Project Duration

The project team estimated greater than four construction seasons to complete this alternative. The team deemed that mechanical removal of sediment from the lakes would be very slow.

Relative Water Quality Impact

The project team rated this alternative's relative water quality impact as high. This alternative involves removing all the water from the lakes for an extended period, resulting in a temporary disruption to the lakes' normal function.

Relative Aquatic Fauna Impact

The project team rated this alternative's relative aquatic fauna impact as high. Drawdown of the lakes would likely result in the loss of the lakes' entire fauna.

Relative BVW Impact

The project team rated this alternative's relative BVW impact as High. Drawdown of the lakes would temporarily impact the hydrology of bordering wetlands, which could lead to long-term changes of the wetland system.

Relative Traffic Impact

The project team rated this alternative's relative traffic impact as low. This alternative will require the smallest volume of truck traffic and truck access will be via a primary road.

Private Well Impacts

The project team rated this alternative's private well impact as high. Drawdown of the lakes could significantly affect the yields of shallow wells located near Elginwood Pond.

Aesthetic Impacts

The project team rated this alternative's aesthetic impacts as high. The team deemed that this alternative could create significant odor, visual, and noise impacts. There will be a high potential for odor impacts associated with the sediment drying, especially with the entire volume of the lake drying simultaneously. Dewatering pumps will have to operate around the clock for this alternative, creating a constant noise impact. The visual impact of fully dewatered lakes will also be significant.

Relative Upland Impact

The project team rated this alternative's relative upland impact as low. This alternative would not require development of vegetated upland.

4.2.4 Mechanical - Lagoon

Technical Feasibility

This alternative was deemed to be technically infeasible by the project team due to the expected difficulty in mechanically dredging the fine organic sediments in the lakes.

Cost

The project team did not estimate a cost for this alternative since it had been deemed technically infeasible.

Project Duration

The project team estimated greater than four construction seasons to complete this alternative. The team deemed that mechanical removal of sediment from the lakes would be very slow.

Relative Water Quality Impact

The project team rated this alternative's relative water quality impact as high. Mechanical dredging of the lakes' fine and organic sediment would create significant turbidity, which would be difficult to contain with turbidity barriers.

Relative Aquatic Fauna Impact

The project team rated this alternative's relative aquatic fauna impact as medium. Dredging would be conducted on a relatively small percentage of the lakes at any one time, which would allow much of the lake to remain undisturbed. However, expected water quality impacts associated with this alternative would be likely to impact aquatic fauna outside the work zone.

Relative BVW Impact

The project team rated this alternative's relative BVW impact as low. The alternative will not directly impact wetlands or their hydrology nor does it require significant construction within BVW buffer zone.

Relative Traffic Impact

The project team rated this alternative's relative traffic impact as High. This alternative will require the largest volume of truck traffic because sediments will have to be transported twice: once from the lakes to the dewatering lagoons and a second time from the lagoons to the re-use site.

Private Well Impacts

The project team rated this alternative's private well impact as medium. The mechanical dredging will not affect water elevations in the lake, so well yields will not

be impacted. However, the water quality impacts expected with this alternative could affect the quality of the water is these wells.

Aesthetic Impacts

The project team rated this alternative's aesthetic impacts as medium. Potential aesthetic impacts associated with this alternative include odor impacts during lagoon dewatering, and visual and noise impact of dredging equipment and dewatering facilities.

Relative Upland Impact

The project team rated this alternative's relative upland impact as high. This alternative would require significant upland development for the construction of dewatering lagoons and appurtenances.

4.3 Selection of Preferred Alternative

Based on the above evaluation the second alternative, hydraulic dredging with mechanical dewatering, is clearly the most viable option for the proposed project. Economically, this alternative has the lowest estimated cost. Environmentally, this alternative has the least impact on wetlands, wildlife, habitat, and water quality. Aesthetically, this option has the least disruptive to the natural surroundings. For these reasons, the project team has selected hydraulic dredging with mechanical dewatering as the preferred alternative for the Crystal Lake and Elginwood Pond Dredging Project.

5.0 SUMMARY

The City of Peabody is proposing to dredge Crystal Lake and Elginwood Pond. Several dredging and sediment dewatering technologies are available for this project. The project team identified four dredge process alternatives and evaluated them on multiple economic, environmental, and aesthetic criteria. Based on this evaluation, hydraulic dredging with mechanical dewatering is clearly the best alternative for this project from both an economic and environmental standpoint. Therefore, this alternative was selected as the proposed methodology for the Crystal Lake and Elginwood Pond dredge project.

SEDIMENT REUSE PLAN

CRYSTAL LAKE/ELGINWOOD POND DREDGING PROJECT PEABODY, MASSACHUSETTS

Prepared for:

Department of Community Planning and Development, City of Peabody

for Submittal to:

Executive Office of Environmental Affairs, MEPA Unit

Prepared by:

ENSR
155 Otis Street, Northborough, MA 01532

November 14, 2000

CRYSTAL LAKE/ELGINWOOD POND DREDGING PROJECT
PEABODY, MASSACHUSETTS
SEDIMENT REUSE PLAN

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Appendices

1.0 INTRODUCTION

The City of Peabody proposes to dredge Crystal Lake and Elginwood Pond to mitigate the effects of long-term cultural eutrophication. Approximately 90,000 cubic yards of sediment (in-lake volume) will be dredged from the lakes with approximately 60,000 and 30,000 cubic yards of sediment originating from Crystal Lake and Elginwood Pond, respectively. Once dried and consolidated the sediment volume will be reduced by approximately 25 to 50 percent yielding approximately 45,000 to 70,000 cubic yards of sediment for reuse. Several beneficial alternatives are available for reuse of the dredged sediment. This report has been prepared to summarize the evaluation of the available alternatives.

2.0 REUSE ALTERNATIVES

The City of Peabody evaluated numerous alternatives for the reuse of the material to be dredged from the lakes, including the following:

1. General use as a topsoil (without amendment),
2. General use as a topsoil amendment (mixed with sand),
3. Use as a topsoil amendment for several landfill closure projects,
4. Use in composting and/or various construction operations (with amendment), and
5. Daily Cover at several landfills.

Sites where the dredged materials could be re-used in the above ways were presented to the Massachusetts Department of Environmental Protection 401 Water Quality Certification program for review in a letter dated March 9, 2000. This letter is enclosed in **Appendix A**. The alternatives have been revised to incorporate the DEP's comments, which were included in a letter dated April 6, 2000. This letter is enclosed in **Appendix B**. The following is a more detailed description of these options.

2.1 Topsoil/Topsoil Amendment – GCR Landfill Closure, Peabody

Under this alternative, the dewatered sediment will be trucked directly from the belt filter press portion of the dewatering operation to the reuse site with no additional treatment or testing needed. The sediment would be stockpiled for use as a topsoil or topsoil amendment over the landfill as part of the capping process in the landfill closure. The City has selected this as the preferred alternative and begun discussions with GCR, the landfill owner. Closure of the landfill is an on-going activity and therefore the time frame when dewatered sediment could be received by the landfill is somewhat flexible. The demand for topsoil during the closure activity will allow all of the dredged material to be re-used at this site. The alternative will provide a beneficial re-use of the material.

This site was not part of the original set of sites described in the March 9, 2000 letter to DEP (**Appendix A**), however another site using the same application was included (see Section 2.3 below). The DEP Water Quality Certification program indicate that this use would require the approval of the DEP's Northeast Regional Office as part of the landfill's closure plan. In response, GCR submitted a request for guidance to the DEP regarding the use of the dredged material as the vegetative support layer at the landfill. DEP indicated in the letter included in **Appendix C** that "the use of such soil in the closure of a landfill constitutes a viable reuse of the sediment".

2.2 Daily Cover – Ash Monofill, Peabody

This alternative involves using the dredged material at the ash monofill in Peabody for use as daily cover on a continuing need basis. The site receives ash from a solid waste incinerator located at the North Andover Resource Recovery Facility. The monofill facility requires approximately 100-150 cubic yards per day for cover. One potential concern regarding this alternative is that the high water content of the dredged sediment may conflict with the monofill's daily cover permit conditions. For this reason, the dredged sediment might require additional drying before use at this site. Otherwise, this is a viable alternative because it will provide a beneficial reuse of the material, the need for material is continual and not time dependent and it will isolate sediment from contact with sensitive receptors. The DEP indicated that the lake sediment is suitable for this use with no further testing in its April 6, 2000 letter (Appendix B).

2.3 Topsoil Amendment – Landfill Closure, Lawrence - MHD # 602682

This alternative involves using the dredged material to make loam material needed for a landfill closure project in Lawrence. The material would be mixed in equal parts with sand to meet MassHighway's specification for Loam Borrow. The project will require approximately 14,000 cubic yards of material in 2001. The DEP has indicated that this use would require the approval of the DEP's Northeast Regional Office as part of the landfill's closure plan.

2.4 Composting/Topsoil Amendment – Bob Wood Trucking, Peabody

This alternative involves trucking the dredged material to Bob Wood Trucking where it would be amended with sand, loam, and/or compost. Bob Wood Trucking, located at Lakeland Industrial Park in Peabody would conduct these operations. Bob Wood is experienced in using this material, as he received de-watered sediment from the Hardy Pond dredging project in Waltham during 1999. He is fully able to comply with DEP recommendations as to the amount of amendments and ratios to be used when screening the finished project. As Mr. Wood has a large operation, he is able to receive all the material from this project on an on-going basis. He will also be able to accommodate the stockpile/staging area needs prior to use of the material. This option creates an advantageous re-use for the material in a number of ways, rather than disposal in a landfill.

The DEP has two concerns related to this use: (1) the proximity of the Wood Site to residential communities and other sensitive receptors (for odors), and (2) management of stormwater run-off at the site. The DEP would require these issues to be addressed, during the Water Quality Certification process, before approving this option.

2.5 Topsoil Amendment – Peabody Municipal Golf Course

This alternative was originally included in the set of possible sites for re-use of the material and involved using the dredged material for topsoil or topsoil amendment at the Peabody Municipal Golf Course. The topsoil material would be used as cover for a former waste site and for the ledge outcroppings surrounding the greens. Approximately 30,000 to 50,000 cubic yards of material (consisting of sediment mixed with sand) were needed. The DEP indicated that this use would be appropriate if post-dredging analysis shows the soils may be mixed with clean sand to meet the applicable soil quality standards. However, material was needed during the summer of 2000; since course construction is nearly complete, the window of opportunity to take advantage of this alternative has passed and therefore this alternative is no longer considered viable.

3.0 SUMMARY

The City of Peabody considered several beneficial reuse alternatives for sediments dredged from Crystal Lake and Elginwood Pond. The City selected reuse of the dredged materials as topsoil/topsoil amendment at the GCR Landfill closure in Peabody as the preferred alternative.

APPENDIX A

LETTER TO DEP

(March 9, 2000)

ENSR
Consulting • Engineering • Remediation

155 Otis Street
Northborough, MA 01532-2414
(508) 393-8558
FAX (508) 393-8647
http://www.ensr.com

March 9, 2000

Ms. Judy Perry
Massachusetts Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02106

Subject: Crystal Lake & Elginwood Pond, Peabody, MA
Dredge Material Reuse Alternatives

Dear Ms. Perry:

On behalf of the City of Peabody, we are seeking your opinion relative to 401 Water Quality Certification (314CMR9), regarding the current alternatives under consideration for reuse of dredged materials from Crystal Lake and Elginwood Pond in Peabody. We are seeking your input prior to filing a Notice of Project Change under the Massachusetts Environmental Protection Act (MEPA) process. As you know, the City of Peabody is proposing to dredge these ponds. We anticipate that the dredging operations will yield approximately 60,000 and 30,000 cubic yards of material (before drying) from Crystal Lake and Elginwood Pond, respectively.

The City is proposing to use a hydraulic dredge process with filter belt press dewatering, similar to the process used for Hardy Lake in Waltham, Massachusetts. The dewatering process will also involve the use of potable water grade polymers, such as Allied Colloid LT-24, to aid in sediment consolidation and improve filtrate quality. Filtrate will be returned to a temporary settling area enclosed by floating turbidity barriers in Crystal Lake. The dewatered sediment will be trucked directly from the dewatering operation to an off-site staging area. The following alternatives for reuse of the dredged material are currently under consideration:

1. General use as a topsoil (without amendment),
2. General use as a topsoil amendment (mixed with sand),
3. Topsoil amendment for several landfill closure projects,
4. Use in composting, and/or various construction operations (with amendment),
5. Daily Cover at several landfills, and
6. Disposal at a licensed facility.

The following is a more detailed description of these options.

Daily Cover – GCR Landfill, Peabody

This alternative involves using the dredged material at the GCR Landfill, an ash monofill, in Peabody for use as daily cover on a continuing need basis. The

Massachusetts Contingency Plan regulations (310CMR40). No detected concentrations were higher than the Soil-1/GW-1 standards. However, the reporting limits for some parameters slightly exceeded the Soils-1/GW-1 reporting standards on one or more of the collected samples. Therefore, we cannot definitively conclude that the sediment meets the Soil-1/GW-1 reporting limits for the following parameters:

Pesticides

- Aldrin
- Dieldrin

Polynuclear Aromatic Hydrocarbons (PAHs)

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Dibenz(a,h)anthracene
- Indeno(1,2,3-cd)pyrene

We have also compared the chemical analytical results to the 90th percentile soil background concentrations (ref: Interim Final Policy WSC/ORS-95-141) for Massachusetts. Results indicated that the concentrations of several parameters exceed the 90th percentile concentrations at one or more locations. Detection limits for parameters were also higher than the 90th percentile background concentrations. The following table compares the sediment analytical results to the 90th percentile soil results for the parameters in question. A table summarizing all of the sediment analytical results is attached.

Sediment Quality Monitoring Results Comparison

Parameter	90th Percentile Soil Conc. (ppm)	Monitoring Results by Composite Sample					
		CL-1 (ppm)	CL-2 (ppm)	CL-3 (ppm)	EP-1 (ppm)	EP-2 (ppm)	EP-3 (ppm)
Arsenic	17	<16.9	**<27.0**	**<17.6**	<14.7	<10.8	<14.9
Cadmium	2	**<5.64**	**<8.99**	**<5.87**	**<4.90**	<3.60	**<4.96**
Chromium (total)	29	28.8	**36.0**	13.1	**45.6**	**49.4**	**40.1**
Copper	38	24.8	**48.6**	34.1	**38.7**	**50.1**	**40.1**
Lead	99	68.8	**172.0**	**113.0**	41.7	**160.0**	**135.0**
Mercury	0.9	**<1.22**	**<1.99**	**<1.11**	**<1.14**	**<0.874**	**<1.13**
Nickel	17	**18.0**	**25.2**	**20.6**	**39.7**	**89.0**	**43.6**
Zinc	116	83.5	**164.0**	98.1	68.6	**151.0**	106.0

Materials that meet the highest MCP standards but exceed one or more of the 90th percentile background concentrations by 50 percent or less will be classified for use un-ammended as landfill daily cover, or for mixing with sand as topsoil in a ratio of 1:1 (sand:dredged material) or greater.

C. Meets SOIL-1/ GW-1 but exceeds 90th Percentile Background by more than 50%

Materials that meet the highest MCP standards but exceed one or more of the 90th percentile background concentrations by 50 percent or less will be classified for use as landfill daily cover.

D. Exceeds SOIL-1/GW-1 Standards

We do not expect any of the soils to fall within this category based on the soil quality testing already performed, however any materials that exceed Soil-1/GW-1 standards will be classified as suitable only for disposal in an appropriate landfill.

The following matrix summarizes these re-use options.

Sediment Reuse Alternative Matrix

Use Option	Stockpile Classification			
	A. Meets All Standards	B. Exceeds 90th Percentile by <50%	C. Exceeds 90th Percentile by >50%	D. Exceeds GW-1/Soil-1/Standards
1. Topsoil – Unamended	✓			
2. Topsoil Amendment Mixed 1:1 with Sand	✓	✓		
3. Composting	✓			
4. Landfill Topsoil – Mixed 1:1 with Sand	✓	✓	✓	
5. Landfill Daily Cover	✓	✓	✓	
6. Landfill Disposal				✓

Proposed Protocol

Given the above alternatives and the known information regarding the quality of the sediments, we propose the following protocol for use of the dredged materials:

1. Perform Hydraulic Dredging Activity as discussed above.
2. Dewater dredged material using belt filter press technology. Dewatered dredge material will be conveyed directly to dump trucks.
3. Collect one soil sample per truckload (approximately 1 per 20 cubic yards).
4. Truck de-watered sediment from processing site to a temporary staging site located in Peabody. Segregate Dredged material into stockpiles of approximately 1,000 yards (approx. 1 week's product).
5. Develop one composite sample for each stockpile as it is completed and submit to a Massachusetts licensed laboratory for chemical analysis for the following parameters:

Metals
- Arsenic
- Cadmium
- Chromium
- Copper
- Lead
- Mercury
- Nickel
- Zinc

Pesticides
- Aldrin
- Dieldrin

Polynuclear Aromatic Hydrocarbons (PAHs)
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Dibenz(a,h)anthracene
- Indeno(1,2,3-cd)pyrene

6. Based on the results of the chemical analysis, each stockpile will be classified for re-use as follows.

A. Unregulated

A stockpile will be designated as unregulated and suitable for any reuse if laboratory results indicate that the stockpile meets the Soil-1/GW-1 standard and the 90th percentile background.

B. Meets SOIL-1/ GW-1 but exceeds 90th Percentile Background by less than 50%

We request that you respond in writing, by March 24, 2000, to confirm that our proposed approach is tenable. Specifically we are interested in your comments regarding the following:

- use of a temporary staging area,
- reuse alternatives,
- soil monitoring parameters, and
- sample collection and consolidation frequency.

Please do not hesitate to call the undersigned if you have any questions or require additional information in this matter.

Sincerely,
ENSR

Matthew J. Kennedy, PE
Senior Engineer

attachments

cc: Vera Kolias, City of Peabody
Ken Wagner, ENSR
Mike Toohill, ENSR

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CRYSTAL LAKE AND ELGINWOOD POND SEDIMENT ANALYSIS

	GW-1, SOIL-1 Reportable Standards (ppm)	Results (ppm)					
Total Metals		**CL-1**	**CL-2**	**CL-3**	**EP-1**	**EP-2**	**EP-3**
Arsenic	30	<16.9	<27.0	<17.6	<14.7	<10.8	<14.9
Cadmium	30	<5.64	<8.99	<5.87	<4.90	<3.60	<4.96
Chromium (total)	1000	28.8	36.0	13.1	45.6	49.4	40.1
Copper		24.8	48.6	34.1	38.7	50.1	40.1
Lead	300	68.8	172.0	113.0	41.7	160.0	135.0
Mercury	20	<1.22	<1.99	<1.11	<1.14	<0.874	<1.13
Nickel	300	18.0	25.2	20.6	39.7	89.0	43.6
Zinc	2500	83.5	164.0	98.1	68.6	151.0	106.0
Total Contaminant Leaching Procedure Metals							
Arsenic	5	<0.015	<0.015	<0.015	<0.015	<0.015	<0.030
Barium	100	0.042	0.056	0.050	0.057	0.132	0.083
Cadmium	1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium	5	<0.005	0.071	<0.005	<0.005	<0.005	<0.010
Lead	5	<0.010	<0.015	<0.015	<0.015	<0.015	<0.020
Mercury	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	1	<0.015	<0.015	<0.015	<0.015	<0.015	<0.030
Silver	5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020
PCBs (total)	2						
PCB-1016		<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
PCB-1221		<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
PCB-1232		<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
PCB-1242		<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
PCB-1248		<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
PCB-1254		<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
PCB-1260		<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Pesticides							
Aldrin	0.03	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
alpha-BHC		<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
beta-BHC		<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
delta-BHC		<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
gama-BHC (Lindane)		<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Chlordane	1	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
DDT and derivatives	2	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Dieldrin	0.03	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Endosulfan and derivatives	20	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Endrin/Endrin aldehyde	0.6	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Heptachlor/heptachlor epoxide	0.06-0.1	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Toxaphene		<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Extractable Petroleum Hydrocarbons							
C9-C18 Aliphatics	1000	<33	<33	<33	<33	<33	<33
C19-C36 Aliphatics	2500	<33	<33	<33	<33	280	<33
C11-C22 Aromatics	200	<33	<33	<33	<33	49	<33
Unadjusted C11-C22 Aromatics		<33	<33	<33	<33	49	<33

CRYSTAL LAKE AND ELGINWOOD POND SEDIMENT ANALYSIS

	GW-1, SOIL-1 Reportable Standards (ppm)	Results (ppm)					
Polynuclear Aromatic Hyrdocarbons							
Acenaphthene	20	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Acenaphthylene	100	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Anthracene	1000	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Benzo(a)anthracene	0.7	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Benzo(a)pyrene	0.7	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Benzo(b)fluoranthene	0.7	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Benzo(k)fluoranthene	7	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Benzo(ghi)perylene	1000	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Chrysene	7	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Dibenz(a,h)anthracene	0.7	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Fluoranthene	1000	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Fluorene	400	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Indeno(1,2,3-cd)pyrene	0.7	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
2-Methylnaphthalene	4	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Naphthalene	4	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Phenanthrene	100	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Pyrene	700	<0.851	<0.133	<0.913	<0.866	<0.617	<0.143
Volatile solids (% organic)		59	51	29	50	24	31
Total solids (% non-liquid)		16	12	23	14	23	16
Grain size analysis (sieve/hydrometer)							
Sieve No. 4 (4.75 mm)		ND	ND	ND	ND	ND	ND
Sieve No. 10 (2.00 mm)		ND	ND	ND	1.2	0.6	1.1
Sieve No. 40 (0.425 mm)		12.1	3.2	12.3	7.4	1.3	1.1
Sieve No. 200 (0.075 mm)		37.8	38.1	20.1	37	18.8	21.8
Passing 200		50	58.6	36.8	54.3	79.2	75.9

Detection limit exceeds reportable standard

APPENDIX B

DEP LETTER

(April 6, 2000)

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

ARGEO PAUL CELLUCCI
Governor

JANE SWIFT
Lieutenant Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

April 6, 2000

Matthew J. Kennedy, P.E.
ENSR
155 Otis Street
Northborough, MA 01532-2414

Re: Water Quality Certification review (T# 136371)
Peabody, Crystal Lake and Elginwood Pond Dredging
Dredged material reuse options

Dear Mr. Kennedy:

The Department has reviewed your letter of March 9, 2000 containing reuse alternatives for the dredged material. We understand dredging would be done using the "Hardy Pond" method involving hydraulic dredging followed by dewatering using belt filter presses, and that the volume dredged would be 60,000 cy for one pond and 30,000 cy for the other. We indicated in our August 1999 letter to the City that the sediments exceeded the Department's criteria for unrestricted upland reuse of sediments.

Concerning the reuse alternatives you have described in your letter:

1. Use as daily cover at GCR Landfill, Peabody on a continuing need basis. This is a lined landfill. None of the sediment contaminants exceeds DEP policy thresholds for this use. This option can be authorized in the WQC without further sediment testing.

2. Mix the dredged material with sand and make loam for Lawrence Landfill closure. DEP approval is required from the Northeast Regional Office in Wilmington for this alternative to be part of that landfill's closure plan.

3. Stockpile dredged material at Bob Wood Trucking, then amend with sand and loam to produce fill for Peabody Municipal Golf Course, cover for GCR landfill, and other uses. DEP is opposed to stockpiling the material without first having ENSR provide information on (1) the proximity of the Wood site to residential communities and other sensitive receptors (for odors), and (2) management of stormwater run-off at the site. We will need to see a plan addressing both issues for the Wood site.

The dredged material exceeds Massachusetts Soil Background concentrations by a few parts per million in the case of several metals (arsenic, chromium, copper, lead, nickel). Elginwood Pond sediment's average nickel concentration exceeds the nickel criterion by a factor of over 3. Mercury concentrations

could not be compared to the 0.3 ppm Soil Background concentration since the laboratory detection limit was from 1 to 9 ppm. Also, MCP standards for S-1/GW-1 would need to be met for the reuse of the dredged material as soil in upland areas, and several PAH compounds were reported as "less than" values which slightly exceeded the MCP standard of 0.7 ppm. DEP is not opposed to mixing the dredged material with clean sand or soil to make it more suitable for reuse elsewhere.

Prior to such use, if approved, DEP will require testing of each 1000 cubic yard stockpile at the rate of 10 representative grab samples composited (5 and 5) into two samples for analysis.

In summary, the Department strongly recommends that the dewatered dredged material be used at the GCR Landfill in Peabody and that it be stockpiled there, if necessary. Further information will be needed by the Department before any determination can be made on permitting the stockpiling of the dredged material at the Wood site. Further chemical analysis will be needed by the Department, as noted above, before the amended dredged material may be used at other upland sites.

Please contact Judith Perry (617-292-5655 if you have questions about our review.

Yours truly,

Lois Bruinooge, Director
Wetlands and Waterways Program
Division of Watershed Management

cc: Vera Kolias, Dept. of Community Development & Planning, Peabody City Hall, Peabody, MA 01960
Ed MacDonald, DEP/NERO – Solid Waste Management
Steve Lipman, DEP/Commissioner's Office, Boston
401 File

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APPENDIX C

DEP LETTER REGARDING USE OF DREDGE MATERIALS AT GCR LANDFILL

(October 16, 2000)

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Metropolitan Boston – Northeast Regional Office

ARGEO PAUL CELLUCCI
Governor

JANE SWIFT
Lieutenant Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

OCT 16 2000

William Roberts
GCR, Inc.
12 Washington Street
Wellesley, MA 02181

RE: PEABODY – Solid Waste
GCR Landfill
Use of Dredge Spoil in
Vegetative Support Layer
FMF # 39620

Dear Mr. Roberts:

The Metropolitan Boston/Northeast Regional Office of the Department of Environmental Protection, Bureau of Waste Prevention, Solid Waste Management Section has reviewed your request for guidance regarding the use of dredge spoil as soil in the vegetative support layer at the GCR Landfill, Farm Avenue, Peabody, MA (the "landfill"). This request was submitted, by letter dated July 20, 2000, on GCR's behalf by Coneco Engineers & Scientists, Bridgewater, MA.

GCR, Inc. proposes to use soils dredged from Crystal Lake and Elginwood Pond in Peabody, MA as vegetative support soil in the completion of the closure of the landfill. Both ponds are freshwater water bodies. The sediments consist of fine grained "mucks" with a high organic content.

Based on the provided data, the Department has determined that the use of such soil in the closure of a landfill constitutes a viable reuse of the sediment. The Department, therefore, concurs with your proposal to use the dredge spoil from Crystal Lake and Elginwood Pond provided the spoils are:

1. dewatered prior to placement to remove free draining water,

2. mixed with other soils and/or other additives as necessary to yield:
   a. an organic content compatible with the post closure use of the site,
   b. a grain size distribution suitable for maintaining:
      i. adequate control of erosion,
      ii. a soil structure suitable for vegetation root growth,

3. managed to prevent odors and/or other nuisance conditions.

If you have any questions regarding this matter please contact David Adams at 978-661-7661.

Sincerely,

David C. Adams
Environmental Engineer
Solid Waste Management

Sincerely,

Edward H. MacDonald
Regional Engineer for
Waste Prevention

EHM/DCA/dca

cc: City of Peabody, Department of Human Services, 24 Lowell St., Peabody, MA 01960
Coneco Engineers & Scientist, 4 First St., Bridgewater, MA 02324, attn: Richard Debenedicitis
DEP/BWP/Boston, attn: Paul Emond
DEP/BRP/Boston, attn: Yvonne Unger

ATTACHMENT D:
WATERSHED MANAGEMENT PLAN

WATERSHED MANAGEMENT PLAN

CRYSTAL LAKE/ELGINWOOD POND DREDGING PROJECT PEABODY, MASSACHUSETTS

Prepared for:

Department of Community Planning and Development, City of Peabody

for Submittal to:

Executive Office of Environmental Affairs, MEPA Unit

Prepared by:

ENSR
155 Otis Street, Northborough, MA 01532

November 13, 2000

APPENDIX C

DEP LETTER REGARDING USE OF DREDGE MATERIALS AT GCR LANDFILL

(October 16, 2000)

ATTACHMENT D:
WATERSHED MANAGEMENT PLAN

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CRYSTAL LAKE/ELGINWOOD POND DREDGING PROJECT PEABODY, MASSACHUSETTS

Prepared for:

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APPENDIX C

DEP LETTER REGARDING USE OF DREDGE MATERIALS AT GCR LANDFILL

(October 16, 2000)

CRYSTAL LAKE/ELGINWOOD POND DREDGING PROJECT
PEABODY, MASSACHUSETTS
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1.0 WATERSHED SETTING

Crystal Lake and Elginwood Pond receive runoff from an urban watershed within Peabody and Lynnfield (see **Figure 1**). Both ponds receive high sediment and nutrient loads, resulting in decreased water quality and an accelerated rate of sedimentation.

Elginwood Pond, which has three inflow points (discharge from Crystal Pond, the main stem of the headwaters to Norris Brook, and a small unnamed tributary) has sediment depths averaging three feet, and water depths on the average of one to three feet. Sedimentation is particularly severe in the arm of Elginwood Pond that receives runoff from a large (2,140-acre) urbanized watershed. Soil loss equations show that expected annual losses from the watersheds to the pond cannot fully account for the levels of sediment accrual observed in the pond (especially from the 200 acre watershed of the unnamed tributary to the Norris Brook system). The sediment ranges from fine/medium-grained sands to silty mucks. Much of the sediment load from the 200 acre urbanized watershed appears to be coming from street sanding in the winter. Internal productivity (due to high in-lake nutrient levels) appears to account for the sedimentation near the center and outlet end of the lake.

Crystal Lake also exhibits reduced water depths (averaging four feet) and deep sediments (averaging six feet), much of it from long-term cultural eutrophication. The watershed to Crystal Lake is relatively small (approximately 300 acres) but heavily urbanized. Although inflows of suspended solids to the pond are an issue, the accumulation of sediment within Crystal Lake appears to be more of a function of internal productivity than of exogenous input. Nutrient inputs to the lake are high and the flushing rate of the lake is slow enough to allow for significant internal productivity in the system. These two factors help sustain high productivity levels in the pond and high sedimentation rates of the plants produced in the system. The high organic content of the sediment samples taken from Crystal Lake (75% total volatile solids versus 28% for Elginwood Pond) helps support this hypothesis.

2.0 WATERSHED MANAGEMENT GOALS

The principal goal of the Crystal Lake/Elginwood Pond Watershed Management Program is to ameliorate the influences of cultural eutrophication by:

- minimizing the volume of suspended solids entering the lakes, and
- reducing the mass of nutrients entering the ponds via non-point sources.

The following is a discussion of these goals.

2.1 Reduce Suspended Solids Load

The first goal of the watershed management plan is to reduce the overall sediment load to the lakes, particularly that related to road sanding. Reducing the sediment load comprises an important step to minimize future incremental loss of lake volume, once dredging has been completed. The Watershed Management Plan focuses on two sources of sediment:

- road sand, and
- construction site erosion.

Road sanding is currently the most significant contributor of sediment volume to lakes. Reducing this load may be accomplished by reducing application rates, or by providing BMPs for sediment removal. Reducing the wintertime sand application rates could create an unacceptable public safety risk, unless the application of road salt is significantly increased, which would not be a beneficial tradeoff with respect to water quality. Therefore the watershed management plan is geared towards removing the sand from stormwater before it enters the lakes. Fortunately road sand has a large grain size relative to the spectrum of suspended solids, which allows it to settle quickly. Therefore, relatively small BMPs can be used to remove most of the sediment related to roadway sanding.

Since the majority of the watershed to the lakes is already developed, construction site erosion is a much smaller contributor than it once was. However, construction related erosion can result in a large volume of sedimentation over a short time. Therefore, effective control of erosion and sedimentation from infill development could significantly reduce sediment loads.

2.2 Reduce Nutrient Load

The second goal of the watershed management plan is to reduce the nutrient loads to the lakes. The two nutrients of primary concern are phosphorus and nitrogen. Much of the phosphorus that enters a pond system comes as particulate-bound, rather than dissolved, loading. Reducing the sediment load before it enters the ponds should help decrease phosphorus inputs. Removal of the nutrient-rich sediment from the ponds will also limit the availability of phosphorus to the systems. Nitrogen loading is more difficult to manage because most of it is in dissolved form, but control of phosphorus can help achieve water quality goals in this case, because algae growth in the lakes is phosphorus limited.

3.0 WATERSHED MANAGEMENT PROGRAM

The City has devised a comprehensive watershed management plan to meet the stated objectives. The plans include structural, procedural, educational, and regulatory measures. The following is a description of these elements.

3.1 Structural Stormwater Practices

The watershed management plan includes several structural measures for reducing the sediment load to the lakes. The following structural stormwater controls will be implemented into the lakes' stormwater management plan:

- sediment forebays, and
- deep sump catchbasin retrofit.

A brief description of each control follows:

3.1.1 Sediment Forebays

Sediment forebays will be constructed in Crystal Lake and Elginwood Pond at the outlets from the major stormwater outfalls to the Lakes. **Figure 2** depicts the locations of the proposed forebays. The main purpose of the forebays is to collect coarse sediments, mainly road sand, in a defined area before they enter the main body of each lake. Forebays facilitate routine maintenance by concentrating the incoming sediments in a well defined, centralized and accessible location away from resource areas. Since wintertime road sanding is currently the primary source of new sediments to the ponds, the forebays will be an effective means of controlling re-sedimentation of the lakes.

Creation of sediment forebays will also contribute to reducing nutrient inputs to the lakes. Much of the phosphorus that enters a pond system comes as particulate-bound, rather than dissolved, loading. Settling the sediment load out before it enters the ponds should help decrease phosphorus inputs.

3.1.2 Deep Sump Catchbasin Retrofit

The City is also instituting a program of catch basin retrofitting in the lakes' watershed. Existing standard catch basins will be retrofit with deep sump catch basins as part of future roadway improvement projects. The purpose of this action is to provide greater capacity for removal of road sand in the watershed.

3.2 Procedural Stormwater Practices

The watershed management plan includes several procedural controls to reduce the mass of sediment and nutrient discharges to the lakes, including:

- catchbasin inspection and maintenance,
- forebay inspection & maintenance,
- street sweeping, and
- construction site inspections.

A brief description of each measure follows:

3.2.1 Catchbasin Inspection and Maintenance

The City will give inspection and maintenance of catch basins in the lakes' watershed the highest priority. The City will inspect the catch basins in the watershed twice yearly - before winter and in the spring. Catch basins will be cleaned when more than 25 percent of their capacity has been filled.

3.2.2 Forebay Inspection & Maintenance

The City will regularly inspect the forebays constructed in the lakes. A standpipe will be incorporated into each forebay to measure sediment accumulations. The forebays will be cleaned when greater than 25 percent of the their capacity has been consumed.

3.2.3 Street Sweeping

The City sweeps streets in the watershed annually in the spring. Streets in the lakes' watershed will be scheduled to be swept first. This street sweeping removes a portion of the sand applied in the winter before it is washed to the lakes.

3.2.4 Construction Site Inspections

Proper sediment and erosion control for construction sites is a key part of the watershed management plan. It is much more difficult to remove suspended fine sediments than it is to prevent suspension in the first place. The City will inspect all construction sites within the watershed at least once for adherence to proper sediment and erosion control procedures.

3.3 Watershed Management Education

The City has developed a watershed management education program for Crystal Lake and Elginwood Pond, including:

- watershed management pamphlet,
- neighborhood outreach meetings, and
- watershed management web page.

3.3.1 Watershed Management Pamphlet

The City is currently designing a watershed management pamphlet for distribution to all households within the lakes' watershed. The purpose of the pamphlet will be to inform the members of the watershed community that they live in the lake's watershed and that their individual actions and practices affect the long-term quality of the lakes. This pamphlet will cover several topics related to the goals of the watershed management program including:

- lake background information,
- brief discussion of the dredging project,
- recommended lawn fertilizer practices,
- recommended management practices for oil and hazardous materials,
- discussion of sediment and erosion control practices,
- discussion of xeriscaping practices,
- reference to the watershed management web page, and
- list of watershed management references.

The city has received a grant from the Massachusetts Department of Environmental Management *2000 Lake and Pond Grant Program* to aid in the cost of printing these pamphlets. A copy of the grant application, award letter and brochure are included in **Appendix A**. The City plans to distribute the pamphlets to coincide with the start of the dredging projects. The City will redistribute new pamphlets to the community every 2 to 3 years because watershed management must be implemented as a long-term ongoing activity to be successful.

3.3.2 Neighborhood Outreach Meetings

The City will periodically conduct informational meetings for the watershed community to discuss issues related to the citizen's role in protection of the lakes. The first meeting will be scheduled to coincide with the commencement of lake dredging and will include a discussion of the need for the dredging project, as well as the controls that will be required to combat future cultural eutrophication. After this first informational meeting, meetings will be planned every 2 to 3 years.

3.3.3 Watershed Management Web Page

The City will create a web page on the City of Peabody Web Site (www.ci.peabody.ma.us). The site will include information relative to the dredging project, a discussion of the key components of the watershed management plan, and information regarding the community's role in watershed management.

3.4 Regulatory Measures

The City has several existing and proposed regulations related to management of the lakes' watershed, including:

unless the applicant, in addition to meeting, the otherwise applicable requirements of this ordinance, has proved by a preponderance of the evidence that (1) there is no practicable alternative to the proposed project with less adverse effects, and that (2) such activities, including proposed mitigation measures, will have no significant adverse impact on the areas or values protected by this ordinance....

- Wetland Loss & Artificial or Replacement Wetlands - To prevent wetlands loss, the Commission shall require applicants to avoid wetlands alteration wherever feasible; shall minimize wetlands alteration; and, where alteration is unavoidable, shall require mitigation.... All removal, filling, dredging, or altering of any wetland shall be mitigated by the creation of artificial or replacement wetlands, with the replacement wetland built at one hundred and fifteen (115) percent of the size of the area which was disturbed...
- Dimensional Regulations -
  - Underground Storage Tanks for chemicals and petroleum products, regardless of size, shall not be located within one hundred (100) feet of any resource area.
  - No paddock shall be located within one hundred (100) feet of any resource area.
  - Commercial, Institutional, Industrial Structures and associated parking facilities shall not be installed within one hundred (100) feet of any resource area.
  - Any other structure requiring a building permit, including but not limited to, dwellings, garages, decks, storage sheds, swimming pools, etc. shall not be installed within 75 ft of any resource area.
  - Driveways and utility service connections or mains shall not be installed within twenty five (25) feet of any resource area.
  - Manure shall not be stockpiled or stored within one hundred (100) feet of any resource area.

- City of Peabody stormwater management plan ordinance, and
- City of Peabody wetland protection ordinance.

The following is a description of the watershed management provisions of each of these regulations:

3.4.1 City of Peabody Stormwater Management Plan Ordinance

The City is currently adopting a regulation governing stormwater management for the entire City of Peabody. This regulation will require stormwater management for all commercial and industrial projects and for residential projects over 0.5 acres. The regulation will includes the following standards for stormwater management:

- Control of post-development peak discharges to not exceed existing discharges for the 2, 10, 25, and 100-year, 24-hour storms,
- Control of post-development discharge volume to not exceed existing volume for the 10-year, 24-hour storm,
- Treatment of stormwater discharges to achieve 80 percent total suspended solids removal, and
- Infiltration measures to approximate pre-development conditions.

Although, the City has not formally adopted this regulation at this time, its provisions are already being applied to new developments. A draft copy of the regulation is enclosed in **Appendix B**.

3.4.2 City of Peabody Wetland Protection Ordinance

The City's wetland protection ordinance governs work within wetland resource areas and their associated 200-foot buffer zones. Therefore, this regulation applies to work done adjacent to the lakes or their tributaries, but not the entire watershed. This regulation requires specific performance standards for work under its jurisdiction, including the following:

- No Build Zone - Lands within two hundred (200) feet of rivers, ponds and lakes, and lands within one hundred (100) feet of other resource areas, are presumed important to the protection of these resources .... The Commission therefore, may require that the applicant maintain a strip or buffer of continuous, undisturbed vegetative cover within the one hundred (100) or two hundred (200) foot area, respectively, ...Said buffer shall be known as the "No-build Zone." Within the No-build Zone established by the Commission, no grading, planting, site work, construction, or storage is allowed. Vegetation in the No-Build Zone shall not be cut or trimmed in any manner. This condition shall be maintained in perpetuity....
- Storm Water & Drainage Requirements - All work subject to review under this ordinance shall conform to the Storm Water Rules and Regulations of the city of Peabody, and all federal, state, and local drainage regulations.
- Rivers and Streams -In the review of areas within two hundred (200) feet of rivers and streams, no permit issued hereunder shall permit any activities