



CITY OF VANCOUVER

ADMINISTRATIVE REPORT

Date: June 3, 2005
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TO: Standing Committee on City Services and Budgets
FROM: General Manager of Engineering Services
SUBJECT: Vancouver Landfill Capital Projects

RECOMMENDATIONS

- A. THAT Council approve the following projects at the Vancouver Landfill:
- Western 40 Hectares berm construction (\$1,650,000)
 - Phase 1 closure and landfill gas collection works (\$11,875,000)

At an estimated cost of \$13,525,000 to be funded from the Solid Waste Capital Reserve.

- B. THAT Council approve the following projects at the Vancouver Landfill:
- Operational landfill gas collection works (\$1,275,000)
 - Powerline relocation and emergency power and controls upgrades (\$980,000)
 - Residential drop-off and weighscale redevelopment (\$2,500,000)

At an estimated cost of \$4,755,000 to be funded with a loan from the Solid Waste Capital Reserve, with terms acceptable to the Director of Finance, with costs allocated to users of the Landfill.

- C. THAT Council approve the following projects and studies at the Vancouver Landfill:
- i. Road paving (\$400,000)
 - ii. Hydrogeological review (\$200,000)
 - iii. Solid Waste Capital Reserve review (\$50,000)
 - iv. U.B.C. yard trimmings compost agricultural use study (\$75,000)

At an estimated cost of \$725,000 to be funded from the Landfill Operating budget with costs allocated to users of the Landfill.

- D. THAT the General Manager of Engineering Services enter into an agreement with Golder Associates Ltd. to provide professional services for the design of a portion of the proposed landfill gas collection works at a maximum cost of \$29,900 plus GST to be funded as part of the operational gas collection works in Recommendation B.
- E. THAT the General Manager of Engineering Services and the Director of Legal Services seek proposals for additional beneficial use of landfill gas at the Vancouver Landfill.
- F. THAT the General Manager of Engineering Services and the Director of Legal Services enter into negotiations with the GVS&DD governing the use of biosolids at the Vancouver Landfill, and subsequently report back to Council.

COUNCIL POLICY

On May 3, 1994, Council agreed to support the Regional Solid Waste Management Plan, which included requirements to upgrade the Vancouver Landfill.

On May 8, 2001, Council increased the minimum balance of the Solid Waste Capital Reserve to \$30,000,000 to provide for future closure and post-closure costs at the Vancouver Landfill. The minimum required balance is to be reviewed every five years.

Expenditures from reserves require Council authorization.

SUMMARY

A number of projects and studies are proposed for the Vancouver Landfill. The projects include:

- constructing a screening berm along the southern edge of the Western 40 Hectares of the Landfill
- installing final cover on Phase 1, the most eastern phase of the Landfill
- installing gas collection works required for the Phase 1 closure as well as other areas of the Landfill
- moving a high voltage electrical power line and upgrading the controls and emergency power for the Landfill pump station and landfill gas collection system
- redeveloping the residential drop-off area and weighscale system to improve traffic management and provide more waste reduction and recycling opportunities
- paving various roads at the Landfill
- conducting a hydrogeological review at the Landfill
- conducting a review of the Solid Waste Capital Reserve
- providing partial funding for research into the agricultural use of yard trimmings compost to the University of British Columbia Soil Science Department.

The majority of the proposed work is required by the Landfill's Ministry of Water Land and Air Protection Operational Certificate.

These projects would be implemented over the next two years at a cost of approximately \$19,000,000. Each of the proposed projects would be funded from one of the following three sources:

- directly from the Solid Waste Capital Reserve
- as loans from the Solid Waste Capital Reserve
- or alternatively from the Landfill Operating Budget

Projects proposed to be funded from the Solid Waste Capital Reserve are landfill closure projects that by agreement are funded outright by the City of Vancouver, with some cost recovery from the GVRD. Projects proposed to be funded with loans from the Solid Waste Capital Reserve are capital intensive projects that support ongoing landfill operations. The loans would be repaid through landfill tipping fees. The Solid Waste Capital Reserve's primary purpose is to fund projects associated with the operation, closure and post-closure care of the Landfill. Projects proposed to be funded directly from the Landfill Operating Budget are smaller value operational projects that can be funded over one or two years through landfill tipping fees.

The proposed expenditures have minimal impact on the City's operating budget as the Landfill is a Regional facility with all users paying tipping fees that fund the operation of the Landfill.

Two additional temporary Engineering positions would be required to implement the proposed projects. The positions would be paid for as part of the project funding.

PURPOSE

The purpose of this report is to recommend the implementation of a series of projects and studies at the Vancouver Landfill.

BACKGROUND

The City of Vancouver owns and operates the Vancouver Landfill in Delta. The Landfill receives approximately 40% of the GVRD's waste, and is expected to continue to operate for approximately 40 more years.

The City of Vancouver operates the Landfill under an Operational Certificate issued by the B.C. Ministry of Water, Land and Air Protection. The Operational Certificate requires that a closure plan be developed for the Western 40 Hectares of the Landfill. This area of the Landfill was filled in the 1960s and 1970s.

As part of Vancouver's 1999 agreement with Delta, the Western 40 Hectares can only be refilled with waste materials for grading and contouring purposes. In January 2003, Council approved recommendations from the General Manager of Engineering Services to hire Sperling Hansen Associates to develop a closure plan for the Western 40 Hectares of the Landfill.

Other areas of the Landfill are being filled up to 39 metres in height to allow future operations of the Landfill to occur within the existing landfill footprint. The fill plan involves filling the landfill in nine phases over the next approximately 40 years. As each phase is filled,

the Operational Certificate requires that environmental protection systems be installed to close the phase. Environmental protection systems include final cover, landfill gas (LFG) collection works and leachate management works. These systems minimize the environmental impact of completed areas of the Landfill. The first phase of the Landfill will be filled to capacity in 2005 and requires closure in 2006.

A number of other projects and studies are proposed to facilitate the ongoing operation of the Landfill.

DISCUSSION

Western 40 Hectares Closure

The Western 40 Hectares closure plan was developed in partnership with the Corporation of Delta and the GVRD. The plan involves regrading the Western 40 Hectares of the Landfill (see Figure 1) with demolition and construction wood-waste to promote drainage and to prepare the area for end use. Environmental protection systems including final cover and LFG collection and leachate management systems will be installed once regrading is complete. The Closure Plan was approved by the Ministry of Water, Land and Air Protection in December 2004.

Western 40 Hectare closure activities will occur over the next approximately 10 to 15 years. End use may not occur for 20-25 years and is likely to include recreational activities and wildlife habitat development.

This report seeks Council approval to build a screening berm at the southern edge of the Western 40 Hectares. The location of the berm is shown in Figure 1. The berm is proposed to be 650 metres long and approximately 5 to 10 metres high. The purpose of the berm is to separate the Landfill area to be closed from the main Landfill access road. The berm also will serve as a visual screen.

In advance of constructing the berm, an impermeable flexible plastic membrane will be installed on top of the existing landfill. This will prevent any migration of rainwater into the landfill or any leachate migration into the berm. Surface water from the berm can then be diverted away from the Landfill's leachate collection system, reducing leachate generation.

The total cost of the project is estimated at \$1,650,000.

Additional expenditures for final cover and other environmental protection systems for the Western 40 Hectares are expected in approximately 2010 and 2015. Future closure costs for the Western 40 Hectares are estimated at approximately \$30,000,000.

Phase 1 Closure

The future fill plan for the Landfill is comprised of nine phases as described in the 2000 Vancouver Landfill Design and Operations Plan. Currently, landfill operations are occurring in Phase 1 located at the eastern edge of the Landfill (See Figure 1). Phase 1 is expected to be completed in late 2005.

Closure of Phase 1 will be based on the same principles as will be used in the closure of the Western 40 Hectares. A final cover system including a flexible plastic membrane will be installed on top of the landfill to minimize moisture infiltration into the landfill and maximize LFG capture. Minimizing moisture infiltration into the landfill minimizes the amount of leachate generated. Maximizing LFG capture minimizes greenhouse gas emissions.

The estimated cost of the final cover system is approximately \$10,600,000. LFG collection infrastructure requirements for the closure of Phase 1 are included in the LFG Collection and Beneficial Use Section.

Final Cover Topsoil and Biosolids Use

For both the Western 40 Hectare Berm and the Phase 1 Closure, a thick layer of topsoil will be required on top of the final cover system to provide a substrate for plant materials. Native plants including trees will be planted in the top-soil to provide habitat for birds and other animals.

Biosolids from the Greater Vancouver Sewerage and Drainage District's (GVS&DD) wastewater treatment plants will be used to manufacture topsoil for the berm and the Phase 1 Closure. The General Manager of Engineering Services proposes entering into negotiations with the GVS&DD to develop an agreement governing the use of the biosolids. It is expected that the GVS&DD will pay all costs associated with managing the biosolids.

Costs for installing the biosolids based topsoil as well as planting native vegetation are included in the cost estimates for the Phase 1 Closure and the Western 40 Hectares Berm. Some of these costs will likely be recovered from the GVS&DD as they represent a portion of the cost of managing the biosolids.

LFG Collection and Beneficial Use

LFG has been collected at the Vancouver Landfill since 1991. Since the fall of 2003, Maxim Power Corporation has been beneficially using approximately 80,000 cubic metres per day of LFG generating 5.5 MW of electricity and 100,000 GJ/year of heat for a greenhouse adjacent to the Landfill.

As part of the closure of Phase 1, a LFG collection system will be required. In addition, a horizontal gas collection system is required in advance of filling Phase 2 of the Landfill. Golder Associates Ltd. (the designer of the most recent LFG collection system expansion) has provided a proposal to do the detailed design of the Phase 2 LFG collection system. The cost of Golder's proposal is \$29,900 plus GST. Golder is familiar with the City's LFG collection system and the General Manager of Engineering Services proposes that Golder be hired directly to complete this project. The LFG system design for Phase 1 will be part of the design of the overall Phase 1 closure system. The City will hire a consulting team for the closure of Phase 1 on a competitive basis.

With the installation of the LFG collection system and final cover in Phase 1 of the Landfill, it is expected that there will be a substantial increase in gas available for beneficial use. Maxim Power Corporation has rights to approximately 125,000 cubic metres per day of LFG. Beyond that amount, the City can seek proposals for beneficial use. The General Manager of Engineering Services therefore recommends that the City seek proposals for beneficial use of

the LFG. Increased beneficial use of the LFG would therefore be in place once closure of Phase 1 is complete.

The total cost of additional LFG collection works including those required for Phase 1 is estimated at \$2,550,000. Approximately half of those costs are closure related costs and half are costs associated with ongoing landfill operations.

Power Line Relocation and Emergency Power and Controls Upgrade

The landfill high voltage power supply line was installed in the early 1990s prior to the development of a comprehensive fill plan for the Landfill. The power supply line provides electricity for the LFG collection system and the composting facility. The power supply line is located north of the main Landfill access road in an area that is slated to be refilled as part of the Western 40 Hectares Closure Plan and future landfill phase construction. The power supply line can be moved to the southern edge of the landfill minimizing impacts on landfill operations. As part of the project, it is proposed that the control systems and standby power supply systems for the Landfill's leachate collection system and LFG system be upgraded. Upgrading these systems will minimize the potential for the systems to fail during emergency operations.

The estimated cost of moving the power supply system and upgrading the controls and standby power for the leachate pump station and LFG control system is \$980,000.

Residential Drop-Off Redevelopment and Weighscale Improvements

A number of improvements are proposed for the residential drop-off and weighscale facilities at the Landfill. The weighscals are proposed to be replaced and moved further into the site. Relocating the weighscals further into the site will allow the construction of a recycling area ahead of the weighscals and improved traffic management. A recycling area ahead of the weighscals encourages recycling because customers can conveniently drop-off recyclables at no cost without waiting in the landfill line-up. Other waste reduction opportunities such as a reusable materials drop-off will also be included in the recycling area.

The new weighscale system will have additional scales including scales dedicated to commercial traffic. An improved scale system will reduce wait times entering and leaving the landfill that now can exceed 30 minutes on peak days. Long waits at the landfill are due to increasing traffic, specifically small vehicle traffic. Overall traffic at the Landfill has increased approximately 33% since 1999.

Bypass lanes will be installed to allow vehicles not required to scale, such as the tractor trailer hauling garbage from the Vancouver South Transfer Station and deliveries to the Landfill, to bypass scale line-ups. Currently, in the event of scale line-ups, tractor trailers and other non-scaled traffic must either wait in line or be flagged into oncoming traffic. Bypass lanes will reduce delays and improve site safety.

The estimated cost upgrading the residential drop-off area and weighscale system is \$2,500,000.

Site Paving

Road paving projects at the Landfill include resurfacing portions of the main access road to facilitate the power line relocation and installation of a new water line as well as some repairs throughout the site. The access road up to Phase 1 would also be paved following the Phase 1 closure. The estimated cost of paving work is \$400,000.

Solid Waste Capital Reserve Review

The Solid Waste Capital Reserve (SWCR) was established to fund future Landfill costs, including closure and post-closure care, and address any environmental issues arising during and after operation of the Landfill.

In 2001, Council set the minimum balance of the SWCR at \$30,000,000 and directed that the requirements for the SWCR be reviewed every five years. The current balance of the SWCR is approximately \$53,000,000. Based on expected contributions to the SWCR over the next few years as well as expenditures projected from the Landfill's 2000 Design and Operations Plan and the Western 40 Hectares Closure Plan, the SWCR is expected to go below the required minimum balance in approximately 2013.

A third party review of the SWCR is proposed to verify requirements for closure and post closure care and conduct a cash flow analysis of the SWCR. The review will take into account expected revenues, operating costs, loan repayment costs, waste tonnages and potential contingency requirements. The landfill's Operational Certificate requires that the City maintain a reserve sufficient to fund closure, post-closure and environmental contingencies related to the Landfill. Additionally, the City's annual financial report must report all liabilities including Landfill closure and post-closure care costs. The cost of the review is estimated at \$50,000. Results of the review will be reported to Council.

Hydrogeological Review

The Landfill's Operational Certificate requires that a hydrogeological review be conducted at the Landfill every five years. A hydrogeological review is a detailed review of the impact of the Landfill on ground and surface water systems and includes computer modelling as well as collection and interpretation of field data. Hydrogeological reviews were conducted in 1995 and 2000 by Gartner Lee Ltd. The cost of the hydrogeological review is estimated at \$200,000 based on the cost of the two previous reviews.

University of British Columbia Soil Science Compost Utilization Grant

For the last number of years, the City of Vancouver has worked with the University of British Columbia (UBC) Soil Science Department to investigate the use of yard trimmings compost for agricultural purposes. The research has been conducted on farms in Delta close to the Landfill. The goal of the research has been to demonstrate the benefits of using compost combined with other materials such as poultry manure in both traditional and organic agriculture. Proper manure management also protects ground and surface waters.

The program has provided significant benefits to both the City of Vancouver and Delta farmers through improved agricultural practises and better understanding of the role of the Landfill in the community. Funding from the City of Vancouver assists UBC in leveraging funds from other levels of government, as well as foundations and agencies. The research is

supported by local farmers through in-kind contributions. The project is also supported by the Delta Farmers' Institute.

UBC is seeking funding from the City for a three year research program. The City's contribution would be \$25,000 per year for a total contribution of \$75,000. Participation in the project supports Vancouver's sustainability objectives as well as Vancouver's food strategy by encouraging local growing of traditional and organic produce.

FINANCIAL IMPLICATIONS

This report recommends a number of capital projects and studies at the Vancouver Landfill. There are two basic categories of projects required at the Landfill:

- landfill closure projects
- ongoing landfill operations projects

Projects required as part of progressive closure of the Landfill are funded directly from the Solid Waste Capital Reserve (SWCR). Under Vancouver's 1989 agreement with Delta and the GVS&DD, closure related work is funded by the GVS&DD and Vancouver. The GVS&DD portion of the cost is based on the GVRD portion of the total amount of waste in the Vancouver Landfill at closure. The GVRD portion is currently approximately 15%. Vancouver funds the full value of the project and is subsequently reimbursed by the GVS&DD for their portion.

Capital costs required for ongoing Landfill operations are normally funded with loans from the SWCR to be repaid through tipping fees by Landfill users including the Solid Waste Utility. The Solid Waste Utility pays approximately 12% of Landfill operating costs.

The following table shows a list of the proposed projects as well as the proposed source of funds for each project.

Project	Amount	Source of Funds
Western 40 Hectares Berm	\$1,650,000	SWCR
Phase 1 Closure	\$10,600,000	SWCR
Phase 1 Closure LFG	\$1,275,000	SWCR
Other LFG	\$1,275,000	SWCR Loan
Power Line Relocation	\$980,000	SWCR Loan
Residential Drop-Off and Weighscale	\$2,500,000	SWCR Loan
Site Paving	\$400,000	Landfill Operating Budget
SWCR Review	\$50,000	Landfill Operating Budget
Hydrogeological Review	\$200,000	Landfill Operating Budget
UBC Yard Trimmings Study	\$75,000	Landfill Operating Budget
Total Expenditures	\$19,005,000	

The cost of the proposed closure related projects is \$13,525,000. This includes both the Vancouver and GVS&DD portion of the costs. The costs also includes costs associated with using biosolids to manufacture topsoil. The GVS&DD is expected to reimburse the City for costs associated with using biosolids. Closure costs would be funded directly from the SWCR and not impact Solid Waste Utility fees.

Projects proposed as loans from the SWCR total \$4,755,000. These costs would be funded with loans from the SWCR and repaid through tipping fees. Based on an annual interest rate of 6% and ten years loan repayment, the annual cost of the loans would be approximately \$650,000. The Solid Waste Utility funds a portion of the operating cost of the Landfill consistent with its portion of the total annual waste disposed at the Landfill. On this basis, the annual cost to the Solid Waste Utility of the proposed projects would be approximately \$75,000/year, or less than \$1/household/year for 10 years.

Projects proposed to be funded directly from the Landfill Operating Budget total \$750,000. The Solid Waste Utility portion of these costs would be equivalent to a one time cost of about \$1 per household.

PERSONNEL IMPLICATIONS

This report proposes significant expenditures to meet the City's obligations in operating the Vancouver Landfill. To implement the projects proposed in this report, two additional temporary engineering positions are required for the next two years. These positions are expected to be Civil Engineer 1 positions, subject to classification review by Human Resource Services.

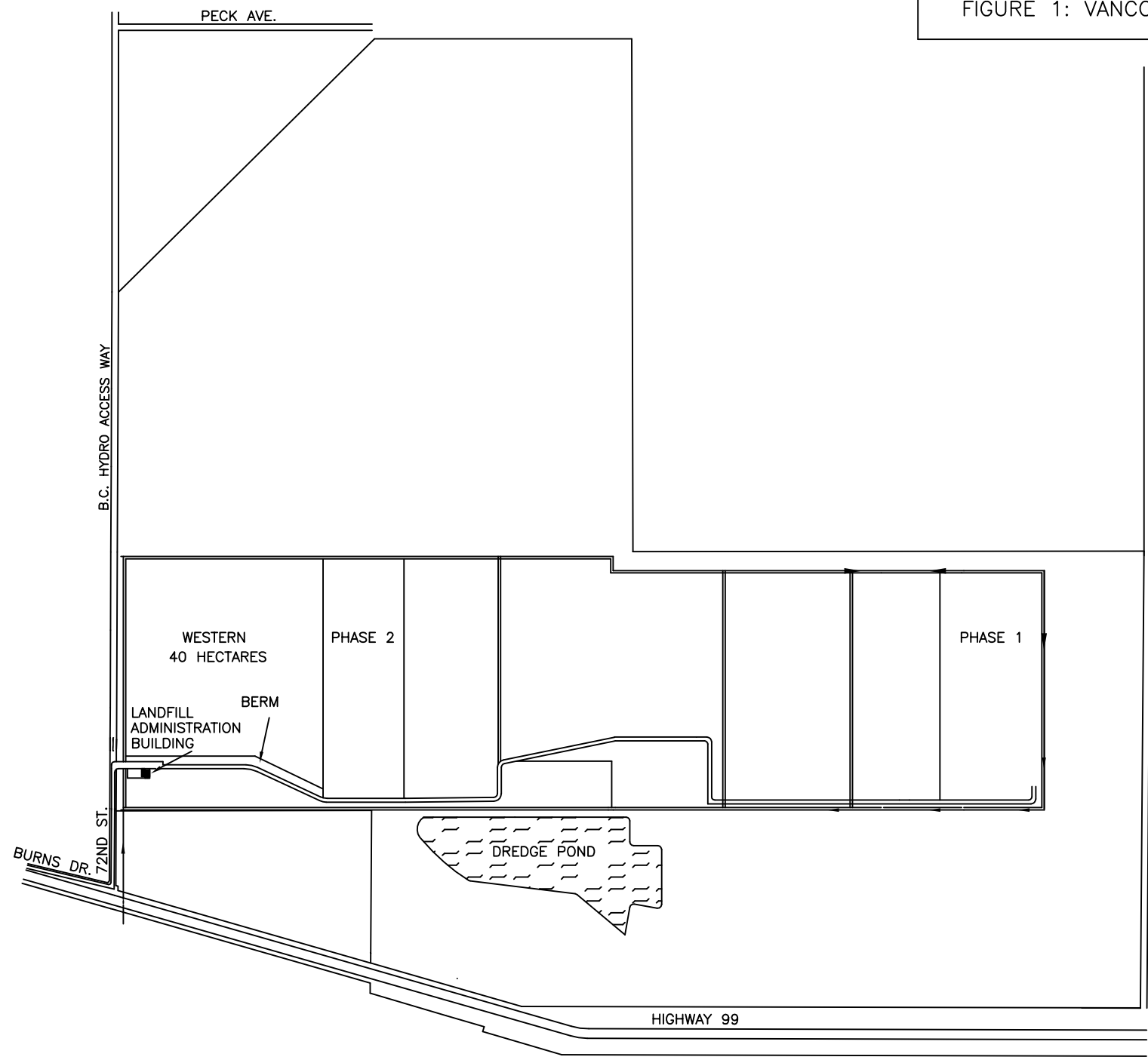
These new Engineers would be housed in rental office space close to the Landfill. Additional permanent office space required to house existing staff will be proposed in a future report to Council.

ENVIRONMENTAL IMPLICATIONS

The improvements proposed in this report are aimed at minimizing the environmental impacts of the Vancouver Landfill.

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FIGURE 1: VANCOUVER LANDFILL



APPROX. SCALE: 1:18000

DATE: APR. 28, 2005

FILE : VANLF56.DWG