CITY OF BURNABY

ENVIRONMENT AND WASTE MANAGEMENT COMMITTEE

HIS WORSHIP, THE MAYOR
AND COUNCILLORS

Re: Burnaby Lake Pilot Dredging Project

RECOMMENDATIONS:

1. ***THAT*** Council receive this report for information.

2. ***THAT*** Council authorize staff to undertake an extended lake water quality program at a cost of approximately $20,000 as described in this report and to pursue further discussion with regulatory agencies on construction requirements for future dredging opportunities.

3. **THAT** a copy of this report be forwarded to the Parks & Recreation Commission, GVRD Parks Department, Fisheries & Oceans, the Ministry of Environment, Lands & Parks, Burnaby Lake Advisory Association and Burnaby Streamkeepers and further that the contents of the report be incorporated into the planning process for the lake master plan.

REPORT

The Environment and Waste Management Committee, at its meeting held on 1999 November 09, received and adopted the *attached* report summarizing the results of the Burnaby Lake Pilot Dredging Project. The report noted that the pilot project provided excellent data and knowledge for future dredging program analysis. The report concluded by outlining four options for a potential large scale dredging program.

Arising from discussion, the Committee requested that the results of the pilot dredging project be incorporated into the planning process for the lake master plan.

Respectfully submitted,

:COPY - CITY MANAGER
- DIRECTOR ENGINEERING
- DIRECTOR FINANCE
- DIR. PLNG. & BLDG.
- DIR. PARKS, REC. & CULT. SERV.

Councillor D. Johnston
Chair

Councillor C. Redman
Member

Councillor D. Lawson
Member

TO:	CHAIRPERSON & MEMBERS ENVIRONMENT & WASTE MANAGEMENT COMMITTEE	**DATE:**	1999 11 02
FROM:	DIRECTOR ENGINEERING	**FILE:**	40-09-03

SUBJECT: BURNABY LAKE PILOT DREDGING PROJECT

PURPOSE: To provide the Committee and Council with a final summary report on the Burnaby Lake Pilot Dredging Project.

RECOMMENDATION:

1. **THAT** the Committee recommend to Council that:

   a) this report be received for information;

   b) staff be authorized to undertake an extended lake water quality program at a cost of approximately $20,000 as described in this report and to pursue further discussion with regulatory agencies on construction requirements for future dredging opportunities;

   c) a copy of this report be forwarded to the Parks & Recreation Commission, GVRD Parks Department, Fisheries & Oceans, and the Ministry of Environment, Lands & Parks.

REPORT

1.0 INTRODUCTION

Council, at its regular meeting of 1999 July 12, awarded a contract to Trimax Residuals to undertake the pilot dredging work in Burnaby Lake. The dredging work commenced on August 20 and was complete by 1999 September 16. Extensive sediment and process water sampling program was conducted during the pilot dredging program to assist in developing management options for Burnaby Lake. The sampling results have now been compiled and evaluated with respect to future dredging considerations.

The purpose of this report is to summarize the knowledge gained through the pilot program and to outline the issues and financial implication related to future large scale lake dredging undertakings.

2.0 RESULTS - DREDGING AND DEWATERING

2.1 Dredging Operations

- The dredging machine selected for the job has adequate capacity to perform the task of removing lake bed sediments and surface vegetation.

- The warm, dry weather combined with low lake levels during the summer months presented difficulty for the dredge to navigate in some parts of the pilot area. The use of a self-propelled dredge as opposed to the cable system used in the pilot project would offer greater efficiency.

- For large scale dredging operations, an optimum dredging-processing operation may be achieved with the use of two dredging machines.

- The use of silt fence is effective in mitigating the migration of disturbed lake bed sediments beyond the work area.

- The City parking area located to the north of the Rugby Club is a suitable site for the treatment operations. The site can be used for future dredging by extending the dredge pipe length and adding additional pumps.

- The low impact of the dredging operations on the surrounding environment indicates that the operations could be extended year round subject to regulatory agency approvals.

2.2 Dewatering and Treatment Operations

- The goal of the treatment process, to obtain a treated water quality of no more than 25 mg/l of Total Suspended Solids (TSS) and 5 Nephelometric Units (NTU) of turbidity above the existing lake levels as set by the regulatory agencies is achievable.

  Operation and cost efficiency may be gained if the water quality standards are relaxed for a lower treatment level, without compromising the overall water quality in Still Creek and the Lake.

- The use of centrifuges and polymer is the best option for the dewatering and treatment operations. The mixed sediment and vegetation removed from the lake presented no difficulty to the dewatering process.

- Results of the sediment sampling program indicated that concentrations of poisonous metals such as arsenic, lead, mercury and chromium were below the Provincial soil quality standards for residential, commercial and industrial land use in all samples. However, some dewatered sediments contained elevated levels of zinc, Polycyclic Aromatic Hydrocarbons (PAH's), and Heavy Extractable Petroleum Hydrocarbons (HEPH's) which exceed the Provincial standards for residential use. With the exception of a very small percentage of sediment samples, the test results generally indicated that the sediments meet the Commercial/Industrial land use standards. For future large scale dredging project, discussion with the Ministry of Environment on the sediment quality and disposal options should be pursued to minimize sediment disposal cost.

- The environmental monitoring program conducted during the pilot program confirmed that the treatment process is operating well within the environmental guidelines and the option of a 24 hour operation to improve cost efficiency for large scale projects should be investigated and pursued.

3.0 FUTURE LARGE SCALE DREDGING PROGRAM

As the purpose of the pilot dredging program is merely to confirm the technical and environmental feasibility of dredging and treating the lake bed sediment, no decision has been made on future dredging program and the optimum volume. Information and data obtained from the pilot program will be incorporated into the joint City and GVRD Parks management plan study for the Park and the subject of dredging will be reviewed through the planning and public input process.

In general, the experiences of the pilot project revealed that there are no significant technical or environmental difficulties related to the dredging and treatment process that would preclude a large scale dredging program from proceeding. However, there are several issues that should be addressed prior to making a decision on whether a large scale program should proceed. These issues are:

- The pilot program was restricted to a six week fisheries period in the summer. Further discussion with DFO should take place to assess the feasibility of extending the dredging operations throughout most of the year (at least 9 months). The extended operation would create less disruption in the long term and improve the project cost efficiency significantly.

  Concurrent with the discussion with DFO, it is recommended that an in-lake monitoring program be initiated immediately to collect data on seasonal dissolved oxygen and total suspended solids concentrations throughout the lake, as well as parameter concentrations during wet and dry weather periods. The information would be used to identify any critical periods, if any, where dredging operations should be avoided. It is estimated that the sampling program would cost approximately $20,000 and carry on for about 12 months.

- The discharge water criteria as described earlier in this report were established by Fisheries & Oceans. Based on data obtained from the pilot program, the water quality objectives for the treatment process may be reduced to improve project efficiency without compromising the overall water quality in the Lake. Further discussion with DFO should take place to seek an optimum balance on the discharge water criteria.

- The dewatered sediments are in general conformance with the Provincial soil quality standards for commercial and industrial use with the exception of a few samples. The re-use of the dewatered sediments as fill material on commercial or industrial lands would avoid expensive disposal cost at a landfill. Further discussion with the Ministry of Environment staff should take place to assess sediment quality results and disposal options.

- For optimum operation and cost efficiency, the option of 24 hours dredging and treatment process should be investigated and pursued. For extended time operation, City noise variance would need to be granted and a night time emergency response plan must be developed. It is expected that where dredging takes place near residential area, night time operation may require higher noise abatement measures or adjustment during summer months.

4.0 FINANCING

4.1 Pilot Project Cost Summary

The total budget approved for the pilot project is $845,000 including engineering, environmental monitoring and construction. The $845,000 also included an allocation of $170,000 from the GVRD as contribution towards the project.

The final project cost is estimated to be approximately $720,000. The cost savings are a direct result of underexpenditure in site preparation, solids disposal and unused contingency allowance. The $20,000 required for the extended lake monitoring program as described earlier in this report are available in the Capital Contingency account.

4.2 Large Scale Dredging Cost Projections

The future opportunity of dredging the entire lake or part of it will continue to be evaluated as part of the management plan process and the results of the public review. The pilot program completed in the Summer of 1999 provided excellent data and knowledge for future dredging program analysis.

Earlier engineering analysis estimated that incoming sediments to the Lake is approximately 4,000m^3/year. Based on the pilot program, it is reasonable to conclude that a 50,000 to 100,000m^3 dredging program would not alter the Lake dynamics significantly. A small scale dredging program would provide a short term (10-15 years) solution to the sedimentation and vegetation control issues in the Lake. In order to provide a longer term solution (50 year) and to create a more significant enhancement to the lake dynamics for improved water depths, better channelization and flow patterns, a dredging program of between 200,000 and 300,000m^3 would be necessary. It is noted that for the purpose of rejuvenating the Lake, dredging, habitat protection and vegetation control become an important and integral decision which requires a balanced approach to address each issue.

To provide an order of magnitude costs for a large scale dredging program that would produce significant enhancement to the lake dynamics, cost analysis was prepared for the scenarios of 200,000 and 300,000m^3 dredging program. Based on an extended year round operations and 12 hours and 24 hours daily processing for 6 days per week, the following cost projections were produced.

Table 1: Preliminary Cost Estimate for Large Scale Dredging Program

Scenario	Estimated Project Duration (Working Days)	Estimated Project Cost ($ M)
1. 200,000m^3 12 hrs operation	300-350 (approx. 1 1/2 calendar year)	14.0
2. 200,000m^3 24 hrs operation	150-170 (approx. 8 months)	10.0
3. 300,000m^3 12 hrs operation	450-550 (approx. 2 calendar years)	21.0
4. 300,000m^3 24 hrs operation	220-270 (approx. 1 calendar year)	15.0

The cost estimates contained in Table 1 include an allowance for design, construction inspection and contingency but exclude solids disposal cost which may not be required if a suitable management option is found.

The cost analysis concluded that significant cost saving (approximately 30%) may be realized if the operations could be extended to 24 hours, 6 days/week.

5.0 CONCLUSION

Burnaby Lake is one of the water bodies within the Greater Vancouver region that contain significant ecological value. The ongoing sedimentation in the Lake is a major issue in the management direction for the Burnaby Lake Regional Nature Park.

The pilot dredging program conducted earlier in the Summer of 1999 provided valuable information on the technical and environmental issues that need to be addressed before a large scale dredging program is implemented. Should a large scale program be considered in the future, a dredging program in the order of 200,000 to 300,000m^3 should be pursued in order to achieve an optimum enhancement to the lake dynamics. Such a major undertaking would require $10 to $21 million, depending on the scenario selected and whether relaxation on the construction period by the regulatory agencies can be obtained. Within the limits of accuracy of the cost estimates, the cost analysis provides an overview of the financial commitment that may be required for large scale dredging operations.

In conclusion, the pilot dredging program was successful and met the objective set out for the program. Valuable information was collected and will be utilized in the decision making process for the future of the Lake. During the entire phase of the pilot program, tremendous technical support and cooperation was received from the GVRD, Fisheries & Oceans, and Ministry of Environment, Lands & Parks and their continuing involvement would be necessary if further dredging is pursued.

W.C. Sinclair, P. Eng.
DIRECTOR ENGINEERING

LSC:jb

cc: City Manager
Director Planning & Building
Director Parks, Recreation & Cultural Services
Director Finance