ENGINEERING / PLANNING EVALUATION AND COST ASSESSMENTS FOR LONG TERM EXPANSION

Mayer Waste Disposal Site
Township of Champlain, Ontario

Prepared for 781998 Ontario Inc.

DECEMBER 1999
REF. NO. 7918 (4)
This report is printed on recycled paper.

TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF TABLES
(Following Report)

LIST OF APPENDICES

LIST OF DRAWINGS
(Following Report)

1.0 INTRODUCTION

1.1 PURPOSE OF DOCUMENT

The purpose of this document is to provide an engineering and planning evaluation and cost assessment of certain alternatives identified for long term expansion of the Domestic Landfill at the Mayer Waste Disposal Site in the Township of Champlain in the Province of Ontario (Site). This evaluation and cost assessment was undertaken to identify a preferred alternative should long term expansion of the Domestic Landfill be sought. The Domestic Landfill currently operates under Certificate of Approval A 471506, issued under Part V of the Environmental Protection Act. The Certificate of Approval expires on March 1, 2001. The long term expansion of the Domestic Landfill is anticipated to enable the Town of Hawkesbury and other municipalities in Eastern Ontario and potentially Western Quebec to have continued access to an environmentally sound and economically feasible non-hazardous solid waste disposal facility for a period of approximately 20 years.

The proposed long term expansion of the Domestic Landfill at the Mayer Waste Disposal Site will be subject to approvals under the following legislation:

- Environmental Assessment;
- Environmental Protection Act;
- Ontario Water Resources Act;
- Planning Act; and
- Aggregate Resource Act.

This document presents an overview of the current approval process for a long term landfill expansion in the Province of Ontario, describes the existing geologic and hydrogeologic conditions at the Site, identifies expansion alternatives that are considered environmentally feasible within the context of existing Site conditions and land ownership, provides a cost assessment for each of the identified alternatives and provides a discussion on the overall suitability of each alternative identified for long term expansion for the Domestic Landfill.

2.0 BACKGROUND

The Mayer Waste Disposal Site (Site) is a private waste management facility owned by 781998 Ontario Inc. located immediately east of the Town of Hawkesbury along Highway 17 and is geographically situated within the Township of Champlain. The Site consists of two distinct landfills that have historically operated under separate Provisional Certificates of Approval: a Domestic Landfill (Provisional Certificate of Approval No. A471506 issued on August 20, 1980) and an Industrial Landfill (Provisional Certificate of Approval No. A471507 issued on August 7, 1983).

The Mayer Waste Disposal Site has, since 1955, served as the only solid non-hazardous waste disposal facility for the Town of Hawkesbury and has also served other municipalities and industries in Eastern Ontario. The Site was originally established for waste disposal purposes in approximately 1955. At that time, the only active portion of the Site was the Domestic Landfill.

On February 19, 1993, the Ministry of Environment (MOE) issued a Control Order to 781998 Ontario Inc. and to 437846 Ontario Inc. and Rene Mayer, then co-owners of the Mayer Waste Disposal Site. Part 2, Section 2.3 of the 1993 Control Order required that a study of the Site be carried out to test, examine and report on the condition of the Site and its natural environment.

In response to the 1993 Control Order, 781998 Ontario Inc. developed and carried out a Phase I and Phase II Environmental Investigation. The initial Phase I Environmental Investigation focused on determining the impacts of the Site on surface water and groundwater quality and established information on existing Site conditions and operations. A detailed Phase II Environmental Investigation was subsequently conducted to:

- complete definition and assessment of hydrogeologic conditions;
- assess the Site geology for preferential gas migration routes; and
- define Site conditions including existing topography.

Following preparation and submission of the report entitled "Phase II Environmental Investigation", 781998 Ontario Inc. prepared and submitted a report entitled "Proposed Remediation Plan" for the Site in accordance with Section 2.4 of the 1993 Control Order. All technical aspects of the Proposed Remediation Plan have been approved by the MOE.

The Domestic Landfill presently operates under a Notice of Amendment to Certificate of Approval No. A471506, dated June 19, 1998, that permits the operational life of the Domestic Landfill to continue until the currently approved contours are reached or March 1, 2001, whichever is earlier. The current approved service area of the Domestic Landfill for the acceptance of municipal waste includes the municipalities of the Town of Hawkesbury and the Township of Champlain. The service area for the Domestic Landfill for the acceptance of non-hazardous solid industrial waste includes the Counties of Prescott and Russell; Stormont, Dundas and Glengarry; Hastings; Leeds and Grenville; Fontenac; Lennox and Addington, Lanark; the Region of Ottawa-Carleton; and Canton de Grenville, Quebec.

The Industrial Landfill presently operates under an approval issued under Section 32 of the Environmental Protection Act (EPA) in conjunction with the Proposed Closure Plan submitted by 781998 Ontario Inc. to the MOE for the Industrial Landfill in March 1995. The service area for the Industrial Landfill for the acceptance of non-hazardous solid industrial waste is the same as the service area for the Domestic Landfill described above. The Industrial Landfill is anticipated to be closed in December 2000, based on currently forecasted disposal volumes.

3.0 REASON FOR PROPOSED LONG TERM EXPANSION

Commencing in 1984, the Town of Hawkesbury and several other municipalities participated in a Waste Management Master Plan Study (WMMPS) to define a long term solid waste disposal facility to meet its waste management needs. Other participants in the Study included the Township of West Hawkesbury, the Town of Vankleek Hill, the Township of East Hawkesbury, the Village of L'Orignal and, as of 1990, the Township of Longueuil.

Based on a decision reached in September 1996 by the Board of Waste Management of the Hawkesbury and Area Waste Management System Planning Study (WMSPS), six short-listed candidate sites were released from further consideration as potential public landfill sites. Subsequently, in December 30, 1996, the Hawkesbury and Area WMSPS dissolved, thus ending the twelve-year WMMP process without identifying a potential long term solid waste disposal facility. As such, the Town of Hawkesbury has expressed interest in continuing to utilize the Domestic Landfill at the Mayer Waste Disposal Site as the principal facility for meeting the landfill component of its long term municipal waste management needs.

The opportunity to provide long term waste management services to the Town of Hawkesbury is the primary basis for the decision by 781998 Ontario Inc. to seek the necessary approvals for long term expansion of the Domestic Landfill. The decision is founded on a fundamental understanding of existing Site conditions developed through many years of detailed hydrogeologic and hydrologic investigations and water quality monitoring program at the Site.

4.0 APPROVAL REQUIREMENTS FOR LONG TERM EXPANSION

4.1 ENVIRONMENTAL ASSESSMENT ACT

The long term expansion of the existing approved limits of refuse of the Domestic Landfill may require approval under the Environmental Assessment (EA Act). This requirement is subject to a decision by the Minister of the Environment to designate the Site under the EA Act.

In accordance with the Guide to Preparing Terms of Reference for Individual Environmental Assessments (MOE Draft, February 14, 1997) and with Section 6(2) of the EA Act, 781998 Ontario Inc. has prepared Draft Terms of Reference for Completion of an EA. The EA Draft Terms of Reference have been reviewed and discussed with the MOE EA Branch. The following is an overview of how the environmental assessment, including a comprehensive public and agency consultation program, will be conducted.

4.1.1 TERMS OF REFERENCE

As noted above, Draft Terms of Reference have been prepared in accordance with the Guide to Preparing Terms of Reference for Individual EA's and have been reviewed and discussed with the MOE EA Branch. Specifically, CRA met on April 22, 1998 with EA Branch representatives (Ms. Barbara Johnston, Ms. Susan Wagter and Mr. Jim Clifford) at their office in Toronto to discuss an initial Draft Terms of Reference. A second Draft was subsequently submitted for review based on comments received as a result of the April 1998 meeting. Subsequent to determining the availability of additional lands and selection of the preferred expansion alternatives, Final Draft Terms of Reference were prepared and presented to the EA Branch on June 25, 1999. A meeting was held on June 29, 1999 with Ms. Ann Weiszmann of the EA Branch to review these Final Draft Terms of Reference and obtain MOE input prior to formal public, agency/stakeholder and Core Review Team consultation.

As previously discussed, the proposed undertaking will be the long term expansion of the existing approved limits of refuse of the Domestic Landfill. The long term expansion of the Domestic Landfill will provide for continued access to an environmentally sound and economically feasible non-hazardous solid waste disposal facility for the Town of Hawkesbury and other municipalities in Eastern Ontario for a period of approximately 20 years.

The current engineering/planning evaluation and cost estimate has been established based, in part, on existing environmental studies completed by 781998 Ontario Inc. in 1996 as part of an earlier proposed Interim Expansion of the Domestic Landfill. For this EA, it is proposed that the existing environmental studies relating to the previous Interim Expansion proposal be reviewed and utilized, where appropriate. New field work and assessments will be carried out as required to ensure that any change in environmental conditions on and in the vicinity of the Domestic Landfill have been identified and addressed.

Public and agency input and consultation will form an important part of the EA. In order to ensure that an effective, transparent, and accountable process has been conducted, 781998 Ontario Inc. will develop a comprehensive public and agency consultation process consisting of the following elements:

- Submission of Final Draft Terms of Reference to a Core Review Team of key agencies and stakeholders established by the MOE for review and input;
- Preparation of Newsletter No. 1, which will provide an overview of the proposed undertaking, an announcement that Final Draft Terms of Reference have been prepared and will be available for review at Public Open House No. 1, a summary of the EA process that will be followed during the project and solicitation of applicants to form a Public Liaison Committee to assist 781998 Ontario Inc. in ensuring that the concerns and suggestions of the public are incorporated into the EA;
- Development of a Public Liaison Committee based on the interest and qualifications of applicants and additional recommendations received from the Core Review Team;
- Scheduling of Public Liaison Committee Meeting No. 1 to establish the goals and objectives of the EA, provide an overview of and solicit input on the Final Draft Terms of Reference to conduct the EA, provide a summary of the work plan and schedule; and outline the long term expansion alternative;
- Scheduling of Public Open House No. 1 to inform the public of the goals and objectives of the EA, provide an overview of and solicit input on the Final Draft Terms of Reference to conduct the EA, outline the work plan and schedule, present the alternatives and alternatives evaluation criteria and solicit input into additional alternatives and/or evaluation criteria;
- Submit Final Terms of Reference to the Minister of the Environment;
- Scheduling of Public Liaison Committee Meeting No. 2 to review the Draft EA report and obtain input relative to the recommended alternative(s) and the development of mitigation measures;

- Preparation of Newsletter No. 2 to describe the results of the EA process and the development of mitigation measures, and to obtain input relative to the proposed expansion alternatives, work plan and schedule;
- Scheduling of Public Open House No. 2 to present the results of the EA process, the proposed mitigation measures identified and obtain input relative to the proposed expansion alternative(s), work plan and schedule; and
- Consultation, throughout the EA process, with the agency Core Review Team to ensure that agency concerns and input are incorporated into the evaluation process, that appropriate mitigation measures are considered and that the proposed expansion meets all applicable agency standards and legislative/regulatory requirements.

Upon completion of the public and agency consultation program noted above the Final Draft EA Report (reflecting all input from the public, core review team agencies and the EA Branch) will be formally submitted to MOE for Review. The MOE review process, including timelines, for EA Reviews are the Minister's decision is outlined in Ontario Regulation 616/98.

4.2 ENVIRONMENTAL PROTECTION ACT

Concurrent with conduct of the EA and preparation of the EA Report a comprehensive Hydrogeoloic Report and a Design and Operation (D & O) Plan will be prepared in support of an application under Part V of the Environmental Protection Act (EPA) to amend Certificate of Approval No. A471506. The Hydrogeologic Report and the D & O Plan must be prepared to meet the requirements of Ontario Regulations 232/98. The Hydrogeologic report will build on the current hydrogeologic knowledge of the Site and will present how the long term expansion will fit into and react within the existing groundwater regime at the Site. The D & O Plan will present the design and operational procedures for the expanded Site. The Part V application and supporting documentation will be submitted concurrent with the submission of the EA. The Part V EPA application will be subject to application fees as stipulated in Ontario Regulation 363/98.

4.3 ONTARIO WATER RESOURCES ACT

An application to amend the existing Certificate of Approval issued under Section 53 of the Ontario Water Resources Act will be prepared and submitted, along with supporting

documentation, at the time of the EPA submission. The supporting documentation will include an expanded storm water management plan for the Site to accommodate the expansion of the Domestic Landfill. The Section 53 application will be subject to application fees as stipulated in Ontario Regulation 364/98.

4.4 PLANNING ACT

All Township of Champlain Official Plan and Zoning By-law requirements applicable to the affected lands (i.e. lands now owned by 781998 Ontario Ltd. and lands acquired for the proposed long term expansion) will be met. If required, a Site Plan Agreement will be prepared and submitted to the municipality. If necessary, amendments to the Official Plan and Zoning By-law will be sought in conjunction with the submission of the Final EA Report. In this regard, notices of Official Plan and Zoning By-Law amendments will, if required, be placed in the local print media for public and agency/stakeholder review and comment. Any appeals will be addressed directly with the appellant(s) or through an appropriate dispute resolution forum acceptable to the Minister of Municipal Affairs and Housing. Should appeals be unable to be resolved through the above mechanisms, a hearing before the Ontario Municipal Board may be required.

4.5 AGGREGATE RESOURCES ACT

On those affected lands currently subject to a Site Plan under the Aggregate Resources Act, a request to amend the Site Plan will be prepared and submitted to the Ministry of Natural Resources (MNR) for review and approval in conjunction with the submission of the Final EA Report. This request will outline the reasons for the amendment and the area(s) affected. Based on its review, the MNR will either directly approve the amendment request and instruct 781998 Ontario Inc. to prepare a Site Plan amendment or, if the amendment is considered to differ significantly from the approved Site Plan, seek input from the Township of Champlain and any other applicable agencies as determined by the MNR prior to ruling on the request. In the latter case, it may be necessary to meet with the MNR and other agencies in order to explain the nature of the amendments being sought and to address any concerns or issues identified.

4.6 TIMING REQUIREMENTS

The time required to complete the necessary EA work tasks, inclusive of MOE and other agency/public mandatory review periods, is anticipated to be approximately 2 years.

Subsequent preparation to the Draft EA Report will occur over an approximate six month period in conjunction with public and agency review and comment, followed by completion and submission of a Final EA Report early in the second year. Once a Final EA Report has been submitted, a formal 30-week agency review period is entered into, following which a decision on the undertaking is reached. In the event that the EA is referred to a hearing, a hearing would be prepared for and attended by the end of the second year.

Following approval of the EA and the EPA, OWRA, Planning Act and ARA approvals noted above (culminating in the issuance of an amended C of A) it is anticipated that an approximate 4-month construction period would be required to permit any pre-expansion engineering works to be constructed. A schedule listing the above described approval process activities and illustrating the anticipated timelines is provided as Figure 1.

5.0 EXISTING SITE CONDITIONS

In order to further evaluate the suitability of long term expansion of the Domestic Landfill, CRA undertook, in 1998, a detailed hydrogeologic investigation and assessment of the potential expansion areas. The 1998 activities conducted by CRA as part of the hydrogeological investigation and assessment included:

- Installation of 12 new monitoring wells on and in vicinity of the Site including:
  - two new leachate wells within the existing Domestic Landfill;
  - a nested monitoring well (three) along the downgradient (Hawkesbury Transport) property boundary;
  - a nested monitoring well (four) between the Domestic and Industrial landfills;
  - two monitoring wells on Mr. Gilles Parisien's property to the immediate west of the Site; and
  - one monitoring well upgradient of the Domestic Landfill.
- Advancement of two boreholes within the existing contaminant attenuation zone, downgradient of the Domestic Landfill;
- Installation of a new gas monitoring probe to the south of the Domestic Landfill;
- Groundwater sampling and hydraulic testing of selected wells;
- Assessment of the groundwater flow system in both the perched and lower overburden aquifers;
- Assessment of the groundwater quality at the Site and potential for off-Site impact;
- Landfill expansion footprint and waste capacity assessment for selected expansion alternatives;
- Leachate attenuation modeling for the various expansion alternatives to establish landfill design requirement;
- Development of conceptual expanded landfill designs; and
- Development of leachate disposal alternatives.

The existing conditions at the Site (as of November 1998) are illustrated on Drawing No. 1. Sections 5.1 to 5.6 of this report provide a brief description of the hydrogeological setting of the Site compiled through historical investigations and supplemented by the 1998 detailed hydrogeological investigation.

5.1 GEOLOGY

In general, the soil stratigraphy at the Site consists of three main geological units, a surficial deltaic sand overlying a marine (Leda) clay unit which in turn overlies a sand deposit. This stratigraphy is mainly present at the Domestic Landfill. Due to historic aggregate extraction operations, the surficial sand is absent beneath the Industrial Landfill. In addition, the fine grained Leda clay beneath the surficial sand is also absent beneath the Industrial Landfill due to erosional processes and potentially also from historic extraction operations. The overburden at the Site overlies grey limestone bedrock of the Rockcliff formation. Observations made during drilling investigation on Mr. Parisien's property to the west of the Site and on the Hawkesbury Transport property located to the east of the Site indicate that the sequence of surficial deltaic sand overlying Leda clay overlying a sand deposit is maintained to the east and west of the Domestic Landfill.

5.2 HYDROGEOLOGY

The Site is characterized by two overburden aquifers; an upper unconfined (water table) aquifer comprised of surficial sand and a lower confined overburden aquifer also consisting of sand. The two aquifers are separated by a Leda clay deposit which acts as an aquitard of very low hydraulic conductivity underneath the Domestic Landfill. This clay aquitard thins out however between the Domestic and the Industrial Landfills, resulting in localized mixing of both the water table and the lower overburden aquifer.

5.3 WATER TABLE AQUIFER

The water table aquifer consists mainly of grey fine-grained sand with little silt. The thickness of this unit is highly variable at the Site due to historical mineral aggregate extraction operations. The thickness of the water table aquifer varies from 4.3 in the south portion of the Domestic Landfill and thins out to 1.5 m in the north portion. The water table aquifer drops off the clay aquitard between the Domestic and the Industrial Landfill, where the perched water combines with the lower overburden aquifer.

Based on groundwater data obtained to date, groundwater flow within the water table aquifer in the vicinity of the Domestic Landfill generally occurs in an easterly-northeasterly direction towards the Hawkesbury Transport property. The groundwater flow patterns observed for the water table aquifer generally coincides with the observed

top of clay aquitard contours. This would indicate that the water table aquifer behaves as a perched water table system.

Data obtained to date indicates that a portion of the water table aquifer which flows underneath the Domestic Landfill is captured by a north-south oriented on-Site drainage ditch located at the downgradient limit of the existing Contamination Attenuation Zone (CAZ), along the western limit of the Hawkesbury Transport property. This ditch was observed to extend through the entire thickness of the water table aquifer and is anchored within the underlying clay aquitard. The water collected from this drainage ditch is then canalized to a surface water pond located in the central portion of the adjacent Hawkesbury Transport property to the east. The elevation of the surface water in the pond indicates that the observed pond is located within the lower overburden aquifer.

5.4 CLAY AQUITARD

The Leda clay aquitard encountered beneath the water table aquifer consists mainly of grey clay with some silt. This clay is very soft and generally highly plastic. The aquitard thickness beneath the Domestic Landfill varies from approximately 15 m in the south to 6 m in the northern portion of the Domestic Landfill. The clay aquitard was also encountered on both Gilles Parisien and Hawkesbury Transport properties to the west and east of the Domestic Landfill, respectively. Available water level information for the water table and lower overburden aquifers in the vicinity of the Domestic Landfill indicates that the presence of the aquitard results in hydraulic separation. A downward vertical gradient was measured across the clay aquitard. As previously indicated, the clay aquitard thins out between the Domestic and Industrial Landfill and is completely absent underneath the Industrial Landfill.

5.5 LOWER OVERBURDEN AQUIFER

The lower overburden aquifer is generally encountered beneath the clay aquitard and consists mainly of brown sand with some silt. The sand is fine grained, poorly graded and generally dense to very dense. This aquifer is confined beneath the Domestic Landfill and unconfined beneath the Industrial Landfill.

Based on the hydraulic data collected to date, groundwater flow in the lower overburden aquifer in the vicinity of the Domestic Landfill is towards the east-northeast, as is the overlying water table aquifer. However, the direction of groundwater flow of

the lower overburden aquifer shifts toward the north between the Domestic and Industrial Landfills. This shift in groundwater flow coincides roughly with the area where the water table aquifer joins the lower overburden aquifer.

Water collected in the surface water pond located in the central portion of the Hawkesbury Transport property enters the lower overburden aquifer and flows towards the north. The area north and east of the Industrial Landfill is subject to surface water ponding. It appears that the surface water from the adjacent properties both east and west of the Site presently drain towards this low-lying area surrounding the Industrial Landfill.

5.6 CURRENT GROUNDWATER CONDITION

Groundwater at the Site is currently assessed semi-annually by a network of over thirty monitoring wells. Parameters currently analyzed include selected metals, general chemistry parameters and volatile organic compounds. For the purpose of the present evaluation, assessment of groundwater impact at the Site was evaluated with respect to chloride and the Reasonable Use Concept (RUC) as developed by the MOE. The RUC provides standards for groundwater quality at sites that are regulated under the EPA or the OWRA. Chloride was selected as an indicator parameter to allow evaluation of Site performance since this parameter is considered to be a conservative ion and is not adsorbed by the aquifer material.

According to the MOE's RUC, the maximum allowable level of a particular parameter such as chloride in groundwater at the Site boundary can be determined. For chloride, a non-health related parameter, the addition of the background level to 50 percent of the difference between the MOE drinking water objective and background would enable determination of the maximum allowable level. The MOE drinking water objective for chloride is 250 mg/L. Based on the results of the groundwater sampling program conducted during the November 1993 and January and April 1994 sampling events, the background chloride level for the shallow water table aquifer at OW1-93 is about 20 mg/L. Thus, utilization of the RUC yields a maximum allowable chloride level of about 135 mg/L at the downgradient Site boundary. Therefore the Site performance would be evaluated as based on an ODWO of 250 mg/L and the RUC level of 135 mg/L.

Monitoring results gathered to date from the Site indicate some degradation of on-Site groundwater quality within the water table aquifer beneath and immediately downgradient of the Domestic Landfill. However, the chloride levels at the downgradient Site boundary are well within the ODWOs and the RUC level is generally

met. As such, under the present Site conditions, no degradation of groundwater quality has occurred off-Site, downgradient of the Domestic Landfill Site.

6.0 EXPANSION ALTERNATIVES AND DESIGN

6.1 EXPANSION ALTERNATIVES

To evaluate the suitability of continued use of the Domestic Landfill for long term municipal waste management purposes, CRA, given the existing knowledge of the Site setting, has identified three landfill expansion alternatives adapted to the physical and environmental limitations of the Site and of the adjacent properties. Lands in vicinity of the Site are, and have historically been used for aggregate extraction purposes. This includes the adjacent lands both to the east and west of the Site. Substantial portions of the adjacent properties are presently inactive and consist of medium density brush and open field. Potential Domestic Landfill expansion alternatives identified at this time include:

Alternative 1. Expansion East - Fully Engineered: Under this scenario the Domestic Landfill footprint would be expanded towards the east, into the existing east buffer zone of the Site. The downgradient boundary would remain at the existing Site boundary adjacent to the Hawkesbury Transport property. The expansion area would be fully engineered with a leachate collection system. A perimeter leachate collection system would be installed to retrofit the existing Domestic Landfill. The collected leachate would be pumped via forcemain to the Town of Hawkesbury sanitary sewer system.

Alternative 2. Expansion East with Contaminant Attenuation Zone (CAZ): Under this scenario the Domestic Landfill footprint would be expanded to the east utilizing the same footprint as Alternative 1. However, in this scenario, the Hawkesbury Transport property would be purchased and used to extend the east buffer zone and the CAZ further downgradient of the Domestic Landfill. The Domestic Landfill would continue to operate as an attenuation site for the management of leachate. Contingency plans for the collection and treatment of leachate would be established.

Alternative 3 Expansion West with CAZ: Under this scenario the Domestic Landfill footprint and west buffer zone would be expanded towards the west on lands presently owned by Mr. Gilles Parisien. The downgradient boundary of the Site would remain at the existing Site boundary adjacent to the Hawkesbury Transport property. The east buffer and CAZ would remain unchanged. As with Alternative 2, contingency plans for the collection and treatment of leachate would be established.

The limits of the three expansion alternatives are illustrated on Drawings Nos. 2, 3 and 4 and the conceptual design details of the three expansion alternatives are illustrated on Drawings Nos. 5, 6 and 7. In order to determine the preferred expansion alternative, consideration needs to be given to hydrogeologic conditions, potential impacts to the environment, availability and economic feasibility of required land acquisitions, landfill design criteria and resulting Site life estimates.

6.2 DESIGN CONSIDERATIONS

6.2.1 WASTE CHARACTERISTICS

For the purposes of this evaluation the waste composition and disposal rates assured for the long term expansion period is the same as that currently disposed of at both the Domestic and Industrial Landfill Sites as follows:

- domestic waste generated by residential, commercial and light industrial sources within the Town of Hawkesbury and Township of Champlain; and
- solid non-hazardous industrial wastes, which includes demolition waste and land clearing debris, generated by commercial and light industrial sources from the County of Prescott and Russell, County of Stormont, Dundas and Glengarry, County of Hastings, County of Leeds and Grenville, County of Frontenac, County of Lennox and Addington, Region of Ottawa-Carleton, County of Lanark and County de Granville, Quebec.

6.2.2 WASTE GENERATION FORECAST

The projected population for the Town of Hawkesbury, as summarized in the Design and Operations Plan, Emergency Certificate of Approval (CRA, April 1997) is expected to increase marginally until the year 2036. As such, it is felt that population adjustments will not result in an increase in the rate of landfilling at the Site over the long term expansion period.

Based on the calculated consumption volume for the Domestic Landfill for 1994, 1995, 1996, 1997 and 1998, the average annual consumption rate at the Domestic Landfill is estimated to be approximately 8,985 m^3/year. Based on the calculated consumption volume for the Industrial Landfill for 1997 and 1998, the average annual consumption rate at the Industrial Landfill is estimated to be 9,218 m^3.

Since the proposed waste characteristics and service area for the long term operation of the Site are anticipated to be the same as those for the current Domestic and Industrial Landfills, and the fact that the projected population adjustments are not anticipated to have appreciable impact the landfilling rate at the Site during the long term expansion period, the annual consumption rate for the long term expansion period is estimated to be approximately 18,203 m^3 (8,985 m^3 + 9,218 m^3) per year.

6.2.3 LANDFILL DESIGN CRITERIA

The design criteria for the long-term expansion are presented in Table 6.1. In several cases maximum and minimum values are given, which reflect upper and lower limits of the range of acceptable values. The design criteria represent current landfill industry standards as outlined in Ontario Regulation 232/98. Usage of this design criteria, as a minimum, will ensure that the landfill will function in an environmentally acceptable manner. The major components of the landfill include buffer zone, base contours, soil requirements, landfill capacity, final contours, final cover and surface water management systems. Conceptual details of the expansion alternatives are presented on Drawings No. 5, 6 and 7, respectively.

6.2.4 SITE LIFE ESTIMATES

Using the design criteria presented on Table 6.1, CRA developed conceptual base and final contours for all three alternatives. Based on a comparison of the respective contours for each alternative, the total air space available for placement of refuse and daily cover is as follows:

Alternative	*Air Space* *(allocated for refuse and daily cover)*
Alternative 1	395,700 m^3
Alternative 2	349,185 m^3
Alternative 3	234,716 m^3

Refuse compaction rates achieved are related to the type and size of compaction equipment utilized and the nature of refuse. During the long term expansion period, it is proposed to use the appropriate equipment to compact refuse and daily cover soils at the Site to achieve a gross density of 600 kg/m^3.

Using the compaction rate of 600 kg/m^3, the total landfill capacity expressed in metric tonnes (MT) allocated for each of the three alternatives are as follows:

Alternative	*Landfill Capacity (allocated for refuse and daily cover)*
Alternative 1	237,420 MT
Alternative 2	209,511 MT
Alternative 3	193,240 MT

Using the average annual consumption rate of 18,203 m^3 and the compaction rate of 600 kg/m^3 it is estimated that 10,921 MT of the allocated capacity will be consumed each year during the long term expansion period at the Site.

Based on the above estimated landfill capacity for each alternative and the average annual consumption rate, the Site life estimates for each of the alternatives is estimated as follows:

Alternative	*Site Life*
Alternative 1	21.7 Years
Alternative 2	19.7 Years
Alternative 3	17.7 Years

In recognition of the overall objectives of the engineering/planning evaluation and cost assessment, the estimated landfill capacity has a greater impact on the evaluation then the exact number of years in which landfilling occurs. Additionally, the rate of landfill consumption in any given year could be substantially increased or decreased due to a number of factors such as commercial and industrial development in the area, improved segregation and recycling programs, etc. As such, the following Site Life estimates have been used in the cost assessment for the three alternatives:

Alternative	*Site Life*
Alternative 1	20 Years
Alternative 2	20 Years
Alternative 3	18 Years

6.2.5 ATTENUATION POTENTIAL OF THE EXPANSION ALTERNATIVES

In order to assess the potential for degradation of on-Site and off-Site groundwater quality associated with the three alternatives for the expansion of the Domestic Landfill, CRA undertook a mathematical evaluation of the migration potential of chloride using standard groundwater modelling procedures.

The contaminant attenuation model utilized for the Site consisted of a simple dilution model which requires as input area values for the landfill and the available CAZ along with Site-specific hydrogeological and infiltration parameters. The input areas were measured from available site plans while the hydrogeological parameters (hydraulic conductivity, hydraulic gradient and porosity) were generally gathered from data obtained through previous on-Site investigations. The dilution model was initially calibrated using existing Site conditions including the most recent leachate and downgradient chloride concentration. The calibrated model was then used to predict the chloride concentration along the downgradient Site boundary under the three selected expansion alternatives.

The following subsections briefly discusses the potential for off-Site degradation for each expansion alternative as well as the associated design considerations.

Alternative 1 - Expansion East - Fully Engineered

Dilution calculations based on expanding the Domestic Landfill on-Site towards the east with no purchase of additional land, indicate clearly that chloride levels along the downgradient limit of the Site would exceed the RUC standards. As such, this expansion alternative would require the installation of engineered systems in order to complete collection of all or a portion of the leachate generated for adequate off-Site treatment. The design characteristics for Alternative 1 (Engineered Site) are presented in Drawing 5.

Alternative 2 - Expansion East with CAZ

Under this scenario, the Domestic Landfill would still be expanded on-Site towards the east, but the Hawkesbury Transport property would be used as a CAZ. Dilution modeling of this expansion alternative indicates anticipated theoretical levels of chlorides at the downgradient property boundary below the RUC. As such, no off-Site degradation of the groundwater quality is anticipated, and the landfill expansion could proceed as a natural attenuation landfill with designed contingency measures to mitigate any potential concerns about future groundwater quality. The design characteristics for Alternative 2 are presented in Drawing 6.

Alternative 3 - Expansion West with CAZ

Under this alternative, the Domestic Landfill would be expanded towards the west on lands presently owned by Mr. Gilles Parisien, while the CAZ would remain as it actually is. Dilution modeling under this scenario indicates anticipated levels of chloride at the downgradient property boundary to be slightly below the RUC. As such, the landfill expansion could proceed as a natural attenuation landfill again with designed contingency measures to mitigate any potential concerns about future groundwater quality. The design characteristics for Alternative 3 are presented in Drawing 7.

6.3 CONTINGENCY MEASURES FOR THE NATURAL ATTENUATION LANDFILL ALTERNATIVES

As discussed previously, preliminary modeling undertaken under the proposed expansion alternatives was limited to dilution from precipitation infiltration within the CAZ and groundwater influx upgradient of the Domestic Landfill. Further dilution is however anticipated north of the Domestic Landfill where the clay aquitard thins out and mixing of the perched water table and the lower overburden aquifer occurs. Based on data available on the hydraulic conductivity hydraulic gradient and saturated thickness of both aquifers, a projected dilution ratio in excess of 100:1 is anticipated when the relatively low flow of the perched water table comes in contact with the higher flow of the lower overburden aquifer.

As a contingency measure for the prevention of off-Site degradation downgradient of the Domestic Landfill for the natural attenuation landfill alternatives (Alternatives 2 and 3), a groundwater interceptor ditch could be installed along the eastern limit of the CAZ in the event of RUC exceedance, to channel the impacted perched water table to the lower overburden aquifer for further dilution. The geological setting of the Site,

with the clay aquitard generally located within 3 to 5 metres from the ground surface along the downgradient of the Domestic Landfill, is well suited for the installation of a low cost perimeter groundwater interceptor ditch or perforated tile anchored within the aquifer if further attenuation is deemed necessary.

Further attenuation could be achieved by pre-treating the collected perched water prior to final discharge to the lower overburden aquifer. Preliminary assessments indicate that the collected perched water along the downgradient property boundary could be passed through a low cost aeration lagoon and a constructed wetland system to further reduce the levels of VOCs, BOD, iron and nutrients, which are generally associated with leachate-impacted groundwater. The approximate location of the contingency groundwater interceptor ditch for Alternatives 2 and 3 is shown on Drawings 6 and 7, respectively while the design characteristics of the contingency aeration lagoon and wetland is presented on Drawing 8.

Alternatively, the contingency measure for the prevention of off-Site degradation downgradient of the Domestic Landfill for the natural attenuation landfill alternatives (Alternatives 2 and 3), could consist of a leachate collection and pumping system. This system would include a groundwater interceptor/collection ditch, a pumping station and a forcemain connected to the existing Town of Hawkesbury municipal sanitary sewer.

It is CRA's opinion that the above mentioned contingency measures will ensure that the long term expansion of the Domestic Landfill can be implemented as a natural attenuation waste disposal facility in an environmentally defendable manner.

7.0 COST ASSESSMENT

7.1 GENERAL

A cost assessment has been prepared for each of the three long term expansion alternatives to help evaluate and compare the feasibility of each alternative. The cost assessment includes an estimate for all expenditures which are reasonably anticipated during the development, operational and closure periods of the Landfill. The cost assessment includes land acquisition, approval and land use amendments, development, maintenance and monitoring, closure, and post-closure monitoring and maintenance costs for each alternative. The cost estimate also includes contingencies for consolidated hearing and leachate treatment, should they be required. Operational costs, such as staff and equipment, have not been included as these costs are directly dependent of the rate of landfilling and not the expansion alternative.

For expenditures which are to be implemented over a number of years (i.e. development, maintenance and monitoring, closure and post closure monitoring and maintenance), the costs used for comparison represent the present worth of the expenditures assuming that the funds will be available in the year 1999. Details on the present worth calculations are presented in Section 7.3 of this report.

7.2 DETAILED COST ASSESSMENT

A summary of the land acquisition, approval and land use amendments, development, maintenance and monitoring, closure and post-closure monitoring and maintenance cost for each of the three long term expansion alternatives are presented in Table 7.0. Details of the individual cost for each of the alternatives are presented on the subsequent Tables 7.1 to 7.12, as indicated on Table 7.0.

Table 7.1 presents the land acquisition costs. For Alternative 1 - Expansion East Fully Engineered, no additional land is required. As described in Section 6.1, this alternative utilizes the existing land east of the Domestic Landfill on lands presently owned by 781998 Ontario Inc. Alternative 2 - Expansion East with CAZ and Alternative 3 - Expansion West with CAZ both require the purchase of additional land which is currently owned by Hawkesbury Transport and Mr. Gilles Parisien, respectively. The land purchase costs presented on Table 7.1 are based on preliminary discussion with the respective owners. Associated costs include land transfer tax, which is equal to 0.5% of the purchase price for the first $55,000 plus 1.0% of the purchase price from $55,001 to

$250,000 plus 1.5% of the purchase price above $250,000, and an allowance equal to 5% of the purchase price for lawyer fees.

Table 7.2 presents the EA approval costs and reflects the EA process described in Section 4.1. The EA approval cost for each of the three expansion alternatives is estimated to be the same. For each alternative a contingency allowance of $50,000 has been included to cover additional work which may be required by the MOE as a result of core review team and/or public comments.

Table 7.3 presents the EPA approval costs as mentioned in Section 4.2. These costs include additional hydrogeological investigation and preparation of EPA level Hydrogeological Investigation Report, Site design and supporting documentation, public consultation and completion of Section 27 Application and Application Fees. As of October 1, 1998, Section 27 C of A applications are subject to fees in accordance with Ontario Regulation 363/98 for both private and public sector. For all three expansion alternatives being considered at the Site, the Section 27 C of A application fees are $30,000. The EPA Approval cost for Alternative 1 - Expansion East Fully Engineered is slightly less ($35,000 less) than Alternatives 2 and 3. The cost reduction is related to the reduction in scope of the hydrogeological investigation and the leachate management plan, since leachate in Alternative 1 will be collected and treated off-Site.

Table 7.4 presents the OWRA approvals and Official Plan and Zoning By-law Amendments. The OWRA approvals include surface water management plan, leachate collection system (Alternative 1 only) and groundwater interceptor ditch (Alternatives 2 and 3 only). OWRA applications are subject to fees in accordance with Ontario Regulation 364/98. The OWRA application fees for all three alternatives is estimated to be $2,000. The cost associated with Official Plan and Zoning By-law Amendments include advertisements and notices. All three alternatives require Official Plan and Zoning By-law Amendments. As such, the cost estimate for each alternative is the same, ($20,000).

Table 7.5, 7.6 and 7.7 detail the Site development costs for Alternatives 1, 2 and 3, respectively. The development phases and year of implementation for the various works are also noted on the tables. The Site development costs include capital costs for engineering, construction, and contract administration. The unit costs provided in the tables are based on representative unit cost awarded for previous Site works, where applicable, and a combination of material, labour and profit costs representative of the Eastern Ontario market. All unit costs are reflective of 1999 costs and rates. In addition to the capital cost, an allowance equal to 15% of capital cost is included for mobilization, demobilization, bonds and insurance, and additional requirements established during

final design phase. An allowance of 20% is included for engineering. The engineering allowance includes contract documents, tender documents, contract administration, construction inspection and materials testing. As noted in Section 7.1 and detailed later in Section 7.3, the total cost of the works has been calculated to represent the present worth of the work in 1999 dollars.

Table 7.8 presents the annual maintenance and monitoring cost for each of the alternatives. These costs include annual monitoring program and maintenance and operation of leachate collection system (Alternative 1 only) and storm water management facilities, and an allowance for Site maintenance and repair. The annual monitoring program costs are based on the current Site monitoring program. It is expected that the specifics of the current monitoring program will differ from the monitoring program with expansion of the landfill, however, the scope is expected to remain similar. The maintenance and operation of the leachate collection system only apply to Alternative 1 - Expansion East Fully Engineered. This cost includes leachate discharge fees, which are anticipated to be $0.50 per m^3, an allowance for operation, maintenance, and calibration of equipment, and flushing and vacuuming leachate piping. Maintenance and operations of the storm water management facility includes removal of sediment from ditching and pond and erosion repairs. The allowance for Site maintenance and repair includes the final cover system, roadways, fencing monitoring wells and stations. The total costs for maintenance and monitoring are calculated by multiplying the annual costs by the number of years the landfill is estimated to be in operation. In order to provide comparative maintenance and monitoring costs between the three alternatives, the costs are calculated in present worth (1999 dollars) as noted in Section 7.1 and Section 7.3 of this report.

Table 7.9 presents the closure costs for each of the alternatives. The closure costs assume a final cover consisting of 0.6 m low permeable clay overlayer by 0.15 m of vegetative topsoil. The low permeable cover unit costs are representative of the average unit cost bid for previous work at the Site, plus additional cost for supply should a local source not be secured. The unit cost for topsoil and seed and mulch are based on Regional pricing. An allowance of 15% for mobilization, demobilization, bonds and insurance and 20% for engineering has been included in the total closure costs. The closure costs have also been calculated in present worth (1999 dollars) in order to provide comparative costs between the alternatives. When calculating the present worth for the closure works, it was assumed that the closure works will be completed annually for the area of the landfill completed to final contours beginning two years after commencement of operation and ending two years after the landfill has reached final capacity.

Table 7.10 presents the post-closure monitoring and maintenance costs for each of the three alternatives. The post-closure monitoring is reduce by approximately 60% of the monitoring program during the operational life of the landfill. Regular maintenance of the leachate collection system (Alternative 1 only) and storm water management facilities and allowance for maintenance and repair of the final cover system, roadways, fencing and monitoring wells and stations are the same as during the operation life of the landfill. The total post-closure monitoring and maintenance costs for each of the alternatives is calculated by multiplying the annual costs by the number of years of the long term monitoring period (contaminating life span). In all three alternatives, the contaminating life span is estimated to be 25 years. In order to adequately compare the alternatives, the total post-closure monitoring and maintenance costs are presented in 1999 dollars (present worth).

Table 7.11 presents the contingency consolidated hearing costs. A consolidated hearing may be required if extensive public objection is evident during the EAA/EPA Approval process. Should a consolidated hearing be required, it is anticipated to last approximately nine months. The cost for the consolidated hearing includes preparation for and attendance by engineers, development of conditions of approval and an allowance for peer review and legal assistance. The consolidated hearing cost for the three alternatives is estimated to be the same.

Table 7.12 presents the contingency leachate treatment cost for Alternatives 2 and 3 which would operate with a CAZ. Results of preliminary modeling (Section 6.2.5) indicate that the RUC should be met along the downgradient Site boundary for both Alternatives 2 and 3. However, if the downgradient groundwater quality is observed to deteriorate to levels above the RUC, a contingency for a leachate treatment system will need to be implemented. The contingency for leachate treatment for both Alternatives 2 and 3 consists of a groundwater interceptor ditch or tile along the downgradient boundary of the CAZ, canalization piping and construction of an aeration lagoon and a constructed wetland.

The costs for the leachate treatment system for Alternative 2 is slightly less than that for Alternative 3 ($35,600 less) due to the length of the groundwater interceptor system which would be required.

7.3 PRESENT WORTH

In order to compare the total cash value of the three expansion alternatives the value of the items implemented on an annual basis are calculated based on their worth in the current year (1999 dollars).

For this calculation we assumed an annual interest rate of 5% which is compounded yearly. The annual values are converted into a corresponding future value corresponding to the first year of implementation. For this, we use a compound amount factor for a single payment which represents the annual cost at the end of every year. The formula for this calculation is the following:

$F = P \times (1 + i)^n$ where

F: future value
P: present value
i: interest rate
n: number of interest periods

The annuity is then spread out over the predetermined number of years and the present worth factor for equal payment series is calculated. This will give us the money worth equivalent to the first year of the program. The corresponding formula is:

$$P = A \times \left[\frac{(1+i)^n - 1}{i(1+i)^n} \right]$$ where

P: present value
A: annuity
i: interest rate
n: number of interest periods

The future worth is then converted into 1999 dollars using a present worth factor for single payment. The formula for this last calculation step is:

$P = F \times (1 + i)^{-n}$ where

P: present value
F: future value
i: interest rate
n: number of interest periods.

As previously noted in Section 7.1 and 7.2 the Site development, maintenance and monitoring, closure and post-closure monitoring and maintenance activities are implemented over a number of years. For comparison and evaluation, the cost

associated with these activities have been calculated to represent the present worth of the activities in 1999 Dollars.

The following table presents the future and present worth for each of the activities:

Activity	*Future Worth*	*Present Worth*
Site Development		
Alternative 1 - Expansion East Fully Engineered	$3,016,497	$2,178,954
Alternative 2 - Expansion East With CAZ	$1,120,130	$691,936
Alternative 3 - Expansion West with CAZ	$882,071	$642,687
Monitoring and Maintenance		
Alternative 1 - Expansion East Fully Engineered	$1,752,500	$511,051
Alternative 2 - Expansion East With CAZ	$1,370,000	$399,509
Alternative 3 - Expansion West with CAZ	$1,370,000	$371,893
Closure Costs		
Alternative 1 - Expansion East Fully Engineered	$1,100,790	$640,124
Alternative 2 - Expansion East With CAZ	$1,100,790	$640,124
Alternative 3 - Expansion West with CAZ	$1,046,763	$629,588
Post-Closure Monitoring and Maintenance		
Alternative 1 - Expansion East Fully Engineered	$1,315,625	$353,361
Alternative 2 - Expansion East With CAZ	$837,500	$224,942
Alternative 3 - Expansion West with CAZ	$837,500	$242,872

8.0 EVALUATION OF EXPANSION ALTERNATIVES

Section 1 to 7 of this engineering and planning evaluation and cost assessment report, outlines the approval process and requirements for a long term expansion of a landfill in the Province of Ontario, describes the geologic and hydrogeologic conditions at the Site, identifies three expansion alternatives that are considered environmentally reasonable within the control of the existing Site conditions and land ownership, and provides a cost assessment for each alternative.

The overall suitability and feasibility of each alternative is evaluated by comparing the Pros and Cons of each alternative. A summary of the Pros and Cons for each alternative are summarized below.

Alternative 1 - Expansion East Fully Engineered

Pros	*Cons*
• provides an environmentally sound non-hazardous solid waste facility	• zoning and planning amendments required
• no additional land required	• requires leachate collection system and off-site treatment of leachate
• Site life estimate greater than 20 years	• cost per metric tonne of refuse is substantially higher than both Alternatives 2 and 3
	• constructability (some of the Site development works would require specialized contractors)

Alternate 2 - Expansion East with CAZ

Pros	*Cons*
• provides an environmentally sound non-hazardous solid waste facility	• additional land required
• the requirement for implementation of leachate collection and treatment contingency measures are unlikely	• zoning and planning amendments required
• cost per metric tonne of refuse is lower than both Alternatives 1 and 3	
• Site life estimate approximately 20 years	
• constructability (majority of Site development works could be completed by Owner)	

Alternative 3 - Expansion West with CAZ

Pros	Cons
• provides an environmentally sound non-hazardous solid waste facility	• additional land required • zoning and planning amendments required • implementation of leachate treatment contingency measures are likely • cost per metric tonne, when leachate treatment contingency measures are considered, are higher than Alternative 2 and in the range of Alternative 1 • Site life estimate is slightly less than both Alternatives 1 and 2 (18 years) • removal of existing final cover required on west side of Site • significant environmental issues exist on required land

9.0 CONCLUSIONS

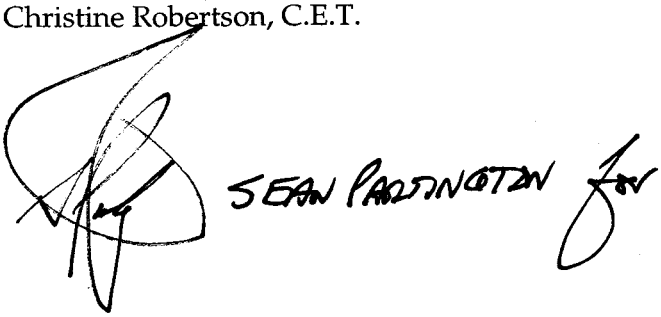
Based on the results of the evaluation and cost assessment completed for the three long term expansion alternatives developed for the Mayer Waste Disposal Site, it is concluded that Alternative 2 - Expansion East with CAZ is the preferred alternative for the long term expansion of the Domestic Landfill.

Alternative 2 provides an environmentally sound and economically feasible option to provide solid non-hazardous waste facility for approximately a 20-year period. The cost per metric tonne for this option is the least expensive. Additionally, greater cost savings could be realized if the Site development works were partially or completely constructed by the owner.

The engineering/planning evaluation and cost assessment of certain feasible alternatives for the long term expansion of the Mayer Waste Disposal Site was conducted during 1998 and the first quarter of 1999. Since completion of this study, 781998 Ontario Inc. has acquired the land east of the existing Site, formerly owned by Hawkesbury Transport and Excavation Ltd.

All of Which is Respectfully Submitted,
CONESTOGA-ROVERS & ASSOCIATES

Christine Robertson, C.E.T.



Gregory D. Ferraro, P. Eng.

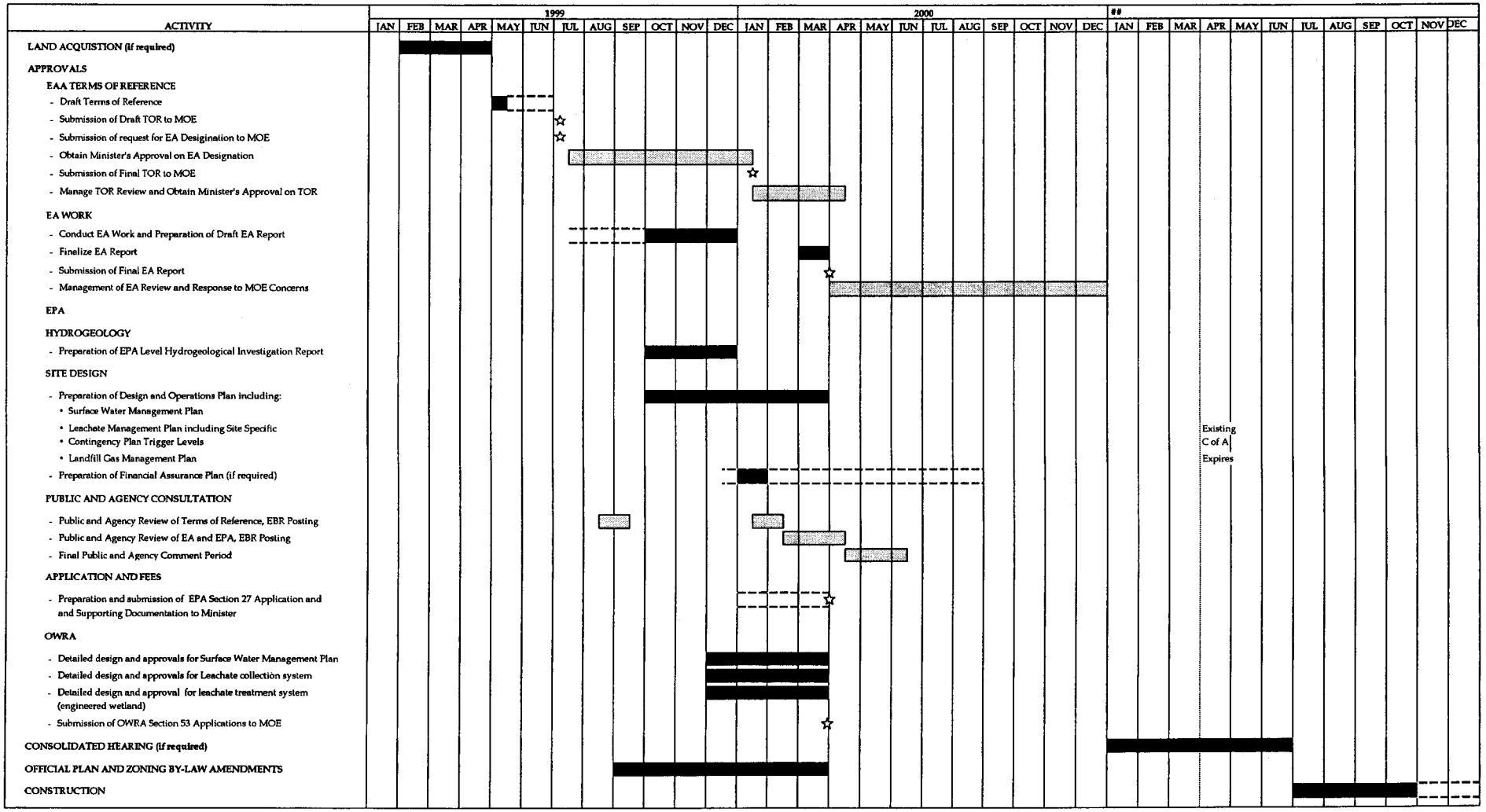


figure 1

WORK SCHEDULE
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE
Township of Champlain, Ontario

TABLE 6.1
LANDFILL DESIGN CRITERIA
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item	*Criteria*
• On-Site buffer zone	• minimum 30 m width for operational, maintenance monitoring control and corrective measures; nuisance controls; and physical separation.
• Maximum height of existing Domestic Landfill (top of refuse and daily cover)	• 78.25 m.
• Maximum height of expansion area (top of refuse and daily cover) landfill	• Similar to existing
• Minimum base elevation of landfill	• 1.0 m above seasonal high water table elevation for alternatives with CAZ. • 1.0 m above top of undisturbed native clay for fully engineered alternative.
• Soil requirements	• daily and interim cover soil obtained from on-Site borrow area(s). • low permeable final cover soil obtained from off-Site sources. • topsoil obtained from off-Site and on-Site borrow area(s). • organic material may be added to topsoil to improve quality and to sustain plant growth.
• Required site capacity (Refuse and daily cover soils)	• Suitable to accommodate 15-25 year Site life.
• Maximum side slopes	• 4:1 (25%)
• Minimum side slopes	• 20:1 (5%)
• Final cover (depth 0.75 m)	• 0.15 m vegetated topsoil • 0.6 m low permeable soil (maximum remolded hydraulic conductivity 1 x 10^{-5} cm/sec)
• Surface water control systems	• ditch 25-year design storm • pond 5-year design storm

TABLE 7.0 A

COST SUMMARY
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Activity	*Alternative 1 - Expansion East Fully Engineered*	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
LAND ACQUISITION (TABLE 7.1)	$0	$300,050	$211,525
APPROVALS AND LAND USE AMMENDMENTS			
EAA (TABLE 7.2)	$151,000	$151,000	$151,000
EPA (TABLE 7.3)	$128,000	$163,000	$163,000
OWRA (TABLE 7.4)	$27,000	$17,000	$17,000
OFFICIAL PLAN AND ZONING (TABLE 7.4)	$20,000	$20,000	$20,000
SUB TOTAL - APPROVALS AND LAND USE AMENDMENTS	$326,000	$351,000	$351,000
SITE DEVELOPMENT (TABLES 7.5 TO 7.7)	$3,016,497	$1,120,130	$882,071
MAINTENANCE AND MONITORING (TABLE 7.8)	$1,752,500	$1,370,000	$1,233,000
CLOSURE (TABLE 7.9)	$1,100,790	$1,100,790	$1,046,763
POST-CLOSURE MONITORING AND MAINTENANCE (TABLE 7.10)	$1,315,625	$837,500	$837,500
SUBTOTAL	$7,511,412	$5,079,470	$4,561,859
GOODS AND SERVICE TAX (7%)	$525,799	$355,563	$319,330
TOTAL COST	$8,037,211	$5,435,033	$4,881,189
CONTINGENCIES			
CONSOLIDATED HEARING (TABLE 7.11)	$205,000	$205,000	$205,000
LEACHATE TREATMENT (TABLE 7.12)	$0	$585,000	$554,400
SUBTOTAL	$205,000	$790,000	$759,400
GOODS AND SERVICE TAX (7%)	$14,350	$55,300	$53,158
TOTAL CONTINGENCY COST	$219,350	$845,300	$812,558

TABLE 7.0 B

PRESENT WORTH COST SUMMARY
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Activity	*Alternative 1 - Expansion East Fully Engineered*	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
LAND ACQUISITION (TABLE 7.1)	$0	$300,050	$211,525
APPROVALS AND LAND USE AMMENDMENTS			
EAA (TABLE 7.2)	$151,000	$151,000	$151,000
EPA (TABLE 7.3)	$128,000	$163,000	$163,000
OWRA (TABLE 7.4)	$27,000	$17,000	$17,000
OFFICIAL PLAN AND ZONING (TABLE 7.4)	$20,000	$20,000	$20,000
SUB TOTAL - APPROVALS AND LAND USE AMENDMENTS	$326,000	$351,000	$351,000
SITE DEVELOPMENT[1] (TABLES 7.5 TO 7.7)	$2,178,954	$691,936	$642,687
MAINTENANCE AND MONITORING[1] (TABLE 7.8)	$511,051	$399,509	$371,893
CLOSURE[1] (TABLE 7.9)	$640,124	$640,124	$629,588
POST-CLOSURE MONITORING AND MAINTENANCE[1] (TABLE 7.10)	$353,361	$224,942	$242,872
SUBTOTAL	$4,009,490	$2,607,562	$2,449,565
GOODS AND SERVICE TAX (7%)	$280,664	$182,529	$171,470
TOTAL COST	$4,290,154	$2,790,091	$2,621,035
CONTINGENCIES			
CONSOLIDATED HEARING (TABLE 7.11)	$205,000	$205,000	$205,000
LEACHATE TREATMENT (TABLE 7.12)	$0	$585,000	$554,400
SUBTOTAL	$205,000	$790,000	$759,400
GOODS AND SERVICE TAX (7%)	$14,350	$55,300	$53,158
TOTAL CONTINGENCY COST	$219,350	$845,300	$812,558

Note:
1 Represents the Present Worth of the Cost in 1999 Dollars

TABLE 7.1

LAND ACQUISITION COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Alternative 1 - Expansion East Fully Engineered*	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
1	LAND PURCHASE	$0		
	- Parisien Property			$200,000
	- Hawkesbury Transport Property		$295,000	
2	ASSOCIATED COSTS			
	- Land Transfer Tax[1]	$0	$2,900	$1,475
	- Property Registration Fees	$0	$50	$50
	- Allowance for Lawyers Fees [(2)]	$0	$2,100	$10,000
	TOTAL	$0	$300,050	$211,525

Note:

1. Land transfer tax is calculated as a percentage of the purchase price as follows:
   - 0.5% of the first $55,000
   - 1.0% from $55,001 to $250,000
   - 1.5% over $250,000
2. Lawyers fees for Altwernative 1 and 3 are calculated at 5 percent of the purchase price. Lawyers fees for Alternative 2 represent actual fees paid for legal services at the time of purchase.

TABLE 7.2

EAA APPROVAL COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Alternative 1 - Expansion East Fully Engineered*	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
1	**TERMS OF REFERENCE**			
	- Draft Terms of Reference [1]	$1,000	$1,000	$1,000
	- Draft TOR Public and Agency Consultation [2]	$15,000	$15,000	$15,000
	- Manage TOR and Minister's Approval	$5,000	$5,000	$5,000
2	**EA WORK**			
	- Conduct EA Work and Preparation of Draft EA Report	$30,000	$30,000	$30,000
	- Public and Agency EA Consultation [3]	$25,000	$25,000	$25,000
	- Submission of Final EA Report including Response to MOE Concerns and Management of EA Review	$25,000	$25,000	$25,000
3	**CONTINGENCY**			
	- Recommended Contingency Allowance	$50,000	$50,000	$50,000
	TOTAL	**$151,000**	**$151,000**	**$151,000**

Notes:

1 Draft Terms of Reference has been reviewed by MOE, however due to MOE staff changes, an allowance is required for communication with new MOE staff members to help familiarize them with project.

2 Includes Consultation with CRT/MOE EAA Branch, 1 PAC Meeting, 1 Newsletter, and 1 Open House.

3 Includes Consultation with CRT/MOE EAA Branch, 1 PAC Meeting, 1 Newsletter, and 1 Open House.

TABLE 7.3

EPA APPROVAL COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Alternative 1 - Expansion East Fully Engineered*	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
1	**HYDROGEOLOGY**			
	- Allowance for completion of detailed hydrogeological investigation	$10,000	$30,000	$30,000
	- Preparation of EPA Level Hydrogeological Investigation Report	$10,000	$10,000	$10,000
2	**SITE DESIGN**			
	- Preparation of Design and Operations Plan	$10,000	$10,000	$10,000
	- Preparation of Surface Water Management Plan	$10,000	$10,000	$10,000
	- Preparation of Leachate Management Plan including Site Specific Contingency Plan Trigger	$5,000	$20,000	$20,000
	- Preparation of Landfill Gas Management Plan	$5,000	$5,000	$5,000
	- Allowance for completion of a Closure Plan	$10,000	$10,000	$10,000
	- Allowance for completion of an End Use Plan	$10,000	$10,000	$10,000
	- Preparation of Financial Assurance Plan (if landfill is to remain privately owned)	$10,000	$10,000	$10,000
3	**PUBLIC CONSULTATION**			
	- Consultation process and response to review comments including revisions to EPA documentation [1]	$15,000	$15,000	$15,000
4	**APPLICATION AND FEES**			
	- Preparation of Section 27 Application and Submission of Application and Supporting Documentation to Minister	$3,000	$3,000	$3,000
	- Section 27 Application Fees [2]	$30,000	$30,000	$30,000
	TOTAL	**$128,000**	**$163,000**	**$163,000**

Notes:

1 Includes Consultation with CRT/MOE EA Branch, 1 PAC Meeting, 1 Newsletter, and 1 Open House.

2 Fees based on Ontario Regulation 363/98.

TABLE 7.4

OWRA APPROVALS AND OFFICIAL PLAN AND ZONING
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Alternative 1 - Expansion East Fully Engineered*	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
1	OWRA APPROVALS			
	- Detailed design and approvals for Surface Water Management Plan	$10,000	$10,000	$10,000
	- Detailed design and approvals for Leachate collection system	$15,000	$0	$0
	- Detailed design of groundwater interceptor ditch	$0	$5,000	$5,000
	- Application Fees [1]	$2,000	$2,000	$2,000
	TOTAL	$27,000	$17,000	$17,000
2	OFFICIAL PLAN AND ZONING BY-LAW AMENDMENTS including Advertisements and Notices	$20,000	$20,000	$20,000
	TOTAL	$20,000	$20,000	$20,000

Note

1 Fees based on Ontario Regulation 364/98.

TABLE 7.5

ALTERNATIVE 1 - EXPANSION EAST FULLY ENGINEERED
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	Description	Unit	Quantity	Unit Cost	Total Cost
INITIAL SITE AND PHASE 1 DEVELOPMENT (YEAR 2001 - 2005)					
1	**PERIMETER WALL**				
	- excavation of trench	m^3	13,650	$6.00	$81,900
	- dewatering of trench	LS	1	$20,000.00	$20,000
	- supply, placement and compaction of clay	m^3	9,750	$20.00	$195,000
	- backfilling with native soil	m^3	405	$8.00	$3,240
2	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,600	$2.00	$13,200
	- stripping of topsoil	m^3	2,750	$6.00	$16,500
	- excavation of native soil to within 600mm of top of clay	m^3	24,875	$6.00	$149,250
	- dewatering of expansion area	LS	1	$5,000.00	$5,000
3	**LEACHATE COLLECTION PIPING**				
	- 200mm perforated HDPE pipe (supply and install)	LM	575	$130.00	$74,750
	- 200mm non-perforated HDPE pipe (supply and install)	LM	35	$130.00	$4,550
	- geotextile (Terrafix 200W)	m^2	1,564	$2.00	$3,128
	- clear stone ($CaCO_3$<60% & $MgCO_3$>40%)	MT	318	$40.00	$12,716
	- backfill with native material	m^3	75	$8.00	$600
	- Leachate manholes	EA	17	$800.00	$13,600
4	**FORCEMAIN**				
	- 75mm HDPE pipe	LM	1,800	$100.00	$180,000
	- excavation	m^3	4,700	$6.00	$28,200
	- backfill with native material	m^3	3,200	$8.00	$25,600
	- backfill with imported material	m^3	1,600	$8.00	$12,800
	- granular bedding	MT	1,700	$10.00	$17,000
5	**LEACHATE PUMPING STATION**				
	- including chamber, mechanical, electrical and fencing	LS	1	$150,000.00	$150,000
6	**PERIMETER FENCING**				
	- fencing 1.2m Woven Wire	LM	500	$15.00	$7,500
	- 10m double swing gate	EA	2	$200.00	$400
7	**SITE ROADS**				
	- excavation and grading	m^3	2,100	$6.00	$12,600
	- proof roll sub-grade	m^2	7,000	$1.00	$7,000
	- supply, place and compact road base (450mm - granular B)	MT	6,910	$10.00	$69,100
	- supply, place and compact road base (150mm - granular A)	MT	2,100	$10.00	$21,000

TABLE 7.5

ALTERNATIVE 1 - EXPANSION EAST FULLY ENGINEERED
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
8	PERIMETER DITCHES				
	- excavation and grading	m^3	500	$6.00	$3,000
	- place and grade 100mm topsoil layer	m^2	5,100	$8.00	$40,800
	- seed and mulch	m^2	5,100	$1.00	$5,100
	- temporary check dams	EA	6	$150.00	$900
	- permanent check dams	EA	6	$350.00	$2,100
9	SWM POND				
	- excavation	m^3	450	$6.00	$2,700
	- berm	m^3	450	$6.00	$2,700
	- culvert (2-700mm CSPs)	LM	40	$350.00	$14,000
	- place and grade 100mm topsoil layer	m^2	200	$8.00	$1,600
	- seed and mulch	m^2	200	$1.00	$200
10	WEIGH SCALE	LS	1	$75,000.00	$75,000
11	RELOCATION OF MATERIAL RECYCLING AREA	LS	1	$5,000.00	$5,000
				SUBTOTAL	**$1,277,734**
12	**Allowance for mobilization, demobilisation, bonds and insurance (15% of subtotal)**				$191,660
13	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$191,660
14	**Engineering Allowance (20% of subtotal)** - includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				$255,547
				TOTAL - INITIAL SITE AND PHASE 1 DEVELOPMENT COST	**$1,916,601**
				YEAR TO BE IMPLEMENTED	**2001-2005**
				TOTAL - INITIAL SITE AND PHASE 1 DEVELOPMENT COST (1999 DOLLARS)[1]	**$1,568,082**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.5

ALTERNATIVE 1 - EXPANSION EAST FULLY ENGINEERED
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
PHASE 2 DEVELOPMENT (YEAR 2006 - 2010)					
1	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,600	$2.00	$13,200
	- stripping of topsoil	m^3	2,750	$6.00	$16,500
	- excavation of native soil to within 600mm of top of clay	m^3	24,875	$6.00	$149,250
	- dewatering of expansion area	LS	1	$5,000.00	$5,000
2	**LEACHATE COLLECTION PIPING**				
	- 200mm perforated HDPE pipe (supply and install)	LM	225	$130.00	$29,250
	- geotextile (Terrafix 200W)	m^2	644	$2.00	$1,288
	- clear stone ($CaCO_3$<60% & $MgCO_3$>40%)	MT	131	$40.00	$5,236
				SUBTOTAL	**$219,724**
3	**Allowance for mobilization, demobilisation, bonds and insurance (15% of subtotal)**				$32,959
4	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$32,959
5	**Engineering Allowance (20% of subtotal)** - includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				$43,945
				TOTAL - PHASE 2 DEVELOPMENT COST	**$329,586**
				YEAR TO BE IMPLEMENTED	**2006-2010**
				TOTAL - PHASE 2 DEVELOPMENT COST (1999 DOLLARS)[1]	**$222,608**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.5

ALTERNATIVE 1 - EXPANSION EAST FULLY ENGINEERED
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
PHASE 3 DEVELOPMENT (YEAR 2011 - 2015)					
1	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,600	$2.00	$13,200
	- stripping of topsoil	m^3	2,750	$6.00	$16,500
	- excavation of native soil to within 600mm of top of clay	m^3	24,875	$6.00	$149,250
	- dewatering of expansion area	LS	1	$5,000.00	$5,000
2	**LEACHATE COLLECTION PIPING**				
	- 200mm perforated HDPE pipe (supply and install)	LM	300	$130.00	$39,000
	- geotextile (Terrafix 200W)	m^2	782	$2.00	$1,564
	- clear stone ($CaCO_3$<60% & $MgCO_3$>40%)	MT	159	$40.00	$6,358
				SUBTOTAL	**$230,872**
3	**Allowance for mobilization, demobilisation, bonds and insurance (15% of subtotal)**				$34,631
4	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$34,631
5	**Engineering Allowance (20% of subtotal)** - includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				$46,174
				TOTAL - PHASE 3 DEVELOPMENT COST	**$346,308**
				YEAR TO BE IMPLEMENTED	**2011-2015**
				TOTAL - PHASE 3 DEVELOPMENT COST (1999 DOLLARS) (1)	**$193,094**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.5

ALTERNATIVE 1 - EXPANSION EAST FULLY ENGINEERED
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
PHASE 4 DEVELOPMENT (YEAR 2016 - 2020)					
1	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,600	$2.00	$13,200
	- stripping of topsoil	m^3	2,750	$6.00	$16,500
	- excavation of native soil to within 600mm of top of clay	m^3	24,875	$6.00	$149,250
	- dewatering of expansion area	LS	1	$5,000.00	$5,000
2	**LEACHATE COLLECTION PIPING**				
	- 200mm perforated HDPE pipe (supply and install)	LM	610	$130.00	$79,300
	- geotextile (Terrafix 200W)	m^2	1,564	$2.00	$3,128
	- clear stone ($CaCO_3$<60% & $MgCO_3$>40%)	MT	327	$40.00	$13,090
	- Leachate manholes	EA	4	$800.00	$3,200
				SUBTOTAL	**$282,668**
3	**Allowance for mobilization, demobilisation, bonds and insurance (15% of subtotal)**				$42,400
4	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$42,400
5	**Engineering Allowance (20% of subtotal)** - includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				$56,534
				TOTAL - PHASE 4 DEVELOPMENT COST	**$424,002**
				YEAR TO BE IMPLEMENTED	**2016-2020**
				TOTAL - PHASE 4 DEVELOPMENT COST (1999 DOLLARS) [1]	**$195,169**
				ALTERNATIVE 1 - TOTAL SITE DEVELOPMENT COST	**$3,016,497**
				ALTERNATIVE 1 - TOTAL SITE DEVELOPMENT COST (1999 DOLLARS) [1]	**$2,178,954**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.6

ALTERNATIVE 2 - EXPANSION EAST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
INITIAL SITE AND PHASE 1 DEVELOPMENT (YEAR 2001 - 2005)					
1	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,600	$2.00	$13,200
	- stripping of topsoil	m^3	2,750	$6.00	$16,500
	- excavation of native soil to with 1m of average groundwater elevation	m^3	12,438	$6.00	$74,625
	- dewatering expansion area	LS	1	$5,000.00	$5,000
2	**PERIMETER FENCING**				
	- fencing 1.2m Woven Wire	LM	500	$15.00	$7,500
	- 10m double swing gate	EA	2	$200.00	$400
3	**SITE ROADS**				
	- excavation and grading	m^3	2,100	$6.00	$12,600
	- proof roll sub-grade	m^2	7,000	$1.00	$7,000
	- supply, place and compact road base (450mm - granular B)	MT	6,910	$10.00	$69,100
	- supply, place and compact road base (150mm - granular A)	MT	2,100	$10.00	$21,000
4	**PERIMETER DITCHES**				
	- excavation and grading	m^3	500	$6.00	$41,753
	- place and grade 100mm topsoil layer	m^2	5,100	$8.00	$40,800
	- seed and mulch	m^2	5,100	$1.00	$5,100
	- temporary check dams	EA	6	$150.00	$900
	- permanent check dams	EA	6	$350.00	$2,100
5	**SWM POND**				
	- excavation	m^3	450	$6.00	$2,700
	- berm	m^3	450	$6.00	$2,700
	- culvert (2-700mm CSPs)	LM	40	$350.00	$14,000
	- place and grade 100mm topsoil layer	m^2	200	$8.00	$1,600
	- seed and mulch	m^2	200	$1.00	$200
6	**RELOCATION OF MATERIAL RECYCLING AREA**	LS	1	$5,000.00	$5,000
7	**WEIGH SCALE**	LS	1	$75,000.00	$75,000

TABLE 7.6

ALTERNATIVE 2 - EXPANSION EAST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
				SUBTOTAL	$418,778
8	**Allowance for mobilization, demobilization, bonds and insurance (15% of subtotal)**				$62,817
9	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$62,817
10	**Engineering Allowance (20% of subtotal)** - includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				$83,756
				TOTAL - INITIAL SITE AND PHASE 1 DEVELOPMENT COST	$628,167
				YEAR TO BE IMPLEMENTED	2001-2005
				TOTAL - INITIAL SITE AND PHASE 1 DEVELOPMENT COST (1999 DOLLARS)[1]	$513,940

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.6

ALTERNATIVE 2 - EXPANSION EAST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
PHASE 2 DEVELOPMENT (YEAR 2006 - 2010)					
1	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,600	$2.00	$13,200
	- stripping of topsoil	m^3	2,750	$6.00	$16,500
	- excavation of native soil to with 1m of average groundwater elevation	m^3	12,438	$6.00	$74,625
	- dewatering expansion area	LS	1	$5,000.00	$5,000
				SUBTOTAL	**$109,325**
2	**Allowance for mobilization, demobilisation, bonds and insurance (15% of subtotal)**				$16,399
3	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$16,399
4	**Engineering Allowance (20% of subtotal)**				$21,865
	- includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				
				TOTAL - PHASE 2 DEVELOPMENT COST	**$163,988**
				YEAR TO BE IMPLEMENTED	**2006-2010**
				TOTAL - PHASE 2 DEVELOPMENT COST (1999 DOLLARS)[1]	**$11,076**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.6

ALTERNATIVE 2 - EXPANSION EAST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
PHASE 3 DEVELOPMENT (YEAR 2011 - 2015)					
1	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,600	$2.00	$13,200
	- stripping of topsoil	m^3	2,750	$6.00	$16,500
	- excavation of native soil to with 1m of average groundwater elevation	m^3	12,438	$6.00	$74,625
	- dewatering expansion area	LS	1	$5,000.00	$5,000
				SUBTOTAL	**$109,325**
2	**Allowance for mobilization, demobilisation, bonds and insurance (15% of subtotal)**				$16,399
3	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$16,399
4	**Engineering Allowance (20% of subtotal)**				$21,865
	- includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				
				TOTAL - PHASE 3 DEVELOPMENT COST	**$163,988**
				YEAR TO BE IMPLEMENTED	**2011-2015**
				TOTAL - PHASE 3 DEVELOPMENT COST (1999 DOLLARS)[1]	**$91,436**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.6

ALTERNATIVE 2 - EXPANSION EAST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
PHASE 4 DEVELOPMENT (YEAR 2016 - 2020)					
1	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,600	$2.00	$13,200
	- stripping of topsoil	m^3	2,750	$6.00	$16,500
	- excavation of native soil to with 1m of average groundwater elevation	m^3	12,438	$6.00	$74,625
	- dewatering expansion area	LS	1	$5,000.00	$5,000
				SUBTOTAL	**$109,325**
2	**Allowance for mobilization, demobilisation, bonds and insurance (15% of subtotal)**				$16,399
3	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$16,399
4	**Engineering Allowance (20% of subtotal)** - includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				$21,865
				TOTAL - PHASE 4 DEVELOPMENT COST	**$163,988**
				YEAR TO BE IMPLEMENTED	**2016-2020**
				TOTAL - PHASE 4 DEVELOPMENT COST (1999 DOLLARS)[1]	**$75,484**
				ALTERNATIVE 2 - TOTAL SITE DEVELOPMENT COST	**$1,120,130**
				ALTERNATIVE 2 - TOTAL DEVELOPMENT COST (1999 DOLLARS)[1]	**$691,936**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.7

ALTERNATIVE 3 - EXPANSION WEST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
INITIAL SITE AND PHASE 1 DEVELOPMENT (YEAR 2001 - 2005)					
1	**REMOVAL OF EXISTING FINAL COVER AND FENCE**				
	- stripping and stockpiling of topsoil	m^2	500	$3.00	$1,500
	- excavation and stockpiling of clay material	m^3	2,950	$8.00	$23,600
	- excavation and stockpiling of granular road base	m^3	550	$6.00	$3,300
	- removal and salvage of existing woven wire	LM	540	$4.00	$2,160
2	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	12,000	$2.00	$24,000
	- stripping of topsoil	m^3	4,400	$6.00	$26,400
	- excavation of native soil to with 1m of average groundwater elevation	m^3	2,500	$6.00	$15,000
	- dewatering expansion area	LS	1	$2,000.00	$2,000
3	**PERIMETER FENCING**				
	- fencing 1.2m Woven Wire	LM	740	$15.00	$11,100
4	**SITE ROADS**				
	- excavation and grading	m^3	2,500	$6.00	$15,000
	- proof roll sub-grade	m^2	8,100	$1.00	$6,707
	- supply, place and compact road base (450mm - granular B)	MT	6,800	$10.00	$68,000
	- supply, place and compact road base (150mm - granular A)	MT	2,400	$10.00	$24,000
5	**PERIMETER DITCHES**				
	- excavation and grading	m^3	2,300	$6.00	$13,800
	- place and grade 100mm topsoil layer	m^2	5,000	$8.00	$40,000
	- seed and mulch	$0	$0	$0.00	$0
	- temporary check dams	EA	8	$150.00	$1,200
	- permanent check dams	EA	8	$350.00	$2,800
6	**SWM POND**				
	- excavation	m^3	450	$6.00	$2,700
	- berm	m^3	450	$6.00	$2,700
	- culvert (1-700mm CSPs)	LM	20	$350.00	$7,000
	- place and grade 100mm topsoil layer	m^2	200	$8.00	$1,600
	- seed and mulch	m^2	200	$1.00	$200

TABLE 7.7

ALTERNATIVE 3 - EXPANSION WEST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
7	WEIGH SCALE	LS	1	$75,000	$75,000
				SUBTOTAL	**$369,767**
8	**Allowance for mobilization, demobilization, bonds and insurance (15% of subtotal)**				$55,465
9	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$55,465
10	**Engineering Allowance (20% of subtotal)** - includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				$73,953
				TOTAL - INITIAL SITE AND PHASE 1 DEVELOPMENT COST	**$554,651**
				YEAR TO BE IMPLEMENTED	**2001-2005**
				TOTAL - INITIAL SITE AND PHASE 1 DEVELOPMENT COST (1999 DOLLARS)[1]	**$453,792**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.7

ALTERNATIVE 3 - EXPANSION WEST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
PHASE 2 DEVELOPMENT (YEAR 2006 - 2010)					
1	**REMOVAL OF EXISTING FINAL COVER AND FENCE**				
	- stripping and stockpiling of topsoil	m^2	500	$3.00	$1,500
	- excavation and stockpiling of clay material	m^3	2,950	$8.00	$23,600
	- excavation and stockpiling of granular road base	m^3	550	$6.00	$3,300
	- removal and salvage of existing woven wire	LM	540	$4.00	$2,160
2	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,000	$2.00	$12,000
	- stripping of topsoil	m^3	2,200	$6.00	$13,200
	- excavation of native soil to with 1m of average groundwater elevation	m^3	2,500	$6.00	$15,000
	- dewatering expansion area	LS	1	$2,000.00	$2,000
				SUBTOTAL	**$72,760**
3	**Allowance for mobilization, demobilization, bonds and insurance (15% of subtotal)**				$10,914
4	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$10,914
5	**Engineering Allowance (20% of subtotal)** - includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				$14,552
				TOTAL - PHASE 2 DEVELOPMENT COST	**$109,140**
				YEAR TO BE IMPLEMENTED	**2006-2010**
				TOTAL - PHASE 2 DEVELOPMENT COST(1999 DOLLARS)[1]	**$73,715**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.7

ALTERNATIVE 3 - EXPANSION WEST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
PHASE 3 DEVELOPMENT (YEAR 2011 - 2014)					
1	**REMOVAL OF EXISTING FINAL COVER AND FENCE**				
	- stripping and stockpiling of topsoil	m^2	500	$3.00	$1,500
	- excavation and stockpiling of clay material	m^3	2,950	$8.00	$23,600
	- excavation and stockpiling of granular road base	m^3	550	$6.00	$3,300
	- removal and salvage of existing woven wire	LM	540	$4.00	$2,160
2	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,000	$2.00	$12,000
	- stripping of topsoil	m^3	2,200	$6.00	$13,200
	- excavation of native soil to with 1m of average groundwater elevation	m^3	2,500	$6.00	$15,000
	- dewatering expansion area	LS	1	$2,000.00	$2,000
				SUBTOTAL	**$72,760**
3	**Allowance for mobilization, demobilization, bonds and insurance (15% of subtotal)**				$10,914
4	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$10,914
5	**Engineering Allowance (20% of subtotal)**				$14,552
	- includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				
				TOTAL - PHASE 3 DEVELOPMENT COST	**$109,140**
				YEAR TO BE IMPLEMENTED	**2011-2014**
				TOTAL - PHASE 3 DEVELOPMENT COST (1999 DOLLARS)[1]	**$61,998**

Note:

1. *The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.*

TABLE 7.7

ALTERNATIVE 3 - EXPANSION WEST WITH CAZ
DEVELOPMENT COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
PHASE 4 DEVELOPMENT (YEAR 2015 - 2018)					
1	**REMOVAL OF EXISTING FINAL COVER AND FENCE**				
	- stripping and stockpiling of topsoil	m^2	500	$3.00	$1,500
	- excavation and stockpiling of clay material	m^3	2,950	$8.00	$23,600
	- excavation and stockpiling of granular road base	m^3	550	$6.00	$3,300
	- removal and salvage of existing woven wire	LM	540	$4.00	$2,160
2	**PREPARATION OF EXPANSION AREA BASE**				
	- clearing and grubbing	m^2	6,000	$2.00	$12,000
	- stripping of topsoil	m^3	2,200	$6.00	$13,200
	- excavation of native soil to with 1m of average groundwater elevation	m^3	2,500	$6.00	$15,000
	- dewatering expansion area	LS	1	$2,000.00	$2,000
				SUBTOTAL	**$72,760**
3	**Allowance for mobilization, demobilization, bonds and insurance (15% of subtotal)**				$10,914
4	**Allowance for additional requirements established during final design phase (15% of subtotal)**				$10,914
5	**Engineering Allowance (20% of subtotal)**				$14,552
	- includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				
				TOTAL - PHASE 4 DEVELOPMENT COST	**$109,140**
				YEAR TO BE IMPLEMENTED	**2015-2018**
				TOTAL - PHASE 4 DEVELOPMENT COST (1999 DOLLARS)[1]	**$53,182**
				ALTERNATIVE 3 - TOTAL SITE DEVELOPMENT COST	**$882,071**
				ALTERNATIVE 3 -TOTAL SITE DEVELOPMENT COST (1999 DOLLARS)[1]	**$642,687**

Note:

1. The total development costs (1999 dollars) represents the present worth of the development costs assuming that the funds for the expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent were used for the present worth calculations.

TABLE 7.8

MONITORING AND MAINTENANCE COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Alternative 1 - Expansion East Fully Engineered*	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
1	ANNUAL MONITORING PROGRAM [1]			
	- conduct monitoring events (2 per year)	$17,000	$17,000	$17,000
	- analytical expenses	$25,000	$25,000	$25,000
	- survey and volume calculations	$5,000	$5,000	$5,000
	- reporting (1 per year)	$8,000	$8,000	$8,000
2	LEACHATE COLLECTION SYSTEM			
	- discharge fees [2]	$9,125	$0	$0
	- allowance for operation, maintenance, and calibration of equipment	$5,000	$0	$0
	- allowance for flushing and vacuuming leachate piping	$5,000	$0	$0
3	STORMWATER MANAGEMENT FACILITIES			
	- removal for sediment from ditching and ponds (1 event per year)	$2,500	$2,500	$2,500
	- allowance for maintenance and erosion repairs	$2,000	$2,000	$2,000
4	ALLOWANCE FOR SITE MAINTENANCE AND REPAIR			
	- final cover system	$3,000	$3,000	$3,000
	- roadways	$2,000	$2,000	$2,000
	- fencing	$1,000	$1,000	$1,000
	- monitoring wells	$3,000	$3,000	$3,000
	TOTAL ANNUAL MONITORING AND MAINTENANCE COSTS[3]	**$87,625**	**$68,500**	**$68,500**
	OPERATING LIFE SPAN (YEARS)	**20**	**20**	**18**
	TOTAL MONITORING AND MAINTENANCE COSTS	**$1,752,500**	**$1,370,000**	**$1,233,000**
	TOTAL MONITORING AND MAINTENANCE COSTS (1999 DOLLARS)[4]	**$511,051**	**$399,509**	**$371,893**

Notes:

1. Based on current site monitoring program.
2. Discharge fees based on $0.50 per m^3 of leachate discharged into sanitary sewer system.
3. The annual total operating costs represents the operating cost for the year 2000.
4. The total monitoring and maintenance costs (1999 dollars) represents the present worth of the total monitoring and maintenance costs over the anticipated operating life span assuming that the funds for this expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent we used for the present worth calculations.

TABLE 7.9

CLOSURE COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
ALTERNATIVE 1 - EXPANSION EAST FULLY ENGINEERED					
1	CLOSURE COSTS				
	- supply, place and compact 0.6m low permeable final cover	m^3	42,800	$15.00	$642,000
	- place and compact 0.15m topsoil	m^3	10,800	$8.00	$86,400
	- seed and mulch	m^2	72,000	$1.00	$72,000
	- landfill gas vents	LS	1	$15,000.00	$15,000
				SUBTOTAL	$815,400
2	**Allowance for mobilization, demobilization, bonds and insurance (15% of subtotal)**				$122,310
3	**Engineering Allowance (20% of subtotal)**				$163,080
	- includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				
				ALTERNATIVE 1 - TOTAL CLOSURE COST	$1,100,790
				IMPLEMENTATION PERIOD (YEARS)	20
				ALTERNATIVE 1 - TOTALCLOSURE COST (1999 DOLLARS) [1]:	$640,124

Note:

1. The total closure costs (1999 dollars) represents the present worth of the total closure costs over the anticipated implementation period assuming that the funds for this expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. For this calculation it was assumed that the closure works would be completed annually for the area of the landfill completed to final contours, beginning 2 years after commencement of operation and ending 2 years after landfill has reached final capacity (the year 2003 to 2022). An inflation rate of 1.05 percent and an interest rate of 5 percent was used for the present worth calculations.

TABLE 7.9

CLOSURE COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
ALTERNATIVE 2 - EXPANSION EAST WITH CAZ					
1	CLOSURE COSTS				
	- supply, place and compact 0.6m low permeable final cover	m^3	42,800	$15.00	$642,000
	- place and compact 0.15m topsoil	m^3	10,800	$8.00	$86,400
	- seed and mulch	m^2	72,000	$1.00	$72,000
	- landfill gas vents	LS	1	$15,000.00	$15,000
				SUBTOTAL	$815,400
2	Allowance for mobilization, demobilization, bonds and insurance (15% of subtotal)				$122,310
3	Engineering Allowance (20% of subtotal)				$163,080
	- includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				
				ALTERNATIVE 2 - TOTAL CLOSURE COST	$1,100,790
				IMPLEMENTATION PERIOD (YEARS)	20
				ALTERNATIVE 2 - TOTAL CLOSURE COST(1999 DOLLARS) [1]	$640,124

Note:

1. The total closure costs (1999 dollars) represents the present worth of the total closure costs over the anticipated implementation period assuming that the funds for this expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and compounded inflation and interest over that number of years. For this calculation it was assumed that the closure works would be completed annually for the area of the landfill completed to final contours, beginning 2 years after commencement of operation and ending 2 years after landfill has reached final capacity (the year 2003 to 2022). An inflation rate of 1.05 percent and an interest rate of 5 percent was used for the present worth calculations.

TABLE 7.9

CLOSURE COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
ALTERNATIVE 3 - EXPANSION WEST WITH CAZ					
1	CLOSURE COSTS				
	- supply, place and compact 0.6m low permeable final cover	m^3	40,660	$15.00	$609,900
	- place and compact 0.15m topsoil	m^3	10,260	$8.00	$82,080
	- seed and mulch	m^2	68,400	$1.00	$68,400
	- landfill gas vents	LS	1	$15,000.00	$15,000
				SUBTOTAL	**$775,380**
2	**Allowance for mobilization, demobilization, bonds and insurance (15% of subtotal)**				$116,307
3	**Engineering Allowance (20% of subtotal)**				$155,076
	- includes Contract Documents, Tender, Contract Administration, construction inspection and materials testing				
				ALTERNATIVE 3 - TOTAL CLOSURE COST	**$1,046,763**
				IMPLEMENTATION PERIOD (YEARS)	**18**
				ALTERNATIVE 3 - TOTAL CLOSURE COST (1999 DOLLARS) [1]	**$629,588**

Note:

1. The total closure costs (1999 dollars) represents the present worth of the total closure costs over the anticipated implementation period assuming that the funds for this expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and compounded inflation and interest over that number of years. For this calculation it was assumed that the closure works would be completed annually for the area of the landfill completed to final contours, beginning 2 years after commencement of operation and ending 2 years after landfill has reached final capacity (the year 2003 to 2020). An inflation rate of 1.05 percent and an interest rate of 5 percent was used for the present worth calculations.

TABLE 7.10

POST-CLOSURE MONITORING AND MAINTENANCE COSTS
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Alternative 1 - Expansion East Fully Engineered*	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
1	ANNUAL LONG TERM MONITORING PROGRAM			
	- conduct monitoring event (1 per year)	$6,500	$6,500	$6,500
	- analytical expenses	$11,000	$11,000	$11,000
	- reporting (1 per year)	$2,500	$2,500	$2,500
2	LEACHATE COLLECTION SYSTEM			
	- discharge fees [1]	$9,125	$0	$0
	- allowance for operation, maintenance, and calibration of equipment	$5,000	$0	$0
	- allowance for flushing and vacuuming leachate piping	$5,000	$0	$0
3	STORMWATER MANAGEMENT FACILITIES			
	- removal for sediment from ditching and ponds (1 event per year)	$2,500	$2,500	$2,500
	- allowance for maintenance and erosion repairs	$2,000	$2,000	$2,000
4	ALLOWANCE FOR SITE MAINTENANCE AND REPAIR			
	- final cover system	$3,000	$3,000	$3,000
	- roadways	$2,000	$2,000	$2,000
	- fencing	$1,000	$1,000	$1,000
	- monitoring wells	$3,000	$3,000	$3,000
	TOTAL ANNUAL POST-CLOSURE MONITORING AND MAINTENANCE COSTS	$52,625	$33,500	$33,500
	LONG TERM MONITORING PERIOD (YEARS)	25	25	25
	TOTAL POST-CLOSURE MONITORING AND MAINTENANCE COSTS	$1,315,625	$837,500	$837,500
	TOTAL POST-CLOSURE MONITORING AND MAINTENANCE COSTS (1999 DOLLARS)[2]	$353,361	$224,942	$242,872

Notes:

1. discharge fees based on $0.50 per m^3 of leachate discharged into sanitary sewer system.
2. The total post closure monitoring and maintenance costs (1999 dollars) represents the present worth of the total post-closure monitoring and maintenance costs over the anticipated monitoring period assuming that the funds for this expenditure will be available in the year 1999. The present worth calculations take into account the number of years between 1999 and the year the expenditure will actually occur and annually compounded inflation and interest over that number of years. An inflation rate of 1.05 percent and an interest rate of 5 percent was used for the present worth calculations.

TABLE 7.11

CONTINGENCY CONSOLIDATED HEARING
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Alternative 1 - Expansion East Fully Engineered*	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
1	CONSOLIDATED HEARING			
	- Preparation for and attendance at hearings	$100,000	$100,000	$100,000
	- Development of conditions of approval	$5,000	$5,000	$5,000
	- Allowance for peer review and legal assistance	$100,000	$100,000	$100,000
	TOTAL	$205,000	$205,000	$205,000

TABLE 7.12

CONTIGENCY LEACHATE TREATMENT PLAN
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

Item No.	*Description*	*Unit*	*Quantity*	*Unit Cost*	*Total Cost*
	ALTERNATIVE 2 - EXPANSION EAST WITH CAZ				
	CONTIGENCY MEASURE - OPTION 1				
	ON-SITE LEACHATE TREATMENT (WETLAND)				
	- ditch excavation	m^3	13,300	$6.00	$79,800
	- lagoon excavation	m^3	1,450	$6.00	$8,700
	- culvert (400mm CSP)	LM	30	$300.00	$9,000
	- place and grade 100mm topsoil layer (ditch)	m^2	16,000	$8.00	$128,000
	- seed and mulch (ditch)	m^2	16,000	$1.00	$16,000
	- mechanical (lagoon aeration equipment)	LS	1	$10,000.00	$10,000
	- wetland development	m^2	4,380	$75.00	$328,500
	- wetland overflow	LS	1	$5,000.00	$5,000
				ALTERNATIVE 2 - TOTAL	**$585,000**
	CONTIGENCY MEASURE - OPTION 2				
	OFF-SITE LEACHATE TREATEMENT (PUMP STATION AND FORCEMAIN)				
	COLLECTION DITCH				
	- ditch excavation	m^3	7,200	$6.00	$43,200
	- place and grade 100mm topsoil layer (ditch)	m^2	8,700	$8.00	$69,600
	- seed and mulch (ditch)	m^2	8,700	$1.00	$8,700
	FORCEMAIN				
	- 75mm HDPE pipe	LM	1,800	$100.00	$180,000
	- excavation	m^3	4,700	$6.00	$28,200
	- backfill with native material	m^3	3,200	$8.00	$25,600
	- backfill with imported material	m^3	1,600	$8.00	$12,800
	- granular bedding	MT	1,700	$10.00	$17,000
	LEACHATE PUMP STATION				
	- including chamber, mechanical, electrical and fencing	LS	1	$150,000.00	$150,000
				ALTERNATIVE 2 - TOTAL	**$535,100**

TABLE 7.12

CONTIGENCY LEACHATE TREATMENT PLAN
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

ALTERNATIVE 3 - EXPANSION WEST WITH CAZ

CONTIGENCY MEASURE - OPTION 1
ON-SITE LEACHATE TREATMENT (WETLAND)

- ditch excavation	m^3	11,500	$6.00	$69,000
- lagoon excavation	m^3	1,450	$6.00	$8,700
- culvert (400mm CSP)	LM	30	$300.00	$9,000
- place and grade 100mm topsoil layer (ditch)	m^2	13,800	$8.00	$110,400
- seed and mulch (ditch)	m^2	13,800	$1.00	$13,800
- mechanical (lagoon aeration equipment)	LS	1	$10,000.00	$10,000
- wetland development	m^2	4,380	$75.00	$328,500
- wetland overflow	LS	1	$5,000.00	$5,000
			ATLERNATIVE 3 - TOTAL	$554,400

CONTIGENCY MEASURE - OPTION 2
OFF-SITE LEACHATE TREATEMENT (PUMP STATION AND FORCEMAIN)

COLLECTION DITCH				
- ditch excavation	m^3	7,200	$6.00	$43,200
- place and grade 100mm topsoil layer (ditch)	m^2	8,700	$8.00	$69,600
- seed and mulch (ditch)	m^2	8,700	$1.00	$8,700
FORCEMAIN				
- 75mm HDPE pipe	LM	1,800	$100.00	$180,000
- excavation	m^3	4,700	$6.00	$28,200
- backfill with native material	m^3	3,200	$8.00	$25,600
- backfill with imported material	m^3	1,600	$8.00	$12,800
- granular bedding	MT	1,700	$10.00	$17,000
LEACHATE PUMP STATION				
- including chamber, mechanical, electrical and fencing	LS	1	$150,000.00	$150,000
			ALTERNATIVE 3 - TOTAL	$535,100

Note:
For comparison purposes the cost of the on-Site lechate treatment contigency measure was used in the summary tables

TABLE 8.1

LANDFILL COSTS (ACTUAL AND PRESENT WORHT) / LANDFILL CAPACITY COMPARISON

LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

	Alternative 1 - Expansion East Fully Engineered	*Alternative 2 - Expansion East with CAZ*	*Alternative 3 - Expansion West with CAZ*
LANDFILL COST	$8,037,211	$5,435,033	$4,881,189
LANDFILL COST (1999 DOLLARS)	$4,290,154	$2,790,091	$2,621,035
LANDFILL CAPACITY (MT) [1]	237,420	209,511	193,240
ESTIMATED SITE LIFE (YEARS)	20	20	18
COST PER METRIC TONNE OF REFUSE	$33.85	$25.94	$25.26
COST PER METRIC TONNE OF REFUSE (1999 DOLLARS)	$18.07	$13.32	$13.56
LANDFILL COST INCLUDING CONTINGENCIES	$8,256,561	$6,280,333	$5,693,747
LANDFILL COST INCLUDING CONTINGENCIES (1999 DOLLARS)	$4,509,504	$3,635,391	$3,433,593
LANDFILL CAPACITY (MT) [1]	237,420	209,511	193,240
COST PER METRIC TONNE OF REFUSE INCLUDING CONTINGENCIES	$34.78	$29.98	$29.46
COST PER METRIC TONNE OF REFUSE INCLUDING CONTINGENCIES (1999 DOLLARS)	$18.99	$17.35	$17.77

Note:

1 Assumes a refuse compaction rate of 600 kg/m^3

APPENDIX A

TERMS OF REFERENCE
LONG TERM EXPANSION
MAYER WASTE DISPOSAL SITE

TERMS OF REFERENCE FOR COMPLETION OF AN ENVIRONMENTAL ASSESSMENT MAYER WASTE DISPOSAL SITE, TOWNSHIP OF CHAMPLAIN, ONTARIO

1.0 INTRODUCTION

The Environmental Assessment Act requires that environmental assessments be prepared in accordance with Terms of Reference (TOR) approved by the Minister of the Environment (the Minister). A proponent of an undertaking that is subject to the Environmental Assessment Act must apply to the Minister for approval to proceed with the undertaking. The proponent must first submit, for the Minister's approval, a proposed TOR that will govern the preparation of an environmental assessment (EA) for the undertaking. The proponent must subsequently complete the application for approval by submitting an EA that has been prepared in accordance with the approved TOR.

These TOR provide the framework for an individual EA for the proposed long term expansion of the Mayer Waste Disposal Site (Site) Domestic Landfill. The following detailed work plan will form the framework and basis of the proposed TOR.

These TOR have been prepared in accordance with the Guide to Preparing Terms of Reference for Individual Environmental Assessments (MOE Draft, February 14, 1997) and with Section 6 (2) (c) of the Environmental Assessment Act viz., to ..."set out in detail the requirements of the preparation of the environmental assessment." The EA to be completed will be prepared in accordance with Section 6.1(2) of the Environmental Assessment Act.

1.1 CONTENTS OF THE TERMS OF REFERENCE

These TOR consist of ten sections and two appendices as follows:

- Introduction (Section 1.0) - This section describes the undertaking and the planning context of the EA;
- Background (Section 2.0) - This section describes the Site location and approval status of the Mayer Waste Disposal Site;
- Rationale for the Undertaking (Section 3.0) - This section describes in broad terms the basis for seeking the long term expansion of the Domestic Landfill;
- Description of the Environment and Potential Effects (Section 4.0) - This section describes the environmental setting of the Site and outlines the potential

environmental effects of the undertaking based on the current knowledge of the Site and surrounding area;

- Consultation Plan (Section 5.0) - This section identifies the points in the process where public consultation will be sought and explains how public consultation activities will be carried out;
- Other Approvals (Section 6.0) - This section describes other regulatory approval requirements for the undertaking in addition to the Environmental Assessment Act;
- Proposed Schedule (Section 7.0) - This section provides an overview of the time commitments required to execute each element of the EA work plan;
- Alternatives (Section 8.0) - This section addresses the rationale for expansion of the Domestic Landfill and alternative methods of accommodating the expansion;
- EA Work Plan (Section 9.0) - This section describes the activities to be conducted as part of the EA study and the content of the EA Report;
- Modifications to These Terms of Reference (Section 10.0) - This section describes the circumstances under which revisions to the TOR may occur;
- Appendix A - Reference Documents; and
- Appendix B - TOR Development.

The undertaking being considered is the long term expansion of the existing approved limits of refuse of the Domestic Landfill. It is anticipated that long term expansion of the Domestic Landfill will enable the Town of Hawkesbury and other municipalities in Eastern Ontario to have continued access to an environmentally sound and economically feasible non-hazardous solid waste disposal facility for a period of approximately 20 years. Expansion of the Domestic Landfill involves expanding the existing landfill footprint to the east into the existing buffer zone and extending the limit of the Site east onto lands owned by the proponent, 781998 Ontario Inc.

Approximately 400,000 cubic meters of landfill capacity, providing approximately 20 years of Site life, will be sought in order to provide non-hazardous solid waste management services required by the Town of Hawkesbury and other potential clients in Eastern Ontario.

2.0 BACKGROUND

2.1 SITE LOCATION AND APPROVAL STATUS

The Mayer Waste Disposal Site (Site) is a private waste management facility owned by 781998 Ontario Inc. located immediately east of the Town of Hawkesbury along Highway 17 and is geographically situated within the Township of Champlain (formerly the Township of West Hawkesbury). The Site location is shown on Figure 1. Waste management services currently provided by 781998 Ontario Inc. are limited to non-hazardous solid domestic and industrial waste disposal. An affiliate company, Gilles R. Mayer Sanitation Ltd., currently provides non-hazardous solid waste collection services to the Town of Hawkesbury and local industrial clients. At present, the Site is operated by Gilles R. Mayer Sanitation Ltd., which also provides on-Site municipal and industrial recyclable materials segregation and storage services.

A legal survey has been completed to legally define the limits of the Mayer Waste Disposal Site and is included for reference purposes. The Mayer Waste Disposal Site presented in the legal survey encompasses 24.41 hectares and consists of Part 1 (Instrument No. 69187), Part 2 (Instrument No. 69186), Part 3 (Instrument No. 81286), and Part 4 (Instrument Nos. 81285 & 81286). The boundaries established by the survey plan coincide with the limits of the Site including the buffer zone and Contaminant Attenuation Zone (CAZ) noted in Plan 2 of the Proposed Remediation Plan, July 14, 1994. The property boundaries and the CAZ are noted on the enclosed Drawing No. 1 (Existing Conditions, November 1998). The survey plan has been registered on the Deed of Lands pertaining to Parts 1, 2, 3, and 4 as per Reference Plan 46R-5726.

In addition, 781998 Ontario Inc. acquired the groundwater rights on or under the downgradient property recently required by 781998 Ontario Inc. (former Hawkesbury Transport and Excavation Inc. property) which encompasses Parts 1, 2, 3, 4, 5, 6, 7, 8, and 9 of Part Lot 1 and Common Lot, Broken Front Concession and Concession 1, Township of West Hawkesbury (currently Township of Champlain) as designated as Plan 46R-5100. The transfer of the groundwater rights was registered on the Deed of Land on June 5, 1992.

The Site contains two distinct landfills which have historically operated under separate Provisional Certificates of Approval (C of A): a Domestic Landfill (Provisional C of A No. A471506 issued on August 20, 1980) and an Industrial landfill (Provisional C of A

No. A471507 issued on November 7, 1983). Drawing No. 1 illustrates the relative locations of the Domestic and Industrial Landfills within the Mayer Waste Disposal Site.

2.2 DOMESTIC LANDFILL

The Domestic Landfill, which has been in operation since 1955, consists of approximately 5.53 hectares (11.5 acres) on the south portion of the Mayer Waste Disposal Site. The Domestic Landfill was established under Provisional C of A No. A471506 issued on August 20, 1980. An application for a 90 Day Emergency Certificate of Approval (E C of A) was approved under Section 31 of the Environmental Protection Act (EPA) by the MOE on July 19, 1994 with an expiry date of October 17, 1994. The expiry date was subsequently extended by the MOE to November 18, 1994.

As per Condition No. 5 of the amended C of A, an application for an 18-Month E C of A was subsequently prepared and submitted by 781998 Ontario Inc. for MOE approval on October 14, 1994. Approval of this application under Section 31 of the EPA was granted by the MOE on November 18, 1994. This approval permitted the Domestic Landfill to operate with revised final contours until April 17, 1996 subject to the conditions outlined in the Amendment Notice.

On April 16, 1996, the MOE issued an E C of A for a 30 Day Extension following expiry of the 18 Month E C of A. This 30 Day Extension, issued as a Notice of Amendment to Provisional C of A No. A471506, permitted a further 30 day period for continued landfilling of Town of Hawkesbury waste at the Domestic Landfill. The 30 day period allowed the Town of Hawkesbury time to consider its waste disposal options and to negotiate a new waste collection and disposal agreement with Gilles R. Mayer Sanitation Ltd. and 781998 Ontario Incs. respectively. Following the execution of a new waste collection and disposal agreement on May 6, 1996, the MOE issued the existing Notice of Amendment to Provisional C of A No. A471506 dated May 17, 1996 (Appendix A6). This Notice of Amendment extended the operational life of the Domestic Landfill to the earlier date of issuance of a C of A for the proposed Interim Expansion or until the currently approved contours are reached.

On June 27, 1996, 781998 Ontario Inc. submitted to the Minister of the Environment and applicable Ministries and agencies required under MOE Guideline No. E-4 (Interim Expansion of Municipal Landfills) two documents entitled:

- "Request for Confirmation of Non-Designation Under the Environmental Assessment Act" (CRA, June 1996); and
- "Design and Operations Report and Plans" (CRA, June 1996).

The above documents were submitted in support of an Application for Approval of a Waste Disposal Site dated May 1, 1996 by 781998 Ontario Inc. This Application was submitted to amend C of A No. A471506 to permit a five year Interim Expansion of the Domestic Landfill.

The proposed Interim Expansion involved a 20 metre horizontal easterly expansion of the existing easterly boundary of the Domestic Landfill onto lands owned by 781998 Ontario Inc. presently forming the east buffer zone. The Application was for an easterly expansion of the landfilling area to be established in the existing buffer zones of the Site and a further easterly expansion to accommodate a temporary recyclable materials storage area, material recovery bins, stormwater management ponds and ditches and access roads necessary for landfill operations, servicing and monitoring.

Subsequent to the circulation and receipt of comments on the above-noted documents, 781998 Ontario Inc. formally requested that a hearing before the Environmental Assessment Board be scheduled pursuant to Section 30 of the EPA to hear evidence in support of the proposed Interim Expansion. However, subsequent to the request for hearing, the Board of Waste Management of the Hawkesbury Waste Management Systems Plan Study (WMSPS) ceased the pursuit of a long term waste management plan for the greater Hawkesbury study area. Under Guideline No. E-4, a prerequisite of Interim Expansion approval is the engagement of the party in need (i.e. the Town of Hawkesbury) in long term waste management planning. As a result, 781998 Ontario Inc. revoked the application and abandoned its pursuit of the Interim Expansion.

On March 18, 1997, 781998 Ontario Inc. submitted to the MOE a report entitled "Addendum to Proposed Remediation Plan" for the Mayer Waste Disposal Site. This report was prepared as an addendum to the Proposed Remediation Plan which was submitted in July 1994 to the MOE in response to Section 2.4 of the February 19, 1993 Control Order. The Addendum report summarized the Remediation Plan studies, designs, approval and Site works completed for Interim Expansion of the Domestic Landfill and presented the proposed activities to be carried out to complete the implementation of the Remediation Plan for the Site. Additionally, the Addendum report proposed to amend the Remediation Plan by revoking the Ministerial submission

for the Interim Expansion and, in place, preparing a request for an Amendment to the current E C of A to allow continued use of the Domestic Landfill throughout the remainder of the Remediation Plan implementation period.

On April 2, 1997, 781998 Ontario Inc. submitted a letter to the MOE Environment Assessment Branch requesting postponement of processing of the Request for Confirmation of Non-Designation under the Environment Assessment Act submitted in support of the proposed Interim Expansion of the Domestic Landfill until such time that an amendment to the E C of A No. A471506 was issued.

On April 22, 1997, 781998 Ontario Inc. submitted to the MOE Approvals Branch a request for amendment of the existing E C of A No. A471506 to amend the existing E C of A to permit use of the Domestic Landfill during the remainder of the Remediation Plan implementation period (approximately 3.0 to 3.5 years). Enclosed in support of this request was the report entitled "Design and Operations Plan, Domestic Landfill, Emergency Certificate of Approval Amendment". This report was prepared in accordance with the requirements outlined in the MOE Guide for Applying for Certificates of Approval - Waste Disposal Sites, Approvals Branch, September 1992, Appendix VII, Section 12, Emergency Certificates of Approval.

On August 1, 1997, 781998 Ontario Inc. submitted to the MOE Approvals Branch a Part V EPA Application for Approval of a Waste Disposal Site. This application was provided in support of the April 22, 1997 request for amendment to the existing E C of A No. A471506 and in response to the MOE's Approval Branch, May 13, 1997 correspondence on this matter.

As part of 781998 Ontario Inc.'s response to the MOE's comments on the Design and Operations Plan (CRA April 1997), 781998 Ontario Inc. submitted to the MOE Approvals Branch a Draft Supplemental Hydrogeologic Assessment Report on December 1, 1997, a revised edition on January 19, 1998 and a final version on January 8, 1999. The report primarily deals with performance of the Site with respect to groundwater and surface water management and facilitates monitoring the performance of the Site during the extended emergency period.

The application for the E C of A was approved under Section 31 of the EPA by the MOE on June 19, 1998. The notice amended Condition No. 8 of the existing E C of A to allow for continued landfilling at the Domestic Landfill until the revised final contours are reached or until March 2001, whichever is earlier. Additionally, the notice of

amendment details a revised Site monitoring and reporting program. The enclosed Drawing No. 2 illustrates the proposed final contours of the Domestic Landfill as approved in accordance with the E C of A.

2.3 INDUSTRIAL LANDFILL

The Industrial Landfill, which has been in operation since November 1983, consists of approximately 3.4 hectares (8.4 acres) on the north portion of the Mayer Waste Disposal Site. The Industrial landfill was established under C of A No. A471507 issued on November 7, 1983. 781998 Ontario Inc. prepared a Proposed Closure Plan as partial fulfillment of an application under Section 27 of the EPA to amend C of A No. A471507 for the Industrial Landfill. This application was submitted to the MOE on March 16, 1995. Provisional C of A No. A471507 for the Industrial landfill was issued by the MOE in January 1996. Final closure of the Industrial Landfill will occur upon reaching the final contours provided in the approved Closure Plan. Closure of the Industrial Landfill is expected to occur in late 2000. The Industrial Landfill is not subject to the undertaking and is referred to in these TOR for background purposes only.

3.0 RATIONALE FOR THE UNDERTAKING

In order to evaluate the long term expansion of the existing approved limits of refuse at the Domestic Landfill, a work plan was developed to provide 781998 Ontario Inc. with an engineering/planning evaluation and cost assessment of certain feasible expansion alternatives. Since the completion of this engineering/planning evaluation, 781998 Ontario Inc. acquired an adjoining easterly property (formerly owned by Hawkesbury Transport and Excavation Ltd.) and will be consolidating the required portion of this property into the overall Site. The acquisition of this property has thus narrowed the expansion alternatives available to 781998 Ontario Inc. to an easterly extension of the existing Domestic Landfill into the east buffer zone and extending the buffer zone onto lands owned by 781998 Ontario Inc., using the recently acquired property to the east.

The rationale for the undertaking is as follows:

- Beginning in 1984, the Town of Hawkesbury and other member municipalities of the Hawkesbury and Area Waste Management System Plan Study (WMSPS), including

the Township of West Hawkesbury, the Town of Vankleek Hill, the Township of East Hawkesbury, the Village of L'Orignal and, later in 1990, the Township of Longueuil, were involved in a Waste Management Master Plan (WMMP) to define a long term public solid waste disposal facility to meet its waste management needs. Based on a decision reached in September 1996 by the Board of Waste Management of the Hawkesbury and Area WMSPS, six short-listed candidate sites were released from further consideration as potential public landfill sites. Additionally, effective December 30, 1996, the Hawkesbury and Area WMSPS was terminated, thus ending the twelve year WMMP process without identifying a potential long term public solid waste disposal facility.

- The decision to seek the necessary approval for long term expansion of the Domestic Landfill is based on the opportunity of providing long term municipal and industrial waste management services combined with a fundamental understanding of existing Site conditions which provides insight into the feasibility of long term expansion. Interest has been expressed locally in support of long term expansion of the Domestic Landfill by both public and private sector organizations. Furthermore, there already exists a very comprehensive knowledge base with respect to the Site compiled through progressively detailed hydrogeological and hydrological investigations completed on behalf of 781998 Ontario Inc.
- The initial engineering/planning evaluation and cost assessment, which built on existing environmental studies completed by 781998 Ontario Inc. as part of an earlier proposed Interim Expansion of the Domestic Landfill, consisted of a preliminary environmental screening assessment of the identified feasible expansion alternative. Studies completed at the Site for the purposes of the proposed Interim Expansion, consisting of natural environment assessment (i.e. Biological Analysis), hydrogeologic and hydrologic conditions assessment, archaeological assessment, noise assessment, air quality assessment and transportation assessment, suggest that the expansion alternative noted previously involves either negligible impacts to the environment or impacts which can be readily mitigated.

4.0 DESCRIPTION OF THE ENVIRONMENT AND POTENTIAL EFFECTS

The Mayer Waste Disposal Site is topographically characterized by the landfill mounds of both the Domestic Landfill and the adjoining northerly Industrial Landfill, which are separated by an eastward flowing surface water drainage channel (tributary to Bruno-Lauzon Drain) and an overall undulating topography resulting from historic

aggregate extraction operations. The Site is understood to have originally been bisected by a periglacial esker, which has experienced significant alteration due to historic aggregate extraction activities. Non-landfilled portions of the Site are characterized generally by remnant aggregate extraction pits, active Site borrow areas and/or undeveloped sections of land. The undeveloped portions of the Site are further characterized by the presence of dense, low to medium canopy deciduous vegetation, particularly to the east and north.

In general, the soil stratigraphy at the Site consists of three main geological units: a surficial sand overlying a clay unit which in turn overlies a sand deposit. This stratigraphy is mainly representative of the Domestic Landfill. Due to historic aggregate extraction operations, the surficial sand and underlying clay are absent at the Industrial Landfill location. Beneath the overburden soils at the Site is a grey limestone bedrock of the Rockcliff Formation.

Two overburden aquifers have been identified beneath the Domestic Landfill: an upper unconfined (water table) aquifer within the surficial sands and a lower confined to unconfined overburden aquifer within sands at depth. The two described aquifers are separated by a clay deposit which acts as an aquitard of very low hydraulic conductivity. Deep stratigraphy at the Site indicates the presence of a bedrock aquifer.

Groundwater within the water table aquifer beneath and in the vicinity of the Site ultimately discharges into local water courses, particularly the on-Site drainage ditch (tributary to Bruno-Lauzon Drain) flowing easterly between the Domestic and Industrial Landfills. Although some downward vertical migration of groundwater may occur through the fine grained material to the deeper overburden aquifer, the majority of the flow occurs laterally within the surficial water table aquifer. Thus, it is assumed that horizontal flow occurs within the shallow water table aquifer.

The Ministry of Natural Resources (MNR) in 1994 advised 781998 Ontario Inc. that the tributary to the Bruno-Lauzon Drain that bisects the Site is an unmaintained agricultural drain and that a diversion of the tributary, as proposed at the time to permit implementation of the Proposed Remediation Plan, would act to improve downstream water quality. Although the MNR at the time determined that an Additional Ecological Evaluation of the tributary was not necessary in support of the proposed diversion, 781998 Ontario Inc. intends to confirm this original view as part of the current EA study, as described later in these TOR, through an updated Biological Analysis.

Based on the results of the Phase II Environmental Investigation completed at the Site, an identified impact on groundwater quality within the shallow water table aquifer to the north and east of the Domestic Landfill was established. The Phase II Environmental Investigation concluded that the calculated Reasonable Use Concept (RUC) chloride level of 135 mg/L would be met at the eastern boundary of the Mayer Waste Disposal Site. Chloride, which is a non-health related parameter, was detected in the upper overburden aquifer within the Site at relatively elevated concentrations. Therefore, a downgradient Contaminant Attenuation Zone (CAZ) was established in the east buffer zone of the Site.

Lands in the vicinity of the Site are, and have historically been, used primarily for aggregate extraction purposes. This includes lands to the west and east, owned respectively by Mr. Gilles Parisien (Atomik Construction Ltd.) and 781998 Ontario Inc. (former Hawkesbury Transport and Excavation Ltd. property). Substantial sections of these adjacent properties are also presently inactive and also consist of medium density bush and old fields. As noted in the Archaeological Assessment report prepared for the previously proposed Interim Expansion of the Domestic Landfill in 1995, the degree of aggregate extraction on and in the vicinity of the Site has effectively removed any evidence of past human activity in the area. The Archaeological Assessment further concluded that a Stage 2 Archacological Assessment was not required for the Site.

To the north of the Site, land use is essentially mixed consisting primarily of institutional (cemetery) and residential development. The Carillon Gardens Subdivision, located northeast of the Site, consists of approximately thirty (30) single family detached residential dwellings. These dwelling are serviced by individual water supply wells and septic systems. 781998 Ontario Inc. monitors two residential wells in the Carillon Gardens Subdivision as part of a long term monitoring program that has been approved by the MOE. Monitoring results compiled annually since 1994 have indicated that the Mayer Waste Disposal Site has had no impact on well water quality in the Carillon Gardens Subdivision. Land use to the south of the Site consists generally of inactive old fields owned by Carillon Gardens Hawkesbury Ontario and Messrs. Angelo and Antonio Saltarelli. Highway 17 separates the Site from the above southerly properties.

Potential impacts on the environment at the Site were extensively evaluated during the assessment previously carried out for the proposed Interim Expansion of the Domestic Landfill. This work showed that potential impacts would be negligible and that potential impacts could be readily mitigated. These potential impacts and mitigation measures included:

- the potential for excess noise would be mitigated by regulated operating hours and distance to nearest residence;
- the potential for groundwater impacts would be mitigated by the addition of the existing CAZ and numerous wells to monitor groundwater conditions around the Site;
- the potential for windblown litter would be mitigated by application of daily cover, tarped transport vehicles and regular employee monitoring and collection operations;
- the potential for odour and vector impacts would be mitigated by the application of daily cover; and
- the potential for surface water sedimentation and stormwater flows would be mitigated by the implementation of a surface water management system for the entire Site.

Details of the environmental assessment impact studies completed to date may be found in the Reference Documents listed in Appendix A. Technical evaluations completed to date at the Mayer Waste Disposal Site include:

- On-Site and off-Site Hydrogeological and Hydrological Evaluations;
- Biological Analysis;
- Archaeological Assessment;
- Design and Operation Report and Plans;
- Annual Monitoring Reports (consisting of twenty-two on-Site and off-Site monitoring wells, two leachate wells, two private water supply wells located in the Carillon Gardens Subdivision, six surface water locations and two gas probe nests); and
- Surface Water Management Plan.

A description of the environment and potential effects for this EA will be determined as a result of reviewing and updating the 1996 environmental assessment work completed to date.

For this EA, the existing environmental assessment work will be reviewed and updated where necessary relative to the proposed easterly expansion described above. New field

work will be conducted as required to ensure that any changes in environmental conditions at the Site and its vicinity are identified and dealt with in the updated assessments. In particular, an updated Biological Analysis and additional hydrogeological and hydrological analyses at the Site and on the former Hawkesbury Transport and Excavation Ltd. property will be completed. The technical studies will be prepared to ensure that all potential impacts to the environment associated with long term expansion of the Site are assessed and that appropriate mitigative measures are developed and implemented as required. These studies will also provide the framework to address potential comments and concerns raised by the Core Review Team (CRT), the public and other agencies.

5.0 CONSULTATION PLAN

Public and agency consultation for the EA will involve the following activities:

a) In addition to the first information newsletter published at the time of preparation of the draft TOR, a second newsletter will be published and distributed throughout the community. All newsletters will be published in both English and French languages. The second newsletter will describe the Draft EA Report. Care will be taken to ensure that the proposed undertaking is clearly explained to members of the public, particularly adjacent property owners.

b) In addition to the first public Open House held at the time of preparation of the draft TOR, one additional public Open House/Meeting will be held upon completion of the Draft EA Report to explain the proposed EA undertaking and to seek public comment. All public consultation forums will be conducted in both English and French languages. The public's comments will be reflected in the Final EA Report. The need for additional public meetings, as determined by the response to proposed undertaking, will be evaluated and addressed during the EA as required.

c) In addition to the first Public Liaison Committee (PLC) meeting held at the time of preparation of the draft TOR, one other PLC meeting will be held to review the Draft EA Report. PLC comments and concerns will be addressed in the Draft and Final EA Report.

e) Letters will be sent to all affected agencies and stakeholders including, but not limited to, the Ministry of the Environment, the Ministry of Natural Resources, Ministry of Health, County Medical Officer of Health, Ministry of Agriculture and Food, Ministry of Transportation, Ministry of Municipal Affairs, Ministry of

Citizenship and Culture, Transport Canada, Fisheries and Oceans Canada, Environment Canada, Public Works and Government Services Canada, the Town of Hawkesbury and the Township of Champlain. These letters will explain the proposed EA to expand the approved limits of refuse of the Domestic Landfill and will invite comments on the proposal. Agency/stakeholder comments and concerns will be reflected in the Final EA Report. A revised placeholder list will be prepared and issued following completion of this initial round of agency/stakeholder consultation.

A minimum 4-week public comment period is allowed for subsequent to the newsletter circulation and public Open House/Meeting.

6.0 OTHER APPROVALS

In addition to approval of this EA under the Environmental Assessment Act, Certificate of Approval No. A471506 for the Domestic Landfill will need to be amended. Joint Environmental Assessment Act/Environmental Protection Act approval will therefore be sought.

The EA Report will identify and discuss other approvals required for carrying out the undertaking. Other approvals will include:

- Amendment to the Section 53 Ontario Water Resources Act (OWRA) Approval;
- Official Plan and Zoning By-law Amendments; and
- Aggregate Resources Act (ARA) Site Plan Amendments.

Supporting documentation to be completed for other approvals will include:

- Detailed hydrogeological investigation and assessment of the expansion area;
- Design and Operation Plan for the expansion area;
- Leachate and Landfill Gas Management Plans; and
- Amended Surface Water Management Plan.

7.0 PROPOSED SCHEDULE

The schedule depicting the timeline involved in finalizing and submitting the TOR, completing and submitting an EA Report, public and agency consultation, consolidated hearing, if required, detailed design, official plan and zoning by-law amendments and construction are provided on the enclosed Figure 2. This schedule has been conceived not only on the basis of proposed EA approval timelines issued by the MOE under Ontario Regulation 616/98 but, also, to coincide with expiry of the amended Certificate of Approval anticipated to be issued by the MOE for completion of the Proposed Remediation Plan. A discussion of the TOR preparation schedule and public and agency consultation is further provided in Appendix B.

The time required to complete the necessary work tasks is approximately 2 years. Assuming notification to proceed, finalized TOR can be submitted within a 1-month period, followed by a 12-week review. Once the TOR have been formally approved, it would then be possible to initiate the EA Study. Subsequent preparation of the Draft EA Report is shown to occur over an approximate six month period in conjunction with public and agency review and comment, followed by completion and submission of a Final EA Report near the end of the first year.

Once a Final EA Report has been submitted, a formal 30-week agency review period is entered into, following which one of the following five decisions may be reached:

- approval of the undertaking;
- approval of the undertaking subject to conditions;
- refusal of approval;
- refer to mediation; or
- refer to hearing.

In the event that a hearing is required, a hearing would be prepared for and attended by the end of the second year.

Pending approval of the EA Report following a hearing (if necessary), an approximate 4-month construction period would be required to permit pre-expansion engineering works to be constructed.

8.0 ALTERNATIVES

781998 Ontario Inc., the owner of the Mayer Waste Disposal Site, is a privately owned and operated company. The decision to seek the necessary approval to expand the existing approved limits of refuse of the Domestic Landfill is a business decision based solely on the opportunity of providing a long term non-hazardous solid waste disposal facility for potential users within a defined service area.

A range of "alternative methods" reasonably available to 781998 Ontario Inc., which appear at this time not to have significant environmental effects based on previous works completed at the Site and as discussed within the context of these TOR, will be discussed with the PLC, agencies/stakeholders and the public and evaluated. The following are the "alternative methods" of addressing the landfill component that will be evaluated during the initial alternatives evaluation and in the EA:

- expansion of the Domestic Landfill to the east into the existing buffer zone and CAZ, which will be extended further east onto lands recently acquired by 781998 Ontario Inc. (former Hawkesbury Transport and Excavation Ltd. property); and
- increasing the height of the existing Domestic Landfill.

These "alternative methods" will be reviewed and evaluated in both the initial alternatives focussing evaluation and the EA and a preferred alternative will be identified. The "alternative methods" will be assessed based on hydrogeologic conditions, adjacent land use, potential impacts to the environment and the availability and economic feasibility of purchasing the land to the east or west of the existing Site. Evaluation criteria will be established in conjunction with the PLC and through public input achieved through the public Open House/Meeting. Preliminary alternative design concepts will also be developed for each "alternative method" and will be evaluated in conjunction with the PLC and through the public Open House/Meeting.

The enclosed Drawing No. 3 (Limits of Proposed Expansion Area) provides a conceptual overview of the expanded Domestic Landfill as envisaged based on current Site conditions and future waste management engineering requirements. At present, the proposed expansion area would consist of an approximate 80 meter easterly expansion into the existing buffer land and CAZ with the concurrent establishment of 30 meter north/south buffer lands and an approximate 158 meter easterly buffer and extended CAZ onto the recently acquired former Hawkesbury Transport and Excavation Ltd.

property. It is presently envisaged that the expanded Domestic Landfill profile would approximate the current approved elevation of the Domestic Landfill in accordance with the cross-sectional representation noted on Drawing No. 2. Final details concerning the horizontal and vertical profile of the expanded Domestic Landfill will be determined pending future discussion with the CRT, the PLC and the public.

9.0 EA WORK PLAN

An EA study will be conducted and an EA Report will be prepared. While the EA Report in content and structure will meet the requirements of the Environmental Assessment Act, given the environmental assessment work conducted to date it is anticipated that this task will require a focussed investigative field work program. Additionally, a more detailed evaluation of the socio-economic impacts resulting from long term Domestic Landfill expansion and other issues potentially raised during the draft TOR review process will be addressed including potential affects and mitigative measures.

As previously noted, for this EA the existing environmental assessment work will be reviewed and updated where necessary. New field work, including an updated Biological Analysis and additional hydrogeological and hydrological analyses, will be completed at the Site and on the former Hawkesbury Transport and Excavation Ltd. property. The technical studies will be prepared to ensure that all potential impacts to the environment associated with long term expansion of the Site are assessed and that appropriate mitigative measures are developed and implemented as required. No other technical studies are presently anticipated as such studies have been previously completed as part of the proposed 1996 Interim Expansion of the Domestic Landfill and are considered to be acceptable for and directly applicable to the undertaking as proposed. However, should the MOE, the CRT and/or the public consider certain additional studies to be necessary and relevant to the undertaking, 781998 Ontario Inc. is willing to evaluate the need for such studies and undertake any required work as may be identified.

The EA Report will be prepared first in draft, for review by the CRT established by the MOE the PLC and members of the public. A copy of the Draft EA Report will also be provided to directly affected agencies for comment. Upon receipt of all comments, the EA Report will be finalized.

10.0 MODIFICATIONS TO THESE TERMS OF REFERENCE

Once approved by the Minister, these Terms of Reference will both provide the framework for preparing the EA and serve as a benchmark for reviewing the EA.

It is understood that given the nature of the TOR, it is not intended to present every detail of all the activities that will occur when preparing the EA.

It is therefore possible that in carrying out the work contemplated by these TOR, it may become evident that certain modifications to the approved TOR may be necessary. It is envisioned that these changes may include the following types of activities:

- Requirements for additional or expanded studies or work to ensure that the nature and magnitude of the environmental effects are accurately identified;
- Elimination of studies, changes in the methodology or a decrease in detail of future studies from what was originally proposed in the TOR. This may be in response to further study that showed effects to be less than previously estimated; or
- Modifications to the proposed public consultation program given the above changes.

The list is not intended to be exhaustive; it is simply to set out, by example, the types of changes that will be considered routine and/or that are likely to result in an insignificant impact on the environment, and that could be accommodated within the framework of an approved TOR. Any significant variance to the approved TOR may require new or amended TOR to be submitted to the Minister for his or her approval.

In the event of uncertainty as to whether a proposed change should be considered routine or of note, the MOE will be consulted through the Director of the EA Branch.

Appendices

Appendix A - Reference Documents

The following references are provided as sources of background information. Copies of the documents may be viewed at the offices of Conestoga-Rovers & Associates, 179 Colonnade Road, Suite 400, Nepean, Ontario K2E 7J4. (613)-727-0510.

A. Phase I Environmental Investigation. CRA 1993

B. Phase II Environmental Investigation. CRA 1994

C. Proposed Remediation Plan. CRA 1994

D. Proposed Closure Plan - Industrial Landfill. CRA 1995

E. Annual Monitoring Reports. CRA 1995, 1996, 1997, 1998

F. Surface Water Management Plan - Preliminary Design. CRA 1995

G. Design and Operation Report and Plans. CRA 1996

H. Request for Confirmation of Non-Designation Under the EA Act. CRA 1996

I. Addendum to Proposed Remediation Plan. CRA 1997

J. Design and Operations Plan, Emergency Certificate of Approval Amendment. CRA 1997

K. Engineering/Planning Evaluation and Cost Assessment, CRA 1999

Appendix B - TOR Development

As required under the Environmental Assessment and Public Consultation Act, an important first step in the EA process is the preparation of TOR for the EA. The TOR must be developed in consultation with potentially affected parties and the MOE and must be approved by the Minister.

The first step in the work plan, then, is to complete the draft TOR. This will be done in consultation with the MOE EA Branch and the CRT.

The next stage in finalizing the draft TOR will be a more formal period of consultation with other government agencies, with a proposed Public Liaison Committee (PLC) and with the general public. An information newsletter is proposed for circulation throughout the community during this period, followed by a public Open House. Every effort will be made to form a PLC with a balanced membership composed of members of the public from the Town of Hawkesbury and the Township of Champlain and particularly people living near the Site.

Upon receipt of comments as a result of the above consultation, the draft TOR will be finalized and submitted to the MOE for approval. This process will involve a maximum of 3-weeks, following which the TOR are then required to be listed on the Environmental Bill of Rights (EBR) Registry for general public review and comment.

Following a 4-week EBR notice period, the Minister can then approve the TOR and the EA Study may proceed. It is anticipated that approval of the draft TOR will occur concurrently with the initial regulatory and economic feasibility study.

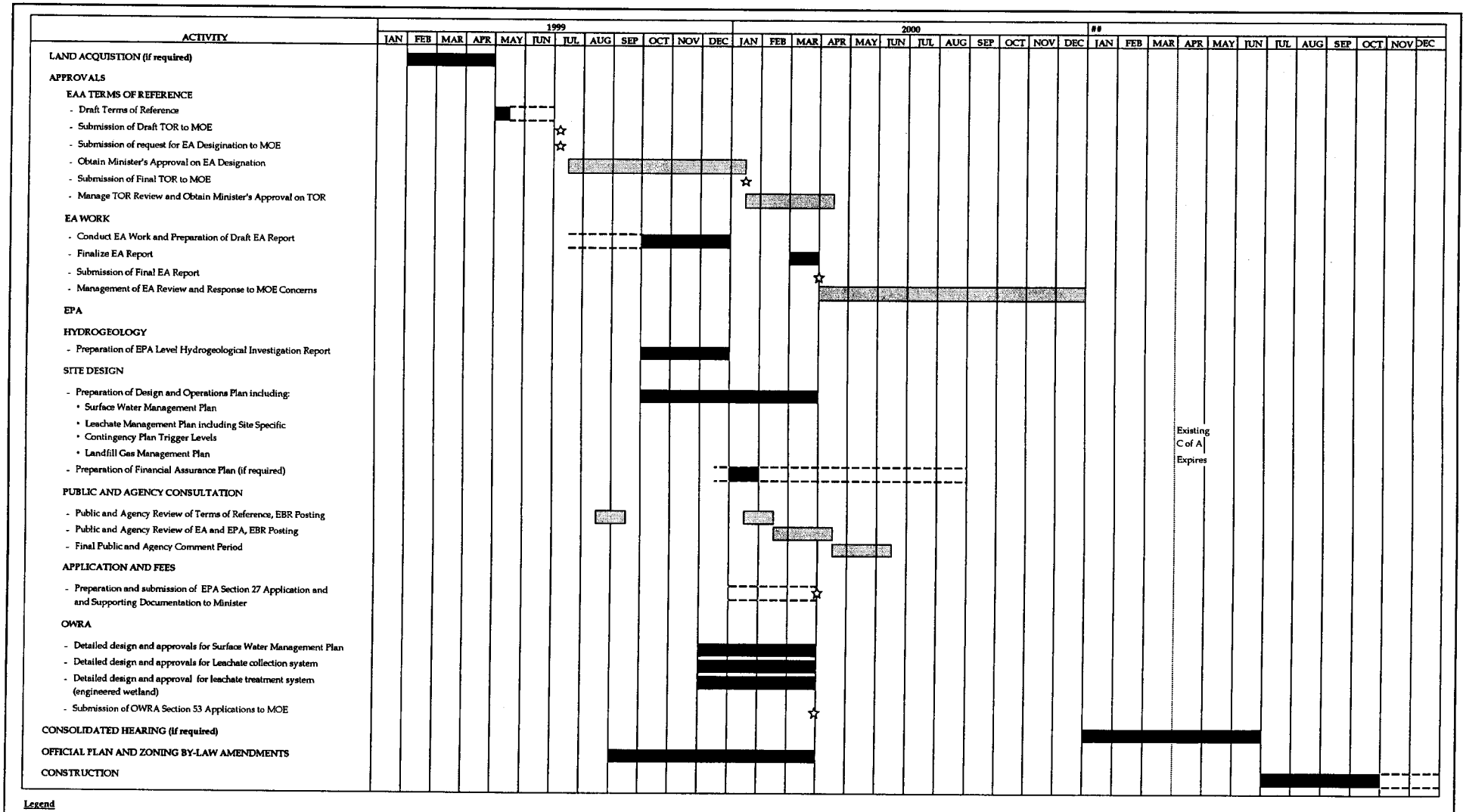
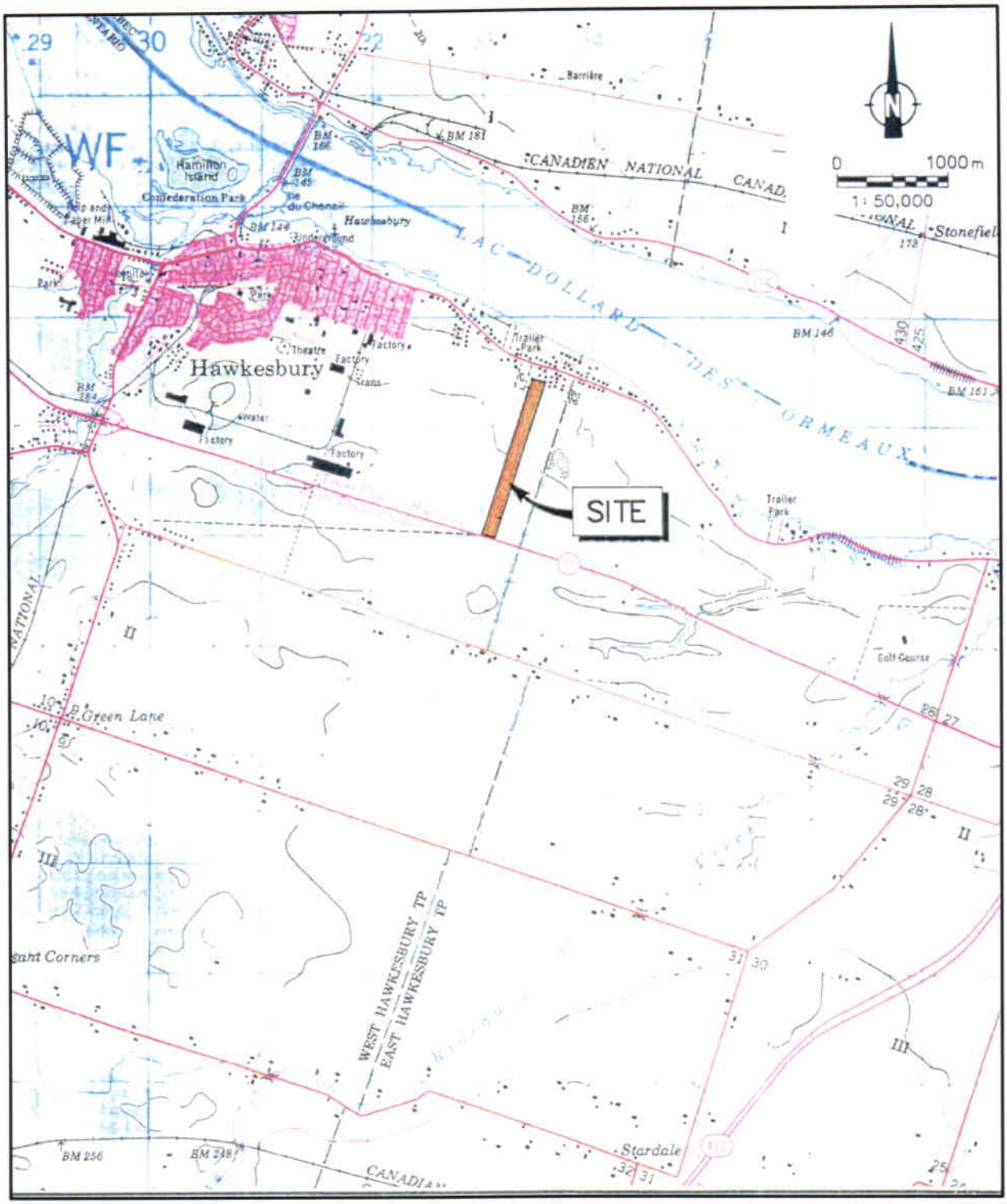


figure 2

WORK SCHEDULE
TERMS OF REFERENCE FOR COMPLETION OF AN EA
MAYER WASTE DISPOSAL SITE
Township of Champlain, Ontario



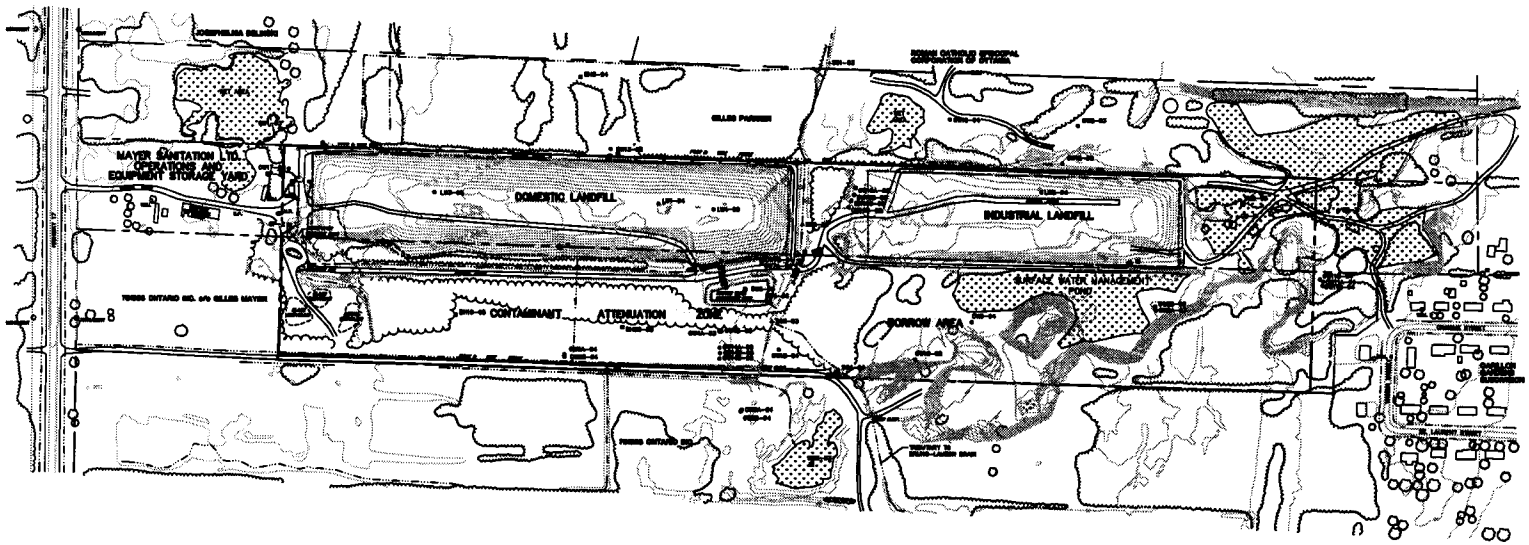
SOURCE: MAP 31 G/10, HAWKESBURY, ONTARIO

figure 1

SITE LOCATION PLAN
TERMS OF REFERENCE FOR COMPLETION OF AN EA
MAYER WASTE DISPOSAL SITE
Township of Champlain, Ontario

CRA

7918-00(TOR)GN-OT004 SEP 21/99



NO	Revision	Date	Initial

NOTES

1. EXISTING CONTOURS FOR THE INDUSTRIAL AND DOMESTIC LANDFILLS AND BORROW AREA WERE DEVELOPED FROM THE TOTAL STATION SURVEYS CONDUCTED BY CONESTOGA-ROVERS & ASSOCIATES COMPLETED OCTOBER 27, 1995; NOVEMBER 2, 1995; AND NOVEMBER 3, 1997 AND THE GPS SURVEY CONDUCTED ON NOVEMBER 2, 1995. REMAINING CONTOURS ARE FROM THE BASE PLAN PRODUCED BY THE BASE MAPPING CO. LTD., MAY 1990.

LEGEND

- PROPERTY BOUNDARY
- APPROVED LIMIT OF SITE AS PER REGISTERED PLAN 46R-3728
- LEACHATE WELL
- DITCH MONITORING STATION
- SURFACE WATER MONITORING STATION
- DOMESTIC WELL
- BOREHOLE
- GROUNDWATER MONITORING WELL
- GAS MONITORING PROBE
- APPROXIMATE LIMIT OF REFUSE
- LIMIT OF TREES/BUSH
- CONTOUR AND ELEVATION (m AMSL)
- DITCH/STREAM
- WET AREA
- ACCESS ROAD

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

MAYER WASTE DISPOSAL SITE
Township of Champlain
791999 ONTARIO INC.

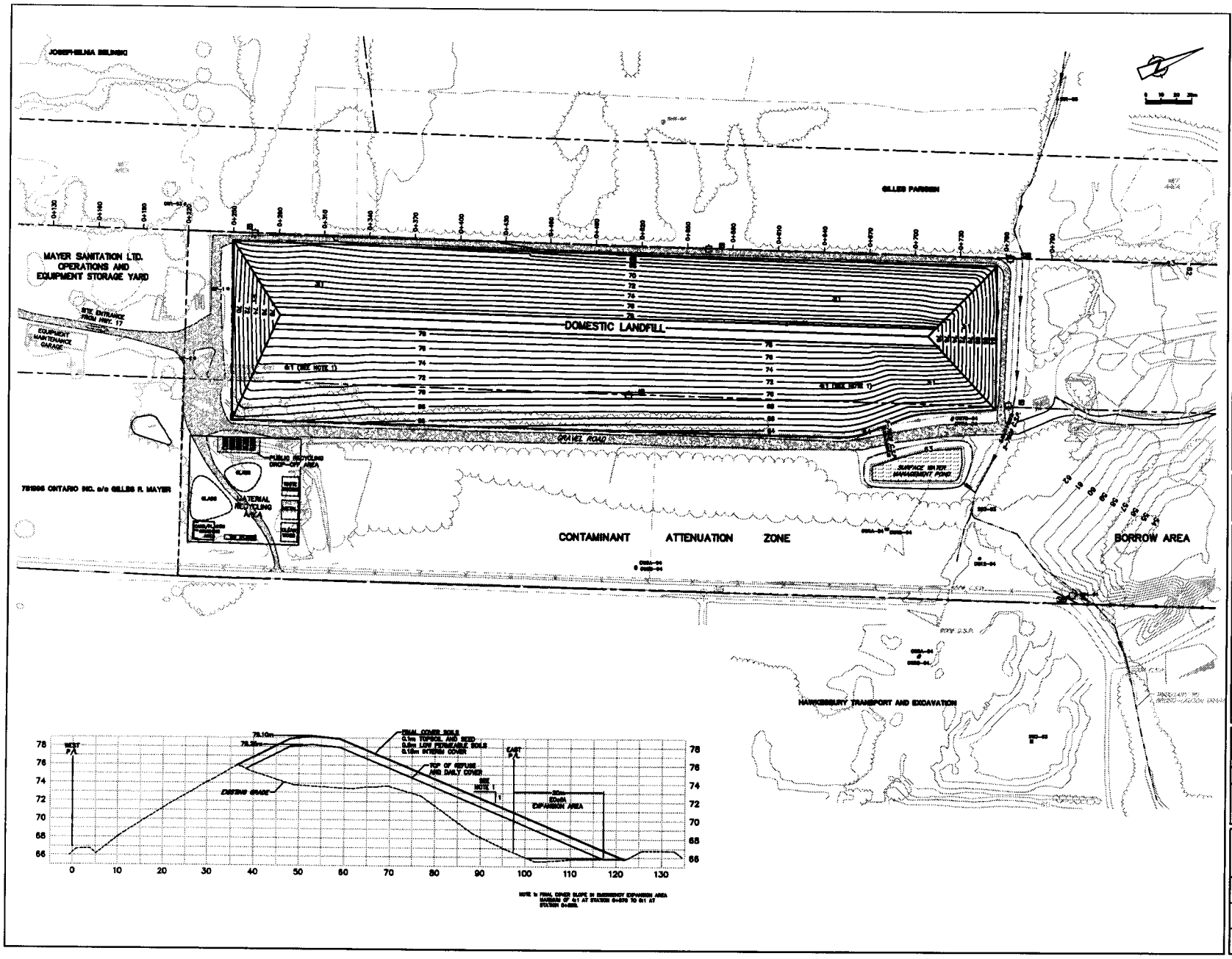
TERMS OF REFERENCE FOR PREPARATION OF AN EA

EXISTING CONDITIONS
NOVEMBER 1998

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			
SEE NOTE 1			
Project Manager: G. FERRARO	Reviewed By: C. ROBERTSON	Date: SEPTEMBER 1998	
Scale: AS SHOWN	Project No.: 07918-00	Report No.: TOR	Drawing No.: 1

07918-00(TOR)GN-DT001 SEP 21/98



NOTES:

EXISTING CONTOURS FOR THE INDUSTRIAL AND DOMESTIC LANDFILLS AND BORROW AREA WERE DEVELOPED FROM THE TOTAL STATION SURVEYS CONDUCTED BY CONESTOGA-ROVERS & ASSOCIATES COMPLETED OCTOBER 27, 1995, NOVEMBER 5, 1996 AND NOVEMBER 5, 1997. REMAINING CONTOURS ARE FROM THE BASE PLAN PRODUCED BY THE BASE MAPPING CO. LTD., MAY 1990.

LEGEND

- PROPERTY BOUNDARY
- APPROVED LIMIT OF SITE AS PER REGISTERED PLAN 46R-5726
- LEACHATE WELL
- DITCH MONITORING STATION
- SURFACE WATER MONITORING STATION
- DOMESTIC WELL
- BOREHOLE
- GROUNDWATER MONITORING WELL
- GAS MONITORING PROBE
- APPROXIMATE LIMIT OF REFUSE
- LIMIT OF TREES/BUSH
- ACCESS ROAD
- CONTOUR AND ELEVATION (m AMSL)
- DITCH/STREAM
- PONDED WATER
- PERIMETER FENCE
- PERIMETER ROAD
- PROPOSED PERIMETER FENCE
- PROPOSED FINAL CONTOUR AND ELEVATION (mAMSL)
- PROPOSED PERIMETER DITCH

No.	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 2cm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

MAYER WASTE DISPOSAL SITE
Township of Champlain
781996 ONTARIO INC.

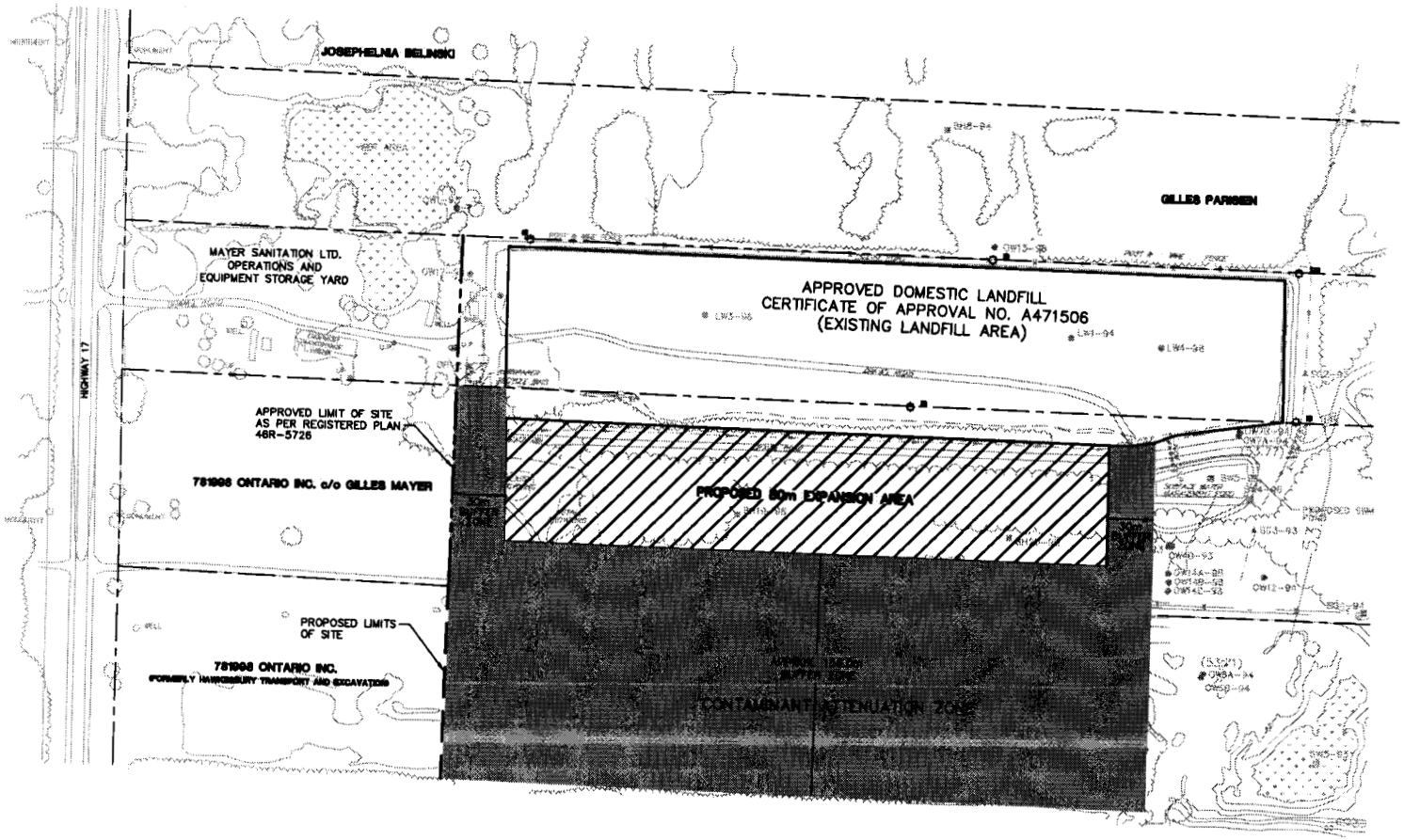
TERMS OF REFERENCE FOR COMPLETION OF AN EA

DOMESTIC LANDFILL – E C of A
PROPOSED FINAL CONTOURS

CRA
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			
SEE NOTE 1			
Project Manager: G. FERRARO	Reviewed By: C. ROBERTSON	Date: SEPTEMBER 1999	
Scale: AS SHOWN	Project No.: 07918-00	Report No.: TOR	Drawing No.: 2

07918(002)GT002 APR 08/96



NO	Revision	Date	Initial

NOTES

1. EXISTING CONTOURS FOR THE INDUSTRIAL AND DOMESTIC LANDFILLS AND BORROW AREA WERE DEVELOPED FROM THE TOTAL STATION SURVEYS CONDUCTED BY CONESTOGA-ROVERS & ASSOCIATES COMPLETED OCTOBER 27, 1995; NOVEMBER 3, 1996; AND NOVEMBER 5, 1997; AND THE GPS SURVEY CONDUCTED ON NOVEMBER 2, 1998. REMAINING CONTOURS ARE FROM THE BASE PLAN PRODUCED BY THE BASE MAPPING CO. LTD., MAY 1990.

LEGEND

- PROPERTY BOUNDARY
- LW1-94 LEACHATE WELL
- BH3-93 DITCH MONITORING STATION
- SW2-93 SURFACE WATER MONITORING STATION
- BH5-94 BOREHOLE
- OW4A-93 GROUNDWATER MONITORING WELL
- GM-1 GAS MONITORING PROBE
- APPROXIMATE LIMIT OF REFUSE
- LIMIT OF TREES/BUSH

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

MAYER WASTE DISPOSAL SITE
Township of Champlain
781998 ONTARIO INC.

LIMITS OF PROPOSED EXPANSION AREA

CONESTOGA-ROVERS & ASSOCIATES

Source Reference			
SEE NOTE 1			
Project Manager: G. FERRARO	Reviewed By: C. ROBERTSON	Date: SEPTEMBER 1998	
Scale: AS SHOWN	Project No.: 07918-00	Report No.: MISC-1	Drawing No.: 3

07918-00(TOR)GN-DT003 SEP 21/98