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New York City Department of Environmental Protection

BODR Validation Services, Design Services and Design Services During Construction for the

Construction of CSO Abatement Facility at Gowanus Canal OH-007

Green Remediation Plan

Contract: CSO-GC-SFS DES OH | PIN: 82620WP01534

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Hazen

Brown AND Caldwell



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Draft
Green Remediation Plan for
Gowanus Canal Site OH-007 Outfall
CSO-GC-SFS-DES
Construction of CSO Facilities for Gowanus Canal

Prepared for
New York City Department of Environmental Protection
June 2023

This is a draft and is not intended to be a final representation
of the work done or recommendations made by Hazen and
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It should not be relied upon; consult the final report.

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List of Abbreviations

%	percent
ADC	alternative daily cover
BAPE	benzo (a) pyrene equivalent
BC	Brown and Caldwell
BUD	beneficial use determination
C&D	construction and demolition
CKD	cement kiln dust
COC	constituent of concern
CP	construction package
CSO	combined sewer overflow
CWTS	construction water treatment system
DEC	New York State Department of Environmental Conservation
DEP	New York City Department of Environmental Protection
DER	Division of Environmental Remediation
USEPA	United States Environmental Protection Agency
GHG	greenhouse gas
GRP	Green Remediation Plan
kWh	kilowatt-hours
LKD	lime kiln dust
LTTD	low-temperature thermal desorption
MGP	Manufactured Gas Plant
MSW	municipal solid waste
NAPL	non-aqueous phase liquid
NYCRR	New York Codes, Rules and Regulations
NJDEP	New Jersey Department of Environmental Protection
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PDI	pre-design investigation
ppm	part(s) per million
RCRA	Resource Conservation and Recovery Act
RH	Red Hook
SCO	soil cleanup objectives
SOE	support of excavation
SOP	standard operating procedures
SRUP	Soil Reuse Proposal
SPDES	State Pollutant Discharge Elimination System
V3	version 3
WRRF	Wastewater Resource Recovery Facility

Section 1
Project Information

This Green Remediation Plan (GRP) supports the remedial design for the Owl's Head Property (OH) Gowanus Combined Sewer Overflow (CSO) Facility in Brooklyn, New York. The GRP incorporates guidance provided by the United States Environmental Protection Agency (USEPA) Region 2 entitled the "Clean & Green Policy"[1] and "Consideration of Greener Cleanup Activities in the Superfund Process"[2] to enhance the environmental benefits of federal cleanup programs by promoting technologies and practices that are sustainable.

The USEPA added the Gowanus Canal to the Superfund Program's National Priorities List on March 2, 2010, and the City of New York (City) was named as one of several potentially responsible parties (PRPs). In September 2013, the USEPA, acting under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund), issued its Record of Decision (ROD) describing the selected remedy for the Gowanus Canal Superfund Site. In May 2014, USEPA issued an Administrative Order for Remedial Design (Index Number CERCLA-02-2014-2019) (ROD Unilateral Administrative Order [UAO]) that contained a Statement of Work (SOW) specifying tasks to design the components of the remedy selected in the ROD. As part of the ROD-selected remedy, the City was directed to institute CSO controls consisting of the design and construction of retention tanks to intercept discharges from the two largest CSO discharges to Gowanus Canal, Outfall RH-034 in the Red Hook (RH) Wastewater Resource Recovery Facility (WRRF) drainage area and OH-007 in the Owl's Head (OH) WRRF drainage area.

This GRP focuses on the remediation-related activities required to comply with the United States Environmental Protection Agency's (USEPA) Record of Decision (ROD, September 2013); Administrative Order for Remedial Design and Statement of Work (May 2014); and Administrative Order for Remedial Design, Removal Action and Remedial Action (March 2021). Specifically, the remediation activities include excavation of contaminated material and soil to the depth necessary to prepare for the construction of the CSO facility, and the operation of any temporary groundwater management system necessary to conduct the excavation. Demolition of existing buildings and installation of the support of excavation (SOE) are precursors to excavation of the contaminated soil and are addressed in this GRP.

The scope of work described herein is for activities required to incorporate green remediation during building demolition, SOE installation, soil excavation and groundwater treatment required for construction of the CSO retention tank and conveyance. Beyond the remediation scope of work addressed in this GRP, other green and sustainable requirements are incorporated in the overall design for the CSO facility that are not specific to remediation -- including the use of Envision; waste minimization during construction of the CSO tank, conveyance and superstructure; and energy and efficiency requirements for construction and operation of the CSO facility. Those additional components of sustainability planning for the overall project are not described in this document.

[1] USEPA Region 2 "Clean & Green" Policy https://www.epa.gov/greenercleanups/epa-region-2-clean-and-green-policy, updated 2010

[2] USEPA Memorandum Regarding "Consideration of Greener Cleanup Activities in the Superfund Cleanup Process", August 2, 2016, https://semspub.epa.gov/work/HQ/100000160.pdf

Application of the practices and technologies described in the GRP are incorporated into the technical specifications as part of the remedial design to be implemented by the contractor.

1.1 Green and Sustainable Remediation Requirements

Green remediation can be defined as the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions.[3] The objectives of the Clean & Green Policy are to:

- Protect human health and the environment by achieving remedial action goals
- Support human and ecological use and reuse of remediated land
- Minimize impacts to water quality and water resources
- Reduce air emissions and greenhouse gas (GHG) production
- Minimize material use and waste production
- Conserve natural resources and energy

As the remedial activities to be conducted by New York City Department of Environmental Protection (DEP) is part of a Superfund project, the Clean & Green Policy applies.

The USEPA policy establishes a preference for the following:

- 100 percent use of renewable energy, and energy conservation and efficiency approaches
- Cleaner fuels and clean diesel technologies and strategies
- Water conservation and efficiency approaches
- Sustainable site design
- Material reuse or recycling
- Recycling applications for materials generated at or removed from the site
- Environmentally preferable purchasing
- GHG emission reduction technologies

1.1.1 Other Guidance and Policy

In addition to the USEPA's Clean & Green Policy, other guidance or policy requiring consideration and implementation of green and sustainable practices during remediation activities include:

- New York State Department of Environmental Conservation (DEC) Program Policy Division of Environmental Remediation (DER)-31/Green Remediation (January 20, 2011). DER-31 provides concepts and techniques of green remediation and applies to all phases of the site clean-up process which are under DEC agency-lead. This policy is cited by USEPA in the Statement of Work that is included in the 2014 Order.
- Standard Operating Procedures (SOP) established by DEP, including SOPs related to sustainability, efficiency, and other green concepts. These SOPs are incorporated into the overall project design and, where applicable, the remediation activities:
  - SOP 049—Sustainability Management
  - SOP 050—Sustainability Workshop, Preliminary
  - SOP 051—Sustainability Workshop, Deep Dive

[3] Superfund Green Remediation Strategy, August 2009. Published by U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response Office of Superfund Remediation and Technology Innovation, last updated September 2022. https://www.epa.gov/greenercleanups/superfund-green-remediation-strategy

  - SOP 052—Sustainability Rating Systems (LEED and Envision)
  - SOP 053—Energy Conservation and GHG Reduction Plan Requirements
  - SOP 054—Stormwater Runoff Reduction Report
  - SOP 055—Climate Risk Assessment and Adaptation Plan
  - SOP 056—Sustainable Material Content Plan
  - SOP 057—Construction Waste Estimate Report
  - SOP 058 – Soil Management
- Sustainability provisions of New York City local laws are incorporated into the overall project and, where applicable, the remediation activities:
  - Local Law No. 77/2003—Use of Low Sulfur Diesel Fuel by Nonroad Vehicles
  - Local Law No. 118-121/2005—Sustainable Business Practices and Procurement
  - Local Law No. 57/2010—Water Efficiency Standards
  - Local Law No. 71/2011—Recycled Asphalt
  - Local Law No. 1/2013—MWBE
  - Local Law No. 10/2013—Stormwater Tolerant Plantings
  - Local Law No. 130/2013—Electric Vehicle Charging Stations
  - Local Law No. 18/2014—Construction site Lighting
  - Local Law No. 6/2016—Geothermal Analysis
  - Local Law No. 31/2016—Low Energy Intensity Building Requirements
  - Local Law No. 32/2016—Green Building Standards
  - Local Law No. 91/2016—New York City Energy Conservation Code (NYCECC)
  - Local Law No. 97/2017—GHG Reduction
  - Local Law No. 45/2018—Real-time Energy Monitoring
  - Local Law No. 94/2019—Sustainable Roofs
  - Local Law No. 97/2019—GHG Reduction
  - Local Law No. 154/2021—Use of Substances with Certain Emissions Profiles
  - Local Law No. 41/2021—NYC's Climate Resiliency Design Guidelines
- Envision Version 3 (V3) credits potentially applicable to remediation activities include:
  - Section 3 Resource Allocation:
    - RA1.1 Support Sustainable Procurement Practices
    - RA1.2 Use Recycled Materials
    - RA1.4 Reduce Construction Waste
    - RA1.5 Balance Earthwork Onsite
    - RA2.2 Reduce Construction Energy Consumption
    - RA3.3 Reduce Construction Water Consumption
  - Section 4 Natural World:
    - NW2.1 Reclaim Brownfields

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    - NW2.4 Protect Surface and Groundwater Quality
- Section 5 Climate and Risk
    - CR1.2 Reduce Greenhouse Gas Emissions
    - CR1.3 Reduce Air Pollutant Emissions

It is noted that Envision V3 credits are referenced for alignment with full project credit tracking, and remediation activities may not be included in the final credit evaluation.

In addition to specific green remediation requirements by local, state, and federal agencies and governments, the significant quantity of soil to be excavated at the site warrants special consideration be given to waste management policy, the requirements of which impact the overall sustainability of the chosen remedy. It is DEP's policy to beneficially reuse excavated soil to the maximum extent practicable. Options for reuse are evaluated in this document.

The management of impacted material at sites within New York State is governed by DEC's policy for beneficial reuse. Two types of beneficial reuse are a pre-determined beneficial use determination (BUD) and a case-specific BUD pursuant to Title 6 of the New York Codes, Rules and Regulations (NYCRR) Part 360. Both BUD types allow for soil to be reused onsite and at other sites provided certain criteria and standards are met. Once a BUD is granted, the soil ceases to be classified as waste. USEPA must also approve how soil is managed due to the CERCLA site status. To summarize the policy as it applies to the site:

Pre-determined BUDs may be applicable for some waste materials to be handled at the site, including:

- Processed, uncontaminated concrete and brick separated from other waste
- Recycled, uncontaminated asphalt pavement
- Scrap metal
- Certain fill materials that meet 6 NYCRR Part 375-6 soil cleanup objectives (SCOs) for residential use and protection of groundwater for general fill uses in any setting except undeveloped land or agricultural crop land
- Certain fill materials that meet SCOs for residential use and protection of groundwater for all parameters except polycyclic aromatic hydrocarbons (PAHs) where benzo (a) pyrene equivalent (BAPE) must be < 3 (three) parts per million (ppm) for restricted uses such as engineered embankments or subgrade in transportation corridors or site with similar exceedances; fill material must be used above seasonal high-water table
- Certain fill materials that meet SCOs for residential use and protection of groundwater for all parameters except metals and PAHs where BAPE must be < 3 (three) ppm and metals must meet SCOs for commercial use for limited uses under foundations and pavement above the seasonal high-water table

Of note, restricted-use fill or limited-use fill may not be transported to Long Island counties (Nassau and Suffolk) and there are DEC notification requirements for transportation or relocation in New York City.

Case-specific BUD determination may be granted by written petition submitted to the DEC with the following requirements:

- Analytical data (may include requirements for emerging contaminants)
- Demonstration that there is a known or reasonably probable market for the intended use
- Contaminants do not exceed Part 375-6 SCOs for Residential Use and Protection of Groundwater, unless petitioner demonstrates "properties or characteristics unique to the material or use that are acceptable to the Department"

- A case-specific BUD is valid for five (5) years
- Numerous annual reporting requirements
- USEPA and DEC's DER would have to approve concept of beneficial use before DEC would consider a petition
- Reuse in other states subject to approval by the state agency and USEPA

1.2 Site Background

The site location and uses, site geology and hydrogeology, and existing site conditions are briefly described in this section.

1.2.1 Site Location and Uses

The site consists of five contiguous parcels of land, three of which are currently occupied by various commercial and industrial industries. The fourth is a strip of privately-owned land that is labelled as 5th Street and serves as an access driveway across the peninsula. The fifth property is currently operated by the New York City Department of Sanitation (DSNY). The DEP has acquired all five (5) of the parcels to facilitate the construction of a four (4)-million-gallon combined sewer overflow (CSO) retention facility for CSO outfall Owls Head OH-007. The location of the five parcels of land, herein referred to as the Site, is shown in Figure 1.

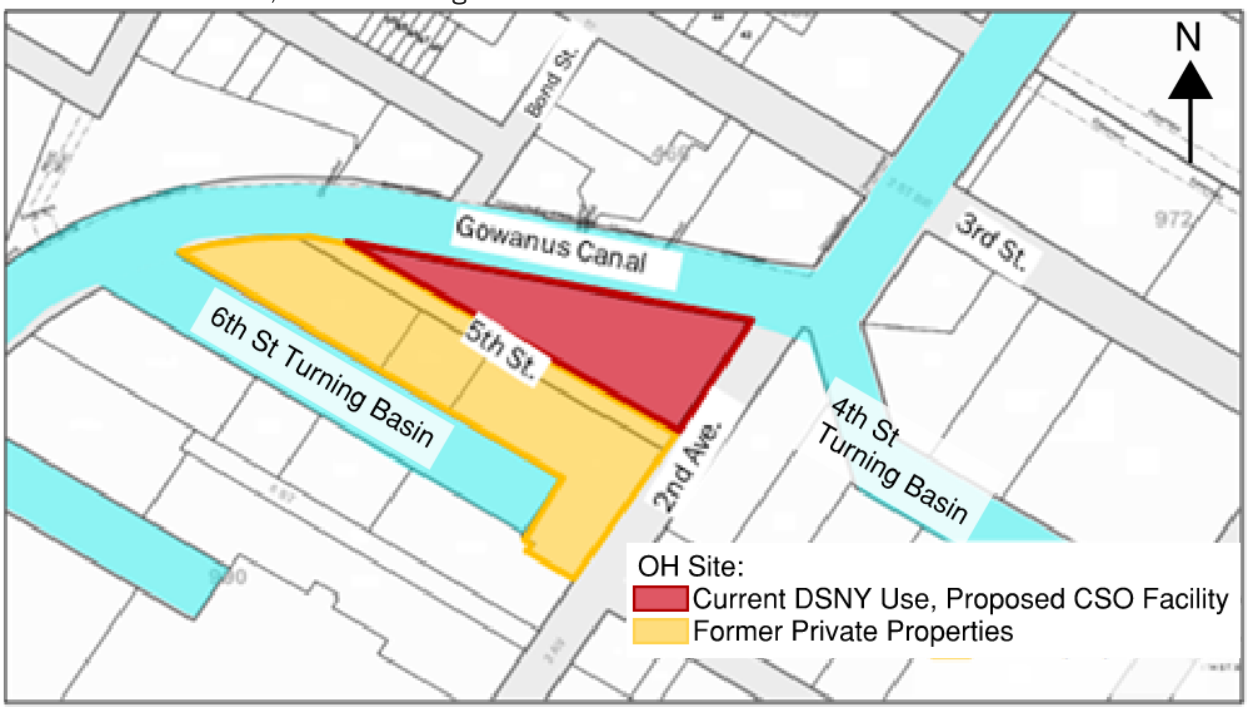


Figure 1: OH-007 CSO Facility Location

The construction activities related to the CSO project will encompass all five (5) properties within a four (4)-acre triangular shaped property bounded by the Gowanus Canal to the north, 2nd Avenue to the southeast, and the 6th Street Turning Basin to the southwest. A portion of the property north of 5th Street is currently utilized by DSNY for storage of snowplow truck equipment and road salt, and for processing of compost. The future CSO facility will be located on the DSNY parcel. The other site parcels are located between 5th Street and the 6th Street Turning Basin and contain several one (1)-

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story buildings used for various commercial and industrial purposes. Following demolition of the buildings, the four (4) parcels south of the DSNY property will be used for the relocation of the DSNY facilities and for support of the CSO facility construction.

The sites are located in an urban neighborhood with surrounding properties used for various purposes including commercial, industrial and residential. The Gowanus Canal potentially can be used for barging material to and from the site. There are no freight rail facilities in the immediate area. The nearest interstate highway (I-278) is approximately 0.5 mile from the site. The contractor will evaluate and propose transportation options for approval taking into account the feasibility of barge and rail transport as part of the Soil Excavation, Reuse, Transportation and Disposal (SERTD) plan that is required pursuant to Specification 31 23 16 – Excavation.

The site is located across the canal from the former Citizen's Manufactured Gas Plant (Citizen's MGP) Site which is undergoing active remediation as of the writing of this document. The entire peninsula has been the location of various industries throughout its history. Additional information regarding the OH site is contained in the "Draft OH-007 Pre-Design Investigation Report" prepared by Hazen and Sawyer/Brown and Caldwell, March 2018 (Hazen/Brown and Caldwell [BC], 2018.

1.2.2 Geology and Hydrogeology

The area around the OH site is flat with a gentle drop in elevation from the center of the site towards the Gowanus Canal. The site is located within the Atlantic Coastal Plain geologic province. The stratigraphy in the region is characterized by sedimentary formations deposited during the Cretaceous, Tertiary, and Quaternary Periods, underlain by Pre-Cambrian metamorphosed igneous rock. The sedimentary formations dip to the south - southeast at a low angle toward the Atlantic Ocean.

The site, like much of the surrounding land area, is immediately underlain by anthropogenic (man-made) fill consisting of miscellaneous urban rubble including non-local soil. The thickness of the fill ranges between ten (10) feet and 20 feet. Underlying the various fill materials are native sediments which were deposited during recent times (Holocene Epoch) in the tidal marsh, tidal channel, and estuarine settings of Gowanus Bay. The tidal marsh/alluvial deposits often contain significant organic material (meadow mat) such as organic silt, peat, and/or plant fragments. The tidal channel and estuarine deposits typically are rich in sand and silt. The tidal marsh/alluvial deposits range in thickness from ten (10) feet to 20 feet. Below these recent deposits are sands and gravels deposited as glacial outwash during the Pleistocene Epoch extending to depths of 150 feet or greater.

The depth to groundwater measured in the monitoring wells screened within the shallow groundwater zone at the site ranges from five (5) feet to eight (8) feet below the ground surface, as summarized in the 2018 Draft Pre-Design Investigation (PDI) Report. In general, the depth to groundwater increases with distance from the Canal, with the greatest depth to groundwater at the eastern end of the site, reflecting the higher surface elevation there.

1.2.3 Summary of Existing Conditions

This is a summary of documented and suspected contamination in soil and groundwater on the OH-007 CSO project site (Figure 1), which includes the DSNY Salt Lot (Block 977 Lot 3), Fifth Street (Block 977 Lot 1), and three parcels to the south (Block 990 Lots 1, 16, 21). The abbreviated information herein is presented in greater detail in the Pre-Design Investigation Report (March 2018), the Phase I Environmental Site Assessment Report (April 2022) and the draft Preliminary Hazards Inventory Report (July 2022). The 2018 Draft OH-007 PDI report provides a detailed description of existing site conditions, including the locations and depth intervals where constituents of concern (COCs) were detected, and non-aqueous phase liquid (NAPL) was observed. The NAPL observations along with analytical results are shown on the geologic cross-sections contained in the report and indicate the

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subsurface distribution of the NAPL and the migration pathways it followed. Other figures in the PDI report further illustrate in plan-view the distribution of NAPL and COCs.

BC conducted groundwater treatability testing at the related RH-034 site farther north along the canal to inform and guide that CSO facility design by evaluating options for treating impacted groundwater removed during dewatering of the excavation and water impacted by construction operations prior to discharge. An evaluation showed that the OH-007 site had similar groundwater characteristics to the RH-034 site. The report "Groundwater Treatability Study for RH-034 Facility" (Hazen/BC, 2018) presents results of bench-scale groundwater treatability testing. Findings from these studies are summarized below.

Groundwater treatability testing found filtration and treatment of groundwater via granular activated carbon adequate to meet anticipated limits for subsequent discharge to the Gowanus Canal under a State Pollutant Discharge Elimination System (SPDES) discharge permit equivalent. Dewatered solids may be blended with excavated material and managed with soils or disposed of offsite separately in geotube bags, or similar. Options for beneficial reuse are discussed below.

Total matrix concentrations of some metals and benzene in select soil samples exceeded 20 times the respective toxicity characteristic leaching procedure (TCLP) limits, indicating a potential for some soil to exceed the toxicity characteristic threshold. As previously discussed in prior site documents, soil for which the toxicity characteristic threshold for benzene only is exceeded will be subject to the DEC policy for management of coal tar waste and impacted media from former MGPs [Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment (DER-4)] (DEC 2002). New York State policy allows for qualifying, impacted soil to be treated at a thermal treatment facility rather than managed as a hazardous waste. In addition, this policy states that activities including excavation and staging, transportation, handling and storage at the receiving facility, thermal treatment, and management of treated material are not subject to DEC's hazardous waste management regulatory program. It is important to note that DEP performed their own survey and decided that the benefits of thermal treatment for soil reuse did not outweigh the carbon footprint of thermal treatment. Therefore, thermal treatment would only be used for MGP-impacted soils with high benzene concentrations that could be rendered non-hazardous through DER-4.

In addition to the COC impacts discussed above, other site conditions are important to take into consideration for the sustainable remedial design including the following:

- Pre-demolition survey findings regarding hazards management including asbestos, mercury, lead, and polychlorinated biphenyls (PCBs)
- Potential wooden foundation piles treated with creosote or other chemicals
- Potential gasoline underground storage tanks
- Potentially COC-impacted subsurface utility bedding
- Potential Recognized Environmental Conditions identified during the Phase I Environmental Site Assessment including a former asbestos storage and manufacturing facility

1.3 Overview of the Remedial Activities

In accordance with the Administrative Orders, DEP will perform excavation within the footprint of the OH-007 tank and associated conduit areas, including excavation of contaminated material and soil to the depth necessary to prepare for the construction of the CSO facility, and operation of a temporary groundwater management system necessary to conduct the excavation. Site preparation and demolition activities at the site and installation of the SOE are related activities that must be completed prior to excavation.

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For the purposes of preparing the design, the project has been divided into three separate construction packages (CPs):

- CP-1 is a site preparation contract. This package includes demolition of existing structures on the OH Property, disconnection and/or relocation of any in-service utilities, and provision of a secure site perimeter for work that will follow. Additionally, as part of CP-1, a new salt shed, and temporary composting facility will be constructed to replace the ones being demolished.
- CP-2 includes most subsurface work and remediation activities. It includes construction of the support of excavation (SOE); the excavation, stabilization of free liquids, reuse or disposal of soils; and construction of the CSO tank.
- CP-3 includes superstructure construction over the retention tank, including installation of facility equipment and conveyance. Additionally, CP-3 will include potential abandonment of existing sewer structures in 2nd Avenue.

The following activities are associated with the excavation and related operations (demolition and SOE installation):

- Generation of approximately 38,615 tons of demolition debris, including concrete, brick, asphalt, glass, ductile iron, metal, reinforcing steel, steel, wood and asbestos-containing debris (Construction Waste Estimate Report – OH-007, CP-1, 90% Design Milestone Update [Hazen/BC, 2022], Construction Waste Estimate Report – OH-007, CP-2, 90% Design Milestone Update [Hazen/BC, 2023], Construction Waste Estimate Report – OH-007, CP-3, 60% Design Milestone Update [Hazen/BC, 2023]).
- Excavation of approximately 99,510 in-place cubic yards of soils from CP-2 and CP-3 (including tank, conveyance, and SOEs). In addition to the soil which must be excavated for installation of the tank, the installation of the SOE system includes a cement-bentonite slurry wall to bedrock with a diaphragm slab around the top and will result in excess soil and slurry mixture requiring offsite disposal. Materials to construct the SOE and concrete tank may contain recycled content in the form of fly ash (April 2022 Recyclable Materials Content Report – OH-007 [Hazen/BC, 2022]). Additional volume will be excavated from the street for subsequent piping corridors for sewer conveyance piping. During excavation activities, dewatering will be completed by the contractor via submersible pumps in sumps and pits and/or extraction wells.
- Stabilization of liquids, including groundwater and residual NAPL, prior to transport offsite for treatment, disposal, and/or reuse as summarized below. Given the volume of soils below the water table and the presence of coal tar impacts at depth, it is anticipated that soils will need to be stabilized onsite to meet the basic thermal desorption or landfill disposal facility acceptance criteria (i.e., no free liquids and maximum permissible moisture contents) prior to shipment.
- Reuse/recycling and/or disposal of building materials from demolition activities.
- Treatment, disposal, and/or reuse of excavated soil as discussed further in Section 3.

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Section 2
Green Remediation Practices and Technologies

In the USEPA Region 2 "Clean & Green Policy" USEPA has identified several green remediation practices and technologies which are referred to as touchstones for remedial actions. USEPA recommends that these practices/technologies are the "starting point" for Superfund cleanups. This policy applies to all Superfund sites and the guidance states that these practices/technologies will be standard unless a site-specific evaluation demonstrates impracticability or favors an alternative green approach. These five touchstones are:

- Use of 100 percent of electricity from renewable sources
- Waste minimization through recycling and reusing onsite materials (including soil and demolition debris) to prevent waste
- Use of concrete made with coal combustion products replacing a portion of traditional cement
- Use of clean diesel fuels and technologies
- Methane capture at landfills

A brief discussion of potential applications of the first four green remediation technologies at the site follows. There is not a landfill at this site, nor will there be one constructed, so this fifth technology opportunity is not discussed herein.

Table 1 presents a description of each green remediation practice/technology discussed herein and identifies the specification or other document that incorporates it through the implementation of the project. Touchstone practices are identified and grouped with preferred practices, as identified in "Clean & Green Policy." These practices/technologies will be implemented to the extent practicable as described further below.

To measure the cost differentials and environmental benefits associated with implementing the Clean & Green Policy, tracking metrics have been developed and are described below. These have been developed with reliance on the USEPA "Green Remediation Measurements/Evaluation Subgroup – Metrics"[4] and through evaluation of best practices.

2.1 Renewable Electrical Energy

Environmental remediation projects frequently require the onsite use of purchased electricity. This electricity may be used to power remediation equipment, ventilation systems, construction trailers, security lighting, and monitoring equipment. To achieve USEPA's stated priority for the use of 100 percent renewable energy, the contractor is required to enter into agreements with the local electrical utility to supply energy generated by renewable methods. This can include generation from solar, wind, hydro power, or combustion of landfill gases such as methane, among others. In general, there is a higher price for these renewably generated energy sources. This cost will be tracked over the life of the project. Reasonable efforts will be made to work with local energy suppliers to identify the cheapest

[4] USEPA Region 2: "Green Remediation Measurements/Evaluation Subgroup – Metrics" http://www.epa.gov/region02/superfund/green_remediation/metrics.html

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source of renewably generated energy. The selection of the renewably generated energy program will be made to the greatest extent practicable. This will be accomplished by requiring the contractor to provide the cost of a percentage of renewable energy procured from local utilities as part of the bidding process for the project.

The contractor may find that generating electricity onsite through renewable methods (such as solar panels or small wind turbines) may be a more effective option than purchasing electricity from renewable sources. Applications for onsite generation may include solar panels for electricity used to power trailers, use of solar panels or small wind turbines to power air monitoring stations, or solar powered charging stations for power tools. The specifications require the contractor to submit a plan for review and approval should they choose to take this approach,

The contractor will be required to include in reporting submittals the quantity of electricity used (kilowatt-hours [kWh]) and the zip code of the site where energy is supplied from as well as the make-up of each renewable energy source that contributed to the electricity purchased. If energy is generated onsite, this should be reported as an offset to purchase of energy generated elsewhere. The information will then be entered into USEPA's Power Profiler to determine the amounts of nitrogen, sulfur and carbon oxides avoided by utilizing renewable sources of electricity.

2.2 Waste Minimization

Waste minimization can take place in several instances during the remediation process. This includes waste generated onsite during implementation of the remedy, including soil/slurry and demolition debris (both BUD and non-BUD), as well as wastes generated through materials purchasing and procurement.

Construction Waste Estimate Reports have been prepared that approximate the quantity of waste to be generated during demolition and construction activities associated with CP-1, CP-2 and CP-3 (Hazen/BC, 2022). During the Preliminary Sustainability Workshop on June 6, 2022, a waste reduction goal was set at 90 percent reduction of non-hazardous materials to landfill and has since been updated to 100 percent reduction. Soil is addressed separately from other construction wastes and is excluded from this calculation. The waste reduction goals will be accomplished by including in the contractor bid specifications, Specification 01 74 20 – Construction Waste Management, the requirement to locally recycle construction and demolition waste. Soil and debris management for waste minimization is discussed in greater detail in Section 3.

Waste minimization during remediation activities will be implemented at the site through the following mechanisms, which are incorporated into the specifications:

- Environmentally preferable purchasing which, among other items, identifies purchasing of materials which are locally produced, contain recycled materials, and/or have minimal packaging. These materials will be preferentially purchased. In addition, locally produced materials may not only have less waste but reduce the transportation requirements to bring the materials onsite. Local manufacturers may be amenable to reductions in packaging.
- Material reuse or recycling (within regulatory requirements) of waste products onsite which may be related to prior activities (e.g., historic concrete footings and foundations not otherwise impacted by onsite contamination, or similar demolition debris meeting reuse requirements and regulations with adequate customer need to take specific materials). If these materials cannot be reused onsite, preference will be given to local recycling facilities where the concrete can be recycled (subject to permit limitations on contaminated debris). Use of a local recycling facility will reduce the transportation footprint of these materials. Also, recycled material may be used as a

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component of concrete or slurry to be used onsite during remediation activities. This is discussed in greater detail in Section 2.3.

- Composting and re-use of site vegetation, as applicable. It is not expected that significant organic material removal will be required, however, where grubbing and site vegetation removal is required, these materials may be chipped (if necessary) and composted. If there is space onsite for composting, the composted organic material may be used during site restoration after the remedy is complete, where necessary. If there is not sufficient area onsite for a compost pile or if the materials are not required for final restoration, a local composting facility will be found for disposal of organic waste. In general, roots and site vegetation which are in areas which are impacted will not be sent for offsite composting, nor used in restoration activities onsite. In addition, composting of meadow mat materials, contingent upon COC concentrations, may be considered for reuse dependent on regulatory approvals.
- Daily site operation waste minimization: Activities at the site will require that office paper, newspaper, plastics, metals, and other recyclables be removed from the site and recycled at local municipal recycling facilities.
- Efficient design and implementation of soil excavation to minimize excavated soil volume, as appropriate, and maximize soil reuse.

Contractor reporting submittals will include the following information to measure and report on the implementation of waste minimization activities and their impact on project GHG emissions during the execution of the project:

- For materials reduced, the amount (in tons) and type (steel, wood, glass, plastic, paper, Portland cement, etc.) of materials reduced through purchase of products with recycled content (e.g., tons of steel, ground granulated blast-furnace slag, etc.).
- For materials reused or recycled, the amount (in tons) and type (steel, wood, glass, concrete, construction and demolition debris, organic, etc.) of materials reused or recycled.
- For materials disposed of (i.e., non-hazardous waste disposal, construction debris, and municipal waste generated during onsite activities), the amount (in tons and number of trips) and type of each material disposed of, the type of disposal (landfill or recycling), and the distance traveled per trip to the disposal facility.

These metrics shall be collected in coordination with the requirements of the Construction Waste Estimate Report OH-007 CP-1 (Hazen/BC, 2022), and the Sustainable Material Content Plan – OH-007 CP-1 (Hazen/BC, 2022), Construction Waste Estimate Report – OH-007 CP-2 (Hazen/BC, 2023), and the Sustainable Material Content Plan – OH-007 CP-2 (Hazen/BC, 2023), the Construction Waste Estimate Report – OH-007 CP-3 (Hazen/BC, 2023), and the Sustainable Material Content Plan – OH-007 CP-3 (Hazen/BC, 2023).

2.3 Use of Combustion By-Products

Coal fired power plants generate quantities of byproducts during generation of electricity. This byproduct can be generally split into four groups: fly ash, a light powdery substance collected in the emission control systems of power plants; bottom ash, a coarser material collected at the bottom of the coal furnace; boiler slag, the molten bottom ash collected at the base of some furnaces that, after quenching with water, fractures, crystallizes, and forms pellets; and flue gas desulfurization material and other materials such as fluidized bed combustion ash, cenospheres, and scrubber residues.

Fly ash can be used in concrete. The resulting concrete is stronger and less permeable as well as less expensive. In addition, fuel costs and associated GHG emissions are reduced during production of cement as the fly ash does not require the same “preheating” as a clay or limestone component. Boiler

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slag can be used as a mineral filler in asphalt, as a fill material in structural embankments, or as a raw material in concrete products. Other by-products (such as ground granulated blast furnace slag, produced as an iron blast furnace byproduct) may also be appropriate for use as a substitute for fly ash to meet the goal of using recycled material in concrete.

For concrete used during SOE construction, the contractor will be required to provide information in project submittals for concrete, describing the waste/combustion by-products. The Contractor will be required to include in reporting submittals the quantity of fly ash or boiler slag used in concrete at the site (tons). If the engineering properties of material with combustion byproducts does not meet required design specifications of certain site features, concrete without sustainable byproducts will be accepted with an emphasis on local sources, and the contractor shall provide a written justification for using traditional materials.

Stabilization of free liquids in excavated soil may utilize either cement kiln dust (CKD) or lime kiln dust (LKD) or other amendments as determined effective by the contractor. If contractors prefer to use manufactured products such as Portland cement or quick lime due to more reliable physical properties, limited use of these manufactured products for the more heterogenous or wet material is encouraged. If segregation is feasible, using a combination of manufactured and CKD or LKD will also be considered.

2.4 Clean Diesel Fuels and Technologies

Clean diesel fuels and technologies can be implemented at a site in a variety of ways. Clean diesel can include low sulfur fuels, ultra-low sulfur fuels, or fuels which include a biodiesel component. These fuels have lower GHG emissions and are better for the immediate and global environment. In addition, diesel equipment can be retrofitted with additional filtering mechanisms to prevent the emissions of particulates onsite. Equipment in use at remediation sites which use diesel fuels can include excavators, generators, dump trucks, and other earth moving equipment.

Specifications will include a requirement for the contractor to either utilize clean diesel fuel, or similar, or use retrofitted machinery, or similar, onsite to reduce emissions resulting from traditional diesel. Contracting requirements will be based on DEC and DEP standard specifications and policies and contract language. These technologies may include addition of diesel particulate filters, manufacturer provided emissions upgrades, and/or use of alternative diesel-type fuels with lower concentrations of sulfur. A list of verified non-road engine technologies is available from USEPA[5] and includes specific manufacturers and types of reduction technologies. A local source of biodiesel exists and can deliver fuel onsite[6]. This information will be discussed with the contractor and implemented to the greatest extent practicable, taking into consideration that the contractor may have constraints on the use of biodiesel in engines from the machinery manufacturers and the ability to retrofit equipment.

The contractor will be required to include in reporting submittals fleet and technology information, including:

- Number of vehicles in fleet
- Vehicle/Equipment Type, Sector, Application, Horsepower Rating and Model Year
- Fuel Type and Annual Fuel Usage
- Usage Rate (hours/vehicle/year)

[5] Verified Nonroad Engine Technologies List https://www.epa.gov/verified-diesel-tech/verified-technologies-list-clean-diesel

[6] Alternative Fuels Data Center, USDOE. https://www.afdc.energy.gov/fuels/biodiesel_locations.html#/find/nearest?fuel=BD. Accessed March 23, 2023.

- Number of Vehicles in Fleet to be Retrofitted
- Retrofit Technology Type and Model Year

Other best practices will be required at the site, including a no-idling requirement, carpooling requirements to bring non-local workers onsite, and creative routing to combine trips (where possible). These best practices will be captured in the following metrics:

- Number of miles driven for this project
- Description of combined trips made for this project
- Daily trip-length to arrive onsite for all individuals (after carpooling), and the "base-case" scenario for these individuals if they had not carpooled

2.5 Other Technologies

The Clean & Green Policy establishes a preference for several other best practices and technologies. These are described below with the appropriate metric to evaluate the implementation of each practice/technology.

- **Energy conservation:** Energy conservation and efficiency approaches beyond what is discussed above may include using EnergyStar® equipment to reduce the amount of energy required during construction. Where electric generators are used onsite, preference will be given to more efficient generators. Idling restrictions and use of efficient onsite construction trailers will be implemented. Where appropriate compact fluorescent lamp lighting will be used. Trailer placement will consider the onsite vegetation and take advantage of any shelter it provides to reduce the use of heating and cooling systems.
- **Water conservation:** Water conservation and efficiency approaches will be implemented at the site to reduce the use of potable water for construction needs. This may include requiring the use of WaterSense® products to reduce the amount of water used onsite during construction. Stormwater collected during remediation activities will be treated in the construction water treatment system (CWTS) along with groundwater from dewatering and other potentially contaminated sources of water. Reuse of the treated water onsite may not be practical for this project. Water discharged from the CWTS will be required to meet limits established in an SPDES permit equivalent. However, this does not ensure that the water would be suitable for potential onsite uses during construction. There may be some instances where the CWTS discharge can be approved for use in lieu of potable water and can be considered on a case-by-case basis. For example, this water could be used to backwash the CWTS filters but could not be applied for dust control.
- **Sustainable site design:** Local environmental impacts of construction will be minimized. This will include construction site best management practices to minimize and slow the movement of water or soil offsite during construction. Restoration and stabilization work will include reseeding with local (non-invasive) plant types, as deemed necessary.
- **Transportation of construction materials, soil, and routine supplies by rail lines:** The contractor will be required to consider options for construction material and waste transportation which could potentially consider the use of rail lines. These will be evaluated in part with local waste disposal/recycling requirements (described above) to determine the best method of transporting materials to and from the site. This practice is discussed in greater detail in Section 3.
- **GHG emission reduction:** Technologies which reduce or restrict the onsite generation of known GHGs, such as carbon dioxide or methane, will be implemented, where practical.

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Section 3
Site Specific Green Remediation Approaches

In addition to the practices/technologies emphasized by the Clean & Green Policy, other green remediation approaches are addressed in the project design. These approaches include:

- Soil and debris management
- Life cycle analysis for soil treatment and transportation
- Treated groundwater reuse evaluation

3.1 Soil and Debris Management

The project will entail generation of significant quantities of demolition debris and soil, beginning with the removal of all existing buildings and foundations and continuing with installation of the SOE for the CSO retention tank, then the excavations for the tank and its conveyances as well as new sewers and drainage structures within the adjacent streets. Most or all the debris and soil will require offsite management because few if any opportunities for onsite use have been identified. Construction of the tank within the excavation minimizes the need for backfill that could utilize materials removed from the excavation footprint, and any additional fill needed to establish final grades will be used at a much later date following initial soil excavation activities.

There are several options for managing debris and soil depending on the physical characteristics of each material and the nature of the contaminants (if any) associated with the material. In addition to disposal as regulated wastes, some materials may qualify for recycling or reuse, often within regulatory frameworks under which the materials cease to be classified as wastes. The following sections describe available disposal and reuse options that have been identified for various categories of debris and soil.

3.1.1 Demolition Debris

The project will require the removal of buildings and structures located on Parcels identified as Block 997 Lot 3, Block 990 Lot 1, and Block 990 Lot 16. Structures and their foundations located on Block 997 Lot 3, north of 5th street, will be demolished during CP-1. Demolition of buildings on Block 990 Lot 1 and Block 990 Lot 16 will initially leave the foundations and slabs in place to minimize the disturbance of soil (CP-1). During CP-2, the remaining slabs, and foundations of the structures south of 5th street will be demolished prior to constructing the SOE.

3.1.1.1 Regulated Wastes

Pre-demolition surveys were conducted for the structures on Parcels identified as Block 990 Lot 1 and Block 990 Lot 16. The purpose of the surveys was to identify potentially hazardous and regulated building materials that would require special handling and disposal due to the presence of regulated hazardous substances. Identified hazardous or potentially hazardous materials that are present in the buildings include but are not limited to the following:

- Asbestos Containing Material

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- Paint containing lead or other heavy metals
- Paint, caulk, light ballasts or other materials containing PCBs
- Containerized wastes and regulated liquids such as waste oil, lubricants and solvents
- USEPA Universal Wastes (batteries, pesticides, mercury-containing equipment, lamps)

Most of these materials must be transported to disposal facilities permitted under Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA) and/or New York State's solid waste regulations. In most cases hazardous materials can be abated or removed prior to demolition, thereby rendering the remaining structural materials suitable for recycling or reuse. Common examples of pre-demolition abatement/removal include:

- Asbestos abatement
- Removing and consolidating loose, flaking lead paint, testing the paint by TCLP, and then disposing of it in an appropriately permitted solid waste or hazardous waste landfill
- Removing and consolidating PCB light ballasts and shipping them to a TSCA incinerator or TSCA/RCRA Hazardous Waste landfill
- Removing and consolidating fluorescent/mercury vapor lamps and shipping them to an approved Universal Waste destination facility

The total quantity of hazardous materials found within the buildings constitutes a small percentage of the total mass of the buildings.

3.1.1.2 Recyclable Demolition Materials

After removal/abatement of the hazardous materials, most of the remaining structural materials can be reused or recycled. Listed below, in Table 2 are estimated quantities of recyclable building materials anticipated during CP-1, CP-2, and CP-3 (Construction Waste Estimate Report Construction Package 1 [Hazen/BC, 2023]; Construction Waste Estimate Report Construction Package 2 [Hazen/BC, 2023], Construction Waste Estimate Report Construction Package 3 [Hazen/BC, 2023]):

Table 2 Recyclable Demolition Waste Quantity Estimate

Item	CP-1 Total Quantity (tons)[1]	CP-2 Total Quantity (tons)[1]	CP-3 Total Quantity (tons)[1]
Asphalt	600	240	6,500
Concrete[2]	16,000	530	820
Ductile Iron	2	-	-
Steel	1,210	-	2,600
Timber Wood	-	-	300

Reference: Construction Waste Estimate Reports (CP-1, CP-2, and CP-3); December 2022, April 2023, March 2023; Hazen and Sawyer/Brown and Caldwell.

1. Numbers rounded to nearest significant digit.
2. Structural and non-structural concrete.

In New York State, the recycling of construction and demolition (C&D) debris is regulated by 6 NYCRR Subpart 361-5 (Construction and Demolition Debris Handling and Recovery Facilities). These regulations apply to facilities that process and/or store C&D debris in order to extract recyclable or reusable materials. Permitted facilities may not accept C&D debris, fill material, or similar material from a site being remediated pursuant to a program administered by the DEC or USEPA unless the material is accompanied by written approval from the DEC or USEPA. The regulation also requires that

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wood must be “unadulterated” and/or “uncontaminated.” Friable asbestos-containing waste may not be accepted by permitted recycling facilities.

C&D debris processing facilities which are registered pursuant to 6 NYCRR Subpart 360-16.1 must have a waste control plan which includes methods and procedures to prevent inadvertent acceptance of historic fill or other unauthorized waste which can render otherwise acceptable materials such as concrete, asphalt pavement, brick, rock and soil unsuitable for recycling or beneficial use. The DEC’s Model Waste Control Plan for Registered C&D Debris Processing Facilities defines acceptable materials as recognizable and uncontaminated concrete (including steel or fiberglass reinforcing rods that are embedded in the concrete), brick, asphalt pavement, glass, rock and soil (RUCARB and soils).

Under the DEC’s Model Waste Control Plan the following C&D debris items are not acceptable for processing in any quantity and must be diverted to another facility for disposal or recycling:

- historic fill
- asbestos waste
- garbage
- corrugated container board
- electrical fixtures such as fluorescent light ballasts or transformers, electrical wiring, fluorescent lights
- carpeting, furniture
- appliances
- tires
- containers in any size
- fuel tanks
- clay pipe
- ceramic tile
- coal and slag
- mollusk shells
- wood (including painted, treated and coated wood and wood products),
- land clearing debris
- wall coverings
- plaster
- drywall
- plumbing fixtures
- non-asbestos insulation
- roofing shingles and other roof coverings
- plastics

Loads accepted from any demolition site must be screened for potential historic fill. No chemical testing is required for materials which are limited to recognizable concrete, brick, asphalt pavement and rock with less than five (5) percent by volume of soil or other material passing through the one-quarter (1/4)-inch sieve. Otherwise, representative samples of the fine matrix (material passing the one-quarter (1/4)-inch sieve) must be tested chemically for metals, semi-volatile organic compounds, pesticides and PCBs and the results compared with SCOs listed in 6 NYCRR Part 375-6.8(b). Waste

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material may not be accepted if the average concentration of any contaminant exceeds the lower of the residential SCO or the protection of groundwater SCO.

3.1.2 Excavated Soil

An approximate total of 99,510 cubic yards of soil will be excavated throughout CP-1, CP-2, and CP-3 to accommodate the CSO retention tank and its conveyances and new sewers and drainage structures. As described in the following subsections, excavated soils may either be disposed of as solid wastes or reused, depending on factors such as contamination, physical properties, the feasibility of segregating different soil types, the availability of reuse sites at time of construction, and cost.

3.1.2.1 Disposal/Treatment as Waste

It is possible to dispose of all excavated soils as solid waste in a variety of permitted disposal or treatment facilities. DEP has a stated preference to avoid landfilling of soil, and the environmental implications of disposal vs. reuse are discussed later in this GRP. Depending on waste characteristics, excavated soils may be landfilled or incinerated as hazardous waste, disposed of in non-hazardous (RCRA Subtitle D) landfills, or treated to remove or stabilize contaminants prior to reuse or disposal.

Hazardous Waste. Based on analytical results from the PDI, lead was the only constituent found above the RCRA Hazardous Waste Levels. Lead exceeded the toxicity characteristic level in the sample collected from the fill material at a single boring location. Lead was detected at 9.11 mg/L from the 12.3 to 12.9 ft interval at boring OH-SB-02. This result indicates there is potential for some of the fill material to exhibit a hazardous waste characteristic, which will need to be considered in plans for managing the excavated soils during construction. Although PCBs were identified in some building materials, no PCBs were detected in soil on the OH-007 parcels. Some soil samples had total matrix lead or benzene concentrations that would indicate a potential to exhibit the RCRA Toxicity Characteristic for these contaminants (D008 lead, D018 benzene). Final waste classification of such soils will require TCLP testing. As discussed below, MGP wastes that exhibit the D018 (benzene) Toxicity Characteristic are exempt from hazardous waste regulation in New York State provided that the wastes are treated in a permitted low-temperature thermal desorption (LTTD) facility. If waste characterization testing of excavated soils results in the classification of some soil as Hazardous Waste (other than D018), that soil will likely be disposed of in a RCRA Subtitle C permitted landfill after stabilizing the soil as necessary to meet RCRA land disposal restrictions unless the soil can be rendered non-hazardous through treatment to remove the characteristic. As discussed later in this GRP, the environmental implications of Subtitle C landfill disposal include the carbon footprint of transportation and landfill maintenance activity, contribution of landfill gases to total GHGs, and the use of clean soil from borrow pits for daily landfill cover. Compared to Subtitle D municipal solid waste (MSW) landfills, Subtitle C landfills use little soil for daily cover.

Subtitle D Landfill. Disposal of waste soil in a Subtitle D landfill (industrial waste and/or MSW) will be an option for all excavated soil that is not classified as a hazardous waste under federal and state regulations. The PDI analytical results indicate that little soil has a potential to exhibit either the D008 lead or D018 benzene Toxicity Characteristics, making Subtitle D landfill disposal effectively a baseline alternative against which various treatment and reuse options can be applied. As discussed in the following sections, the environmental implications of Subtitle D landfill disposal include the carbon footprint of transportation and landfill maintenance activity, the contribution of landfill gases to total GHGs, and the consumption of clean soil from borrow pits for daily landfill cover. As discussed in Subsection 3.1.3.1 below, some Subtitle D landfills, particularly ones used extensively for MSW, employ contaminated soil as alternative daily cover (ADC) instead of using virgin soil from borrow pits.

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3.1.2.2 Low Temperature Thermal Desorption

LTTD is a process in which contaminated soil is heated in a rotary kiln to volatilize organic contaminants contained in the soil. The kiln exhaust is processed to remove the volatilized contaminants before being discharged to the atmosphere. The treated soil is then cooled and stockpiled while awaiting landfilling or reuse. LTTD does not reduce the concentrations of non-volatile contaminants such as heavy metals. In New York State, LTTD is the only option (other than managing as hazardous waste) for managing MGP wastes that would otherwise be classified as a D018 Characteristic Hazardous Waste due to the presence of benzene. The options for reuse of soil treated by LTTD depend on the degree of treatment and the concentrations of contaminants remaining in the treated soil. Some LTTD facilities treat soil only to the extent needed to meet criteria for landfill ADC, blending incoming waste streams from various sources to minimize the treatment needed to achieve ADC criteria. One LTTD facility (Clean Earth of Fort Edward, NY formerly known as ESMI) holds a BUD from the DEC that allows Clean Earth to sell treated soil for use as unrestricted fill. Clean Earth's BUD requires that the treated fill material meet New York State's SCOs for Unrestricted Use, thereby limiting the concentrations of metals that can be accepted in incoming material. Another LTTD facility (Bayshore Recycling of Keasby, NJ) has indicated that it would consider returning treated soil to the generator for use as the generator deems appropriate.

LTTD consumes fossil fuel (natural gas, Fuel Oil no. 6, Fuel Oil no. 2) for firing the rotary kiln and heating the soil to a temperature sufficient to volatilize the organic contaminants and the water in the soil. Thus, fuel consumption depends on both the nature of the contamination and the amount of soil moisture. Clean Earth Fort Edward calculated emissions estimate of 0.12 tons GHG CO_2 Equivalents per ton of soil. Clean Earth's calculation assumes that the fuel is natural gas, and the soil is wet coal tar soil requiring energy of two (2) one million British Thermal Units/ton to process. To account for the combustion of the contaminants in the soil, Clean Earth assumed an equivalent of 1,000 ppm of Total Petroleum Hydrocarbons derived from Fuel Oil No. 6 oil as an approximation of coal tar.

The sustainable benefits of LTTD include the diversion of material from landfills and the production of clean fill materials that can be substituted for use of non-renewable, virgin soil and aggregate resources. However, the DEP does not prefer LTTD as it is an energy intensive process and has a high carbon footprint. Instead, the DEP prefers to limit application of this technology to MGP soil with high benzene concentrations to render the soil nonhazardous.

3.1.3 Construction Debris

Construction debris will be generated at different stages throughout the project. CP-1 will include the relocation of the DSNY-operated winter weather operations and the stabilization of Block 997 Lot 3. CP-2 will contain most of the subsurface work such as construction of the support of excavation, and the construction of the foundation for the facility. CP-3 will include the superstructure construction of the facility itself as well as the conveyance necessary to integrate the facility with DEP's infrastructure.

3.1.4 Recyclable Construction Materials

After construction is completed for each construction package, most of the remaining structural materials can be reused or recycled. Listed below, in Table 3 are estimated quantities of recyclable building materials anticipated during CP-1, CP-2, and CP-3 (Construction Waste Estimate Report Construction Package 1 [Hazen/BC, 2023]; Construction Waste Estimate Report Construction Package 2 [Hazen/BC, 2023], Construction Waste Estimate Report Construction Package 3 [Hazen/BC, 2023]):

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Table 3 Recyclable Construction Waste Quantity Estimate			
Item	CP-1 Total Quantity (tons)[1]	CP-2 Total Quantity (tons)[1]	CP-3 Total Quantity (tons)[1]
Aluminum	-		0.03
Asphalt	5	8.3	31.30
Bentonite	-	0.2	-
Brass (Polished)	-	-	0.002
Bronze	-	-	0.0001
Cast Iron	-	-	0.05
Ceramic	-	-	0.04
Concrete[2]	660	790	80
Copper	0.04	0.06	0.7
Ductile Iron	0.4	0.07	7
Epoxy	-	-	0.7
Fiberglass	-	-	0.003
Fireproofing	-	-	0.002
Galvanized Steel Conduit	-		3.1
Glass	-	-	0.07
Grout	-	0.4	-
Hardener	-	-	-
HDPE	-	-	0.004
Iron	-	-	4.4
Plywood	-	-	0.4
Plastic Conduit	0.01	-	-
PVC	0.01	1.7	-
Reinforcing Steel	39	-	-
Stainless Steel	0.001	0.09	5.3
Steel	16	80	1.6
Timber Wood	721	140	0.3

Reference: Construction Waste Estimate Reports (CP-1, CP-2, and CP-3); December 2022, April 2023, March 2023; Hazen and Sawyer/Brown and Caldwell.

1. Numbers rounded to nearest significant digit.
2. Structural and non-structural concrete.

In New York State, the recycling of construction and demolition (C&D) debris is regulated by 6 NYCRR Subpart 361-5 (Construction and Demolition Debris Handling and Recovery Facilities). Further detail can be found in section 3.1.1.2 Recyclable Demolition Materials.

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3.1.5 Beneficial Use

DEC's Green Remediation Policy, as described in DER-31[7], endorses the beneficial reuse of materials that would otherwise be considered waste as an opportunity to increase the sustainability of site cleanups. The DEC implements this policy pursuant to the regulations set forth in 6 NYCRR Part 360 Sections 360.12 and 360.13, which were included in the comprehensive revisions of September 5, 2017. These regulations do not apply to materials that are being sent to material recovery facilities (demolition and construction debris recycling, composting, steel recycling) subject to regulation under Part 361 (see Section 3.1.1 Demolition Debris and Section 3.1.3 Construction Debris above).

In general, materials cease to be wasted when used for approved beneficial uses. The timing of the "cessation" varies and may depend on the particular use and/or receipt at the location of use. Some BUDs are pre-defined by DEC, whereas case-specific BUDs may be granted by written petition submitted to DEC. The petitioner must demonstrate that there is a known or reasonably probable market for the intended use. Analytical data must demonstrate that contaminants do not exceed Part 375-6 SCOs for Residential Use and Protection of Groundwater, unless the petitioner demonstrates "properties or characteristics unique to the material or use that are acceptable to the department." A case-specific BUD is valid for no more than 5 years from the date of approval, and there are numerous annual reporting requirements. Petitions for case-specific BUDs from a remediation site are reviewed by DEC only after the USEPA and DEC's DER approve the concept of beneficial use for the particular site. Approval by the USEPA is also required by the Offsite Rule, set forth in the National Contingency Plan at 40 CFR 300.440.

The following subsections describe some pre-determined and case-specific BUDs that have been established in New York State.

3.1.5.1 Alternative Daily Cover

MSW landfill operators must cover all disposed waste at the end of each day to control odors, vectors, fires, litter, and scavenging. Subject to a landfill's operating permit, contaminated soil may be used instead of clean soil for ADC. In New York State, many landfills have obtained BUDs that define criteria for accepting soils for ADC. Waste Management's BUD for its High Acres Landfill in Fairport specifically allows contaminated soil not classified as hazardous waste to be used as ADC. Seneca Meadow's BUD also specifically allows the use of contaminated soil not classified as hazardous waste, as well as chipped trees and C&D debris reduced in size to 3 inches or less. In general, the use of contaminated soils as ADC is limited by the presence of debris, excessive wetness, strong odor, and processed C&D debris fines.

Sustainable benefits of ADC use include the preservation of a non-renewable resource, namely virgin soil from borrowed pits. Because the contaminated soil must be excavated and transported to a disposal destination in any case, its use as ADC also eliminates the burning of fossil fuel to excavate and transport clean soil from a borrow pit.

3.1.5.2 Fill

Section 360.13 sets forth unique requirements for pre-determined beneficial use of fill material. The following pre-determined BUDs may allow the offsite use of soils excavated from the site, depending on the contaminant types and concentrations in the soil.

[7] DEC Program Policy DER-31/Green Remediation; New York State Department of Environmental Conservation, Division of Environmental Remediation; Revised January 20, 2011.

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- "General Fill" may be used in any setting except undeveloped land or agricultural crop land. All parameters must meet the 6 NYCRR Part 375-6 SCOs for Residential Use and Protection of Groundwater.
- "Restricted-Use Fill" must be used only for engineered embankments or subgrade in transportation corridors, or onsite where in-situ materials already exceed SCOs for Residential Use and Protection of Groundwater. It must be used above the seasonal high-water table. All parameters except PAHs) must meet the SCOs for Residential Use and Protection of Groundwater. The BAPE must be < 3 ppm[8].
- "Limited-Use Fill" must be used only under foundations and pavements above the seasonal high-water table. All parameters except metals and PAHs must meet the SCOs for Residential Use and Protection of Groundwater. Metals must meet the SCOs for Commercial Use. The BAPE must be < 3 ppm.

For all three of these BUDs, because the soil onsite originates from a location within the City of New York, the regulations require that the soil be sampled and tested. The sampling must be implemented under direction of a Qualified Environmental Professional and minimum sampling frequencies are specified (360.13(d) Table 1). Analytes must include volatile organic compounds, semi-volatile organic compounds, metals, pesticides, and PCBs. For Parcel VI and VII soils, asbestos will also be required because demolition of structures will have occurred on the site.

Under the Part 360.13 regulation, no one may receive payment or other consideration for allowing the use of Restricted-Use Fill or Limited-Use Fill on their property, and neither Restricted-Use Fill nor Limited-Use Fill may be transported to Long Island counties (Nassau and Suffolk). There are DEC notification requirements for transportation or relocation in New York City.

Sustainable benefits of reusing excavated soils under the above BUDs are the preservation of non-renewable aggregate and virgin soil resources together with the elimination of GHG emissions associated with the mining and transportation of these virgin materials.

3.1.5.3 Asphalt Pavement

The reuse of petroleum-contaminated soils in the manufacture of hot- and cold-mix asphalt has been well established[9]. Some soils on OH-007 appear to be impacted primarily by petroleum-based constituents. DEC has granted case-specific BUDs to numerous facilities to produce asphalt from such soils. Facilities located in the New York City/Long Island area include Tyree Brothers Environmental Services in Farmingdale (cold-mix asphalt), Posillico in West Hempstead (asphalt), Rason Asphalt Inc. in Old Bethpage (hot-mix asphalt), and Transmine, Inc., in Westhampton Beach (cold-mix asphalt).

DEC has also granted case-specific BUDs for manufacturing asphalt from coal tar-contaminated soil. Facilities include Clean Waters of America in Epsom, NH (cold-mix asphalt) and Posillico Brothers Asphalt Co. in Farmingdale, NY (asphalt).

Sustainable benefits of reusing petroleum- and coal tar-impacted soils in asphalt pavement include reducing demand for non-renewable aggregate and the sequestering of petroleum contamination that would otherwise be a source of GHGs if it were treated by thermal desorption.

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[8] Benzo(a)pyrene (BAP) Equivalent is calculated using the following formula: BAPE= 1 x conc. Benzo(a)pyrene + 0.1 x [conc. Benz(a)anthracene + conc. Benzo(b)fluoranthene + conc. Benzo(k)fluoranthene + conc. Dibenz(a,h)anthracene + conc. Indeno(1,2,3-c,d)pyrene] + 0.01 x conc. Chrysene (All concentrations in mg/kg or ppm, dry weight.)

[9] USEPA Office of Research and Development; "Potential Reuse of Petroleum Contaminated Soil: A Directory of Permitted Recycling Facilities"; EPA/600/R-92/096, June 1992.

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3.1.5.4 Metropolitan Gas/Lowe's Project

DEC issued case-specific BUD no. 50-2-24 to a developer, F.C. Gowanus, for petroleum- and coal tar-contaminated soil. The site fronted the Gowanus Canal at 2nd Avenue and 10th Street. The developer subsequently constructed a Lowe's retail store on the property. A BUD application submitted by the developer's consultant to the DEC was approved prior to the start of excavation. However, the BUD was not used as the facility providing reuse material (Clean Earth-NY) already had an approved BUD in place.

Opportunities to employ case-specific BUDs may be identified for OH-007 soils, depending on the availability of destination sites and the assessment of soils that would not qualify for one of the existing, pre-determined BUDs. For example, it may be cost-effective to petition DEC for a BUD that would accommodate soils with benzene concentrations greater than the SCO for protection of groundwater, if a destination site and application are identified that eliminates any threat to groundwater quality.

The sustainable benefits of case-specific beneficial uses are like those previously mentioned, including the preservation of non-renewable, virgin soil and fill resources and the reduction of GHG emissions associated with excavation and transportation of these resources.

3.1.5.5 New Jersey Beneficial Use

In New Jersey, contaminated soil from sources such as the OH-007 parcels may be used at a contaminated site as a constructive part of a remedial action or closure with written approval of the New Jersey Department of Environmental Protection (NJDEP) pursuant to New Jersey's solid waste regulations at New Jersey Administrative Code (NJAC) 7:26-1.7(g)[10]. The following restrictions apply:

- The receiving site may not accept more soil than is needed to bring the site up to the design grade. This is to prevent the receiving site from functioning as a landfill without the benefit of public input.
- The soil may not contain contaminants different than what is presently on the receiving site, and concentrations of a given contaminant may not exceed the concentrations in the receiving site. For the evaluation of discrete sample data, the maximum concentration of a contaminant in the soil from the originating site cannot exceed the 75th percentile of the contaminant concentration at the receiving site.
- The soil must meet the geotechnical requirements for fill. This would preclude the beneficial use of material that has excessive organic content, possibly including the meadow mat deposits.
- The NJDEP must conclude that there is sufficient analytical data for both the originating and receiving sites to adequately characterize the sites. In the absence of a Remedial Investigation for the originating site, the NJDEP has issued a specific sample characterization protocol. Among other requirements, sample collection, preservation and handling must be performed in accordance with NJAC 7:26E-2 and with the latest edition of "New Jersey Department of Environmental Protection Field Sampling Procedures Manual."

The person responsible for conducting the New Jersey site remediation who wants to use contaminated soil must prepare a Certificate of Authority to Operate (CAO) a Beneficial Use Project Application. The CAO Application must include a description of the beneficial use project including the origin of the material to be beneficially used, documentation of all contaminants and their concentrations, maps of sample locations and proposed use locations, copies of the analytical packages used to evaluate the material, and the schedule for initiation and completion of the beneficial use project. Within 90 days of receipt of a complete application, the NJDEP must either

[10] https://www.nj.gov/dep/dshw/rrtp/bud.htm

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issue a certificate of authority to operate for a beneficial use project in the State of New Jersey or deny the application.

In contrast with New York State, the owner of a site in New Jersey may accept compensation for receiving the beneficial use soil.

3.2 Life Cycle Analysis of Soil Treatment and Transportation

Due to the mixture of contaminants in the soils onsite, and the large quantity of material that must be removed from the site to construct the CSO facility, the transportation, handling, and ultimate disposition or end-use of the soil material has the potential to be a large component of the total environmental footprint of the overall project. Additionally, DEP has identified a preference to avoid disposing of soil at landfills. When there are no other viable alternatives to landfill disposal, soil reuse as landfill ADC is preferable to landfill disposal provided it does not require energy intensive treatment such as LTTD that would not otherwise be required for landfill disposal. Soil reuse as ADC will off-set mining of virgin soil/gravel/stone from borrow pits and quarries with the attendant disruptions of ecological functions in those source areas.

There are limited opportunities for soil reuse onsite as soil excavation is to create space for the construction of the subsurface tank and conveyance structures.

Based on PDI results (Hazen/BC 2018), portions of the fill, meadow mat, and alluvial/outwash material from the site may be suitable for beneficial use, as discussed further below. Excavated soil that does not meet BUD criteria may be eligible for beneficial use following LTTD to reduce concentrations of volatile and semi-volatile organic compounds with certain limitations. For example, high moisture or organic content will cause the material to be unsuitable for thermal treatment and metals concentrations will not be reduced by LTTD. The fill, meadow mat, and glacial sand layers have different physical properties that together with contaminant concentrations will influence the potential treatment and reuse options.

- For the estimated 31,400 cubic yards of fill material to be excavated within the SOE for the tank:
  - Approximately 100 percent of the fill exceeds the default criteria for unrestricted use BUD criteria.
  - A case-specific BUD would be required for beneficial use other than ADC due to the presence of metals at concentrations above the established criteria.
  - It would not be practical to segregate metals exceedances given the heterogeneous nature of the fill.
  - NAPL impacts would need to be addressed separately from remainder of fill.
  - Landfill disposal or use as ADC would be an option if a no viable reuse option is available at time of excavation.
- For the estimated 27,000 cubic yards of meadow mat to be excavated within the SOE for the tank:
  - Approximately 45 percent of the meadow mat exceeds the default unrestricted use BUD criteria.
  - Beneficial use options would be as a soil amendment for planting media; however, almost half of this soil does not meet BUD criteria without treatment.
  - Meadow mat is not a suitable candidate for thermal desorption due to high organic and high moisture content.

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  - A potential option may be to blend the meadow mat with other soil, treat it by thermal desorption and obtain BUD for beneficial use, if applicable criteria can be achieved.
  - Landfill disposal or possibly use as ADC would be an option if a no viable reuse option is available at time of excavation.
- For the estimated 16,600 cubic yards of glacial sand to be excavated within the SOE for the tank:
  - Approximately 67 percent of the glacial sand exceeds the default unrestricted use BUD criteria.
  - A portion (approximately 33 percent) of the soil may be eligible for beneficial use as restricted-use or limited-use fill without treatment.
  - A substantially greater percentage of the soil may be eligible for beneficial use if a case-specific BUD is granted that allows for reuse of soil in which only the impact to groundwater criterion for benzene is exceeded.
  - Additional soil may be eligible for beneficial use following LTTD treatment, which may be required for soil if the toxicity characteristic limit for benzene is exceeded.
  - Landfill disposal or possibly use as ADC would be an option if no viable reuse option is available at the time of excavation.

A sustainability and green remediation evaluation framework has been developed and includes:

- Impacts during construction: energy and water use, air, impacts to neighborhood residents (noise, traffic)
- Impacts during transportation: energy use, air, impacts to infrastructure and residents along transit corridors
- Impacts during treatment: energy and water use, air, externalized costs of other materials used during treatment
- Impacts during final use of material: reuse of material as clean fill/replace a virgin material source

A quantitative evaluation of carbon dioxide quantities considered the use of truck, rail, and barge modalities to transport soil over approximately 750 miles, which is the average distance between the OH-007 site and a facility based on the preliminary list of disposal sites. It was found that transport emissions by road (assuming a medium and heavy-duty truck) are approximately four times greater than by barge and approximately eight times greater than by rail. As seen in Figure 2, if traveling for a long distance, it is encouraged to opt for use of rail, as it produces the least emissions.

Considerations included in the qualitative evaluation other than the calculated carbon impacts that may bear on the ultimate selection of soil treatment/disposal/reuse options and transit mode include:

- Regulatory agency approval including approval of BUD applications
- Available market for beneficial use
- Risk of release of materials during intermodal transfers
- Impact to local communities (traffic, localized emissions, health and safety risk, and infrastructure impacts) for each mode of transit
- Schedule constraints to meet project deadlines based on production estimates for different transportation modes

The last three items are relevant to any evaluation of transport and treatment/disposal/reuse options regardless of the sustainability considerations.

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A decision tree has been developed to visualize the regulatory acceptance criteria and potential treatment, disposal and reuse options for excavated soils, and is included as Figure 3. This decision tree walks through the evaluation of soil management options with a preference for beneficial use. Management of excavated soils and other remediation wastes is addressed as a unit price line item in the specifications.

3.3 Treated Groundwater Usage

A CWTS will be utilized for treatment of extracted groundwater for dewatering during excavation activities, as well as other sources of potentially contaminated water. The groundwater is expected to be discharged to the Gowanus Canal under a SPDES permit equivalent. Reuse of the treated water onsite may not be practical for this project. Although water discharged from the CWTS will be required to meet limits established in the SPDES permit equivalent, this does not ensure that the water would be suitable for potential onsite uses during construction, where potable water is specified. Additionally, the water treatment plant/groundwater extraction system may not provide sufficient volume to meet the requirements onsite. The contractor is encouraged to include treated groundwater where it is appropriate and meets analytical requirements for onsite use.

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Section 4
Implementation

Green remediation practices and technologies are being incorporated into the design for the remediation and related activities as described in the preceding sections of this GRP. The contractor will be a partner in implementing these requirements and may have other innovative best practices and technologies which are not described in this document. The reporting metrics will be collected in contractor required submittals and documented in the Remedial Action Report or other appropriate report. If a specified practice or technology is determined to be impractical during planning or construction, the reasons will be documented in the report.

4.1 Specifications

A summary of the green remediation requirements incorporated in the specifications, and the related Clean & Green touchstone practice/technology, is provided in Table 1. The Green Remediation Requirements specification provides an overview of the Green Remediation requirements for the project and the contractor's responsibilities. The contractor will be required to submit a Green Remediation Implementation Plan, assign a person to be responsible for Green Remediation issues compliance and coordination, attend meetings, and submit documentation called for in the specifications.

4.2 Record-Keeping

USEPA has specified collection of metrics in the Clean & Green Policy[11]. These metrics will be collected by contractors and reviewed by the construction manager or engineer during construction activities. The metrics that will be collected are:

- kWh of electricity used and the zip code where the energy is supplied. The kWh of electricity provided by renewable sources, or the percent of renewable energy that is included in the provided energy mix, will also be provided.
- For concrete or stabilization products, the tons of fly ash or other coal combustion products will be collected and summarized.
- Fleet information, including number of vehicles, vehicle type and fuel type/usage, and usage rates for vehicles used will be collected for construction vehicles used onsite and for transportation of soil. This information will be used to develop the emissions reductions resulting from the use of clean diesel technologies.
- Amount (in tons) of materials reduced through the purchase of products with recycled content and recycled during construction activities. This applies to commonly recycled materials including steel, wood, glass, plastic, paper, concrete, construction and demolition debris, organic materials, etc.
- Amount (in tons) of soil diverted from disposal options including landfills via beneficial use and ADC options.

[11] USEPA Region 2 Clean & Green Policy: Touchstone Practices and Metrics ", https://www.epa.gov/sites/production/files/2016-08/documents/region_2_clean_green_policy_metrics_touchstone_practices.pdf

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In addition to the data required by USEPA, other reporting requirements are being developed in coordination with the preparation of the Envision model for the project and will be included in the specifications.

4.3 Reporting

Following the completion of construction at the site, appropriate documentation will be prepared to summarize the implementation of the GRP. The report will incorporate the construction metrics collected and will summarize the overall impact of the GRP using calculation tools provided by USEPA. This will include:

- USEPA Power Profiler to calculate the quantity of nitrogen oxides, sulfur dioxides, and carbon dioxides avoided by use of renewable energy sources
- USEPA Waste Reduction Model, to calculate the amount of carbon dioxide avoided by use of fly ash instead of Portland cement
- USEPA Diesel Emission Quantifier, to generate the emissions reductions that result from the use of clean diesel technologies
- USEPA ReCon Tool to calculate GHG benefits of maximizing the reduction, reuse, and recycle of materials

The report will also include a description of life cycle analyses and other tools used during selection of options for management of excavated soil.

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Section 5
Limitations

This document was prepared solely for New York City Department of Environmental Protection (DEP) in accordance with professional standards at the time the services were performed and in accordance with the contract between DEP and Hazen and Sawyer/Brown & Caldwell dated April 29, 2021. This document is governed by the specific scope of work authorized by DEP; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by DEP and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Section 6
References

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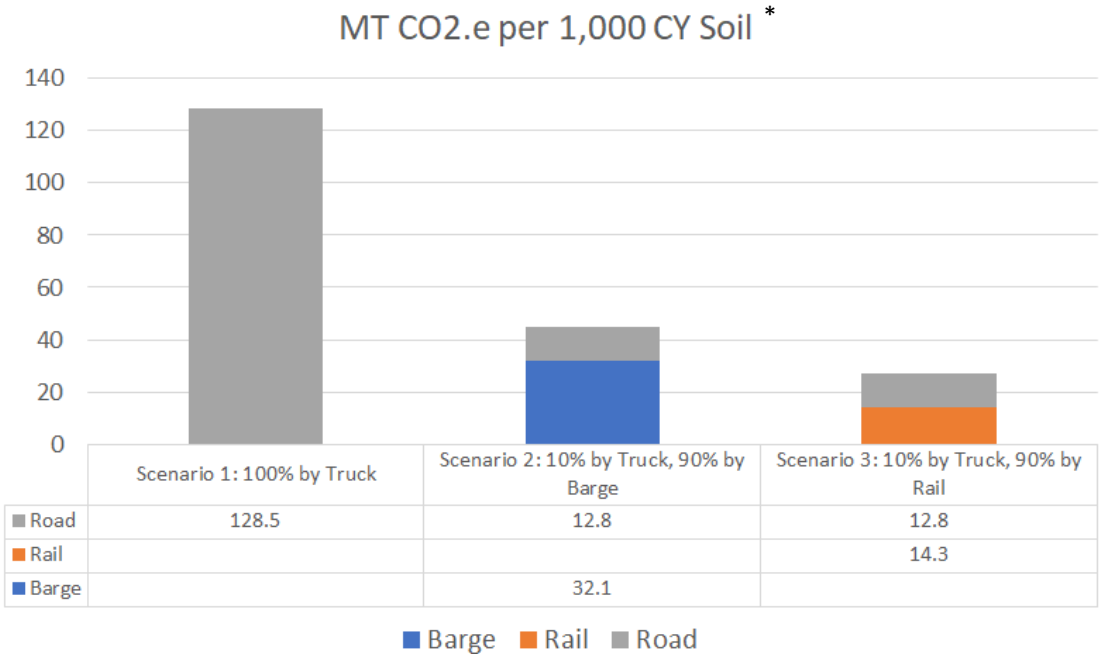
List of Figures

Figure 2. Qualitative Evaluation of CO2 Quantities for Various Transportation and Disposal Modalities

Figure 3. Soil Treatment/Disposal/Reuse Decision Tree

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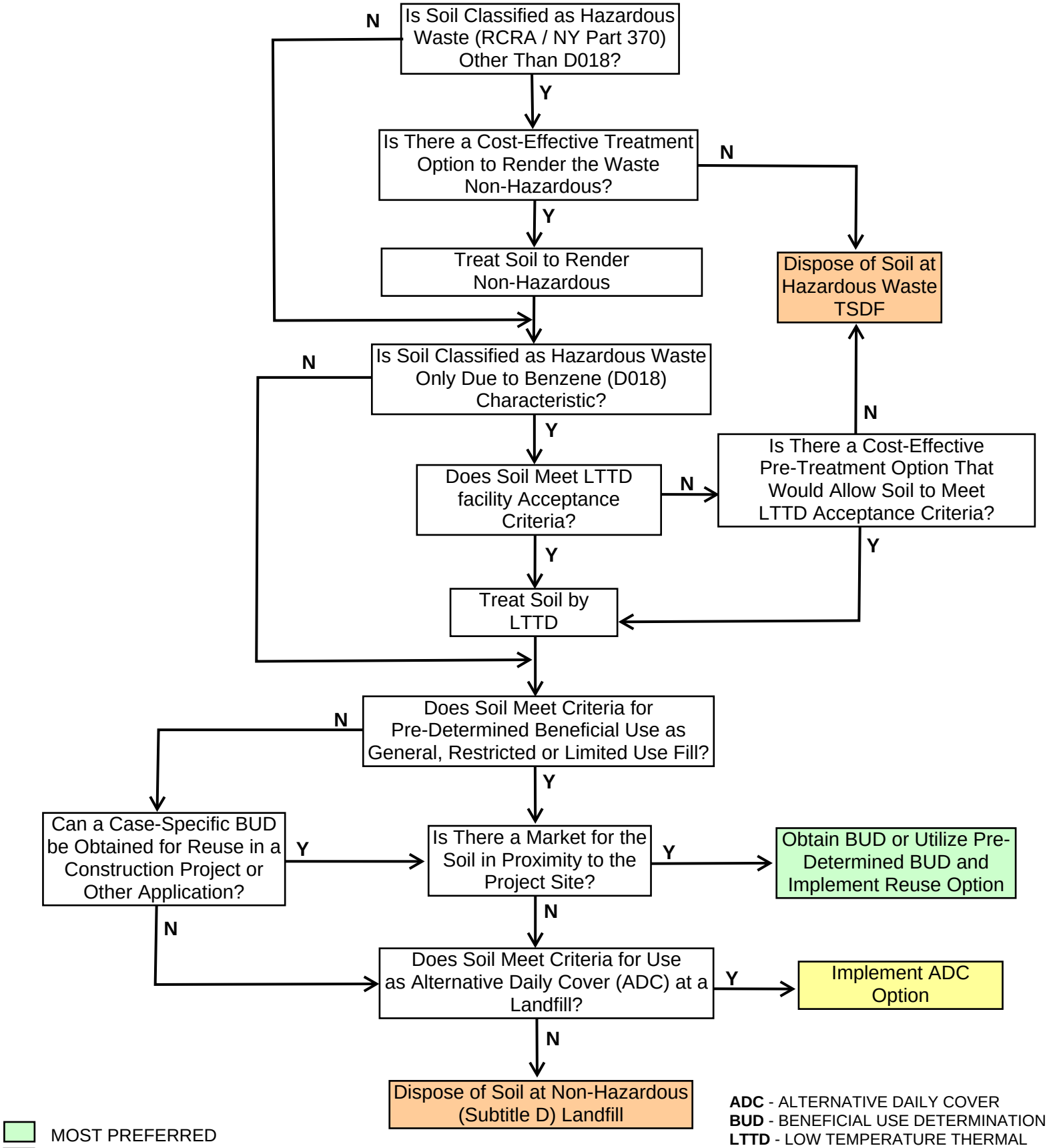
FIGURE 2: QUALITATIVE EVALUATION OF CO2 QUANTITIES FOR VARIOUS TRANSPORTATION AND DISPOSAL MODALITIES



	Scenario 1: 100% by Truck	Scenario 2: 10% by Truck, 90% by Barge	Scenario 3: 10% by Truck, 90% by Rail
Road	128.5	12.8	12.8
Rail			14.3
Barge		32.1	

* % is based on distance covered by each mode as a fraction of the total journey.

FIGURE 3
SOIL TREATMENT / DISPOSAL / REUSE DECISION TREE



MOST PREFERRED
PREFERRED TO LANDFILL DISPOSAL
LEAST PREFERRED

ADC - ALTERNATIVE DAILY COVER
BUD - BENEFICIAL USE DETERMINATION
LTTD - LOW TEMPERATURE THERMAL DESORBTION
TSDF - TREATMENT, STORAGE, OR DISPOSAL FACILITY

List of Tables

Table 1. Green Remediation Practices and Touchstone Technologies

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Table 1. Green Remediation Practices and Touchstone Approaches

EPA Region 2 Clean & Green Policy	Recommendation Detail	Metrics / Site Specific Approach	Other Relevant Guidance	Reference to Specifications
Overall Goals	Protect human health and the environment by achieving remedial action goals		DER-4 - Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment DER-31 - Green Remediation	01 11 00 Summary of Work 01 41 00 - Regulatory Requirements 01 41 11 - Envision Requirements 01 41 12 - Green Remediation Requirements (Details provided below)
	Support human and ecological use and reuse of remediated land		NYC Local Law No. 31 of 2016 – Low Energy Intensity Building Requirements NYC Local Law No. 32 of 2016 – Green Building Standards NYC Local Law No. 32 of 2018 – ASHRAE Updates DEP SOP 055 – Climate Risk Assessment and Adaptation Plan	
	Minimize impacts to water quality and water resources		DEP SOP 054 – Stormwater Runoff Reduction Report	
	Reduce air emissions and greenhouse gas production		DEP SOP 053 – Energy Conservation and GHG Reduction Plan Requirements Envison V3 CR1.3 Reduce Air Pollutant Emissions	
	Minimize material use and waste production		DEP SOP 056 – Recycled and Regional Content for New Materials DEP SOP 057 – Construction Waste Estimate Report Envision V3 RA1.4 Reduce Construction Waste	
	Conserve natural resources and energy		DEP SOP 053 – Energy Conservation and GHG Reduction Plan Requirements	
Touchstone Approach	Use of 100% of electricity from renewable sources	Source and cost of purchased electricity	DEP SOP 053 – Energy Conservation and GHG Reduction Plan Requirements Envision V3 RA2.2 Reduce Construction Energy Consumption	01 51 12 - Temporary Heat and Ventilation 01 51 30 - Temporary Electrical System
Preferred Practice	100% use of renewable energy, and energy conservation and efficiency approaches	Source and cost of purchased electricity+F14 Quantity and type of fuels used on-site during construction EnergyStar® equipment	NYC Local Law 6 of 2016 – Geothermal Analysis NYC Local Law 24 of 2016 – Photovoltaic Analysis Envision V3 RA2.2 Reduce Construction Energy Consumption	01 51 30 - Temporary Electrical System 01 52 10 - Temporary Field Office Trailers 01 52 40 - Field Office Equipment and Supplies
Touchstone Approach	Clean diesel fuels and technologies	Vehicle retrofit information Source and quantity of purchased diesel fuel and diesel fuel substitutes	DEP SOP 053 – Energy Conservation and GHG Reduction Plan Requirements Envison V3 CR1.3 Reduce Air Pollutant Emissions NYC Local Law 77 of 2003 – Use of Ultra Low Sulfur Diesel Fuel by Nonroad Vehicles / Construction Vehicle Emissions	01 14 00 - Work Restrictions
Preferred Practice	Cleaner fuels and clean diesel technologies and strategies	Vehicle retrofit information Source and quantity of purchased diesel fuel and diesel fuel substitutes Emissions limitations for fuel used in construction vehicles, and procure green vehicles	DEP SOP 053 – Energy Conservation and GHG Reduction Plan Requirements Envison V3 CR1.3 Reduce Air Pollutant Emissions NYC Local Law 77 of 2003 – Use of Ultra Low Sulfur Diesel Fuel by Nonroad Vehicles / Construction Vehicle Emissions	01 14 00 - Work Restrictions

Table 1. Green Remediation Practices and Touchstone Approaches

EPA Region 2 Clean & Green Policy	Recommendation Detail	Metrics / Site Specific Approach	Other Relevant Guidance	Reference to Specifications
Touchstone Approach	Material reuse, reduction, or recycling	Meet project waste reduction goal of 90 percent diversion of non-hazardous waste from landfills excluding soils. Effective recycling/reuse program. Source a minimum percentage volume or weight of construction materials from recycled sources per the Recycled Material Content Memorandum. Recycled material comprises recycled, reused, and renewable materials, including existing structures and materials onsite. Valuable, recyclable material includes, and is not limited to, brick, concrete, cardboard, metals, wood, glass, plastics, soil/dirt, rocks and stones, sheetrock, and ceramics. Use of local facilities to recycle metal, concrete, soil. Locally recycle all steel and concrete construction waste, and to reuse soil onsite where possible. Provide storage and collection of recyclables from the construction trailers and construction activities. Use of construction and demolition methods and processes to ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.	DEP SOP 056 – Recycled and Regional Content for New Materials DEP SOP 057 – Construction Waste Estimate Report Envision V3 RA1.4 Reduce Construction Waste	01 71 50 - General Constrcution Requirements 01 74 20 - Construction Waste Management 02 71 00 - Construction Water Treatment System 02 41 10 - Demolition and Removals 31 05 19 - Geosynthetics for Earthwork 31 10 10 - Site Clearing 31 23 16 - Excavation 31 23 23 - Fill 31 32 36 - Jet Grouting 31 56 24 - Structural Concrete Slurry Wall 31 63 16 - Auger Cast Grout Piles
Preferred Practice	Recycling applications for materials generated at or removed from the Site	When encountered as part of the Work, construction waste will be disposed of by recycling methods in accordance with the NYC Recycling Law: Local Law 19 (1989) and Local Law 87 (1992), and NYC's Commercial Recycling Regulations: Rules Governing the Recycling of Private Carter-Collected Waste (September 1993). Under these laws and rules, waste materials to be recycled shall include concrete, metals, and rock. In addition, recycling of cardboard, clean dimensional wood (scrap wood, pallets, etc.), green wood (stumps and tree parts), asphalt, brick, concrete, concrete block, metals, steels, glass, roofing, fencing, mercury containing light bulbs, recyclable office wastes, paints, and solvents will be completed as applicable. All material to be recycled will be separated from normal refuse, per NYCDOS Rules. Material not required to be recycled will be disposed of by the Contractor as specified and in accordance with all applicable federal, state, and local regulations and DEP EHS Policies and Procedures. For each waste stream: * Quantity of material generated * Quantity of material reused onsite * Quantity of material reused offsite * Quantity of material recycled offsite * Quantity of material disposed of traditionally / landfilled	DEP SOP 056 – Recycled and Regional Content for New Materials DEP SOP 057 – Construction Waste Estimate Report Envision V3 RA1.4 Reduce Construction Waste NYC Local Law No. 71 of 2011 – Reclaimed Asphalt and Pavement	01 71 50 - General Construction Requirements 01 74 20 - Construction Waste Management 02 71 00 - Construction Water Treatment System 02 41 10 - Demolition and Removals 31 05 19 - Geosynthetics for Earthwork 31 10 10 - Site Clearing 31 23 16 - Excavation 31 23 23 - Fill 31 32 36 - Jet Grouting 31 56 24 - Structural Concrete Slurry Wall 31 63 16 - Auger Cast Grout Piles
Preferred Practice	Environmentally preferable purchasing	Distance material travels from manufacturer to site Distance material travels from supplier to site Summary of steps taken to reduce packaging	DEP SOP 056 – Recycled and Regional Content for New Materials Envision V3 RA1.1 Support Sustainable Procurement Practices Envision V3 RA1.2 Use Recycled Materials	01 41 11 - Envision Requirements 01 41 12 - Green Remediation Requirements
Touchstone Approach	Use of concrete made with coal combustion products as applicable	Type of byproduct used in concrete, quantity used Overall quantity of concrete required on-site	DEP SOP 056 – Recycled and Regional Content for New Materials Envision V3 RA1.2 Use Recycled Materials	31 32 36 - Jet Grouting 31 56 24 - Structural Concrete Slurry Wall 31 63 16 - Auger Cast Grout Piles

Table 1. Green Remediation Practices and Touchstone Approaches

EPA Region 2 Clean & Green Policy		Recommendation Detail	Metrics / Site Specific Approach	Other Relevant Guidance	Reference to Specifications
Touchstone Approach		Methane capture at landfill sites	Not Applicable	Not Applicable	Not Applicable
Other	Preferred Practice	Sustainable site design		SOP 049 – Sustainability Management SOP 050 – Sustainability Workshop, Preliminary SOP 051 – Sustainability Workshop, Deep Dive SOP 052 – Sustainability Rating Systems (LEED and ENVISION) NYC Local Law No. 1 of 2013 – NYCECC and MWBE	01 41 11 - Envision Requirements 01 41 12 - Green Remediation Requirements
	Preferred Practice	Greenhouse gas emission reduction technologies	Reduction technology equipment cut sheets	RA2.2 Reduce Construction Energy Consumption	01 14 00 - Work Restrictions 01 52 10 - Temporary Field Office Trailers 01 52 40 - Field Office Equipment and Supplies
	Preferred Practice	Water conservation and efficiency approaches	Use low flow fixtures Provide records of potable water consumption (by truck/tote delivery records or Automated Meter Readings) Water conservation technology equipment cut sheets Estimate of water conserved on-site Regenerated GAC for the groundwater treatment system Use alternative sources of water (e.g., treated stormwater and/or groundwater meeting applicable reuse requirements) for dust control to the extent practicable WaterSense Products and Management Practices	NYC Local Law No. 57 of 2010 – Water Efficiency Standards	01 51 11 - Temporary Water and Sanitary Services 01 52 10 - Temporary Field Office Trailers 02 71 00 - Construction Water Treatment System 31 23 19 - Dewatering
	Preferred Practice	Stormwater management	Minimize erosion and sediment runoff Demonstrate all stormwater managed appropriately and in accorsance with stormwater pollution prevention plan	DEP SOP 054 – Stormwater Runoff Reduction Report NYC Local Law No. 97 of 2017 – Water Pollution Control including Stormwater	31 56 24 - Structural Concrete Slurry wall 31 25 10 - Dust, Soil Erosion and Sedimentation Control
	Preferred Practice	Use of rail lines as applicable	Transit type and distance for major purchases and equipment delivery, waste disposal		02 41 10 - Demolition and Removals 31 23 16 - Excavation

Notes:

%	Percent
CP	Cleanup Program
DER	Division of Environmental Remediation
EHS	Environment, Health, and Safety
EPA	Environmental Protection Agency
GAC	Granular Activated Carbon
GHG	Greenhouse Gas
GRP	Green remediation plan
LEED	Leadership in Energy and Environmental Design
NYCDEP	New York City Department of Environmental Protection
NYCDOS	New York City Department of Sanitation
NYSDEC	New York State Department of Environmental Conservation
SDS	Standard Design Specification
SOP	Standard Operating Procedure
SPEC	Specification
SWPP	Stormwater Pollution Prevention Plan