REGION OF OTTAWA CARLETON | REPORT
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TO/DEST. Co-ordinator
Planning and Environment Committee

FROM/EXP. Director, Solid Waste Division
Environment and Transportation Department

SUBJECT/OBJET **FINAL DRAFT - TRAIL ROAD LANDFILL ASSET MANAGEMENT AND LANDFILL OPTIMIZATION STUDY - DATED OCTOBER 1998**

DEPARTMENTAL RECOMMENDATION

That the Planning and Environment Committee and Council receive for information the final draft of the *Trail Road Landfill Asset Management and Landfill Optimization Study,* dated October 1998.

BACKGROUND

The *Trail Road Landfill Asset Management and Landfill Optimization Study* was one of the steps recommended in the Region's *Waste Management Master Plan - Interim Review,* as approved by Council in April 1990. The plan outlined three major studies to be completed as part of the reinitiation of the Waste Management Planning Exercise. The three studies are as follows:

1. Waste Composition Study

   Planning for waste management initiatives cannot be done efficiently without an understanding of activities, sources, and types of materials in the local solid waste stream. The Waste Composition Study was conducted to provide a comprehensive audit of residential, industrial, commercial, and institutional waste in Ottawa-Carleton. The Waste Composition Study was completed in December of 1992.

2. 3Rs Study

The 3Rs Study commenced in July 1992, near the completion of the Waste Composition Study. The purpose of the 3Rs Study was to provide the basis for evaluating and implementing courses of action in the areas of waste reduction, reuse and recycling. The 3Rs final report was approved in February 1995, and staff are actively implementing and evaluating low cost, low technology options identified in that study.

3. Landfill Optimization Study

The Landfill Optimization Study commenced near the end of 1993 and has been underway since that time. Some interruptions occurred as the Region determined the issue of compensation for landfill use in Ottawa-Carleton, and in order to allow for a review which was required as a result of regulatory changes which have occurred over the past two years. Over this period of time and due, in part, to the public's support and participation in the Region's diversion programs, residential waste quantities have been reduced, and revised projections have been made. The purpose of this study was to examine the feasibility of possible changes to the methods of operation, the design, or other technical changes that might be made at the Region's Trail Road Landfill Site in order to use the site as efficiently as possible.

It is important to note that the regulatory environment under which waste management facilities operate continues to evolve and change. In the summer of 1996, the Ministry of Environment and Energy (now Ministry of the Environment) circulated a consultation paper titled *"Responsive Environmental Protection"*, and solicited comments on many environmental aspects including waste management. The result of that consultation in the form of Acts, regulations and guidelines is still unknown. In addition, at the same time, discussion papers were circulated introducing landfill standards. The Ministry has stated that the proposed standards will ensure that new or expanded municipal non-hazardous waste landfills in Ontario are the most environmentally protected in the world. By introducing clearly defined standards, the approval process will become less costly, more timely, and more certain.

In January 1997, a new *Environmental Assessment and Consultation Improvement Act*, Bill 76, came into effect. This legislation modified a number of the requirements of the *Environmental Assessment Act* which is applicable to new or expanded landfills in the Province of Ontario. Some key new aspects of that regulation allow for the approval of "terms of reference" by the Minister before work can proceed on an environmental assessment. The terms of reference can be tailored to a particular proposal or planning process, thereby reducing the scope of the matters that are to be considered. The scope document must also outline public consultation. Once approved, the terms of reference become enshrined and must be followed. These changes have the potential to reduce the length and complexity of the landfill approval process; however, to date, very few waste management terms of reference have been submitted.

OVERVIEW OF THE REPORT

The *Trail Road Landfill Asset Management and Landfill Optimization Study* report represents a summary of a number of technical investigations that have been undertaken for the Trail Road Landfill. Extensive scientific, engineering, and financial analysis work was also undertaken for this report in the areas of waste quantity projection, landfill reclamation, waste disposal volume recovery resulting from dynamic and biological forces within the landfill, environmental screening, and landfill economics. A copy of the Executive Summary is attached as Annex A. It should be noted that this study does not deal with, or impact upon the Nepean Landfill Site.

The following is a brief overview of the sections of the report:

1. Background to Approval and Landfilling at Trail Road

   This section of the report provides a description of the landfill, including: an overview of waste disposal in Ottawa-Carleton, a review of the history of the development of the existing waste disposal site, an outline of the changes in land ownership in the area related to the assembly of property for the landfill, the evolution of the design and construction of the land form, and the periodic amendments that have been made to the provisional Certificate of Approval (C of A) for waste disposal. Since waste was first disposed of at the site, in May of 1980, the operations and approved land form have changed a number of times in response to both environmental and engineering factors.

2. Landfill Operation and Design Options

   This section of the report introduces options for the optimization of the Trail Road Landfill, including operational changes, waste volume, and design changes. Over the life of this study, some of the operational changes and waste volume optimization options identified have been tried and, in some cases, implemented. The key design options that are introduced include: modifying the base elevation of Stages 1 and 2, increasing the height of the Landfill, increasing the footprint area of the Landfill, and reclaiming landfill space by effectively mining those older areas of the existing Landfill.

3. Engineering and Environmental Constraints

   In view of possible design options, this section offers a preliminary evaluation of a number of engineering and environmental areas that should be considered as part of any future work. The areas considered include geotechnical, hydrogeological, surface water, environmental monitoring, land use, natural environment, air environment, transportation planning, and height and visibility concerns.

   Having identified some possible concerns and some proposed areas of limitation, a base case and number of options to be evaluated are identified.

4. Methodology for Cost Comparison of Design Options

   In order to compare different options with different timelines, a standard methodology and a number of assumptions are established in this section. The methodology for calculating additional air space capacity is outlined. There is a discussion with respect to possible waste diversion scenarios; and an outline of the present value cost analysis used to compare different options is presented.

5. Cost Comparison of Design Options

   Supported by various charts and tables, different options are described. An outline of the cost analysis is presented as well as a summary of the additional capacity that is gained through the options. The chapter concludes by presenting the present value, cost savings and the site-life extension for the various options compared to the base-case scenario.

6. Conclusions

   This section briefly presents the highlights of the report, none more significant than the following: *"The Trail Road Landfill is an excellent waste disposal site which could continue to be operated for many years with the adoption of any or all of the feasible design options available to optimize and extend waste disposal operations at the Landfill"*.

Included in the data generated as part of this report, future waste quantity projections have been updated, and it appears that the Trail Road Landfill Site will continue to meet the waste disposal requirements for the residents of Ottawa-Carleton under current and foreseeable conditions until the year 2009. The additional years of useful life are partly attributable to recent waste diversion initiatives and can possibly be further extended through more diversion programs.

CONSULTATION

The *Trail Road Landfill Asset Management and Optimization Study* represents the third of three reports initiated under the *Waste Management Master Plan - Interim Review* as approved by Council. The report presents a technical feasibility study with respect to a variety of design or operational options at the Trail Road site. The next step is to initiate discussions with the public and stakeholder groups to outline the findings of the study and solicit their comments on the options reviewed. Results of those consultations will be the subject of a future report to Committee.

FINANCIAL IMPACTS

The Region has a long-term responsibility for the disposal of residential solid waste. The management and landfill optimization study outlines, on a preliminary basis, a number of options that appear to be technically feasible and economically advantageous to the residents of Ottawa-Carleton. Subject to the results of the above-noted public consultation and further Council

direction on this matter, the Region may seek to obtain the various approvals required to either further optimize this landfill asset or seek alternative disposal options. The study offers a preliminary estimate of savings related to the various optimization options

Approved by
P. McNally, P.Eng.

PM/md

Attach. (1)

ANNEX A

TRAIL ROAD LANDFILL
ASSET MANAGEMENT STUDY
LANDFILL OPTIMIZATION REPORT
FINAL DRAFT
FOR THE REGIONAL MUNICIPALITY
OF OTTAWA-CARLETON

EXECUTIVE SUMMARY

The Trail Road Landfill is a municipal solid waste disposal facility that is owned and operated by the Regional Municipality of Ottawa-Carleton. The landfill is located in the City of Nepean and currently has a total approved capacity of approximately 8.8 million cubic meters. By the end of 1996, of the total original approved volume of the Trail Road Landfill, an estimated 2.6 million cubic meters of "air space" was still available for waste disposal operations. Based on the calculations completed for this report, the volume of the remaining air space suggests that the Trail Road Landfill could potentially remain in operation until the year 2009.

This asset management study was initiated as part of the Region's solid waste planning exercise to assess;

- the remaining capacity of the existing landfill;
- possible changes to the operating practices at the landfill which might extend the life of the facility;
- possible changes to the design of the landfill under the existing Certificate of Approval which might extend the life of the facility; and
- possible changes to the landfill under a revised Certificate of Approval which might extend the life of the landfill further.

In order to make this assessment, the study;

- examines the history of the Trail Road Landfill, including its "approvals" history (Section 2);

- reviews the possible operational and design changes which should be considered in an effort to extend the life of the landfill (Section 3);

- reviews a series of considerations which affect the appropriateness of certain landfill design options (Section 4); and

- compares the various design options from a cost perspective (Section 6) based on a methodology which is described in Section 5.

The report is divided into seven sections beginning with an introduction. **Section 2** of the study describes the site and its geographical setting and traces the development of landfilling in the vicinity of Trail Road.

Section 2 also contains an analysis of the waste quantities potentially requiring disposal at the Trail Road Landfill over the next number of years. These quantities have been estimated based on past generation rates as well as future population and economic growth estimates for the Region. In addition, a number of waste diversion scenarios have been examined to identify a range of waste quantities that could require disposal at the Trail Road Landfill. This section also includes an analysis of landfill capacity and site life estimates.

Section 3 of the study examines both existing and emerging technologies which may be available to reduce the rate of consumption of the remaining volume of the landfill. Possible operational changes which were examined include placing the waste at the highest achievable density through the use of various mechanisms, minimizing the volume of waste disposed of in the landfill by using various technologies (for example leachate recirculation) and using alternate daily or intermediate cover materials which have the potential to conserve the remaining approved landfill capacity.

Section 3 also introduces a series of design changes (in addition to the operational improvements noted above) that could be implemented at the Trail Road Landfill to extend the life of the site. These design changes include;

- lowering the base elevation of the landfill;

- increasing the height of the landfill (over part or all of the existing disposal area);

- placing waste over a larger waste disposal area;

- undertaking a landfill reclamation program; and

- various combinations of these design alternatives.

In **Section 4** of the report, each of the design changes described in Section 3 are examined in the context of a series of considerations including geotechnical, hydrogeological, surface water management, environmental monitoring, land use, natural environment, air environment, transportation and landfill height and visibility issues. This section also sets out an evaluation of the design options.

In anticipation of Section 6, which is a cost comparison of the various design options for extending the life of the landfill, Section 5 describes the basic methodology which is used in section 6 to carry out a cost comparison. Therefore, section 5 describes how a "Base Case Scenario" was established against which the design options are each compared. In addition, the methodology by which estimated savings from deferred capital expenditures are calculated is described.

Section 6 outlines the cost comparison of the various design options as well as an outline of the additional capacity which each design has the potential to yield and the timing of expenditures with respect to the various options.

Section 7 sets out an outline of the study as well as conclusions as follows:

1. The current Provisional Certificate of Approval for the Trail Road Landfill limits the remaining capacity and site life to the original height, volume, and footprint of the disposal area which was approved in 1977.

2. The original proposed and approved height and footprint area of the Landfill were established based on a sketch of the new landfill over the new property area that was acquired adjacent to the Nepean Landfill in March, 1975 on the north side of Trail Road.

3. The original and current approved volume of the Landfill is based on a 1975 estimated quantity of material that was available on site for daily and final cover using the 1975 proposed landform and the original estimated refuse to cover ratios. Soil is currently being imported to this site for daily and final cover material.

4. The RMOC started construction of the Trail Road Landfill in December, 1978, and waste disposal operations for the Trail Road Landfill began in May, 1980.

5. Based on historical waste quantities (1996 Annual Monitoring and Operating program) the Trail Road Landfill will be full in 2005. Allowing for the effect of projected waste diversion quantities and optimization of operational practices, the expected life of the Landfill could be extended to 2009.

6. In accordance with current estimates and other Ontario experience, approximately $40 million and a minimum of seven years would be required to find, approve, design and construct a new landfill for solid waste disposal in the Region.

7. The Trail Road Landfill is an excellent waste disposal site which could continue to operate for many years with the adoption of any or all of the feasible design options available to optimize and extend waste disposal operations at the Landfill.

8. Design options which are feasible include landfill reclamation, an increase in height over part or all of the Landfill, an increase in footprint of the Landfill, or certain combinations of these options.

9. The RMOC should move on to detailed investigation of the various optimization options and the approvals required to carry out those options.