Greenpoint Petroleum Remediation Project encompasses a number of sites in Greenpoint (the northwestern-most area of Brooklyn) that may have contributed to petroleum discharges to Newtown Creek (Figure 2). These petroleum discharges were first documented in 1978. Large-scale oil storage and refining operations have been located in the Greenpoint area since the 1860s (Weston 2009). In 1892, Standard Oil Trust consolidated most of the refineries in the area into one operation that became the Mobil Oil Corporation Brooklyn Refinery. Refinery operations ceased in 1966, with petroleum bulk storage continuing until about 1993 (AECOM 2011). ExxonMobil has been involved in remedial activities at this site since 1979, shortly after the U.S. Coast Guard discovered that oil was seeping into Newtown Creek at the northern terminus of Meeker Avenue (AECOM 2011). Subsequent investigations of the area indicated that approximately 17-30 million gallons of petroleum product underlay the Greenpoint area. Between 1979 and 2012, 11.8 million gallons of oil were recovered, and 4.2 billion gallons of groundwater were extracted and treated (http://nysdecgreenpoint.com/ProjectHistory.aspx).

Other facilities managed under the Greenpoint Petroleum Remediation Project include the BP Amoco Terminal, Paragon Oil Terminal (now known as Chevron-Texaco Corporation), Apollo Street Creek Parcels, and ExxonMobil Off-Site Plume (Weston 2009). The Brooklyn Union Gas Company operated a large coal gasification plant on 115 acres at Greenpoint from 1928 through the early 1950s.

Figure 2. Greenpoint Areas of Remediation (From website: http://nysdecgreenpoint.com/ProjectHistory.aspx)

Phelps Dodge Refining Corporation (Laurel Hill Chemical Works)

Laurel Hill Chemical Works began production of sulfuric, nitric, muriatic, and other acids in approximately 1866 (Anchor 2007a). In the 1880s, Laurel Hill Chemical Works was renamed the Walter and Nichols Company (subsequently becoming G.H. Nichols and Co). Ownership eventually shifted to the Phelps Dodge Refining Corporation, a company that smelted ore concentrates, copper, brass, and refined silver and nickel. Phelps Dodge Refining Corporation ceased operation in approximately 1983. A Record of Decision was issued for upland cleanup actions at this site in 2003 (Anchor 2007a). As of 2009, remedial activities have included the excavation and disposal of PCB and petroleum contaminated soil; construction of a groundwater extraction, containment, and treatment system; and capping of approximately 14 acres of the 37-acre site (AECOM 2011; Weston 2009).

BCF Oil Refining, Inc.

BCF Oil Refining Inc. processed waste oils, tank bottoms, and oily-water mixtures to produce fuel oil. Tanks formerly located at the facility contained waste oil contaminated with PCBs, trichloroethane, 1,1,1-trichloroethane, tetrachloroethene, and chlorofluorocarbon compounds (Anchor 2007a; Weston 2009). Groundwater samples collected from 1992 through 1998 revealed the presence of a non-aqueous phase liquid (NAPL) product containing gasoline and light weight fuel oils. Soils are contaminated with VOCs, SVOCs, polycyclic aromatic hydrocarbons (PAHs), and PCBs (Weston 2009). Between May 2000 and October 2001, the USEPA conducted an emergency response action, removing over 800,000 gallons of PCB-contaminated soil, sludge, and wastewater. The NYSDEC prepared an RI/FS Work Plan in 2008, which was implemented in February of 2009. The BCF Oil Refining, Inc. site was deleted from the NYSDEC Registry of Inactive Hazardous Wastes in April of 2011 (Weston 2009; http://lists.dec.state.ny.us/pipermail/kingscountycleanupnews/2011-April/000009.html).

Other Industrial Facilities

Other industrial facilities that may have contributed petroleum and/or hazardous substances to Newtown Creek include:

Empire Transit Mix, Inc.,

NYCON Supply Corporation,
Former WLK Corporation Site,
Former Morgan Oil Terminal,
Ditmas Oil Terminal,
Former Pratt Oil Works,
Equity Works Site,
Getty Petroleum Marketing & Getty Terminal Corporation,
ALCOA/the Federal Defense Plant Corporation
(Weston 2009; AECOM 2011)

C. Natural Resources of Newtown Creek

Natural resources currently present in Newtown Creek are impacted by the adverse environmental conditions in the Creek caused by the combination of hazardous substances, excess nutrients, wastewater discharges, combined sewer overflows, and physical changes to the habitat, including dredging, channelization, and shoreline hardening. Anoxic conditions frequently occur and Newtown Creek has been included on the Clean Water Act 303(d) list since 2004 as impaired due to oxygen depletion. The shoreline of the Creek is substantially hardened with riprap and bulkheading and there is little adjacent terrestrial habitat in this urbanized environment.

Fish

A small number of the following fish species were collected near the mouth of Newtown Creek in an August 2001 survey by the NYCDEP as part of the Harborwide Field Sampling and Analysis Plan ("FSAP"): striped bass (*Morone saxatilis*), weakfish (*Cynoscion regalis*), and winter flounder (*Pleuronectes americanus*) (NYCDEP 2011). In addition, Weston (2009) reported finding bluefish (*Pomatomus saltatrix*) in Newtown Creek. In addition to the above specified species, the following fish are commonly found in the downstream East River: Atlantic silverside (*Menidia menidia*), Atlantic menhaden (*Brevoortia tyrannus*), scup (*Stenotomus chrysops*), fourbeard rockling (*Enchelyopus cimbrius*), bay anchovy (*Anchoa mitchilli*), silver hake (*Merluccius bilinearis*), grubby (*Myoxocephalus aeneus)*, Atlantic tomcod (*Microgadus tomcod*), tautog (*Tautoga onitis*), blueback herring (*Alosa aestivalis*), northern pipefish (*Syngnathus fucus*), summer flounder (*Paralichthys dentatus*), northern searobin (*Prionotus carolinus*), white perch (*Morone americana*), hogchoker (*Trinectes maculatus*), American shad (*Alosa sapidissima*), and alewife (*Alosa pseudoharengus*) (USFWS 1996; Lawler, Matusky and Skelly Engineers [LMS] 1993; LMS 1994; Normandeau Associates, Inc. 1994; EEA 1991; DTA 2004). American eel (*Anguilla rostrata*) have been collected in trawl surveys in the East and Harlem Rivers (DTA 2004).

Ichthyoplankton sampling was conducted by NYCDEP in 2001 as part of the Harborwide FSAP. Fish eggs and larvae of 18 taxa, including species such as wrass (Labridae), tautog (*Tautoga onitis*), cunner (*Tautogolabrus adspersus*), goby (Gobiidae), and herrings (Clupeidae), were collected in Newtown Creek and the East River. American sand lance (*Ammodytes americanus*) were collected in Newtown Creek, with the greatest abundance found at the head of the Creek; gobies were prevalent in the mid-section of the Creek. In light of the fact that most fish eggs were collected near the mouth of Newtown Creek, it was hypothesized that there may be limited fish spawning within Newtown Creek (NYCDEP 2011).

The Ravenswood Generating Station is located on the East River, approximately two miles north of where Newtown Creek discharges to the East River. Entrainment data from this power plant during 1991-1994 and 2000 reported eggs of Atlantic menhaden, bay anchovy, cunner, fourbeard rockling, grubby, silver hake, tautog, weakfish, and winter flounder; fourbeard rockling egg densities were orders of magnitude higher than other species (DTA 2004). Commonly found fish larvae in the same studies were bay anchovy, grubby, naked goby, weakfish, and winter flounder, while juveniles most frequently entrained included bay anchovy, naked goby, northern pipefish, smallmouth flounder, searobin spp., and winter flounder (DTA 2004). Entrained yearlings included American eel (DTA 2004).

Benthic and Epibenthic Invertebrates

NYCDEP (2007) summarized benthic inventory data based on studies conducted in Newtown Creek in 2001 and 2003. Sampling was conducted at the head of English Kills, the mouth of English Kills, the head of Maspeth Creek, two locations near the mouth of Newtown Creek, and several locations near the Creek's "midpoint" (located near the Brooklyn-Queens Expressway). The most common benthic invertebrates were worms in the Phylum Annelida, including oligochaetes and polychaetes. Copepods (crustaceans) were found at a few locations. One species of mollusk (*Mulina lateralis*) was found at the head of English Kills and another mollusk (*Nassarius trivittatus*) was collected at the "midpoint" location. The benthic community of Newtown Creek was summarized as being relatively high in numbers of individuals and low to moderate in numbers of species. Annelid worms were the dominant organisms, comprising 98% of the individuals in the community (NYCDEP 2011). According to NYCDEP (2011), page 4-47, "The pattern of abundance and composition of benthic species, in combination with their documented pollution tolerance, are indicators of degraded benthic habitat quality in Newtown Creek."

NYCDEP (2011) also summarized epibenthic survey data collected in Newtown Creek in 2001 as part of the Harborwide Epibenthic Recruitment and Survival FSAP (HydroQual 2001). Epibenthic arrays, consisting of multiple 8-inch by 8-inch synthetic plates, were deployed in April 2001 in the upper and middle portion of Newtown Creek and the East River near the mouth of the Creek. The plates were retrieved and organisms counted at 3 months and 6 months after deployment. In Newtown Creek, 18 taxa were identified on epibenthic arrays. Most abundant were sea squirts (*Molgula manhattensis*), tunicates (*Botryllus schlosseri*), hydroids, and barnacles (*Balanus eburneus*). Worms, crabs, and mussels were found in lower numbers. The sampling location in upper Newtown Creek had the least number of species and lowest weights of organisms. Weston (2009) reported blue-claw crabs in Newtown Creek.

Benthic surveys were conducted during the 1980s at several locations in the East River using a number of sampling techniques (e.g., bottom trawl; ponar, Petersen and VanVeen dredges; epibenthic sled), collecting a great variety of taxa (DTA 2004). Polychaetes were most consistently abundant among the dredge samples, while blue crab was the dominant species among bottom trawls (DTA 2004). Epibenthic samples collected in the East River during five consecutive months during the winter of 1984-85 were numerically dominated by polychaetes (Nereidae), amphipods (Gammaridae), Curnacea, isopods (*Edotea* spp.), and particularly mysids (*Neomysis americana*) (DTA 2004).

Birds

Bird species that have been reported in Newtown Creek include the cormorant (*Phalacrorax auritus*), egret (*Ardea sp.*), and green heron (*Butorides virescens*) (Anchor 2011). Anecdotal reports, supported by photographs on the Newtown Creek Alliance website, indicate that laughing gulls (*Larus atricilla*), barn swallows (*Hirundo rustica*), belted kingfishers (*Magaceryle alcyon*), great egrets (*Ardea modesta*), and black-crowned night herons (*Nycticorax nycticorax*) may be found along Newtown Creek (http://www.newtowncreekalliance.org/image-galleries). There is an anecdotal report and photograph of a peregrine falcon (*Falco peregrinus*) along Newtown Creek in June of 2012.

D. Contaminants of Concern

Surface Water

There are very limited surface water data available for Newtown Creek. We reiterate that since 2004, Newtown Creek has been listed on the USEPA Clean Water Act 303(d) list as impaired due to oxygen depletion.

In the Operable Unit 6 Remedial Investigation (limited to the Newtown Creek reach adjacent to the Phelps Dodge/Laurel Hill facility), surface water was sampled in March and August of 2004 (Anchor 2007b). There were a few substances detected in excess of NYSDEC water quality standards or other screening benchmarks. They are aluminum, copper, cyanide, 4,4'-DDT, endosulfan I and endosulfan II and are discussed further in Section IIIE below.

Groundwater

Groundwater in the vicinity of Newtown Creek has been found to be contaminated with hazardous substances, including petroleum and a variety of metals, SVOCs, and VOCs (Weston 2009).

Sediment

The following hazardous substances are among those that have been detected in sediment samples from Newtown Creek. Additional information on these substances is presented in Section IIIE. Hazardous substances in sediment include arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, PAHs, including acenaphthylene, acenaphthene, benz(a)anthracene, benzo(g,h,i)perylene, fluoranthene, flourene, phenanthrene, and pyrene, polychlorinated biphenyls (PCBs), pesticides, including DDT, chlordane, and dieldrin, Bis(2-ethylhexyl)phthalate, and dioxin.

E. Damages Excluded from Liability under CERCLA, OPA, or CWA

The DOI regulations provide that the Natural Resource Trustees must determine whether the damages being considered are barred by specific defenses or exclusions from liability under CERCLA, RCRA, OPA, or the CWA (43 CFR §11.24). The Trustees have reviewed this issue and have determined that there are no defenses or exclusions from liability that can be successfully raised by the Potentially Responsible Parties ("PRPs") for most, if not all, of the releases of hazardous substances described herein.

The Trustees must determine whether the damages:

(i) resulting from the discharge or release were specifically identified as an irreversible and irretrievable commitment of natural resources in an environmental impact statement or other comparable environmental analysis, that the decision to grant the permit or license authorizes such commitment of natural resources, and that the facility or project was otherwise operating within the terms of its permit or license, so long as, in the case of damages to an Indian Tribe occurring pursuant to a Federal permit or license, the issuance of that permit or license was not inconsistent with the fiduciary duty of the United States with respect to such Indian Tribe; or

(ii) the release of a hazardous substance from which the damages have resulted have not occurred wholly before the enactment of CERCLA; or

(iii) resulted from the application of a pesticide product registered under the Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. section 135-135k; or

(iv) resulted from any other federally permitted release, as defined in section 101 (10) of CERCLA; or

(v) resulted from a release or threatened release of recycled oil from a service station dealer described in section 107(a)(3) or (4) of CERCLA if such recycled oil is not mixed with any other hazardous substance and is stored, treated, transported, or otherwise managed in compliance with regulations or standards promulgated pursuant to section 3014 of the Solid Waste Disposal Act and other applicable authorities.

The Trustees must also determine whether the discharge meets one or more of the exclusions provided in section 311 (a)(2) or (b)(3) of the CWA or Section 2703 of the OPA.

The Trustees have determined that none of the above-specified liability exclusions are applicable to this Site; thus they are not precluded from pursuing a successful natural resource damage claim for injuries caused by the release of hazardous substances and/or oil to Newtown Creek.

III. PRELIMINARY IDENTIFICATION OF RESOURCES POTENTIALLY AT RISK

A. Potentially Affected Resources

Numerous Trust resources in Newtown Creek have been potentially affected by the releases of petroleum and hazardous substances. Currently, water and sediment quality conditions preclude the diversity and abundance of fish and wildlife resources that would normally be expected in urban estuarine habitat of this type, as evidenced by species that are found in the adjacent East River, which provides similar estuarine habitat. The potentially affected resources include:

BENTHIC INVERTEBRATES: The sampling performed thus far in Newtown Creek revealed a limited number and diversity of benthic invertebrates, most of which were characterized as annelid worms and other pollution-tolerant organisms (NYCDEP 2011). The benthic community of the East River was evaluated as part of a license application for the Ravenswood Generating

Station. The Ravenswood benthic community was more diverse than the Newtown Creek benthic community and included sand worms, tunicates, clams, mudworms, polychaetes, nematodes, amphipods, oligochaetes, rock crabs, lady crabs, horseshoe crabs, mud crabs, spider crabs, blue crabs, shrimp, grass shrimp, blue mussels, and dog whelks (TRC Environmental 2000). Benthic macroinvertebrates found in earlier biota surveys from the East River (1980s) are consistent with the assemblage of benthic invertebrates reported at Ravenswood (DTA 2004). Some of these taxa, and potentially others, such as Eastern oyster, may be expected to occur in Newtown Creek if water and sediment quality improved.

FISH: Very little information was found on current or historic occurrence of fish in Newtown Creek. Fish found in Newtown Creek in the 2007 NYCDEP survey were striped bass, weakfish, and winter flounder. Ichthyoplankton, in particular larval fish, included additional species such as American sand lance and gobies. Few fish eggs were found in the NYCDEP survey, except at the mouth of Newtown Creek, suggesting limited fish spawning within the Creek (NYCDEP 2011). A more diverse fishery exists in the adjacent East River; these include bluefish, Atlantic silverside, Atlantic menhaden, scup, fourbeard rockling, bay anchovy, silver hake, grubby, Atlantic tomcod, tautog, blueback herring, northern pipefish, summer flounder, northern searobin, and white perch.

The shortnose sturgeon (*Acipenser brevirostrum*) is Federally listed as an endangered species in Queens and Bronx counties (USFWS 2010), and has been extensively studied in the Hudson River (DTA 2004). It may occasionally pass through the East River, although the East River is not considered as habitat for this species (Bain 2009).

BIRDS: In spite of impaired aquatic habitat and limited physical habitat, double-crested cormorants, belted kingfishers, black-crowned night-herons, barn swallows, laughing gulls, peregrine falcons and great egrets have been reported along Newtown Creek (Anchor 2011; http://www.newtowncreekalliance.org/image-galleries). With improved sediment and water quality, and enhancement of terrestrial and riparian habitat along Newtown Creek, this area is expected to support birds typically found in the lower Hudson River or East River, species such as mallard (*Anas platyrhynchos*), canvasback (*Aythya valisineria*), scaup (*Aythya* spp.), and Canada goose (*Branta canadensis*). The piping plover (*Charadrius melodus*) is a Federally listed endangered species in Queens County that may occur in the vicinity of Newtown Creek (USFWS 2010).

MAMMALS: Mammals that may be impacted by direct or food chain chemical exposures and habitat degradation in the vicinity of Newtown Creek are those capable of surviving in an urban environment. These mammals include raccoons, skunks, rabbits, muskrats, bats and a variety of rodents. Marine mammals that could be impacted include harbor seals and harbor porpoises.

THREATENED AND ENDANGERED SPECIES: Federally- or State-listed species that may occur in the East River, and potentially Newtown Creek, include the shortnose sturgeon, sea turtles, including the Kemp's ridley sea turtle (*Lepidochelys kempii*), loggerhead sea turtle (*Caretta caretta*), leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtle (*Eretmochelys imbricata*), green sea turtle (*Chelonia mydas*), and piping plover.

B. Exposed Areas

Areas presently identified into which petroleum and hazardous substances have been released include Newtown Creek, English Kills, East Branch, Maspeth Creek, Whale Creek, and Dutch Kills. These affected areas include surface waters, adjacent groundwater, sediments, submerged lands, wetlands, and associated uplands. Tracer studies showed that chemicals released into Newtown Creek are carried into the East River (Schmieder et al. 2004), are rapidly and extensively transported within the East River due to tidal circulation (Caplow et al. 2004), and travel in the East River at least as far south as the Verrazano Bridge (~15 km) within one day of being released into Newtown Creek (Schmieder et al. 2004).

C. Preliminary Identification of Pathways

Primary pathways by which Trust resources have been exposed to oil and hazardous substances from the Site are likely to include: surface water transport, groundwater discharge, overland runoff and sedimentation, food chain, and airborne transport and atmospheric fallout of particulates. Of these, the most significant routes of petroleum and hazardous substance transport are direct discharges to Newtown Creek and its tributaries, movement of contaminated sediment food chain, and groundwater transport.

D. Exposed Water and Sediment Estimates

All of the area and volume of Newtown Creek (both surface water and sediment) and its tributaries are believed to have been exposed to contaminants. The Schmieder et al. (2004) study confirmed that water and sediment in the East River have been exposed to contaminants from Newtown Creek. In addition, substantial groundwater contamination exists, notably in the vicinity of Greenpoint (at the Greenpoint Petroleum Remediation Project and associated sites), Quanta Resources, and the former Laurel Hills facility.

E. Estimates of Concentrations

SURFACE WATER: 43 CFR § 11.14(pp) defines surface water resources as "the waters of the United States, including the sediments suspended in water or lying on the bank, bed, or shoreline, and sediments in or transported through coastal and marine areas."

In 2004, as part of the Remedial Investigation ("RI") conducted by Anchor Environmental on behalf of Phelps Dodge Refining Corporation, surface water samples were collected at a total of seven (7) locations in the Newtown Creek and the East River area (Anchor 2007a). Four locations were sampled in Maspeth Creek and Newtown Creek adjacent to the Phelps Dodge/Laurel Hill facility, one location was sampled at the junction of English Kills and the East Branch of Newtown Creek, one location was sampled midway between the Brooklyn Queens Expressway and the junction of Dutch Kills, and one location was sampled in the East River near the mouth of Newtown Creek.

Anchor (2007a) used the surface water data in a screening ecological risk assessment to identify chemicals of potential concern (COPCs). Chemicals found in excess of State or Federal water quality standards or criteria are shown in Table 1.

Table 1. Chemical Parameters in Excess of Water Quality Standards in Newtown Creek Surface Water. {Data Source: Anchor (2007a), Appendix M}						
Chemical Parameter	Concentration Range (µg/L)	Applicable NYSDEC Water Quality Standards and Federal Ambient Water Quality Criteria for Class SD Waters*				
		FW A(A)	SW A(A)	FW A(C)	SW A(C)	FW CCC
Aluminum	53.3 - 284	100				
Copper **	1.1 – 16.4		4.8			
Cyanide	0.005	0.022	0.001	0.0052	0.001	
Iron	174 – 617	300		300		
4,4'-DDT	0.0011 – 0.0034					0.001
Endosulfan I	0.002	0.22	0.034	0.009	0.001	
Endosulfan II	0.0023 – 0.0054	0.22	0.034	0.009	0.001	

* It appears that at least some of the water quality standards presented in Anchor (2007b) may not have been for Class SD waters; NYSDEC water quality standards may be found at http://www.dec.ny.gov/regs/4590.html

* *NYSDEC has an A(A) copper standard for Class SD waters of 4.8 µL (this chemical parameter is not identified in Anchor (2007a) as exceeding a water quality standard

FW A(A) = Freshwater aquatic acute standard; SW A(A) = Saltwater aquatic acute standard; FW A(C) = Freshwater aquatic chronic standard; SW A(C) = Saltwater aquatic chronic standard; FW CCC = Federal Ambient Water Quality Criteria (chronic).

Relevant standards and criteria are highlighted.

A number of VOCs were detected in surface water (e.g., 1-4 dichlorobenzene, trichloromethane, tetrachloroethene, dichlorobenzene, trichloroethene), but none exceeded any screening benchmarks (Anchor 2007a).

Petroleum products have been discharged into the waters of Newtown Creek as a result of the Greenpoint petroleum spill (USEPA 2007). There have also been other discharges of petroleum products to Newtown Creek as a result of releases at a petroleum refinery and storage facilities or leakage at above-ground and underground storage tanks (Anchor 2007a). Any visible oil film or oil attributable to industrial or other wastes is a violation of the NYSDEC narrative water quality standard for "oil and floating substances" (Part 703.2 – NYSDEC Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations: http://www.dec.ny.gov/regs/4590.html#16133).

GROUNDWATER: Prior to 1947, groundwater was the primary source of Brooklyn's drinking water. Heavy pumping of water lowered groundwater levels, reducing the reliability of that supply. Since the groundwater pumping station closed down in 1947, groundwater levels are believed to have recovered, but groundwater has not been used as a public drinking water source since 1947 (USEPA 2007). Metal concentrations in the groundwater at the Laurel Hill facility were tested as part of the OU6 remedial investigation and found to exceed the NYSDEC Class GA groundwater standards (Anchor 2007b). At the Laurel Hill facility, a shoreline groundwater barrier wall, collection, and treatment system were installed in 2005 and 2006 (Anchor 2007b).

The groundwater system in the Greenpoint area immediately adjacent to Newtown Creek (downstream of the Laurel Hill facility uplands) has been contaminated by approximately 30 million gallons of petroleum (Weston 2009). The petroleum products are located approximately 40 feet beneath the ground in the Greenpoint area. Adjacent to the Greenpoint site, groundwater samples collected between 1992 and 1998 under a former BCF Oil petroleum distillation and waste oil recycling center were found to be contaminated with LNAPL (mixture of gasoline and light-weight fuel oils) and VOCs, prompting NYSDEC to request USEPA to conduct an emergency removal action (Weston 2009).

During the course of a removal action at the Newtown Refining Corporation (near Quanta hazardous waste site), a floating, petroleum free-product layer was observed within the water table. Groundwater was determined to be contaminated with VOCs and SVOCs. The direction of the hydraulic gradient in shallow groundwater was generally to the southwest, toward the Capasso site and Newtown Creek (Anchor 2007a). Various soil and groundwater contaminants were identified at the Capasso site, including benzene, toluene, ethylene, and xylene (BTEX), PCBs, trichloroethylene, and chloroform (Anchor 2007a).

SEDIMENT:

Three sediment collection efforts have occurred within Newtown Creek. The USEPA collected sediment samples in 2009 from the head to the mouth of Newtown Creek, as well as site-specific background samples in an East River embayment. These data are summarized in Weston (2009) and presented in Tables 2 and 3. Sediment was collected from the surface down to a two foot depth and from a two to six foot depth.

Sediment sampling was also conducted in 2004 as part of the OU6 RI for Phelps Dodge Refining Corporation (Anchor 2007b) (See Table 2 and 3). Sediment samples were collected from 27 locations, generally within proximity of the Phelps Dodge site.

The NYCDEP sampled Newtown Creek sediment to characterize it prior to dredging the navigation channel. Sediment (and water) samples were collected in March 2009. The area sampled consisted of portions of the navigational channel of Newtown Creek from the confluence of the East River to approximately the confluence of the Whale Creek Canal, and a portion of Whale Creek Canal (generally the lower “half” of Newtown Creek). Sixteen samples were collected (NYCDEP 2009).

Table 2. Metals in Excess of Sediment Quality Benchmark Concentrations in Newtown Creek Surface Sediment (0-2 feet) all units mg/kg DW {data sources: Weston (2009), Anchor (2007a), and NYCDEP (2009)}.

Analyte	Datasets			Comparison values		
	Concentration range of detections *(average; N=47)* at OU6 (Anchor 2007a; Appendix M)	Concentration range of detections Newtown Creek and Whale Creek Canal *(# detects; N=16)* (NYCDEP 2009)	Concentration range of observed releases *(N samples)* (throughout Newtown Cr) (Weston 2009)	J values (exceedence indicates "observed release") (Weston 2009)	NYSSEL	ERM
Arsenic	3.7 – 216 (58)	9.6 – 58 (16)	189 – 197 (2)	112	33	70
Cadmium	2.2 – 264 (44)	0.86 – 33.5 (16)	2.0 – 457 (55)	2.3	9	9.6
Chromium (total)	45 – 1,990 (400)	NA	375 – 2,140 (16)	374	110	370
Copper	100 – 9,980 (2,561)	129 – 1200 (16)	514 – 12,100 (41)	473	110	270
Lead	113 – 1,570 (743)	135 – 1020 (16)	718 – 2,080 (16)	697	110	218
Mercury	0.33 – 6.15 (2.9)	0.98 – 4.4 (16)	NA	NA	1.3	0.71
Nickel	33 – 2,840 (461)	NA	138 – 1,790 (28)	163	50	51.6
Zinc	231 – 15,500 (3,070)	NA	1,650 – 9,210 (25)	1,559	270	410

1 Data in Weston (2009) are reported as "observed releases." An observed release generally only includes sample results that are equal to or greater than three times the background concentration of the substance in question. These data should not be used for calculating a range or average sediment concentration of contaminants or concern, but to provide an indication of the frequency at which concentrations exceed a screening threshold concentration (that generally is in excess of toxicity screening thresholds).

2 The NYSSEL is defined as the lower of either the Persaud et al. (1992) Severe Effect Level or the Long and Morgan (1991) Effect-Range-Median Concentration (NYSDEC 1999).

3 The ERM is defined as the median concentration of a substance in sediment among coastal and marine sediment samples that were associated with sediment toxicity (MacDonald et al. 1996).

Table 3. Organic Compounds in Excess of Sediment Quality Benchmark Concentrations in Newtown Creek Sediment (all units µg/kg DW) (data sources: Weston (2009), Anchor (2007b), and NYCDEP (2009)).

Analyte	**Datasets**			**ERM**[1]
	Concentration range of detections *(average; N)* at OU6 (Anchor 2007b; Appendix M)	Concentration range of detections Newtown Creek and Whale Creek Canal *(# detects; N=16)* (NYCDEP 2009)	Concentration range of observed releases throughout Newtown Creek *(N samples)* (Weston 2009)	
PAHs (N=49)				
Acenaphthylene	66 – 55,000 (2,325; 49)	104 – 1,110 (15)	NA	640
Anthracene	160 – 110,000 (6,949; 49)	129 – 11,800 (16)	780 – 3,200 (3)	1,100
Benzo(a)pyrene	530 – 110,000 (10,086; 49)	367 – 5,410 (16)	630 – 2,800 (6)	1,600
Benzo(b)fluoranthene	350 – 86,000 (7,799; 49)	261 – 5,720 (16)	710 – 2,700 (6)	1,600
Chrysene	550 – 130,000 (11,983; 49)	400 – 11,800 (16)	650 – 3,600 (6)	2,800
Dibenz(a,h)anthracene	97 – 23,000 (1,997; 49)	34 – 558 (16)	NA	260
Fluoranthene	530 – 340,000 (21,811; 49)	452 – 31,500 (16)	640 – 3,200 (12)	5,100
Fluorene	75 – 95,000 (4,122; 49)	25 – 9,790 (16)	2,600 (1)	540
Phenanthrene	310 – 390,000 (20,933; 49)	202 – 47,000 (16)	660 – 12,000 (7)	1,500
Pyrene	670 – 250,000 (23,420; 49)	687 – 31,100 (16)	680 – 12,000 (11)	2,600
PCBs (N=45)				
Total	580 – 41,900 (10,977; 45)	132 – 2722 (13)	1,200 – 3,800 (expressed as Aroclor 1242 or 1254)	180
Pesticides				
tDDT	45 – 1,360 (391; 45)	4.4 – 75.9 (12)	NA	46.1
Alpha-chlordane	15 – 290 (83; 45)	6.7 – 8.2 (5)	NA	6*
Gamma-chlordane	15 – 700 (175; 45)	3.1 – 13.5 (2)	NA	6*
Dieldrin	46 – 170 (31; 45)	14 – 46.6 (2)	NA	8
SVOCs				
Bis(2-ethylhexyl)phthalate	1,000 – 290,000 (54,996; NA)	Not Sampled	600 – 54,000 (15)	2646.5**

2-Methylnaphthalene	56 – 380,000 (9,238; 49)	21 – 13,000 (15)	NA	670
Naphthalene	80 – 540,000 (14,360; 49)	30 – 5,480 (16)	NA	2,100
Dioxins/Furans				
Dioxin TEQ (WHO) Reported Units: pg/g	**NA**	12.2 – 699 pg/g (16) = 0.0000122 – 0.000699 ug/g = 0.000102 – 0.005825 ug/gOC ***	NA	0.0002 ug/gOC ****

[1]An ERM is defined as the median concentration of a substance in sediment among coastal and marine sediment samples that were associated with some level of sediment toxicity (MacDonald et al. 1996).
* Expressed as chlordane
** No ERM available; criterion is Marine Probable Effects Level (MacDonald et al. 1996)
*** Conversion: (ug chemical / g OC) = (ug chemical / g dry sediment) / (g OC / g dry sediment). NYSDEC (1999) guidance indicates that a value of 0.12 for the mass fraction OC in sediment is the maximum allowed value for using the NYSDEC sediment criteria based on OC content. Dioxins were detected in each of 15 sediment samples analyzed.
**** No ERM available; dioxin criterion is NYSDEC (1999) sediment criterion for 2,3,7,8-TCDD - wildlife bioaccumulation, expressed in the guidance as: ug 2,3,7,8-TCDD/g organic carbon in the sediment (OC).

IV. PRE-ASSESSMENT SCREEN CRITERIA

43 CFR Section 11.23(e) specifies five criteria that must be met before proceeding with a natural resource damage assessment. The criteria are as follows:

- ❒ A discharge of oil or a release of a hazardous substance has occurred.
- ❒ Natural resources for which the Trustees may assert trusteeship under CERCLA, OPA, CWA, or State statutory and common law claims have been or are likely to have been adversely affected by the discharge or release.
- ❒ The quantity and concentration of the discharged petroleum or released hazardous substance is sufficient to potentially cause injury, as that term is used in this part, to those natural resources.
- ❒ Data sufficient to pursue an assessment are readily available or likely to be obtained at reasonable cost.
- ❒ Response actions, if any, carried out or planned, do not or will not sufficiently remedy the injury to natural resources without further action.

These criteria are satisfied for the releases of hazardous substances covered by this Preassessment Screen, as follows:

Criteria #1: A discharge of oil or a release of a hazardous substance has occurred.

There have been releases of petroleum and other hazardous substances, as defined by CERCLA, OPA, and the CWA. Hazardous substances that have been released into Newtown Creek include, but are not limited to, the following:

- Oil (total petroleum hydrocarbons),
- PAHs (Polycyclic aromatic hydrocarbons),
- PCBs (Polycyclic aromatic hydrocarbons),
- Phthalates,
- Metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc,
- Pesticides: chlordane, endosulfan I, endosulfan II, 4.4'-DDT, total DDTs, and
- Dioxins, dibenzofurans

Liability for injuries to natural resources as a result of petroleum is addressed in the OPA. The remaining substances identified above are listed as hazardous substances pursuant to Section 102(a) of CERCLA, 42 U.S.C. § 9602(a); 40 CFR §302.4, and Section 311 of the Federal Water Pollution Control Act, 33 U.S.C.§1321. These substances have been released into the geographic area of concern from various sources including, but not limited to, oil refinery and storage facilities, chemical manufacturing facilities, ore smelting companies, iron and steel companies, plastics manufacturers, and stormwater outfalls.

These released contaminants have infiltrated the groundwater, surface water, and sediment of Newtown Creek and the adjacent ecosystems, and have injured Trust resources.

Criteria #2: Natural resources for which the Trustees may assert trusteeship under CERCLA, OPA, CWA, or State statutory and common law claims have been or are likely to have been adversely affected by the releases.

The Trust natural resources in the assessment area that have been or are likely to have been adversely affected by releases of hazardous substances include, but are not limited to, surface water, groundwater, sediment, and biological resources (43 CFR § 11.14z).

Surface water of Newtown Creek has been contaminated by releases of petroleum products and hazardous substances such as aluminum, iron, copper, cyanide, endosulfan I, endosulfan II, and 4,4'-DDT (Anchor 2007a). See Table 1.

Groundwater has been contaminated with oil (petroleum products), metals, VOCs, and SVOCs.

Newtown Creek sediment has been contaminated by petroleum products and hazardous substances including, but not limited to, PAHs, phthalates, arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, chlordane, DDT, dieldrin, PCBs, and dioxins/dibenzofurans (Anchor 2007a). See also Tables 2 and 3.

There are no available data on concentrations of hazardous substances in biota. However, based on the high concentrations of certain substances in the sediment, biological organisms are likely to have been exposed to concentrations of hazardous substances that have caused significant adverse effects. This is further discussed in Criteria #3 below.

Criteria #3: The quantity and concentration of the discharged petroleum or released hazardous substance is sufficient to potentially cause injury, as that term is used in this part, to those natural resources.

43 CFR §11.14(v) defines injury as "a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a discharge or release of a hazardous substance, or exposure to a product of reactions resulting from…[such] discharge…or release…."

The quantity and concentration of the oil and hazardous substances that have been released have caused injuries to natural resources in the assessment area. Documented injuries to natural resources in the assessment area include:

1) New York State Department of Health (NYSDOH) human health advisories;

2) Toxicity of sediments to benthic organisms, as demonstrated by laboratory or field studies;

3) Concentrations of substances in Newtown Creek sediments that exceed sediment toxicity thresholds and/or have been associated with toxic effects in fish, benthic organisms, and other biota, as documented in the scientific literature

4) Concentrations of substances in Newtown Creek surface water that exceed State or Federal water quality standards, and

5) Concentrations of substances in excess of Federal or State laws or regulations that establish standards for drinking water, in groundwater that was potable prior to the discharge or release.

These injuries are discussed below in greater detail. These biological responses meet the acceptance criteria for injury in accordance with Title 43 CFR Part 11.

1) NYSDOH Human Health Advisories

Since at least 1996, the NYSDOH has issued Fish Consumption Advisories for the East River, which includes the Newtown Creek tributary. The 2011/2012 NYSDOH advisory warns the public that:

- they should eat no channel catfish, gizzard, white catfish, or crab hepatopancreas and crab cooking liquid from these waters;
- they should not eat more than one meal per month of Atlantic needlefish, bluefish, rainbow smelt, striped bass, white perch, carp, or goldfish from these waters; and

- women under 50 years of age and children under 15 should eat no fish from these waters.

The contaminants of concern for these waters are PCBs and dioxins in fish and cadmium, and PCBs and dioxin in crab and lobster (NYSDOH 2011).

The NYSDOH and Agency for Toxic Substances and Disease Registry (ATSDR) issued a Draft Public Health Assessment for Newtown Creek in February of 2012 that concluded swimming, scuba diving, and wind surfing (with full body immersion) could harm people's health due to biological contaminants and physical hazards (underwater debris, commercial boat traffic) (http://www.health.ny.gov/environmental/investigations/newtown/).

2) Toxicity of Sediments to Benthic Organisms as Demonstrated by Laboratory or Field Studies

The NYCDEP (2007) conducted water column and sediment toxicity studies as part of the harbor-wide biological FSAP, with water and sediment samples collected from four locations within Newtown Creek (from the head to the mouth). Tests conducted at each location included sediment tests with an amphipod (*Leptocheirus plumulosus*). Results of the sediment tests showed significant toxicity in all four tests. In three of the four tests, less than 3% of the organisms survived after 10 days of exposure to the sediment. In the fourth test, both growth and survival were significantly reduced relative to the control sample. Sediment cores were also evaluated against the guidance values presented in the NYSDEC Technical and Operational Guidance Series for "In-Water and Riparian Management of Sediment and Dredged Material." Newtown Creek sediments were classified as Class C – High Contamination, with acute toxicity to aquatic life predicted (NYSDEC 2004).

The benthic invertebrate taxa in Newtown Creek were evaluated by NYCDEP (2007) at seven stations in Newtown Creek and one station in the East River. The benthic invertebrate diversity increased with distance downstream in Newtown Creek. Five invertebrate species were found in sediment collected at the confluence of English Kills and the East Branch, compared with 70 taxa found at the Newtown Creek station closest to the East River. Most of the benthic invertebrates found in Newtown Creek were classified as Annelida (worms), an indication of poor water and sediment quality.

The benthic community of the East River was evaluated as part of a license application for the Ravenswood Generating Station. The Ravenswood benthic community was more diverse than the Newtown Creek benthic community and included sand worms, tunicates, clams, mudworms, polychaetes, nematodes, amphipods, oligochaetes, rock crabs, lady crabs, horseshoe crabs, mud crabs, spider crabs, blue crabs, shrimp, grass shrimp, blue mussels, and dog whelks (TRC Environmental 2000). These data indicate that benthic communities in Newtown Creek are less diverse than benthic communities in the adjacent East River.

3) Concentrations of substances in Newtown Creek sediments that exceed sediment toxicity thresholds and/or have been associated with toxic effects in fish, benthic organisms, and other biota, as documented in the scientific literature

CONCENTRATIONS OF METALS IN SEDIMENT ABOVE THRESHOLD CONCENTRATIONS

A selection of metals that have exceeded sediment quality benchmarks are discussed below and presented in Table 2.

Arsenic
As shown on Table 2, arsenic concentrations in Newtown Creek surface sediment samples (3.7 – 216 mg/kg) exceeded both the NYSSEL (33 mg/kg) and ERM (70 mg/kg), sediment toxicity thresholds above which impacts to benthic invertebrates will occur. The adjusted background concentration[1] of arsenic in surface sediment was 21 mg/kg (Weston 2009). Arsenic in sub-surface sediment was as high as 839 mg/kg (Weston 2009).

Arsenic is a carcinogen and teratogen in vertebrates and causes mortality in benthic invertebrates, zooplankton, and algae (Eisler 1988a). Arsenic has been shown to accumulate in fish from waterbodies contaminated with arsenic (Eisler 1988a), and mortality and teratogenicity have been associated with arsenic exposures in various birds species (Eisler 1988a).

Cadmium
Cadmium concentrations were as high as 457 mg/kg in surface sediment, compared with an adjusted background concentration of 2.96 mg/kg (Weston 2009) (See Table 2). The Weston (2009) data indicate that at least 55/58 surface sediment samples and 47/58 sub-surface sediment samples had cadmium concentrations that exceeded the ERM (9.6 mg/kg) by an order of magnitude. Forty-seven of 47 sediment samples collected as part of the OU6 RI exceeded the ERM for cadmium (Anchor 2007b). These data indicate probable sediment toxicity related to cadmium.

Cadmium is a known teratogen and carcinogen and probable mutagen in vertebrates. In aquatic organisms, cadmium has been associated with reduced growth, respiratory disruption, reduced reproduction, immobilization, molt inhibition, and death (Eisler 1985).

Chromium
Chromium concentrations in Newtown Creek surface and sub-surface sediment were as high as 2,140 mg/kg and 3,720 mg/kg, respectively (Weston 2009). The adjusted background concentration was 519 mg/kg (Weston 2009). Sediment sampling performed for the OU6 RI (Anchor 2007b) indicated an average chromium concentration in sediment of 400 mg/kg, with the range of chromium concentrations from 45 to 1,990 mg/kg.

[1] Adjusted background concentration is the maximum concentration found in sediment from the Atlantic Basin (embayment along East River just south of Newtown Creek mouth) multiplied by an adjustment factor (USEPA 2009 and Weston 2009).

The Weston (2009) and Anchor (2007b) data indicate that surface and sub-surface sediment samples have chromium concentrations that exceeded the ERM (370 mg/kg) by an order of magnitude. These data indicate probable sediment toxicity related to chromium.

Chromium is mutagenic, teratogenic, and carcinogenic to a wide variety of organisms. Hexavalent chromium (Cr+6) is the most biologically active form of chromium and has been associated with abnormal enzyme activities, altered blood chemistry, lowered resistance to pathogenic organisms, behavioral modifications, disrupted feeding, histopathology, osmoregulatory upset, alterations in population structure and species diversity indices, and inhibition of photosynthesis in a variety of organisms (Eisler 1986a).

Copper

Copper concentrations in Newtown Creek surface sediment samples were as high as 12,100 mg/kg, with concentrations frequently in excess of 1,000 mg/kg (Table 2). The adjusted background concentration for copper is 214.72 mg/kg (Weston 2009). Sediment copper concentrations generally exceeded the ERM of 270 mg/kg, sometimes by one to two orders of magnitude. These data indicate sediment toxicity related to copper.

Copper is associated with a variety of adverse effects in benthic macroinvertebrates, zooplankton, algae, and many freshwater and marine fish species (Eisler 1998a). At high concentrations, copper can cause gill damage in aquatic invertebrates and interferes with osmoregulation in fish (Eisler 1998a). Copper-stressed common mussels (*Mytilus edulis*) die more quickly because they have greater difficulty adapting to conditions of anoxia, high temperatures, and low salinities (Weber et al. 1992, as cited in Eisler 1998a).

Lead

Lead was detected in surface and sub-surface sediment samples at concentrations as high as 2,080 mg/kg and 7,070 mg/kg, respectively (Table 2 and Weston 2009). Sediment samples frequently contained lead well in excess of the ERM of 218 mg/kg. These data indicate probable sediment toxicity related to lead.

Lead has been shown to adversely affect growth, reproduction, and survival in aquatic organisms and may contribute to deformities. Lead has been linked with weight loss, neurological effects, and mortality in birds, including waterfowl (Eisler 1988b).

Mercury

Mercury was not sampled as part of the USEPA Site Inspection Report for Newtown Creek (Weston 2009). As part of the OU6 RI, mercury was reported in Newtown Creek sediment at concentrations ranging from 0.33 to 6.15 mg/kg, with an average mercury concentration of 2.9 mg/kg (Anchor 2007b). The average mercury concentration in Newtown Creek sediment exceeded the ERM (0.71 mg/kg) for this metal by an order of magnitude, an indication that sediment toxicity related to mercury is likely.

Mercury is a mutagen, teratogen, and carcinogen, and causes embryocidal, cytochemical, and histopathological effects. Mercury, at comparatively low concentrations, adversely affects the

reproduction, growth, behavior, metabolism, blood chemistry, osmoregulation, and oxygen exchange of marine and freshwater organisms (Eisler 1987a).

Nickel
Nickel concentrations in surface and sub-surface sediment were as high as 2,840 mg/kg and 5,010 mg/kg, respectively (Table 2 and Weston 2009). The adjusted background concentration of nickel in surface sediment was 163 mg/kg (Weston 2009). Most sediment samples collected as part of the OU6 RI exceeded the nickel ERM of 51.6 mg/kg (Anchor 2007b). These data indicate probable sediment toxicity related to nickel.

Nickel exposure has been correlated with reduced survival in benthic invertebrates, with nickel bioavailability affected by sediment physicochemical characteristics such as AVS (acid volatile sulfide), total organic carbon (TOC), and particle size distribution (Besser et al. 2011; Eisler 1998b).

Zinc
In surface sediment samples, zinc concentrations were as high as 15,500 mg/kg (Table 2), with concentrations generally higher in the upper reaches of the creek. The adjusted background concentration of zinc in surface sediment was 346.5 mg/kg. Zinc in sub-surface sediment at was as high as 30,200 mg/kg (Weston 2009).

The Weston (2009) data indicate that at least 25/58 surface sediment samples had zinc concentrations that exceeded the ERM (410 mg/kg) by an order of magnitude. These data indicate probable sediment toxicity related to zinc.

Zinc can affect survival of benthic invertebrates and benthic community diversity (Iwasaki et al. 2011; Watzin and Roscigno 1997; Eisler 1993).

Concentrations of Organic Compounds in Sediment Above Threshold Concentrations

The following organic compounds have significantly exceeded one or more sediment quality benchmarks and are present at concentrations in sediment that are likely to cause adverse effects in aquatic organisms and have the potential to cause adverse effects in higher trophic level organisms (Table 3).

PAHs
A number of PAH compounds have been detected in sediment at concentrations in excess of sediment screening benchmarks (Table 3). These include anthracene, pyrene, chrysene, benzo(a)pyrene, phenanthrene, and fluoranthene (Weston 2009). The OU6 RI reported an average total PAH concentration in Newtown Creek sediments of 110,992 µg/kg (Anchor 2007b). Also, based on the concentrations of individual PAH compounds presented in Table 3, total PAH concentrations have likely exceeded the total PAH freshwater ERM value of 35,000 µg/kg and freshwater consensus-based probable effects concentration (PEC) (see MacDonald et al. 2000a) of 22,800 ug/kg. Average concentrations of individual PAH compounds in Newtown Creek exceeded their respective ERMs (Table 3).

PAHs are strongly associated with or known to cause a variety of adverse effects in aquatic organisms. Several PAHs, including benzo(a)anthracene, benzo(a)pyrene, chrysene, and dibenzo(a,h)anthracene are potent carcinogens (Eisler 1987b). Although the occurrence of cancer in aquatic organism has not been definitively linked to PAHs and no histopathological studies have been performed on aquatic organisms in Newtown Creek, PAHs have been implicated in causing a variety of developmental anomalies and tumors in fish and aquatic mammals. PAHs have also been shown to cause a variety of other toxicological responses in aquatic organisms, birds, and mammals, including but not limited to, inhibition of survival, growth, and reproduction (Eisler 1987b).

Reduced growth and suppressed immune function were observed in salmonids from sites with sediment total PAH levels in the 5,000-10,000 µg/kg range (Arkoosh et al. 1998). Similarly, Heintz et al. (1999) reported increased mortality in pink salmon embryos exposed to oiled gravel with total PAH concentrations in the 3,800-4,600 µg/kg range.

The average PAH concentration in sediments from Newtown Creek (as presented in Anchor 2007b and calculated by summing individual PAH compounds from Weston 2009) exceeds all sediment quality benchmarks and exceeds concentrations shown to be toxic to a variety of benthic organisms and fish, as discussed above.

PCBs

PCBs were detected in surface sediment samples at concentrations as high as 41,900 µg/kg (Table 3). All of the 45 samples collected at OU6 (Anchor 2007b) and as part of the Expanded Site Investigation (Weston 2009) exceeded the ERM of 180 µg/kg (Anchor 2007b). The most frequently detected Aroclors were 1242, 1254, and 1260.

MacDonald et al. (2000b) developed consensus-based sediment effects concentrations for PCBs, based on a review and evaluation of existing sediment quality guidelines. They developed a marine/estuarine MEC (midrange effect concentration above which adverse effects frequently occur) and an EEC (extreme effects concentration above which adverse effects usually or always occur). They concluded, "Sediment associated PCBs are likely to cause or significantly contribute to adverse biological effects at concentrations in excess of the MEC (400 µg/kg) or EEC (1,700 µg/kg)." Many sediment samples from Newtown Creek have contained PCBs in excess of these concentrations. The average PCB concentration in OU6 sediment was 10,977 µg/kg, well in excess of the EEC (Table 4).

PCBs can cause a variety of adverse effects in organisms, including but not limited to: liver and dermal toxicity, teratogenic and other reproductive effects, and neurological effects. Responses depend on the impacted species and the particular congener mixture to which that species is exposed and can, therefore, vary from subtle (e.g., induction of hepatic microsomal enzymes) to severe (e.g., impaired reproduction and death). In addition, toxic effects are likely to be more severe at higher trophic levels due to bioconcentration and biomagnification (Eisler 1986b).

Most PCB concentrations in sediments from Newtown Creek (Weston 2009 and Anchor 2007b) exceeded sediment quality benchmarks and exceeded concentrations shown to be toxic to a variety of benthic organisms and fish, as discussed above.

Bis(2-ethylhexyl)phthalate
Bis(2-ethylhexyl)phthalate was found in surface sediment at concentrations as high as 290,000 µg/kg (Table 3).

The mean concentration of bis(2-ethylhexyl)phthalate reported in Newtown Creek sediment at OU6 greatly exceeded the Marine Probable Effects Level of 2,646 µg/kg, suggesting that adverse effects to benthic organisms are likely.

Phthalates may cause acute toxicity or reproductive impairment in benthic invertebrates, and reduce benthic invertebrate diversity. In general, the lower molecular weight esters are more toxic than higher molecular weight esters (Staples et al. 1997).

Dieldrin
Dieldrin was found in sediments at concentrations ranging from 46 to 170 µg/kg, in excess of the ERM of 8 µg/kg (Anchor 2007b). Dieldrin is an insecticide which is a breakdown product of the insecticide, aldrin. This compound is highly toxic to crustaceans, fish, and birds. It has been linked with direct mortality of birds, such as bald eagles and peregrine falcons, that ingested dieldrin-contaminated prey (Peakall 1996). Dieldrin is present in Newtown Creek sediment at concentrations likely to adversely impact benthic invertebrates. Dieldrin accumulation in the food chain has not been measured in Newtown Creek; however, it may well present a threat to fish, birds, and other organisms feeding in Newtown Creek.

DDT
DDT was detected in Newtown Creek sediment at concentrations ranging from 45 to 1,360 µg/kg, with an average concentration of 390 µg/kg (Anchor 2007a). DDT is persistent in the environment, undergoing slow biodegradation to DDD, DDE, and other metabolites. It is a well-established fact that DDT and its major metabolite, DDE, cause a reduction in the thickness and strength of avian eggshells as well as embryolethality; in addition, these compounds are contributing causes of reduced growth and altered behavior in birds (Blus 1996; U.S. Department of Health and Human Services 2002). Newtown Creek sediment tDDT concentrations exceed the ERM of 46 µg/kg, suggesting that adverse impacts to benthic organisms are likely.

Chlordane
Chlordane (alpha plus gamma-chlordane) was reported in Newtown Creek sediment at concentrations ranging from 30 to 990 µg/kg, with an average concentration of 258 µg/kg (2007a). Chlordane is a persistent organochlorine pesticide that has been banned for all uses in the United States since 1988. Exposure to chlordane by fish and aquatic invertebrates may result in death, impaired reproduction, and/or histopathological changes; exposure to chlordane by birds may result in death, impaired reproduction, and/or neurological impairments (Eisler 1990). The concentrations of chlordane in Newtown Creek sediment exceeded the ERM of 6 µg/kg, indicating the potential for adverse effects to benthic organisms.

Other Pesticides
Lindane, heptachlor epoxide, and endosulfan are three additional organochlorine pesticides that have been detected in the sediment at concentrations that exceeded sediment benchmarks such as the ERM or chronic saltwater NYSDEC benthic aquatic life criteria and may pose toxicity to benthic organisms, as well as higher trophic level organisms (Table 3).

Dioxin
NYCDEP (2009) reported dioxins in each of 15 sediment samples collected in Newtown Creek and Whale Creek in March 2009. The dioxin TEQs were calculated to range from 0.0000122 µg/g to 0.000699 µg/g. These equate to carbon normalized TEQ concentrations of 0.000102 to 0.005825 µg/g OC. Some of these values exceeded the NYSDEC sediment criterion for 2,3,7,8-TCDD of 0.0002 µg/g OC, indicating the potential for wildlife toxicity. See Table 3 footnote. Polychlorinated dibenzo- *para*- dioxins (dioxins) can cause acute and delayed mortality as well as carcinogenic, teratogenic, mutagenic, histopathologic, immunotoxic, and reproductive effects in birds, fish, mammals, and other organisms (Eisler 1986c).

Petroleum
Significant volumes of oil have been discharged either directly into Newtown Creek or into the groundwater aquifer, leading to discharges into Newtown Creek. Oil is known to adversely affect fish by causing gill obstruction, enlarged livers, reduced growth, fin erosion, reduced reproduction, altered behavior, genetic abnormalities, cancer, and death. Oil can reduce the insulation value of feathers and fur leading to hypothermia in birds and mammals. Ingestion of oil can lead to reproductive dysfunction and mortality.
http://www.epa.gov/oem/docs/oil/edu/oilspill_book/chap5.pdf

4) Concentrations of substances in Newtown Creek surface water that exceed State or Federal water quality standards.

A number of chemical parameters exceeded NYSDEC water quality standards in surface water collected adjacent to OU6 (Phelps Dodge/Laurel Hill) (Anchor 2007b). They are aluminum, copper, cyanide, endosulfan I, and endosulfan II. 4,4'-DDT exceeded the Federal ambient water quality criteria (chronic). See Table 1.

Also, there is some limited evidence of surface water toxicity, at least in the upper reach of Newtown Creek. Water column acute toxicity (7-day) tests were conducted with mysid shrimp (Mysidopsis spp.) using surface water collected in August 2003 from four locations in Newtown Creek, its tributaries and branches (NYCDEP 2011). Growth (but not survival) was significantly reduced in mysids exposed to surface water from the uppermost reach of Newtown Creek (English Kills). Growth and survival were not affected in mysids exposed to the other three surface water samples.

5) Concentrations of substances in excess of drinking water standards established by Federal or State laws or regulations that establish such standards for drinking water, in groundwater that was potable before the discharge or release.

Groundwater in the Newtown Creek assessment area has been contaminated with hazardous substances. Groundwater within the assessment area that contains substances above NYSDEC groundwater standards is injured pursuant to Title 43 CFR Part 11.62(c)(1)(i). At a minimum, metal concentrations in the groundwater at the Laurel Hill facility have been found to exceed the NYSDEC Class GA groundwater standards (Anchor 2007a). Contamination of groundwater with petroleum products and VOCs has also been documented at Greenpoint and the Newtown Refining Corporation (Anchor 2007a, USEPA 2007). Various soil and groundwater contaminants were identified at the Capasso site, including benzene, toluene, ethylene, and xylene (BTEX), PCBs, trichloroethylene, and chloroform (Anchor 2007a). Although groundwater in the vicinity of Newtown Creek is not currently used, it was used as a source of potable water prior to overuse that left its supplies diminished by 1947 (USEPA 2007).

Criteria #4: Data sufficient to pursue an assessment are readily available or likely to be obtained at reasonable cost.

Data sufficient to pursue an assessment can be obtained at a cost that is substantially less than the anticipated monetary damage amount (the cost of restoring, rehabilitating, replacing, and/or acquiring the equivalent of the resources injured by the release of hazardous substances at or from the Site). A comprehensive, Creek-wide study is being conducted by the PRPs pursuant to an Administrative Order on Consent (AOC) issued by EPA. In accordance with the AOC, a Remedial Investigation/Feasibility Study Work Plan for Newtown Creek has been prepared (AECOM 2011).

Criteria #5: Response actions, if any, carried out or planned do not or will not sufficiently remedy the injury to natural resources without further action.

Response actions will not sufficiently remedy the injury. As of the current date, there have been limited efforts to remediate contaminated sediments in Newtown Creek, the numerous contaminated groundwater plumes or the surface runoff that is discharging to the Creek. The response actions which have been initiated at individual hazardous waste sites along Newtown Creek (such as Laurel Hill and Greenpoint) have failed to address the cumulative injuries to natural resources caused by the release of hazardous substances into the Newtown Creek system – particularly bioaccumulation of contaminants in the biota and the residual contamination of the sediments of Newtown Creek. Furthermore, response actions will not assess or develop restoration plans for the injuries to natural resources and the services provided by those resources from 1981 to the present day. Therefore, it has been determined by the Trustees that response actions carried out or currently planned will not remedy the injury to the natural resources of Newtown Creek without further action.

V. PRE-ASSESSMENT SCREEN DETERMINATION

Following the review of information described in this Preassessment Screen, the Trustees have made a preliminary determination that the criteria specified in 43 CFR Part 11 (Natural Resource

Damage Assessments) have been met. The Trustees have further determined that there is a reasonable probability of making a successful claim for damages with respect to Newtown Creek natural resources over which the Trustees have trusteeship. Therefore, the Trustees have determined that an assessment of Newtown Creek natural resource damages is warranted.

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Newtown Creek Site
Preassessment Screen

Approvals:

The U.S. Department of the Interior, by its Authorized Official

By: _____

Name: _____

Title: _____

Date: _____

The State of New York, by its Authorized Official

By: _____

Name: _____

Title: _____

Date: _____

The U.S. Department of Commerce, by its Authorized Official

By: _____

Name: _____

Title: _____

Date: _____