Table 3.1

Contaminants Used in Mean PEC Quotient Calculation

	PEC
Metals (mg/kg)	
Mercury	2.2
Organic Compounds	
BTEX Compounds (µg/kg)	
Ethylbenzene	176
Xylenes	560.8
Chlorinated Benzenes (µg/kg)	
Chlorobenzene	428
Dichlorobenzenes	239
Trichlorobenzenes	347
PAH Compounds (µg/kg)	
Acenaphthene	861
Acenaphthylene	1301
Anthracene	207
Benz[a]anthracene	192
Benzo[a]pyrene	146
Benzo[b]fluoranthene	908
Benzo[ghi]perylene	780
Benzo[k]fluoranthene	203
Chrysene	253
Dibenz[a,h]anthracene	157
Fluoranthene	1436
Fluorene	264
Indeno[1,2,3-cd]pyrene	183
Naphthalene	917
Phenanthrene	543
Pyrene	344
Polychlorinated Biphenyls (µg/kg)	
Total PCBs	295

The PECQ for a given contaminant is calculated as the concentration of that contaminant in a given location within the lake divided by the PEC value associated with that contaminant. The PECQ is first calculated for the first five chemical parameter of interest (CPOI) groups (mercury, ethylbenzene and xylenes, chlorinated benzenes, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) using detections. These values are then averaged to get the final mean PECQ for the station. For example, in a simplified hypothetical case where all contaminants for the five CPOI groups are detected at a station and PECQs of 1.0, 2.0, 3.0, 4.0 and 5.0 were calculated for the five groups, the mean PECQ for the station would be the average of the five PECQ values (i.e., (1.0+2.0+3.0+4.0+5.0)/5 = 3), resulting in a mean PECQ of 3.0 (i.e., 15/5) for the overall station.

REMEDIATION AREA A

		Chemical Isolation Layer(1)(2)						Habitat/Erosion Protection Layer			Additional Habitat Layer			Total Habitat Layer(3)		Total Isolation Cap	
Water Depth/ Habitat Module	**Mixing Layer(4) (ft)**	**pH Amended Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Non-pH Amended[2] Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**
0 to 3 ft of water depth																	
6A (Cap Area A-2) (+1-1 ft)																	
5A (Cap Area A-2) (0.5-2 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	coarse gravel	0.50	0.875	medium sand	1.50	1.75	2.0	2.625	3.25	4.375
3A (Cap Area A-2) (2-3 ft)																	
6A (+1-1 ft)																	
5A (0.5-2 ft)	0.25	n/a	n/a	1.0	1.25	1.0	1.25	coarse gravel	0.50	0.875	medium sand	1.50	1.75	2.0	2.625	3.25	4.125
4A (1-3 ft)																	
3A (2-3 ft)																	
3 to 7 ft of water depth																	
3A (Cap Area A-2) (3-7 ft)	0.25	0.25	0.50	0.75	1.0	1.0	1.5	fine gravel	1.5	1.75	n/a	n/a	n/a	1.5	1.75	2.75	3.5
3A (3-7 ft)	0.25	n/a	n/a	1.0	1.25	1.0	1.25	fine gravel	1.5	1.75	n/a	n/a	n/a	1.5	1.75	2.75	3.25
7 to 10 ft of water depth																	
2A (Cap Area A-2) (7-10 ft)	0.25	0.25	0.50	0.75	1.0	1.0	1.5	fine gravel	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	3.0
2A (7-10 ft)	0.25	n/a	n/a	1.0	1.25	1.0	1.25	fine gravel	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	2.75
10 to 20 ft of water depth																	
2A (Cap Area A-2) (10-20 ft)	0.25	0.25	0.50	0.75	1.0	1.0	1.5	medium sand	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	3.0
2A (10-20 ft)	0.25	n/a	n/a	1.0	1.0	1.0	1.0	medium sand	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	2.5
20 to 30 ft of water depth																	
1 (20-30 ft)	0.25	n/a	n/a	0.50	0.50	0.50	0.50	medium sand	1.0	1.25	n/a	n/a	n/a	1.00	1.25	1.75	2.0

REMEDIATION AREA B

		Chemical Isolation Layer(1)(2)						Habitat/Erosion Protection Layer			Additional Habitat Layer			Total Habitat Layer(3)		Total Isolation Cap	
Habitat Module	**Mixing Layer(4) (ft)**	**pH Amended Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Non-pH Amended[2] Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**
0 to 3 ft of water depth																	
5A (0.5-2 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	coarse gravel	0.5	0.875	fine gravel	1.5	1.75	2.0	2.625	3.25	4.375
3A (2-3 ft)																	
3 to 4 ft of water depth																	
3A (3-4 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	coarse gravel	0.5	0.875	fine gravel	1.0	1.25	1.5	2.125	2.75	3.875
4 to 7 ft of water depth																	
3A (4-7 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	fine gravel	1.5	1.75	n/a	n/a	n/a	1.5	1.750	2.75	3.5
7 to 10 ft of water depth																	
2A (7-10 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	coarse sand	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	3.0
10 to 30 ft of water depth																	
2A (10-20 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	medium sand	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	3.0
1 (20-30 ft)																	

REMEDIATION AREA C

		Chemical Isolation Layer(1)(2)						Habitat/Erosion Protection Layer			Additional Habitat Layer			Total Habitat Layer(3)		Total Isolation Cap	
Habitat Module	**Mixing Layer(4) (ft)**	**pH Amended Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Non-pH Amended[2] Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**
0 to 3 ft of water depth																	
6B (+1-1 ft)																	
5B (0.5-2 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	coarse gravel	0.5	0.875	fine gravel	1.5	1.75	2.0	2.625	3.25	4.375
3B (2-3 ft)																	
3 to 4 ft of water depth																	
3B (3-4 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	coarse gravel	0.5	0.875	fine gravel	1.0	1.25	1.5	2.125	2.75	3.875
4 to 7 ft of water depth																	
3B (4-7 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	fine gravel	1.5	1.75	n/a	n/a	n/a	1.5	1.75	2.75	3.5
7 to 10 ft of water depth																	
2A (7-10 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	fine gravel	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	3.0
10 to 30 ft of water depth																	
2A (10-20 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	medium sand	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	3.0
1 (20-30 ft)																	

REMEDIATION AREA D

		Chemical Isolation Layer(1)(2)						Habitat/Erosion Protection Layer			Additional Habitat Layer			Total Habitat Layer(3)		Total Isolation Cap	
Habitat Module	**Mixing Layer(4) (ft)**	**pH Amended Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Non-pH Amended[2] Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**
0 to 3 ft of water depth																	
6B (+1-1 ft)																	
5B (0.5-2 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	coarse gravel	0.5	0.875	medium sand	1.5	1.75	2.0	2.625	3.25	4.375
3B (2-3 ft)																	
3 to 4 ft of water depth																	
3B (3-4 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	coarse gravel	0.5	0.875	medium sand	1.0	1.25	1.5	2.125	2.75	3.875
4 to 7 ft of water depth																	
3B (4-7 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	fine gravel	0.5	0.75	medium sand	1.0	1.25	1.5	2.0	2.75	3.75
7 to 10 ft of water depth																	
2A (7-10 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	fine gravel	0.5	0.75	medium sand	0.5	0.75	1.0	1.5	2.25	3.25
10 to 30 ft of water depth																	
2A (10-20 ft)	0.25	0.25	0.5	0.75	1.0	1.0	1.5	medium sand	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	3.0
1 (20-30 ft)																	

REMEDIATION AREA E

		Chemical Isolation Layer(1)(2)						Habitat/Erosion Protection Layer			Additional Habitat Layer			Total Habitat Layer(3)		Total Isolation Cap	
Habitat Module	**Mixing Layer(4) (ft)**	**pH Amended Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Non-pH Amended[2] Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Grainsize**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**	**Minimum (ft)**	**Assumed Mean With Over Placement (ft)**
0 to 3 ft of water depth																	
6B (+1-1 ft) 5B (0.5-2 ft) 3B (2-3 ft)	0.25	n/a	n/a	1.0	1.25	1.0	1.25	cobbles	0.5	1.0	coarse gravel	1.5	1.875	2.0	2.875	3.25	4.375
3 to 7 ft of water depth																	
3B (3-7 ft)	0.25	n/a	n/a	1.0	1.25	1.0	1.25	cobbles	0.5	1.0	coarse gravel	1.0	1.375	1.5	2.375	2.75	3.875
7 to 10 ft of water depth																	
2B (7-10 ft)	0.25	n/a	n/a	1.0	1.25	1.0	1.25	coarse gravel	1.0	1.375	n/a	n/a	n/a	1.0	1.375	2.25	2.875
10 to 20 ft of water depth																	
2A (10-20 ft)	0.25	n/a	n/a	1.0	1.25	1.0	1.25	fine gravel	1.0	1.25	n/a	n/a	n/a	1.0	1.25	2.25	2.75
2A (Navigation Channel) (12 ft)	0.25	n/a	n/a	1.0	1.25	1.0	1.25	cobbles	1.0	1.50	n/a	n/a	n/a	1.0	1.50	2.25	3.00
20 to 30 ft of water depth																	
1 (20-30 ft)	0.25	n/a	n/a	0.5	0.75	0.5	0.75	coarse sand	1.0	1.25	n/a	n/a	n/a	1.0	1.25	1.75	2.25

(1) Mixing and Chemical Isolation Layers grainsize are medium sand. The chemical isolation layer includes GAC except in model areas A-1 and E-1.
(2) Details of how the buffer layer is incorporated into the design are provided in Section 4.1.4.
(3) Total Habitat Layer is the sum of the Habitat/Erosion Protection Layer and the Additional Habitat Layer
(4) Mixing layer includes pH amendment in all areas except Model Areas A-1, E-1, E-2 and E-3.

Table 4.2
Sediment Cap Mixing Observations

			Atterberg Limits						Mixing Information	
Site	**Moisture Content**	**Percent Solids**	**LL**	**PI**	**Undrained Shear Strength (psf)**	**Water depth (feet)**	**Cap Design**	**Method of Placement**	**Measured (in)**	**Observed/General**
KPC Ward Cove Sediment Remediation Ketchikan, AK (1)	Avg 415%	Avg 19%	--	--	3 to 100	40 to 120	6 to 12 inches of clean, fine to medium sand	Mechanical bucket	--	Clear cap/sediment boundary; minimal to no mixing noted
University of New Hampshire Contaminated Sediment Center - Pilot Cap, NH (2)	--	--	--	--	--	<10 (small pond)	4 inch Phosfil reactive cap	Mechanical bucket	1.5	
Gasco Site Removal Action, WA	--	Avg 62%	--	--	--	0 to 30	12 inches of sand overlain by 6 inches armor	Mechanical bucket	0.74 avg	
USACE - Los Angeles -Capping Project - Dredge Material Placement in Harbor Cells, CA (3)	140 to 183% Avg 161%	35 to 41% Avg 38%	53 to 76 Avg 66	22 to 41 Avg 33	7.5 to 13 Avg 11	60	2.5 to 3.0 feet of Los Angeles River Estuary material	Stagnant bottom dump barge	--	Mud waves created in some locations. Other areas performed as anticipated.
Silver Lake Pilot Study, MA (4)	--	--	--	--	--	0 to ~25	~6 inches of sand	Hydraulic spreader box	Max ~2	--
USACE - Los Angeles - Aquatic Capping Project Cap Material Placement Los Angeles Harbor, CA (3)	98 to 134% Avg 111%	43 to 51% Avg 47%	38 to 51 Avg 44	7 to 20 Avg 13	5 to 22 Avg 11	52	5 feet of fine to medium sand	Bottom dump barge moving and rehandling with bucket	--	Confirmation cores indicate little mixing of the cap and underlying contaminated sediment
Port of Olympia, WA	Avg 245%	Avg 28%	--	--	--	40	min 3 inches nominal 6 inches of sand	Mechanical bucket	0.4 avg	
Matsushima Bay Japan (5)	200 to 375% Avg 275%	21 to 33% Avg 27%	160 to 175	115 to 130	5 to 35	10	12 inches of fine sand	Unknown	--	Deemed successful
Hudson Run Reservoir Barberton, OH	51 to 287% Avg 211%	26 to 66% Avg 34%	54 to 93 Avg 79	17 to 51 Avg 39	10 to 76 psf Avg 24 psf	5	12 inches of medium to coarse sand	Hydraulic with surface diffuser barge	--	Successful; minimal mixing noted in cores
Soda Lake Capping Casper, WY (6)	161 to 455% Avg 200%	18 to 38% Avg 33%	91 to 155	>50	Less than 280	0.5 to 12	3 feet of medium clean sand	Hydraulic with surface diffuser barge	--	Clear cap/sediment boundary; minimal mixing noted
Lower Fox River Phase 1, WI (7)	78 to 346% Avg 238%	22 to 56% Avg 32%	99 to 210	61 to 163	--	4 to 8 feet	6 inches of sand	Hydraulic with surface diffuser barge	0.4 avg	
Anacostia River, DC (8)	--	--	--	--	~40	--	--	--	1.6 avg	--
Lower Canal, S. of the South Closure, Bypass Canal Lake Charles, LA (9)	40 to 500% Avg 150%	15 to 70% Avg 40%	-	-	17 to 46 Typ 21	4 to 6	12 inches of fine to medium sand overlain by 6 inches of gravel	--	--	Minimal
Hiroshima Bay Sediments Japan (5)	80 to 100% Avg 88%	50 to 56% Avg 53%	60 to 75 Avg 68	22 to 38 Avg 31	20 to 85	65 to 70	12 to 20 inches of sand	Unknown	--	Deemed Successful
Lake Biwa Japan (5)	95 to 150% Avg 125%	40 to 51% Avg 44%	70 to 135 Avg 105	40 to 70 Avg 55	20 to 190	5	8 inches of medium sand	Unknown	--	Deemed Successful
G-P Log Pond Bellingham, WA (10)	97 to 175% Avg 142%	36 to 51% Avg 41%	65 to 175 Avg 105	36 to 79 Avg 61	65 to 277 Avg 144	3 to 15	6 inches to 8 feet of fine to medium sand	Mechanical bucket	--	Clear cap/sediment boundary
West Waterway CAD Seattle, WA (11)	Avg 91%	Avg 52%	Avg 73	Avg 39	Not measured	55 to 65	2 feet of uniformly-graded sand	Bottom dump barge	--	Clear cap/sediment boundary

Table 4.2
Sediment Cap Mixing Observations

			Atterberg Limits						Mixing Information	
Site	**Moisture Content**	**Percent Solids**	**LL**	**PI**	**Undrained Shear Strength (psf)**	**Water depth (feet)**	**Cap Design**	**Method of Placement**	**Measured (in)**	**Observed/General**
Stryker Bay, MN (12)	Avg 84.3%	--	Avg 62	Avg 37	15 to 264 Avg 69	<5	36 inches of sand with GAC mat / 12 inches of sand	Hydraulic with surface diffuser barge	--	undredged area settling - 2 to 4 inches, dredged area settling 0 to 2 inches
New London Disposal Site, CT (13)	--	--	--	--	--	~60	Dredged material	dump barge	--	No physical mixing noted
Grasse River - Capping Pilot Study, NY (14)	--	--	--	--	--	average 16	various	various	--	Cap/sediment mixing zone of less than 2 inches
Massachusetts Bay Disposal Site, MA (15)	--	--	--	--	--	~275	Dredged material	dump barge	--	Little to no sediment mixing noted
Central Long Island Sound disposal operations , NY (16)	--	--	--	--	--	~60	Dredged material	dump barge	--	Very clear chemical and visual boundaries; minimal mixing

Notes:
LL - liquid limit
PI - plasticity index (LL minus the plastic limit)
psf - pounds per square foot
-- - Data not available
References:
(1) Ward Cove Sediment Remediation Project: Design Analysis Report for the Marine Operable Unit of the Ketchikan Pulp Company Site. Hartman Consulting 2000
(2) Presentation - Status of Ex-Situ and In-Situ Treatment Methods Kevin H. Gardner, University of New Hampshire, Eric A. Stern, US EPA Region 2 2009
(3) Los Angeles Region Dredged Material Management - Design and Construction of the Aquatic Capping Pilot Project. Verduin et al. 2002
(4) Pilot Study Report for Silver Lake Sediments, Arcadis BBL 2008
(5) Guidance for In-Situ Subaqueous Capping of Contaminated Sediments. Palermo et al. 1998
(6) Experience in Capping Soft Sediments in a Refinery Wastewater Settlement Pond: Soda Lake, Wyoming. Houck et al. 2001
(7) Lower Fox River Phase 1 Remedial Action Draft Summary Report 2007. Shaw et al. 2008
(8) Personal communication with Dr. Danny Reible, April 7, 2009.
(9) Data Report, Sediment Characterization. Lake Charles, Louisiana. Anchor, 2003.
(10) Productive Reuse of Dredged Material: Capping of a Mercury Contaminated Sediment Site. Verduin et al. 2001
(11) Dredged Material is not Spoil: A Report on the Use of Dredged Material in Puget Sound to Isolate Contaminated Sediments. Sumeri 1996
(12) Personal communication with McGann. April 13, 2009
(13) Monitoring Survey at the New London Disposal Site. SAIC 2004
(14) Documentation Report - Grasse River Capping Pilot Study. BBL 2002
(15) The Massachusetts Bay Disposal Site Capping Demonstration Project. SAIC 2003
(16) Sediment Capping of Dredged Material Disposal Mounds: An Overview of the New England Experience 1979-1993. SAIC 1995

Table 4.3
Summary of Wind/Wave Erosion Protection Particle Grain Size

	Remediation Area A		Remediation Area B		Remediation Area C		Remediation Area D		Remediation Area E	
Water Depth (ft)	Particle Size	Minimum Thickness (inches)	Particle Size	Minimum Thickness (inches)	Particle Size	Minimum Thickness (inches)	Particle Size	Minimum Thickness (inches)	Particle Size	Minimum Thickness (inches)
20’ to 30’	Fine sand	3	Fine sand	3	Fine sand	3	Fine sand	3	Medium sand	3
15’ to 20’	Fine sand	3	Fine sand	3	Medium sand	3	Medium sand	3	Fine gravel	3
10’ to 15’	Fine sand	3	Medium sand	3	Medium sand	3	Medium sand	3	Fine gravel	3
8’ to 10’	Medium sand	3	Coarse sand	3	Fine gravel	3	Fine gravel	3	Coarse gravel	3
6’ to 8’	Coarse sand	3	Fine gravel	3	Fine gravel	3	Fine gravel	3	Coarse gravel	3
Surf zone to 6’	Fine gravel	3	Fine gravel	3	Fine gravel	3	Fine gravel	3	Cobbles	6
Within surf zone	Coarse gravel	3	Coarse gravel	3.5	Coarse gravel	4	Coarse gravel	4	Cobbles	6

Notes:

1. The breaking wave depth is approximately 3.5 ft in Areas A and B, 4 ft in Areas C and D, and 7 ft in Area E.

2. The erosion protection layer thickness will be the greater of either 1.5 times the largest particle diameter, or 2 times the median particle diameter. For practical application considerations for construction, the minimum erosion protection layer thickness will be 6 inches (0.5 ft).

Table 4.4
Estimated Cap Material Volumes

	Cap Area (acre)	Medium Sand (CY)	Coarse Sand (CY)	Medium Sand with GAC (CY)	Medium Sand with Siderite (CY)	Fine Gravel (CY)	Coarse Gravel (CY)	Coarse Gravel / Cobble (CY)	Total by Remediation Area (CY)
Remediation Area A	85.8	276,900	0	24,600	18,400	47,300	23,500	0	390,700
Remediation Area B	16.6	25,300	1,400	26,700	20,000	9,300	28,300	0	111,000
Remediation Area C	24.1	33,000	0	38,800	29,100	20,100	5,100	0	126,100
Remediation Area D	98.5	200,100	0	158,600	119,000	26,000	20,000	0	523,700
Remediation Area D Addendum	5.6	11,300	0	9,000	6,800	0	0	0	27,100
Remediation Area E	188.7	204,800	58,100	227,900	0	84,400	286,000	165,600	1,026,800
Remediation Area F	0.6	2,600	0	0	0	0	0	0	2,600
NMC Spits	1.9	5,400	0	3,100	2,300	0	2,300	0	13,100
Wastebed 1-8	2.5	7,900	0	3,000	3,000	0	3,000	0	16,900
Wastebed B outboard	16.4	46,300	0	31,400	12,500	0	19,800	0	110,000
Total by mat'l type		813,600	59,500	523,100	211,100	187,100	388,000	165,600	
			Total Sand (CY) 1,607,300				Total Gravel (CY) 740,700		

- Estimated cap material volumes assume average over-placements for each layer in water depth greater than 2 ft.
- Estimated cap material volumes assume a cap placements to within 6" of design elevation in 0-2 ft. water depths

Table 5.1
Estimated Dredge Volumes

Dredge Area	Dredge Areas				
	Dredge Area (sf)	Dredge Area (acre)	Appendix F Dredge Volume (cy)	Over Dredge Volume (cy)	Total Dredge Volume (cy)
RA-A	969,226	22.3	90,600	17,900	108,500
RA-B	118,586	2.7	15,500	2,200	17,700
RA-C	217,635	5.0	32,400	4,000	36,400
RA-D[1]	3,983,018	91.4	1,179,800	2,200	1,182,000
RA-E	2,910,022	66.8	355,100	53,900	409,000
RA-E (CSX)[2]	405,000	9.3	58,100	7,500	65,600
Total	8,603,487	197.5	1,731,500	87,700	1,819,200

Contingency Volume, 10%	181,900
Total Estimated Volume	2,002,000

1. Overdredge volume in RA-D is based on overdredging in nearshore habitat modules only (0 to 2 ft. water depth).

2. Stability of the nearshore region of RA-E is currently being evaluated due to the close proximity of the CSX railroad tracks to the dredge area. Dredge volumes in the table are conservatively assumed to be an average of 3.875 ft. in this area, to account for the amount of sediments that would be dredged including mean overplacements for each layer if there were no stability limitations.

Table 6.1
Lake Utilities Summary

Rem Area	Utility	Owner	Diam. (in)	Construction	Length from shore	Status
A	Pipeline (Western)	Honeywell	10?	Cast Iron	Unknown	Abandoned
A	Pipeline (Eastern)	Honeywell	10?	Cast Iron	Unknown	Abandoned
C	Westside Pumping Station Outlet	Metro	42	Reinforced Concrete Pipe	Unknown	Active
C	Tributary 5A Outlet	Honeywell	60	Steel with Concrete Headwall Structure	Approximately 40 ft	Active
C	NYDOT (I-690) Outfall	NYDOT	24	Ductile Steel Encased in Concrete	Approximately 20 ft	Active
D	Cooling Water Intake - Solvay	Honeywell	84	Corrugated Iron	1175 ft	Abandoned
D	Cooling Water Intake - Solvay	Honeywell	72	Cast Iron	1275 ft	Abandoned
D	Water Inlet Pipes (West) - Allied Chemical	Honeywell	42	Cast Iron	1230 ft	Abandoned
D	Water Inlet Pipes (Middle) - Allied Chemical	Honeywell	30	Cast Iron	1145 ft	Abandoned
D	Water Inlet Pipes (East) - Allied Chemical	Honeywell	16	Cast Iron	890 ft	Abandoned
D	Diffuser Pipeline from East Flume Pump Station	Honeywell	60	Coal Tar-lined Steel	825 ft from flowmeter	Abandoned
D/E	Sun Oil Pipeline	Sun Oil	8	Cast Iron	N/A	Abandoned
E	Metro Stormwater Drain	Metro	24	RCP	82 ft	Active
E	Metro Shoreline Outfall	Metro	96	RCP	75 ft	Active
E	Metro Deepwater Outfall	Metro	60	RCP	1640 ft	Not Currently Active