

THE REGIONAL  
MUNICIPALITY  
OF HALTON

*Walter Sullivan*

# **INTERIM WASTE DISPOSAL FEASIBILITY STUDY**



September, 1978

# M. M. DILLON LIMITED

consulting engineers and planners

BOX 219, STN. K, TORONTO, CANADA M4P 2G5 • (416) 482-5656 • CABLE: DILLENG • TELEX 064-7540

OUR FILE: 8320-01

YOUR FILE:

29 August 1978

Regional Municipality of Halton  
3027 Harvester Road  
Burlington, Ontario  
L7N 3G8

Attention: Mr. D.J. Corbett, P.Eng.  
Manager, Design and Construction

Interim Waste Disposal  
Feasibility Study

Dear Sirs:

We are pleased to present the Final Report of the Interim Waste Disposal Feasibility Study. The report has been prepared in accordance with the resolution of Regional Council of 5 July 1978 detailing the work to be carried out.

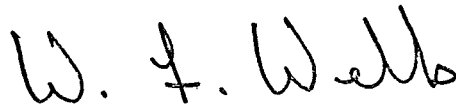
With the short time available for preparation, valuable assistance was rendered by many members of Regional and Area Municipal staffs. We thank all those for their efforts.

The report was reviewed by the TECO Committee on Wednesday 23 August. The comments of the Committee have been incorporated into the report.

We look forward to discussing our findings with you.

Yours truly,

M. M. DILLON LIMITED



WFW:jm

W.F. Wells, P.Eng.  
Project Manager

REGIONAL MUNICIPALITY  
OF  
HALTON

INTERIM WASTE DISPOSAL  
FEASIBILITY STUDY

FINAL REPORT

Prepared by  
M. M. DILLON LIMITED

29 August 1978

FILE: 8320-01

## TABLE OF CONTENTS

|                                                      | PAGE |
|------------------------------------------------------|------|
| 1. INTRODUCTION                                      | 1    |
| 1.1 Background                                       | 1    |
| 1.2 Rationale for the Feasibility Study              | 1    |
| 2. WASTE QUANTITIES AND LANDFILL REQUIREMENTS        | 3    |
| 2.1 General                                          | 3    |
| 2.2 Estimates of Waste Quantities and Character      | 3    |
| 2.2.1 Basis for Estimates                            | 3    |
| 2.2.2 Previous Waste Projections                     | 5    |
| 2.2.3 Short-Term Estimates                           | 6    |
| 2.2.4 Long-Term Estimates                            | 10   |
| 2.3 Waste Distribution                               | 13   |
| 2.4 Short-Term Landfill Requirements                 | 13   |
| 3. DEVELOPMENT OF AN INTERIM LANDFILL PLAN           | 18   |
| 3.1 Regional Solid Waste Concerns                    | 18   |
| 3.2 Current Operations at Landfills                  | 18   |
| 3.3 Selected Sites                                   | 19   |
| 3.4 Scope of Work                                    | 20   |
| 3.5 Plan Development                                 | 22   |
| 4. BURLINGTON LANDFILL SITE                          | 23   |
| 4.1 Expansion Within Existing Boundaries,<br>Phase 1 | 23   |
| 4.2 Possible Property Expansion                      | 23   |
| 4.2.1 Potential Area for                             | 23   |
| 4.2.2 Site Development                               | 25   |
| 4.2.3 Site Design                                    | 26   |
| 4.3 Conclusions                                      | 27   |
| 4.4 Program for Approval                             | 28   |
| 4.5 Capital Costs                                    | 29   |

TABLE OF CONTENTS  
(continued)

|                                          | PAGE |
|------------------------------------------|------|
| 5. MILTON BRICK YARD SITE                | 30   |
| 5.1 Background                           | 30   |
| 5.2 Potential for Development            | 30   |
| 5.3 Conclusions                          | 31   |
| 6. NATCO QUARRY                          | 32   |
| 6.1 Potential Area for Landfilling       | 32   |
| 6.2 Site Development                     | 32   |
| 6.3 Site Design                          | 35   |
| 6.4 Conclusions                          | 36   |
| 6.5 Program for Approval                 | 37   |
| 6.6 Capital Costs                        | 38   |
| 7. OAKVILLE LANDFILL SITE                | 40   |
| 7.1 Expansion Within Existing Boundaries | 40   |
| 7.2 Possible Property Expansion          | 40   |
| 7.2.1 Potential Areas for Landfill       | 40   |
| 7.2.2 Site Development                   | 41   |
| 7.2.3 Site Design                        | 42   |
| 7.3 Conclusions                          | 43   |
| 7.4 Program for Approval                 | 44   |
| 7.5 Capital Costs                        | 44   |
| 8. PLAN ALTERNATIVES                     | 46   |
| 8.1 Waste Transportation                 | 46   |
| 8.2 Landfill Alternatives                | 47   |
| 8.3 Recommended Option                   | 52   |

# LIST OF TABLES

|         |                                                                                  | PAGE |
|---------|----------------------------------------------------------------------------------|------|
| TABLE 1 | - COMPARISON OF POPULATION ESTIMATES<br>REGION OF HALTON                         | 7    |
| TABLE 2 | - PER CAPITA WASTE GENERATION*<br>REGION OF HALTON                               | 9    |
| TABLE 3 | - POPULATION PROJECTIONS BY MUNICIPALITY<br>REGION OF HALTON                     | 11   |
| TABLE 4 | - EXPECTED WASTE QUANTITIES (TONS PER<br>YEAR)                                   | 12   |
| TABLE 5 | - REMAINING LANDFILL CAPACITY REGION OF<br>HALTON                                | 14   |
| TABLE 6 | - ESTIMATED LANDFILL CAPACITY (BY VOLUME)<br>REQUIRED 1980-1983 REGION OF HALTON | 16   |
| TABLE 7 | - ESTIMATED LANDFILL CAPACITY (BY WEIGHT)<br>REQUIRED 1980-1983 REGION OF HALTON | 17   |
| TABLE 8 | - OPTIONS FOR WASTE DISPOSAL (1)                                                 | 48   |

## LIST OF FIGURES

- FIGURE 1 - KEY PLAN
- FIGURE 2 - BURLINGTON LANDFILL
- FIGURE 3 - MILTON BRICK YARD
- FIGURE 4 - NATCO QUARRY
- FIGURE 5 - NATCO QUARRY TRANSPORTATION ROUTES
- FIGURE 6 - OAKVILLE LANDFILL
- FIGURE 7 - GEORGETOWN LANDFILL

REGIONAL MUNICIPALITY OF HALTON  
INTERIM WASTE DISPOSAL  
FEASIBILITY STUDY

1. INTRODUCTION

1.1 Background

By resolution of Regional Council of 5 July 1978, M. M. Dillon Limited was retained to prepare an Interim Waste Disposal Feasibility Study for the Regional Municipality of Halton.

The purpose of the study is to recommend the best strategy for provision of landfill capacity until such time as major new Regional facilities for waste disposal and/or processing can be approved and developed.

Based on the investigations and recommendations of this report, Regional Council may select the specific landfill alternatives to be developed to provide continued landfill capacity. The timetable and estimated cost to carry out site investigations and develop the engineering data required for applications for Certificates of Approval are given for each site.

1.2 Rationale for the Feasibility Study

In, January 1976, the Interim Report of the Region of Halton Resource Recovery Study reported on and made recommendations for establishment of major Regional landfill sites. The Region has undertaken significant investigations of suggested

alternatives and is currently taking all necessary steps to receive approval for a major new landfill. However, approval procedures, site acquisition and site development will likely require until into 1981 before major new capacity is available.

*assuming  
all goes  
reasonably well*

Landfill sites are currently being operated by the Region in Georgetown, Burlington and Oakville. Though a program of upgrading operations and site redesign has been underway, the approved landfill capacity in all three sites will be fully utilized by the end of 1979.

When the Georgetown landfill closes, wastes currently being received at this site from the Milton and Halton Hills area will be redirected to the Oakville landfill site. No decision has yet been made on the provision of transfer facilities for the Halton Hills area as recommended in the feasibility study for Resource Recovery for Halton.

After closure of the Oakville landfill all wastes will be \* N.B., transported to the Burlington landfill site. This then would be the only operating landfill in the Region.

The need for interim waste disposal is apparent. This study must:

- recommend additional landfill capacity in areas physically suitable
- recommend a program that will permit approval of new capacity at the earliest possible dates
- recommend a program that provides sound waste management practices and is compatible with Regional policies on waste management.

## 2. WASTE QUANTITIES AND LANDFILL REQUIREMENTS

### 2.1 General

Concern has been expressed by Regional Council that estimates of waste quantities previously used for design of new waste facilities have been high. This concern results from comparison of recent landfill weight records with previous projections and from waste projections generated in the "Mayor's Task Force on Waste Management" in Burlington which differed with those projections used in consultants reports.

Considerable attention has been given in this report to estimates of waste quantities. Outlined below is the basis for estimates used and comments respecting variance from previous estimates given.

### 2.2 Estimates of Waste Quantities and Character

#### 2.2.1 Basis for Estimates

The production of solid wastes is population related. In small communities and rural areas the contributor to the solid waste system is primarily residential with limited commercial input. The waste quantities therefore are closely related to the population of these areas. The waste character is predominately 'municipal' or putrescible wastes with small, periodic quantities of bulky wastes, debris and brush.

In large urban communities the estimate of both waste quantity and quality are more complex and are less directly population related. Major industries, large regional commercial and institutional facilities and quantities of construction and demolition debris significantly influence the waste stream.

Estimates of quantities in the solid waste stream is imprecise. Scales now exist at all three landfills in the Region. Currently wastes entering the landfills in trucks are weighed, but not wastes brought in cars, small trailers or half ton trucks. Weight records are therefore not a total record of all wastes being deposited at the landfills. However the quantities that by-pass the scales in these vehicles is not considered significant. Weight records are only available for 1975, 1976 and 1977. Minimal historic data is therefore available.

Demolition and construction debris are often used for short-term filling of lands within the area municipalities. While this is occurring, these wastes are not recorded as part of the waste stream. On conclusion of these fill projects such wastes may require disposal at an approved Regional landfill site. For planning purposes therefore, estimates of these waste quantities must be made and considered within the Regional scheme.

In rural areas, waste often picked up in normal garbage collection in the City is disposed of on one's own property. The demand put on the Regional waste system from the rural area is significantly less from a quantity or capacity point-of-view than that of the urban area.

Estimates of waste quantities therefore must be made from available data such as collection records where waste collection exists, disposal records, truck counts and related information. The base year estimate is normally calculated and, with the population records, a 'pounds per capita' estimate is derived.

The accuracy of projections of future waste quantities is dependent on:

- the accuracy of the base year data
- population projections and distribution
- increase or decrease of unit generation rates (pounds per capita per day).

Because of the variables in estimates of future waste generation, continuous monitoring and revision of estimates is required as part of a plan implementation and update.

### 2.2.2 Previous Waste Projections

In 1974 an Area Waste Management Study was completed for the then County of Halton. Population and waste projections to 1995 were made in that report. Those projections were made without the benefit of weight records from all existing landfills and without population information on a Regional basis.

In 1976 new estimates were presented in the Interim Report, Resource Recovery Study. These estimates also were prepared without benefit of actual weight records at landfills in the Region. These new estimates were based on those given in the

Area Waste Management Study revised downward resultant from revised population estimates given by the Regional Planning Department.

In August 1978 the "Regional Plan" Regional Municipality of Halton, was published which again revised the expected Regional population downward. There is justification, therefore, to prepare new estimates of waste quantities and distribution in the Region. \*

Table 1 shows the comparative population estimates from each report. The data have been interpolated to bring estimates to the same horizon years as are used in the "Regional Plan".

The population estimates for future years have been downgraded from prior estimates used. Likewise actual weight records, though not totally reflecting the entire waste stream, do indicate that previous projections of future waste quantities may be high.

The variance in the estimates versus the actual waste quantities weighed is likely accounted for by the reduced population. However other factors were discussed above that will contribute to the differences but cannot be independently quantified.

### 2.2.3 Short-Term Estimates

Short-term estimates of waste production in the Region have been prepared by application of appropriate waste generation factors (pounds per capita per day) to the projected population for each Area Municipality from 1978 to 1983.

TABLE 1  
COMPARISON OF POPULATION ESTIMATES  
REGION OF HALTON

|                             | 1976    | 1986    | 1996    | 2001    |
|-----------------------------|---------|---------|---------|---------|
| <u>BURLINGTON</u>           |         |         |         |         |
| Area Waste Management Study | 112,700 | 184,000 |         |         |
| Resource Recovery Study     | 110,000 | 166,000 | 216,000 |         |
| Regional Plan               | 104,300 | 133,000 |         | 170,000 |
| <u>OAKVILLE</u>             |         |         |         |         |
| Area Waste Management Study | 72,800  | 136,200 |         |         |
| Resource Recovery Study     | 72,000  | 112,000 | 145,500 |         |
| Regional Plan               | 68,500  | 94,000  |         | 130,000 |
| <u>MILTON</u>               |         |         |         |         |
| Area Waste Management Study | 22,600  | 39,100  |         |         |
| Resource Recovery Study     | 20,200  | 37,900  | 49,000  |         |
| Regional Plan               | 20,600  | 33,000  |         | 37,000  |
| <u>HALTON HILLS</u>         |         |         |         |         |
| Area Waste Management Study | 36,700  | 54,400  |         |         |
| Resource Recovery Study     | 37,400  | 50,500  | 60,700  |         |
| Regional Plan               | 34,200  | 45,000  |         | 50,000  |
| <u>REGION OF HALTON</u>     |         |         |         |         |
| Area Waste Management Study | 244,800 |         |         |         |
| Resource Recovery           | 239,600 | 366,400 | 471,200 |         |
| Regional Plan               | 227,600 | 305,000 |         | 387,000 |

To estimate waste generation factors, weight records from 1975 to 1977 were examined from the existing landfill sites in Burlington, Oakville and Georgetown. The factors were derived by correlation of the waste inputs at the sites to the actual population producing these wastes. Table 2 illustrates the results of this analysis.

The values of per capita waste generated varied by municipalities depending upon the degree of urbanization and industrial development. From 1975 to 1976 per capita waste generation showed a definite upward trend for each municipality. From 1976 to 1977 there were no significant changes. In the absence of further data it is considered reasonable to assume that for the calculation of short-term waste projections, the 1977 waste generation factors are appropriate. This hypothesis is generally supported by analysis of extrapolated waste quantities for the first six months of 1978. This may, however, be an approach that ultimately underestimates actual waste quantities.

Population forecasts for each Area Municipality were derived in consort with the Regional Planning Department for each year from 1978 to 1983. These population forecasts were correlated with the 1986 horizon year projections cited in "The Regional Plan", Regional Municipality of Halton, 1978. The details of the methodology used by the Regional Planning Department are described in the report "Demographic Analysis and Population Trend Forecast for the Regional Municipality of Halton", September 1975.

TABLE 2  
PER CAPITA WASTE GENERATION\*  
REGION OF HALTON

| DISPOSAL SITE<br>(Municipality)                  | 1975       |                                  |                                                   | 1976       |                                  |                                                   | 1977       |                                  |                                                   |
|--------------------------------------------------|------------|----------------------------------|---------------------------------------------------|------------|----------------------------------|---------------------------------------------------|------------|----------------------------------|---------------------------------------------------|
|                                                  | POPULATION | WASTE<br>QUANTITY<br>(tons/year) | PER CAPITA<br>WASTE<br>GENERATION<br>(lb/cap/day) | POPULATION | WASTE<br>QUANTITY<br>(tons/year) | PER CAPITA<br>WASTE<br>GENERATION<br>(lb/cap/day) | POPULATION | WASTE<br>QUANTITY<br>(tons/year) | PER CAPITA<br>WASTE<br>GENERATION<br>(lb/cap/day) |
| Burlington Landfill<br>(Burlington)              | 101,936    | 72,612                           | 3.9                                               | 104,300    | 87,795                           | 4.6                                               | 105,714    | 87,987                           | 4.5                                               |
| Oakville Landfill<br>(Oakville)                  | 67,634     | 55,761                           | 4.5                                               | 68,500     | 65,638+                          | 5.2                                               | 68,572     | 68,064                           | 5.4                                               |
| Georgetown Landfill<br>(Halton Hills and Milton) | 50,703     | 26,174                           | 2.8                                               | 54,800     | 32,534                           | 3.2                                               | 56,088     | 33,721                           | 3.2                                               |

\* Based on actual wastes quantities weighted at each landfill.

+ Actual input of 79,516 tons adjusted downward to allow for 13,878 tons Union Carbide line sludge.

Two estimates of projected populations were developed. The maximum development estimate (recorded as 'high' estimate in the tables) was derived from analysis of possible development while the 'low' estimate results from mathematical analysis of historical trends.

Table 3 illustrates the high and low population estimates for the area municipalities for 1978-1983. It is expected that the low estimate is the most probable population to be realized.

In the preparation of the Interim Waste Disposal Feasibility Study however, it is recognized that a flexible system is required and that the effect of the higher population estimates on waste quantities must be considered.

Table 4 shows the high and low estimates for waste quantities from 1978-1983 for each municipality.

The quantities were calculated on the basis of distribution to existing landfill sites. The quantities for Milton and Halton Hills, therefore, are not independently stated. As these sites close, the quantities estimated are those that would require redirection to other sites.

#### 2.2.4 Long-Term Estimates

The update of the long-term (20 year) projections of waste quantities, distribution and character are not covered by this report. Work is continuing on analysis of the industrial waste stream as part of the resource recovery program. A

TABLE 3  
POPULATION PROJECTIONS BY MUNICIPALITY  
REGION OF HALTON

| MUNICIPALITY |      | 1977    | 1978    | 1979    | 1980    | 1981    | 1982    | 1983+   | 1986*   |
|--------------|------|---------|---------|---------|---------|---------|---------|---------|---------|
| Burlington   | High | 105,714 | 114,200 | 118,700 | 123,900 | 130,600 | 134,800 | 140,250 | 133,000 |
|              | Low  |         | 108,500 | 111,800 | 115,200 | 118,300 | 121,500 | 124,750 |         |
| Oakville     | High | 68,572  | 75,600  | 79,000  | 81,700  | 85,200  | 88,700  | 91,750  | 94,000  |
|              | Low  |         | 70,400  | 72,200  | 73,900  | 75,700  | 77,500  | 79,250  |         |
| Milton       | High | 22,095  | 24,900  | 26,100  | 27,600  | 28,500  | 29,900  | 30,800  | 33,000  |
|              | Low  |         | 23,600  | 25,200  | 26,800  | 28,300  | 29,500  | 30,350  |         |
| Halton Hills | High | 33,993  | 36,000  | 38,300  | 41,000  | 44,100  | 49,350  | 53,250  | 45,000  |
|              | Low  |         | 34,000  | 36,500  | 36,900  | 38,250  | 39,250  | 40,500  |         |
| TOTAL        | High | 230,374 | 250,700 | 262,100 | 274,300 | 288,400 | 302,750 | 316,050 | 305,000 |
|              | Low  |         | 230,500 | 251,900 | 252,800 | 260,550 | 367,750 | 274,850 |         |

+ 1983 population derived by linear extrapolation

\* 1986 population from "The Regional Plan" (Regional Municipality of Halton, August, 1978)

TABLE 4  
EXPECTED WASTE QUANTITIES  
(TONS PER YEAR)

| <u>MUNICIPALITY</u>     |      | <u>1978</u> | <u>1979</u> | <u>1980</u> | <u>1981</u> | <u>1982</u> | <u>1983</u> |
|-------------------------|------|-------------|-------------|-------------|-------------|-------------|-------------|
| Burlington              | High | 94,800      | 98,500      | 102,800     | 108,400     | 111,900     | 116,400     |
|                         | Low  | 90,000      | 92,800      | 95,600      | 98,200      | 100,800     | 103,500     |
| Oakville                | High | 74,800      | 78,200      | 80,900      | 84,300      | 87,800      | 90,800      |
|                         | Low  | 69,700      | 71,500      | 73,200      | 74,900      | 76,700      | 78,500      |
| Halton Hills and Milton | High | 36,500      | 38,600      | 41,200      | 43,600      | 47,600      | 50,400      |
|                         | Low  | 34,600      | 37,000      | 38,200      | 39,900      | 41,250      | 42,500      |
| TOTAL                   | High | 206,100     | 201,300     | 207,000     | 213,000     | 218,000     | 224,500     |
|                         | Low  | 194,300     | 215,300     | 224,900     | 236,300     | 247,300     | 257,600     |

separate report will be produced when work is completed on revising the waste estimates and character breakdown in accordance with the "Regional Plan" population projections and the industrial waste questionnaires currently circulating.

### 2.3 Waste Distribution

The distribution of wastes within the Region was reported on in the Interim Report, Resource Recovery Study. Preliminary review of current waste projections indicates the distribution pattern is virtually the same. Waste distribution within the Region will be addressed in a subsequent report on long-term waste quantity projections.

### 2.4 Short-Term Landfill Requirements

The requirements for landfill capacity are based on the estimated waste quantities for the Region given in Table 4. To be consistent with the Region's methods of assessing landfill capacity, landfill requirements were calculated on the following assumptions:

- daily cover will be applied in the ratio of one part cover to five parts refuse with allowance for an additional two feet of final cover
- an average in-place refuse density of 800 pounds per cubic yard will be obtained.

The estimated remaining approved capacities and the predicted closure dates for the existing Burlington, Oakville and Georgetown landfill sites are as shown in Table 5.

TABLE 5  
REMAINING LANDFILL CAPACITY  
REGION OF HALTON

| <u>Disposal Site</u> | <u>Refuse Capacity<br/>(tons)</u> | <u>Estimated<br/>Closure Date</u> | <u>Refuse<br/>Routing</u>                                    |
|----------------------|-----------------------------------|-----------------------------------|--------------------------------------------------------------|
| +Burlington Landfill | 153,400                           | December 1979                     | Halton Hills<br>and Oakville<br>refuse after<br>October 1979 |
| *Oakville Landfill   | 116,700                           | October 1979                      | Halton Hills<br>refuse after<br>March 1979                   |
| +Georgetown Landfill | 31,600                            | March 1979                        | Halton Hills<br>refuse to<br>Oakville<br>after March<br>1979 |

TOTAL WASTES                      301,700

FINAL CLOSURE DATE                      December 1979

+    as of April 1978.

\*    as of May 1978.

From December 1979 there will be a shortfall in landfill capacity until new Regional facilities can be approved and put into operation. Without further delays to the existing timetable it is expected that this will not occur before mid 1981. To provide for flexible operation it is recommended that the Interim Waste Disposal Feasibility Study provide for landfill capacity beyond 1981.

Based on the projected waste quantities in Table 4, landfill volume requirements from January 1980 to December 1983 are shown in Table 6. The table has been subdivided to show capacity requirements for putrescible ('wet') wastes and 'dry' wastes separately. From estimates of waste characteristics derived in the Interim Report, Resource Recovery the quantity of 'dry' waste is expected to be approximately 15 per cent of the total wastes.

Based on the assumptions previously stated, the tonnage of wastes that will be handled is shown in Table 7.

The high and low estimates have been consistently used throughout this report so that the effect on the variance in waste quantities can be seen. The plan alternatives derived in Section 8 consider the range of estimates given and their effect on available or recommended landfill capacity.

TABLE 6  
ESTIMATED LANDFILL CAPACITY (BY VOLUME) REQUIRED 1980-1983  
REGION OF HALTON

|      |      | 'WET' WASTES                  |                                  | 'DRY' WASTES*                 |                                  | TOTAL WASTES                  |                                  |
|------|------|-------------------------------|----------------------------------|-------------------------------|----------------------------------|-------------------------------|----------------------------------|
|      |      | ANNUAL VOLUME<br>(cu.yd./yr.) | CUMULATIVE<br>VOLUME<br>(cu.yd.) | ANNUAL VOLUME<br>(cu.yd./yr.) | CUMULATIVE<br>VOLUME<br>(cu.yd.) | ANNUAL VOLUME<br>(cu.yd./yr.) | CUMULATIVE<br>VOLUME<br>(cu.yd.) |
| 1980 | High | 573,600                       | 573,600                          | 40,400                        | 40,400                           | 614,000                       | 614,000                          |
|      | Low  | 527,700                       | 527,700                          | 37,200                        | 37,200                           | 609,900                       | 609,900                          |
| 1981 | High | 602,700                       | 1,176,300                        | 42,500                        | 82,900                           | 645,200                       | 1,259,200                        |
|      | Low  | 543,300                       | 1,071,000                        | 38,300                        | 75,500                           | 581,600                       | 1,191,500                        |
| 1982 | High | 630,600                       | 1,806,900                        | 44,500                        | 127,400                          | 675,100                       | 1,934,300                        |
|      | Low  | 555,900                       | 1,626,900                        | 39,200                        | 114,700                          | 595,100                       | 1,786,600                        |
| 1983 | High | 657,000                       | 2,463,900                        | 46,400                        | 173,800                          | 703,400                       | 2,637,700                        |
|      | Low  | 572,400                       | 2,199,300                        | 40,400                        | 155,100                          | 612,800                       | 2,399,400                        |

Capacity includes allowance for daily cover at ratio of one part cover to five parts waste.

\* Capacity for 'dry' wastes calculated at density of 2,000 lb/cu.yd.

TABLE 7  
ESTIMATED LANDFILL CAPACITY (BY WEIGHT) REQUIRED 1980-1983  
REGION OF HALTON

|      |      | 'WET' WASTES     |                               | 'DRY' WASTES     |                               | TOTAL WASTE      |                               |
|------|------|------------------|-------------------------------|------------------|-------------------------------|------------------|-------------------------------|
|      |      | <u>TONS/YEAR</u> | <u>CUMULATIVE<br/>TONNAGE</u> | <u>TONS/YEAR</u> | <u>CUMULATIVE<br/>TONNAGE</u> | <u>TONS/YEAR</u> | <u>CUMULATIVE<br/>TONNAGE</u> |
| 1980 | High | 191,200          | 191,200                       | 33,700           | 33,700                        | 224,900          | 224,900                       |
|      | Low  | 175,900          | 175,900                       | 31,000           | 31,000                        | 207,000          | 207,000                       |
| 1981 | High | 200,900          | 392,000                       | 35,400           | 69,200                        | 236,300          | 461,200                       |
|      | Low  | 181,100          | 357,000                       | 31,900           | 63,000                        | 213,000          | 420,000                       |
| 1982 | High | 210,200          | 602,200                       | 37,100           | 106,300                       | 247,300          | 708,500                       |
|      | Low  | 185,300          | 542,300                       | 32,700           | 95,700                        | 218,000          | 638,000                       |
| 1983 | High | 219,000          | 821,200                       | 38,700           | 144,900                       | 237,600          | 966,100                       |
|      | Low  | 190,800          | 733,100                       | 33,700           | 129,400                       | 224,500          | 862,500                       |

### 3. DEVELOPMENT OF AN INTERIM LANDFILL PLAN

#### 3.1 Regional Solid Waste Concerns

At a meeting of the Area Municipal Public Works Directors, a 15 point program was suggested respecting the handling and disposal of solid wastes. These points were sent to the Ministry of the Environment for consideration. Appendix A, item 1 contains the relevant correspondence.

The Council Resolution of 5 July requested consideration of temporary burning of certain waste materials, namely brush. The response of the Ministry of 24 July 1978 indicates existing standards respecting open burning at landfills would not be relaxed. No burning will therefore be permitted.

#### 3.2 Current Operations at Landfills

Current operations at existing Burlington and Oakville landfills employ a Cat 816 landfill compactor for refuse placement and a Cat 977 track loader, for placement of cover and site maintenance. The compactor is used on a ramped face approximately eight feet high, working up or down slope dependent upon site conditions and ease of operation.

From brief observations on site, it would appear that refuse is being placed in thin layers and well compacted. However, in view of the apparent effective operating procedures, the expected actual density of refuse in place may be more in the order of 1,000 pounds per cubic yard. Such densities, using track type tractors, are commonly reported in the

literature and with landfill compactors, refuse densities are typically around 1,200 pounds per cubic yard. These significantly exceed the 800 pounds per cubic yard currently used to calculate waste capacity. Landfill capacity therefore may be underestimated by 20 per cent or, alternatively, site operations may be further improved to achieve the higher densities. Since accurate operating results are not available, it is recommended that a program of test cells or other means for measurement of densities be undertaken. Also, the ratio of cover material to waste should be monitored. Generally this ratio will decrease as the size of the landfill operation increases. Dependent upon the findings of such a monitoring program, specific operating changes could then be implemented if appropriate.

### 3.3 Selected Sites

The existing landfill sites were reviewed with the intent of increasing capacity within existing boundaries by modification of contours and/or increasing capacity by addition of land. In discussion and review with Regional staff, it was accepted that neither of these methods of increasing capacity were available at the Georgetown landfill. However operational changes as discussed in Section 3.2 may provide additional capacity. The study therefore concentrated on provision of new capacity at the existing Burlington and Oakville landfill sites.

The Milton Brick yard was identified in the Interim Report, Resource Recovery Study as a possible 'dry' waste site (Site H), though of limited capacity. This site also is considered in this report.

The NATCO quarry in Burlington has previously been suggested as a possible landfill site. NATCO had retained hydro-geologic consulting services to investigate the quarry and approach the Region concerning its use. Regional Council requested this site also be included in development of the Interim Waste Disposal Feasibility Study.

In summary, four specific locations were selected for review as shown on Figure 1. These are the existing Burlington and Oakville landfill sites, the Milton Brick yard (Site H) and the NATCO quarry in Burlington.

### 3.4 Scope of Work

The intent of this report is to investigate the feasibility of providing landfill capacity at the specified locations.

The work program consisted of sufficient analysis of the locations to establish the technical feasibility of providing additional landfill capacity. Preliminary hydrogeologic investigations were carried out to assess any constraints to site development. No drilling or detailed field work was carried out at any of the locations. Preliminary design considerations were developed for possible landfill areas in order to estimate capacities available and identify major capital works that would be required to develop the site.

Capital costs were developed for expected major works and represent 'magnitudes' of costs for site comparative purposes. These costs were developed without the benefit of design work being carried out.

The Official Plan and zoning status was checked for each site to identify their status as acceptable and/or compatible land uses. Traffic and transportation aspects were identified for each site to evaluate access requirements and possible impacts and/or conflicts with the surrounding area. A preliminary environmental analysis was carried out to determine any conflicts that may occur with the natural environment. Probable property values on a per acre basis were supplied by the Regional Property Agent.

The Region of Halton sent out notices to all occupants of property within 1,000 feet of the selected areas. These notices advised the occupants of the work to be undertaken, the work schedule and attached a copy of the Council Resolution of 5 July which authorized preparation of the Interim Waste Disposal Feasibility Study (see Appendix A, item 2).

These analysis result in a discussion of the potential for development for landfilling for each site and identify, in a preliminary fashion, the expected development constraints, either technical or social that may limit development of the site from a cost point of view or from an approvals timetable.

For each site, where appropriate, a timetable and costs for preparation for approval of the site have been given.

The following Sections deal with the investigations of each site as follows:

Section 4 - Burlington Landfill Site

Section 5 - Milton Brick Yard

Section 6 - NATCO Quarry

Section 7 - Oakville Landfill Site

The preliminary hydrogeologic review was carried out by Gartner Lee Associates and for the NATCO Quarry only with Geo-Environ Ltd. The reports provided by these firms are attached in Appendix B.

M. M. Dillon Limited utilized appropriate staff expertise to prepare brief reports on preliminary transportation and traffic analysis and preliminary environmental analysis of the selected sites. These reports are contained in Appendix B.

### 3.5 Plan Development

Resultant from the independent discussions of each site in Sections 4 through 7, an analysis was undertaken of the combinations available to the Region to develop new capacity (Section 8).

The effects of each viable combination on the waste management system were considered. The Plans that will permit maximum landfill development with the least constraints are recommended.

#### 4. BURLINGTON LANDFILL SITE

##### 4.1 Expansion Within Existing Boundaries, Phase 1

The Ministry of the Environment has previously expressed concern about this site and is on written record as "would not encourage major adjustment..." to the final approved contours for the Burlington landfill. Site inspection indicates that there may be potential for an additional lift over the northern part of the site, between the Bell Canada telephone lines that cross the site and the northern property boundary. The proposed maximum height of this addition would have an elevation not exceeding 565 feet with an average lift thickness of approximately eight feet. The area is shown as Phase 1 on Figure 2. The proposed expansion would permit additional capacity for 73,900 tons refuse over an area of approximately 20 acres. \*

##### 4.2 Possible Property Expansion

###### 4.2.1 Potential Area for Landfill

Preliminary hydrogeological investigations have indicated that the area including the existing site is suitable for landfilling, as long as provision is made for protection of surface water. The area is predominately erodable shale with shallow soil depth to rock. It is expected that leachate would be contained at surface but must be collected to avoid surface water contamination. Detailed on-site hydrogeologic studies will be required to confirm the assumptions and provide design criteria for leachate collection.

The landfill site and surrounding lands are shown on Figure 2. The landfill is bordered on the west by a wide, deep ravine. The face of the landfill along the ravine is partially eroded and leachate springs have occurred. It is not considered feasible to fill this ravine. Also access to lands west of the ravine is virtually cut off by the ravine.

The lands immediately east of the landfill toward Bayview Park were previously recommended for the fill expansion and were the subject of a design report prepared by M. M. Dillon Limited in 1976. Shale reserves have now been proven on the property and shale recovery, under lease from the National Sewer Pipe Company, will get underway in 1980 with an expected life of 20 years. This property is not available in the short-term for landfill.

The area south of the site is restricted in size by a hydro right-of-way. The lands abutting the north service road are prime industrial lands. These lands are not recommended for landfill.

The area considered most acceptable for short-term extension is the land immediately north of the site. The expansion should be limited to the westerly portion of this area immediately north of the existing site. This expansion could be serviced by an extension of the leachate collection system proposed for the existing site, and would also likely meet the intent established by the Parkway Belt West Plan, July 1978 (this land is subject to provisions of the Plan). It is recommended that this north extension be developed.

#### 4.2.2 Site Development

##### A. Zoning and Official Plan

The subject property is within the "General Complementary Use Area" of the Parkway Belt West Plan, July 1978. The intended use as a landfill appears to be within the intent of the plan providing proper environmental and design studies are undertaken.

##### B. Transportation and Traffic

Access to the expanded site would be either by the present route from the north service road off Highway 403 or alternatively from King Road (see Exhibit 2) by construction of a new site road. The King Road access however may conflict with the intent of the Parkway Belt West Plan. Truck movements generated by use of the site as a Regional facility would not create any operational difficulties.

##### C. Environmental Analysis

The site consists of uncultivated land divided by a major hedgerow running north-south. Agriculture is not a major use of this area. The western part of the site is well screened by dense stands of trees along the ravine to the west and north, and by the hedgerows to the east. The eastern part of the site is clearly visible from King Road.

The woodlots to the west and north of the site would require further investigation to evaluate the impact of landfill operations on existing biology.

#### 4.2.3 Site Design

##### A. Leachate Control

Examination of the two existing landfills, the completed Bayview Park and the present operating site, has revealed leachate outbreaks from the sides of the fill. The presence of leachate springs indicates that the underlying Queenston shale is relatively impermeable to groundwater flow and that development of a new site should incorporate measures for protection of surface water.

A peripheral leachate system is currently being designed for the operating site. This would be extended to provide leachate collection for further development. Detailed information respecting groundwater contamination in this hydrogeological condition will require investigation at the time of site design.

However from preliminary investigations it is likely that a simple toe drain would be adequate for the western part of the potential landfill area, immediately north of the existing operation. If operations moved east, the topography is such that a more sophisticated system would probably be required with complete redesign of the leachate system.

Landfill expansion should therefore be limited to the area immediately north of the existing landfill so that:

- i) the possible complexities of a more sophisticated leachate system are avoided
- ii) existing hedgerow and trees can be used to provide effective screening from King Road.

#### B. Surface Drainage

The Queenston shale bedrock is very susceptible to erosion when exposed to the atmosphere. Design measures would be required to accommodate surface water runoff from the site, so that serious erosion does not occur.

#### C. Capacity

Preliminary hydrogeological investigation suggests that an excavation depth of 10 feet should not be exceeded to ensure that a suitable thickness of overburden remains between refuse and the shale bedrock.

This expansion shown as Phase 2 on Figure 2 would provide capacity for approximately 511,100 tons refuse. The total capacity of the Phase 1 and Phase 2 area is 585,000 tons.

### 4.3 CONCLUSIONS

The area north of the existing site is recommended for site expansion. If the northeast section is used, the topography is such that extensive redesign of leachate would be required. The recommended north extension, including adjustment to the existing site, would provide a capacity of approximately 585,000 tons.

The property is within Parkway Belt West Plan and is designated General Complementry Use Area. The development of a landfill appears compatible with the intent of the plan without requiring a rezoning. The property is currently in private ownership.

Detailed environmental and design studies would be required to ensure that development guidelines in the Parkway Belt West Plan are fulfilled.

#### 4.4 Program for Approval

##### Hydrogeologic Impact Study

- includes all on-site drilling, monitoring, assessment of existing site and preparation of impact report. 5 months \$30,000

##### Environmental Analysis

- review impacts of existing site and provide impact assessment for extended area. 2½ months \$ 5,000

##### Design and Operations Report\*

- prepare design report for site extension and manual for site operations. 4 months \$13,000  
\$48,000

Applications for submission to government bodies would likely be complete between March and June 1979. Board hearings would be likely for early summer with an approval in Fall 1979. It is expected, therefore that the site could be operational by late 1979.

\* Additional mapping may be required. Mapping costs do not usually exceed \$2,000.

#### 4.5 Capital Costs

Capital costs for expected major site works and site development have been estimated. The land would likely require purchase by the Region. An allowance is made for land purchase based on the expected acreage required and a per acre value supplied by the Regional property agent.

|                                                       |                  |                  |
|-------------------------------------------------------|------------------|------------------|
| Land                                                  | <u>\$137,000</u> | <u>\$137,000</u> |
| Site Works                                            |                  |                  |
| Leachate system                                       | \$ 96,000        |                  |
| Drainage                                              | 33,000           |                  |
| Site preparation                                      | <u>97,000</u>    | <u>\$226,000</u> |
| Engineering and<br>Contingencies (15%)                | <u>\$ 34,000</u> | <u>\$ 34,000</u> |
| Preparation of Application<br>and Engineering Studies | <u>\$ 48,000</u> | <u>\$ 48,000</u> |
| TOTAL                                                 |                  | \$445,000        |
| Capacity with Phase 1 and Phase 2<br>expansion        |                  | 585,000 tons     |
| Development Cost per ton                              |                  | \$0.76/ton       |

## 5. MILTON BRICK YARD SITE

### 5.1 Background

The Terms of Reference for the Halton Resource Recovery Study included consideration of selected quarries as possible landfill sites. The Milton Brick yard was identified as a possible site. In the Interim Report, Resource Recovery Study, January 1976, the Milton Brick yard (Site H) was recommended as a possible 'dry' waste site for Regional use.

In September 1976 a Stage 1 hydrogeological report was prepared and presented to Regional Council. The report suggested development of the site as a 'dry' waste site but cautioned on the limited capacity available and the interpretation of 'dry' wastes within the context of landfilling regulations of the Ministry of the Environment.

### 5.2 Potential for Development

The preliminary hydrogeology indicates that groundwater contamination is not likely to be a problem. However surface drainage through the pit area would require diversion. Development of a landfill to contain leachable materials would include a toe drain leachate collection system.

Access to the site is restricted. Major truck traffic would use Steeles Avenue from Milton or Tremaine Road from the south. As a possible dry waste site, traffic volumes associated with dumping operations would be limited.

The designation of the lands through the Official Plan process are unclear, as is the zoning. It is probable that, should the lands be developed for landfilling, a zoning by-law for the use would be required.

The property owners were contacted to determine their future plans and to investigate the feasibility of the Region acquiring the lands for a landfill. The owners advised that a new extraction plan was being prepared and would be available in two to six months. This plan would preclude use of the site for landfilling in the short-term. Correspondence confirming property availability is attached in Appendix A.

### 5.3 Conclusions

Because of the unavailability of property, and the active use to which it will be put, no further consideration is given to the Milton Brick yard.

## 6. NATCO QUARRY

### 6.1 Potential Area for Landfilling

The quarry is located to the south of the CN tracks and Highway 403 and is bounded on the west, south and east by stream valleys as shown in Figure 4. A second unexploited reserve of shale is located between the small creek to the south of the excavated area and Grindstone Creek further south. Preliminary investigations indicate that hydrogeologically both areas would be suitable for landfilling providing that the stream which flows through the site can be relocated. The possible development of the site for landfilling is discussed in the following.

### 6.2 Site Development

#### A. Zoning and Official Plan

The subject property is designated "Special Complementary Use" in the Parkway Belt West Plan. No specific reference is made to landfills, but public utilities are permitted. It is likely the site could be developed as a landfill within existing use designations as it would meet the intent of the plan. However detailed studies would be required to ensure location and design was not detrimental to the Grindstone Creek watershed or the Botanical Gardens.

*Questioned ?*  
*impossible \**

## B. Transportation and Traffic

*unacceptable* \* Three existing access routes to this site have been investigated. These are shown on Figure 5. All would require access from Plains Road. The general transportation and traffic aspects of these accesses have been given preliminary review. Should this site be developed, detailed traffic \* analysis of alternative routes would be required.

The first route provides access from Plains Road to Howard Drive to Sumach Drive. This route has a reversing curve prior to passing through Hidden Valley Park. The Park is a developed recreation facility run by the Burlington Parks and Recreation Department. It is developed on both sides of the road around Grindstone Creek. Sumach Drive has residential development and a food warehousing terminal. The Burlington Parks and Recreation Department have expressed concern over \* the use of this access for a landfill. See correspondence in Appendix A.

*NB* \* The road network would require upgrading if it were to be used continuously by major truck traffic. There are conflicts between existing development and this proposed access that make it unattractive.

*NB* \* The second possible access is from Plains Road via Unsworth Avenue to the NATCO property. Unsworth Avenue is a major street in a prime residential area. Major truck traffic would be incompatible with existing road design and the general character of the area.

NB → The third route would provide access from Plains Road to a connection with Snake Road. This route is indirect for Burlington traffic and is restricted from access by Oakville traffic. A new access road to the quarry would be required from Snake Road. Severe topographic limitations suggest this is not an economic alternative.

Potential access from Highway 403 was investigated. Such access would require off ramps from 403 westbound to Lemonville Road or York Road. There are topographic limitations in so doing particularly to Lemonville Road. New ramps would also be required for trucks to enter Highway 403 eastbound.

NB → To cross the CN rail tracks, either the existing crossing at Lemonville Road would be used or a new crossing would be constructed. In either case, significant capital works in road and bridge improvements and construction would be required.

### C. Environmental Analysis

Both potential landfill areas are well screened by dense stands of trees on all but the north side of the quarry, which abuts Highway 403.

To the south, the site abuts the Royal Botanical Gardens. Further studies would be required to evaluate the impact of landfill operations on the existing environment and to meet the objectives established in the Parkway Belt West Plan. Site design and after use may be complementary to the Botanical Gardens development.

### 6.3 Site Design

#### A. Stream Diversion

In order to reduce the potential for surface water pollution, the stream which passes through the site would require diversion to the south into Grindstone Creek. From preliminary considerations, calculations indicate a peak flow of 320 cubic feet per second for a storm with a return frequency of five years must be handled.

Excavation of a sizeable channel and a drop structure would be required to accommodate these flows. Further studies would be required to establish storm frequency and design criteria.

In addition, it may be necessary to construct a dam across the existing stream bed at the west end of the quarry to prevent egress of leachate to surface drainage.

#### B. Leachate Control

A leachate collection system would be required on the site. It is suggested that the existing stream bed be utilized for this purpose with the addition of a collection sump at the western extremity as shown in Figure 4. The stream bed would be lined with gravel and the quarry floor regraded to facilitate drainage of leachate into the drain. Similarly should the area south of the present stream be excavated and landfilled, the excavation floor would require sloping to the collection area. System design would be subject to development of design criteria, resultant from detailed on-site hydrogeologic studies.

Ultimate disposal of leachate would require the installation of a pumping station and force main to the nearest sanitary sewer situated at the intersection of Unsworth Avenue and Gardenview Drive.

#### C. Capacity

The capacity of the site has been estimated to incorporate two possible development plans. The first involves filling of the existing quarry with final contours not exceeding an elevation of 340 feet. The second plan incorporates the area south of the present stream, with final contours domed to a maximum elevation of 360 feet. Preliminary hydro-geological investigations indicate that sufficient cover material could be excavated from the southerly area for landfill operations over both areas.

Development of the site would provide capacity for 282,600 tons of refuse using the original quarry only or for 718,300 tons of refuse using the combined area of 21 acres.

#### 6.4 Conclusions

The NATCO Quarry is available for landfilling. Development of the quarry area only would provide capacity of approximately 282,600 tons and of the adjacent area to the south, 718,300 tons.

The site is hydrogeologically acceptable, but would require a major creek diversion including excavation of a new channel and construction of an elaborate drop structure and stilling basin. A leachate collection system would be required with installation of a pumping station and force main for ultimate disposal of leachate to sanitary sewer.

The transportation routes and access to the site are poor, and would require further investigation in assessing the suitability of the site. The potential high development costs for both on site and off site works would make the development unfavourable.

#### 6.5 Program for Approval

There is not expected to be any property difficulties with NATCO as the owners indicate a willingness to participate with the Region in development of the site as a landfill. On site studies could start immediately.

Because of development problems with the site, extensive studies would be required. The key areas include:

- detailed traffic and transportation analysis to assess access alternatives on existing routes or identify an alternative new access.
- detailed environmental analysis to assess potential impacts of the landfill on the surrounding natural environment, particularly the Royal Botanical Gardens and to assess impacts on the Grindstone Creek watershed.

- detailed hydrologic studies to determine design storm for creek diversion and develop alternatives for diversion and drop structure into Grindstone Creek. Drainage works would be subject to the approval of the Halton Region Conservation Authority.
- normal hydrogeologic studies, and development of a site design and operations report.

|                        |          |          |
|------------------------|----------|----------|
| Environmental Analysis | 4 months | \$12,000 |
|------------------------|----------|----------|

#### Hydrogeologic Impact

- |                                             |          |          |
|---------------------------------------------|----------|----------|
| - on site drilling, monitoring and analysis | 5 months | \$25,000 |
|---------------------------------------------|----------|----------|

#### Design and Operations

- |                                                                                                         |          |                 |
|---------------------------------------------------------------------------------------------------------|----------|-----------------|
| - includes major transportation and traffic analysis, hydrologic studies and preparation of site design | 7 months | \$35,000        |
|                                                                                                         |          | <u>\$72,000</u> |

*assuming no  
Citizen  
involvement*

Studies would occur concurrently. It is expected all reports would be complete by late Spring 1979 with public hearings likely for mid-summer to early fall 1979. The site could likely be in operation in early 1980.

#### 6.6 Capital Costs

The owners of the property have indicated their willingness to participate with the Region in development of this site as a landfill. It is not expected the Region would acquire the property. The Region may pay an annual lease or pay a per ton fee to the owners for the landfill. No allowance has been made for property acquisition or for any fees that may be paid.

|                            |                  |                           |
|----------------------------|------------------|---------------------------|
| Site Works                 |                  |                           |
| Leachate system part 1     | \$ 26,000        |                           |
| part 2                     | 101,000          |                           |
| Scales and scale house     | 75,000           |                           |
| Stream diversion           | 600,000          |                           |
| Site preparation           | <u>88,000</u>    |                           |
|                            |                  | <u>\$ 890,000</u>         |
| Engineering and            |                  |                           |
| Contingencies (15%)        | <u>\$134,000</u> |                           |
|                            |                  | <u>\$ 134,000</u>         |
| Preparation of Application |                  |                           |
| and Engineering Studies    | <u>\$ 72,000</u> |                           |
|                            |                  | <u>\$ 72,000</u>          |
| TOTAL                      |                  | <u><u>\$1,096,000</u></u> |

Capacity with original pit only (A) 282,600 tons.

Capacity with original pit plus extended area (B) 718,300 tons.

Development cost per ton (A) \$3.87/ton

Development cost per ton (B) \$1.52/ton

No allowance has been made for off site road work as insufficient information is available on the extent of the work upon which to base cost estimates.

## 7. OAKVILLE LANDFILL SITE

### 7.1 Expansion Within Existing Boundaries

Previous negotiations with the Ministry of the Environment respecting site design have indicated that major adjustments of final contours are not feasible within existing boundaries. The physical setting and general character of the site also would limit upward expansion. The topography of the lands surrounding the Oakville landfill site is generally flat. The site is poorly screened from the neighbouring properties and the adjacent Fourth Line.

Little or no potential for expansion of the site within the existing boundaries exists.

### 7.2 Possible Property Expansion

#### 7.2.1 Potential Areas for Landfill

Hydrogeologically the main constraint for a major expansion of the Oakville landfill is the limited thickness of the overburden over bedrock. Previous site investigations indicate the soil thickness does not exceed 10 feet overlying the Queenston shale bedrock. Excavation would be limited by the shallow soils. A deficiency of cover material for extended operations is probable.

The site is bounded on the west and south by perennial streams that drain into Oakville Creek. Previous problems have occurred with breakout of leachate from the site. The Region

has recently installed a toe drain system around part of the west and south side of the site to alleviate these leaching problems. Any expansion of the site must consider the effect on existing leaching problems and the design of the existing collection system.

The area north of the site has minor woodlots and borders onto estates mainly horse farms on Burnhamthorpe Road. The existing landfill operation has access from the Fourth Line, is visible from Fourth Line but does not abut it. It is recommended that a minor expansion be developed immediately east of the existing operation with the south boundary more or less coincident with an extension of the existing boundary. This area is shown on Figure 6.

#### 7.2.2 Site Development

##### A. Zoning and Official Plan

The subject property is designated agriculture both in the Oakville Official Plan and by Oakville Zoning By-Law. No mention of landfill is made as a permitted use. The property is outside the Parkway Belt jurisdiction. It is expected that rezoning would be required to permit a landfill.

##### B. Transportation and Traffic

Current access to the site is from the Fourth Line via Highway 5. Preliminary analysis of traffic on Highway 5 and the Fourth Line was undertaken to review the effects of using the site as the Regional facility. No major problems are expected resultant from increased traffic.

### C. Environmental Analysis

The site is uncultivated agricultural land traversed by a tributary of the Oakville Creek. The site is clearly visible from the Fourth Line and would require construction of berms to obscure an extended operation.

#### 7.2.3 Site Design

##### A. Leachate Control

Expansion at the site would require the extension of the existing leachate collection system to protect surface water from discharge of leachate at the toe of the fill. Detailed hydrogeologic studies will be required to identify impacts from the existing site, predict impacts from the extended site and provide design criteria for the extension of the leachate system. At present leachate is pumped back into the fill via an infiltration well. The impact of this arrangement with the extended landfill and long-term implications will require detailed study during preparation of the engineering design and operations report.

##### B. Stream Diversion

It would be possible to increase the capacity of the extension by diversion of the creek flowing through the potential landfill area. The location of the proposed diversion is shown in Figure 6.

### C. Capacity

In consultation with the Region, two capacity estimates were developed for the proposed extensions, one on the basis of unchanged surface drainage and the other incorporating diversion of the stream traversing the property to the south boundary. Preliminary estimates of capacity were made for the expanded site both with the creek diversion and without the diversion. No allowance has been made for excavation due to the shallow soil depths. Final capacities would be developed in the site design report.

The estimated capacity with the addition is:

- |                            |               |
|----------------------------|---------------|
| - without stream diversion | 142,200 tons  |
| - with stream diversion    | 221,800 tons. |

### 7.3 Conclusions

The area immediately east of the existing landfill south of the access road from Fourth Line should be developed as a minor expansion. A minor creek diversion is required to gain maximum capacity. The existing leachate collection system can be expanded to service this area.

The lands are privately owned and will likely require a rezoning to permit a landfill.

#### 7.4 Program for Approval

It is expected that only the hydrogeologic impact study and the design and operations report will be required for this extension. Preparation and processing of an Official Plan Amendment and Zoning Application are also possible.

##### Hydrogeologic Impact

|                                             |          |          |
|---------------------------------------------|----------|----------|
| - on-site drilling, monitoring and analysis | 5 months | \$30,000 |
|---------------------------------------------|----------|----------|

##### Design and Operations Report

|                                      |          |                 |
|--------------------------------------|----------|-----------------|
| - site design and plan of operations | 3 months | <u>\$10,000</u> |
|                                      |          | \$40,000        |

The engineering documentation for an application for approval can be finalized within 6 months. However the Official Plan and Zoning Amendments may require a longer period to resolve with the additional possibility of a Ontario Municipal Board hearing. The approval process may therefore require an additional year after completion of engineering and planning documentation. Environmental Hearings could likely be scheduled for the spring of 1979 with approval by the summer. Assuming resolution of a rezoning the expansion could be operational by late 1979.

#### 7.5 Capital Costs

Land purchase would be required. An allowance is made for land costs based on a per acre value supplied by the Regional property agent.

|                                                       |                  |                         |
|-------------------------------------------------------|------------------|-------------------------|
| Land                                                  | <u>\$202,000</u> | <u>\$202,000</u>        |
| Site Works                                            |                  |                         |
| Leachate system                                       | \$ 50,000        |                         |
| Stream diversion                                      | 20,000           |                         |
| Site preparation                                      | <u>23,000</u>    |                         |
|                                                       |                  | <u>\$ 93,000</u>        |
| Engineering and<br>Contingencies (15%)                | <u>\$ 14,000</u> | <u>\$ 14,000</u>        |
| Preparation of Application<br>and Engineering Studies | <u>\$ 40,000</u> | <u>\$ 40,000</u>        |
| TOTAL                                                 |                  | <u><u>\$349,000</u></u> |

Capacity of site with stream diversion (A) 221,800 tons.

Capacity of site without stream diversion (B) 142,800 tons.

Development costs per ton (A) \$1.57/ton.

Development costs per ton \*(B) \$1.57/ton.

\* Total development costs without stream diversion are  
\$224,000.

## 8. PLAN ALTERNATIVES

### 8.1 Waste Transportation

With the closure of existing landfill sites, wastes will be transported to other operating sites. The first area to be affected will be Georgetown - Acton where the existing site is expected to close in March 1979. Wastes must then be transported to the Oakville landfill site.

The Georgetown landfill is receiving wastes from Halton Hills and the Town of Milton. The distance for Milton trucks to travel to the Georgetown site versus the Oakville landfill is more or less the same. It is recommended that the wastes from Milton immediately be redirected to the Oakville landfill. The capacity still available at Georgetown can therefore be reserved for the Halton Hills area thereby minimizing short-term haul costs.

Transportation of wastes from the Georgetown - Action area to landfills south of Highway 401 will likely be required both in the short and long-term. It is recommended that consideration be given to provision of transfer facilities to serve this area. This is consistent with the recommendations of the Region of Halton Resource Recovery Feasibility Study, July 1976.

## 8.2 Landfill Alternatives

Of the five sites evaluated for provision of new landfill capacity, two were eliminated from inclusion in plan alternatives. The Milton Brick yard is not available for filling. The existing Georgetown landfill has no potential for additional capacity either by increasing the fill height or by addition of adjacent lands. The existing conditions of the Georgetown landfill are shown in Figure 7.

Seven alternative schemes have been evaluated. These are shown in Table 8 along with system capacity, probable closure dates and development costs.

Listed below is an outline and discussion of each system.

### OPTION 1

Develop Oakville landfill without the portion requiring stream diversion. Develop Phase 1 and 2 expansions at the Burlington landfill site.

Wastes from Milton, Halton Hills and Oakville will be landfilled at Oakville until March 1981. Wastes from Burlington will continue to go to the expanded Burlington site. From April 1981, all wastes will be disposed of at the Burlington site. System capacity is available to May 1983.

TABLE 8  
OPTIONS FOR WASTE DISPOSAL (1)

| OPTION                                                           | SITE<br>CAPACITY<br>(TONS) | SYSTEM<br>CAPACITY<br>(TONS) | SITE<br>CLOSURE                        | DEVELOPMENT<br>COSTS (\$)               | DEVELOPMENT<br>COSTS PER<br>TON |
|------------------------------------------------------------------|----------------------------|------------------------------|----------------------------------------|-----------------------------------------|---------------------------------|
| 1 Oakville<br>W/O Stream Diversion<br>+<br>Burlington<br>1 and 2 | 142,200<br>585,000         | 727,200                      | March 1981<br><u>May 1983</u>          | \$224,000<br>\$445,000<br>\$699,000     | \$0.92                          |
| 2 Oakville<br>W Stream Diversion<br>+<br>Burlington<br>1 and 2   | 221,800<br>585,000         | 806,800                      | December 1981<br><u>September 1983</u> | \$349,000<br>\$445,000<br>\$794,000     | \$0.99                          |
| 3 Burlington<br>1 and 2                                          | 585,000                    | 585,000                      | <u>September 1982</u>                  | \$445,000                               | \$0.76                          |
| 4 Oakville<br>W/O Stream Diversion<br>+<br>(2) NATCO             | 142,200<br>718,300         | 860,500                      | March 1981<br><u>December 1983</u>     | \$224,000<br>\$1,096,000<br>\$1,320,000 | \$1.53 <sup>(3)</sup>           |
| 5 Oakville<br>W Stream Diversion<br>+<br>(2) NATCO               | 221,800<br>718,300         | 940,100                      | December 1981<br><u>Early 1984</u>     | \$349,000<br>\$1,096,000<br>\$1,445,000 | \$1.54 <sup>(3)</sup>           |
| 6 (2) NATCO                                                      | 718,300                    | 718,300                      | <u>April 1983</u>                      | \$1,096,000                             | \$1.52 <sup>(3)</sup>           |
| 7 Burlington<br>+<br>Oakville<br>W Stream Diversion              | 73,900<br>221,800          | 295,700                      | September 1980<br><u>May 1981</u>      | \$349,000                               | \$1.18                          |

- NOTES: 1 Table is based on low estimates of wastes only.  
2 Only full development of the NATCO quarry was considered.  
3 Does not include cost estimates for possible major off-site road works.

N  
N  
N

The system would permit development of landfill capacity at existing sites only without encroachment on new areas. Existing routes already used by refuse trucks would continue to be used. The system would guarantee capacity available to the Region beyond the expected approval of new Regional facilities.

The extension to Burlington would likely only require approval under the Environmental Protection Act. Lands at Oakville are also subject to a possible Official Plan and zoning amendment that may require additional public hearings.

#### OPTION 2

Develop Oakville landfill with the stream diversion. Develop Phase 1 and 2 expansions at the Burlington landfill.

Wastes from Milton, Halton Hills and Oakville will be land-filled at Oakville until December 1981. Wastes from Burlington will continue to go to the expanded Burlington site. From January 1982, all wastes will go to the Burlington site. System capacity is available to September 1983.

The system has the same general advantages and disadvantages of Option 1. Though slightly more expensive on a per ton basis, it will provide the least transportation costs for Halton Hills and Milton.

### OPTION 3

Develop the Phase 1 and 2 expansion at the Burlington landfill site.

All wastes in the Region will be hauled to Burlington from January 1980 onward. The system can provide landfill capacity to September 1982.

While the least cost solution respecting site development, it provides the most costly haul system for Milton, Halton Hills and Oakville. This expansion could likely receive approval in a minimum time compared with the other alternative sites described.

### OPTIONS 4 and 5

Develop the Oakville extension and the NATCO quarry.

Halton Hills, Milton and Oakville wastes would go to Oakville until capacity is reached. Burlington wastes go to NATCO.

Beyond 1981, all wastes go NATCO. These systems have capacity to early 1984.

These systems offer the best potential for capacity but are the most costly to develop. Added to these development costs would be off-site costs for road works not yet determined. These high costs make this system uncompetitive with other alternatives.

Also, it is expected that the approval procedures may be elongated because of public objection to the development, particularly NATCO. The access to the NATCO property severely restricts its potential as a landfill for all wastes. However, the site may be considered for disposal of 'dry' wastes and debris.

#### OPTION 6

Develop the NATCO property to receive all wastes within the Region.

All wastes would go to NATCO. The existing Oakville and Burlington sites would be closed. The system has capacity to April 1983.

The system has generally the same disadvantages as are stated for Options 4 and 5. It has the additional disadvantage of further increasing the haulage costs for Oakville, Milton and Halton Hills.

#### OPTION 7

Develop Phase 1 expansion to the Burlington landfill within existing boundaries and develop the Oakville expansion with the diversion of the stream.

Burlington wastes would go to the Burlington site until closure in September 1980 and thereafter would go to the Oakville site. Wastes from Halton Hills, Milton and Oakville would go to the Oakville site.

This system does not permit sufficient capacity to meet Regional needs. It therefore merits no further attention.

### 8.3 Recommended Option

Option 2, the expansion of the existing Burlington and Oakville landfills is recommended. This option permits flexibility in short-term operation, minimizes haul costs and will permit development of additional landfill capacity within the time frame required.

While slightly more costly than Option 1, it is recommended that the engineering studies and design be carried out to include the creek diversion. As the construction of the diversion will take place during the later stages of site development, the works may not be required pending the approval of new Regional facilities.

It is recommended that the Regionl immediately embark on the preparation of applications for approval as required for each site expansion.

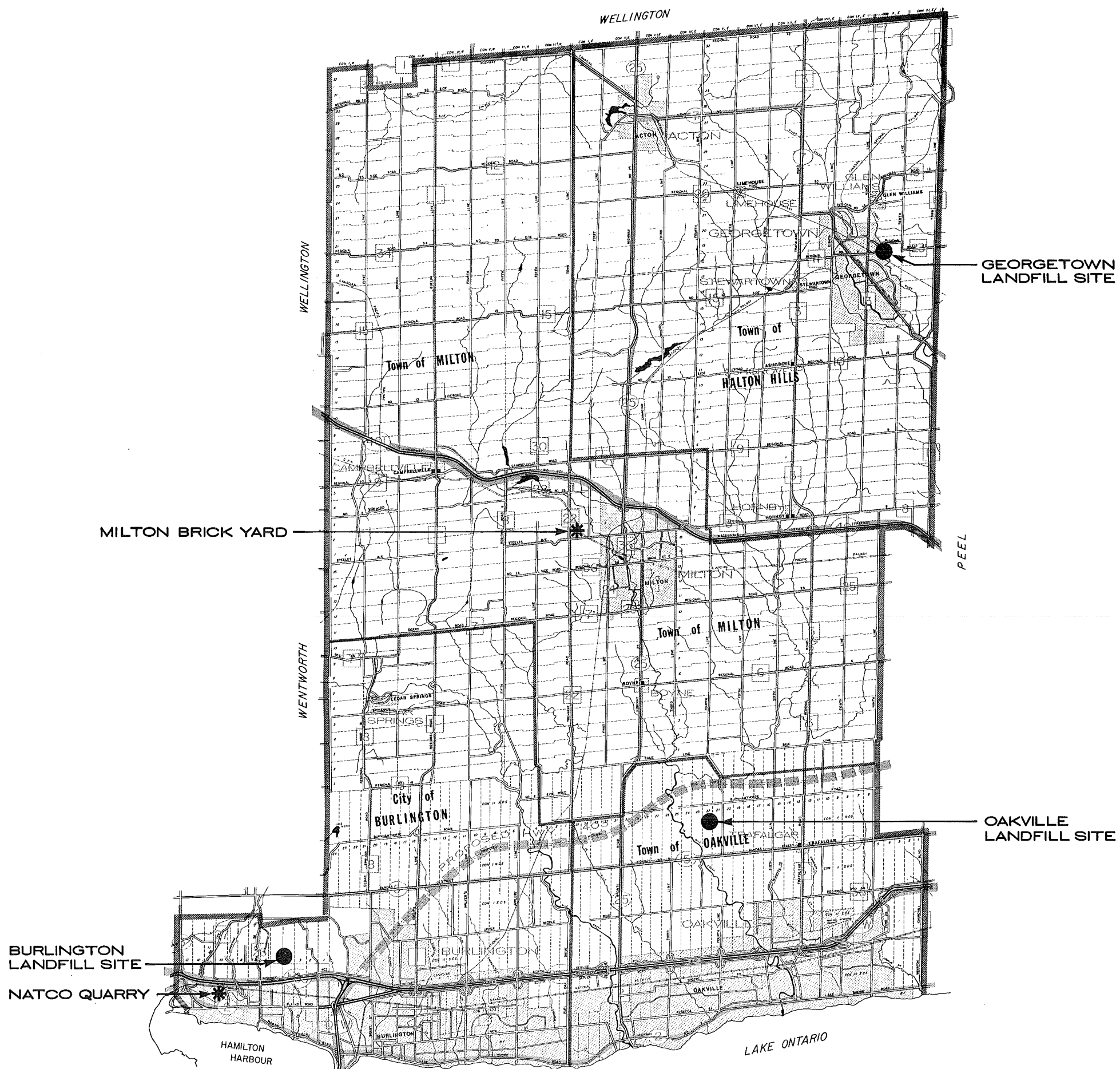


*W. F. Wells*

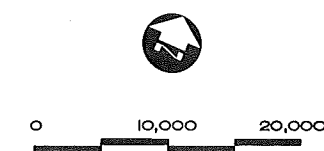
W. F. Wells, P. Eng.  
Project Manager

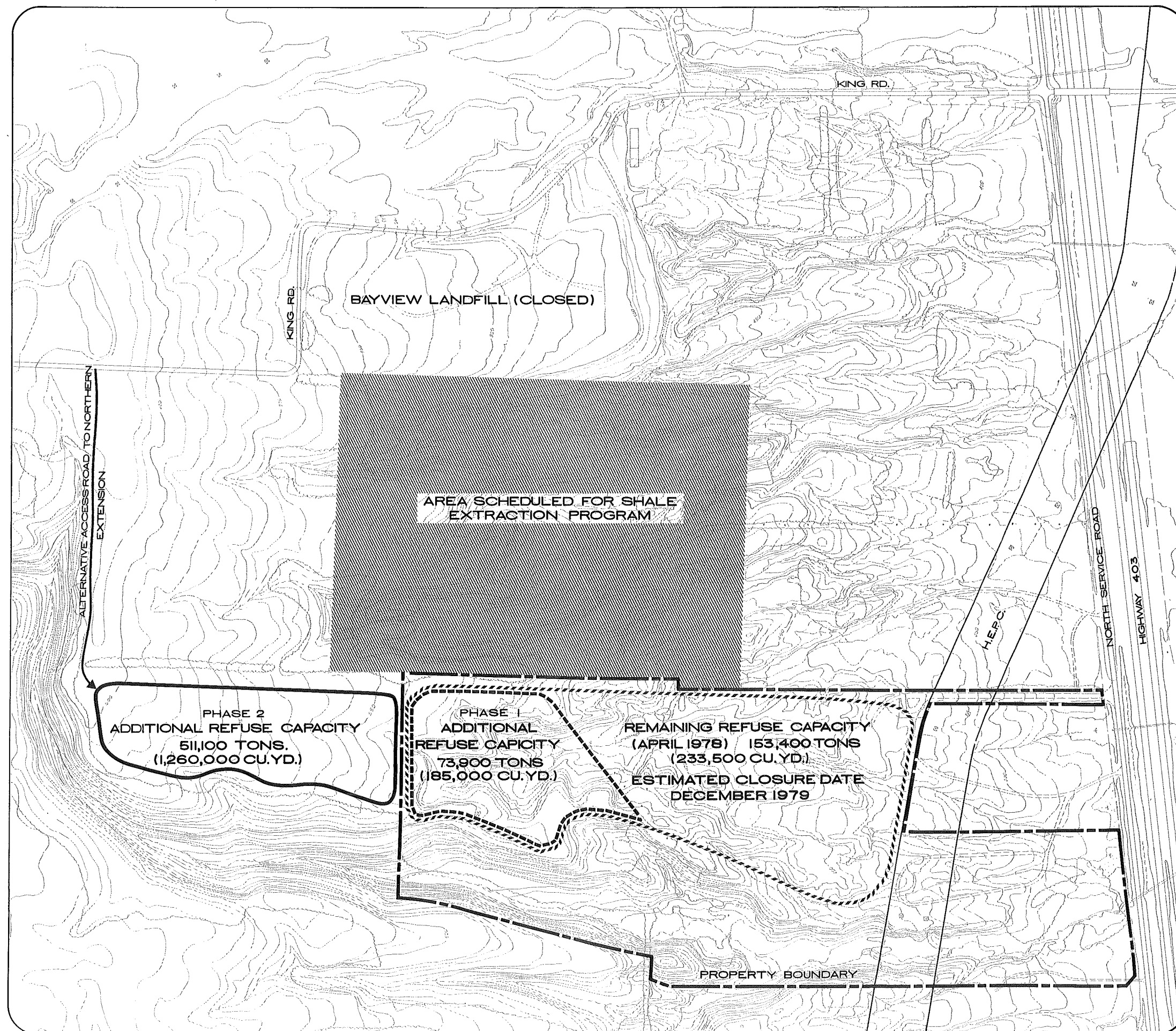
*M. P. Scott*

M. P. Scott, M. Sc.  
Project Co-ordinator



- EXISTING LANDFILL SITES
- \* POTENTIAL LANDFILL SITES
- BUILT-UP AREAS
- 25— KING'S HIGHWAY
- 3— REGIONAL ROAD

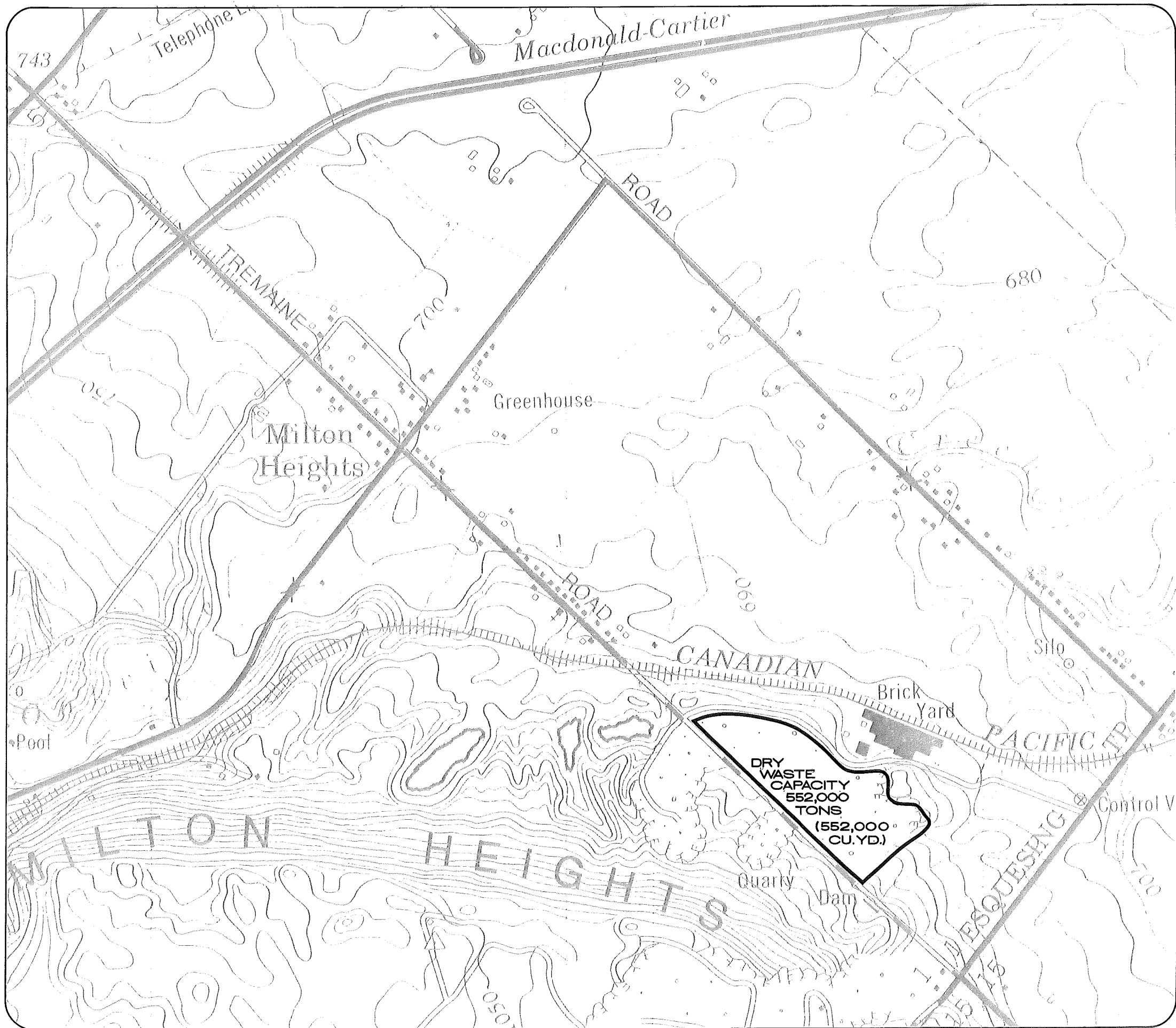




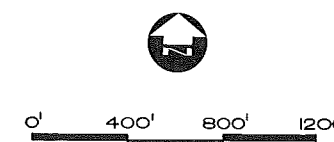
- — — — — PROPERTY BOUNDARY
- //// //// EXISTING LANDFILL BOUNDARY
- PROPOSED LANDFILL EXPANSION WITHIN EXISTING BOUNDARIES
- POTENTIAL AREA FOR LANDFILL EXTENSION
- ▨▨▨▨▨▨ AREA SCHEDULED FOR SHALE EXTRACTION PROGRAM

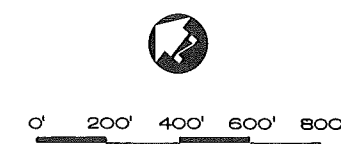
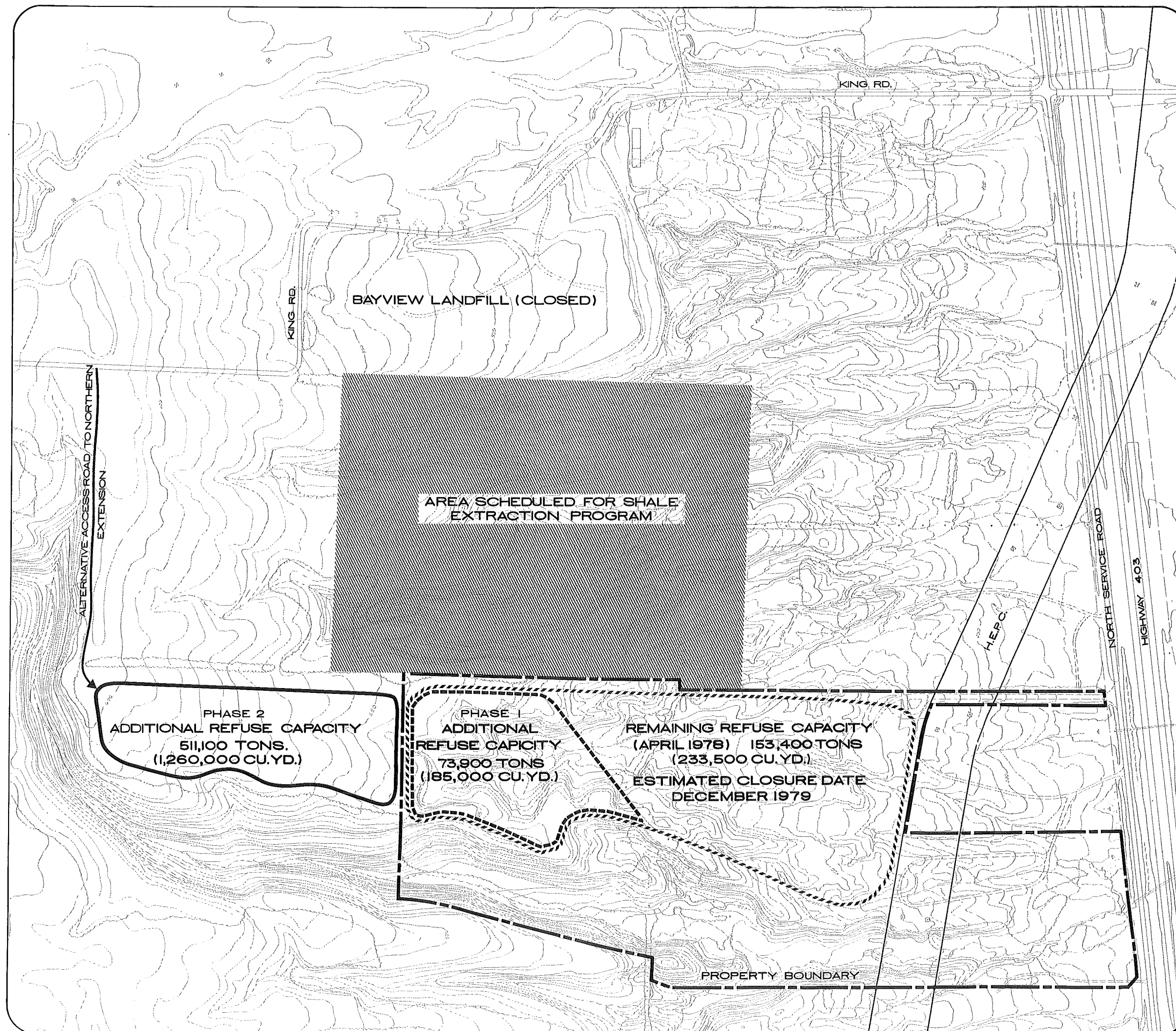


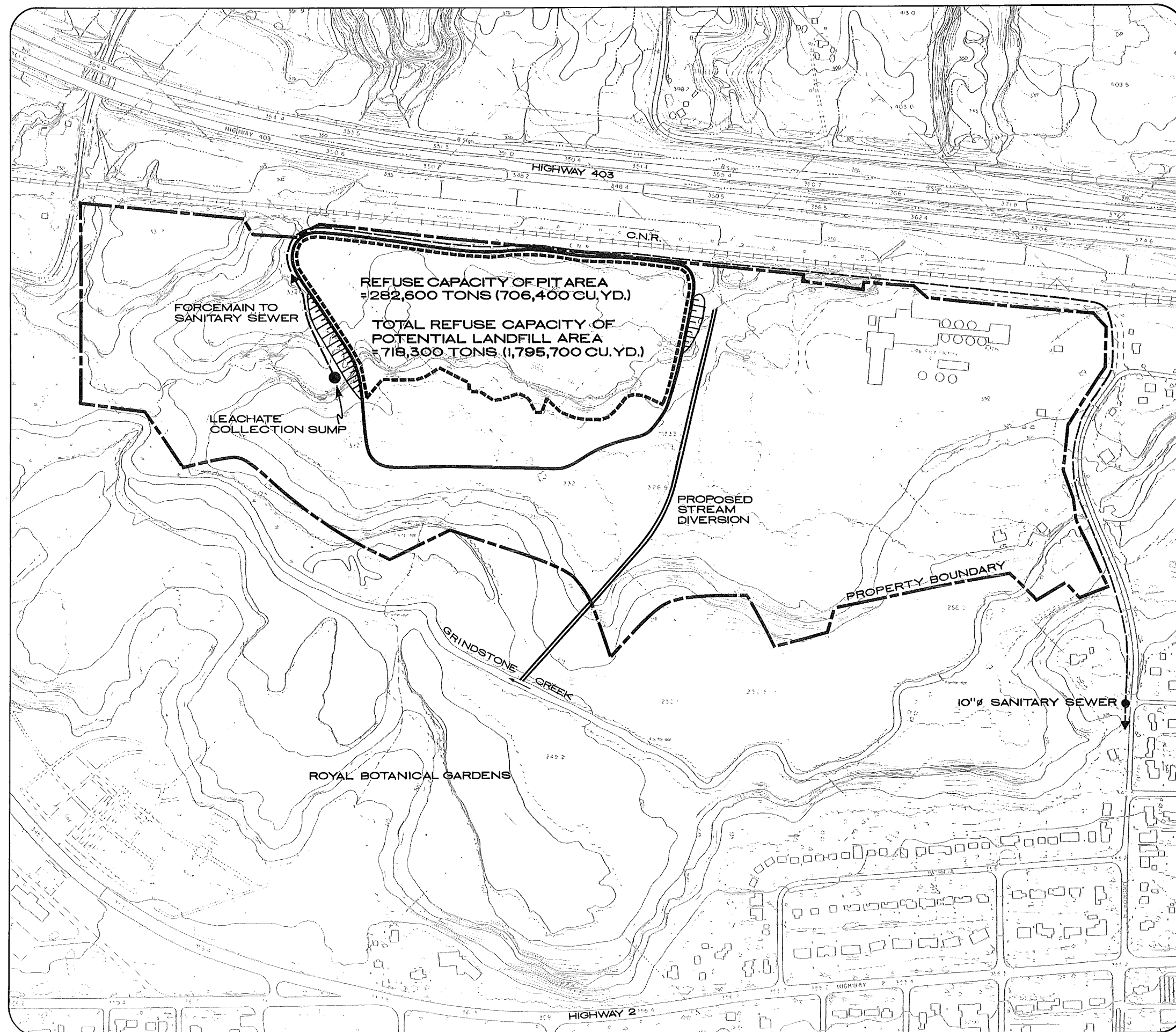
0' 200' 400' 600' 800'



— POTENTIAL LANDFILL AREA





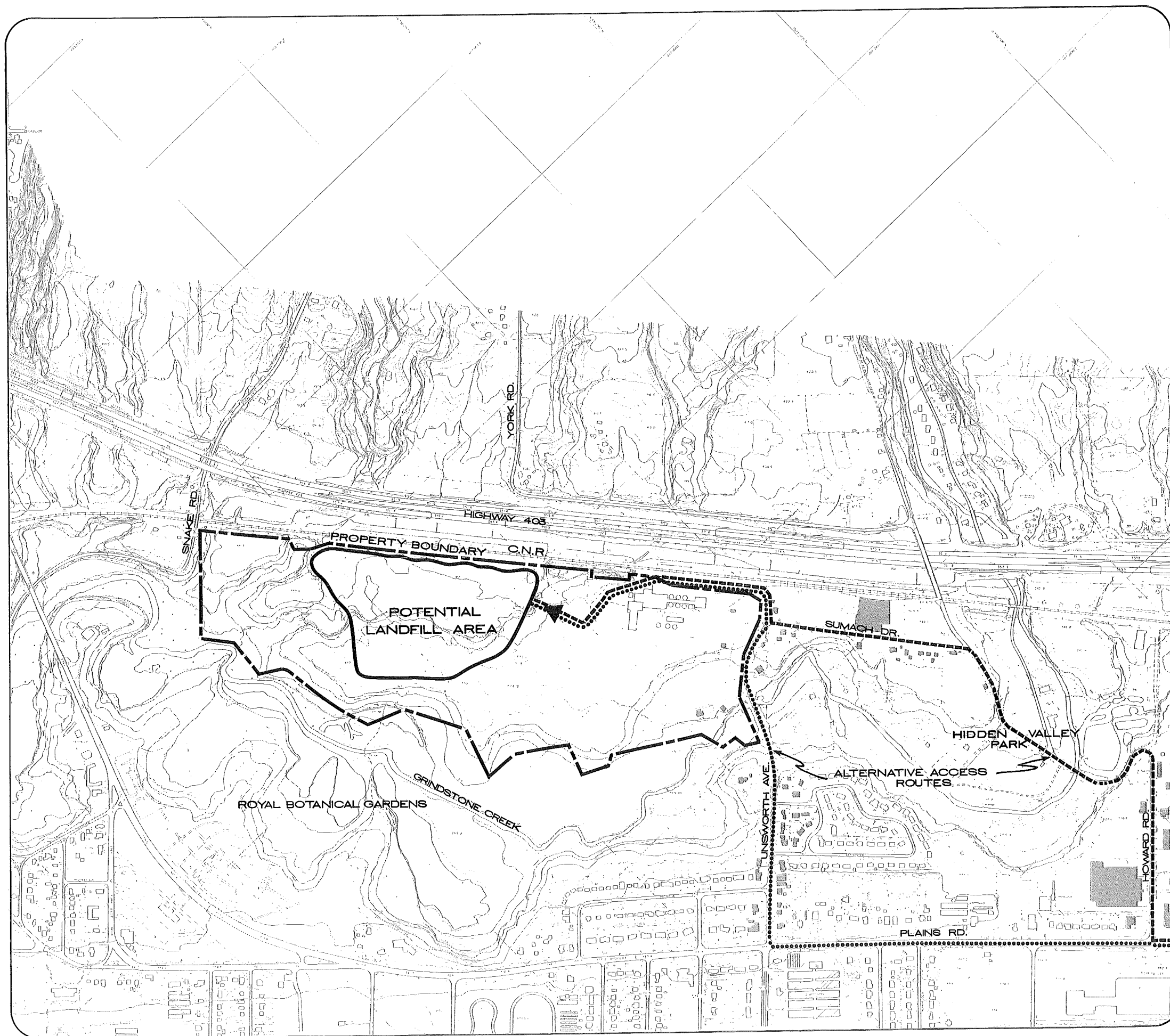


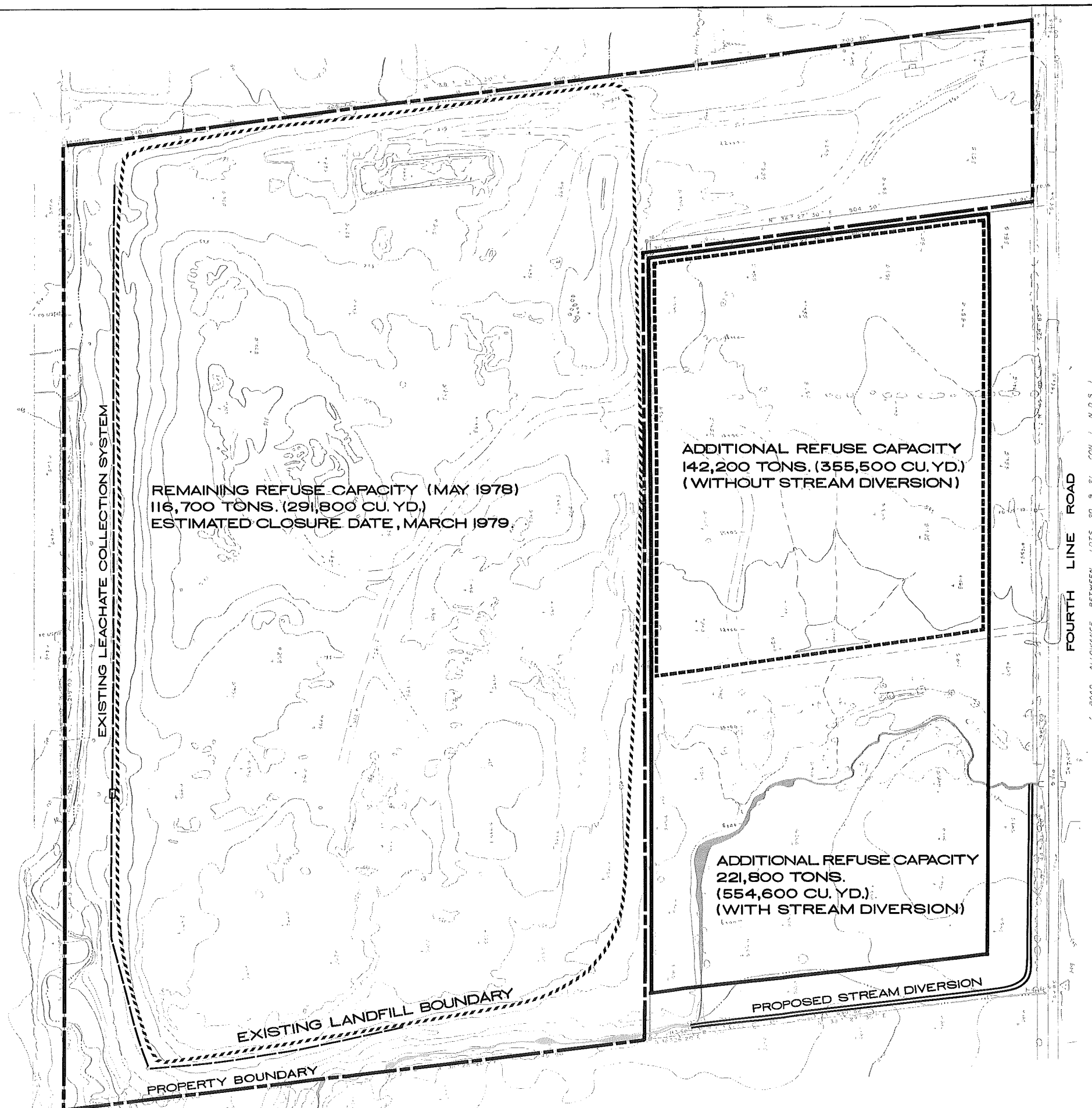
- — — — — PROPERTY BOUNDARY
- POTENTIAL LANDFILL AREA
- - - - - PIT AREA
- - - - - SCHEMATIC LOCATION OF FORCEMAIN
- ▬▬▬▬ BERM
- ===== PROPOSED STREAM DIVERSION
- ..... SURFACE DRAINAGE





- PROPERTY BOUNDARY
- POTENTIAL LANDFILL AREA
- HOWARD RD. ACCESS ROUTE
- ..... UNSWORTH AVE. ACCESS ROUTE
- PROPERTIES ON ACCESS ROUTES

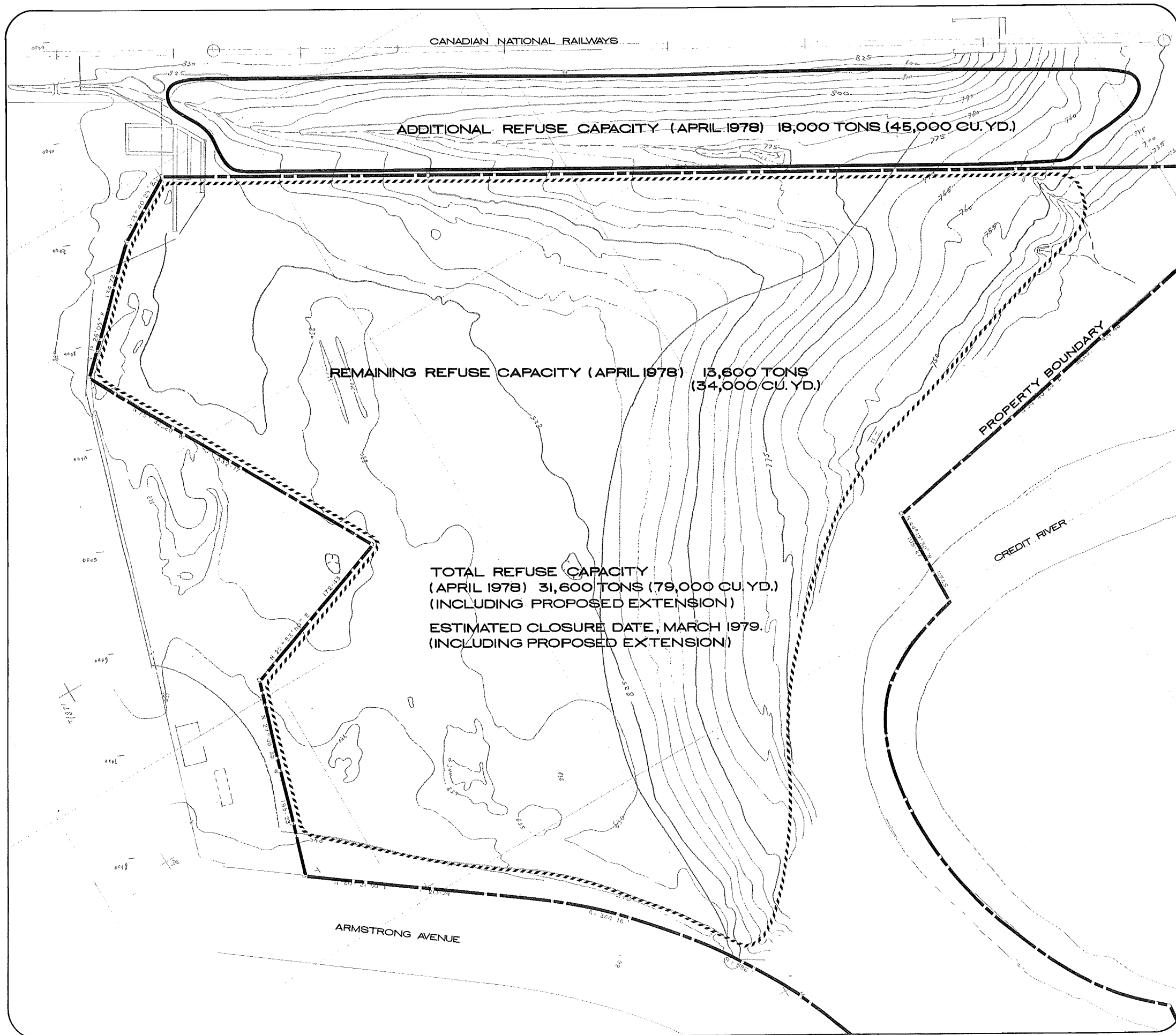




- PROPERTY BOUNDARY
- EXISTING LANDFILL BOUNDARY
- POTENTIAL AREA FOR LANDFILL EXTENSION (WITH STREAM DIVERSION)
- POTENTIAL AREA FOR LANDFILL EXTENSION (WITHOUT STREAM DIVERSION)
- PROPOSED STREAM DIVERSION
- EXISTING LEACHATE COLLECTION SYSTEM



0' 100' 200' 300'



- — — — — PROPERTY BOUNDARY
- - - - - EXISTING LANDFILL BOUNDARY
- PROPOSED LANDFILL EXTENSION



0 50 100 150

## APPENDIX A

### Correspondence

| <u>ITEM</u> | <u>DESCRIPTION</u>                                                                                                                                                             |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1           | <ul style="list-style-type: none"><li>- 15 point solid waste program of Area Public Works Directors</li><li>- response from Ministry of the Environment 24 July 1978</li></ul> |
| 2           | <ul style="list-style-type: none"><li>- Public notice re Interim Waste Disposal Feasibility Study with Council Resolution of 5 July 1978</li></ul>                             |
| 3           | <ul style="list-style-type: none"><li>- Correspondence between M. M. Dillon Limited and the Milton Group Limited re Milton Brick Yard</li></ul>                                |
| 4           | <ul style="list-style-type: none"><li>- Staff report to Committee of the Whole re NATCO Quarry 19 August 1977</li></ul>                                                        |
| 5           | <ul style="list-style-type: none"><li>- Correspondence between M. M. Dillon Limited and the Burlington Recreation Department re NATCO Quarry</li></ul>                         |
| 6           | <ul style="list-style-type: none"><li>- Correspondence between M. M. Dillon Limited and the Royal Botanical Gardens re NATCO Quarry.</li></ul>                                 |

### 9. Sanitary Landfill Sites

Much discussion took place on this item. It was agreed that the problems with landfill sites are not Regional only and that each area municipality will be severely affected by the lack of an adequate landfill site. Each Director from the area municipalities stated his willingness to help in any way possible for the problem to be resolved. It was agreed that a meeting should be held among Messrs. Morrow, Raftis and Reid and the 5 Directors of Public Works to review the entire problem and to discuss contingency plans. Different ideas thrown out for consideration to solve or help the situation were as follows:

- a) Meeting between Regional Chairman and Premier Davis
- b) M.O.E. to permit major adjustments to contours at Burlington and Oakville sites, i.e. formation of ski hills, if necessary.
- c) Province of Ontario to assume responsibility for developing landfill site.
- d) Use of existing quarries for receiving inert materials - example Milton Brick Quarries.
- e) Placing of inert materials in Lake Ontario for shore protection or fill behind breakwalls.
- f) Major relaxation in M.O.E. rules regarding burning of leaves, brush, wood, etc. and relaxation in M.O.E. pollution laws.
- g) Mulching of all leaves for parks.
- × h) Cessation of special pick-ups in area municipalities
  - i) Reduction of number of containers allowed per dwelling unit in area municipalities.
  - j) Separation at source - Recycling programs.
  - × k) Garbage collection reduced to once every two weeks
  - l) No stumps, logs, or brush <sup>excepted</sup> except at landfill sites.
  - m) Brush accepted only if put through chippers
  - n) Sending garbage to other regions
  - o) Review existing regulations about garburators

Region to contact Building Departments of area municipalities suggesting that they require a statement from demolition contractor at time of granting demolition permit as to where demolition materials will be disposed of.

### 10. Regional Projects on Town Roads

R. Austin complained that Halton Hills are not satisfied with the inspection the Region is providing on Regional projects on town streets in Halton Hills. R. Moore will investigate.



Ministry of the      Central Region  
Environment

July 24, 1978.

Suite 700  
150 Ferrand Drive  
Don Mills, Ontario  
M3C 3C3  
(416) 424-3000

Mr. R. W. J. Moore, P. Eng.,  
Director of Public Works,  
Regional Municipality of Halton,  
3027 Harvester Road,  
Burlington, Ontario.  
L7N 3G8

Dear Mr. Moore:

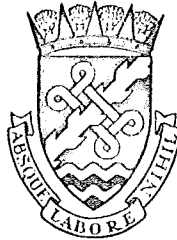
Re: Region of Halton  
Waste Disposal

We refer to your letter of June 29, 1978 containing minutes of a recent meeting held with the Area Municipal Directors of Public Works. We will address the items as they were outlined in the minutes.

- (a) no comment
- (b) The Burlington and Oakville Landfill sites were not initially designed to provide for extreme contours such as ski hills. Thus, we would not encourage major adjustments to the existing sites. We feel more attention should be given to developing a new Regional site(s). But if Halton seeks to undertake major alterations to the existing sites to accomodate several years of landfilling, a formal application to this Ministry with supporting documentation would be required; the application would very likely require a hearing under The Environmental Protection Act, 1971.
- (c) We have enclosed a copy of an address made by the Minister to the Legislature on June 20, 1978 in which Provincial responsibilities were made clear.
- (d) We refer you to our letter to Mr. D. J. Corbett dated June 26, 1978 in which we indicated that landfilling of inert materials is exempt from the requirements of Regulation 824 of The Environmental Protection Act.
- (e) Placing of inert materials in Lake Ontario for shore protection comes under the jurisdiction of the Halton Region Conservation Authority.



THE  
REGIONAL MUNICIPALITY  
OF  
HALTON



2027 HARVESTER ROAD  
BURLINGTON, ONTARIO L7N 3G8

TELEPHONE MILTON 878-5571  
TORONTO 920-6945  
BURLINGTON 639-5793

REGIONAL CLERK'S

1978 07 31

DEPARTMENT

TO WHOM IT MAY CONCERN

RE: SOLID WASTE (GARBAGE) DISPOSAL

The Regional Municipality of Halton is responsible for providing sanitary landfill facilities for the disposal of solid wastes generated within Halton.

The Region is presently working on a long term waste disposal program which includes proposals for a Regional sanitary landfill site in Milton at Tremaine and Britannia Roads, and also includes proposals for a resource recovery plant. However, our present sanitary landfill sites are reaching capacity and indeed may be filled before a long-term waste disposal plan can be realized. With this in mind, Regional Council instructed that a study be undertaken of lands that may be used for waste disposal in the interim between the time existing sites have become filled and the time a central site has been developed. (Reference is made to the attached copy of Council's resolution passed on July 5)

The feasibility study will be confined to areas around the existing landfill site in Burlington, the Clay Quarry lands owned by NATCO Building Products in Burlington just south of Highway 403, the existing landfill site in Oakville, the Milton Brick Co. lands just east of Tremaine Road in Milton and the existing Georgetown landfill site in Halton Hills. The study areas are shown on the attached map.

Any one, or a combination, of the areas may be selected for development of waste disposal facilities which can be used until new long-term disposal facilities become available. It does not follow that all the study areas will be used and the selection of areas will depend on technical, environmental, planning and economic considerations. Adoption of an interim plan will, of course, be decided by Regional Council, and the report covering the findings of the feasibility study will be presented to Council on September 6, 1978. Should you wish to appear as a delegation on that date, please notify the Regional Clerk.

/Contnd...

-2-

If you require any further information or have any comments, please phone the Halton Region Public Works Department, 639-5793 or 878-5571, and ask for Mr. Corbett at extension 207.

G.D. Brown  
Clerk  
Regional Municipality of Halton  
3027 Harvester Road  
BURLINGTON, Ontario  
L7N 3G8

DJC:sw

REGIONAL MUNICIPALITY OF HALTON

RESOLUTION PASSED BY COUNCIL JULY 5, 1978

"WHEREAS the Region is presently working on a long term waste disposal plan

AND WHEREAS in the meantime the life of the existing landfill sites is fast coming to an end and may have to close before the long term waste disposal program is operational

AND WHEREAS in an attempt to ease the impending waste disposal crisis it is desirable that an interim waste disposal plan be adopted to provide waste disposal ability for the Region when the existing landfill sites would have to close and prior to the commencement of the long term waste disposal plan

AND WHEREAS before adopting an interim waste disposal plan a feasibility study is required:

NOW THEREFORE BE IT RESOLVED THAT:

- (1) This Council hereby instructs Regional staff with the assistance of the Regional consultant, M.M. Dillon Limited, to do a feasibility study on the implementation of an interim waste disposal plan to provide waste disposal ability to the Region during the period when the existing landfill sites have to close and prior to the commencement of a long term Regional waste disposal plan. Such study shall include examination of:
  - (a) the analysis and updating of refuse projections for the next few years.
  - (b) maximizing the use of existing Burlington, Oakville and Georgetown sites.
  - (c) expanding the existing sites (within existing limits and expand the existing sites) onto small portions of apparently available adjacent lands
  - (d) establishment of interim landfill operation on NATCO lands on Highway 403 in Burlington
  - (e) using the "Milton Quarry" (Site "H") as a Dry Waste Site only
  - (f) temporary burning of certain wastes
- (2) The feasibility study shall include comments for each part of the proposed plan as follows:
  - i) technical possibility
  - ii) technical requirements
  - iii) Provincial requirements, M.O.E. or otherwise

- iv) environmental problems (noise, air, water, pollution, etc.
  - v) planning problems (O.P., Zoning, Traffic, landuse compatibility, access, road improvements, etc.)
  - vi) land acquisition problems
  - vii) detailed preliminary hydrogeologic suitability and design criteria, where applicable
  - viii) detailed studies required
  - ix) legal approvals required (procedures and estimated timetable
  - x) estimated costs for studies, approvals, legals, design, engineering, construction
  - xi) estimated time frame to achieve each part of the Plan
  - xii) estimated effect on filling interim waste disposal need each part of the Plan will have.
- (3) In reporting back to Regional Council, Regional staff are permitted to make additional suggestions respecting a proposed Interim Waste Disposal Plan and if they do so they shall report on their feasibility in the same manner as set out above.
- (4) Residents within 1000 ft. of existing sites be notified of Council's action."

# M. M. DILLON LIMITED

consulting engineers and planners

BOX 219, STN. K, TORONTO, CANADA M4P 2G5 • (416) 482-5656 • CABLE: DILLEN • TELEX 064-7540

OUR FILE: 8320-01

YOUR FILE:

14 August 1978

Milton Brick Company  
55 Glencameron Road  
Unit 202  
Thornhill, Ontario  
L3T 1P2

Attention: Mr. W.A. Breukelman  
President

Regional Municipality of Halton -  
Interim Waste Disposal Study

Dear Sirs:

Further to our telephone conversation of 10 August 1978 regarding the Milton Brick Yard, we would like to clarify our interest in the property and request confirmation of your extraction plan.

M. M. Dillon Limited has been retained by the Regional Municipality of Halton to carry out an 'Interim Waste Disposal Study' to examine several options for the disposal of the Region's wastes for a period of two to five years. Included in this study is the Milton Brick Yard.

It is now our understanding that you are currently developing plans for a twenty five year extraction programme at the site, and that this would not be compatible with waste infilling in the two to five year time scale.

...continued

ITEM 3



Milton Brick Company

- 2 -

14 August 1978

We would appreciate confirmation of your plans to continue extraction of shale and any further relevant information available at this time.

. Thank you for your assistance.

Yours truly,

M. M. DILLON LIMITED



MPS:lly

M.P. Scott, M.Sc.  
for W.F. Wells, P.Eng.  
Project Manager



# Milton Group Limited

55 Glencameron Road, #202  
Thornhill, Ontario, L3T 1P2

RECEIVED

AUG 16 1978

14 August 1978

M. M. DILLON LTD.  
TORONTO, OFFICE

M. M. Dillon Ltd.,  
PO Box 219,  
Station K,  
Toronto, Ontario  
M4P 2G5

Attn: Mr. M. P. Scott

Dear Sir:

Re: Regional Municipality of Halton  
File PR-271, Solid Waste Disposal

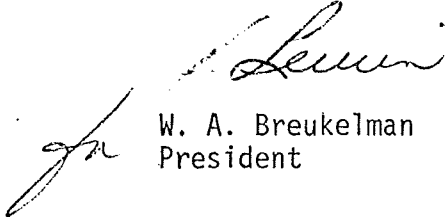
| FILE |  |  |
|------|--|--|
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |

We have received the above referenced letter and are responding to you in relationship to it, as well as to our telephone conversation.

Milton Group Limited intends to develop its present clay resorces to the fullest extent possible and therefore the pits will not be available for use as a disposal centre in the foreseeable future.

Yours truly

WAB/d1

  
W. A. Breukelman  
President

THE REGIONAL MUNICIPALITY OF HALTON

Report to Committee of the Whole Date 77-08-19  
From R.W.J. Moore, P.Eng. Report No. PW.122/77  
Re: SANITARY LANDFILL, FILE PR-271

---

Mr. Chairman and Members:

RECOMMENDATION

THAT no action be taken at this time regarding a proposal to develop a sanitary landfill on lands of NATCO Building Products Limited.

REPORT

On May 19, 1977, Mr. Brian Whitehead, of Geo Environ Limited, made a presentation to the Region's Solid Waste Resource Recovery Technical Co-ordinating Committee (TECO) on behalf of NATCO Building Products Limited regarding development of a landfill in the worked out part of the NATCO clay quarry. Regional Council subsequently requested a staff report on the feasibility of the quarry as an interim site.

The NATCO lands are immediately south of HWY. 403 just east of Snake Road at the end of Unsworth Avenue in Burlington. They are adjacent to lands of the Royal Botanical Gardens about 1.5 miles west of the present Burlington Landfill Site. The location is shown on the attached map.

NATCO has a total of 37 acres, 17 acres worked out and 20 acres in reserve. The lands are being mined to obtain clay for the manufacture of bricks.

The worked out part appears to have a life expectancy of approximately four years for Burlington waste alone. As a Regional site, it could last perhaps 1-1/2 years.

If removal of the clay reserves on the other 20 acres could be timed to accommodate a landfill operation, the total 37 acres could function as a Regional disposal site for four years. It is not known if, or when, NATCO intends to remove material from the 20 acre reserve.

Truck access to the clay pits is not good. Both accesses, Unsworth Avenue, and Howard Road/Sumach Drive, run through residential areas. The residents, without doubt, would be opposed to increased truck traffic. There are geometrically deficient

/cont'd.....

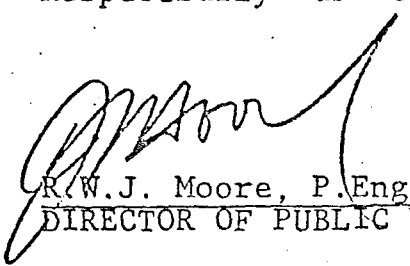
sections on Unsworth where improvements would be needed. The Unsworth/Plains Road intersection would have to be rebuilt to accommodate truck turns.

The pit itself is located in an area where environmental and social impact would be minimal. Prime agricultural lands are not involved. Filling the pit with waste would restore and rehabilitate an area that is of little, or no, use for anything in its present condition. A leachate collection system would be required. Leachate could conceivably be recirculated on site for a few years and then put into the sanitary sewer system.

The feasibility of the clay pits as an interim proposition depends on how long it will take to obtain a Certificate of Approval to operate a landfill at location "F". The usual procedures for applying to the Minister for approval to operate a landfill on the NATCO lands would have to be followed. Procedures for obtaining the certificate for "F" are further advanced, by comparison, and it could therefore take just as long to obtain a certificate for the NATCO site as it will for "F".

All things considered, it is our recommendation that any further action with respect to the NATCO proposition should be held in abeyance until we can determine more closely the time that will be required to obtain approvals for a new sanitary landfill at location "F".

Respectfully submitted,



R.W.J. Moore, P.Eng.  
DIRECTOR OF PUBLIC WORKS

DJC\*pm



# M. M. DILLON LIMITED

consulting engineers and planners

BOX 219, STN. K, TORONTO, CANADA M4P 2G5 • (416) 482-5656 • CABLE: DILLENG • TELEX 064-7540

8320-01

OUR FILE:

YOUR FILE:

14 August 1978

Burlington Recreation Department  
426 Brant Street  
Burlington, Ontario  
L4R 3Z6

Attention: Mr. A. Dojcak

Regional Municipality of Halton -  
Interim Waste Disposal Study

Dear Sirs:

Further to our telephone conversation of 10 August regarding the Natco Quarry, we would like to clarify our interest in the property and request your comments on the possible development of the site.

M. M. Dillon Limited has been retained by the Regional Municipality of Halton to carry out an "Interim Waste Disposal Study" to examine several available options for disposal of the Region's wastes for a period of two to five years. Included in this study is the evaluation of the Natco Quarry as a potential landfill.

The development of the site as a Regional facility would involve daily traffic movements of up to 300 trucks per day, five days per week. The most direct access routes to the Natco Quarry would be from Plains Road via either Unsworth Avenue or Howard Road and Sumach Drive. We would envisage a number of problems in either approach, among which is the impact on the recreational use of Hidden Valley Park.

We would appreciate your comments on this matter as your earliest convenience.

Yours truly,

M. M. DILLON LIMITED

*M.P. Scott*

M.P. Scott, M.Sc.  
for W.F. Wells, P.Eng.  
Project Manager

50 HOLLY STREET, TORONTO, ONTARIO

MPS:1ly

ITEM 5





RECEIVED  
AUG 23 1978  
M. M. DILLON LTD.  
TORONTO, OFFICE

CITY OF BURLINGTON

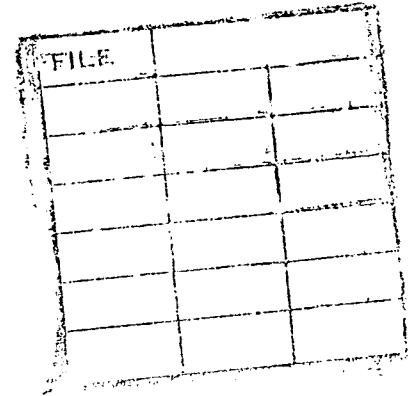
426 Brant Street, Burlington, Ontario. Box 5013

416-639-1873

Postal Code L7R 3Z6

August 21, 1978

Mr. M. P. Scott,  
M. M. Dillon Limited,  
Box 219, Station K,  
Toronto, Ontario  
M4P 2G5



Dear Mr. Scott:

RE: REGIONAL MUNICIPALITY OF HALTON -  
INTERIM WASTE DISPOSAL STUDY

In reply to your letter of August 14, 1978, we wish to express our serious concern in having daily traffic movements of up to 300 trucks per day, five days per week, hauling the Region's wastes through Hidden Valley Park.

The proposed routes, using either Unsworth Avenue or Howard Road and Sumach Drive, have recreation areas on both sides of the roads, and we are concerned with safety of the park users and particularly the youngsters attempting to cross the roads with this increase in traffic.

We would appreciate being kept informed of any further plans to increase the traffic in this area.

Yours truly,

T. Dojcak,  
Deputy Director  
Department of Recreation Services

TD:jec

cc: L. Branch

# M. M. DILLON LIMITED

consulting engineers and planners

BOX 219, STN. K, TORONTO, CANADA M4P 2G5 • (416) 482-5656 • CABLE: DILLENGL • TELEX 064-7540

OUR FILE: 8320-01

YOUR FILE:

14 August 1978

Royal Botanical Gardens  
Box 399  
Hamilton, Ontario  
L8N 3H8

Attention: Dr. L. Laking  
Director

Regional Municipality of Halton -  
Interim Waste Disposal Study

Dear Sirs:

Further to our telephone conversation of 10 August 1978 regarding the Natco Quarry, we would like to clarify our interest in the property and request your comments on the possible development of the site.

M. M. Dillon Limite has been retained by the Regional Municipality of Halton to carry out an "Interim Waste Disposal Study", to examine several available options for disposal of the Region's wastes for a period of two to five years. Included in the study is the evaluation of the Natco Quarry as a potential landfill site.

Whilst we have not carried out detailed design for the site, our preliminary investigations indicate that landfill operations would not have any detrimental effect on the Botanical Gardens. However, landfill development would require the diversion of the drainage, currently flowing through the southern end of the pit, in a southerly direction to Grindstone Creek. We have enclosed a schematic drawing (potential landfill area in red) to indicate the areas which could be developed for landfill and the proposed stream diversion. We would appreciate your comments to the three specific concerns.

...continued

ITEM 6

50 HOLLY STREET, TORONTO, ONTARIO

TORONTO LONDON OTTAWA WINDSOR SUDBURY CAMBRIDGE THUNDER BAY WINNIPEG YELLOWKNIFE



14 August 1978

- (i) the impact of the site's operation upon the adjacent property of the Royal Botanical Gardens;
- (ii) the acceptability of the proposed stream diversion to the Royal Botanical Gardens;
- (iii) the suitability of the site as an addition to the Royal Botanical Gardens on completion of landfilling.

Thank you for your assistance.

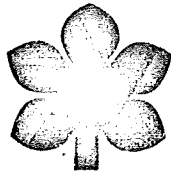
Yours truly,

M. M. DILLON LIMITED



MPS:lly  
Encls:

M.P. Scott, M.Sc.  
for W.F. Wells, P.Eng.  
Project Manager



RECEIVED

AUG 30 1978

M. M. DILLON LTD.  
TORONTO, OFFICE

August 25, 1978

M.N. Dillon, Ltd.,  
Consulting Engineers and Planners,  
Box 219, Station K,  
Toronto, Ontario.  
M4P 2G5

Attention: Mr. M.P. Scott

Gentlemen:

Re: Natco Property - Interim Waste Disposal Study -  
Halton Region.

| FILE |  |  |
|------|--|--|
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |

In response to your request dated August 14th, our technical staff has made an assessment of the Natco Quarry property as a potential interim waste disposal site for the Regional Municipality of Halton. This has been done from the viewpoint of R.B.G. being an immediate neighbour, in that an important segment of R.B.G. natural lands in Hendrie Valley are contiguous with the Natco Quarry or clay pits.

This assessment has been done principally from the viewpoint of its affect on the environment - both immediate as dumping would proceed, and in the long term relative to leachates.

An operation of this type would have a detrimental impact on what is now a quiet natural valley, in terms of noise, odours from refuse and later from escaping gases, during frequent periods when air circulation is in the northwest, north and northeast quadrants. Should burning be permitted, resulting pollutants would further aggravate the situation, making the adjacent valley unpleasant for people using the extensive trail system, and at the same time affecting the biotic elements of the valley, R.B.G. areas in Hendrie Park including R.B.G. Headquarters.

A further point relates to its proximity to a proposed Environmentally Sensitive Area in the valley owned by Natco immediately west of the clay pits and including adjacent R.B.G. lands. This may well be officially designated an E.S.A. shortly by Halton Region, thus further complicating the proposal to use the clay pits as a land fill site.

August 25, 1978

M.N. Dillon, Ltd.,  
Consulting Engineers and Planners,  
Toronto, Ontario.  
Page 2

Referring to specific points raised in your letter, our comments are as follows:

1. Leachate and Surface Runoff

The factor most important to R.B.G. relates to what happens to the leachate from such an operation. Hydrogeologic data at this point appears non-existent for this specific site.

R.B.G. natural lands have recently been subjected to both surface pollution and leachate problems from a land fill site (now permanently closed) near Cootes Paradise Marsh. With this experience fresh in our minds, R.B.G. would require guarantees from the Ontario Ministry of the Environment that the current proposal would not create yet another problem for R.B.G., this time for the lower Grindstone Creek in Hendrie Valley.

The lack of specific hydrogeologic information becomes a basic objection to the proposal at this time.

2. Effects of Altering Stream Course

The proposal to re-route the small stream bordering the Natco Quarry beyond the eastern boundary of the proposed landfill site, could probably be achieved without major objection from R.B.G. The steep drop before reaching the valley would require special permanent erosion protection treatment. However, as this small stream reaches the valley floor, if diverted, it could be allowed to meander through the old channel at the northern fringe of the flats, rather than cutting a new diversion across the flats, directly to Grindstone channel. This valley floods regularly and deeply in springtime. A new channel cut perpendicularly across the flood flow could cause washout problems which currently exist only along one section of the existing Grindstone Creek channel. R.B.G. does not need a new water-course problem in this valley!

Your suggestion to use the old stream bed on the bermed western edge of the site as a collecting area for leachates to be pumped and piped to the nearest sewer at Unsworth and Gardenvue Drive would effectively prevent such from moving directly into the drainage system to Grindstone Creek. However, this is a long and doubtless expensive haul.

3. Suitability of this Proposed Land Fill Site (on completion) as an Extension of the R.B.G. Properties of Hendrie Valley.

Desirability of incorporating such lands into R.B.G., becomes evident from three viewpoints:

- (i) immediate proximity to existing R.B.G. lands
- (ii) proximity to proposed Halton Region Environmentally Sensitive Area (E.S.A.)
- (iii) achieving control over what happens on another part of the extensive boundaries of R.B.G.

M.N. Dillon, Ltd.,  
Consulting Engineers and Planners,  
Toronto, Ontario.  
Page 3

To have control over the area including the E.S.A. up to the CNR right-of-way removes the possibility of a future non-compatible involvement on the northern boundary of Hendrie Valley. R.B.G. experience suggests that housing is one of the worst uses to which the boundary of a natural area can be put. Portions of natural areas immediately adjacent to housing have little chance of remaining a worthwhile natural resource.

It is appropriate to point out that a case can be made on the part of botanical garden for acquisition of abandoned clay pits per se. Such provide opportunities for studies of pioneer vegetation and for an experimental approach to vegetal rehabilitation.

A completed land fill site provides other experimental opportunities relating to establishing vegetation which could be valuable likewise to a research oriented institution. From these points of view, we can respond positively as to suitability for incorporation into R.B.G. lands.

This has been prepared by R.B.G. staff as a response to questions raised. There has been no opportunity for any official input on the part of the R.B.G. Board which will be involved should this particular land fill site be favoured.

Yours very truly,



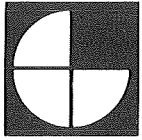
Leslie Laking,  
Director.

LL:nm

## APPENDIX B

### Background Reports

| <u>ITEM</u> | <u>DESCRIPTION</u>                                                                                                                                                                                                                                     |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1           | <ul style="list-style-type: none"><li>- Report prepared by Gartner Lee Associates on preliminary hydrogeologic review of selected sites</li><li>- Report prepared by Geo-Environ Limited on preliminary hydrogeologic review of NATCO Quarry</li></ul> |
| 2           | <ul style="list-style-type: none"><li>- Preliminary Transportation Analysis of selected sites prepared by M. M. Dillon Limited</li></ul>                                                                                                               |
| 3           | <ul style="list-style-type: none"><li>- Preliminary Environmental Analysis of selected sites prepared by M. M. Dillon Limited</li></ul>                                                                                                                |



**Gartner  
Lee  
Associates Limited**

Consulting  
Engineering  
Geologists and  
Hydrogeologists

Toronto - Buttonville Airport ■ Markham, Ontario ■ L3P 3J9 ■ 416-297-4600

21 August 1978

M. M. Dillon Limited  
Box 219, Stn. K  
Toronto, Ontario  
M4P 2G5

Attention: Mr. W.F. Wells, P.Eng.  
Project Manager

Hydrogeological Aspects,  
Halton Waste Disposal  
Feasibility Study

Dear Mr. Wells:

As per your letter of July 19, 1978 we have completed further investigations on the following sites:

- i) the Burlington Landfill
- ii) the Milton Brick Yard and
- iii) the Oakville Landfill

In addition, in consultation with Geo-Environ Limited, we assessed the hydrogeological suitability of the Natco Property for landfilling.

Our study technique consisted of reviewing previously prepared reports, updating the data and consultations.

Burlington Landfill

The existing landfill is producing leachate which seeps to the surface and leaves the fill in drainage courses adjacent to the site. This indicates that the shale is relatively impermeable, to ground water flow, and the main concern of developing a site at this location would be protection of the surface water. A leachate collection system is presently being designed for the existing site to alleviate this concern.

... continued

ITEM 1

No detailed information exists with regards to ground water contamination at these types of settings. Consequently, substantial effort would be required to determine if a more sophisticated leachate collection system would eventually be required.

Although lands abutting on the east of the existing landfill are most hydrogeologically suitable for landfilling, these are not available because of a long-term plan to remove shale aggregate. Consequently expansion to the north is the only reasonable alternative. This land is bounded on the north and west by a major creek valley, on the east by King Road and to the south by the heads of the streams. For conceptual design purposes, we would suggest a maximum fill depth of 10 feet be used to determine the site capacity. Leachate collection would also be necessary. A simple toe drain would likely be adequate for the lands immediately north of the present fill area. Lands to the east would probably require a more sophisticated system incorporating toe drains and possibly pumping stations to tie, back, into the main gravity collection system at the existing fill area. To eliminate the need for pumping stations, deep excavations in shale bedrock would likely be required.

The Queenston shale bedrock is very susceptible to erosion when exposed to the atmosphere. Design measures would be required to accommodate surface water runoff from the site such that gullying and serious erosion does not occur.

Table 1, attached to this letter, contains a detailed estimate of costs to carry out the necessary studies to obtain a certificate of approval through the Environmental Hearing Board process.

#### Milton Brick Yard

This site is an inactive quarry which we understand is being reactivated very shortly for a 25 year extraction program. Bedrock is the Queenston shale formation. Surface water protection is the main concern for developing either a "dry" or "wet" waste site. Perennial streams flowing through the site would require diversion and toe drain leachate collection would be required to ensure no contamination in the creeks. In view of the proposed extraction program, little effort was spent on evaluating this alternative.

... continued

Oakville Landfill

This site is developed within a glacial till soil environment. Leachate has in the past emanated at the toe of the landfill and left the site by way of a tributary to Sixteen Mile Creek. Consequently, a leachate collection system was designed and installed to intercept this discharge and protect the stream quality.

Information presently on file suggests that overburden (soil) thickness in this area is approximately 10 feet overlying Queenston shale bedrock. As mentioned previously, no data or past experience exists with regards to leachate movement within this type of bedrock. Consequently, substantial effort would be required to check this aspect prior to making representation before an environmental hearing. Ground water flow appears to be south westerly towards Sixteen Mile Creek. It is expected that any leachate by-passing the present collection system would move through the rock with this ground water system.

In view of the uncertainty with the impact on ground water in the rock, we would not suggest expanding the site west, north or south. In particular, no major expansion to this location is recommended. If a five foot excavation is contemplated, inadequate natural attenuation would likely exist to properly renovate leachate before entering the bedrock. Expansion easterly would not likely create any adverse impact. This is probable because any leachate produced in the expansion area would likely move under the existing fill area. As such any remedial measures taken to alleviate potential ground water contamination in the existing fill area would be adequate to control the proposed expansion as well.

We would suggest expanding easterly only and using an excavation depth of 5 feet for site capacity calculations and expanding the existing leachate collection system around the expansion area. In this regard, there exists a probable long-term leachate handling problem. Presently, leachate is pumped back into the refuse. This will ultimately require transporting away for treatment. The only other obvious design feature would be relocation of a stream which presently traverses the proposed expansion lands.

...continued

21 August 1978

Natco Property

No work had previously been carried out at this site by our company. Geo-Environ Limited had investigated the feasibility of landfilling. Consequently, we retained their services to minimize duplication of work. We have discussed this site with Mr. B. Whitehead, president of Geo-Environ Limited, reviewed the data on his file and visited the site. Mr. Whitehead has prepared a summary report of his findings, which we concur with. This report is appended for a detailed description of the site.

This location could safely be operated as a landfill providing that:

- i) the stream presently traversing the quarry is diverted away from the landfill;
- ii) a leachate collection system is designed, incorporating the streambed as the main collection area. This would require construction of a pumping station and force main for ultimate discharge into a sanitary sewer.

Reference is made to the Geo-Environ Limited report for details.

In summary, Burlington, Natco and Oakville appear most suitable hydrogeologically. All sites would require toe drain, leachate collection systems at a minimum. There is an uncertainty, at this time, as to the adequacy of this collection system to protect ground water should the need arise. Determining this aspect would be the main thrust of further studies. Table 1 attached outlines the expected costs and timings of the further studies and the attached "Description of Stage Investigations", outlines the scope of the work.

Respectfully submitted,

GARTNER LEE ASSOCIATES LIMITED



EGA:ges

E.G. Anderson, P.Eng.  
Consulting Hydrogeologist

TABLE 1  
ESTIMATES OF COSTS AND TIMING FOR  
FURTHER HYDROGEOLOGICAL STUDIES

| Site       | *Stage 1<br>Hydrogeo. | Cost of<br>*Stage 2<br>Hydrogeo.<br>(timing) | Cost of<br>*Stage 3<br>Hydrogeo.<br>(timing) | Total Cost<br>of Additional<br>Hydrogeo.<br>Studies | Estimated<br>Duration<br>of Total<br>Technical<br>Work |
|------------|-----------------------|----------------------------------------------|----------------------------------------------|-----------------------------------------------------|--------------------------------------------------------|
| Burlington | complete              | \$23,000<br>(3 months)                       | \$7,000<br>(2 months)                        | \$30,000                                            | 5 months                                               |
| Milton     | complete              | \$15,000<br>(3 months)                       | \$5,000<br>(2 months)                        | \$20,000                                            | 5 months                                               |
| Oakville   | complete              | \$23,000<br>(3 months)                       | \$7,000<br>(2 months)                        | \$30,000                                            | 5 months                                               |
| Natco      | complete              | \$17,000<br>(3 months)                       | \$8,000<br>(2 months)                        | \$25,000                                            | 5 months                                               |

\* See following page for a description of the stages.

## Description of Staged Investigations

### Stage 1

This consisted of a detailed analysis of all pertinent existing information presently on file. Field checks were carried out at all the sites to confirm the office interpretations. Stage 1 results formed the basis for preliminary assessment of the sites hydrogeological suitability. It also provides an early indication of the likely design concepts to operate the site safely from environmental aspects.

### Stage 2

Work in this stage would consist of field drilling to determine soil and rock characteristics. Tests would be performed down the boreholes to assist in ground water velocity determinations. Monitors would be installed to provide for determination of ground water flow directions and where an existing fill exists, water samples would be retrieved for determination of the site impact on the ground water. The data, thus derived, would be analysed and a brief summary report issued discussing the outcome in sufficient detail that preparation of the design and operation report could commence.

### Stage 3

Monitoring in the field and assistance with preparation of the design-operations report by means of working meetings would represent the main work tasks. A final report would summarize all results of the study in sufficient detail to obtain approvals at an environmental hearing.

# GEO-ENVIRON LIMITED

62 BALMORAL AVENUE  
TORONTO, ONT. M4V 1J4  
TEL. (416) 961-2774

Mr. W. Wells, P.Eng.  
M.M. Dillon Limited  
50 Holly Street,  
Toronto, Ontario

August 8 1978

## Halton Interim Landfill Program - NATCO property Hydrogeological Study

The following sections summarize our findings on the Natco property.

### GEOLOGY

The site is underlain by Queenston shale of Ordovician age which underlies the entire area below the escarpment. The shale is predominantly red as a result of a high iron oxide content, however, secondary alteration possibly by lime-rich groundwaters has resulted in harder green layers and nodules. The shale is reasonably hard, although rippable, until exposed to weathering when it rapidly breaks down to clay. The green shale weathers more slowly than the red. Gypsum nodules of varying size are occasionally found in the shale.

The bedrock surface slopes fairly uniformly from the escarpment to the quarry area. From here, the bedrock surface slope increases toward the lake as a result of glacial scour down the Dundas valley. The bedrock elevation below the Burlington bridge, just off shore is below sea level.

The overburden materials in the area are the result of a number of depositional episodes. Over the bedrock is a thin layer of red clay (weathered bedrock) which is in turn overlain by 10 to 40 feet of silt and clay till of glacial origin. Lacustrine and outwash sands overlie the till in the area north of the site, while most of the area south of highway 403 exhibits lacustrine sands over till or bedrock. In the Highway 2 area south of the site is the Aldershot Bar, a beach gravel deposit which extends northeast - southwest for a distance of about two miles. This bar was an offshore spit during Lake Iroquois times, which trapped eroded clays from the escarpment area forming the clay deposits mined earlier at the site. Recent alluvial deposits are present in the floodplain of Grindstone Creek.

### HYDROGEOLOGY

Groundwater flow in the area is generally toward the lake although local discharge to creeks may locally alter this flow direction. Piezometric surface contours more or less parallel the escarpment and reflect the changes in surface contours. The static levels reported in wells drop from an elevation of about 620 feet above sea level at the base of the escarpment to about 280 feet above sea level at the Natco property.

.... /2

# GEO-ENVIRON LIMITED

-2-

## NATCO HYDROGEOLOGICAL STUDY

There are few overburden aquifers north of highway 403 where most of the wells are completed in bedrock at depths from 30 to 80 feet. South of Highway 2, a sequence of glacial lacustrine and outwash sands gravels and clays form an aquifer which was developed by several wells constructed in 1948. It is doubtful that any wells are still in use in the area south of the site since the area is entirely served by municipal water.

The bedrock throughout the area forms a fair to poor aquifer with well yields generally in the 1 to 5 IGPM range. Yields depend on the number and characteristics of fractures encountered in the bedrock.

Water quality varies with well depth and location, however, the local groundwater can be expected to be highly mineralized, hard, contain an excess of dissolved iron and may contain unacceptable concentrations of sodium chloride or sulfate.

### LOCAL DRAINAGE

With the exception of Grindstone Creek, all of the local streams commence below the base of the escarpment. Most of the streams are deeply encised into the bedrock. Flows vary considerably as only a small percentage of the precipitation infiltrates into the ground, resulting in high streamflows and low baseflows. The maximum/minimum flow ratio for Grindstone Creek is in excess of 7200.

Two streams, having a drainage area of slightly over one square mile, flow through the property via culverts under the highway and the CN tracks. In addition, a portion of the drainage from the highway and tracks flows into the streams. Peak flow through the culverts is estimated to be in excess of 300 cfs.

### PROPERTY

The Natco property has been used for manufacturing and extractive purposes since 1911. Initially, the surface clay was used alone or mixed with shale for tile and partition blocks. In 1953, the clay was mostly exhausted and material was obtained from nearby pits and quarries. Shale from the Natco quarry has been used infrequently since it is insufficiently plastic, requires extra beneficiation and fires to an unacceptable buff colour. The shale is satisfactory only for solid bricks and at present is uneconomic compared to extraction of material from the National Sewer Pipe quarry.

The quarry section of the property is located to the south of the CN tracks and Highway 403 and is bounded on the west, south and east by stream valleys. A second unexploited reserve of shale is located between the small creek to the south of the excavated area and Grindstone Creek farther south. This shale is overlain by 5 to 25 feet of clay till overburden.

# GEO-ENVIRON LIMITED

-3-

## NATCO HYDROGEOLOGICAL STUDY

The quarry bottom is irregular as shale has been selectively extracted from various areas on an irregular basis and stockpiled to permit weathering. There is a substantial amount of weathered material and unexcavated till in the quarry.

### SITE SUITABILITY FOR LANDFILLING

#### Groundwater

From a hydrogeological standpoint, the quarry is well suited as a landfill site. The site, from its location, appears to be in a discharge zone, reducing the chances of infiltration of leachate. The shale is generally poorly permeable and is only a poor to fair aquifer. The entire area toward the lake is serviced by municipal water supplies so that there are no downgradient groundwater users. The chances of groundwater pollution can be assumed to be low and with the introduction of a leachate collection system, can be assumed to be nil.

#### Surface water

In order to reduce the surface water pollution potential, the stream which passes through the site will require relocation. Assuming side slopes at 1.5 to 1 and a 1200 foot diversion, a total of 100,000 yards of material will require excavation. Part of this material can be used for cover and the shale can be used in the Natco plant. A culvert section will be required to permit truck access to the quarry, with the remainder of the diversion left open or filled with excavation spoil from the region.

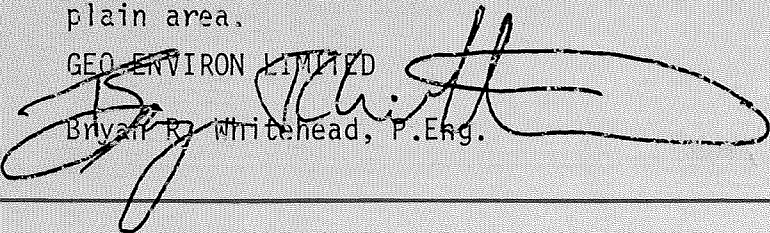
A dam will be required near the present outlet of the stream from the quarry (west end) and a rip rap and gravel leachate collection bed in the vicinity of the existing streambed. The quarry floor should be sloped to the collection bed and a leachate collection sump, pump and forcemain will be required to dispose of the leachate. This sump will be located inside the dam in the west end of the quarry. Should the area south of the present stream be excavated and landfilled, the excavation floor will require sloping to the collection area. With proper engineering there will be no surface water pollution.

#### Other features

Because of the isolation of the site by the transportation corridor to the north, Grindstone Creek to the south, the steep valley walls to the south and west and the plant site to the east, there is little problem anticipated with dust, noise, odour, vermin or unauthorized access. The quarry is well isolated from sight and has no existing ecological value. Proper diversion of the stream will reduce the sediment loading obtained from the quarry and will add an interesting waterfall feature to the flood plain area.

GEO-ENVIRON LIMITED

Bryan R. Whitehead, P.Eng.



REGIONAL MUNICIPALITY OF HALTON  
INTERIM WASTE DISPOSAL  
FEASIBILITY STUDY

PRELIMINARY  
TRANSPORTATION ANALYSIS

M. M. DILLON LIMITED

AUGUST 1978

Prepared by J. Kornets, P.Eng.

ITEM 2

## PRELIMINARY TRANSPORTATION ANALYSIS

The purpose of this analysis is to evaluate the access limitations and specific transportation problems resulting from additional traffic due to expansion of the Oakville and/or Burlington sites, and the proposed NATCO site. The cases investigated are as follows:

- i. Expansion of the Oakville site to accommodate both the Halton Hills/Milton traffic and the Burlington traffic.
- ii. A small expansion of the Oakville site to receive only Halton Hills/Milton in conjunction with a Burlington expansion.
- iii. Expansion of the Burlington site to handle both Oakville and Halton Hills/Milton.
- iv. The use of the NATCO site.

The analysis is carried out for the year 1980 and, although the horizon year for some alternatives may vary by one or two years, the resulting difference in the traffic volume parameter would be negligible and not affect the results.

Total volumes and truck volumes are based on counts taken at three existing landfill sites in Georgetown, Oakville and Burlington, and also on current traffic counts on area roads. An analysis of truck and car arrival patterns at the three existing landfill sites indicates that the peak arrival time does not coincide with the highway peak of 4:30-5:30 p.m. but instead falls between 10:00-11:00 a.m.

### Oakville Site

By 1980, local traffic to this site will be approximately 80 trucks per day. An additional 80 trucks can be expected from Milton and Halton Hills once the Georgetown site is closed. Two primary routes are available to this traffic. One is south on Highway 25 to Dundas, east on Dundas to Fourth Line and north on Fourth Line to the site. The second route is south on Sixth Line and west on Burnhamthorpe. Fourth Line, north of Burnhamthorpe is not suitable for truck traffic due to severe grades and geometric constraints.

Taking the case that the Burlington site will not be expanded, an additional 125 trucks per day will come from this area to the Oakville site. The primary route for these trips will be west along the QEW to north on Highway 25, and east on Dundas to Fourth Line. The total volume arriving at the site will be 285 trucks per day in this extreme case. During the highway peak hour the volume will be 20 trucks arriving at the site. A factored 1975 count on Dundas just east of Highway 25 indicates a PM peak hour volume of 550 vehicles eastbound and 285 westbound. The heavier movement does not oppose the anticipated 10-15 trucks turning left during the peak hour from eastbound on Dundas to northbound on Fourth Line, north of Dundas is 85 vehicles, decreasing to 60 north of the landfill site. Similarly, the peak hour volume on Burnhamthorpe, east of Fourth Line, will be in the order of 125 vehicles. These volumes are low and despite the rural standards of these roads there appear to be no operational difficulties.

The peak hour of operation of the site is between 10:00 a.m. and 11:00 a.m. during which time 25-30 trucks will arrive. This, however, is coincident with a lower background volume on roads and highways in the area.

#### Burlington Site

If a minor expansion of this site is carried out to accommodate only local traffic, the anticipated daily volume will be 125 trucks by 1980. A major expansion to accommodate the Oakville and Georgetown site traffic will more than double this volume to 285 daily trucks. The prime route for 160 trucks will be west along the QEW to Plains Road, north on Brant Street to the north service road. The corresponding PM peak hour volume would be approximately 10 trucks. The remaining 125 would use King Road where the 1980 peak hour two-way volume is forecasted to be 35 vehicles of which less than 10 would be trucks destined for the site. The low peak hour volumes to the site will not create operational difficulties.

#### NATCO Site

Three possible access routes to this site were investigated. The first is via Howard Road, the second is along Unsworth and the third is via a connection from Snake Road. The volumes anticipated at this site include all traffic from the other three sites, representing a volume of 285 trucks daily of which approximately 20 would coincide with the PM road peak hour.

11.?? The first route, via Howard Road, is accessed from Plains Road at a signalized intersection. Just north of the intersection there is a severe curve on Howard as well as a steep grade for heavy truck movements. The problem of restrictive geometry is compounded by narrow pavement width. Although the route passes directly adjacent to a park, the peak hours of park utilization do not coincide with the time of operation of the dump site. Improvements to the geometry and to the pavement would be required prior to the use of this route as access to the NATCO site.

→ The Unsworth route can be considered deficient for truck usage both in terms of geometry and pavement structure. There are no signals at the intersection with Plains Road which could make access/egress by means of a left turn difficult during peak hours. The proximity of residences to the roadway is a major drawback when considering this route.

→ The noise and fumes produced by the trucks would create an undesirable condition in this residential area.

NB  
\* → The additional 285 trucks per day on Plains Road represents an increase in daily truck traffic of 15-20 per cent. An analysis of the present volumes on Plains Road indicates that this increase will not present any major operational difficulties. Public reaction to the increased truck traffic has not been surveyed for purposes of this study, and may therefore, have an effect on the ultimate location of the truck routes.

A field reconnaissance of the Snake Road area west of the site, revealed that a connection may be possible. The optimum location for this road would be running parallel to, and north of, the railway tracks, turning south just west of the Grindstone Creek tributary. By staying close to the south side of the railway, the creek crossing can be made at an existing culvert. A preliminary appraisal indicates a cost in the neighbourhood of \$65,000 for this connection. This is, of course, subject to approval from the CNR of a level crossing of their tracks and assuming that the necessary property can be acquired. If this cannot be done a connection between Snake Road and the site, south of the tracks would be double the cost due to more severe topography and possibly the requirement of a new crossing of the creek.

REGIONAL MUNICIPALITY OF HALTON  
INTERIM WASTE DISPOSAL  
FEASIBILITY STUDY

PRELIMINARY REPORT ON ECOLOGICAL  
SITE CHARACTERISTICS OF THREE POTENTIAL  
DISPOSAL SITES

M. M. DILLON LIMITED

AUGUST 1978

Prepared by M.J. McCartney, B.A., B.Sc.

ITEM 3

## PRELIMINARY ENVIRONMENTAL ANALYSIS

### A. INTRODUCTION

The purpose of this report was to make an overview assessment of three potential waste disposal areas to be used as an interim disposal measure.

The three sites were an extension of Burlington Landfill, an extension of Oakville Landfill and the Natco Quarry (Burlington).

The overview assessment was produced with the intent of identifying potential problem areas from a biophysical perspective. In this way, areas which may require further study during site investigation and design could be identified.

### B. METHODOLOGY

Visual inspection of the sites was made by "windshield survey" supplemented by minor excursions on foot into less visible areas. No quantitative methods were used. Access to private property was restricted and no analysis was made of these areas.

The overview nature of the study resulted from the short time span allotted. Several factors were not dealt with which will require further study, including:

- 1 Regional biophysical context
- 2 Effects on watershed biophysical systems
- 3 Unique, rare or uncommon species
- 4 Historic or archaeological considerations

## C. STUDY DESIGN

The following factors were briefly reviewed during the course of the study:

- 1 Land Capacity for Agriculture
- 2 Vegetation
- 3 Surface Waters
- 4 Visual Aspects

Potential problems in the areas mentioned in the Methodology Section such as archaeological sites or unique species could potentially alter the evaluation of these areas.

After the discussion of the four factors considered in this study, the Recommendations Section summarizes the areas in which further study may be required and recommendations are made.

### C.1 Land Capability for Agriculture

Canada Land Inventory (C.L.I.) maps at a scale of 1:50,000 were used (A.R.D.A. 1968 - Toronto-30 M) to identify approximate soil classification for the three sites. Both the proposed expansion areas at the Oakville and Burlington sites could still be considered to fall into the classification as described, the Natco property has been disturbed and would not be considered suitable agricultural land for most of the land area. The Oakville and Burlington sites and formerly the Natco site were all rated as  $1^6 3^4_T$ .

According to the C.L.I. system, there are seven site classes ranging from no significant limitations to Agriculture (Class 1) to having no capability for agriculture or permanent pasture (Class 7).

The designation  $1^6 3^4_T$  means that approximately sixty per cent of the land in the area is Class 1 and forty per cent is Class 3 with a topographic limitation (T). Specifically this means:

#### Class 1 Land

"Soils in the class have no significant limitations in use for crops. The soils are deep, are well to imperfectly drained, hold moisture well and in the virgin state were well supplied with plant nutrients. They can be managed and cropped without difficulty. Under good management they are moderately high to high in productivity for a wide range of field crops". (ARDA, 1968).

#### Class 3 Land

"Soils in this class have moderately severe limitations that restrict the range of crops or require special conservation practices. The limitations are more severe than for Class 2 soils. They affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. Under good management they are fair to moderately high in productivity for a range of crops." (ARDA 1968)

### Sub Class T

"Adverse topography - either steepness or the pattern of slopes limits agricultural uses." (ARDA 1968).

The limitation of adverse topography applies to most of the uncleared areas on all three properties. Cleared areas usually have slopes of less than five per cent.

### C.2 Vegetation

All three sites have been previously disturbed to some degree. Both the Burlington and Oakville sites are agricultural areas, the Natco site is a quarry. All sites have been cleared of vegetation except where topographic limitations were apparent.

#### Burlington Site

Agricultural land surrounded by vegetation. Hedgerows are found to the south and east and should be preserved (Parkway Belt West Plan 1978) as visual screening and noise buffers. The wooded ravine occurs to the north and west sides of the proposed expansion area, these natural areas should also be preserved (Parkway Belt West Plan, 1978).

Virtually all of the farmland has been rated Site Class 1 for agriculture. Wet stream course areas to the north-west and east of the woodland have been rated Site Class 3. A small productive apple orchard is located just south of woodland but outside the target area.

About one hundred and twenty-five acres of woodland occur in the target area. This medium quality, mature woodland consists of white pine, beech, basswood, ironwood, white ash, sugar maple, red maple, bur oak, red oak, white oak, shagbark hickory, white birch and scattered hemlock. The area was selectively logged many years ago. Residual old trees, mostly sugar maple, red oak and beech are 20" to 30" in diameter. The white pine are about 14" to 18" in diameter. In addition, the pine are dying from blister rust disease and many have been up-rooted by the wind. Average stand diameter for most other species ranges between 8" to 14". Canopy closure varies considerably between 25% to 100%. The woodland is not continuous towards the eastern part of its range.

Imperfectly drained lowland areas are common in the woodland. Associated tree species are red maple, bur oak, buttonbush, willow and hawthorn. Pure stands of shagbark hickory also occur in these lowland areas.

An actively flowing tributary of the Oakville Creek flows through the western portion of the woodland. The stream varies from two feet to ten feet wide. Water purity and stream bed conditions suggest that this is a very high quality stream in the area. Further west, however, the stream passes near the existing landfill site.

The woodland has an active population of deer, small mammals, wildfowl and songbirds.

Due to the sensitivity of this woodlot area, potential effects due to noise, dust and changes to the watercourse should be examined.

### Burlington Expansion Area

This site is well screened by existing vegetation in the form of stream side vegetation (north and west) and hedgerows (south and east). Minor screening will be required to augment the existing hedgerow areas. All vegetation around this site should be preserved for screening.

### Natco Site

The site is well screened by vegetation from most visual aspects. Minor screening may be required to screen the view from Highway 403.

### Oakville Site

This site is highly visible from the fourth line and may require extensive screening and berms.

The existing site is visible but the present visual impact is mitigated to some extent by the fields of the proposed expansion area.

## D: RECOMMENDATIONS

Based on observations made during the site visit and review of secondary source materials the following recommendations can be made.

1. The effects of the proposed sites on the hydrogeologic and surface water regimes should be studied further. Such a study should include impacts on possible future recreational use of downstream areas.
2. The acceptibility of channelization or diversion of the watercourses should be investigated in conjunction with future hydrological analyses.
3. The presence or absence of unique, rare or uncommon species in the areas and adjacent lands should be established.
4. Historic and Archaeologic sites should be checked with the local Ministry of Culture and Recreation.
5. Potentially erodable soils should be investigated further, particularly on the Natco and Burlington sites.
6. Visual aspects should be investigated further.
7. Potential impacts on adjacent woodlots or ravine areas including wildlife species and habitats should be further investigated. This may be undertaken relatively easily by comparing the existing landfill sites (Oakville and Burlington) and their adjacent woodlots with woodlots adjacent to the proposed areas.

Specifically the three sites each have potential problems. Anticipated effects at the Burlington and Oakville sites will involve incremental increases due to the existing use as landfill sites. The Natco site is least desirable as an interim site due to this aspect, and the fact that the topographic aspects of the Natco site are restrictive.

The Oakville site is worst from the visual impact perspective, the Burlington and Natco sites are both better screened with existing vegetation.

The Burlington site is least desirable from an erosion protection point of view, the existing site has created substantial erosion. Design criteria should reflect the potential impact on the watercourse.

It is the author's opinion based on this preliminary assessment that the option with least effects would be the development of the area east of the Oakville site and that the north portion not requiring the creek diversion is the favoured area. Design criteria for this site could include development up to a 100 foot buffer north of the creek and provision of berms and screens to reduce local visual effects in addition to hydrogeologic aspects.

Further study as described earlier should be undertaken to enable a more complete evaluation of the three areas.