Table 4-1
Applicable, Relevant or Appropriate Requirements (ARARs)
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Geosyntec Consultants

ARAR Type	Requirement	Status	Summary of Requirement
Action-Specific	New Jersey Air Pollution Control Rules (N.J.A.C 7:27)	Potentially Applicable- to remedial activities generating certain air emissions	Establishes standards for the emissions of contaminants into [the ambient atmosphere] air.
Action-Specific	Clean Air Act (42 U.S.C subsections 7401 et seq)	Potentially Applicable- to remedial activities generating certain air emissions	Establishes standards for the emissions of contaminants into [the ambient atmosphere] air.
Action-Specific	Occupation Safety and Health Standards and Safety and Health Regulations for Construction (29 CFR 1910 and 1926)	Relevant and Appropriate – to remedy construction	Establishes occupational safety and health standards.
Action-Specific	Guide to Management of Investigation-Derived Wastes (OSWER Publication 9345.3-03FS)	To Be Considered	Present regulatory background and options for managing investigation-derived waste at Superfund sites.
Action-Specific	New Jersey Field Sampling Procedures Manual, Appendix 6.1, New Jersey Well Standards	To Be Considered	Establishes standards for the construction, maintenance, and sampling of monitoring wells.
Action-Specific	New Jersey Noise Control Rules (N.J.A.C 7:29).	Relevant and Appropriate	Prohibits the generation of certain types of noise at specific times and establishes methods to determine compliance.
Action-Specific	New Jersey Brownfield and Contaminated Site Remediation Act (N.J.S.A. 58:1B-1 et seq.)	Applicable	Enabling legislation for development of remediation standards necessary to protect public health and safety and the environment from discharged hazardous substances and for mandating cleanup of contaminated sites.
Action-Specific	New Jersey Technical Requirements for Site Remediation (N.J.A.C 7:26E)	Applicable	Establishes the technical requirements for the remediation of contaminated sites.
Action-Specific	Administrative Requirements for the Remediation of Contaminated Sites (N.J.A.C 7:26C)	Applicable	Requirements related to New Jersey's site remediation process.
Action-Specific	Green Remediation: Incorporating Sustainable Environmental Practices in Remediation of Contaminated Sites (OSWER Publication EPA 542-R-08-002)	To Be Considered	Outlines the principals of green remediation and describes opportunities to reduce the footprint of cleanup activities throughout the life of a project. Identifies new strategies and alternatives to improve sustainability of cleanup activities, and helps decision-makers balance the alternatives within existing regulatory frameworks.
Action-Specific	RCRA Subtitle D Landfills (40 CFR Parts 239 - 259)	Applicable	These regulations apply to non-hazardous waste landfills, including municipal solid waste landfills
Action-Specific	Additional, Specific Disposal Regulation for Sanitary Landfills (N.J.A.C. 7:26-2A)	Applicable	State regulations that include the requirements for closure and post-closure of sanitary landfills.

Table 4-1
Applicable, Relevant or Appropriate Requirements (ARARs)
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement
Action-Specific	New Jersey Solid Waste Rules (N.J.A.C 7:26)	Applicable	Governs the registration, operation, maintenance, and closure of sanitary landfills, other solid waste facilities, and solid waste transportation operations in the State of New Jersey.
Action-Specific	Presumptive Remedy for CERCLA Municipal Landfills (OSWER Directive No. 9355.0-49F)	To Be Considered	This guidance outlines a streamlined approach to the scoping (planning) stages of the RI/FS in the process of closing municipal landfills under CERCLA, with containment as the presumptive remedy. This directive also provides guidance regarding the appropriate level of detail appropriate for risk assessment of source areas and characterization of hot spots.
Action-Specific	New Jersey Storm Water Management Rules (N.J.A.C 7:8)	Applicable	Establishes stormwater management requirements to prevent contamination of waterways via stormwater discharge.
Action-Specific	New Jersey Water Pollution Control Act Regulations (N.J.A.C 7:14)	Relevant and Appropriate	Prohibits the discharge of any pollutant into the waters of the State without a valid permit.
Action-Specific	New Jersey Pollutant Discharge Elimination System Rules (N.J.A.C 7:14A)	Applicable	Establishes the framework under which NJDEP regulates the discharge of pollutants to the surface and groundwater's of the State.
Action-Specific	New Jersey Department of Transportation (NJDOT) Standard Specifications – Soil Erosion and Sediment Control Measures (1996) (N.J.A.C. 16:25A-2.1 et seq.)	To Be Considered	NJDOT standards are typically used to develop the appropriate plans for sediment and soil erosion control required under New Jersey Soil Conservation Act.
Action-Specific	RCRA Generation, Transportation and Disposal of Hazardous waste (40 CFR 260-270)	Potentially Applicable – to the management of waste streams for off-site disposal	Establishes responsibilities and standards for the management of hazardous and non-hazardous waste.
Action-Specific	49 C.F.R. Hazardous Materials Transportation	Potentially Applicable – to waste streams transported offsite for disposal	Regulates transportation of hazardous materials in the United States under the Department of Transportation (49 CFR).
Action-Specific	New Jersey Hazardous Waste Rules (N.J.A.C 7:26G)	Potentially Applicable – to waste streams transported offsite for disposal	Identifies the standards for the acceptable management of hazardous waste in New Jersey.
Action-Specific	Plant Protection Act (7 U.S.C. Section 2814)	Potentially Applicable - if remedy requires introducing vegetation to any portion of the site	Requires the use of integrated management systems to control or contain undesirable plant species. Applicable to on-site remedial activities to control, eradicate, or prevent or retard the spread of such weeds.
Action-Specific	Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; 50 CFR 10.13)	Applicable	This Act makes it unlawful to "take, capture, kill," or otherwise impact a migratory bird or any nest or egg of a migratory bird.

Table 4-1
Applicable, Relevant or Appropriate Requirements (ARARs)
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement
Action-Specific	NJDEP "Ecological Evaluation Technical Guidance." Version 1.3, February 2015.	To Be Considered	Provides guidance on conducting ecological evaluations and implementing Risk Management Decisions for ecologically sensitive natural resources.
Chemical-Specific	Remediation Standards (N.J.A.C 7:26D; 7:9B; 7:9C) (See Note 1)	Applicable	Establishes the minimum standards for the remediation of soil, groundwater, and surface water.
Chemical-Specific	Federal Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (40 CFR 141.11-.16, and .60-.63)	To Be Considered	Defines the quality criteria for public drinking water supplies.
Chemical-Specific	New Jersey Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (N.J.S.A. 58:12A-1 et seq.)	To Be Considered	Defines the quality criteria for public drinking water supplies.
Chemical-Specific	NJDEP Site Remediation Program, Technical Guidance for the Attainment of Remediation Standards and Site- Specific Criteria September 24, 2012, Version 1.0.	To Be Considered	Guidance on alternate methods to achieve compliance with applicable remediation standards.
Chemical-Specific	EPA Human Health Assessment Cancer Slope Factors (CSFs)	To Be Considered	CSFs are developed by EPA for health effects assessments or evaluation by the Human Health Assessment Group. These values present the most up-to-date cancer risk potency information and are used to compute the individual incremental cancer risk resulting from exposure to carcinogens.
Chemical-Specific	NJDEP "NJDEP Ecological Screening Criteria." March 2009.	To Be Considered	Provides Ecological Screening Criteria to be used as screening values in ecological assessments.
Chemical-Specific	RCRA Groundwater Protection Standards and Maximum Concentration Limits (40 CFR 264, Subpart F)	Applicable	Regulates release from the solid management unit (i.e. the landfill) and specifies the groundwater protection standards.
Chemical-Specific	NJDEP Groundwater Quality Standards (N.J.A.C. 7:9C)	Applicable	Establishes the minimum standards for the remediation of groundwater.
Location-Specific	New Jersey Flood Hazard Area Control (N.J.A.C 7:13)	Applicable	Sets forth the requirements governing activities in the flood hazard area or riparian zone of a regulated water.
Location-Specific	EPA's 1985 "Policy on Floodplains and Wetlands Assessments for CERCLA Actions".	To Be Considered	Requires that CERCLA actions meet the substantive requirements of Floodplain Management Executive Order (EO 11988) and Protection of Wetlands Executive Order (EO 1990).
Location-Specific	Executive Order 11988 Floodplain Management	To Be Considered	Requires federal agencies to avoid to the extent possible long- and short-term adverse impacts associated with the occupancy and modification of flood plains, and avoid support of floodplain development wherever there is a practicable alternative.

Table 4-1
Applicable, Relevant or Appropriate Requirements (ARARs)
Rolling Knolls Landfill Superfund Site - Feasibility Study
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ARAR Type	Requirement	Status	Summary of Requirement
Location-Specific	Establishment of a Classification Exception Area/Well Restriction Area (N.J.A.C. 7:9-6.6)	Applicable	Promulgated state regulations that include requirements for establishing a classification exception area/well restriction area where groundwater quality does not meet New Jersey groundwater quality criteria
Location-Specific	Ground Water Quality and Surface Water Standards (N.J.A.C 7:9).	Applicable	Regulates activities respecting protection and enhancement of ground water and surface water resources.
Location-Specific	Federal Water Pollution Control Act (FWPCA) (33 USC 1521 et seq.)	Applicable	Requires a permit from USACE and consideration by both the EPA and the USFWS before an application to dredge and fill may be enacted.
Location-Specific	New Jersey Freshwater Wetlands Protection Act Rules (N.J.A.C 7:7A)	Applicable	Requires permit for regulated activity disturbing freshwater wetlands.
Location-Specific	Section 404 - Clean Water Act, as it pertains to wetlands	To Be Considered	Prohibits discharge of dredged or fill material into wetlands adjacent to navigable waters without a permit.
Location-Specific	Executive Order 11990 Protection of Wetlands	To Be Considered	Requires federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
Location-Specific	Endangered Species Act (16 USC 1531 et seq.)	Applicable	Requires that action be performed to conserve endangered species or threatened species.
Location-Specific	New Jersey Endangered Plant Species Program (N.J.A.C 7:5C)	Relevant and Appropriate	Identifies the official list of endangered plant species and establishes the program for maintaining and updating the list.
Location-Specific	New Jersey Division of Fish, Game, and Wildlife Rules (N.J.A.C 7:25)	Relevant and Appropriate	Supplements the statutes governing fish and game laws in the State of New Jersey.
Location-Specific	National Wildlife Refuge System Administration Act of 1968, as amended by the National Wildlife Refuge System Improvement Act of 1997	Applicable	This act and amendments governs the use and management of National Wildlife Refuges.
Location-Specific	Final Comprehensive Conservation Plan, Great Swamp National Wildlife Refuge, November 2014	To Be Considered	This plan present the management goals, objectives, and strategies that guide the management of the Great Swamp National Wildlife Refuge over the next 15 years.
Location-Specific	Wilderness Act of 1964 (16 USC 1131-1136)	Applicable	This act directs each agency administering designated wilderness to preserve the "wilderness character" of areas within the National Wilderness Preservation System (NWPS) and to manage the land for the "use and enjoyment of the American people in a way that will leave those areas unimpaired to future use and enjoyment as Wilderness.

Table 4-1
Applicable, Relevant or Appropriate Requirements (ARARs)
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement
Location-Specific	Great Swamp Wilderness Act of 1968 (Public Law 90-532, September 28, 1968)	Applicable	Designates the eastern portion of the refuge, comprised of 3,660 acres, as the Wilderness Area.
Location-Specific	Refuge Recreation Act of 1962 (16 USC 460K-460K-4)	Applicable	Assures present or future recreational uses by the public on areas within national wildlife refuges.
Location-Specific	Floodplain Management and Wetlands Protection (40 CFR 6.302(a) and (b); 40 CFR 6, Appendix A)	Applicable	Requires agencies to perform certain measures to avoid the long and short term impacts associated with the destruction or modification of wetlands and floodplains.
Location-Specific	Federal Noxious Weed Act of 1974 (PL 93-629; 7 USC 2801, et seq)	Applicable	Requires the use of integrated management systems to control or contain undesirable plant species.
Location-Specific	Executive Order 13112. Management of Invasive Species	To Be Considered	Requires that federal agencies take certain actions to prevent introduction of invasive species and provide for their control.
Location-Specific	Fish and Wildlife Coordination Act (16 USC 661 - 667e)	Applicable	Requires actions to protect fish or wildlife when diverting, channeling, or modifying a stream.
Location-Specific	Fish and Wildlife Coordination Act Advisories.	To Be Considered	Advisories on the effects of pollutants and other activities on wildlife, including migratory birds and fish, and wildlife habitat authorized under the Fish and Wildlife Coordination Act.

Notes:
1. As described in a letter from Walter Mugdan of USEPA to Irene Kropp of NJDEP, dated 12 May 2010, New Jersey's Soil Remediation Standards (SRS, including both the residential and non-residential scenarios) for direct contact (i.e., ingestion/dermal exposure) are potential ARARs, but will not be considered as ARARs if those standards are not generally applicable, but rather, can change on a site-by-site basis (USEPA, 2010).

Table 4-2
Potential Preliminary Remediation Goals for Soil in the Landfill
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Chemical Name	CAS Number	NJDEP Non-Residential Direct Contact Soil Remediation Standards (mg/kg)	ARS (mg/kg)	Federal Remediation Guideline - Residential (mg/kg)	Federal Remediation Guideline - Non-Residential (mg/kg)
1,1-Biphenyl	92-52-4	240			
1,1-dichloroethane	75-34-3	24			
1,2,4-trichlorobenzene	120-82-1	820			
1,2-dichlorobenzene	95-50-1	59000			
1,2-dichloroethane	107-06-2	3			
1,3-dichlorobenzene	541-73-1	59000			
1,4-dichlorobenzene	106-46-7	13			
2,4-dimethylphenol	105-67-9	14000			
2,4-dinitrophenol	51-28-5	1400			
2,4-Dinitrotoluene	121-14-2	3			
2-methylnaphthalene	91-57-6	2400			
2-methylphenol	95-48-7	3400			
4,4-DDD	72-54-8	13			
4,4-DDE	72-55-9	9			
4,4-DDT	50-29-3	8			
4-methylphenol	106-44-5	340			
a-BHC	319-84-6	0.5			
Acenaphthene	83-32-9	37000			
Acenaphthylene	208-96-8	300000			
Acetophenone	98-86-2	5	13		
Aldrin	309-00-2	0.2	0.7		
Anthracene	120-12-7	30000			
Antimony	7440-36-0	450	830		
Arsenic	7440-38-2	19	19		
Barium	7440-39-3	59000			
b-BHC	319-85-7	2			
Benzo(a)anthracene	56-55-3	17	87		
Benzaldehyde	100-52-7	68000			
Benzene	71-43-2	5			
Benzo(a)pyrene	50-32-8	2	9		
Benzo(b)fluoranthene	205-99-2	17	87		
Benzo(g,h,i)perylene	191-24-2	30000			

Table 4-2
Potential Preliminary Remediation Goals for Soil in the Landfill
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Chemical Name	CAS Number	NJDEP Non-Residential Direct Contact Soil Remediation Standards (mg/kg)	ARS (mg/kg)	Federal Remediation Guideline - Residential (mg/kg)	Federal Remediation Guideline - Non-Residential (mg/kg)
Benzo(k)fluoranthene	207-08-9	170			
Beryllium	7440-41-7	140			
Bis(2-chloroethyl)ether	111-44-4	2			
Bis(2-ethylhexyl)phthalate	117-81-7	140	670		
Butyl benzyl phthalate	85-68-7	14000			
Cadmium	7440-43-9	78			
Caprolactam	105-60-2	340000			
Carbazole	86-74-8	96			
Carbon disulfide	75-15-0	110000			
Carbon tetrachloride	56-23-5	4	24		
Chlordane (cis)	5103-71-9	1	5		
Chlordane (trans)	5103-74-2	1	5		
Chlorobenzene	108-90-7	7400			
Chlorodibromomethane	124-48-1	8			
Chloroform	67-66-3	2	10		
Chrysene	218-01-9	1700			
cis-1,2-dichloroethene	156-59-2	560			
Cobalt	7440-48-4	590			
Copper	7440-50-8	45000	83000		
Cyanide Total	57-12-5	680			
Dibenz(a,h)anthracene	53-70-3	2	9		
Dichlorodifluoromethane	75-71-8	230000			
Dichloromethane	75-09-2	230			
Dieldrin	60-57-1	0.2	0.8		
Diethylphthalate	84-66-2	550000			
Di-n-butyl phthalate	84-74-2	68000			
Di-n-octyl phthalate	117-84-0	27000			
Endosulfan I	959-98-8	6800			
Endosulfan I and II	115-29-7	6800			
Endosulfan II	33213-65-9	6800			
Endosulfan sulfate	1031-07-8	6800			
Endrin	72-20-8	340			

Table 4-2
Potential Preliminary Remediation Goals for Soil in the Landfill
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Chemical Name	CAS Number	NJDEP Non-Residential Direct Contact Soil Remediation Standards (mg/kg)	ARS (mg/kg)	Federal Remediation Guideline - Residential (mg/kg)	Federal Remediation Guideline - Non-Residential (mg/kg)
Ethylbenzene	100-41-4	110000			
Fluoranthene	206-44-0	24000			
Fluorene	86-73-7	24000			
g-BHC (Lindane)	58-89-9	2			
Heptachlor	76-44-8	0.7	3		
Heptachlor epoxide	1024-57-3	0.3			
Hexachlorobenzene	118-74-1	1			
Indeno(1,2,3-c,d)pyrene	193-39-5	17			
Isophorone	78-59-1	2000			
Lead	7439-92-1	800	2700	200	800
Manganese	7439-96-5	5900	16000		
Mercury	7439-97-6	65	180		
Methoxychlor	72-43-5	5700			
Methyl Ethyl Ketone	78-93-3	44000			
MTBE	1634-04-4	320			
Naphthalene	91-20-3	17			
Nickel	7440-02-0	23000			
n-Nitrosodiphenylamine	86-30-6	390			
o,p-DDD	53-19-0	13			
o,p'-DDE	3424-82-6	9			
PCBs (Sum of total)	1336-36-3	1	5*		
Pentachlorophenol	87-86-5	3			
Phenanthrene	85-01-8	300000			
Phenol	108-95-2	210000			
Pyrene	129-00-0	18000			
Selenium	7782-49-2	5700			
Silver	7440-22-4	5700			
Styrene	100-42-5	260			
Tetrachloroethene	127-18-4	1500			
Toluene	108-88-3	91000			
Toxaphene	8001-35-2	3			
trans-1,2-dichloroethene	156-60-5	720			

Table 4-2
Potential Preliminary Remediation Goals for Soil in the Landfill
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Chemical Name	CAS Number	NJDEP Non-Residential Direct Contact Soil Remediation Standards (mg/kg)	ARS (mg/kg)	Federal Remediation Guideline - Residential (mg/kg)	Federal Remediation Guideline - Non-Residential (mg/kg)
trans-1,3-dichloropropene	542-75-6	7			
Trichloroethene	79-01-6	10			
Trichlorofluoromethane	75-69-4	340000			
Vanadium	7440-62-2	1100	2100		
Vinyl chloride	75-01-4	2			
Xylene Total	1330-20-7	170000			
Zinc	7440-66-6	110000			

Notes:
* - The risk-based concentration (RBC) for PCBs is 10 mg/kg, however since the Alternate Remediation Standard is lower than the RBC, the ARS was selected as the PRG.
ARS - Alternate Remediation Standard
PRG - Preliminary Remediation Goal
CAS - Chemical Abstracts Service
NJDEP - New Jersey Department of Environmental Protection
mg/kg - milligrams per kilogram

Table 4-3
Preliminary Remediation Goals for Soil in the Landfill
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Chemical Name	CAS Number	PRG (mg/kg)
Acetophenone	98-86-2	13
Aldrin	309-00-2	0.7
Antimony	7440-36-0	830
Arsenic	7440-38-2	19
Benzo(a)anthracene	56-55-3	87
Benzo(a)pyrene	50-32-8	9
Benzo(b)fluoranthene	205-99-2	87
Bis(2-ethylhexyl)phthalate	117-81-7	670
Cadmium	7440-43-9	78
Carbon tetrachloride	56-23-5	24
Chlordane (cis)	5103-71-9	5
Chlordane (trans)	5103-74-2	5
Chloroform	67-66-3	10
Copper	7440-50-8	83000
Dibenz(a,h)anthracene	53-70-3	9
Dieldrin	60-57-1	0.8
Heptachlor	76-44-8	3
Heptachlor epoxide	1024-57-3	0.3
Lead	7439-92-1	2700
Manganese	7439-96-5	16000
Mercury	7439-97-6	180
PCBs (Sum of total)	1336-36-3	5*
Vanadium	7440-62-2	2100

Notes:
* - The risk-based concentration (RBC) for PCBs is 10 mg/kg, however since the Alternate Remediation Standard (ARS) is lower than the RBC, the ARS was selected as the Preliminary Remediation Goal (PRG).
CAS - Chemical Abstracts Service
mg/kg - milligrams per kilogram

Table 4-4

Potential Preliminary Remediation Goals for Soil in the Baseball Field

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Chemical Name	CAS Number	NJDEP Residential Direct Contact Soil Remediation Standards (mg/kg)	ARS (mg/kg)	Federal Remediation Guideline - Residential (mg/kg)
2,4-DDT	789-02-6	NS		
2-methylnaphthalene	91-57-6	230		
4,4-DDE	72-55-9	2		
4,4-DDT	50-29-3	2		
Acenaphthene	83-32-9	3400		
Anthracene	120-12-7	17000		
Arsenic	7440-38-2	19		
Barium	7440-39-3	16000		
Benz(a)anthracene	56-55-3	5		
Benzo(a) pyrene	50-32-8	0.5	1	
Benzo(b)fluoranthene	205-99-2	5		
Benzo(g,h,i)perylene	191-24-2	380000		
Benzo(k)fluoranthene	207-08-9	45		
Beryllium	7440-41-7	16		
Butyl benzyl phthalate	85-68-7	1200		
Cadmium	7440-43-9	78		
Carbazole	86-74-8	24		
Chrysene	218-01-9	450		
Cobalt	7440-48-4	1600		
Copper	7440-50-8	3100		
Cyanide Total	57-12-5	47		
Di-n-octyl phthalate	117-84-0	2400		
Endosulfan sulfate	1031-07-8	470		
Fluoranthene	206-44-0	2300		
Fluorene	86-73-7	2300		
Heptachlor epoxide	1024-57-3	0.07		
Indeno(1,2,3-c,d)pyrene	193-39-5	5		

Table 4-4
Potential Preliminary Remediation Goals for Soil in the Baseball Field
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Chemical Name	CAS Number	NJDEP Residential Direct Contact Soil Remediation Standards (mg/kg)	ARS (mg/kg)	Federal Remediation Guideline - Residential (mg/kg)
Lead	7439-92-1	400		200
Manganese	7439-96-5	11000		
Mercury	7439-97-6	23		
Naphthalene	91-20-3	6		
Nickel	7440-02-0	1600		
Pentachlorophenol	87-86-5	0.9		
Pyrene	129-00-0	1700		
Silver	7440-22-4	390		
Vanadium	7440-62-2	78		
Xylene Total	1330-20-7	12000		
Zinc	7440-66-6	23000		

Notes:
ARS - Alternate Remediation Standard
NS - No Standard
CAS - Chemical Abstracts Service
NJDEP - New Jersey Department of Environmental Protection
mg/kg - milligrams per kilogram

Table 4-5

Preliminary Remediation Goals for Soil in the Baseball Field

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Chemical Name	CAS Number	PRG (mg/kg)
Benzo(a) pyrene	50-32-8	1

Notes:

PRG - Preliminary Remediation Goal

CAS - Chemical Abstracts Service

mg/kg - milligrams per kilogram

Table 4-6

Potential Preliminary Remediation Goals for Soil in the Shooting Range

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Chemical Name	CAS Number	NJDEP Residential Direct Contact Soil Remediation Standards (mg/kg)	ARS (mg/kg)	Federal Remediation Guideline - Residential (mg/kg)
2-methylnaphthalene	91-57-6	230		
Acenaphthene	83-32-9	3400		
Anthracene	120-12-7	17000		
Antimony	7440-36-0	31		
Arsenic	7440-38-2	19		
Barium	7440-39-3	16000		
Benz(a)anthracene	56-55-3	5		
Benzo(a) pyrene	50-32-8	0.5	1	
Benzo(b)fluoranthene	205-99-2	5		
Benzo(g,h,i)perylene	191-24-2	380000		
Benzo(k)fluoranthene	207-08-9	45		
Beryllium	7440-41-7	16		
Cadmium	7440-43-9	78		
Chrysene	218-01-9	450		
Cobalt	7440-48-4	1600		
Copper	7440-50-8	3100		
Cyanide Total	57-12-5	47		
Fluoranthene	206-44-0	2300		
Indeno(1,2,3-c,d)pyrene	193-39-5	5		
Lead	7439-92-1	400		200
Manganese	7439-96-5	11000		
Mercury	7439-97-6	23		
Naphthalene	91-20-3	6		
Nickel	7440-02-0	1600		
n-Nitrosodiphenylamine	86-30-6	99		

Table 4-6

Potential Preliminary Remediation Goals for Soil in the Shooting Range

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Chemical Name	CAS Number	NJDEP Residential Direct Contact Soil Remediation Standards (mg/kg)	ARS (mg/kg)	Federal Remediation Guideline - Residential (mg/kg)
Pyrene	129-00-0	1700		
Silver	7440-22-4	390		
Vanadium	7440-62-2	78	180	
Zinc	7440-66-6	23000		

Notes:

ARS - Alternate Remediation Standard

CAS - Chemical Abstracts Service

NJDEP - New Jersey Department of Environmental Protection

mg/kg - milligrams per kilogram

Table 4-7

Preliminary Remediation Goals for Soil in the Shooting Range

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Chemical Name	CAS Number	PRG (mg/kg)
Benzo(a) pyrene	50-32-8	1
Vanadium	7440-62-2	180

Notes:

CAS - Chemical Abstracts Service

mg/kg - milligrams per kilogram

Table 4-8

Potential Preliminary Remediation Goals for Groundwater at the Site

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Chemical Name	CAS Number	New Jersey Ground Water Quality Standards (ug/L)
1,1-dichloroethane	75-34-3	50
1,2,4-trichlorobenzene	120-82-1	9
1,2-dibromoethane	106-93-4	0.03
1,2-dichlorobenzene	95-50-1	600
1,3-dichlorobenzene	541-73-1	600
1,4-dichlorobenzene	106-46-7	75
1,4-Dioxane	123-91-1	0.4*
2,4-dimethylphenol	105-67-9	100
2-methylnaphthalene	91-57-6	30*
2-methylphenol	95-48-7	50
4,4-DDE	72-55-9	0.1
4-chloro-3-methylphenol	59-50-7	100*
4-methylphenol	106-44-5	50
a-BHC	319-84-6	0.02
Acenaphthene	83-32-9	400
Acenaphthylene	208-96-8	100*
Acetone	67-64-1	6000
Aldrin	309-00-2	0.04
Aluminum	7429-90-5	200
Anthracene	120-12-7	2000
Antimony	7440-36-0	6
Arsenic	7440-38-2	3
Barium	7440-39-3	6000
b-BHC	319-85-7	0.04
Benz(a)anthracene	56-55-3	0.1
Benzene	71-43-2	1
Benzo(a) pyrene	50-32-8	0.1
Benzo(b)fluoranthene	205-99-2	0.2
Benzo(g,h,i)perylene	191-24-2	100*
Benzo(k)fluoranthene	207-08-9	0.5
Beryllium	7440-41-7	1
Bis(2-ethylhexyl) phthalate	117-81-7	3
Butyl benzyl phthalate	85-68-7	100
Cadmium	7440-43-9	4
Caprolactam	105-60-2	3500*
Carbon disulfide	75-15-0	700
Carbon tetrachloride	56-23-5	1
Chlordane	5103-71-9	0.5
Chlorobenzene	108-90-7	50

Table 4-8

Potential Preliminary Remediation Goals for Groundwater at the Site

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Chemical Name	CAS Number	New Jersey Ground Water Quality Standards (ug/L)
Chloroethane	75-00-3	5*
Chloroform	67-66-3	70
Chromium (III+VI)	7440-47-3	70
Chrysene	218-01-9	5
cis-1,2-dichloroethene	156-59-2	70
Cobalt	7440-48-4	100*
Copper	7440-50-8	1300
Cyanide Total	57-12-5	100
4,4-DDD	72-54-8	0.1
4,4-DDT	50-29-3	0.1
Dibenz(a,h)anthracene	53-70-3	0.3
Dichlorodifluoromethane	75-71-8	1000
Dieldrin	60-57-1	0.03
Diethylphthalate	84-66-2	6000
Di-n-butyl phthalate	84-74-2	700
Di-n-octyl phthalate	117-84-0	100
Endosulfan I	959-98-8	40
Endosulfan I and II	115-29-7	40
Endosulfan II	33213-65-9	40
Endosulfan sulfate	1031-07-8	40
Endrin	72-20-8	2
Ethylbenzene	100-41-4	700
Fluoranthene	206-44-0	300
Fluorene	86-73-7	300
g-BHC (Lindane)	58-89-9	0.03
Heptachlor	76-44-8	0.05
Heptachlor epoxide	1024-57-3	0.2
Indeno(1,2,3-c,d)pyrene	193-39-5	0.2
Iron	7439-89-6	300
Lead	7439-92-1	5
Manganese	7439-96-5	50
Mercury	7439-97-6	2
Methoxychlor	72-43-5	40
Methyl acetate	79-20-9	7000
Methyl Ethyl Ketone	78-93-3	300
MTBE	1634-04-4	70
Naphthalene	91-20-3	300
Nickel	7440-02-0	100
Nitrogen-nitrate and nitrite	BBL-N-Nitrate/Nitrit	10000

Table 4-8

Potential Preliminary Remediation Goals for Groundwater at the Site

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Chemical Name	CAS Number	New Jersey Ground Water Quality Standards (ug/L)
n-Nitrosodiphenylamine	86-30-6	10
PCBs (Sum of total)	1336-36-3	0.5
Pentachlorophenol	87-86-5	0.3
Phenol	108-95-2	2000
Pyrene	129-00-0	200
Selenium	7782-49-2	40
Silver	7440-22-4	40
Sodium	7440-23-5	50000
Sulfate	14808-79-8	250000
Tetrachloroethene	127-18-4	1
Thallium	7440-28-0	2
Toluene	108-88-3	600
Total Dissolved Solids	TDS	500000
trans-1,2-dichloroethene	156-60-5	100
Trichloroethene	79-01-6	1
Trichlorofluoromethane	75-69-4	2000
Vinyl chloride	75-01-4	1
Xylene Total	1330-20-7	1000
Zinc	7440-66-6	2000

Notes:

CAS - Chemical Abstracts Service

ug/L - micrograms per liter

* - An asterisk denotes the standard is an Interim Ground Water Quality Criterion

Table 4-9

Preliminary Remediation Goals for Groundwater at the Site

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Chemical Name	CAS Number	New Jersey Ground Water Quality Standards (ug/L)
1,4-Dioxane	123-91-1	0.4*
Aluminum	7429-90-5	200
Arsenic	7440-38-2	3
Benzene	71-43-2	1
Iron	7439-89-6	300
Lead	7439-92-1	5
Manganese	7439-96-5	50
Sodium	7440-23-5	50000
Thallium	7440-28-0	2
Vinyl chloride	75-01-4	1

Notes:

CAS - Chemical Abstracts Service

ug/L - micrograms per liter

* - An asterisk denotes the standard is an Interim Ground Water Quality Criterion

Table 5-1

Areas of Particular Concern and Contaminants of Concern Driving Remediation

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

APC	COC Driving Remediation	Proposed ARS (mg/kg)	3x Proposed ARS (mg/kg)	COC Concentration (mg/kg)
POI-9	Benzo(a)pyrene	9	27	33
POI-14	Lead	2,700	8,100	9,210
SS-90	PCBs	5	15	29
SS-97	PCBs	5	15	15.7
SS-103	Lead	2,700	8,100	13,800
SS-109/TP-09[1]	Chloroform	10	30	1,900
SS-118	PCBs	5	15	23

Notes:

1 - The analytical data for these locations was collected from SS-109, which is adjacent to test pit TP-09. Industrial wastes were observed within TP-09 and may be a source to groundwater. Therefore, both of these areas will be remediated.

APC - Area of Particular Concern

ARS - Alternate Remediation Standard

COC - Contaminant of Concern

PCBs - Polychlorinated Biphenyls

mg/kg - milligrams per kilogram

Table 6-1

Comparative Analysis of Soil Remedial Alternatives

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Geosyntec Consultants

	Soil Alternatives							
	1	**2**	**3a**	**3b**	**3c**	**4a**	**4b**	**5**
1. Overall Protection of Human Health and the Environment								
Human Health Protection	NA	2	4	4	4	4	4	4
Environmental Protection	NA	1	3	3	3	3	3	2
2. Compliance with ARARs								
Chemical Specific ARARs	NA	1	4	4	4	4	4	4
Location Specific ARARs	NA	4	4	4	4	4	4	4
Action Specific ARARs	NA	4	4	4	4	4	4	4
3. Long-Term Effectiveness and Permanence								
Magnitude of Residual Risk	NA	1	4	4	4	4	4	4
Adequacy and Reliability of Controls	NA	2	4	4	4	4	4	4
4. Reduction of Toxicity, Mobility, and Volume Through Treatment								
Treatment Process used and Materials Treated	NA	1	1	1	1	1	1	1
Amount of Hazardous Materials Destroyed or Treated	NA	1	1	1	1	1	1	1
Degree of Expected Reductions in Toxicity, Mobility or Volume through Treatment	NA	1	4	4	4	4	4	4
Degree to which Treatment is Irreversible	NA	1	1	1	1	1	1	1
Type and Quantity of Residuals Remaining after Treatment	NA	1	1	1	1	1	1	1
Whether the Alternative Would Satisfy the Statutory Preference for Treatment as a Principal Element	NA	1	1	1	1	1	1	1

Table 6-1
Comparative Analysis of Soil Remedial Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

	Soil Alternatives							
	1	**2**	**3a**	**3b**	**3c**	**4a**	**4b**	**5**
5. Short-Term Effectiveness								
Protection of Community During Remedial Actions	NA	4	3	3	3	2	2	1
Protection of Workers During Remedial Actions	NA	4	4	4	4	2	2	3
Environmental Impacts	NA	4	3	3	3	3	3	1
Time Until Remedial Action Objectives are Achieved	NA	1	4	4	4	3	3	2
6. Implementability								
Ability to Construct and Operate the Technology	NA	4	4	4	4	3	3	2
Reliability of the Technology	NA	4	4	4	4	4	4	4
Ease of Undertaking Additional Remedial Actions, if necessary	NA	4	4	4	4	3	3	2
Ability to Monitor Effectiveness of Remedy	NA	4	4	4	4	4	4	4
Ability to Obtain Approvals and Coordinate with Other Agencies	NA	4	4	4	4	4	4	2
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	NA	4	4	4	4	2	2	4
Availability of Necessary Equipment and Specialists	NA	4	4	4	4	4	4	4
Availability of Prospective Technology	NA	4	4	4	4	4	4	4

Table 6-1

Comparative Analysis of Soil Remedial Alternatives

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

Geosyntec Consultants

	Soil Alternatives							
	1	**2**	**3a**	**3b**	**3c**	**4a**	**4b**	**5**
7. Costs								
Indirect Capital Cost (Design/ Construction Oversight/ Permits)	NA	4	3	3	2	2	2	1
Direct Capital Costs	NA	4	3	3	3	1	1	1
Post-Construction Operation, Maintenance, and Monitoring Costs	NA	4	3	3	3	3	3	1
Total Costs	NA	$ 761,000	$ 15,541,000	$ 17,390,000	$ 21,099,000	$ 32,426,000 - $ 55,859,000	$ 34,359,000 - $ 57,792,000	$ 54,261,000
8. State (or Support Agency) Acceptance	TBE	TBE	TBE	TBE	TBE	TBE	TBE	TBE
9. Community Acceptance	TBE	TBE	TBE	TBE	TBE	TBE	TBE	TBE

Notes

1. Alternative Description:
   - Alternative 1 - No Action
   - Alternative 2 - Site Controls
   - Alternative 3a - Site Controls, Capping of Selected Area to Reduce Overall Risk, and Remediation (Consolidation Under Selected Area Cap) of Areas of Particular Concern (APCs), and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals
   - Alternative 3b - Site Controls, Capping of Selected Area to Reduce Overall Risk, and Remediation (Cap In-Place) of APCs, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals
   - Alternative 3c - Site Controls, Capping of Selected Area to Reduce Overall Risk, and Remediation (Offsite Disposal) of APCs and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals
   - Alternative 4a - Site Controls, Excavation and Off-Site Disposal of Selected Area to Reduce Overall Risk, Remediation (Cap In-Place) of APCs, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals
   - Alternative 4b - Site Controls, Excavation and Off-Site Disposal of Selected Area to Reduce Overall Risk, Remediation (Offsite Disposal) of APCs, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals
   - Alternative 5 - Site Controls and Capping of All Landfill Material
2. TBE - To be evaluated. The findings from the detailed analysis of the State (or support agency) acceptance and Community acceptance criteria will be presented in ROD once USEPA completes their review of and provides comments on the final FS report.
3. Comparative analysis grading description: 1 - Poor, 2 - Moderate, 3 - Good, and 4 - Excellent
4. NA - Not applicable.

Table 6-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements for Soil Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Soil Remedy Alternatives							
				1	2	3a	3b	3c	4a	4b	5
Action-Specific	New Jersey Air Pollution Control Rules (N.J.A.C 7:27)	Potentially Applicable- to remedial activities generating certain air emissions	Establishes standards for the emissions of contaminants into [the ambient atmosphere] air.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	Clean Air Act (42 U.S.C subsections 7401 et seq)	Potentially Applicable- to remedial activities generating certain air emissions	Establishes standards for the emissions of contaminants into [the ambient atmosphere] air.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	Occupation Safety and Health Standards and Safety and Health Regulations for Construction (29 CFR 1910 and 1926)	Relevant and Appropriate – to remedy construction	Establishes occupational safety and health standards.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	Guide to Management of Investigation-Derived Wastes (OSWER Publication 9345.3-03FS)	To Be Considered	Present regulatory background and options for managing investigation-derived waste at Superfund sites.	NA	WBCW (No IDW is anticipated but will estabilish as needed during the design phases)	WBCW (No IDW is anticipated but will estabilish as needed during the design phases)	WBCW (No IDW is anticipated but will estabilish as needed during the design phases)	WBCW (No IDW is anticipated but will estabilish as needed during the design phases)	WBCW (No IDW is anticipated but will estabilish as needed during the design phases)	WBCW (No IDW is anticipated but will estabilish as needed during the design phases)	WBCW (No IDW is anticipated but will estabilish as needed during the design phases)
Action-Specific	New Jersey Field Sampling Procedures Manual, Appendix 6.1, New Jersey Well Standards	To Be Considered	Establishes standards for the construction, maintenance, and sampling of monitoring wells.	NA	NA	NA	NA	NA	NA	NA	NA
Action-Specific	New Jersey Noise Control Rules (N.J.A.C 7:29).	Relevant and Appropriate	Prohibits the generation of certain types of noise at specific times and establishes methods to determine compliance.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	New Jersey Brownfield and Contaminated Site Remediation Act (N.J.S.A. 58:1B-1 et seq.)	Applicable	Enabling legislation for development of remediation standards necessary to protect public health and safety and the environment from discharged hazardous substances and for mandating cleanup of contaminated sites.	NA	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	New Jersey Technical Requirements for Site Remediation (N.J.A.C 7:26E)	Applicable	Establishes the technical requirements for the remediation of contaminated sites.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	Administrative Requirements for the Remediation of Contaminated Sites (N.J.A.C 7:26C)	Applicable	Requirements related to New Jersey's site remediation process.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	Green Remediation: Incorporating Sustainable Environmental Practices in Remediation of Contaminated Sites (OSWER Publication EPA 542-R-08-002)	To Be Considered	Outlines the principals of green remediation and describes opportunities to reduce the footprint of cleanup activities throughout the life of a project. Identifies new strategies and alternatives to improve sustainability of cleanup activities, and helps decision-makers balance the alternatives within existing regulatory frameworks.	NA	To be considered in the remedial action design	To be considered in the remedial action design	To be considered in the remedial action design	To be considered in the remedial action design	To be considered in the remedial action design	To be considered in the remedial action design	To be considered in the remedial action design

Table 6-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements for Soil Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Soil Remedy Alternatives							
				1	2	3a	3b	3c	4a	4b	5
Action-Specific	RCRA Subtitle D Landfills (40 CFR Parts 239 - 259)	Applicable	These regulations apply to non-hazardous waste landfills, including municipal solid waste landfills	NA	NA	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	NA	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.
Action-Specific	Additional, Specific Disposal Regulation for Sanitary Landfills (N.J.A.C. 7:26-2A)	To Be Considered	State regulations that include the requirements for closure and post-closure of sanitary landfills.	NA	NA	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	NA	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.
Action-Specific	New Jersey Solid Waste Rules (N.J.A.C 7:26)	To Be Considered	Governs the registration, operation, maintenance, and closure of sanitary landfills, other solid waste facilities, and solid waste transportation operations in the State of New Jersey.	NA	NA	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.	NA	Municipal waste is not the responsibility of the current PRPs and thus not applicable. However, any capping implemented as part of this alternative will comply with this ARAR.
Action-Specific	Presumptive Remedy for CERCLA Municipal Landfills (OSWER Directive No. 9355.0-49F)	To Be Considered	This guidance outlines a streamlined approach to the scoping (planning) stages of the RI/FS in the process of closing municipal landfills under CERCLA, with containment as the presumptive remedy. This directive also provides guidance regarding the appropriate level of detail appropriate for risk assessment of source areas and characterization of hot spots.	NA	To Be Considered	To Be Considered	To Be Considered	To Be Considered	To Be Considered	To Be Considered	To Be Considered
Action-Specific	New Jersey Storm Water Management Rules (N.J.A.C 7:8)	Relevant and Appropriate	Establishes stormwater management requirements to prevent contamination of waterways via stormwater discharge.	NA	WBCW during fence construction	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	New Jersey Water Pollution Control Act Regulations (N.J.A.C 7:14)	Relevant and Appropriate	Prohibits the discharge of any pollutant into the waters of the State without a valid permit.	NA	WBCW during fence construction	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	New Jersey Pollutant Discharge Elimination System Rules (N.J.A.C 7:14A)	Relevant and Appropriate	Establishes the framework under which NJDEP regulates the discharge of pollutants to the surface and groundwater's of the State.	NA	WBCW during fence construction	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	New Jersey Department of Transportation (NJDOT) Standard Specifications – Soil Erosion and Sediment Control Measures (1996) (N.J.A.C. 16:25A-2.1 et seq.)	To Be Considered	NJDOT standards are typically used to develop the appropriate plans for sediment and soil erosion control required under New Jersey Soil Conservation Act.	NA	WBCW during fence construction	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW

Table 6-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements for Soil Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Soil Remedy Alternatives							
				1	2	3a	3b	3c	4a	4b	5
Action-Specific	RCRA Generation, Transportation and Disposal of Hazardous waste (40 CFR 260-270)	Potentially Applicable – to the management of waste streams for off-site disposal	Establishes responsibilities and standards for the management of hazardous and non-hazardous waste.	NA	NA	NA	NA	WBCW	WBCW	WBCW	NA
Action-Specific	49 C.F.R. Hazardous Materials Transportation	Potentially Applicable – to waste streams transported offsite for disposal	Regulates transportation of hazardous materials in the United States under the Department of Transportation (49 CFR).	NA	NA	NA	NA	WBCW	WBCW	WBCW	NA
Action-Specific	New Jersey Hazardous Waste Rules (N.J.A.C 7:26G)	Potentially Applicable – to waste streams transported offsite for disposal	Identifies the standards for the acceptable management of hazardous waste in New Jersey.	NA	NA	NA	NA	WBCW	WBCW	WBCW	NA
Action-Specific	Plant Protection Act (7 U.S.C. Section 2814)	Potentially Applicable - if remedy requires introducing vegetation to any portion of the site	Requires the use of integrated management systems to control or contain undesirable plant species. Applicable to on-site remedial activities to control, eradicate, or prevent or retard the spread of such weeds.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; 50 CFR 10.13)	Applicable	This Act makes it unlawful to “take, capture, kill,” or otherwise impact a migratory bird or any nest or egg of a migratory bird.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Action-Specific	NJDEP “Ecological Evaluation Technical Guidance.” Version 1.3, February 2015.	To Be Considered	Provides guidance on conducting ecological evaluations and implementing Risk Management Decisions for ecologically sensitive natural resources.	NA	Being considered	Being considered	Being considered	Being considered	Being considered	Being considered	Being considered
Chemical-Specific	Remediation Standards (N.J.A.C 7:26D; 7:9B; 7:9C)	Applicable	Establishes the minimum standards for the remediation of soil, groundwater, and surface water.	Does not comply	Does not comply	To be capped and thus WBCW	To be capped and thus WBCW	To be capped or disposed offsite and thus WBCW	To be capped or disposed offsite and thus WBCW	To be disposed offsite and thus WBCW	To be capped and thus WBCW
Chemical-Specific	Federal Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (40 CFR 141.11-.16, and .60-.63)	To Be Considered	Defines the quality criteria for public drinking water supplies.	NA	NA	NA	NA	NA	NA	NA	NA
Chemical-Specific	New Jersey Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (N.J.S.A. 58:12A-1 et seq.)	To Be Considered	Defines the quality criteria for public drinking water supplies.	NA	NA	NA	NA	NA	NA	NA	NA
Chemical-Specific	NJDEP Site Remediation Program, Technical Guidance for the Attainment of Remediation Standards and Site- Specific Criteria September 24, 2012, Version 1.0.	To Be Considered	Guidance on alternate methods to achieve compliance with applicable remediation standards.	Does not comply	Does not comply	To be capped and thus WBCW	To be capped and thus WBCW	To be capped or disposed offsite and thus WBCW	To be capped or disposed offsite and thus WBCW	To be disposed offsite and thus WBCW	To be capped and thus WBCW

Table 6-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements for Soil Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Soil Remedy Alternatives							
				1	2	3a	3b	3c	4a	4b	5
Chemical-Specific	EPA Human Health Assessment Cancer Slope Factors (CSFs)	To Be Considered	CSFs are developed by EPA for health effects assessments or evaluation by the Human Health Assessment Group. These values present the most up-to-date cancer risk potency information and are used to compute the individual incremental cancer risk resulting from exposure to carcinogens.	NA	Being considered	Being considered	Being considered	Being considered	Being considered	Being considered	Being considered
Chemical-Specific	NJDEP "NJDEP Ecological Screening Criteria." March 2009.	To Be Considered	Provides Ecological Screening Criteria to be used as screening values in ecological assessments.	NA	Being considered	Being considered	Being considered	Being considered	Being considered	Being considered	Being considered
Chemical-Specific	RCRA Groundwater Protection Standards and Maximum Concentration Limits (40 CFR 264, Subpart F)	Applicable	Regulates release from the solid management unit (i.e. the landfill) and specifies the groundwater protection standards.	NA	NA	NA	NA	NA	NA	NA	NA
Chemical-Specific	NJDEP Groundwater Quality Standards (N.J.A.C. 7:9C)	Applicable	Establishes the minimum standards for the remediation of groundwater.	NA	NA	NA	NA	NA	NA	NA	NA
Location-Specific	New Jersey Flood Hazard Area Control (N.J.A.C 7:13)	Applicable	Sets forth the requirements governing activities in the flood hazard area or riparian zone of a regulated water.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	EPA's 1985 "Policy on Floodplains and Wetlands Assessments for CERCLA Actions".	To Be Considered	Requires that CERCLA actions meet the substantive requirements of Floodplain Management Executive Order (EO 11988) and Protection of Wetlands Executive Order (EO 1990).	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Executive Order 11988 Floodplain Management	To Be Considered	Requires federal agencies to avoid to the extent possible long- and short-term adverse impacts associated with the occupancy and modification of flood plains, and avoid support of floodplain development wherever there is a practicable alternative.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Establishment of a Classification Exception Area/Well Restriction Area (N.J.A.C. 7:9-6.6)	Applicable	Promulgated state regulations that include requirements for establishing a classification exception area/well restriction area where groundwater quality does not meet New Jersey groundwater quality criteria	NA	NA	NA	NA	NA	NA	NA	NA
Location-Specific	Ground Water Quality and Surface Water Standards (N.J.A.C 7:9).	Applicable	Regulates activities respecting protection and enhancement of ground water and surface water resources.	NA	NA	NA	NA	NA	NA	NA	NA
Location-Specific	Federal Water Pollution Control Act (FWPCA) (33 USC 1521 et seq.)	Applicable	Requires a permit from USACE and consideration by both the EPA and the USFWS before an application to dredge and fill may be enacted.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW

Table 6-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements for Soil Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Soil Remedy Alternatives							
				1	2	3a	3b	3c	4a	4b	5
Location-Specific	New Jersey Freshwater Wetlands Protection Act Rules (N.J.A.C 7:7A)	Applicable	Requires permit for regulated activity disturbing freshwater wetlands.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Section 404 - Clean Water Act, as it pertains to wetlands	To Be Considered	Prohibits discharge of dredged or fill material into wetlands adjacent to navigable waters without a permit.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Executive Order 11990 Protection of Wetlands	To Be Considered	Requires federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Endangered Species Act (16 USC 1531 et seq.)	Applicable	Requires that action be performed to conserve endangered species or threatened species.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	New Jersey Endangered Plant Species Program (N.J.A.C 7:5C)	Relevant and Appropriate	Identifies the official list of endangered plant species and establishes the program for maintaining and updating the list.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	New Jersey Division of Fish, Game, and Wildlife Rules (N.J.A.C 7:25)	Relevant and Appropriate	Supplements the statutes governing fish and game laws in the State of New Jersey.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	National Wildlife Refuge System Administration Act of 1968, as amended by the National Wildlife Refuge System Improvement Act of 1997	Applicable	This act and amendments governs the use and management of National Wildlife Refuges.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Final Comprehensive Conservation Plan, Great Swamp National Wildlife Refuge, November 2014	To Be Considered	This plan present the management goals, objectives, and strategies that guide the management of the Great Swamp National Wildlife Refuge over the next 15 years.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Wilderness Act of 1964 (16 USC 1131-1136)	Applicable	This act directs each agency administering designated wilderness to preserve the "wilderness character" of areas within the Naiton Wilderness Preservation System (NWPS) and to administer the NWPS for the "use and enjoyment of the American people in a way that will leave those areas unimpaired to fure use and enjoyment as Wilderness.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Great Swamp Wilderness Act of 1968 (Public Law 90-532, September 28, 1968)	Applicable	Designates the eastern portion of the refuge, comprised of 3,660 acres, as the Wilderness Area.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Refuge Recreation Act of 1962 (16 USC 460K-460K-4)	Applicable	Assures present or future recreational uses by the public on areas within national wildlife refuges.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Floodplain Management and Wetlands Protection (40 CFR 6.302(a) and (b); 40 CFR 6, Appendix A)	Applicable	Requires agencies to perform certain measures to avoid the long and short term impacts associated with the destruction or modification of wetlands and floodplains.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW

Table 6-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements for Soil Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Soil Remedy Alternatives							
				1	2	3a	3b	3c	4a	4b	5
Location-Specific	Federal Noxious Weed Act of 1974 (PL 93-629; 7 USC 2801, et seq)	Applicable	Requires the use of integrated management systems to control or contain undesirable plant species.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Executive Order 13112. Management of Invasive Species	To Be Considered	Requires that federal agencies take certain actions to prevent introduction of invasive species and provide for their control.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Fish and Wildlife Coordination Act (16 USC 661 et seq	Applicable	Requires actions to protect fish or wildlife when diverting, channeling, or modifying a stream.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW
Location-Specific	Fish and Wildlife Coordination Act Advisories.	To Be Considered	Advisories on the effects of pollutants and other activities on wildlife, including migratory birds and fish, and wildlife habitat authorized under the Fish and Wildlife Coordination Act.	NA	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW	WBCW

Notes

1. Alternative Description:
   - Alternative 1 - No Action
   - Alternative 2 - Site Controls
   - Alternative 3a - Site Controls, Capping of Selected Area to Reduce Overall Risk, and Remediation (Consolidation Under Selected Area Cap) of Areas of Particular Concern (APCs), and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation
   - Alternative 3b - Site Controls, Capping of Selected Area to Reduce Overall Risk, and Remediation (Cap In-Place) of APCs, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals
   - Alternative 3c - Site Controls, Capping of Selected Area to Reduce Overall Risk, and Remediation (Offsite Disposal) of APCs and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals
   - Alternative 4a - Site Controls, Excavation and Off-Site Disposal of Selected Area to Reduce Overall Risk, Remediation (Cap In-Place) of APCs, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals
   - Alternative 4b - Site Controls, Excavation and Off-Site Disposal of Selected Area to Reduce Overall Risk, Remediation (Offsite Disposal) of APCs, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals
   - Alternative 5 - Site Controls and Capping of All Landfill Material
   - Alternative 6 - Site Controls, Excavation and Off-Site Disposal of Developable Area and Areas of Particular Concern
2. WBCW - Will be complied with. Pursuant to the ARAR, applicable standards and regulations will be complied with during remedial design and actions.
3. NA - Not Applicable. The ARAR is not relevant to the alternative remedial actions and therefore not applicable for evaluation of compliance of the alternative to the ARAR.

Table 6-3
Construction Cost Estimate for Soil Alternative No. 2
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Geosyntec Consultants

Component	Unit Cost			Unit	Quantity	Construction Cost Estimate
A - Design/Construction Oversight/Permits						
Pre-Design Investigation	3%	to	4%	% Construction[(2)]	408,400	$ 14,300
Remedial Design	3%	to	6%	% Construction[(2)]	408,400	$ 18,400
Remedial Oversight	5%	to	10%	% Construction[(2)]	408,400	$ 30,700
Subtotal						$ 63,400
B - Construction Preparation						
Bonding, insurance etc.	0.10%	to	0.20%	% Construction[(2)]	408,400	$ 700
Mobilization/Demobilization	1%	to	5%	% Construction[(2)]	408,400	$ 12,300
Subtotal						$ 13,000
C - General Construction and Site Management						
Site management and facilities	$ 5,000	to	$ 20,000	per mth	6	$ 75,000
Survey (topo , wetlands, etc.)			$ 2,500	day	5	$ 12,500
Britten Road entrance repairs	$ 5.5	to	$ 6.5	sft	10,000	$ 60,000
Construction entrance	$ 5,000	to	$ 10,000	est.	1	$ 7,500
Traffic management (assumed half of construction period)	$ 2,000	to	$ 10,000	per mth	3	$ 18,000
Structural BMP (bog turtle)	$ 20,000	to	$ 40,000	est.	1	$ 30,000
Subtotal						$ 203,000
D - Site Controls (physical)						
7-ft high perimeter fence			$ 30	per lin ft	6,500	$ 195,000
20-ft wide double access gates			$ 4,000	each	2	$ 8,000
3-ft wide man gates			$ 800	each	3	$ 2,400
Subtotal						$ 205,400
E - Site Controls (administrative)						
Institutional controls			$ 10,000	est.	1	$ 10,000
Reporting to EPA			$ 4,000	every 5-yrs	6	$ 24,000
Reporting to NJ			$ 4,000	every 2-yrs	15	$ 60,000
Subtotal						$ 94,000

Table 6-3
Construction Cost Estimate for Soil Alternative No. 2
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Unit Cost	Unit	Quantity	Construction Cost Estimate
F - Post-Remedy Operation & Maintenance (O&M)				
Fence O&M	$ 2,100 to $ 6,200	annual	30	$ 182,200
Sampling groundwater network	$ 50,000 to $ 100,000	annual	30	-
Subtotal				$ 182,200
TOTAL				$ 761,000

Notes:

(1) See Table 6-4 for cost estimate assumptions, notes, and limitations.

(2) Construction cost to estimate these items include the costs of Items C and D.

Table 6-4
Cost Estimate Assumptions, Notes, and Limitations for Soil
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Assumptions, Notes, and Limitations
1. **Estimated Quantities** In many cases the areas or volumes have been assumed or obtained from reports prepared by others. The estimated quantities (e.g., length, areas, or volumes) that have been used in the development of the cost estimates should be verified before construction. It is assumed that the work will be done in Level D personnel protective equipment (PPE) and by non-union labor.
2. **Unit Costs** The estimated unit costs are based on Geosyntec's experience and published information such as RSMeans. The costs that have been developed should be considered only as a relative guide. A range of unit costs have been applied to items with high variability.
3. **Areas of Particular Concern (APCs)** APCs are generally defined as areas with soil concentrations greater than 3 times the remedial goal and include POI-09, POI-14, SS-109 (i.e., TP-09), SS-90, SS-97, SS-103, and SS-118. One acre of soil remedy was assumed for each APC.
4. **Capping** A Resource Conservation and Recovery Act (RCRA) Subtitle D landfill capping system was assumed for the capping system as residential future use is not anticipated. However, the goal of capping in Alternatives 3, 4, and 5 is to protect human and ecological receptors and attainment of this goal may not require a Subtitle D-compliant capping system; the final cap design will be prepared during the remedial design phase. In some areas, the limits of cap are expected to extend into open water. In such cases, the cap in these areas will need to be terminated in water to limit contact between waste and water. These areas are expected to include waste relocation edges, existing ponds adjacent to waste, and portions of the landfill perimeter within wetlands. It is assumed a cap would be installed and terminated in an anchor trench at the toe of the excavation. The purpose of the anchor trench is to prevent horizontal migration of constituents in the landfill to the adjacent open water. Placement of geomembrane caps may be difficult in saturated conditions (i.e., cost per acre would be expected to increase). In those areas, it was assumed that the cap would be extended into an 'enhanced' anchor trench. As part of this cost estimate, an anchor trench has been included around the portions of the landfill (e.g., ponds, open water, etc.). It was assumed that the slope above the anchor trench around the perimeter (fringe area) is expected to require additional work as part of the wetland wildlife habitat mitigation strategy. The transition along the cap fringe area is expected to include a riparian zone with a transition zone to open water. Within this transition area, it was assumed that the Agencies will require additional features to be
5. **On-Site Soil Reuse** Based on cost evaluations, on-site soil reuse is less cost effective than imported soils because on-site soil may require soil dewatering and wetland impact mitigation, which likely results in importing the same amount of offsite soils as the onsite soil excavated for reuse.
6. **Flood Hazard Area (FHA)** As the Site is partially located in a regulatory FHA, it will be necessary to achieve a balanced cut and fill grading plan for the landfill closure or placing soil for vegetation within the FHA. If a cap is to be constructed within the FHA, the uppermost 3 feet of landfilled material would be removed and relocated to the upper area of the landfill (i.e., outside of the FHA) before cap construction.

Table 6-4
Cost Estimate Assumptions, Notes, and Limitations for Soil
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Assumptions, Notes, and Limitations
7. **Wetland Impact Mitigation** Regulations, under the Freshwater Wetland Protection Act (NJAC 7:7A) provides the following guidelines for wetlands mitigation. • Creation or Restoration. • Enhancement: Does not include the addition of human-made habitat improvement devices such as duck boxes nor the removal of trash or debris. Compensation ratio can range from 3:1 to 10:1 or more, depending upon the ecological benefit provided by the enhancement activities. • Mitigation Bank or Monetary Contribution, Preservation, or Land Donation (for offsite replication): Mitigation banks are available within the State but currently not within the Site's watershed. To better understand the Agencies expectations regarding the wetland impact mitigation strategy, a pre-permitting consultation with New Jersey Department of Environmental Protection (NJDEP) would be necessary. A counter argument for wetland mitigation under the New Jersey Freshwater Wetlands General Permit for hazardous and landfill closures (NJAC 7:7A-5.4 and 5.5) suggests that mitigation may not be required for disturbance of wetlands located on top of the landfill, or on the intermediate or permanent cover of the landfill. Resolution of this issue will need to be discussed with the Agencies. The cost estimate only takes into consideration that when construction disturbs wetlands the restoration will be on a 1:1 basis and does not include any additional mitigation that the Agencies could apply and that when wetlands are capped, the offsite replication will be on a 1:1 basis and does not include any additional mitigation that the Agencies could apply.
8. **Wildlife Protection** A June 2008 endangered species and critical habitat survey identified two areas of potential bog turtle habitat adjacent to the Site (Amy S. Green Environmental Consultants). Best Management Practices (BMPs) are expected to be required through coordination with the Agencies including the U.S. Fish and Wildlife New Jersey Field Office protect 'critical' habitat during construction. The two areas of potential bog turtle habitat include: (a) 35.31 acres along the western boundary of the landfill and (b) 10.89 acres in the northeastern portion of the landfill. Potential BMPs may include structural (e.g., reinforced silt fence, active management of turtles, etc.,) or non-structural (e.g., restrict construction during turtle nesting season). For purposes of this cost estimate, only the cost of structural BMPs has
9. **Well Restriction** New Jersey regulation (NJAC 7:9D-2.3[a]) prohibits installation of potable wells with casings less than 50 feet in depth. It is expected that the non-potable existing well will be decommissioned.
10. **Groundwater Monitoring Network** No costs have been included to address groundwater. These are addressed under the groundwater alternatives. If Groundwater Alternative 1 (No Action) is selected as the remedy for groundwater, some additional costs will be incurred for long-term monitoring related to the landfill, independent of groundwater

Table 6-4
Cost Estimate Assumptions, Notes, and Limitations for Soil
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Assumptions, Notes, and Limitations
11. **Contingency Cost** The cost estimates do not include contingency costs (e.g., handling of unforeseen liquid or hazardous wastes found in drums or other containers). It is assumed that existing structures to be demolished have no hazardous materials and can be disposed of (consolidated) on-site.
12. **New Jersey Licensed Site Remediation Professional (LSRP)** The opinion of an LSRP may be required during construction; these costs have not been included.
13. **Britten Road** Only an asphalt overlay will be required to restore Britten Road after construction as needed.
14. **Construction Access Road** It was assumed a temporary access road with a length equivalent to half the perimeter of the Site will be constructed.
15. **Clearing and Grubbing** The clearing and grubbing unit cost is expected to vary according to the type of existing vegetation (forested or vegetated).
16. **Upland Area Disturbance** The cost estimates do not include the cost for mitigation of the disturbed upland areas (e.g., mature forest).
17. **Passive Gas Vent System** A passive gas vent system will consist of vertical above ground vents tied into a gas vent layer or a horizontal pipe in a gravel trench constructed under the cap.
18. **Function and Value Assessment** It is assumed sufficient information has been collected to satisfy a function and value assessment for the existing ponds and the 8.3 acres of ponds on or adjacent to the landfill will not require any major retrofits for the management of stormwater from the cap. Where waste exists along a pond perimeter, a cap extension will be installed. No dewatering costs have been included.

Table 6-4
Cost Estimate Assumptions, Notes, and Limitations for Soil
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Assumptions, Notes, and Limitations
19. **Access Control Fence** It is assumed that an access control perimeter fence will be installed only on the sides of the landfill adjacent to private property (i.e., no fence will be installed on the boundary with Great Swamp National Wildlife Refuge).
20. **Excavation of Impacted Soils** As historic data indicate impact to soils in APCs is limited to a depth less than 2 ft below ground surface, it is assumed the top 2-ft of soils of APCs and/or the top 2 to 4-ft of 25-acre selected area (Functional Area 1) will be excavated for consolidation under a cap or offsite disposal, depending on selected alternatives. For offsite disposal, it was assumed 50% of excavated soil is non-hazardous waste and the remaining 50% is hazardous waste. It was also assumed the hazardous and non-hazardous waste disposal facilities are available within 30 miles from the site.
21. **Vegetation of Mostly Non-Vegetated Areas** It is assumed that 50% of the non-vegetated areas can be vegetated by scarifying, fertilizing, and seeding, and the remaining 50% of the non-vegetated areas will require placement of 2-ft thick vegetative support soils (e.g., loam) and seeding. It is also assumed that all non-vegetated areas are located outside of the FHA and therefore flood storage loss compensation for the placement of 2-ft thick soil is not considered.
22. **Post-Remedy Operation and Maintenance** 30 years of operations and maintenance for capped areas and fence and 5 years of maintenance for wetland mitigation areas were assumed. An annual inflation rate of 2.5% was assumed. It was assumed that approximately 1 to 3% of the initial construction costs of the perimeter fence and vegetation of non-vegetated areas will be needed for annual maintenance.
23. **Construction Duration** The assumed construction durations are based on Geosyntec's experience of project with similar scopes. Depending on contractor and their work plan/strategy/experience, weather conditions, and/or unforeseen site conditions (e.g., high value wildlife), a construction duration (and thus overall construction cost) may vary significantly.

Table 6-5
Construction Cost Estimate for Landfill Closure Cap Unit Costs
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Potential Cap Components		
Component	cyd/acre	$/acre
seed & mulch	-	3,270
6-in topsoil layer	810	30,780
18-in protective layer	2,420	84,700
geonet composite	-	32,670
60-mil HDPE geomembrane	-	23,960
6-in gas venting layer	810	28,350
6-in grading and shaping layer	810	4,660
NJ analytical soil tests	4,850	5,000
	Total Cost per Acre: $	**213,390**

Notes:

1. Certain soils such as granular gas vent layer are expected to meet rigorous specification and therefore assume these soils would need to be obtained from an off-site source. Assume that soils will require NJDEP clean fill analytical testing at a reduced frequency of one sample per 1,000 cyd at $1,000/sample with standard turnaround time. The analytical results may need to be reviewed and approved by NJ Licensed Site Remediation Professional; these costs have not been included.
2. Several cap components could be subject to an equivalency evaluation (and possible additional cost reduction), including
   - modify 60-mil to 40-mil thick geomembrane assuming the use of 3/4-in dia. minus material (would need to be confirmed by a puncture test).
   - use of single-sided geonet composite in lieu of double-sided composite (would need to be confirmed by interface friction test).
   - assume the gas venting layer, based on limited methane production, could be substitute for a 6-in thick G&S foundation layer.
3. Costs of the geosynthetic components are based on the 2017 costs for a 25+ acre site closure, provided by Agru America.
4. Estimated number of truck per acre assumes the delivery truck with two trailer axles has a maximum weight capacity of 44,000 lbs per load and assumes ideal unit weights for each material.

Table 6-6a
Construction Cost Estimate for Soil Alternative No. 3a
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Range Unit Cost			Unit	Quantity	Construction Cost Estimate
A - Design/Construction Oversight/Permits						
Pre-Design Investigation	3%	to	4%	% Construction[(2)]	$ 11,429,900	$ 400,100
Remedial Design	3%	to	6%	% Construction[(2)]	$ 11,429,900	$ 514,400
Remedial Oversight	5%	to	10%	% Construction[(2)]	$ 11,429,900	$ 857,300
Subtotal						$ 1,771,800
B - Construction Preparation						
Bonding, insurance etc.	0.10%	to	0.15%	% Construction[(2)]	$ 11,429,900	$ 14,300
Mobilization/Demobilization	1%	to	2%	% Construction[(2)]	$ 11,429,900	$ 171,500
Subtotal						$ 185,800
C - General Construction and Site Management						
Site management and facilities	$ 5,000	to	$ 20,000	per mth	18	$ 225,000
Survey (topo , wetlands, etc.)	$ 75,000	to	$ 100,000	est.	1	$ 87,500
Britten Road entrance overlay	$ 5.5	to	$ 6.5	sft	35,000	$ 210,000
Construction entrance	$ 5,000	to	$ 10,000	est.	1	$ 7,500
Traffic management	$ 2,000	to	$ 10,000	mth	10	$ 60,000
Demolition existing structures and place in LF	$ 10,000	to	$ 25,000	est.	1	$ 17,500
25-ft wide construction access road	$ 100	to	$ 200	lin ft	5,600	$ 840,000
15-ft wide permanent access road	$ 60	to	$ 120	lin ft	5,600	$ 504,000
Structural BMP (bog turtle)	$ 20,000	to	$ 40,000	est.	1	$ 30,000
Subtotal						$ 1,981,500

Table 6-6a
Construction Cost Estimate for Soil Alternative No. 3a
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost	Unit	Quantity	Construction Cost Estimate
D - Areas of Particular Concern (APCs)						
APCs include POI-09, POI-14, SS-109 (i.e., TP-09), SS-90, SS-97, SS-103, and SS-118.						
Assumed 1-acre remediation for each APC.						
Remediation area:	7.0	acres				
Flood hazard area (FHA):	4.0	acres	including APCs POI-9, POI-14, SS-109, and SS-118			
Surface Debris Area :	2.0	acres	including APCs POI-9 and POI-14			
Wetland impact area:	4.8	acres				
Remediation area perimeter:	5,200	feet				
Site Preparation						
Silt fence (perimeter of each APC)			$ 5	lin ft	6,240	$ 31,200
Turbidity curtain			$ 10	lin ft	5,200	$ 52,000
Clearing/grubbing			$ 2,000	acre	8.4	$ 16,800
Relocation of surface debris using LGP equipment			$ 10	cyd	3,300	$ 33,000
Consolidate Impacted Soil Under Selected 25-Acre Cap Area						
Remove/relocate 2-ft thick impacted soil			$ 20	cyd	22,600	$ 452,000
Backfill with offsite soil (e.g., loam)			$ 40	cyd	22,600	$ 904,000
Wetland restoration (re-vegetation)			$ 3,000	acre	4.8	$ 14,400
Subtotal						$ 1,503,400
E - 25-Acre Selected Area (Functional Area 1)						
Remediation area:	25	acres				
Flood hazard area (FHA):	0	acres				
Wetland impact area:	3	acres				
Remediation area perimeter:	6,100	feet				
Site Preparation						
Silt fence			$ 5	lin ft	7,320	$ 36,600
Turbidity curtain			$ 10	lin ft	1,525	$ 15,300
Clearing/grubbing			$ 2,000	acre	30	$ 60,000
Regrade ground to design grades (including 3-ft soil/waste relocation in FHA)			$ 10	cyd	121,000	$ 1,210,000
Final Closure Cap						
Subtitle D cap			$ 220,000	acre	25	$ 5,500,000
Stormwater basin			$ 20,000 to $ 40,000	est.	3	$ 90,000
Perimeter anchor trench			$ 2	lin ft	4,270	$ 8,600
Landform plus enhanced AT			$ 65	lin ft	1,830	$ 119,000
Passive LFG control (vents or vents & trenches)			$ 4,000 to $ 6,000	acre	25	$ 125,000
Wetland 1:1 on-Site reconstruction			$ 150,000	acre	3.0	$ 450,000
Wetland restoration (re-vegetation)			$ 3,000	acre	1	$ 3,000
Subtotal						$ 7,617,500

Table 6-6a
Construction Cost Estimate for Soil Alternative No. 3a
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost			Unit	Quantity	Construction Cost Estimate
F - Vegetation of Non-Vegetated Areas								
Outside of FHA	2	acres						
Scarify, fertilize, and hydroseed				$ 3,300		acre	1	$ 3,300
2-ft soil (veg. support + topsoil) and hydroseed				$ 118,750		acre	1	$ 118,800
Subtotal								$ 122,100
G - Site Controls (physical)								
7-ft high perimeter fence				$ 30		lin ft	6,500	$ 195,000
20-ft wide double access gates				$ 4,000		each	2	$ 8,000
3-ft wide man gates				$ 800		each	3	$ 2,400
Subtotal								$ 205,400
H - Site Controls (administrative)								
Institutional controls				$ 10,000		est.	1	$ 10,000
Reporting to EPA				$ 4,000		every 5-yrs	6	$ 24,000
Reporting to NJ				$ 4,000		every 2-yrs	15	$ 60,000
Subtotal								$ 94,000
I - Post-Remedy Operation & Maintenance								
Maintenance of Vegetation Areas (Item F)			$ 1,300	to	$ 3,700	annual	30	$ 109,800
Landfill monitoring/maintenance			$ 20,000	to	$ 50,000	annual	30	$ 1,536,600
Fence O&M			$ 2,100	to	$ 6,200	annual	30	$ 182,200
Wetland mitigation monitoring/maintenance			$ 37,500	to	$ 50,000	annual	5	$ 230,000
Subtotal								$ 2,058,600
Total								**$ 15,541,000**

Notes:
(1) See Table 6-4 for cost estimate assumptions, notes, and limitations.
(2) Construction cost to estimate these items include the costs of Items C through G.

Table 6-6b
Construction Cost Estimate for Soil Alternative No. 3b
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Range Unit Cost			Unit	Quantity	Construction Cost Estimate
A - Design/Construction Oversight/Permits						
Pre-Design Investigation	3%	to	4%	% Construction[(2)]	$ 13,009,100	$ 455,400
Remedial Design	3%	to	6%	% Construction[(2)]	$ 13,009,100	$ 585,500
Remedial Oversight	5%	to	10%	% Construction[(2)]	$ 13,009,100	$ 975,700
Subtotal						$ 2,016,600
B - Construction Preparation						
Bonding, insurance etc.	0.10%	to	0.15%	% Construction[(2)]	$ 13,009,100	$ 16,300
Mobilization/Demobilization	1%	to	2%	% Construction[(2)]	$ 13,009,100	$ 195,200
Subtotal						$ 211,500
C - General Construction and Site Management						
Site management and facilities	$ 5,000	to	$ 20,000	per mth	18	$ 225,000
Survey (topo , wetlands, etc.)	$ 75,000	to	$ 100,000	est.	1	$ 87,500
Britten Road entrance overlay	$ 5.5	to	$ 6.5	sft	35,000	$ 210,000
Construction entrance	$ 5,000	to	$ 10,000	est.	1	$ 7,500
Traffic management	$ 2,000	to	$ 10,000	mth	10	$ 60,000
Demolition existing structures and place in LF	$ 10,000	to	$ 25,000	est.	1	$ 17,500
25-ft wide construction access road	$ 100	to	$ 200	lin ft	5,600	$ 840,000
15-ft wide permanent access road	$ 60	to	$ 120	lin ft	5,600	$ 504,000
Structural BMP (bog turtle)	$ 20,000	to	$ 40,000	est.	1	$ 30,000
Subtotal						$ 1,981,500

Table 6-6b
Construction Cost Estimate for Soil Alternative No. 3b
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost		Unit	Quantity	Construction Cost Estimate
D - Areas of Particular Concern (APCs)							
APCs include POI-09, POI-14, SS-109 (i.e., TP-09), SS-90, SS-97, SS-103, and SS-118.							
Assumed 1-acre remediation for each APC.							
Remediation area:	7.0	acres					
Flood hazard area (FHA):	4.0	acres	including APCs POI-9, POI-14, SS-109, and SS-118				
Surface Debris Area :	2.0	acres	including APCs POI-9 and POI-14				
Wetland impact area:	4.8	acres					
Remediation area perimeter:	5,200	feet					
Site Preparation							
Silt fence (perimeter of each APC)				$ 5	lin ft	6,240	$ 31,200
Turbidity curtain				$ 10	lin ft	5,200	$ 52,000
Clearing/grubbing				$ 2,000	acre	8.4	$ 16,800
Relocation of surface debris using LGP equipment				$ 10	cyd	3,300	$ 33,000
Cap In-Place							
Excavate/relocate 3-ft soil in FHA				$ 20	cyd	19,400	$ 388,000
Subtitle D cap (see Table 6-4 for details)				$ 220,000	acre	7	$ 1,540,000
Stormwater basin (one basin per each APC)			$ 20,000 to	$ 40,000	est.	7	$ 210,000
Perimeter anchor trench				$ 2	lin ft	2,600	$ 5,200
Landform plus enhanced AT				$ 65	lin ft	2,600	$ 169,000
Passive LFG control (vents or vents & trenches)			$ 4,000 to	$ 6,000	acre	7	$ 35,000
Wetland 1:1 on-Site reconstruction				$ 150,000	acre	4.0	$ 600,000
Wetland restoration (re-vegetation)				$ 3,000	acre	0.8	$ 2,400
Subtotal							$ 3,082,600
E - 25-Acre Selected Area (Functional Area 1)							
Remediation area:	25	acres					
Flood hazard area (FHA):	0	acres					
Wetland impact area:	3	acres					
Remediation area perimeter:	6,100	feet					
Site Preparation							
Silt fence				$ 5	lin ft	7,320	$ 36,600
Turbidity curtain				$ 10	lin ft	1,525	$ 15,300
Clearing/grubbing				$ 2,000	acre	30	$ 60,000
Regrade ground to design grades (including 3-ft soil/waste relocation in FHA)				$ 10	cyd	121,000	$ 1,210,000
Final Closure Cap							
Subtitle D cap				$ 220,000	acre	25	$ 5,500,000
Stormwater basin			$ 20,000 to	$ 40,000	est.	3	$ 90,000
Perimeter anchor trench				$ 2	lin ft	4,270	$ 8,600
Landform plus enhanced AT				$ 65	lin ft	1,830	$ 119,000
Passive LFG control (vents or vents & trenches)			$ 4,000 to	$ 6,000	acre	25	$ 125,000
Wetland 1:1 on-Site reconstruction				$ 150,000	acre	3.0	$ 450,000
Wetland restoration (re-vegetation)				$ 3,000	acre	1	$ 3,000
Subtotal							$ 7,617,500

Table 6-6b
Construction Cost Estimate for Soil Alternative No. 3b
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost		Unit	Quantity	Construction Cost Estimate
F - Vegetation of Non-Vegetated Areas							
Outside of FHA	2	acres					
Scarify, fertilize, and hydroseed				$ 3,300	acre	1	$ 3,300
2-ft soil (veg. support + topsoil) and hydroseed				$ 118,750	acre	1	$ 118,800
Subtotal							$ 122,100
G - Site Controls (physical)							
7-ft high perimeter fence				$ 30	lin ft	6,500	$ 195,000
20-ft wide double access gates				$ 4,000	each	2	$ 8,000
3-ft wide man gates				$ 800	each	3	$ 2,400
Subtotal							$ 205,400
H - Site Controls (administrative)							
Institutional controls				$ 10,000	est.	1	$ 10,000
Reporting to EPA				$ 4,000	every 5-yrs	6	$ 24,000
Reporting to NJ				$ 4,000	every 2-yrs	15	$ 60,000
Subtotal							$ 94,000
I - Post-Remedy Operation & Maintenance							
Maintenance of Vegetation Areas (Item F)			$ 1,300 to	$ 3,700	annual	30	$ 109,800
Landfill monitoring/maintenance			$ 20,000 to	$ 50,000	annual	30	$ 1,536,600
Fence O&M			$ 2,100 to	$ 6,200	annual	30	$ 182,200
Wetland mitigation monitoring/maintenance			$ 37,500 to	$ 50,000	annual	5	$ 230,000
Subtotal							$ 2,058,600
Total							**$ 17,390,000**

Notes:
(1) See Table 6-4 for cost estimate assumptions, notes, and limitations.
(2) Construction cost to estimate these items include the costs of Items C through G.

Table 6-6c
Construction Cost Estimate for Soil Alternative No. 3c
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Range Unit Cost			Unit	Quantity	Construction Cost Estimate
A - Design/Construction Oversight/Permits						
Pre-Design Investigation	3%	to	4%	% Construction[(2)]	$ 16,175,900	$ 566,200
Remedial Design	3%	to	6%	% Construction[(2)]	$ 16,175,900	$ 728,000
Remedial Oversight	5%	to	10%	% Construction[(2)]	$ 16,175,900	$ 1,213,200
Subtotal						$ 2,507,400
B - Construction Preparation						
Bonding, insurance etc.	0.10%	to	0.15%	% Construction[(2)]	$ 16,175,900	$ 20,300
Mobilization/Demobilization	1%	to	2%	% Construction[(2)]	$ 16,175,900	$ 242,700
Subtotal						$ 263,000
C - General Construction and Site Management						
Site management and facilities	$ 5,000	to	$ 20,000	per mth	18	$ 225,000
Survey (topo , wetlands, etc.)	$ 75,000	to	$ 100,000	est.	1	$ 87,500
Britten Road entrance overlay	$ 5.5	to	$ 6.5	sft	35,000	$ 210,000
Construction entrance	$ 5,000	to	$ 10,000	est.	1	$ 7,500
Traffic management	$ 2,000	to	$ 10,000	mth	10	$ 60,000
Demolition existing structures and place in LF	$ 10,000	to	$ 25,000	est.	1	$ 17,500
25-ft wide construction access road	$ 100	to	$ 200	lin ft	5,600	$ 840,000
15-ft wide permanent access road	$ 60	to	$ 120	lin ft	5,600	$ 504,000
Structural BMP (bog turtle)	$ 20,000	to	$ 40,000	est.	1	$ 30,000
Subtotal						$ 1,981,500

Table 6-6c
Construction Cost Estimate for Soil Alternative No. 3c
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost			Unit	Quantity	Construction Cost Estimate
D - Areas of Particular Concern (APCs)								
APCs include POI-09, POI-14, SS-109 (i.e., TP-09), SS-90, SS-97, SS-103, and SS-118.								
Assumed 1-acre remediation for each APC.								
Remediation area:	7.0	acres						
Flood hazard area (FHA):	4.0	acres	including APCs POI-9, POI-14, SS-109, and SS-118					
Surface Debris Area :	2.0	acres	including APCs POI-9 and POI-14					
Wetland impact area:	4.8	acres						
Remediation area perimeter:	5,200	feet						
Site Preparation								
Silt fence (perimeter of each APC)				$ 5		lin ft	6,240	$ 31,200
Turbidity curtain				$ 10		lin ft	5,200	$ 52,000
Clearing/grubbing				$ 2,000		acre	8.4	$ 16,800
Relocation of surface debris using LGP equipment				$ 10		cyd	3,300	$ 33,000
Excavate and Dispose Offsite								
Excavate 2-ft thick impacted soil				$ 20		cyd	22,600	$ 452,000
Off-site transportation			$ 5	to $	10	ton	22,600	$ 169,500
Off-site disposal (hazardous waste)			$ 200	to $	500	ton	11,300	$ 3,955,000
Off-site disposal (non-hazardous waste)			$ 40	to $	70	ton	11,300	$ 621,500
Backfill with offsite soil (e.g., loam)				$ 40		cyd	22,600	$ 904,000
Wetland restoration (re-vegetation)				$ 3,000		acre	4.8	$ 14,400
Subtotal								$ 6,249,400
E - 25-Acre Selected Area (Functional Area 1)								
Remediation area:	25	acres						
Flood hazard area (FHA):	0	acres						
Wetland impact area:	3	acres						
Remediation area perimeter:	6,100	feet						
Site Preparation								
Silt fence				$ 5		lin ft	7,320	$ 36,600
Turbidity curtain				$ 10		lin ft	1,525	$ 15,300
Clearing/grubbing				$ 2,000		acre	30	$ 60,000
Regrade ground to design grades (including 3-ft soil/waste relocation in FHA)				$ 10		cyd	121,000	$ 1,210,000
Final Closure Cap								
Subtitle D cap				$ 220,000		acre	25	$ 5,500,000
Stormwater basin			$ 20,000	to $	40,000	est.	3	$ 90,000
Perimeter anchor trench				$ 2		lin ft	4,270	$ 8,600
Landform plus enhanced AT				$ 65		lin ft	1,830	$ 119,000
Passive LFG control (vents or vents & trenches)			$ 4,000	to $	6,000	acre	25	$ 125,000
Wetland 1:1 on-Site reconstruction				$ 150,000		acre	3.0	$ 450,000
Wetland restoration (re-vegetation)				$ 3,000		acre	1	$ 3,000
Subtotal								$ 7,617,500

Table 6-6c
Construction Cost Estimate for Soil Alternative No. 3c
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost		Unit	Quantity	Construction Cost Estimate
F - Vegetation of Non-Vegetated Areas							
Outside of FHA	2	acres					
Scarify, fertilize, and hydroseed				$ 3,300	acre	1	$ 3,300
2-ft soil (veg. support + topsoil) and hydroseed				$ 118,750	acre	1	$ 118,800
Subtotal							$ 122,100
G - Site Controls (physical)							
7-ft high perimeter fence				$ 30	lin ft	6,500	$ 195,000
20-ft wide double access gates				$ 4,000	each	2	$ 8,000
3-ft wide man gates				$ 800	each	3	$ 2,400
Subtotal							$ 205,400
H - Site Controls (administrative)							
Institutional controls				$ 10,000	est.	1	$ 10,000
Reporting to EPA				$ 4,000	every 5-yrs	6	$ 24,000
Reporting to NJ				$ 4,000	every 2-yrs	15	$ 60,000
Subtotal							$ 94,000
I - Post-Remedy Operation & Maintenance							
Maintenance of Vegetation Areas (Item F)			$ 1,300 to	$ 3,700	annual	30	$ 109,800
Landfill monitoring/maintenance			$ 20,000 to	$ 50,000	annual	30	$ 1,536,600
Fence O&M			$ 2,100 to	$ 6,200	annual	30	$ 182,200
Wetland mitigation monitoring/maintenance			$ 37,500 to	$ 50,000	annual	5	$ 230,000
Subtotal							$ 2,058,600
Total							**$ 21,099,000**

Notes:
(1) See Table 6-4 for cost estimate assumptions, notes, and limitations.
(2) Construction cost to estimate these items include the costs of Items C through G.

Table 6-7a
Construction Cost Estimate for Soil Alternative No. 4a
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Range Unit Cost			Unit		Quantity		Construction Cost Estimate
A - Design/Construction Oversight/Permits								
2-ft Excavation of Selected Area								
Pre-Design Investigation	0.5%	to	1%	% Construction[(2)]	$	27,627,100	$	207,300
Remedial Design	0.5%	to	1%	% Construction[(2)]	$	27,627,100	$	207,300
Remedial Oversight	5%	to	10%	% Construction[(2)]	$	27,627,100	$	2,072,100
4-ft Excavation of Selected Area								
Pre-Design Investigation	0.5%	to	1%	% Construction[(2)]	$	49,012,500	$	367,600
Remedial Design	0.5%	to	1%	% Construction[(2)]	$	49,012,500	$	367,600
Remedial Oversight	5%	to	10%	% Construction[(2)]	$	49,012,500	$	3,676,000
Subtotal (Option 1: 2-ft Excavation of Selected Area)							$	2,486,700
Subtotal (Option 2: 4-ft Excavation of Selected Area)							$	4,411,200
B - Construction Preparation								
2-ft Excavation of Selected Area								
Bonding, insurance etc.	0.05%	to	0.10%	% Construction[(2)]	$	27,627,100	$	20,800
Mobilization/Demobilization	0.25%	to	0.75%	% Construction[(2)]	$	27,627,100	$	138,200
4-ft Excavation of Selected Area								
Bonding, insurance etc.	0.05%	to	0.10%	% Construction[(2)]	$	49,012,500	$	36,800
Mobilization/Demobilization	0.25%	to	0.75%	% Construction[(2)]	$	49,012,500	$	245,100
Subtotal (Option 1: 2-ft Excavation of Selected Area)							$	159,000
Subtotal (Option 2: 4-ft Excavation of Selected Area)							$	281,900
C - General Construction and Site Management								
Site management and facilities	$ 5,000	to	$ 20,000	per mth		24	$	300,000
Survey (topo , wetlands, etc.)	$ 75,000	to	$ 100,000	est.		1	$	87,500
Britten Road entrance overlay	$ 5.5	to	$ 6.5	sft		35,000	$	210,000
Construction entrance	$ 5,000	to	$ 10,000	est.		1	$	7,500
Traffic management	$ 2,000	to	$ 10,000	mth		20	$	120,000
Demolition existing structures and place in LF	$ 10,000	to	$ 25,000	est.		1	$	17,500
25-ft wide construction access road	$ 100	to	$ 200	lin ft		5,600	$	840,000
15-ft wide permanent access road (half of perimeter)	$ 60	to	$ 120	lin ft		5,600	$	504,000
Structural BMP (bog turtle)	$ 20,000	to	$ 40,000	est.		1	$	30,000
Subtotal							$	2,116,500

Table 6-7a
Construction Cost Estimate for Soil Alternative No. 4a
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost			Unit	Quantity	Construction Cost Estimate
D - Areas of Particular Concern (APCs)								
APCs include POI-09, POI-14, SS-109 (i.e., TP-09), SS-90, SS-97, SS-103, and SS-118.								
Assumed 1-acre remediation for each APC.								
Remediation area:	7.0	acres						
Flood hazard area (FHA):	4.0	acres	including APCs POI-9, POI-14, SS-109, and SS-118					
Surface Debris Area :	2.0	acres	including APCs POI-9 and POI-14					
Wetland impact area:	4.8	acres						
Remediation area perimeter:	5,200	feet						
Site Preparation								
Silt fence (perimeter of each APC)					$ 5	lin ft	6,240	$ 31,200
Turbidity curtain					$ 10	lin ft	5,200	$ 52,000
Clearing/grubbing					$ 2,000	acre	8.4	$ 16,800
Relocation of surface debris using LGP equipment					$ 10	cyd	3,300	$ 33,000
Cap In-Place								
Excavate/relocate 3-ft soil in FHA					$ 20	cyd	19,400	$ 388,000
Subtitle D cap (see Table 6-4 for details)					$ 220,000	acre	7	$ 1,540,000
Stormwater basin (one basin per each APC)			$ 20,000	to	$ 40,000	est.	7	$ 210,000
Perimeter anchor trench					$ 2	lin ft	2,600	$ 5,200
Landform plus enhanced AT					$ 65	lin ft	2,600	$ 169,000
Passive LFG control (vents or vents & trenches)			$ 4,000	to	$ 6,000	acre	7	$ 35,000
Wetland 1:1 on-Site reconstruction					$ 150,000	acre	4.0	$ 600,000
Wetland restoration (re-vegetation)					$ 3,000	acre	0.8	$ 2,400
Subtotal								$ 3,082,600

Table 6-7a
Construction Cost Estimate for Soil Alternative No. 4a
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost			Unit	Quantity	Construction Cost Estimate
E - 25-Acre Selected Area (Functional Area 1)								
Remediation area:	25	acres						
Flood hazard area (FHA):	0	acres						
Wetland impact area:	4	acres						
Remediation area perimeter:	6,100	feet						
Site Preparation								
Silt fence				$ 5		lin ft	7,320	$ 36,600
Turbidity curtain				$ 10		lin ft	1,525	$ 15,300
Clearing/grubbing				$ 2,000		acre	30	$ 60,000
2-ft Excavate and Dispose Offsite								
2-ft excavation				$ 15		cyd	80,700	$ 1,210,500
Off-site transportation			$ 5	to $	10	ton	80,700	$ 605,300
Off-site disposal (hazardous waste)			$ 200	to $	500	ton	40,350	$ 14,122,500
Off-site disposal (non-hazardous waste)			$ 40	to $	70	ton	40,350	$ 2,219,300
Backfill with off-site soil				$ 40		cyd	80,700	$ 3,228,000
4-ft Excavate and Dispose Offsite								
4-ft excavation				$ 15		cyd	161,400	$ 2,421,000
Off-site transportation			$ 5	to $	10	ton	161,400	$ 1,210,500
Off-site disposal (hazardous waste)			$ 200	to $	500	ton	80,700	$ 28,245,000
Off-site disposal (non-hazardous waste)			$ 40	to $	70	ton	80,700	$ 4,438,500
Backfill with off-site soil				$ 40		cyd	161,400	$ 6,456,000
Wetland 1:1 on-Site reconstruction				$ 150,000		acre	4.0	$ 600,000
Wetland restoration (re-vegetation)				$ 3,000		acre	1	$ 3,000
Subtotal (Option 1: 2-ft Excavation of Selected Area)								$ 22,100,500
Subtotal (Option 2: 4-ft Excavation of Selected Area)								$ 43,485,900
F - Vegetation of Non-Vegetated Areas								
Outside of FHA	2	acres						
Scarify, fertilize, and hydroseed				$ 3,300		acre	1	$ 3,300
2-ft soil (veg. support + topsoil), and hydroseed				$ 118,750		acre	1	$ 118,800
Subtotal								$ 122,100

Table 6-7a
Construction Cost Estimate for Soil Alternative No. 4a
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Range Unit Cost	Unit	Quantity	Construction Cost Estimate
G - Site Controls (physical)				
7-ft high perimeter fence	$ 30	lin ft	6,500	$ 195,000
20-ft wide double access gates	$ 4,000	each	2	$ 8,000
3-ft wide man gates	$ 800	each	3	$ 2,400
Subtotal				$ 205,400
H - Site Controls (administrative)				
Institutional controls	$ 10,000	est.	1	$ 10,000
Reporting to EPA	$ 4,000	every 5-yrs	6	$ 24,000
Reporting to NJ	$ 4,000	every 2-yrs	15	$ 60,000
Subtotal				$ 94,000
I - Post-Remedy Operation & Maintenance				
Maintenance of Vegetation Areas (Item F)	$ 1,300 to $ 3,700	annual	30	$ 109,800
Landfill monitoring/maintenance	$ 20,000 to $ 50,000	annual	30	$ 1,536,600
Fence O&M	$ 2,100 to $ 6,200	annual	30	$ 182,200
Wetland mitigation monitoring/maintenance	$ 37,500 to $ 50,000	annual	5	$ 230,000
Subtotal				$ 2,058,600
Total (Option 1 - 2-ft Excavation of Selected Area)				**$ 32,426,000**
Total (Option 2 - 4-ft Excavation of Selected Area)				**$ 55,859,000**

Notes:

(1) See Table 6-4 for cost estimate assumptions, notes, and limitations.

(2) Construction cost to estimate these items include the costs of Items C through G.

Table 6-7b
Construction Cost Estimate for Soil Alternative No. 4b
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Range Unit Cost			Unit	Quantity	Construction Cost Estimate
A - Design/Construction Oversight/Permits						
2-ft Excavation of Selected Area						
Pre-Design Investigation	0.5%	to	1%	% Construction[(2)]	$ 30,793,900	$ 231,000
Remedial Design	0.5%	to	1%	% Construction[(2)]	$ 30,793,900	$ 231,000
Remedial Oversight	5%	to	10%	% Construction[(2)]	$ 30,793,900	$ 2,309,600
4-ft Excavation of Selected Area						
Pre-Design Investigation	0.5%	to	1%	% Construction[(2)]	$ 52,179,300	$ 391,400
Remedial Design	0.5%	to	1%	% Construction[(2)]	$ 52,179,300	$ 391,400
Remedial Oversight	5%	to	10%	% Construction[(2)]	$ 52,179,300	$ 3,913,500
Subtotal (Option 1: 2-ft Excavation of Selected Area)						$ 2,771,600
Subtotal (Option 2: 4-ft Excavation of Selected Area)						$ 4,696,300
B - Construction Preparation						
2-ft Excavation of Selected Area						
Bonding, insurance etc.	0.05%	to	0.10%	% Construction[(2)]	$ 30,793,900	$ 23,100
Mobilization/Demobilization	0.25%	to	0.75%	% Construction[(2)]	$ 30,793,900	$ 154,000
4-ft Excavation of Selected Area						
Bonding, insurance etc.	0.05%	to	0.10%	% Construction[(2)]	$ 52,179,300	$ 39,200
Mobilization/Demobilization	0.25%	to	0.75%	% Construction[(2)]	$ 52,179,300	$ 260,900
Subtotal (Option 1: 2-ft Excavation of Selected Area)						$ 177,100
Subtotal (Option 2: 4-ft Excavation of Selected Area)						$ 300,100
C - General Construction and Site Management						
Site management and facilities	$ 5,000	to	$ 20,000	per mth	24	$ 300,000
Survey (topo , wetlands, etc.)	$ 75,000	to	$ 100,000	est.	1	$ 87,500
Britten Road entrance overlay	$ 5.5	to	$ 6.5	sft	35,000	$ 210,000
Construction entrance	$ 5,000	to	$ 10,000	est.	1	$ 7,500
Traffic management	$ 2,000	to	$ 10,000	mth	20	$ 120,000
Demolition existing structures and offsite disposal	$ 10,000	to	$ 25,000	est.	1	$ 17,500
25-ft wide construction access road	$ 100	to	$ 200	lin ft	5,600	$ 840,000
15-ft wide permanent access road (half of perimeter)	$ 60	to	$ 120	lin ft	5,600	$ 504,000
Structural BMP (bog turtle)	$ 20,000	to	$ 40,000	est.	1	$ 30,000
Subtotal						$ 2,116,500

Table 6-7b
Construction Cost Estimate for Soil Alternative No. 4b
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost	Unit	Quantity	Construction Cost Estimate
D - Areas of Particular Concern (APCs)						
APCs include POI-09, POI-14, SS-109 (i.e., TP-09), SS-90, SS-97, SS-103, and SS-118.						
Assumed 1-acre remediation for each APC.						
Remediation area:	7.0	acres				
Flood hazard area (FHA):	4.0	acres	including APCs POI-9, POI-14, SS-109, and SS-118			
Surface Debris Area :	2.0	acres	including APCs POI-9 and POI-14			
Wetland impact area:	4.8	acres				
Remediation area perimeter:	5,200	feet				
Site Preparation						
Silt fence (perimeter of each APC)			$ 5	lin ft	6,240	$ 31,200
Turbidity curtain			$ 10	lin ft	5,200	$ 52,000
Clearing/grubbing			$ 2,000	acre	8.4	$ 16,800
Relocation of surface debris using LGP equipment			$ 10	cyd	3,300	$ 33,000
Excavate and Dispose Offsite						
Excavate 2-ft thick impacted soil			$ 20	cyd	22,600	$ 452,000
Off-site transportation			$ 5 to $ 10	ton	22,600	$ 169,500
Off-site disposal (hazardous waste)			$ 200 to $ 500	ton	11,300	$ 3,955,000
Off-site disposal (non-hazardous waste)			$ 40 to $ 70	ton	11,300	$ 621,500
Backfill with offsite soil (e.g., loam)			$ 40	cyd	22,600	$ 904,000
Wetland restoration (re-vegetation)			$ 3,000	acre	4.8	$ 14,400
Subtotal						$ 6,249,400
E - 25-Acre Selected Area (Functional Area 1)						
Remediation area:	25	acres				
Flood hazard area (FHA):	0	acres				
Wetland impact area:	4	acres				
Remediation area perimeter:	6,100	feet				
Site Preparation						
Silt fence			$ 5	lin ft	7,320	$ 36,600
Turbidity curtain			$ 10	lin ft	1,525	$ 15,300
Clearing/grubbing			$ 2,000	acre	30	$ 60,000
2-ft Excavate and Dispose Offsite						
2-ft excavation			$ 15	cyd	80,700	$ 1,210,500
Off-site transportation (hazardous waste)			$ 5 to $ 10	ton	80,700	$ 605,300
Off-site disposal (hazardous waste)			$ 200 to $ 500	ton	40,350	$ 14,122,500
Off-site disposal (non-hazardous waste)			$ 40 to $ 70	ton	40,350	$ 2,219,300
Backfill with off-site soil			$ 40	cyd	80,700	$ 3,228,000
4-ft Excavate and Dispose Offsite						
2-ft excavation			$ 15	cyd	161,400	$ 2,421,000
Off-site transportation (hazardous waste)			$ 5 to $ 10	ton	161,400	$ 1,210,500

Table 6-7b
Construction Cost Estimate for Soil Alternative No. 4b
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Geosyntec Consultants

Component			Range Unit Cost			Unit	Quantity	Construction Cost Estimate
Off-site disposal (hazardous waste)			$ 200	to $ 500		ton	80,700	$ 28,245,000
Off-site disposal (non-hazardous waste)			$ 40	to $ 70		ton	80,700	$ 4,438,500
Backfill with off-site soil				$ 40		cyd	161,400	$ 6,456,000
Wetland 1:1 on-Site reconstruction				$ 150,000		acre	4.0	$ 600,000
Wetland restoration (re-vegetation)				$ 3,000		acre	1	$ 3,000
Subtotal (Option 1: 2-ft Excavation of Selected Area)								$ 22,100,500
Subtotal (Option 2: 4-ft Excavation of Selected Area)								$ 43,485,900
F - Vegetation of Non-Vegetated Areas								
Outside of FHA	2	acres						
Scarify, fertilize, and hydroseed				$ 3,300		acre	1	$ 3,300
2-ft soil (veg. support + topsoil), and hydroseed				$ 118,750		acre	1	$ 118,800
Subtotal								$ 122,100
G - Site Controls (physical)								
7-ft high perimeter fence				$ 30		lin ft	6,500	$ 195,000
20-ft wide double access gates				$ 4,000		each	2	$ 8,000
3-ft wide man gates				$ 800		each	3	$ 2,400
Subtotal								$ 205,400
H - Site Controls (administrative)								
Institutional controls				$ 10,000		est.	1	$ 10,000
Reporting to EPA				$ 4,000		every 5-yrs	6	$ 24,000
Reporting to NJ				$ 4,000		every 2-yrs	15	$ 60,000
Subtotal								$ 94,000
I - Post-Remedy Operation & Maintenance								
Maintenance of Vegetation Areas (Item F)			$ 1,300	to $ 3,700		annual	30	$ 109,800
Fence O&M			$ 2,100	to $ 6,200		annual	30	$ 182,200
Wetland mitigation monitoring/maintenance			$ 37,500	to $ 50,000		annual	5	$ 230,000
Subtotal								$ 522,000
Total (Option 1 - 2-ft Excavation of Selected Area)								**$ 34,359,000**
Total (Option 2 - 4-ft Excavation of Selected Area)								**$ 57,792,000**

Notes:
(1) See Table 6-4 for cost estimate assumptions, notes, and limitations.
(2) Construction cost to estimate these items include the costs of Items C through G.

Table 6-8
Construction Cost Estimate for Soil Alternative No. 5
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Range Unit Cost			Unit	Quantity	Construction Cost Estimate
A - Design/Construction Oversight/Permits						
Pre-Design Investigation	0.5%	to	2%	% Construction[(2)]	$ 45,720,900	$ 571,600
Remedial Design	0.5%	to	2%	% Construction[(2)]	$ 45,720,900	$ 571,600
Remedial Oversight	5%	to	10%	% Construction[(2)]	$ 45,720,900	$ 3,429,100
Subtotal						$ 4,572,300
B - Construction Preparation						
Bonding, insurance etc.	0.05%	to	0.10%	% Construction[(2)]	$ 45,720,900	$ 34,300
Mobilization/demobilization	0.50%	to	1%	% Construction[(2)]	$ 45,720,900	$ 343,000
Subtotal						$ 377,300
C - General Construction and Site Management						
Site management and facilities	$ 5,000	to	$ 20,000	per mth	36	$ 450,000
Survey (topo , wetlands, etc.)	$ 75,000	to	$ 100,000	est.	1	$ 87,500
Britten Road entrance overlay	$ 5.5	to	$ 6.5	sft	35,000	$ 210,000
Construction entrance	$ 5,000	to	$ 10,000	est.	1	$ 7,500
Traffic management	$ 2,000	to	$ 10,000	mth	24	$ 144,000
Demolition existing structures and place in LF	$ 10,000	to	$ 25,000	est.	1	$ 17,500
25-ft wide construction access road	$ 100	to	$ 200	lin ft	5,600	$ 840,000
15-ft wide permanent access road (half of perimeter)	$ 60	to	$ 120	lin ft	5,600	$ 504,000
Structural BMP (bog turtle)	$ 20,000	to	$ 40,000	est.	1	$ 30,000
Subtotal						$ 2,290,500

Table 6-8
Construction Cost Estimate for Soil Alternative No. 5
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component			Range Unit Cost				Unit	Quantity	Construction Cost Estimate
D - Areas of Particular Concern (APCs)									
APCs include POI-09 and POI-14.									
Assumed 1-acre remediation for each APC.									
Remediation area:	2.0	acres							
Flood hazard area (FHA):	2.0	acres	including APCs POI-9, POI-14, SS-109, and SS-118						
Surface Debris Area :	2.0	acres	including APCs POI-9 and POI-14						
Wetland impact area:	2.4	acres							
Remediation area perimeter:	1500	feet							
Site Preparation									
Silt fence (perimeter of each APC)					$	5	lin ft	1,800	$ 9,000
Turbidity curtain					$	10	lin ft	1,500	$ 15,000
Clearing/grubbing					$	2,000	acre	2.4	$ 4,800
Relocation of surface debris using LGP equipment					$	10	cyd	3,300	$ 33,000
Consolidate Impacted Soil Under Selected 25-Acre Cap Area									
Remove/relocate 2-ft thick impacted soil					$	20	cyd	6,500	$ 130,000
Backfill with offsite soil (e.g., loam)					$	40	cyd	6,500	$ 260,000
Wetland restoration (re-vegetation)					$	3,000	acre	2.4	$ 7,200
Subtotal (consolidation)									$ 459,000
E - Landfill Area 1 (Privately Held)									
Buried waste area:	105	acres							
Flood hazard area (FHA):	29	acres							
Wetland impact area:	9	acres							
Waste area perimeter:	10,825	feet							
Silt fence					$	5	lin ft	12,990	$ 65,000
Turbidity curtain					$	10	lin ft	5,413	$ 54,200
Clearing/grubbing					$	2,000	acre	105.0	$ 210,000
Excavate/relocate 3-ft soil in FHA					$	15	cyd	140,400	$ 2,106,000
Soil/waste grading (ave. 2 ft)					$	10	cyd	245,227	$ 2,452,300
Subtitle D cap					$	220,000	acre	105	$ 23,100,000
Stormwater basin			$ 20,000	to	$	40,000	est.	3	$ 90,000
Perimeter anchor trench					$	2	lin ft	3,248	$ 6,500
Landform plus enhanced anchor trench					$	65	lin ft	7,578	$ 492,600
Passive LFG control (vents or vents & trenches)			$ 4,000	to	$	6,000	acre	105	$ 525,000
Wetland 1:1 on-Site reconstruction					$	150,000	acre	9.0	$ 1,350,000
Wetland restoration (re-vegetation)					$	3,000	acre	10.5	$ 31,500
Subtotal									$ 30,483,100

Table 6-8
Construction Cost Estimate for Soil Alternative No. 5
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Range Unit Cost	Unit	Quantity	Construction Cost Estimate
F - Landfill Area 2 (Great Swamp National Wildlife Refuge Area)				
Buried waste area: 35 acres				
Flood hazard area (FHA): 33 acres				
Wetland impact area: 9.2 acres				
Waste area perimeter: 6,300 feet				
Silt fence	$ 5	lin ft	7,560	$ 37,800
Turbidity curtain	$ 10	lin ft	3,150	$ 31,500
Clearing/grubbing	$ 2,000	acre	42	$ 84,500
Excavate/relocate 3-ft soil in FHA	$ 15	cyd	159,800	$ 2,397,000
Soil/waste grading (ave. 2 ft)	$ 10	cyd	7,099	$ 71,000
Subtitle D cap	$ 220,000	acre	35.2	$ 7,744,000
Stormwater basin	$ 20,000 to $ 40,000	est.	2	$ 60,000
Perimeter anchor trench	$ 2	lin ft	1,890	$ 3,800
Landform plus enhanced anchor trench	$ 65	lin ft	4,410	$ 286,700
Passive LFG control (vents or vents & trenches)	$ 4,000 to $ 6,000	acre	35	$ 176,000
Wetland 1:1 on-Site reconstruction	$ 150,000	acre	9.2	$ 1,380,000
Wetland restoration (re-vegetation)	$ 3,000	acre	3.5	$ 10,600
Subtotal				$ 12,282,900
G - Site Controls (physical)				
7-ft high perimeter fence	$ 30	lin ft	6,500	$ 195,000
20-ft wide double access gates	$ 4,000	each	2	$ 8,000
3-ft wide man gates	$ 800	each	3	$ 2,400
Subtotal				$ 205,400
H - Site Controls (administrative)				
Institutional controls	$ 10,000	est.	1	$ 10,000
Reporting to EPA	$ 4,000	every 5-yrs	6	$ 24,000
Reporting to NJ	$ 4,000	every 2-yrs	15	$ 60,000
Subtotal				$ 94,000
I - Post-Remedy Operation & Maintenance				
Landfill monitoring/maintenance	$ 50,000 to $ 80,000	annual	30	$ 2,853,700
Fence O&M	$ 2,100 to $ 6,200	annual	30	$ 182,200
Wetland mitigation monitoring/maintenance	$ 75,000 to $ 100,000	annual	5	$ 460,000
Subtotal				$ 3,495,900
Total				**$ 54,261,000**

Notes:
(1) See Table 6-4 for cost estimate assumptions, notes, and limitations.
(2) Construction cost to estimate these items include the costs of Items C through G.

Table 6-9
Summary of Remedial Construction Cost Estimates for Soil
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

Component	Alternative No. 1 No Action	Alternative No. 2 Site Controls	Alternative No. 3a Site Controls, Capping of Selected Area to Reduce Overall Risk, Remediation (Consolidation Under Selected Area Cap) of Areas of Particular Concern, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals	Alternative No. 3b Site Controls, Capping of Selected Area to Reduce Overall Risk, and Remediation (Cap In-Place) of Areas of Particular Concern, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals	Alternative No. 3c Site Controls, Capping of Selected Area to Reduce Overall Risk, Remediation (Offsite Disposal) of Areas of Particular Concern, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals	Alternative No. 4a Site Controls, Excavation and Off-Site Disposal of Selected Area to Reduce Overall Risk, Remediation (Cap In-Place) of Areas of Particular Concern, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals		Alternative No. 4b Site Controls, Excavation and Off-Site Disposal of Selected Area to Reduce Overall Risk, Remediation (Offsite Disposal) of Areas of Particular Concern, and Remediation of Non-Vegetated Areas with Soil Sample Results Above Remediation Goals		Alternative No. 5 Site Controls and Capping of All Landfill Material
						Option 1 - 2ft Excavation in Selected Area	Option 2 - 4ft Excavation in Selected Area	Option 1 - 2ft Excavation in Selected Area	Option 2 - 4ft Excavation in Selected Area	
Design/Construction Oversight/Permits	$0	$ 63,400	$ 1,771,800	$ 2,016,600	$ 2,507,400	$ 2,486,700	$ 4,411,200	$ 2,771,600	$ 4,696,300	$ 4,572,300
Construction Preparation	$0	$ 13,000	$ 185,800	$ 211,500	$ 263,000	$ 159,000	$ 281,900	$ 177,100	$ 300,100	$ 377,300
General Construction and Site Management	$0	$ 203,000	$ 1,981,500	$ 1,981,500	$ 1,981,500	$ 2,116,500	$ 2,116,500	$ 2,116,500	$ 2,116,500	$ 2,290,500
Areas of Particular Concern (APCs)	$0	$0	$1,503,400	$3,082,600	$ 6,249,400	$ 3,082,600	$ 3,082,600	$6,249,400	$6,249,400	$459,000
25-Acre Selected Area (Functional Area 1)	$0	$0	$7,617,500	$7,617,500	$ 7,617,500	$ 22,100,500	$ 43,485,900	$ 22,100,500	$ 43,485,900	$0
Entire Landfill (140 acres)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$42,766,000
Vegetation of Non-Vegetated Areas	$0	$0	$122,100	$122,100	$ 122,100	$ 122,100	$ 122,100	$122,100	$122,100	$0
Site Controls (physical)	$0	$ 205,400	$ 205,400	$ 205,400	$ 205,400	$ 205,400	$ 205,400	$ 205,400	$ 205,400	$ 205,400
Site Controls (administrative)	$0	$ 94,000	$ 94,000	$ 94,000	$ 94,000	$ 94,000	$ 94,000	$ 94,000	$ 94,000	$ 94,000
Post-Remedy Operation & Maintenance	$0	$ 182,200	$ 2,058,600	$ 2,058,600	$ 2,058,600	$ 2,058,600	$ 2,058,600	$ 522,000	$ 522,000	$ 3,495,900
Total	$0	$ 761,000	$ 15,541,000	$ 17,390,000	$ 21,099,000	$ 32,426,000	$ 55,859,000	$ 34,359,000	$ 57,792,000	$ 54,261,000

Notes,
(1) All costs are in 2017 dollars with the exception of Post-Remedy Operation & Maintenance (O&M) costs, which assumes 2.5% annual inflation over 30 years for landfill and groundwater O&M and 5 years for wetland mitigation area maintenance.
(2) See attached Tables 6-2, 6-5(a,b,c), 6-6(a,b), 6-7, and 6-8 for details of cost estimates and Table 6-5 for landfill closure cap details.
(3) See Table 6-4 for cost estimate assumptions, notes, and limitations.

Table 7-1
Comparative Analysis of Groundwater Remedial Alternatives
Rolling Knolls Landfill Superfund Site
Chatham, New Jersey

	Groundwater Alternatives		
	1	**2**	**3**
1. Overall Protection of Human Health and the Environment			
Human Health Protection	1	3	4
Environmental Protection	NA	NA	NA
2. Compliance with ARARs			
Chemical Specific ARARs	1	3	4
Location Specific ARARs	NA	4	4
Action Specific ARARs	NA	4	4
3. Long-Term Effectiveness and Permanence			
Magnitude of Residual Risk	1	3	4
Adequacy and Reliability of Controls	NA	3	4
4. Reduction of Toxicity, Mobility, and Volume Through Treatment			
Treatment Process used and Materials Treated	1	1	4
Amount of Hazardous Materials Destroyed or Treated	1	1	4
Degree of Expected Reductions in Toxicity, Mobility or Volume through Treatment	1	1	4
Degree to which Treatment is Irreversible	1	1	3
Type and Quantity of Residuals Remaining after Treatment	1	1	3
Whether the Alternative Would Satisfy the Statutory Preference for Treatment as a Principal Element	1	1	4

Table 7-1
Comparative Analysis of Groundwater Remedial Alternatives
Rolling Knolls Landfill Superfund Site
Chatham, New Jersey

	Groundwater Alternatives		
	1	**2**	**3**
5. Short-Term Effectiveness			
Protection of Community During Remedial Actions	NA	4	4
Protection of Workers During Remedial Actions	NA	4	4
Environmental Impacts	NA	4	3
Time Until Remedial Action Objectives are Achieved	1	2	3
6. Implementability			
Ability to Construct and Operate the Technology	NA	4	4
Reliability of the Technology	NA	4	4
Ease of Undertaking Additional Remedial Actions, if necessary	NA	4	4
Ability to Monitor Effectiveness of Remedy	NA	4	4
Ability to Obtain Approvals and Coordinate with Other Agencies	NA	4	3
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	NA	3	3
Availability of Necessary Equipment and Specialists	NA	4	4
Availability of Prospective Technology	NA	4	4

Table 7-1
Comparative Analysis of Groundwater Remedial Alternatives
Rolling Knolls Landfill Superfund Site
Chatham, New Jersey

	Groundwater Alternatives		
	1	**2**	**3**
7. Costs			
Indirect Capital Cost (Design/ Construction Oversight/ Permits)	NA	3	2
Direct Capital Costs	NA	3	2
Post-Construction Operation, Maintenance, and Monitoring Costs	NA	2	2
Total Costs	NA	$1,345,000	$2,815,000
8. State (or Support Agency) Acceptance	**TBE**	**TBE**	**TBE**
9. Community Acceptance	**TBE**	**TBE**	**TBE**

Notes
1. Alternative Description:
   Alternative 1 - No Action
   Alternative 2 - Source Control and Monitoring
   Alternative 3 - Source Control and Monitoring with a Contingent Remedy
2. TBE - To be evaluated. The findings from the detailed analysis of the State (or support agency) acceptance and Community acceptance criteria will be presented in ROD once USEPA completes their review of and provides comments on the final FS report.
3. Comparative analysis grading description: 1 - Poor, 2 - Moderate, 3 - Good, and 4 - Excellent
4. NA - Not applicable.

Table 7-2

Summary of Compliance to Applicable, Relevant or Appropriate Requirements (ARARs) for Groundwater Alternatives

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Groundwater Remedy Alternatives		
				1	2	3
Action-Specific	New Jersey Air Pollution Control Rules (N.J.A.C 7:27)	Potentially Applicable- to remedial activities generating certain air emissions	Establishes standards for the emissions of contaminants into [the ambient atmosphere] air.	NA	WBCW	WBCW
Action-Specific	Clean Air Act (42 U.S.C subsections 7401 et seq)	Potentially Applicable- to remedial activities generating certain air emissions	Establishes standards for the emissions of contaminants into [the ambient atmosphere] air.	NA	WBCW	WBCW
Action-Specific	Occupation Safety and Health Standards and Safety and Health Regulations for Construction (29 CFR 1910 and 1926)	Relevant and Appropriate – to remedy construction	Establishes occupational safety and health standards.	NA	WBCW	WBCW
Action-Specific	Guide to Management of Investigation-Derived Wastes (OSWER Publication 9345.3-03FS)	To Be Considered	Present regulatory background and options for managing investigation-derived waste at Superfund sites.	NA	WBCW	WBCW
Action-Specific	New Jersey Field Sampling Procedures Manual, Appendix 6.1, New Jersey Well Standards	To Be Considered	Establishes standards for the construction, maintenance, and sampling of monitoring wells.	NA	WBCW	WBCW
Action-Specific	New Jersey Noise Control Rules (N.J.A.C 7:29).	Relevant and Appropriate	Prohibits the generation of certain types of noise at specific times and establishes methods to determine compliance.	NA	WBCW	WBCW
Action-Specific	New Jersey Brownfield and Contaminated Site Remediation Act (N.J.S.A. 58:1B-1 et seq.)	Applicable	Enabling legislation for development of remediation standards necessary to protect public health and safety and the environment from discharged hazardous substances and for mandating cleanup of contaminated sites.	NA	WBCW	WBCW

Table 7-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements (ARARs) for Groundwater Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Groundwater Remedy Alternatives		
				1	2	3
Action-Specific	New Jersey Technical Requirements for Site Remediation (N.J.A.C 7:26E)	Applicable	Establishes the technical requirements for the remediation of contaminated sites.	NA	WBCW	WBCW
Action-Specific	Administrative Requirements for the Remediation of Contaminated Sites (N.J.A.C 7:26C)	Applicable	Requirements related to New Jersey's site remediation process.	NA	WBCW	WBCW
Action-Specific	Green Remediation: Incorporating Sustainable Environmental Practices in Remediation of Contaminated Sites (OSWER Publication EPA 542-R-08-002)	To Be Considered	Outlines the principals of green remediation and describes opportunities to reduce the footprint of cleanup activities throughout the life of a project. Identifies new strategies and alternatives to improve sustainability of cleanup activities, and helps decision-makers balance the alternatives within existing regulatory frameworks.	NA	To be considered in the remedial action design	To be considered in the remedial action design
Action-Specific	RCRA Subtitle D Landfills (40 CFR Parts 239 - 259)	Applicable	These regulations apply to non-hazardous waste landfills, including municipal solid waste landfills	NA	NA	NA
Action-Specific	Additional, Specific Disposal Regulation for Sanitary Landfills (N.J.A.C. 7:26-2A)	Applicable	State regulations that include the requirements for closure and post-closure of sanitary landfills.	NA	NA	NA
Action-Specific	New Jersey Solid Waste Rules (N.J.A.C 7:26)	Applicable	Governs the registration, operation, maintenance, and closure of sanitary landfills, other solid waste facilities, and solid waste transportation operations in the State of New Jersey.	NA	NA	NA

Table 7-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements (ARARs) for Groundwater Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Groundwater Remedy Alternatives		
				1	2	3
Action-Specific	Presumptive Remedy for CERCLA Municipal Landfills (OSWER Directive No. 9355.0-49F)	To Be Considered	This guidance outlines a streamlined approach to the scoping (planning) stages of the RI/FS in the process of closing municipal landfills under CERCLA, with containment as the presumptive remedy. This directive also provides guidance regarding the appropriate level of detail appropriate for risk assessment of source areas and characterization of hot spots.	NA	To be considered in the remedial action design	To be considered in the remedial action design
Action-Specific	New Jersey Storm Water Management Rules (N.J.A.C 7:8)	Applicable	Establishes stormwater management requirements to prevent contamination of waterways via stormwater discharge.	NA	WBCW	WBCW
Action-Specific	New Jersey Water Pollution Control Act Regulations (N.J.A.C 7:14)	Relevant and Appropriate	Prohibits the discharge of any pollutant into the waters of the State without a valid permit.	NA	WBCW	WBCW
Action-Specific	New Jersey Pollutant Discharge Elimination System Rules (N.J.A.C 7:14A)	Applicable	Establishes the framework under which NJDEP regulates the discharge of pollutants to the surface and groundwater's of the State.	NA	WBCW	WBCW
Action-Specific	New Jersey Department of Transportation (NJDOT) Standard Specifications – Soil Erosion and Sediment Control Measures (1996) (N.J.A.C. 16:25A-2.1 et seq.)	To Be Considered	NJDOT standards are typically used to develop the appropriate plans for sediment and soil erosion control required under New Jersey Soil Conservation Act.	NA	WBCW	WBCW
Action-Specific	RCRA Generation, Transportation and Disposal of Hazardous waste (40 CFR 260-270)	Potentially Applicable – to the management of waste streams for off-site disposal	Establishes responsibilities and standards for the management of hazardous and non-hazardous waste.	NA	NA	NA
Action-Specific	49 C.F.R. Hazardous Materials Transportation	Potentially Applicable – to transport of hazardous reagents	Regulates transportation of hazardous materials in the United States under the Department of Transportation (49 CFR).	NA	NA	WBCW

Table 7-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements (ARARs) for Groundwater Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Groundwater Remedy Alternatives		
				1	2	3
Action-Specific	New Jersey Hazardous Waste Rules (N.J.A.C 7:26G)	Potentially Applicable – to waste streams transported offsite for disposal	Identifies the standards for the acceptable management of hazardous waste in New Jersey.	NA	NA	NA
Action-Specific	Plant Protection Act (7 U.S.C. Section 2814)	Potentially Applicable - if remedy requires introducing vegetation to any portion of the site	Requires the use of integrated management systems to control or contain undesirable plant species. Applicable to on-site remedial activities to control, eradicate, or prevent or retard the spread of such weeds.	NA	WBCW	WBCW
Action-Specific	Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; 50 CFR 10.13)	Applicable	This Act makes it unlawful to "take, capture, kill," or otherwise impact a migratory bird or any nest or egg of a migratory bird.	NA	WBCW	WBCW
Action-Specific	NJDEP "Ecological Evaluation Technical Guidance." Version 1.3, February 2015.	To Be Considered	Provides guidance on conducting ecological evaluations and implementing Risk Management Decisions for ecologically sensitive natural resources.	NA	NA	NA
Chemical-Specific	Remediation Standards (N.J.A.C 7:26D; 7:9B; 7:9C)	Applicable	Establishes the minimum standards for the remediation of soil, groundwater, and surface water.	Does not comply	WBCW	WBCW
Chemical-Specific	Federal Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (40 CFR 141.11-.16, and .60-.63)	To Be Considered	Defines the quality criteria for public drinking water supplies.	Does not comply	WBCW	WBCW
Chemical-Specific	New Jersey Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (N.J.S.A. 58:12A-1 et seq.)	To Be Considered	Defines the quality criteria for public drinking water supplies.	Does not comply	WBCW	WBCW

Table 7-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements (ARARs) for Groundwater Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Groundwater Remedy Alternatives		
				1	2	3
Chemical-Specific	NJDEP Site Remediation Program, Technical Guidance for the Attainment of Remediation Standards and Site- Specific Criteria September 24, 2012, Version 1.0.	To Be Considered	Guidance on alternate methods to achieve compliance with applicable remediation standards.	Does not comply	WBCW	WBCW
Chemical-Specific	EPA Human Health Assessment Cancer Slope Factors (CSFs)	To Be Considered	CSFs are developed by EPA for health effects assessments or evaluation by the Human Health Assessment Group. These values present the most up-to-date cancer risk potency information and are used to compute the individual incremental cancer risk resulting from exposure to carcinogens.	NA	WBCW	WBCW
Chemical-Specific	NJDEP "NJDEP Ecological Screening Criteria." March 2009.	To Be Considered	Provides Ecological Screening Criteria to be used as screening values in ecological assessments.	NA	NA	NA
Chemical-Specific	RCRA Groundwater Protection Standards and Maximum Concentration Limits (40 CFR 264, Subpart F)	Applicable	Regulates release from the solid management unit (i.e. the landfill) and specifies the groundwater protection standards.	Does not comply	WBCW	WBCW
Chemical-Specific	NJDEP Groundwater Quality Standards (N.J.A.C. 7:9C)	Applicable	Establishes the minimum standards for the remediation of groundwater.	Does not comply	WBCW	WBCW
Location-Specific	New Jersey Flood Hazard Area Control (N.J.A.C 7:13)	Applicable	Sets forth the requirements governing activities in the flood hazard area or riparian zone of a regulated water.	NA	WBCW	WBCW
Location-Specific	EPA's 1985 "Policy on Floodplains and Wetlands Assessments for CERCLA Actions".	To Be Considered	Requires that CERCLA actions meet the substantive requirements of Floodplain Management Executive Order (EO 11988) and Protection of Wetlands Executive Order (EO 1990).	NA	WBCW	WBCW

Table 7-2
Summary of Compliance to Applicable, Relevant or Appropriate Requirements (ARARs) for Groundwater Alternatives
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Groundwater Remedy Alternatives		
				1	2	3
Location-Specific	Executive Order 11988 Floodplain Management	To Be Considered	Requires federal agencies to avoid to the extent possible long- and short-term adverse impacts associated with the occupancy and modification of flood plains, and avoid support of floodplain development wherever there is a practicable alternative.	NA	WBCW	WBCW
Location-Specific	Establishment of a Classification Exception Area/Well Restriction Area (N.J.A.C. 7:9-6.6)	Applicable	Promulgated state regulations that include requirements for establishing a classification exception area/well restriction area where groundwater quality does not meet New Jersey groundwater quality criteria	NA	WBCW	WBCW
Location-Specific	Ground Water Quality and Surface Water Standards (N.J.A.C 7:9).	Applicable	Regulates activities respecting protection and enhancement of ground water and surface water resources.	NA	WBCW	WBCW
Location-Specific	Federal Water Pollution Control Act (FWPCA) (33 USC 1521 et seq.)	Applicable	Requires a permit from USACE and consideration by both the EPA and the USFWS before an application to dredge and fill may be enacted.	NA	WBCW	WBCW
Location-Specific	New Jersey Freshwater Wetlands Protection Act Rules (N.J.A.C 7:7A)	Applicable	Requires permit for regulated activity disturbing freshwater wetlands.	NA	WBCW	WBCW
Location-Specific	Section 404 - Clean Water Act, as it pertains to wetlands	To Be Considered	Prohibits discharge of dredged or fill material into wetlands adjacent to navigable waters without a permit.	NA	WBCW	WBCW
Location-Specific	Executive Order 11990 Protection of Wetlands	To Be Considered	Requires federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.	NA	WBCW	WBCW
Location-Specific	Endangered Species Act (16 USC 1531 et seq.)	Applicable	Requires that action be performed to conserve endangered species or threatened species.	NA	WBCW	WBCW

Table 7-2

Summary of Compliance to Applicable, Relevant or Appropriate Requirements (ARARs) for Groundwater Alternatives

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Groundwater Remedy Alternatives		
				1	2	3
Location-Specific	New Jersey Endangered Plant Species Program (N.J.A.C 7:5C)	Relevant and Appropriate	Identifies the official list of endangered plant species and establishes the program for maintaining and updating the list.	NA	WBCW	WBCW
Location-Specific	New Jersey Division of Fish, Game, and Wildlife Rules (N.J.A.C 7:25)	Relevant and Appropriate	Supplements the statutes governing fish and game laws in the State of New Jersey.	NA	WBCW	WBCW
Location-Specific	National Wildlife Refuge System Administration Act of 1968, as amended by the National Wildlife Refuge System Improvement Act of 1997	Applicable	This act and amendments governs the use and management of National Wildlife Refuges.	NA	WBCW	WBCW
Location-Specific	Final Comprehensive Conservation Plan, Great Swamp National Wildlife Refuge, November 2014	To Be Considered	This plan present the management goals, objectives, and strategies that guide the management of the Great Swamp National Wildlife Refuge over the next 15 years.	NA	WBCW	WBCW
Location-Specific	Wilderness Act of 1964 (16 USC 1131-1136)	Applicable	This act directs each agency administering designated wilderness to preserve the "wilderness character" of areas within the Naiton Wilderness Preservation System (NWPS) and to administer the NWPS for the "use and enjoyment of the American people in a way that will leave those areas unimpaired to fure use and enjoyment as Wilderness.	NA	WBCW	WBCW
Location-Specific	Great Swamp Wilderness Act of 1968 (Public Law 90-532, September 28, 1968)	Applicable	Designates the eastern portion of the refuge, comprised of 3,660 acres, as the Wilderness Area.	NA	WBCW	WBCW
Location-Specific	Refuge Recreation Act of 1962 (16 USC 460K-460K-4)	Applicable	Assures present or future recreational uses by the public on areas within national wildlife refuges.	NA	WBCW	WBCW

Table 7-2

Summary of Compliance to Applicable, Relevant or Appropriate Requirements (ARARs) for Groundwater Alternatives

Rolling Knolls Landfill Superfund Site - Feasibility Study

Chatham, New Jersey

ARAR Type	Requirement	Status	Summary of Requirement	Groundwater Remedy Alternatives		
				1	2	3
Location-Specific	Floodplain Management and Wetlands Protection (40 CFR 6.302(a) and (b); 40 CFR 6, Appendix A)	Applicable	Requires agencies to perform certain measures to avoid the long and short term impacts associated with the destruction or modification of wetlands and floodplains.	NA	WBCW	WBCW
Location-Specific	Federal Noxious Weed Act of 1974 (PL 93-629; 7 USC 2801, et seq)	Applicable	Requires the use of integrated management systems to control or contain undesirable plant species.	NA	WBCW	WBCW
Location-Specific	Executive Order 13112. Management of Invasive Species	To Be Considered	Requires that federal agencies take certain actions to prevent introduction of invasive species and provide for their control.	NA	WBCW	WBCW
Location-Specific	Fish and Wildlife Coordination Act (16 USC 661 et seq	Applicable	Requires actions to protect fish or wildlife when diverting, channeling, or modifying a stream.	NA	WBCW	WBCW
Location-Specific	Fish and Wildlife Coordination Act Advisories.	To Be Considered	Advisories on the effects of pollutants and other activities on wildlife, including migratory birds and fish, and wildlife habitat authorized under the Fish and Wildlife Coordination Act.	NA	WBCW	WBCW

Notes

1. Alternative Description:
   Alternative 1 - No Action
   Alternative 2 - Source Control and Monitoring
   Alternative 3 - Source Control and Monitoring with Contingent Remedy
2. WBCW - Will be complied with. Pursuant to the ARAR, applicable standards and regulations will be complied with during remedial design and actions.
3. NA - Not Applicable. The ARAR is not relevant to the alternative remedial actions and therefore not applicable for evaluation of compliance of the alternative to the ARAR.

Table 7-3: Construction Cost Estimate for Groundwater Alternative No. 2
Source Control and Monitoring
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham Township, New Jersey

Component	Range Unit Cost ($)		Unit	Quantity	Common Site Construction Cost ($)
A - Design/Construction Oversight/Permits					
Pre-Design Investigation	8	10	% Construction	111,600	10,100
Remedial Design	8	10	% Construction	111,600	10,100
Remedial Oversight	10	15	% Construction	111,600	14,000
Permits	-	-	Not Provided		-
Subtotal					34,200
B - Construction Preparation					
Bonding, insurance etc.	0.1	0.2	% Construction	111,600	200
Mobilization/Demobilization	1	5	% Construction	111,600	3,400
Subtotal					3,600
C - Well Installation and Abandonment					
Project Management	7,500	15,000	per mth	2	22,500
Field Oversight	15,000	25,000	each	1	20,000
Post-Installation Deliverables (Figures, Form Bs, etc.)	5,000	7,500	lump sum	1	6,300
Waste Classification Sampling and Analysis	2,600	3,600	each event	1	3,100
Waste Management and Disposal	2,700	3,700	each event	1	3,200
Drilling Services (up to 10 shallow monitoring wells)	35,000	45,000	lump sum	1	40,000
Geophysical Services	2,000	3,000	each event	3	7,500
Surveying Services	2,000	4,000	day	3	9,000
Subtotal					111,600
D - Post-Remedy Operation & Maintenance					
Sampling groundwater network	60,000	120,000	each event	12	1,080,000
Subtotal					1,080,000
E - Site Controls (administrative)					
Reporting to EPA		4,000	every 5-yrs	6	24,000
NJ Remedial Action Permit Application		2,000	each	1	2,000
NJ Remedial Action Permit Annual Fee		700	average over 30 years	30	21,000
NJ Classified Exception Area/Well Restriction Area		8,000	est.	1	8,000
Reporting to NJ		4,000	every 2-yrs	15	60,000
Subtotal					115,000
TOTAL					1,345,000

Note:

(1) The cost for the source control portion of this alternative has been included in Soil Alternatives 3 through 6. This cost estimate includes monitoring and institutional controls only.

(2) See Table 7-4 for cost estimate assumptions, notes, and limitations.

Table 7-4
Cost Estimate Assumptions, Notes, and Limitations for Groundwater
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham, New Jersey

1. **Estimated Quantities**
   In many cases the areas or volumes have been assumed. The estimated quantities (e.g., length, areas, or volumes) that have been used in the development of the cost estimates should be verified before construction. It is assumed that the work will be done in Level D personnel protective equipment (PPE) and by non-union labor.
2. **Unit Costs**
   The estimated unit costs are based on Geosyntec's experience and published information such as RSMeans. The costs that have been developed should be considered only as a relative guide. A range of unit costs have been applied to an item with high variabilities.
3. **Groundwater Treatment Area and Thickness**
   Groundwater treatment is intended to address impacts present in well MW-3 and in well MW-10 above the NJDEP Ground Water Quality Standards. One area will be treated by enhanced in-situ biodegration and the other will be treated by chemical oxidation. Each area is assumed to be 0.5 acres (total of 1 acre) with a saturated thickness of 10 feet below the water table for the purpose of this cost estimate.
4. **Monitoring Well Installation and Abandonment**
   It is assumed that 10 monitoring wells will be installed around MW-3 and MW-10 and across the landfill to supplement the existing monitoring well network. These wells will be shallow, up to 20 feet below ground surface. One existing monitoring well will be abandoned due to damage and reinstalled with the same construction specifications.
5. **Schedule**
   It is assumed that groundwater monitoring will be implemented after soil remediation and source control are complete.
6. **Well Restriction**
   New Jersey regulation (NJAC 7:9D-2.3[a]) prohibits installation of potable wells with casings less than 50 feet in depth. It is expected that the existing non-potable supply well will be decommissioned.
7. **Source Control**
   The cost for the source control portion of Groundwater Alternatives 2 and 3 is included in the costs for Soil Alternatives 3 through 6. This is because the proposed source control will be implemented at the same time, and will use the same technologies, as the soil remedy. If Soil Alternatives 1 or 2 are selected, a separate source control cost will be developed.
8. **Contingency Cost**
   The cost estimates do not include contingency costs (e.g., handling of unforeseen liquid or hazardous wastes found in drums or other containers, delays due to weather, etc).
9. **New Jersey Licensed Site Remediation Professional (LSRP)**
   The opinion of an LSRP may be required during remedy implementation; these costs have not been included.
10. **Post-Remedy Operation and Maintenance**
    30 years of operations and maintenance for groundwater monitoring were assumed. The groundwater sampling schedule was assumed to be: annual for the first 4 years, biennial for the next 4 years, and octennial starting at Year 8 and onward. This schedule is consistent with NJDEP guidance and equates to 12 sampling events over a 30-year period.
11. **Site Controls (administrative)**
    The annual fee for the Remedial Action Permit for Groundwater is assumed to increase at a rate of 5% per year.

Table 7-5: Construction Cost Estimate for Groundwater Alternative No. 3
Source Control and Monitoring with Contingent Remedy
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham Township, New Jersey

Component	Range Unit Cost ($)		Unit	Quantity	Common Site Construction Cost ($)
A - Design/Construction Oversight/Permits					
Pre-Design Investigation	8	10	% Construction	1,198,200	107,900
Remedial Design	8	10	% Construction	1,198,200	107,900
Remedial Oversight	10	15	% Construction	1,198,200	149,800
Permits	-	-	Not Provided		-
Subtotal					365,600
B - Construction Preparation					
Bonding, insurance etc.	0.1	0.2	% Construction	1,198,200	1,800
Mobilization/Demobilization	1.5	7.5	% Construction	1,198,200	54,000
Subtotal					55,800
C - Well Installation and Abandonment					
Project Management	7,500	15,000	per mth	2	22,500
Field Oversight	15,000	25,000	each	1	20,000
Post-Installation Deliverables (Figures, Form Bs, etc.)	5,000	7,500	lump sum	1	6,300
Waste Classification Sampling and Analysis	2,600	3,600	each event	1	3,100
Waste Management and Disposal	2,700	3,700	each event	1	3,200
Drilling Services (up to 10 shallow monitoring wells)	35,000	45,000	lump sum	1	40,000
Geophysical Services	2,000	3,000	each event	3	7,500
Surveying Services	2,000	4,000	day	3	9,000
Subtotal					111,600
D - Enhanced Biodegradation Groundwater Remedy					
Project Management	7,500	15,000	per mth	2	22,500
Baseline Groundwater Sampling and Analysis	12,000	17,000	lump sum	1	14,500
Field Oversight	24,000	33,000	each	1.5	42,800
Injection Work	75,000	125,000	each	1.5	150,000
Geophysical Services	2,000	3,000	each event	0.5	1,300
Surveying Services	2,000	4,000	day	0.5	1,500
Waste Classification Sampling and Analysis	2,600	3,600	each event	0.5	1,600
Waste Management and Disposal	2,700	3,700	each event	0.5	1,600
Subtotal					235,800
E - In-Situ Chemical Oxidation Groundwater Remedy					
Project Management	7,500	15,000	per mth	2	22,500
Baseline Groundwater Sampling and Analysis	12,000	17,000	lump sum	1	14,500
Field Oversight	24,000	33,000	each	1.5	42,800
Injection Work	300,000	720,000	each	1.5	765,000
Geophysical Services	2,000	3,000	each event	0.5	1,300
Surveying Services	2,000	4,000	day	0.5	1,500
Waste Classification Sampling and Analysis	2,600	3,600	each event	0.5	1,600
Waste Management and Disposal	2,700	3,700	each event	0.5	1,600
Subtotal					850,800
F - Post-Remedy Operation & Maintenance					
Sampling groundwater network	60,000	120,000	each event	12	1,080,000
Subtotal					1,080,000
G - Site Controls (administrative)					
Reporting to EPA		4,000	every 5-yrs	6	24,000
NJ Remedial Action Permit Application		2,000	each	1	2,000
NJ Remedial Action Permit Annual Fee		700	average over 30 years	30	21,000
NJ Classified Exception Area/Well Restriction Area		8,000	est.	1	8,000
Reporting to NJ		4,000	every 2-yrs	15	60,000
Subtotal					115,000
TOTAL					2,815,000

Note:

(1) The cost for the source control portion of this alternative has been included in Soil Alternatives 3 through 6. This cost estimate includes monitoring, institutional controls, and the contingent remedy (assumed to include enhanced biological degradation and in-situ chemical oxidation) only.

Table 7-6: Summary of Remedial Construction Cost Estimates
Rolling Knolls Landfill Superfund Site - Feasibility Study
Chatham Township, New Jersey

Component	Alternative No. 1 No Action	Alternative No. 2 Source Control and Monitoring[1]	Alternative No. 3 Source Control and Monitoring with a Contingent Remedy[1]
Design/Construction Oversight/Permits	$0	$34,200	$365,600
Construction Preparation	$0	$3,600	$55,800
Well Installation and Abandonment	$0	$111,600	$111,600
Enhanced Biodegradation Groundwater Remedy	$0	$0	$235,800
In-Situ Chemical Oxidation Groundwater Remedy	$0	$0	$850,800
Post-Remedy Operation & Maintenance	$0	$1,080,000	$1,080,000
Site Controls (administrative)	$0	$115,000	$115,000
Total	$0	$ 1,345,000	$ 2,815,000

Notes

(1) The cost for the source control portion of Groundwater Alternatives 2 and 3 is included in the costs for Soil Alternatives 3 through 6. This is because the proposed source control will be implemented at the same time as the soil remedy and will use the same technologies as the soil remedy. If Soil Alternatives 1 or 2 are selected, a separate source control cost will be developed.

(2) All costs are in 2018 dollars with the exception of Post-Remedy Operation & Maintenance (O&M) costs, which assumes 2.5% annual inflation over 30 years for landfill and groundwater O&M.

(3) See Tables 7-3 and 7-5 for details of cost estimates.

(4) See Table 7-4 for cost estimate assumptions, notes, and limitations.