

The Regional Municipality of Halton Burlington Landfill Site Application for Continued Use

VOLUME 1 of VOLUME 3

Procedural Sections

- A - Covering letter from Halton Region to the Ministry of the Environment
- B - Covering letter from Dillon to Halton Region
- C - Master Table of Contents
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- E - Property Ownership

Technical Sections

- START →
- F - Introduction Mr. Wells or Mr. Perlman
 - GV - Environmental Impact Assessment Mr. Stevens
 - HV - Rehabilitation and After Use " " + Someone from Royal Botanical Gardens
 - J - Traffic Analysis Mr. Paul Hill
 - KV - Noise Impact Analysis Lightsound, P.D.
 - ND { L - Parkway Belt West Plan Amendment Requirement Assessment } will not be calling Balfour in new of Exhibit 9
 - M - Planning Assessment
 - N - Visual Analysis Mr. Robert Wright

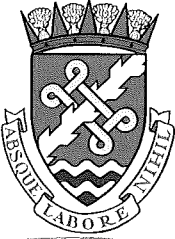
Volume 2

- O - Hydrogeological Study Mr. Robert Lesch

Volume 3

- P - Leachate Treatment Mr. Constantine
- Q - Water Quality Impacts Dr. Johnston
- R - Surface Drainage Alan Mitchell
- S - Design and Operations Wally Wells
- T - Basis for Approval Mr. Perlman
- U - Actions of Regional Council and Record of Review Meetings





THE REGIONAL MUNICIPALITY OF HALTON

P.O. BOX 7000
1151 BRONTE ROAD
OAKVILLE, ONTARIO L6J 6E1
416/827-2151

1984 03 30

March 30/84

Ministry of the Environment
135 St. Clair Avenue West
TORONTO, Ontario
M4V 1P5

Attention: Mr. E. MacIntyre, Director
Environmental Approvals Branch

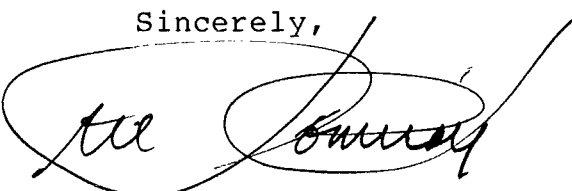
Dear Sir:

This letter and the attached documents form the basis for an application by the Regional Municipality of Halton for a Certificate of Approval for the continued use of the Burlington Landfill Site. This application is made to your Ministry under the Environmental Protection Act.

Your offices previously received an application on February 15, 1984 and we would draw your attention to the minor modification to the areas of Phases B and D. Phase B has been increased from 3 hectares to 3.8 hectares with a corresponding decrease in area for Phase D from 2.2 hectares to 1.4 hectares. This redefinition of the phases occurred as a result of further detailed hydro-geological investigations with respect to the groundwater divide which established the southern limits of Phase D.

In closing, we would appreciate the processing of this application expeditiously in order that a necessary hearing can be scheduled as soon as possible.

Sincerely,


Peter D. Pomeroy
Regional Chairman

GNW:nw
Encl.

BURLINGTON

639-4540

HALTON HILLS
ACTON

853-0501

HALTON HILLS
GEORGETOWN

878-8113

MILTON

878-8113

OAKVILLE

827-2151



OUR FILE: 9319-02

YOUR FILE:

30 March 1984

The Regional Municipality
of Halton
P.O. Box 7000
1151 Bronte Road
OAKVILLE, Ontario
L6J 6E1

Attention: Mr. R.W.J. Moore, P.Eng.
Director of Public Works

Burlington Landfill Continued Use -
Application for a Certificate of
Approval

Dear Sirs:

expansion
In support of an Application for a Certificate of Approval for the Continued Use of the Burlington Landfill Site, we are pleased to provide the 3-Volume set of technical support documents. These Reports will form the basis for presentation of the Application to the hearing before the Environmental Assessment Board and for technical review by the Ministry of the Environment.

We are pleased to have completed this project for the Region.

Yours truly,

M.M. DILLON LIMITED

W. F. Wells

WFW:llly
Encls:

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



SECTION C
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For Office Use
Application Number

**APPLICATION FOR A CERTIFICATE OF APPROVAL
FOR A WASTE DISPOSAL SITE (LANDFILL)**

IMPORTANT NOTE:

If this application is for notification of changes in use, operations, or ownership, specify the MOE number on your certificate A210 102 and fill in only the data on this form which are being revised.

1. Applicant:

Municipal (X) Provincial () Other ()

Name: Regional Municipality of Halton

Address: 1151 Bronte Road Postal Code: L6J 6E1

City/Prov.: Oakville, Ontario Telephone: (416)827-2151

If Applicant not Municipal or Provincial complete the following:

() Proprietorship
Name, if different than applicant: _____ () Corporation: President's Name: _____

() Partnership - Name all partners:

(i) _____ (ii) _____

2. Land Owner: (if not applicant)

Name: _____

Address: _____

3. Lessee (if applicable)

Name: _____

Address: _____

4. Site Operator

Name: _____ Title: _____

Address: _____

5. Site Location:

City () Concession: _____

Town () Name: _____ Lot No: _____

Village () Part of Lot: _____

Township () Street Address: _____

Other _____

Include a copy of the plan of survey of any lands on which the site is to be located.

6. Site Characteristics and Waste Category

- a. Present land use _____
b. Present Official Plan designation of site _____
c. Present zoning category _____
d. Present land use of all adjoining properties to be provided on location map.
e. Rate at which site can receive waste per day.

Domestic _____ () Tonnes () Cu. Meters
Commercial _____ () Tonnes () Cu. Meters

If any of the following waste categories are intended to be received at the site, attached a description of each, including their source to the Application.

Liquid Industrial _____ () Tonnes () Cu. Meters () Litres
Non Hazardous Solid Industrial _____ () Tonnes () Cu. Meters () Litres

Hazardous _____ () Tonnes () Cu. Meters () Litres
Other _____ () Tonnes () Cu. Meters () Litres

f. Number of days/year the site is open _____

g. Population served 292,000 (Est. 1987) (1,511,000)

h. Names of all municipalities/major industries intended to be served by the site

- 1) _____ 4) _____
2) _____ 5) _____
3) _____

i. Total area of site _____ hectares or _____ acres

j. Total area to be filled 34.5 hectares or 85 acres

* k. Estimated additional capacity of the site 511,500 tonnes or 730,800 cu. meters
480,000 686,000

(Rate per day and EST Capacity must be in the same measurement)

Blueprint policy on buffer lands

7. For enlargement and/or change of site only

a. Additional Life Expectancy 3 years (Approximate)

* b. Additional Area Applied for 5.2 (hectares) - Presently Buffer Lands

c. New Total Area of Site Same (hectares) (Phase B - 3 ha.) 3.8
(Phase D - 2.2 ha.) 1.4

d. Name's of New Municipalities potentially served (1) _____

(2) _____ (4) _____

(3) _____ (5) _____

* Subsequently revised. See Addendum # 1

* 8. Control System

- a. Monitoring for - Gas ☐ Yes ☐ No - Ground Water ☒ Yes ☐ No - Surface Water ☒ Yes ☐ No
- b. Control system for - Gas ☐ Yes ☐ No - Gas utilization ☐ Yes ☐ No - Leachate ☒ Yes ☐ No

9. List all Supporting Documents Submitted with this Application.

- SEE ATTACHED -

10. Signature

Applicant Name (Printed) The Regional Municipality of Halton

Title *James R. Grew* *Whitney*

(Signature) A/Regional Chairman Regional Clerk

Date February 15, 1984

SEAL OF COMPANY
(if applicable)

* Note on 8. Control Systems

- a) Monitoring programs will be extended to include new area.
- b) Leachate system will be extended to service new landfill area.

ADDENDUM # 1

Technical investigations completed subsequent to the submission of the Application for a Certificate of Approval have revised some of the figures presented therein. The following changes are consequently in effect:

- 6(k) - Estimated additional capacity of the site: }
 511,500 tonnes
 or 730,800 cu. metres.

- 7(b) - Additional Area Applied for: 5.2 (hectares)
 Presently Buffer Lands (Phase B - 3.8 ha.)
 (Phase D - 1.4 ha.)

*why
change?*
↓
*See TAB F1,
letter from
Region to MOE
(defining where
groundwater
divides)*



SECTION E PROPERTY OWNERSHIP

A title search was carried out in February 1984 to confirm the ownership of adjacent properties to the landfill site. A certified list of adjacent property owners is provided in this section.

The property ownership is shown on Figure E-1.

No additional land will be acquired by the Region to continue landfilling. The lands identified as presently owned by the Region, constitute those included in the current application for a Certificate of Approval.



THE REGIONAL MUNICIPALITY OF HALTON

LAW
DEPARTMENT

P.O. BOX 7000
1151 BRONTE ROAD
OAKVILLE, ONTARIO L6J 6E1
416/827-2151

1984 03 29

Director
Environmental Approvals Branch
Ministry of the Environment
135 St. Clair West
Toronto, Ontario
M4V 1P5

Attention: Erve MacIntyre

Dear Sirs:

Re: Burlington Landfill Site - Regional Municipality of
Halton

Attached please find a list of adjacent property owners which I have been informed, and I verily believe to be a list of all the landowners within a thousand feet of the Burlington Landfill Site located in the City of Burlington in the Regional Municipality of Halton.

Yours very truly,

David Varley
Regional Clerk

CM/pjb
Encl.

BURLINGTON
639-4540

HALTON HILLS
ACTON
853-0501

HALTON HILLS
GEORGETOWN
878-8113

MILTON
878-8113

OAKVILLE
827-2151

BURLINGTON LANDFILL SITE

LIST OF ADJACENT PROPERTIES
SHOWN ON FIGURE 2

National Sewer Pipe Ltd.
Box 1800
Oakville, Ontario
L6J 5C7

National Sewer Pipe Ltd.
1650 Lakeshore Blvd.
Clarkson, Ontario

City of Burlington
Box 5013
Burlington, Ontario
L7R 3Z6

Attention: City Clerk

Azova Investments Limited
45 Overlea Blvd
Suite A-9
Toronto, Ontario
M4H 1C3

Ministry of Government Services
Director Municipal Subsidies
777 Bay Street
12th Floor
Toronto, Ontario
M5G 2E5

E. Wosnick
c/o Mintz & Partners
77 Samor Road
Toronto, Ontario
M6A 1J2

Ontario Hydro
Property Section
700 University Avenue
Toronto, Ontario

Trans Canada Pipeline Ltd
P.O. Box 54
Commerce Court West
Toronto, Ontario
Attn: Mr. D. Calder

Ministry of Transportation
and Communications
Director
777 Bay Street
12th Floor
Toronto, Ontario
M5G 2E5

Mr. R. Elstone
120 Mountain Brow Road East
R.R. #2
Burlington, Ontario
L7R 3X5

Cumis Life Insurance Co.
151 North Service Road
Burlington, Ontario

Tridon Limited
Box 5029
Burlington, Ontario
L7R 4A2

Tridon Limited
210 North Service Road
Burlington, Ontario

C.J. Johnson
1761 Old Waterdown Road
R.R. #2
Burlington, Ontario
L7R 3X5

Bell Canada
Engineering Department
66 Bay Street South
Hamilton, Ontario
L8N 3H2

Cumis Life Insurance Co.
Box 5065
Burlington, Ontario
L7R 4C2

C.N.R.
Suite 1227
20 York Street
Toronto, Ontario
M5J 1E7



**SECTION F
INTRODUCTION**

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SECTION F INTRODUCTION

1. PURPOSE OF SCOPE

expansion
This report provides the basis for an application for a Certificate of Approval for continued use of the Burlington landfill site if necessary into 1987. The design and operations planning proposed herein will allow landfilling beyond the site's currently approved waste capacity. Proposed plans are fully integrated with those of the existing operations. Part of the basis for the design is a hydrogeological study prepared by Gartner Lee Associates Limited and an environmental analysis undertaken by Dillon staff. The plans presented herein meet the intent of Ministry of the Environment guidelines and regulations respecting landfills.

2. BACKGROUND

The Burlington landfill site is located off the North Service Road of Highway 403 between King Road and Waterdown Road in the City of Burlington (Figure F-1). The site was established by the then Town of Burlington in 1972. It was assumed by the Regional Municipality of Halton on 1 January 1974 as an operating landfill site. A chronological site history is provided as Table 1.

The site has continued in operation under authority of the Region since 1974. In April (1980), a public hearing was held before the Environmental Assessment Board to expand the site up to its present size. The additional property acquired through this expansion was (23.3 ha) of which (7 ha) was approved for landfilling. The site presently covers 68.3 ha of which

TABLE 1
SITE HISTORY*

2 July	1971	Original Application for a Certificate of Approval for a waste disposal site filed by the then Town of Burlington.
15 May	1972	Provisional Certificate of Approval #210201 issued to Burlington. Site subsequently opened.
1 January	1974	Regional Government in place.
8 July	1974	Application for a Certificate of Approval filed by Halton Region to change site ownership.
16 September	1974	Provisional Certificate of Approval #210102 issued to the Region.
5 July	1978	Halton Region directs M.M. Dillon to carry out a Regional interim waste disposal plan. (Study completed 29 August 1978)
19 September	1978	Burlington Landfill site extension studies underway.
14 January	1980	Application for expanded landfill operations filed by the Region.
31 January	1980	Provisional Certificate of Approval reissued for expanded Phase I area.
April/May	1980	Environmental Assessment Board hearing and decision approving Phase II area.
24 October	1980	Provisional Certificate of Approval reissued listing provisions for the approval of the Phase II area.
17 March	1983	<u>Region approves start of study to examine the potential continued use of the Burlington site because of timing problems on long-term landfill component of their ongoing Environmental Assessment.</u>
18 April	1983	Start of preliminary discussion groups on continued use proposals.
20 October	1983	Possible Continued Use Report (revised) completed.
7 December	1983	Region approves completion of studies for an Application for continued use of the Burlington Landfill.
February	1984	Region authorizes execution and submission of Application for Continued Use.

* Reports prepared on the Burlington Landfill are listed, chronologically, in Section 7.

29.3
5.2
24.5

get ①
②

29.3 ha is presently approved for landfilling. The basis for this previous application and approval was addressed in a Design and Operations Report, January 1980 prepared by M.M. Dillon Limited and a Hydrogeological Report prepared by Gartner Lee Associates Limited.

Provisional Certificate of Approval #A210102 was issued by the Ministry of the Environment on 24 October 1980, after recommendation for approval by the Environmental Assessment Board, to cover the approved site expansion. The Conditions of Approval attached to this Certificate, and the present status of compliance to these Conditions are discussed in the following section.

Since 1980, Dillon has carried out successive site capacity updates at this landfill to assess residual waste capacity and to monitor site operations. The current estimate of approved waste capacity will see the site completed by August 1984. The Burlington site is the only landfill presently operating in the Region.

how long off is new site?
→ many years, no doubt!

The Environmental Assessment of the landfill component for Halton Region's long-term solid waste management system is presently underway. This work indicates new landfill capacity will not be available by the projected closure date of the Burlington landfill site and therefore, the Region undertook to establish an interim plan. The Region of Halton authorized Dillon in March 1983 to examine alternatives for the continued use of the Burlington Landfill. As part of this program, Dillon and Regional staff met with representatives of interested parties that may be affected by the landfill operation.

Preliminary plans for increasing waste capacity were developed. Gartner Lee Associates Limited were retained to advise on the hydrogeological aspects of these plans. Discussions were held with the Ministry of the Environment, the City of Burlington, citizens and industries local to the site, National Sewer Pipe representatives and the West Burlington Ratepayers Association. As a result of these meetings, the staging and concepts were redefined. The revised program was submitted to the Region and additional meetings held with interested parties. A major public meeting was held at Aldershot Collegiate on 28 September 1983.]

A report entitled "Burlington Landfill Site; Report On Possible Continued Use - Revised", 20 October 1983 was prepared by Dillon and presented to Regional Council. On 7 December 1983 Dillon was directed by Regional Council to proceed with detailed technical studies on the Burlington landfill for the preparation of an application for a Certificate of Approval under the Environmental Protection Act.

* 3. COMPLIANCE WITH EXISTING CONDITIONS OF APPROVAL

Fourteen Conditions of Approval are currently listed on the Burlington Landfill's Provisional Certificate of Approval (Approval #A210102 dated 24 October, 1980). The Conditions are shown below along with a brief description of the Burlington site's status of compliance.

- 1) An access to the site from the North is not to be constructed and only the existing access from the North Service Road in the South is to be utilized.

A northern access was not constructed for the landfill. The existing access point from the North Service Road has always been, and will continue to be, the only entrance to the Burlington site.

- ✓ ii) Liquid industrial and toxic waste including pathological waste, industrial and chemical sludges, hazardous waste, septic tank pumpings, radioactive waste and processed organic waste will not be accepted for disposal at the landfill site.

These wastes are specifically excluded from the Burlington landfill and will continue to be so in the future. The primary control over wastes entering the landfill takes place at the scales as vehicles enter the site. Back-up control is effected by the spotter and equipment operator when wastes are deposited at the working face. Any unacceptable wastes are rejected. *what is done? surely it is possible for some prohibited wastes to enter! how often has this happened?*

- ✓ iii) The Regional Municipality of Halton will carry out the predictive monitoring programs including the submissions to the Ministry of the Environment of an annual monitoring report all in accordance with the Monitoring Report, prepared by Gartner Lee Associates Limited, April 1980 and with any amendments as required from time to time by the Director of the Environmental Approvals Branch of the Ministry of the Environment. *-check April 80 report to see if there has in fact been compliance.*

Ground and surface water monitoring has been carried out at the site since 1980. Annual monitoring reports have been produced by Gartner Lee Associates Limited for the Region and subsequently submitted to the Ministry of the Environment for review. These reports are listed in Section 7.

- iv) No landfilling shall take place in the proposed expansion area until all boreholes, any gas or

water wells, and any other conduits for possible leachate movement within the actual landfill area are identified and the proposed method of properly sealing these are submitted by the Regional Municipality of Halton and approved by the Director of the Environmental Approvals Branch, Ministry of the Environment.

In accordance with this Condition, identified leachate conduits have been sealed to the satisfaction of the Ministry of the Environment.

- v) Prior to landfilling in the Phase II expansion area, details of the surface drainage works, swales and sediment control measures, including measures for draining of Phase II during landfilling operations and for slope stabilization in areas of extreme erosion are to be submitted by the Regional Municipality of Halton and approved by the Director of the Environmental Approvals Branch, Ministry of the Environment.

Surface drainage and sedimentation control works were approved by the Ministry of the Environment prior to their construction. Perimeter ditching has been extended as landfilling progressed and a sedimentation pond was constructed adjacent to the North Service Road. A report dated 28 March 1982, concerning revegetation of the eroded Falcon Creek slopes was prepared for the Region by M.M. Dillon Limited. This report was submitted to the Ministry of the Environment and subsequently several slope rehabilitation measures were undertaken in this area.

- vi) Prior to landfilling in the Phase II expansion area, final plans, specifications and an engineer's report on the toe-drain and under-drain leachate collector system are to be submitted to and approved by the Director of the Environmental Approvals Branch, Ministry of the Environment.

These plans and specifications were submitted to and approved by the Ministry of the Environment.

- ✓ vii) Prior to landfilling in the Phase II Expansion Area, a contingency plan, for the east side of Falcon Creek Valley to intercept leachate, must be submitted by the Regional Municipality of Halton and approved by the Director of the Environmental Approvals Branch of the Ministry of the Environment.

ged
A leachate management contingency plan, prepared by the Region's consultants M.M. Dillon Limited and dated 28 September 1981, was adopted by Regional Council and subsequently submitted to the Ministry of the Environment. This plan would be utilized in the event that any of the ongoing monitoring programs indicate a long-term leachate problem for Falcon Creek. To date the contingency plan has not been necessary.

- viii) Prior to landfilling in the Phase II area of the site the Municipality shall certify that the site preparation work has been completed in accordance with the plans and specifications approved by the Director of the Environmental Approvals Branch of the Ministry of the Environment.

Halton Region certified that surface and subsurface preparatory works for Phase II were substantially complete prior to landfilling in this area all in accordance with the plans and specifications approved by the Ministry of the Environment.

- ix) A progress report on landfilling operations including the following information:
- a) results of an interpretive analysis of all monitoring programs for gas and leachate;

- b) the site map of all the landfilled areas and any deviations from the operating plans;
- c) yearly summary of volumes and weights of waste handled at the site;
- d) environmental and operational problems encountered during the operation and mitigating actions;
- e) quality and quantity of leachate discharged into the sanitary sewer system;
- f) assessment of the operation and performance of all gas and leachate control facilities.

is to be submitted every twelve months to the Director of the Environmental Approvals Branch, Ministry of the Environment. The first report is to be submitted by February 1981, with subsequent progress reports being submitted annually thereafter.

Annual monitoring reports, prepared by Gartner Lee Associates Limited, present the results of all monitoring programs, leachate studies and assess the leachate control works. Semi-annual site capacity updates, prepared by M.M. Dillon, address waste quantities, landfill progress and provide an evaluation of past landfill operations. Annual monitoring reports and information derived from the site capacity updates are submitted on a regular basis to the Ministry of the Environment.

- x) Within four months prior to the closure of the site, a complete closure plan pertaining to the termination of landfilling operations at the site, together with a schedule of dates and details as to the following stages:

- a) planning of the
 - i) development of new sites;
 - ii) rodent extermination at the closing site
 - iii) work required to restrict access to and landscape the closing site
- b) information to and education of the public of
 - i) plan for closure;
 - ii) alternative sites;
- c) implementation of the following parts of the plan
 - i) start-up of new sites;
 - ii) rodent extermination program;
 - iii) grading, compacting, seeding;
 - iv) surface drainage controls
- d) maintenance of the closed site
 - i) by periodic inspections;
 - ii) to ensure revegetation cover, control of erosion and to maintain integrity of the cover material;

is to be submitted for approval to the Director of the Environmental Approvals Branch, Ministry of the Environment.

As the Region is currently proposing to extend the life of the Burlington site, complete closure plans have not yet been prepared. Preliminary concepts for site after-use have been formulated, however, and discussed with the appropriate agencies (such as the Halton Region Conservation Authority and the Royal Botanical Gardens). These concepts are provided in this submission. Should approval not be received for the landfill continuation program, the Region will move to comply with this condition.

- xi) Within six months following the termination of landfilling operations at the site, two copies of as constructed site plans, including details of the final development contours, fill line, buffer zones, site boundaries, location of works, easements, monitoring stations and pollution control facilities are to be submitted to the Director of the Environmental Approvals Branch, Ministry of the Environment.**

This Condition, effective upon site closure, will be satisfied by the Region in accordance with the Ministry's requirements.

- xii) Within four months prior to the closure of the site the Municipality shall submit to the Director of the Environmental Approvals Branch a post closure program providing for the long-term care and maintenance of gas and leachate monitoring and control facilities.**

As previously stated, the Region is presently proposing to extend the life of the landfill site. A complete post closure program, therefore, has not yet been developed but would be should approval for continued landfilling not be granted.

- xiii) No part of the landfilling site shall be conveyed prior to or after closing of the site to any person by the applicant or any transferee from the applicant except to a Federal or Provincial Government, or any agency thereof without the prior approval of the Director of the Environmental Approvals Branch, Ministry of the Environment.**

This Condition, common on Provisional Certificates of Approval for landfills, will be followed by the Region.

- xiv) No operation shall be carried out at the site after one hundred and twenty days from these conditions becoming enforceable unless**

this Certificate including the reasons for these conditions has been registered by the applicant as an instrument in the appropriate Land Registry Office against title of the site and the duplicate registered copy thereof has been returned by the applicant to the Director of the Environmental Approvals Branch, Ministry of the Environment.

The Certificate, including the reasons for these Conditions, has been duly registered by Halton Region.

4. RESPONSIBILITY OF REGION

The Region of Halton is responsible for the provision of waste disposal facilities for its member municipalities. These mandatory responsibilities are set out in the Regional Municipality of Halton Act, Revised Statutes of Ontario, 1980, Chapter 436 and are summarized in Section 137, Subsection(2) as follows:

The Regional Corporation shall continue to provide facilities for the purpose of receiving, dumping and disposing of waste and no area municipalities shall provide such facilities.

A chronological record of the actions taken by Regional Council relative to solid waste management is provided as Section U of these documents.

With the closure of the Oakville landfill at the end of 1982, the Burlington site became the only operating landfill in the Region. Numerous public discussions and meetings with review agencies have been conducted during the formulation of the continued use plans for the Burlington landfill. An outline of these meetings is also provided in Section U of this report.

5. WASTE REQUIRING DISPOSAL

5.1 Rates of Refuse Generation

Until recently, waste quantities received at the Region's landfill sites had increased, on average, by 2.5% each year. In 1983, however, after the Oakville landfill was closed, recorded refuse quantities began to decrease. Refuse generation rates for 1983 were approximately 10% below those of 1982.

A study was undertaken to establish the reasons for the drop and to consider whether the lower tonnage rates would continue. Study results indicated that there would be a growth in waste quantities in the short-term, both from an increase in Regional population and from improved economic conditions in the commercial/industrial sector. Table 1 gives the expected annual waste quantities to 1988.

TABLE 1
PROJECTED WASTE QUANTITIES
(tonnes)

<u>Year</u>	<u>1983 Volume</u>	<u>Increment</u>	<u>Total</u>	<u>Average Tonnes/Month</u>
1984	167,800	7,150	174,950	14,600
1985	167,800	15,200	183,000	15,250
1986	167,800	18,700	186,500	15,550
1987	167,800	22,250	190,050	15,850
1988	167,800	25,800	193,600	16,150

5.2 Waste Characteristics and Control

The site will be available to municipal and private haulers collecting wastes within the Region. Wastes generated from locations outside regional boundaries will not be accepted.

Wastes that will be accepted at the site include solid domestic, commercial, institutional and industrial wastes as well as construction and demolition debris. Wastes from street cleaning, public utilities and other municipal activities will also be allowed.

Certain wastes are specifically excluded from the site. These are:

- pathological wastes
- industrial chemicals and sludges
- liquid industrial wastes
- hazardous or toxic substances
- septic tank pumpings
- radioactive wastes
- sewage sludge

The primary control of wastes being received at the site is vested with the scale operator. All vehicles entering the site report to the scale operator who is empowered to refuse any load of waste materials or to direct where the wastes are dumped within the landfill. The onus for proving the waste is acceptable for disposal is that of the hauler, not of the scale operator.

what does the hauler do?

(
*has this
even been
done?*
The secondary control of wastes is in the operating area. When wastes are dumped from a vehicle, they are visibly inspected by site staff. The staff are empowered to isolate unacceptable loads and require their removal by the hauler.

6. EXISTING SITE OPERATION

Vehicles enter the Burlington Landfill site along a paved access road running off the North Service Road between Waterdown Road and King Road. All incoming vehicles stop at the scalehouse and, with the exception of cars without trailers, all vehicles are weighed on electronic weigh scales. Vehicle weights are recorded for both incoming and outgoing traffic. Two full time personnel are stationed in the scalehouse.

(
All cars are directed to a supervised public container area where wastes are segregated for recycling or are dumped into a container for subsequent transfer to the landfill working area. Containers are available for scrap metal, glass and general refuse. A separate covered container for waste newsprint is located on the site access road before the scalehouse. During periods of bad weather, all vans and small trucks (with small loads) are also directed to the public container facility.

(
All other vehicles proceed from the scalehouse to the landfill working area and are directed to the current dumping area by a spotter. Two landfill compactors continually spread and compact the refuse on the working face. Scrapers, assisted by a bulldozer as required, carry out excavations to





Consulting Engineers & Planners

OUR FILE: 9319-02
YOUR FILE:

30 March 1984

M.M. Dillon Limited
47 Sheppard Avenue East
WILLOWDALE, Ontario
M2N 5X5

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

Burlington Landfill Continued Use -
Application for a Certificate of
Approval

Dear Sirs:

We are pleased to present the Environmental Impact Assessment and Rehabilitation and After Use contained as Appendix 'G' and Appendix 'H' of the Technical Report filed in support of an Application for a Certificate of Approval for the continued use of the Burlington Landfill Site.

The writer will appear as a witness at the hearing before the Environmental Assessment Board on the basis of these reports.

Yours truly,

M.M. DILLON LIMITED

D.G. Stevens, M.Sc.
Associate

DGS:11y
Encl:

G/H-1

BURLINGTON LANDFILL CONTINUATION

G

ENVIRONMENTAL IMPACT ASSESSMENT

9319-04
29 March 1984

M.M. DILLON LIMITED
Consulting Engineers & Planners

SECTION G
ENVIRONMENTAL IMPACT ASSESSMENT

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SECTION G
ENVIRONMENTAL IMPACT ASSESSMENT
SUMMARY

The proposal calls for continued use of the Burlington Landfill site in four phases through 1987, beyond currently approved waste capacity which will be used up by August 1984.

Landfilling operations will continue to change existing topography and create a new soil type on an additional 5.2 ha. Vegetation displaced includes a hedgerow and herbaceous field flora. No significant impacts on watercourses, wildlife or heritage resources are expected.

No part of the Sassafras Woods ESA will be used in the landfill continuation. The natural integrity and diversity of the ESA should not be affected because design and operating measures will mitigate potential adverse effects. Any potential impacts stemming from the low possibility of minor leachate entering the ground water system east of Falcon Creek and the possible installation of a contingency interceptor drain will be limited to the area east of the creek.

We therefore concur with the need and advisability of continued use of the Burlington Landfill site as specified. Following the Design and Operations Report, we recommend these mitigating measures:

- i) a drainage ditch be installed around the perimeter of areas to be landfilled;
- ii) an underdrain leachate system be installed under areas to be landfilled;

- iii) the existing Leachate Management Contingency Plan be amended to reflect the continued use plan;
- iv) [a 10 m buffer area with a strong, well-maintained wire mesh fence be continued around the perimeter of the site;]
- v) water and/or calcium chloride only be applied to control dust on the site; calcium chloride should not be used within 10 m of the Falcon Creek valley crest or in drainage areas;
- vi) litter be controlled by daily pick-up, fencing and minimal working face area;
- vii) the after use and rehabilitation plans be designed and carried out to replace as many of the existing and former natural vegetation and soils on the site as possible;
- viii) suitable vegetation continue to be established on the existing eroded slopes;
- ix) the use of recreational all-terrain vehicles be prohibited on the site;
- x) an environmental inspector be appointed to ensure the environmental protection measures specified are implemented, and that environmental concerns are identified and corrected where needed as soon as possible to reduce environmental impact to a minimum.

1. INTRODUCTION

The purpose of the Burlington Landfill Continuation Environmental Impact Assessment (EIA) is to:

- ① document the existing environmental conditions of the site and surrounding study area;
- ② determine the effects and environmental changes that may occur as a result of a continuation of landfilling activities;
- ③ evaluate the environmental significance of the effects of the continuation;
- ④ indicate mitigating measures and monitoring requirements;
- ⑤ make recommendations to minimize environmental impact.

The Halton Region Official Plan requires an EIA when a development is proposed in or adjacent to an Environmentally Sensitive Area (ESA) identified in the Official Plan, and specifically when a sanitary landfill site is proposed. Sassafras Woods ESA is located adjacent to the Burlington landfill continuation.

The EIA Section G should be read in context together with other submissions being made at this time. These include reports on Rehabilitation and After-Use (Section H), Traffic Analysis (Section J), Noise Impact Analysis (Section K), Parkway Belt West Plan (Section L), Planning Assessment (Section M), Visual Analysis (Section N), Hydrogeological

Study (Section O), Leachate Treatment (Section P), Water Quality (Section Q), Surface Drainage (Section R), and Design and Operations (Section S).

2. DESCRIPTION OF THE PROPOSAL

The proposal calls for continued use of the Burlington landfill site through 1987, beyond currently approved waste capacity which will be used up by August 1984. The proposed landfill continuation is to occur in four phases integrated with existing operations:

- Phase A would raise the presently approved contours to add 6.1 months additional capacity to the landfill.
- Phase B would extend the northern most section easterly for 3.8 ha to add 4.7 months additional capacity to the landfill.
- Phase C involves further contour increases that would prolong use of the landfill for another 16.5 months. }
- Phase D would extend the existing approved landfill 1.4 ha north of a local ground water divide, adding 6.1 more months capacity.

The detailed description of the proposed phases and land uses affected is found in the Design and Operations Report (Section S) and Planning Assessment (Section M).

3. DESCRIPTION OF THE SURROUNDING ENVIRONMENT

3.1 Introduction

The study area is broadly defined here as the existing Burlington Landfill site and the surrounding properties. The extent to which adjacent properties are examined depends on the completeness of existing information and their distance from the landfill area. Thus we perceive no need to study the distant edge of adjacent properties in as much detail as the edge which abuts the landfill site (Figure G-1).

3.2 Methods

Geomorphological and soils data were extracted from Gillespie et al. (1971), Canada Department of Agriculture (undated), Dillon 1980, Proctor & Redfern 1982, Fenco (1983a) and Gartner Lee Associates Limited (Section 0, 1984).

A description of the flora and the fauna was compiled from existing reports (e.g. Halton Region EEAC 1978, Armour et al. 1979, Dillon 1980, Fenco 1983b,e,f, Proctor and Redfern 1982). This information was supplemented by two field trips (Dillon 1983b, 1984a). A reasonably complete inventory of the natural environment has been developed from these reports. Additional field work for updating documentation and confirmation of species is anticipated in the spring of 1984. This is not expected to result in any changes to landfill design or operations.

Significant features were evaluated using Halton Region EEAC (1978) and Armour et al. (1979) for Environmentally Sensitive

Areas, and Argus and White (1977, 1980) for rare plant species. These references were supplemented by our own knowledge of the natural features in Halton Region.

Common names of flora and fauna are used throughout the report unless they are ambiguous or the species are significant, in which case scientific names are used. All scientific names of plants are provided in the Appendix.

3.3 General Description

stress similarity of properties.
The study area lies just southeast of the Niagara Escarpment, and slopes gradually down towards Lake Ontario. Proctor and Redfern (1982) report an average fall of 42 m/km (4.2%) for the adjacent property to the east. The topography is undulating such that the slope to the southeast is not consistent. Much of the study area is cleared land which was presumably originally forested. The only extensive existing forest cover is Sassafras Woods which lines the valley slopes of Falcon Creek and other streams to the west and north of the Burlington Landfill site. Other smaller wooded areas occur on the National Sewer Pipe (NSP) property to the east, and on the vacant land south of Highway 403.

Previously, the Burlington Landfill and NSP properties supported clay pits which were used for the production of brick and in pottery making (Proctor & Redfern 1982). At present, the property to the west of the Burlington Landfill site is in a "natural" state, being designated Environmentally Sensitive Area No. 4 (Sassafras Woods) in the Region of Halton's (1978) Environmentally Sensitive Areas Study. Properties to the east of the Burlington Landfill site are

currently vacant and extensively used for off-road vehicle recreation. The area between Highway 403 and the CNR tracks is also apparently vacant (Figure G-1).

3.4 Soils

The dominant soil materials in the study area are formed on clay tills which cover the Queenstone Shale formation (Dillon 1980, Proctor & Redfern 1982). In places the red Queenston Shale is exposed where ground cover has been removed and surface materials have been lost.

Undisturbed parts of the Burlington Landfill site between the ravines have been identified as well-drained Oneida loam (Gillespie et al. 1971). This textural phase applies only to the surface horizon and is considered to be the result of postglacial wind and water action. Soil reaction in the undisturbed Oneida loam increases from a pH of 5.5 on the surface to 8.0 in the fine textured parent material. Six soil samples obtained by Dillon from the eroded clay/shale slope in 1981 confirmed a pH range from 7.0 to 8.2 (neutral to moderately alkaline) along with low phosphorus, high to excessive potassium and high magnesium levels. In the hydro-geological study (Section 0, Gartner Lee Associates Limited 1984) the glacial till is reported to contain (28%) to (45%) clay size particles (silty clay loam to clay texture) and an average cation exchange capacity of 10.5 me/100 g of soil. } ?

The Canada Land Inventory Soil Capability for Agriculture identifies the Oneida loam as 60% Class 1 and 40% Class 3 with a topographic limitation. This would make it suitable for sustained production of common field crops but no such

use has occurred for some time on areas to be landfilled. Eroded sections and the steep ravines have no present capability for agriculture.

Soils between Highway 403 and the CNR tracks include Trafalgar silty clay loam over shaley clay, Springvale sandy loam over gravel and Winona sandy loam over clay till (Gillespie et al. 1971). Their CLI capability for agriculture has been rated as Class 2 or 3 with moderate limitations of low permeability, wetness and low fertility. Again, little active agricultural use is evident at present.

Most of the soils in unforested sections of the Burlington Landfill site have been disturbed. West of the hedgerow to be removed during Phase B of the landfill continuation, the soils have been extensively scraped by heavy machinery, showing the light-coloured compact parent material. Soils have been stockpiled east of this hedgerow since 1983, forming a large hill. The area east of the hedgerow has also been used for off-road vehicle recreation.

✓ 3.5 Watercourses

The major watercourse flowing through the study area is Falcon Creek. Its headwaters are along the escarpment on the northwest side of the landfill. Numerous small intermittent tributaries drain into the creek in its upper reaches. One other small watercourse, Indian Creek, occurs on the east side of the study site. Both streams flow under Highway 403 and through the low wet area on the south side of the Highway.

Falcon Creek is a locally meandering stream. It has cut a steep wooded valley west of the landfill site. The actual width of the streambed at this point is 1 m to 2 m. Surface drainage from the east side has caused severe gullying and erosion on the deforested part of east slope prior to the property being used for landfilling. Flat areas in the valley have created small wetlands at various places which are dominated by Cattails. These wetlands range in size from a few square metres to approximately 1 ha.

The stream was mostly snow-covered and frozen at the time of the site visits. However, small open areas just north of Highway 403 showed the water to be about 5 cm deep and clear. It was relatively fast flowing over a bottom substrate of rocks and gravel.

South of Highway 403, the creek continued to meander through a valley of varying bank height from very steep to flat. Undercut banks were evident in some areas. Fallen branches and large rocks provided instream cover. The banks were quite heavily vegetated with trees, shrubs and grasses.

Indian Creek has been channelized south of Highway 403. Its bank height is approximately 1 m to 2 m. There was a small flow and water depth was 5 cm. The bottom substrate was gravel.

3.6 Vegetation

The vegetation of the study area can be separated into distinct units which largely correspond to ownership and existing documentation.

3.6.1 Burlington Landfill Site

Much of the site has been highly disturbed as a result of the landfilling operations. However, descriptions of the ravine forest edge (Sassafras Woods and Indian Creek), hedgerows, eroded shale/clay slope on the west, fields and streambank are provided in the Dillon (1980) report and appear below. Vegetation was examined during field surveys in the spring, summer and fall of 1979. Known changes have been incorporated in the description.

Ravine Forest Edge

Mixed ravine forest communities occur along the western, northern and eastern site boundaries. The forest structure is primarily secondary growth, with the largest trees established in the lower ravine areas. The forest presently supports rich canopy and understory flora which has high ecological value, and very high functional value in controlling slope erosion.

The ravine forest bordering the west and north limits of the proposed site extension (areas A, B and C in Figure G-1) is part of Sassafras Woods ESA. It is discussed in detail in the section on Significant Features (Section 3.8).

The edges of Sassafras Woods abutting the landfill were examined. Table 3.1 summarizes species information. No rare plants were observed along the ravine forest edge.

The Indian Creek ravine borders part of the eastern property boundary of the existing landfill area (areas D and E in Figure G-1). Trees are generally young to semi-mature with a few scattered mature specimens of Red and White Oak. Table 3.2 summarizes species information in that area.

Hedgerows (Area G in Figure G-1)

The northern hedgerow, to be removed during Phase B of the landfill continuation, contained a growth of Hawthorn and Honeysuckle with mature White Oak, Red Oak and Shagbark Hickory. The oaks ranged in size between 40 cm to 65 cm diameter (dbh). Shagbark Hickory trees were estimated at up to 25 cm dbh. Also present in the hedgerow were immature Sugar Maple, and White Ash and Nannyberry estimated at less than 20 cm dbh.

The southern hedgerow located along the east side of the existing landfill site entrance road contained Bur Oak ranging between 10-50 cm dbh and scattered young Shagbark Hickory. A clump of semi-mature Eastern Cottonwood formed the northernmost portion of the hedgerow.

TABLE 3.1
VEGETATION ALONG THE EDGE OF SASSAFRAS WOODS ABUTTING
THE BURLINGTON LANDFILL OPERATION (from Dillon 1980)

Area (Refer to Base Map)	Dominant Trees	Size (dbh)*/ Age	Shrubs	Herbaceous Plants	Comments
A	• red oak • shagbark hickory • large-tooth aspen • hawthorn • ironwood • white ash • witch-hazel	• young to semi-mature • 20-cm dbh • 3-6 m in height	• hawthorn • choke cherry • honeysuckle • serviceberry • sumac • saplings of dominant trees	• sweet brier • false solomon's seal • solomon's seal • common buttercup • sharplobed hepatica • common cinquefoil • thimbleweed • wild grape	• red maple (10-20 cm dbh) • sweetcherry (20-25 cm dbh) in association with the dominants along ravine crest • red oak, sugar maple and white pine (40-50 cm dbh) in depressional areas
B	• white oak • red oak • trembling aspen • white ash • sumac • hawthorn	• mature • 20-55 cm dbh	• same species as in Area A	• same species as in Area A	• sugar maple, black maple, shagbark hickory, white pine in association with dominant trees
C	• white oak • red oak • sugar maple • white ash • black cherry • witch-hazel	• 10-45 cm dbh	• honeysuckle • hawthorn • chokecherry • saplings of dominant trees	• solomon's seal • false solomon's seal • trillium • roundlobed hepatica • thimbleweed • jewelweed • wild lily-of-the-valley • white baneberry • common strawberry • common cinquefoil	• ironwood, sweet cherry, red maple (10-30 cm dbh) in association with dominants

* dbh = tree diameter at breast height.

TABLE 3.2

VEGETATION ALONG THE EDGE OF INDIAN CREEK RAVINE (From Dillon 1980)

Area (Refer to Base Map)	Dominant Trees	Size (dbh)*/ Age	Shrubs	Herbaceous Plants	Comments
D	• sugar maple • white ash • ironwood • shagbark hickory • red oak • white oak	• less than 30 cm dbh	• hawthorn	• false solomon's seal • common strawberry • common cinquefoil	
E	• large-tooth aspen • hawthorn • white oak • red oak • shagbark hickory	• 10-20 cm dbh • several red and white oaks are 40-55 cm dbh	• very few shrubs open understory		• open structure

* dbh = tree diameter at breast height

Eroded Western Clay/Shale Slope (Area H in Figure G-1)

Young trees, shrubs and herbaceous plants have colonized the more stable crest and toe areas of the actively eroding slope. Vegetation has been displaced from most of the steep west-facing slope at least since before 1954, judging from aerial photographs.

On stable slope areas, several trees and shrubs (less than 15 cm dbh) were noted during field investigations:

- Large-tooth Aspen
- Trembling Aspen
- Shagbark Hickory
- Red Oak
- White Oak
- Hawthorn
- Choke Cherry
- Currant
- Sumac
- Poison-ivy
- White Ash
- Honeysuckle

Several species of herbaceous flora were also observed along stable areas of the slope, including:

- Common Buttercup
- Shepherd's Purse
- Sweetbrier
- Pasture Rose
- White Sweet-Clover
- Yellow Sweet-Clover

- Red Clover
- Cow Vetch
- Wild Carrot
- Common Milkweed
- Nightshade
- Common Mullein
- Nipplewort
- Yarrow

In actively eroding gullies and along gully spines, the following species were colonizing most successfully:

- Field Horsetail
- Winter Cress
- Sumac
- Common Strawberry
- Hawthorn
- Choke Cherry
- Pasture Rose
- Wild Carrot
- Ox-eye Daisy
- Goldenrod
- Common Chickory
- Welshed Thistle
- Great Burdock

Recent tree planting (Fall 1981 and Spring 1983) on the eroding slopes has included the following species:

- Jack Pine
- White Pine
- White Cedar
- Carolina Poplar (hybrid clone)

- Black Walnut
- Red Oak
- Black Locust

In addition, a mixture of the following grasses and herbaceous legumes together with mulch and adhesive was hydroseeded in June 1983 to control erosion on the slopes:

- Redtop
- Bromegrass
- Tall Fescue
- Red Fescue
- Italian (Annual) Ryegrass
- Birdsfoot Trefoil
- White Sweet-clover
- White Clover

The largest gully (over 3 m deep) had been filled with clay by a bulldozer prior to hydroseeding.

Revegetation in 1983 was hampered by hot dry weather which followed the seeding and continued through most of the summer. Inaccessibility restricted the method of application and the type of mulch that could be applied. The recommended timing of application could not be followed. Seeded areas were also damaged by motorcycles running on the slope. A catch of grass in gully bottoms did become visible in late fall.

Further establishment of suitable vegetation on the eroded slopes is planned for spring 1984.

Fields

The area proposed for the site extension in 1980 was a typical old field ecosystem composed of Timothy Grass, Asters, Goldenrod, Cow Vetch, Thistles, Red Clover and Common Buttercup. Areas to be used for landfill continuation are expected to contain a similar composition. These open field areas, and the field in the south part of the landfill site will be the subject of more fieldwork in spring 1984.

The completed parts of the landfill were sparsely covered with herbaceous species similar to those colonizing the eroded clay slopes. Yellow and White Sweet-clover, Chickory, Shepherd's Purse, and Ox-eye Daisy were the most abundant. The completed parts of the landfill were subsequently hydro-seeded with a grass/legume mixture in 1982 and fertilized in 1983. Revegetation has generally been successful, at least with the rye cover crop in the first year.

Streambanks

Trees, shrubs and vines noted along the banks of Falcon Creek included:

- Eastern Cottonwood
- Black Willow
- Hop-hornbeam
- White Elm
- Witch-hazel
- Wild Grape
- Virginia Creeper
- White Ash

- Honeysuckle
- Dogwood
- Raspberry
- Sumac
- Cottonwood
- Shagbark Hickory

3.6.2 Sassafras Woods

The Halton Region ESA Study (Halton Region EEAC 1978) identifies this area as an environmentally sensitive area (ESA). The significance of Sassafras Woods including rare plants is discussed in more detail in section 3.8 on Significant Features. This section is restricted to a general description of the site.

Several reports have described the natural features of Sassafras Woods ESA (Tant et al. 1977, Halton Region EEAC 1978, Armour et al. 1979, Ecologists 1977). Pertinent sections of these reports were consulted. A summary of the natural features of the area is extracted from Sutherland (1979):

Sassafras Woods is an excellent example of a remnant upland carolinian woodland. Some 12 species of plants encountered are truly carolinian or southern in their affinities. A great many more plant species, while not strictly carolinian, have generally more southerly distributions (Soper, 1962). Six species: Rue-anemone (Anemonella thalictroides), Sweet Chestnut (Castanea dentata); Horsebalm (Collinsonia canadensis), Eastern Flowering Dogwood (Cornus florida), Yellow Mandarin (Disporum lanuginosum) and American Columbo (Frasera carolinensis), are considered to be both nationally and provincially rare (Argus and White, 1977).

The woodlot is south-facing and is well drained by several shallow ravines. Three plant communities within the woodlot are reasonably distinctive and easily defined as: (1) Dry Upland Forest; (2) Dry Wooded Slopes and Ridges; and (3) Ravines and Wet Depressions.

(1) Dry Upland Forest

Dry Upland situations are dominated by Sugar Maple and White Ash and to a lesser extent by both Red Oak and White Oak, White Pine and American Beech. Scattered throughout this association are occasional examples of Sassafras (Sassafras albidum), Sweet Chestnut and Eastern Flowering Dogwood. An understory layer composed of Witch-hazel, Blue-beech, Hop-hornbeam and Eastern Flowering Dogwood is an interesting and distinctly southern association. A number of carolinian herbaceous species occur beneath this understory; notably Horsebalm and Yellow Mandarin.

(2) Dry Wooded Slopes and Ridges

Dry wooded slopes and ridges with southern exposures or aspects are predominantly composed of both Red and White Oak, Shagbark Hickory and White Pine. Witch-hazel, although present in the understory, is far less common than in the preceding plant community; instead, a number of woody plants form a light shrub layer. Many more southerly plants are present in this layer including: Black Huckleberry; New Jersey Tea; Maple-leaved Viburnum and Fragrant Sumac. The co-occurrence of three species of Tick-trefoils is an uncommon regional phenomena. These are Pointed-leaved Tick-trefoil, Naked-flowered Tick-trefoil and Panicked Tick-trefoil. Herbaceous species include: Round-lobed Hepatica, Rue-Anemone, the grass (Panicum latifolium), Yellow Wild Licorice, Seneca Snakeroot and Whorled Milkwort (Polygala verticillata). The occurrence of the regionally uncommon saprophyte, Pinesap (Monotropa hypopithys) is of interest.

(3) Ravines and Wet Depressions

A number of ephemeral streams dissect the woodlot creating shallow ravines. These damp stream beds

in addition to supporting a variety of carolinian plant species, create an aesthetically pleasing riparian habitat. Dense vine tangles composed of Poison-Ivy, Wild Grape and Virginia Creeper are suspended from Witch-hazel and Blue-beech. In the rich silt deposits of the stream-bed occur a number of rare carolinian plants: American Columbo, Spicebush, Horsebalm, and the regionally uncommon grass (Leersia virginica). In the wet duff and muck of stream side seeps grows Michigan Lily. (Sutherland, 1979)

3.6.3 National Sewer Pipe Property

The following description of the vegetation on the NSP site is based on Proctor & Redfern (1982). A large proportion of the property is described as scrub. This cover type included thickets, disturbed bottomland and hedgerows. Common species in the thickets are Hawthorns, Fragrant Sumac, Choke Cherry, Gray Dogwood and Staghorn Sumac. Disturbed ravines are characterized by White Oak, Red Oak, White Ash, Shagbark Hickory and White and Red Elm. The shrub layer included Gray Dogwood, Tartarian Honeysuckle, Buckthorn and Raspberry.

The NSP site also has some significant forest cover. Dominant trees of the canopy of these forests consisted of various combinations of Red Oak, White Oak, Shagbark Hickory, and Sugar Maple. A shrub layer of medium height dominated by Gray Dogwood and Choke Cherry was found to have a dense, patchy nature throughout the forests.

Although Proctor and Redfern identify several rare or significant plants on the NSP site, only one regionally significant plant species, Woodland Sunflower (Helianthus

divaricatus) and one provincially rare species, Mountain Blueberry (Vaccinium pallidum) were documented in the forest adjacent to the landfill site.

The only areas on the NSP site that could be affected by the proposed landfill continuation are the forest edges that border the landfill site, a hedgerow in the south of the property and a tributary of Falcon Creek. The first two areas have been addressed in section 3.6.1 of this EIA on the Burlington Landfill site. The Falcon Creek tributary is a wet swale that originates on the property line between the landfill site and NSP property. It is vegetated mainly by Cattails.

3.6.4 Area South of Highway 403

Fenco Technical Paper No. 3 (1983) describes the site as being dominated by old-field scrub, mature forest, second growth woody species, wetland areas and mature oak grove. It notes that both Black Walnut (Juglans nigra) and Swamp White Oak (Quercus bicolor), two species identified as provincially rare, occur there. The identification of Swamp White Oak at this site should be regarded as tentative owing to the apparent lack of a herbarium specimen and the confusion which sometimes arises between this species and the common Bur Oak. The site was visited in January 1984 (Dillon 1984a) to evaluate, as far as it was possible, the biological characteristics of the site.

The area is largely old field but with scattered wetlands and wooded areas. The area is dissected by several small streams and ditches as well as Falcon Creek and Indian Creek. The

last two watercourses drain the study area north of Highway 403. The old field contains typical early succession herbs.

The main wooded area occurs along the banks of Falcon Creek. It is dominated by Sugar Maple and Red Oak. Other woody species included:

- Hop-hornbeam
- Blue-beech
- Black Cherry
- Shagbark Hickory
- Bitternut Hickory
- Witch-hazel

A small marsh was noted just west of King Road. It was dominated by Cattails with a border of willow shrubs.

The only species of note in this area, apart from the previously mentioned Black Walnut and Swamp White Oak, was a large patch of Rough Aven (Geum laciniatum), which is rare in Ontario and Canada (Argus and White 1977).

3.7 Wildlife

3.7.1 Aquatic Fauna

Small intermittent watercourses in the area are poor for supporting fish. A survey done by Fenco (1983f) in Falcon Creek found three species of minnows in the lower reaches: Spottail Shiner (Notropis hudsonius), Bluntnose Minnow

(Pimephales notatus) and Fathead Minnow (P. promelus). All are common in southern Ontario and typical of warm-water streams.

It is unlikely that fish inhabit Indian Creek due to its intermittent nature and the fact that it has been severely disturbed through channelization.

No stream invertebrates were seen during the site survey, (Dillon 1984a) suggesting that stream flow was low or nil during parts of the year. A survey by Proctor and Redfern (1982) reported the presence of immature damselflies, dragonflies, beetles and mosquitos.

3.7.2 Amphibians and Reptiles

Few amphibians and reptiles have been observed. Only two amphibians, Wood Frog and Red-backed Salamander, and one snake, Eastern Milk Snake have been reported from Sassafras Woods (Armor et al. 1979). Two snakes, Eastern Garter Snake and Northern Brown Snake, and three anurans; Chorus Frog, Green Frog and American Toad have been reported from the NSP site (Proctor & Redfern 1982). There are no reports of herptiles on the Burlington Landfill site.

The following amphibians and reptiles were reported in Fenco Environmental Working Paper No. 6 (1983f) from south of Highway 403.

- American Toad.
- Green Frog
- Bullfrog

- Red-back Salamander
- Painted Turtle
- Snapping Turtle
- Garter Snake

Of these species only the Bullfrog is noteworthy. It occurs uncommonly in the Region of Halton although it is common elsewhere in the province. It was reported from the wetland area south of Highway 403. The greater species richness south of the Highway may be attributed to more wetland area there.

3.7.3 Birds

The following birds have been reported from the study area (Planning Department, Halton 1978, Armour et al. 1979, Proctor & Redfern 1982, and Dillon 1980, 1984a).

Turkey Vulture	Golden-crowned Kinglet
Red-tailed Hawk	Ruby-crowned Kinglet
Ruffed Grouse	American Robin
Killdeer	Gray Catbird
American Woodcock	Brown Thrasher
Herring Gull	European Starling
Owl (species unknown)	Yellow-throated Vireo
Whip-poor-will	Yellow Warbler
Mourning Dove	Ovenbird
Northern Flicker	Common Yellowthroat
Yellow-bellied Sapsucker	Northern Cardinal
Downy Woodpecker	Indigo Bunting
Eastern Kingbird	White-throated Sparrow
Eastern Wood-Pewee	Song Sparrow

Barn Swallow
Blue Jay
American Crow
Black-capped Chickadee
White-breasted Nuthatch
House Wren

Dark-eyed Junco
Bobolink
Red-winged Blackbird
Brown-headed Cowbird
Northern Oriole
American Goldfinch

3.7.4 Mammals

With the exception of those from Sassafras Woods, mammal observations have all been of a casual nature. Armour et al. (1979) did a limited amount of small mammal trapping in Sassafras Woods. The following species have been reported from the study area:

- Smoky Shrew
- Masked Shrew
- Short-tailed Shrew
- Meadow Jumping Mouse
- White-footed Mouse
- Star-nosed Mole
- Woodchuck
- White-tailed Deer
- Eastern Gray Squirrel
- Eastern Cottontail Rabbit
- Raccoon
- Eastern Chipmunk
- Red Squirrel
- Meadow Vole
- Skunk

TABLE 3.3
ONTARIO LAND INVENTORY
LAND CAPABILITY TO PRODUCE WILDLIFE

<u>SPECIES</u>	<u>CAPABILITY CLASS (1-high; 7-low)</u>	<u>LIMITATIONS¹</u>
White-tailed Deer	2	deficient soil moisture
Ruffed Grouse	2	deficient soil moisture
Hungarian Partridge	2	deficient soil moisture
Ring-necked Pheasant	3	climate; deficient soil moisture
European Hare	2	deficient soil moisture
Migrant geese	2	deficient soil moisture
Puddle ducks; Wood Ducks, duck hunting	7	lack of free-flowing water; topography restricting water impoundment; unfavourable land-form pattern

-
1. Characteristics that limit the production of suitable food and cover for wildlife or have an adverse effect on the species.

Both Dillon (1980) and Fenco (1983e) reports note that the White-tailed Deer was particularly common. This concurs with the Ontario Land Inventory (OMNR 1976) which rates the area as Class 2 (out of seven classes with Class 1 being the most productive) for deer production. The Region of Halton (1978) study remarks that the Falcon Creek valley (north of the Burlington Landfill site) serves as a significant wildlife corridor between Sassafras Woods and Waterdown Escarpment Woods, another ESA to the north of the study area.

Table 3.3 gives the productivity classes for wildlife occurring in the area according to the Ontario Land Inventory.

3.8 Significant Features

3.8.1 Sassafras Woods

Sassafras Woods is designated an Environmentally Sensitive area by the Halton ESA study (Halton Region EEAC 1978) and is recognized as such in the Halton Region Official Plan (Halton Regional Municipality 1980). It fulfills two of the nine criteria used for identifying ESA's. The two criteria are:

Criterion Four:

The area is a habitat with limited representation in the Region, Ontario or Canada, or a small remnant of particular habitats which have virtually disappeared within the Region.

The long growing season and the immaturity of sections of Sassafras Woods provide suitable conditions for

Carolinian species. This woods contains the largest number and best quality of Sassafras (Sassafras albidum) and Flowering Dogwood (Cornus florida) in Halton Region. These Carolinian species are near the northern limit of their range in Ontario. Thus their presence indicates a very unusual habitat for Halton Region. (P. Maycock, Pers. comm. 1976).

Criterion Six:

The area provides habitat for rare or endangered species that are endangered Regionally, Provincially or Nationally.

Seven plant species identified as nationally and/or provincially rare in the Halton ESA Study were reported to occur in Sassafras Woods. They are:

Common Hoptree	<u>Ptelea trifoliata</u>
American Columbo	<u>Frasera caroliniensis</u>
Eastern Flowering Dogwood	<u>Cornus florida</u>
Large-bracted Tick Trefoil	<u>Desmodium cuspidatum</u>
Honey Locust	<u>Gleditsia triacanthos</u>
Red Hickory	<u>Carya ovalis</u>
Sassafras	<u>Sassafras albidum</u>

Since publication of the ESA study, Sweet Chestnut (Castanea dentata) has been found in Sassafras Woods ESA. This is nationally and provincially rare, and undoubtedly significant.

Armour et al. (1979) list twenty-one "noteworthy" species in Sassafras Woods, seven of which are considered rare in Ontario. These species are:

* Yellow Mandarin	<u>Disporum lanuginosum</u>
Michigan Lily	<u>Lilium michiganense</u>
* Black Walnut	<u>Juglans nigra</u>
* Rue-anemone	<u>Anemonella thalictroides</u>
Spicebush	<u>Lindera benzoin</u>
Sassafras	<u>Sassafras albidum</u>
Panicled Tick-trefoil	<u>Desmodium paniculatum</u>
Seneca Snakeroot	<u>Polygala senega</u>
Fragrant Sumac	<u>Rhus aromatica</u>
Bittersweet	<u>Celastrus scandens</u>
New Jersey Tea	<u>Ceanothus americanus</u>
Leatherwood	<u>Dirca palustris</u>
* Flowering Dogwood	<u>Cornus florida</u>
Wintergreen	<u>Gaultheria procumbens</u>
Shinleaf	<u>Pyrola elliptica</u>
Round-leaved Pyrola	<u>P. rotundifolia</u>
Starflower	<u>Trientalis borealis</u>
* American Columbo	<u>Frasera caroliniensis</u>
* Poke Milkweed	<u>Asclepias exaltata</u>
* Horsebalm	<u>Collinsonia canadensis</u>
Indian Pipe	<u>Monotropa uniflora</u>

Provincially rare species (Argus and White 1977, 1980) are marked with an asterisk. Some of the other species such as Leatherwood, Indian Pipe and Starflower are quite common in the Region of Halton and in the province and their inclusion as "noteworthy" species is probably unwarranted. Only one rare species, Rue-anemone, occurs on the east slope of Falcon

Creek, adjacent to the landfill operation. All other reported rare species occur west of Falcon Creek (Halton Region Files).

Uncommon bird species noted from Sassafras Woods are:

Whip-poor-will	(<u>Caprimulgos</u> <u>rociferus</u>)
Golden-crowned Kinglet	(<u>Regulus</u> <u>satrapa</u>)
Ruby-crowned Kinglet	(<u>Regulus</u> <u>calendula</u>)
Yellow-throated Vireo	(<u>Vireo</u> <u>flavifrons</u>)

(Armour et al. 1979 and Halton Region EEAC 1978).

Sassafras Woods is one of the last remaining sizeable woodlots below the escarpment in Halton (Halton Region EEAC 1978). Several of the carolinian plant species which occur there (Sweet Chestnut, Sassafras and Flowering Dogwood) are southern species which are approaching their northernmost limits in Halton. The northeast section of Sassafras Woods also provides a continuous wooded link to Waterdown Escarpment Woods (ESA No. 5); (the hydro ROW is the only discontinuity in this wooded corridor). This link is no doubt important for the local movement of mammals and for birds during migration.

The boundaries of the Sassafras Woods ESA are only approximately defined in the Halton ESA study. The Environmental Impact Assessment Guidelines require that "In the area affected by the application, the EIA should investigate and recommend precise ESA boundaries..." (Halton undated, Section 2.4.2). We have examined the affected part of the

Sassafras Woods ESA, and determined the ESA eastern boundary according to the continuity of plant communities. The boundary is illustrated in Figure G-1.

3.9 Heritage Resources

There are no historically significant man-made features on the Burlington Landfill site. An assessment of archaeological potential has been completed by the Museum of Indian Archaeology, University of Western Ontario (1984).

Archaeological surveys have documented 39 sites within a 4 km radius of the Burlington landfill site. A cluster of 23 sites was located south of Plains Road east of the QEW and west of Brant Street. Most of the sites consisted of scatters of stone material and few diagnostic artifacts were found. No known archaeological sites are currently registered on the property to be affected by continued use of the landfill.

Based on the distribution and cultural affiliation of known sites in the vicinity, a high probability is suggested for locating archaeological sites within 200 m of tertiary streams in the area. Any sites found "will probably be Archaic campsites or isolated finds of non-diagnostic lithic material" (Museum of Indian Archaeology 1984).

Extensive disturbance by current landfill operations precludes intensive archaeological examination of the area proposed for landfill continuation. Therefore, no significant archaeological finds are expected in the area affected.

4. ASSESSMENT OF THE EFFECTS ON THE ENVIRONMENT

4.1 Methods

The Design and Operations Report (Section S, Dillon 1984b) for the Burlington Landfill site was examined to identify activities which could produce environmental impacts. A search of the literature was undertaken to document potential adverse effects on the environment produced by landfilling. Included in this search were relevant periodicals and environmental analyses from other landfill operations. Potential impacts were identified and the effect of each of them on different components of the natural environment surrounding the landfill was determined.

Potential environmental impacts were separated into four components: topography and soils, watercourses, vegetation and wildlife. In addition, sections were written that summarize the impacts on Sassafras Woods ESA and the potential impacts of the Leachate Management Contingency Plan. Measures for mitigating adverse effects are discussed in Section 5.

4.2 Topography and Soils

Landfilling operations will continue to change the existing topography. The fairly gentle slopes which currently exist at the site will be replaced by steeper inclines up to a maximum of 25%. The new landform will have an overall higher profile.

The steeper slopes will generate more rapid surface runoff and reduce the amount of surface water which permeates the soil. Susceptibility to erosion will be minimized by prompt revegetation. The generation of landfill gases will alter the internal aerobics of the soil and affect plant intake of trace elements (Flower and Leone 1977). Therefore, a new soil type will be created on an additional 3.8 ha (Phase B) or 5.2 ha (Phase B and D).

4.3 Watercourses

The potential impacts on water quality have been addressed in a separate report (Section Q, Dillon 1984d). The volume of leachate entering surface water systems is low (Section O, Gartner Lee Associates Limited 1984). Other potential effects of the proposed landfill on surface water are limited to those caused by surface water runoff. Erosion control measures outlined in Section 5 should substantially reduce the impacts from surface water runoff and no adverse effects are expected.

Potential increased surface water runoff could increase suspended solids in surface waters under certain circumstances. However, we do not anticipate that this will have any adverse effects on the aquatic flora and fauna as most sediments will be contained by the sedimentation pond. Runoff may also add nutrient loadings, thus increasing the biological oxygen demand (BOD). This is not considered a problem for the watercourses in the area.

4.4 Vegetation

Landfilling activities during Phases B and D will result in the direct loss of hedgerow and field vegetation at the north end of the landfill site.

Approximately 330 m of hedgerow dominated by oaks and Shagbark Hickory together with hawthorn and honeysuckle will be removed. Several large trees are included. Although no intensive inventory of the approximately 5 ha of fields to be removed was completed, it is expected that they contained common field species. As noted, activities associated with current landfilling operations have already heavily disrupted the field vegetation, especially west of the hedgerow. None of the identified species are rare and all are represented elsewhere in the study area.

Leachate and gases produced by a landfill could have an adverse affect on vegetation (USEPA 1976). This would be of particular concern if the damage was to occur on the slopes of Falcon Creek Valley. However, hydrogeologic characteristics of the site, together with a leachate collection system, indicate little or no probability for such an occurrence. Therefore, no significant environmental impacts from gas or leachate springs are expected on vegetation off the active landfill area.

On the slopes of the finished landfill, leachate springs and gases may occur and will affect local vegetation established as part of an after use plan. The leachate springs will be contained and corrected as soon as they appear and damage to vegetation repaired.

Increased surface runoff caused by the steeper slopes being created may increase stress on some vegetation. A surface ditch in the northeast of the site (Phase B) will increase the peak water volume entering an existing drainage swale which empties into Indian Creek. (This could accelerate erosion already present in the drainage swale.) Erosion measures will be incorporated into the design where required and may involve minor vegetation removal.)

The dust produced by vehicular traffic on the landfill site could have some impact, however, there has been comparable vehicular traffic for a number of years already on site and no significant increase in traffic on the site is expected (Section J, Dillon 1984e). (No significant negative effects are anticipated from occasional applications of calcium chloride or water to control the dust.)

There is also potential for damage to vegetation from the operation of heavy machinery during preparation and operation of the landfill. (This would be restricted to the perimeter of the site. (Mitigating measures have been incorporated into the design to prevent this occurring.)

4.5 Wildlife

Direct effects of landfill operations on wildlife will be related to the removal of field and hedgerow habitat. The loss of the fields will displace the local Meadow Vole population which undoubtedly exists there, and the few bird

species which may utilize the open fields for breeding. In view of the large number of similar fields nearby this is not considered a serious impact.

The hedgerow may serve as a wildlife corridor linking the forested lands of the National Sewer Pipe property east of the landfill to the Sassafras Woods ESA and the Niagara Escarpment to the north. However, cover in the hedgerow is not continuous: taller trees with a sparse understorey in the south part are replaced by a lower shrub type in the north section. Gaps in the hedgerow are already present, for example, as a result of present landfilling activities. Depending on after use, new wildlife habitat will be created after closure of the landfill.)

An increase in noise levels from the landfill continuation is not anticipated (Section K, Valcoustics 1984). Although noise may affect some wildlife species, it will not be any different from existing conditions.

As noted, most sediments from increased surface runoff will be contained by the sedimentation pond. Any increase of sediment loading in Falcon Creek is not expected to seriously affect the fish species occurring there, all of which are tolerant of high turbidity.

4.6 Potential Impacts of Leachate Management Contingency Plan

Analysis of ground water movement at the Burlington Landfill site for the 1980 landfill expansion identified a minor

component which moves towards Falcon Creek. To cope with the low possibility that leachate could enter the ground water system and migrate into Falcon Creek, a Leachate Management Contingency Plan was formulated (Dillon 1981). This plan was a required condition of the landfill's Provisional Certificate of Approval issued in 1980. Construction of such a system has potential for environmental impacts on its own.

The contingency plan provides a conceptual framework. Detail design and alignments would not be prepared until a need arose to implement the plan. Several features will be included, however:

- i) a ground water interceptor drain would be installed;
- ii) it would be situated in the low-lying areas of Falcon Creek Valley;
- iii) it would be located below the water table at a sufficient depth to intercept the leachate.

The drain would intercept ground water flowing toward Falcon Creek.

Considerable impact to the vegetation along the alignment of the drain can be expected during construction. A swath of vegetation approximately 7 m wide will be removed to facilitate the installation of the drain. [A major part of this will be within the boundaries of the Sassafras Woods ESA with significant existing vegetation.]

4.7 Sassafras Woods ESA

The landfill continuation is not expected to produce any significant impacts on the Sassafras Woods ESA because design and operating measures will mitigate potential adverse effects (see Section 5). The natural integrity and diversity of the unit should not be affected by site operations. *there are some tho*

There is only a small amount of ground water discharge towards Falcon Creek and inspection of the creek has not identified any leachate springs (Section 0, Gartner Lee Associates Limited 1984). If leachate springs do occur in the future, they and the possible installation of the contingency interceptor drain near the bottom of the valley would result in damage to or removal of some significant vegetation.

Falcon Creek provides a hydrogeological divide between the majority of Sassafras Woods and the landfill (Section 0, Gartner Lee Associates Limited 1984). Therefore, most of Sassafras Woods is in no danger of leachate springs.

Neither of the criteria used to designate Sassafras Woods or ESA are being compromised. None of the carolinian species identified as occurring there are threatened in any way (ESA criterion four). Only one rare species, Rue-anemone, has been identified on the east slope of the Falcon Creek valley (Halton Region Files), but it is adjacent to an area which has already been actively landfilled since 1980. The effect of the landfill on this species will be determined during

subsequent field work in the spring of 1984. No rare species (ESA criterion six) is expected to be affected by the proposal.

There will be no effect on the present use, including educational use, of Sassafras Woods ESA by people. Accessibility will generally be neither increased nor decreased by continued use of the landfill. Impacts of incidental users will depend on implementation and enforcement of a final after use plan and regulations.

5. DESCRIPTION OF MITIGATING MEASURES

5.1 Summary of Concerns Worthy of Mitigation

Impacts on the environment have been kept to a minimum by incorporating mitigating measures into the design and operation of the landfill. The principal concerns have been to control leachate generated at the site and to prevent erosion occurring on vegetated slopes adjacent to the landfill. The displacement of existing land uses on the site by landfilling has been addressed by designing after use concepts which are compatible with the surrounding environment. To ensure the quality of the environment is maintained we are recommending a monitoring program to identify environmental concerns during and after construction of the landfill.)

5.2 Mitigation in Design

A drainage ditch will be installed around the perimeter of the landfill operation (Section S, Dillon 1984b). This ditch will collect surface drainage from the landfill slopes during and after construction. Collection and controlled disposal of surface drainage into local watercourses will significantly reduce erosion and associated loss of vegetation on adjacent ravine slopes.

The selection of the area north and northeast of the existing operation was largely based on the characteristics of underlying soils. These soils are suitable for containment and attenuation of the leachate produced at the landfill. (An underdrain leachate collection system is being installed prior to operations beginning (Section S, Dillon 1984b). This will further reduce the probability of leachate

migrating to the slopes of Falcon Creek ravine to a very low level. If leachate springs occur on the finished landfill, they will be corrected and damaged vegetation replaced.

In addition to these measures, a Leachate Management Contingency Plan (Dillon 1981) has been designed to deal with the possibility of leachate contamination problems in Falcon Creek. The impacts of installing this system will be delineated more precisely if the contingency arises.

A 10 m buffer area will be established around the perimeter of the landfill operation. A wire mesh fence will be constructed within the buffer area but outside the drip line of existing vegetation (see Dillon 1980, Section 4, Figure 2). This will protect vegetation from damage during operations and mitigate litter from blowing off-site.

5.3 Mitigation During Construction (Operation)

The detail design of ditches, erosion control devices, fences and leachate collection works will incorporate appropriate measures to minimize disturbance to existing vegetation and surface soils.

Either water or calcium chloride will be applied as needed to control dust. Calcium chloride should not be applied in drainage areas or within 10 m of the crest of Falcon Creek valley.

Measures for litter control are detailed in the Design and Operations Report (Section S, Dillon 1984b). Briefly, they require:

- the daily pick-up of litter;
- utilization of portable litter fences at the working face;
- a litter control fence around the perimeter of the site;
- keeping the area of the working face to a minimum and in a sheltered location during seasonally windy periods.

5.4 Mitigation Post Construction

A rehabilitation scheme has been designed to restore and enhance as many of the existing environmental features as possible. This includes:

- i) establishing a surface that will accomodate revegetation;
- ii) establishing vegetation suitable for:
 - controlling soil erosion;
 - inducing soil fertility similar to pre-landfill conditions;
 - buffering adjacent significant natural forests;
 - improving re-establishment of native vegetation communities;
 - re-establishing linkage habitat provided by existing hedgegrows;

- enhancing wildlife habitat with additional cover or food;
- blending visually with the natural aesthetics of the study area;
- incorporating opportunities for passive recreation.

5.5 Monitoring

To ensure that environmental concerns are identified as early as possible a monitoring program will be established. The monitoring program will be designed to:

- ensure that unnecessary damage to vegetation during the construction of ditches, fences, access roads and erosion control structures is prevented or where possible repaired;
- ensure the litter and dust control recommendations are adhered to;
- examine finished slopes to identify leachate springs;
- ensure final design slopes are not exceeded;
- ensure that drainage ditches are not obstructed and are functioning properly;
- examine the condition of revegetated areas and determine if additional planting and/or seeding is required;
- identify areas of soil erosion;

- prescribe erosion control measures and monitor their efficiency;
- monitor level of after use and environmental damage by incidental users.

6. RECOMMENDATIONS

We concur with the need and advisability of continued use of the Burlington landfill site as specified in the Design and Operations Report (Section S, Dillon 1984b).

We recommend that mitigating measures discussed in the preceeding section be adhered to. The mitigating measures are summarized below:

- i) a drainage ditch be installed around the perimeter of areas to be landfilled;
- ii) an underdrain leachate system be installed under areas to be landfilled;
- iii) the existing Leachate Management Contingency Plan be amended to reflect the continued use plan;
- iv) a 10 m buffer area with a strong, well-maintained wire mesh fence be continued around the perimeter of the site;
- v) water and/or calcium chloride only be applied to control dust on the site; calcium chloride should not be used within 10 m of the Falcon Creek valley crest or in drainage areas;
- vi) litter be controlled by daily pick-up, fencing and minimal working face area;

- vii) the after use and rehabilitation plans be designed and carried out to replace as many of the existing and former natural vegetation and soils on the site as possible;
- viii) suitable vegetation continue to be established on the existing eroded slopes;
- ix) the use of recreational all-terrain vehicles be prohibited on the site;
- x) an environmental inspector be appointed to ensure the environmental protection measures specified are implemented, and that environmental concerns are identified and corrected where needed as soon as possible to reduce environmental impact to a minimum.

The recommended eastern boundary of the Sassafras Woods ESA, based on continuity of plant communities and the selection criteria used to designate the ESA, is provided on Figure G-1.

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COMMON AND SCIENTIFIC NAMES OF PLANTS
(IN PHYLOGENETIC ORDER)

Field Horsetail	<u>Equisetum arvense</u>
Ferns	-
White Pine	<u>Pinus strobus</u>
Jack Pine	<u>P. banksiana</u>
Hemlock	<u>Tsuga canadensis</u>
White Cedar	<u>Thuja occidentalis</u>
Cattail	<u>Typha</u> sp.
Redtop	<u>Agrostis gigantea</u>
Brome-grass	<u>Bromus inermis</u>
Red Fescue	<u>Festuca rubra</u>
Tall Fescue	<u>F. arundinacea</u>
Italian Rye-grass	<u>Lolium multiflorum</u>
Panic Grass	<u>Panicum latifolium</u>
Cutgrass	<u>Leersia virginica</u>
Timothy	<u>Phleum pratense</u>
Sedge	<u>Carex gracilescens</u>
Yellow Mandarin	<u>Disporum lanuginosum</u>
Dog-tooth Lily	<u>Erythronium americanum</u>
Michigan Lily	<u>Lilium michiganense</u>
Eastern Cottonwood	<u>Populus deltoides</u>
Large-tooth Aspen	<u>P. grandidentata</u>
Trembling Aspen	<u>P. tremuloides</u>
Carolina Poplar	<u>P. X canadensis</u>
Willow (shrubs)	<u>Salix</u> sp.
Black Willow	<u>S. nigra</u>
Bitternut Hickory	<u>Carya cordiformis</u>
Butternut	<u>Juglans cinerea</u>
Black Walnut	<u>J. nigra</u>
Blue-beech	<u>Carpinus caroliniana</u>
Hop-hornbeam	<u>Ostrya virginiana</u>
Sweet Chestnut	<u>Castanea dentata</u>
American Beech	<u>Fagus grandifolia</u>
White Oak	<u>Quercus alba</u>
Swamp White Oak	<u>Q. bicolor</u>
Red Oak	<u>Q. rubra</u>
Bur Oak	<u>Q. macrocarpa</u>

White Elm	<u>Ulmus americana</u>
Red Elm	<u>U. rubra</u>
Dock	<u>Rumex sp.</u>
Spring-beauty	<u>Claytonia sp.</u>
Rue-anemone	<u>Anemonella thalictroides</u>
Round-lobed Hepatica	<u>Hepatica americana</u>
Common Buttercup	<u>Ranunculus acris</u>
Bristly Buttercup	<u>R. hispidus var. marilandicus</u>
Spicebush	<u>Lindera benzoin</u>
Sassafras	<u>Sassafras albidum</u>
Sicklepod	<u>Arabis canadensis</u>
Winter Cress	<u>Barbarea vulgaris</u>
Shepherd's Purse	<u>Capsella bursa-pastoris</u>
Currant	<u>Ribes sp.</u>
Witch-hazel	<u>Hamamelis virginiana</u>
Hawthorn	<u>Crataegus sp.</u>
Common Strawberry	<u>Fragaria virginiana</u>
Rough Avena	<u>Geum laciniatum</u>
Black Cherry	<u>Prunus serotina</u>
Choke Cherry	<u>P. virginiana</u>
Sweet Brier	<u>Rosa eglanteria</u>
Pasture Rose	<u>R. carolina</u>
Bramble	<u>Rubus sp.</u>
Raspberry	<u>Rubus sp.</u>
Honey Locust	<u>Gleditsia triacanthos</u>
Panicked Tick-trefoil	<u>Desmodium paniculatum</u>
Large-bracted Tick-trefoil	<u>D. cuspidatum</u>
Pointed-leaved Tick-trefoil	<u>D. glutinosum</u>
Naked-flowered Tick-trefoil	<u>D. nudiflorum</u>
Birdsfoot Trefoil	<u>Lotus corniculatus</u>
White Sweet-clover	<u>Melilotus alba</u>
Yellow Sweet-clover	<u>M. officinalis</u>
Black Locust	<u>Robinia pseudoacacia</u>
Red Clover	<u>Trifolium pratense</u>
White Clover	<u>T. repens</u>
Cow Vetch	<u>Vicia cracca</u>
Seneca Snakeroot	<u>Polygala senega</u>

Whorled Milkwort
Poison-ivy
Staghorn Sumac
Fragrant Sumac
Bittersweet
Red Maple
Sugar Maple
New Jersey Tea
Buckthorn
Virginia Creeper
Wild Grape
Common St. Johnswort
Leatherwood
Sundrops
Wild Carrot
Flowering Dogwood
Gray Dogwood
Red-osier Dogwood
Wintergreen
Indian Pipe
Pinesap
Round-leaved Pyrola
Shinleaf
Mountain Blueberry
Black Huckleberry
Starflower
White Ash
Red Ash
American Colombo
Common Milkweed
Poke Milkweed
Blue Vervain
Horsebalm
Nightshade
Common Mullein
Yellow Wild Licorice
Tatarian Honeysuckle

P. verticillata
Rhus radicans
R. typhina
R. aromatica
Celastrus scandens
Acer rubrum
A. saccharum
Ceanothus americanus
Rhamnus sp.
Parthenocissus quinquefolia
Vitis riparia
Hypericum perforatum
Dirca palustris
Oenothera biennis
Daucus carota
Cornus florida
C. racemosa
C. stolonifera
Gautheria procumbens
Monotropa uniflora
M. hypopithys
Pyrola rotundifolia
P. elliptica
Vaccinium pallidum
Gaylussacia baccata
Trientalis borealis
Fraxinus americana
F. pennsylvanica
Frasera caroliniensis
Asclepias syriaca
A. exaltata
Verbena hastata
Collinsonia canadensis
Solanum dulcamara
Verbascum thapsus
Galium lanceolatum
Lonicera tatarica

Maple-leaved Viburnum
Downy Arrow-wood
Teasel
Yarrow
Great Burdock
Burdock
Aster
Wetted Thistle
Ox-eye Daisy
Common Chickory
Nipplewort
Canada Goldenrod

Viburnum acerifolium
V. rafinesquianum
Dipsacus sylvestris
Achillea millefolium
Arctium lappa
A. minus
Aster sp.
Carduus crispus
Chrysanthemum leucanthemum
Cichorium intybus
Lapsana communis
Solidago canadensis

STUDY TEAM

The following short descriptions include the principal individuals who prepared the Environmental Impact Assessment and after use concepts. Complete resumes can be provided separately upon request. In addition, Dillon support and technical staff provided assistance where needed.

Denis G. Stevens, M.Sc.

Mr. Stevens is the senior life scientist with Dillon. He is an ecologist with training in botany, soil science, zoology, and environmental planning and assessment, in addition to his major in ecology. He has extensive expertise in natural environment inventory and evaluation on projects such as environmental assessment of landfills, major highways, dams, diversions and pipelines.

Mr. Stevens has given expert testimony before a number of boards and hearings. He is responsible for the environmental assessment component of this project and will give testimony on the natural environment features and potential impacts.

Bohdan I. Kowalyk, R.P.F.

Mr. Kowalyk is a professional forester since 1977. He has participated in a large number of environmental assessments with Dillon, including projects for landfills in Oxford County, Regina and Sault Ste. Marie as well as at Burlington. He also took part in the development of a hazardous waste disposal methodology in Ontario.

Mr. Kowalyk coordinated for three years research projects on the establishment and growth of deciduous and mixed tree communities in various sites in Southern Ontario. He classified soils and evaluated their suitability for different purposes. He has provided tree appraisals and numerous programs for the maintenance of vegetation and environmental quality.

Mirek J. Sharp, M.Sc.

As a plant ecologist and naturalist with Dillon, Mr. Sharp is especially capable of assessing potential impacts to natural systems both at a community and species level. His familiarity with the flora and fauna in Halton Region is particularly useful on this project for determining the significance of natural system components in a regional perspective. He has also been involved in a review of development and their associated impacts in or adjacent to environmentally sensitive areas in Halton.

Mr. Sharp has carried out biophysical inventories of the conservation areas of Halton and evaluated wetlands in the Bronte Creek watershed. He has determined the detailed status of several rare species of flora and fauna.

Donna L. Hinde, B.E.S., M.L.A. - May 1984

Ms. Hinde is an environmental planner and landscape designer with Dillon since 1978. She has prepared landscape plans for visual screening, rehabilitation and after use for landfills in Windsor, Chatham, Regina, Oakville and Oxford County as well as Burlington.

Ms. Hinde has also been involved in environmental assessments for a variety of projects including landfills, hazardous waste storage sites, transportation corridors, airports and subdivisions. She has coordinated master plans for conservation areas and recreation developments.

CONTACTS

Peter F. Rice

Royal Botanical Gardens

Paul Attack
Patricia Herring

Regional Municipality of
Halton

John D. Hall
Brenda Brobst

Halton Region Conservation
Authority

Daryl Cowell
Bill Crins

Halton Ecological &
Environmental Advisory
Committee



OUR FILE: 9319-02
YOUR FILE:

30 March 1984

M.M. Dillon Limited
47 Sheppard Avenue East
WILLOWDALE, Ontario
M2N 5X5

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

Burlington Landfill Continued Use -
Application for a Certificate of
Approval

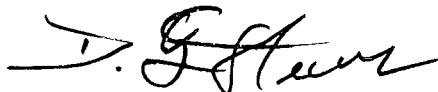
Dear Sirs:

We are pleased to present the Environmental Impact Assessment and Rehabilitation and After Use contained as Appendix 'G' and Appendix 'H' of the Technical Report filed in support of an Application for a Certificate of Approval for the continued use of the Burlington Landfill Site.

The writer will appear as a witness at the hearing before the Environmental Assessment Board on the basis of these reports.

Yours truly,

M.M. DILLON LIMITED



D.G. Stevens, M.Sc.
Associate

DGS:llly
Encl:

G/H-1

- ① check with Dorothy whether WBCG have any comments re rehabilitation and after-use
- ② can site be rehabilitated now? i.e. is there any need, from a rehabilitation point-of-view, to put more garbage into site to get it to a point where it can be then properly rehabilitated? → I assume not!

SECTION H REHABILITATION AND AFTER-USE

SECTION H
REHABILITATION AND AFTER-USE

The site will be progressively rehabilitated as stages of landfilling are completed. Through discussions with representatives from the Region of Halton, City of Burlington, Royal Botanical Gardens, the Halton Region Conservation Authority, and local ratepayers groups, suitable uses for the completed landfill were suggested. Potential site uses included:

- ① - reforestation
- ② - an experimental planting area
- ③ - picnicking
- ④ - trails for hiking and cross-country skiing
- ⑤ - open fields
- ⑥ - agriculture

⑥ { Agriculture was discarded as a possible after use because most of the site will be sloped, limiting its use for animal stock and cultivation.

Leaving the site to natural primary succession on the exposed soils was also discussed as an option. However, the natural process of succession may take too long for vegetation to cover the site, protect it from erosion and mitigate visual impact. In addition, there could be a large production of weeds, by that option, which are not appropriate for site management.

Two conceptual plans for site after use were consequently prepared to indicate possible alternative approaches to rehabilitating the landfill area. The intention of the concept plans is to indicate the range of possible after uses and their general location on-site. Representatives of the previously mentioned agencies were asked to review and comment on the concepts. A more detailed plan of site after-use and rehabilitation, including planting schedules, trail locations and access points, will be prepared based on agency and public comments. The Region of Halton has requested the involvement of Dr. P. Rice from the Royal Botanical Gardens in establishing a planting program for the site.

Both concepts propose extensive tree and shrub planting to help screen the view of the landfill from nearby houses and adjacent roads. As well, a key component of both conceptual plans is the buffering of the adjacent carolinian forests of Sassafras Woods. Planting areas of native indigenous trees and shrubs will be incorporated to extend these forests onto the site properly.

Degradation of the site by motorized recreational vehicles must be controlled. Increased buffering (fencing, planting, minor earthworks) along the edge of the site is suggested. It is also recommended that monitoring and policing of the site be increased to control access by these vehicles.

- ① The first concept (Figure H-1) is based on gradual reforestation of the entire site with restricted public access. Examples of recommended plant species are indicated on the concept plan. Experimental planting areas to test the effects of ambient soil conditions on tree growth are proposed.

The second concept plan (Figure H-2) incorporates some public use for passive recreation while maintaining most of the site for natural forest succession, reforestation and some experimental planting. The site's location relative to Bayview Park, the Parkway Belt, and the Falcon Creek ravine (Sassafras Woods), offers an opportunity to connect site hiking trails with those areas. Small areas for picnicking are proposed for the top of the landform where there will be a view of Burlington to the south.



March 29, 1984.

Mr. W. F. Wells, P. Eng.,
Project Manager,
M.M. Dillon Ltd.,
Consulting Engineers and Planners,
Box 1850,
Station A.,
Willowdale, Ontario M2N 6H5.

Dear Mr. Wells: RE: Burlington Landfill -
Proposed Continued Use.

On behalf of the Royal Botanical Gardens my services have been retained by the Regional Municipality of Halton to provide technical advice with respect to the upcoming hearing concerning the Region's application for a Certificate of Approval for continued use of the Burlington landfill site, and to assist with the implementation of the proposed after-use plan for the site. The reasons for my being invited to participate in this issue is the recognition of my familiarity with the flora of Halton, my association with the EEAC and its chairman, my direct involvement in the determination of ESA in Halton and my background as a biologist and professional forester. In addition, RBG has a long term interest in the flora of Halton and is anxious to assist the Region in matters concerning the welfare of Halton's biota.

As you are the Project Manager from M.M. Dillon Ltd., I write to outline my involvement to date and to respond, briefly, to documentation with which I have been provided.

I was initially contacted by Mr. Paul Attack, Senior Planner with the Region of Halton, in December, 1983 and have participated in three subsequent information meetings with appropriate staff of the Region and of M.M. Dillon on January 10, 17 and March 14, 1984. The January 17th meeting included a visit to the landfill site for orientation. Since January, I have been in receipt of topographical maps and aerial photos of the site from the Region, various documents by Walker, Wright, Young Associates via the Region and draft copies of the Environmental Impact Assessment and Proposed Continued Use (which includes after-use concept) from M.M. Dillon.

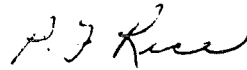
I have reviewed the latter documents from Dillon, have discussed by telephone their contents with the authors and have suggested minor revisions. The Environmental Impact Assessment appears to be thorough and I have no reason to believe that the leachate control measures suggested and the natural dissipation of possible phytotoxic gases won't be adequate to permit revegetation of the site. I am also satisfied that the proposal will have no significant influence on the biological integrity of the adjacent Environmentally Sensitive Area, Sassafras Woods.

NB

Mr. W. F. Wells, P. Eng.,
March 29, 1984,
Page 2.

As the site is semi-rural, bounded on all sides by more or less natural areas, I recommend that the site be encouraged to return to the natural forest cover typical of the surrounding area. This may be accomplished by abandoning the site to natural succession, perhaps an unacceptably slow process, or by judicious planting of appropriate tree and shrub species, the process may be accelerated. As I favour the latter approach, I am in concurrence with concepts for revegetation of the site as presented in the rehabilitation of after-use concept plans within Dillon's Proposed Continued Use document.

Yours truly,

A handwritten signature in cursive script, appearing to read "P. F. Rice".

P. F. Rice, Ph.D., R.P.F.,
Forest Pathologist.

PFR:sdp



15 ✓
question - ?

OUR FILE: 9319-02
YOUR FILE:

30 March 1984

M.M. Dillon Limited
47 Sheppard Avenue East
WILLOWDALE, Ontario
M2N 5X5

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

Burlington Landfill Continued Use -
Application for a Certificate of
Approval

Dear Sirs:

We are pleased to present the Traffic Analysis contained as
Appendix 'J' of the Technical Report filed in support of an
Application for continued use of the Burlington Landfill Site.

The writer will appear as a witness at the hearing before the
Environmental Assessment Board on the basis of this report.

Yours truly,

M.M. DILLON LIMITED

Paul R. Hill

P.R. Hill, P.Eng.
Senior Associate

PRH:lly
Encl:

SECTION J
TRAFFIC ANALYSIS

	PAGE
1. PURPOSE	J-3
2. DATA COLLECTION	J-4
3. ANALYSIS	J-5
3.1 Traffic	J-5
3.2 Accidents	J-7
4. RESULTS	J-9
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SECTION J

TRAFFIC ANALYSIS

1. PURPOSE

The purpose of this investigation was to determine the impact of the continued use of the Burlington landfill site until the year 1987. Included is an analysis of the increases in waste volumes at the site entrance and on the road system in general.

Specific suggestions have been made concerning the North Service Road and the entrance to the landfill site. These have been considered and are reported on.

2. DATA COLLECTION

Data for the analysis carried out was essentially from three sources. The information collected and its source are as follows:

i) Traffic Counts

Traffic counts at the intersections of King/North Service Road and Brant/North Service Road were obtained from the City of Burlington. This included turning movement counts for the morning and afternoon peak hours and other times of the day. Projections of volumes to represent annual average and peak conditions at the intersection were also obtained.

ii) Waste Volumes

The waste related traffic volumes for the site, were obtained from records kept at the existing site. Future forecasts were derived by comparing existing traffic volumes and waste quantities to the waste generation forecasts established in Section F.

iii) Vehicle Classification Counts

Counts by classification of vehicle were taken at the intersection of the North Service Road and the site entrance, and at the intersection of King and the North Service Road on 23 January 1984, by Dillon staff.

iv) Accident Records

Accident records for the intersection of the site ingress-egress and the North Service Road for the years 1981-1983 were obtained from the City of Burlington.

3. ANALYSIS

3.1 Traffic

From available records at the Burlington landfill site for the year 1983 the trip making characteristics of travel to and from the site were determined. These are summarized in Table 1.

TABLE 1
TRIP CHARACTERISTICS - 1983

	Trucks	Other Vehicles	Total
Average Saturday	34	304	338
Peak Saturday	33	543	576
Average Weekday	143	168	311
Peak Weekday	177	309	486

why less than figure for "average Saturday"?

The analysis was carried out for the peak weekday. It is seen from Table 1 that the total volume of traffic to and from the site is higher on Saturdays but the truck volumes are lower and road volumes are less on this day of the week. ('Trucks' designates all vehicles larger than vans or pick-up trucks).

Within the peak weekday the analysis was carried out for the a.m. peak hour (7:30-8:30) the p.m. peak hour (4:30-5:30) and the peak hour of trucks to and from the site (8:00-9:00). The a.m. and p.m. peak hours were used since North Service Road traffic volumes are highest at these times of the day (according to the City of Burlington). The peak arrival and departure time of trucks to and from the site itself was used since it does represent an additional peak.

Table 2 shows the movements to and from the landfill site.

TABLE 2
SITE VOLUMES - NUMBER OF VEHICLES

	<u>Existing 1983</u>				<u>Future 1987</u>			
	<u>Trucks</u>		<u>Total</u>		<u>Trucks</u>		<u>Total</u>	
	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>
A.M. Peak Hour (7:30-8:30)	12	12	25	25	14	14	28	28
P.M. Peak Hour (4:30-5:30)	7	7	36	36	8	8	41	41
Truck Peak (8:00-9:00 a.m.)	24	24	51	51	27	27	58	58

Future volumes were obtained using the projected waste quantities shown in Table 1 of Section F. It is seen that the increases in movements to and from the site are relatively modest during all time periods.

In carrying out the traffic analysis of the site entrance/ North Service Road and King/North Service Road intersections, the following trip distribution was assumed for vehicles to and from the site:

- to and from the east on North Service Road - 90%
- to and from the west on North Service Road - 5%
- to and from the south on King - 5%

The source of existing volumes and assumptions made concerning future conditions are as follows:

i) Existing - 1983

- a.m. and p.m. peak hour volumes are the annual average Friday volumes as provided by the City of Burlington;
- traffic volumes corresponding to the site's truck peak period are derived from counts taken by the consultant on 23 January 1984 and factored to the annual average Friday.

ii) Future - 1987

- future volumes were obtained by factoring existing by 5% per year (assumed growth rate for testing);
- no improvements would be made to the King/North Service Road intersection or to the North Service Road.

Existing and future volumes at the King/North Service Road intersection are shown on Figures J-1 and J-2.

3.2 Accidents

During the period 1981-83 there were four accidents reported at the intersection of the site ingress-egress and the North Service Road. Two of the accidents were related to vehicles turning left into the site from the west. One was related to a right-turning vehicle from the east and the remaining accident involved an outbound vehicle.

The accident experience at this location is what might be expected at an isolated entrance on a facility with a posted speed of 80 km/h. Whereas at an intersection, there is an expectation of stopping because of the volumes and conflicting movements, this is generally not the case at an isolated location, such as the landfill entrance. At these locations, there are relatively low turning volumes and the drivers are less expectant of the condition where they may have to stop.

4. RESULTS

Based on the capacity calculations at the King/North Service Road intersection, the following are the levels of service for each of the time periods:

i) Existing

<u>Time Period</u>	<u>Level of Service</u>
A.M. Peak Hour	"B"
P.M. Peak Hour	"B"
Truck Peak	"B"

ii) Future

<u>Time Period</u>	<u>Level of Service</u>
A.M. Peak Hour	"C"
P.M. Peak Hour	"C"
Truck Peak	"C"

The results of the capacity calculations show that in both the existing and future condition the intersection will operate at a good level of service.

Consideration was also given to the intersection of the North Service Road and the site entrance. The impact of the additional vehicles to and from the site would be minimal for the future condition. Therefore, without any changes in the road or access facility the operation will remain essentially the same as today.

The impact on other intersections, such as Brant/North Service Road and Waterdown/North Service Road would be minimal.

5. OPERATIONAL CHANGES

Two operational changes have been suggested for improving access to the site. These are:

- i) Lowering the posted speed on North Service Road from 80 to 60 km/h.
- ii) To construct a right-turn lane, for vehicles from the east, at the site entrance.

The lowering of the posted speed on the North Service Road would mean a lower differential speed between through vehicles and those turning to the site. This would assist in reducing the potential for, and severity of accidents at the site entrance. This matter should be studied by the City of Burlington in relation to their current practice for such a road and ingress-egress facility. It is noted that at present the posted speed on the North Service Road west of Brant Street is 60 km/h.

The construction of a right-turn lane is desirable in that it removes the inbound vehicles from the east from the stream of through traffic. This then would reduce the potential for accidents and allow for an improved operation on the North Service Road. The design of the right-turn facility would have to be in keeping with the posted speed. The need for a right-turn lane was checked against the standards of the Ministry of Transportation and Communications and others. The available warrants are not definite with respect to this situation.

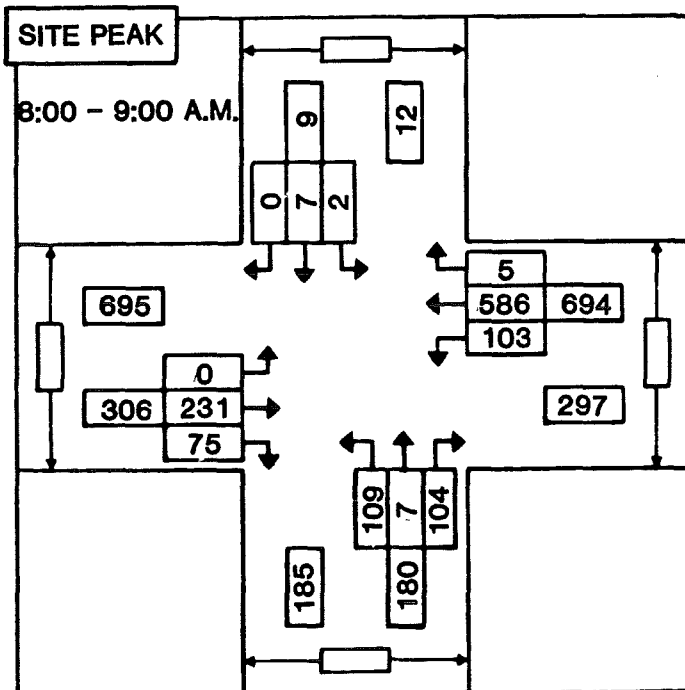
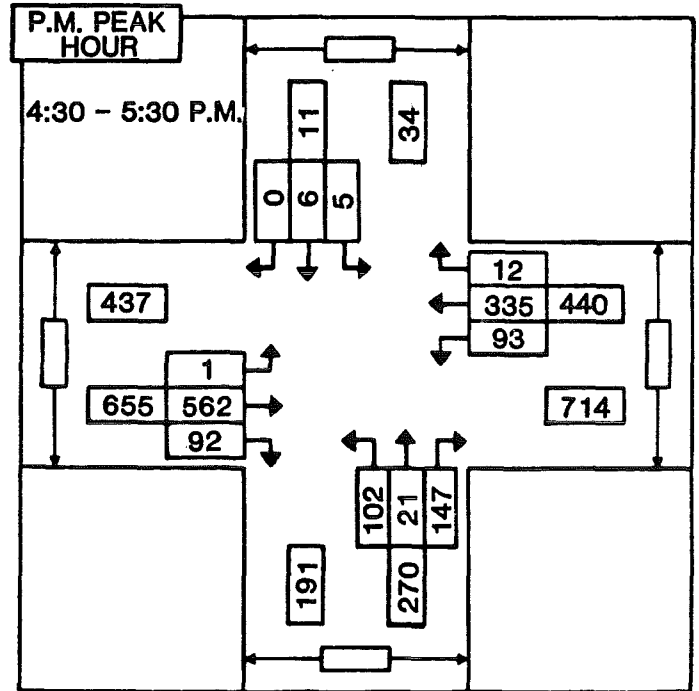
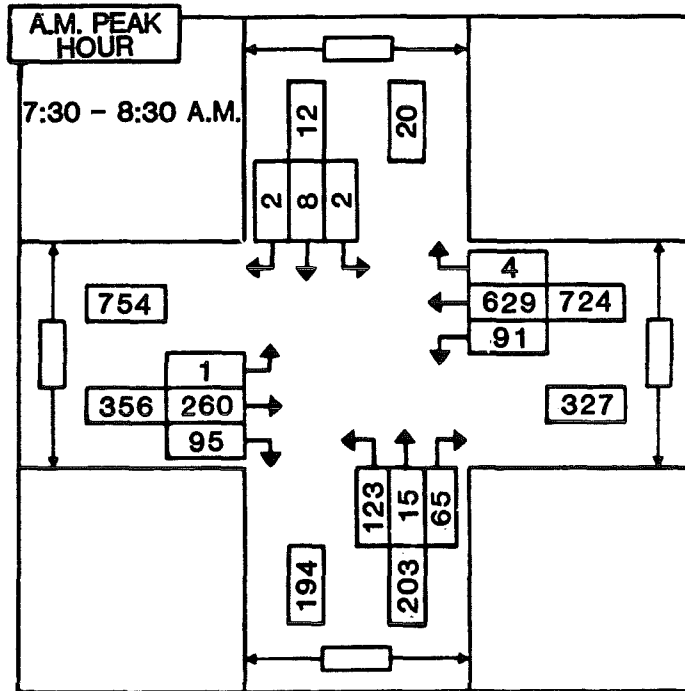
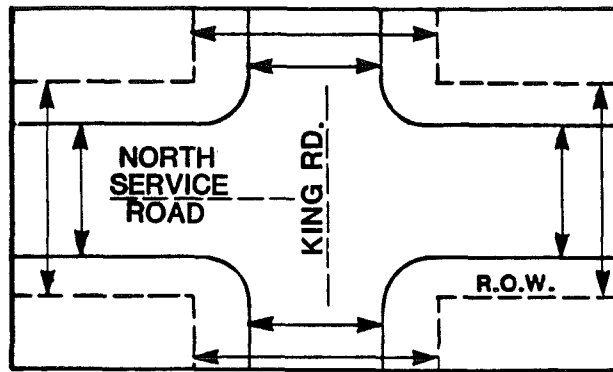


FIGURE J - 1
EXISTING CONDITIONS - 1983

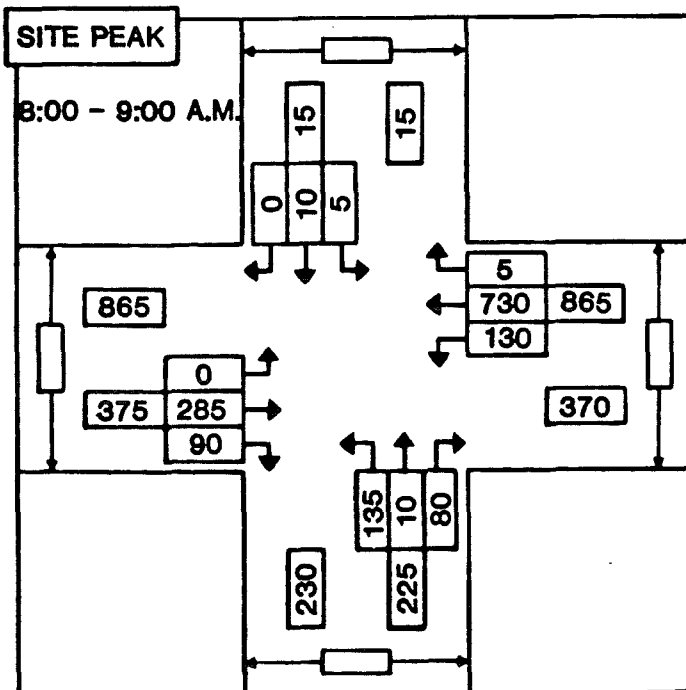
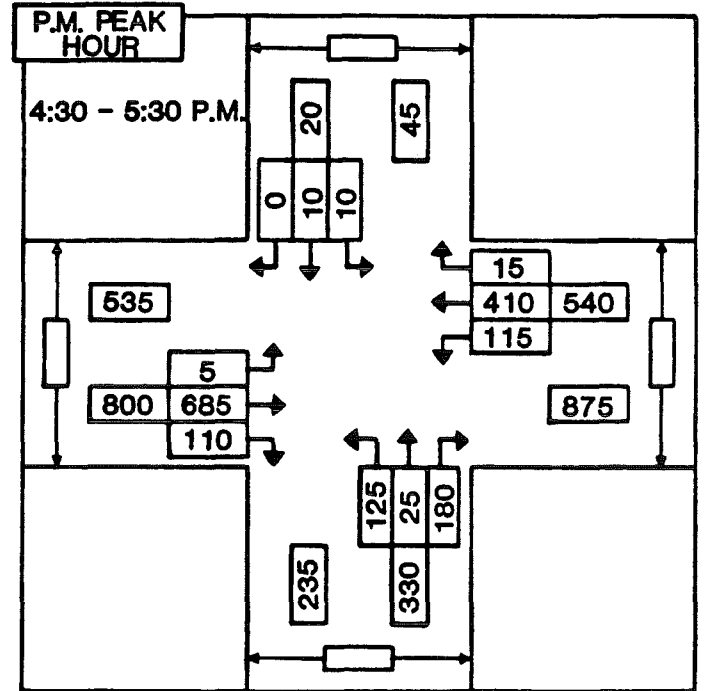
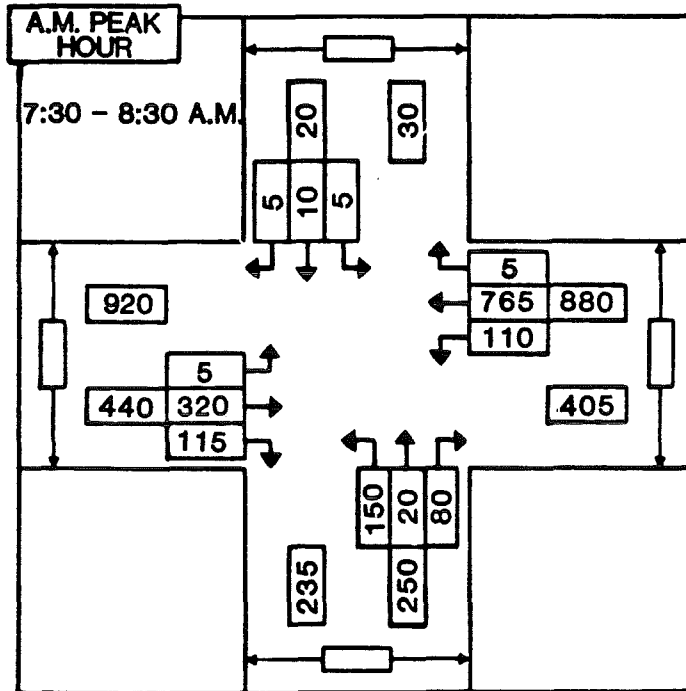
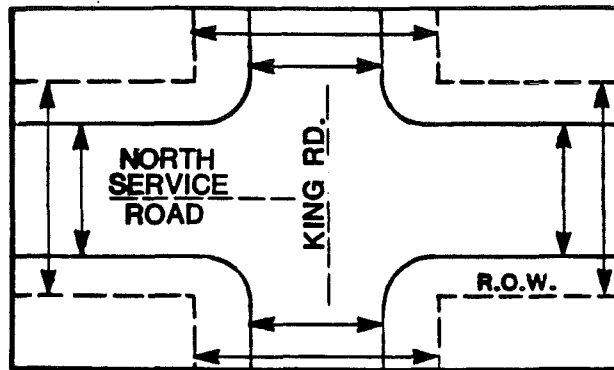


FIGURE J - 2
FUTURE CONDITIONS - 1987



read K-9 →
possibly Ans?

ALCOUSTICS
Canada Ltd.

qualification:
- constantly site for
M.M. Dillon?

March 23, 1984.

M.M. Dillon Ltd.,
47 Sheppard Avenue East,
Willowdale, Ontario.
M2N 6H5

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

Gentlemen:

Re: Burlington Landfill
Our File: AU4

We are pleased to submit our report "Noise Impact Analysis" for the above project.

If there are any questions on any aspect of our work,
we would be pleased to respond.

We appreciate the opportunity to be of service.

Yours truly,

VALCOUSTICS CANADA LTD.



A.D. Lightstone, Ph.D., P.Eng.

ADL/evm
Encl.

K-0

BURLINGTON LANDFILL SITE

NOISE IMPACT ANALYSIS

PREPARED FOR

M.M. DILLON LIMITED

CONSULTING ENGINEERS AND PLANNERS

BY

**VALCOUSTICS CANADA LTD.
CONSULTING ENGINEERS
TORONTO, ONTARIO**

MARCH 23, 1984

PROJECT: AU4-031

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BURLINGTON LANDFILL SITE
NOISE IMPACT ANALYSIS

1. INTRODUCTION

The purpose of this report is to outline the potential environmental noise effects of the continued use of the existing Burlington Landfill site through the year 1987.

NE { Of primary concern are the potential noise effects on a small number of residential properties in the vicinity of the site. }

The site is located on the North Service Road of Highway 403 in the City of Burlington. Of the total (68 ha) site area, about 29.3 ha is currently approved for landfilling, the remaining portion serving as buffer zones, access road, and support facility. The approved waste capacity will be exhausted by August, 1984. // The proposed continued use would extend the closure date of the site. [Additional waste capacity will be provided by raising the final contours in the approved landfill area and by extending the approved area.] Contours will be increased by up to 11 m relative to currently approved landfill elevations.

It is intended that this report be read in conjunction with the other engineering and planning documents pertaining to the proposed continued operations.

2. THE OPERATION AND POTENTIAL NOISE SOURCES

The operation will consist of the transport to the site of refuse suitable for sanitary landfilling. The site will be open to municipal and private waste disposal vehicles, as well as to the general public.

Delivery of waste by the municipalities or by commercial waste disposal companies will, in general, be by packer trucks of varying sizes, which will unload at the working face of the landfill. The general public will deliver their refuse by car, van, or pick-up truck. The public will have access to the landfill area, but cars without trailers will unload into a container facility near the scale house. As appropriate, these containers will be moved to the working face and unloaded.

At the working face, the trucks will unload. The loads will be spread and compacted using refuse compactors. These consist of specially wheeled and articulated tractor devices having a bucket or bulldozer blade at the front.

On the completion of operation each day, the refuse deposited will be covered with a layer of earth. The cover material will be obtained either on site by excavation using self-propelled wheel-type earth scrapers, or imported to the site by truck.

To assist in the spreading of cover a track loader and tractor crawler (dozer) will also be available.

The working of the site will be according to an operational plan which divides the landfill into four phases. Initially, the operation will commence in the southernmost section of the site (Phase A). Final cover, where already in place, will be excavated, stockpiled and re-used where possible. Placement of refuse will then take place in the stripped area while cover material is excavated and delivered to the operating face. The filling operation will be in a series of lifts.

The location and grade level of the operating face will continually change as the landfill operation progresses. This will require the construction and maintenance of internal access roads and ramps.

Existing surface drainage works and leachate control systems will also be extended as necessary.

In terms of noise generation the operations may be divided into separate components:--

- (a) Vehicle movements on the off-site approach roads;
- (b) Vehicle movements within the site to deliver loads to the operating face;
- (c) Spreading and compacting activities at the operating face;
- (d) Excavation and delivery of cover;
- (e) Temporary construction activity related to the construction and maintenance of internal roads and ramps, etc.

The site will be open as follows:--

	May 1 to Sept. 30	Oct. 1 to April 30
Weekdays	8:00 a.m. to 5:30 p.m.	8:00 a.m. to 5:30 p.m.
Saturdays & Holidays	8:00 a.m. to 5:30 p.m.	8:00 a.m. to 4:00 p.m.
Sundays	Closed	Closed

Operations on site will generally commence about one-half hour prior to opening to get equipment into place and extend about one-half hour beyond closing, to permit covering exposed refuse.

3. ENVIRONMENTAL SOUND CRITERIA

The applicable noise criteria are set by the Noise Pollution Control Section of the Ministry of the Environment. Environmental sound levels are continually changing as a function of local and distant activity. Therefore, criteria which reflect both the time period of interest and the variation in sound energy are used.

The criteria are expressed in terms of the parameter L_{eq} - the energy equivalent continuous sound level over the specified time periods. L_{eq} is the constant sound level, which would produce the same total sound energy exposure as the actually varying sound levels, over the same time period.

For the operation of a landfill, the sound exposure criteria at the nearest residential receptor are:--

Time Period	Max. One Hour L_{eq} (dBA)
0700-1900 (day)	55
1900-0700 (night)	45

or the existing sound exposure, if produced by man-made activity, and of higher values than the above.

Appendix K-1 contains a copy of the full guidelines of the Ministry of the Environment.

4. NOISE IMPACT ANALYSIS AND ASSESSMENT

4.1 Introduction

The assessment of potential noise effects involves predicting the sound exposure due to the proposed operations and comparing these predictions against the pre-existing environmental conditions to determine the extent of change that may result and comparing against the relevant criteria discussed earlier.

4.2 Existing Sound Environment

The land use in the area of the proposed site is a mixture of residential, commercial, industrial, recreational, and open space. The existing sound environment would generally be rated as "urban". Existing sound environment in this context means sound from sources other than the landfill in question. The prevailing background sound levels are due primarily to traffic on major arteries (in particular Highway 403) generally to the south of the landfill and due to the sounds of nature and sounds of distant traffic to the north. Local sound intrusions frequently occur due to motor vehicles on the local roads, and adjacent properties.

The existing traffic volumes for Highway 403 and North Service Road are summarized in Table 1.

Table 2 shows the existing sound exposures in areas north of North Service Road and south of Highway 403 at distances of 30, 60 and 150 m from the closest lane of traffic in each case.

4.3 Road Traffic

Table 3 shows the existing (1983) and future traffic (1987) volumes generated by the landfill as obtained from data supplied by M.M. Dillon Limited. The distribution for vehicles to and from the site was summarized as:--

To and from the east on North Service Road	90%
To and from the west on North Service Road	5%
To and from the south on King Road	5%

Light vehicles such as passenger cars, vans, and pick-up trucks are expected to form 50% or more of the traffic stream.

The peak hour for traffic to the site occurs between 0800 to 0900 hours. Along the truck routes, the greatest noise impact would occur during periods when the ratio of site truck traffic to

other traffic is at a maximum, since the pre-existing sound exposure would be at a minimum. For the purpose of this analysis, it was assumed that the traffic is evenly distributed over 24 hours for the pre-existing conditions. (This is clearly not the case and is thus, "conservative", by exaggerating any potential impact).

By superimposing the sound exposure of the site traffic (1987 peak hour) on that for the pre-existing traffic (1983) it is found that the effects in 1987 would be to:--

- (a) increase the hourly L_{eq} by 1 dB or less within close proximity (< 60 m) along the north side of North Service Road. (A small and insignificant change).
- (b) not affect the sound environment on the south side of Highway 403.

Table 4 shows the combined sound exposures. It was assumed that there is no increase in the pre-existing traffic to 1987 and there is no traffic to the site at present. As this is in fact not the case this would lead again to an over-prediction of potential change in sound exposures.

As that there are no existing residences along the North Service Road between King Road and Waterdown Road the noise impact of the haul route is insignificant.

4.4 Site Operations

The site operations represent a much more complex noise source. The noise sources are trucks, and machinery for refuse spreading and earth moving. While certain components of the operation, such as entrance, scale house, etc., remain fixed in place, the land-fill portion is a dynamic, continually changing process. The operating face moves gradually in location, as well as elevation, as first excavation occurs, and then the lifts are added to reach the final elevation.

The refuse trucks will unload at the working face, whereupon the refuse will be spread and compacted. When appropriate, the cover delivered to the top of the working face will be spread over the refuse. In some cases, the unloading and compaction will occur either below or above the existing grade. Eventually, as each phase is nearing completion, the working face will be above the existing grade, as indicated by the final contours. (See Design and Operations Report, Section S by M.M. Dillon).

The above operations will gradually move across the site and continually alter their significance in terms of noise effects at any given observation point on a neighbouring property. Nevertheless, they represent a "chronic" sound source that will be present throughout the life of the site.

The other components of vehicle movements to the working face, at the excavations, etc. identified in Section 2 are also chronic but non-stationary, and in some cases, temporary and short-lived activities.

The assessment of the environmental noise effects of the operation of the site requires consideration not only of the characteristics of the sound sources, and their position on the site; but of the location of and distance to, the point in question; the terrain; the topography; and any possible intervening development in the path to the observation point.

The future operational part of the site is shown in the Design and Operations report.

Buffer zones are provided between the limit of fill and the property boundary. The areas to the north, east and west of the site are heavily treed.

4.5 Existing Neighbours

In the vicinity of the site there is a scattering of existing residences mostly in the northwest direction of the site. The following residences have been identified as being close to an operational boundary.

Existing Residences	Distance to an Operational Boundary
Elstone	410 m
Johnson	620 m
Aitkin/Walker	700 m

The closest residences to the south of the site are located on the south side of the CNR tracks, which are at least 1000 m from an operational boundary, and thus are of no concern with respect to noise impact from the landfill.

Two existing commercial/industrial establishments identified as Tridon Ltd. and Cumis Group are located more than 500 m to the southwest of the site.

4.6 Sound From The Operation

The federal government limits the noise emission for newly manufactured trucks to 77 dBA at 30 m. These regulations are on the basis of the maximum sound emission potential, and are not necessarily directly indicative of typical operating sound levels, which tend to be lower.

what year?
previous limits?
however, by '87 trucks being used should reach limit.?

The Ontario Ministry of the Environment has a guideline of a maximum of 85 dBA at 7 metres (72 dBA at 30 m) for construction equipment over 75 Kw (100 Hp) manufactured after 1981.

Using the assumptions listed below, the 1987 peak hour activity at each working area can be modelled as a point source of sound creating a one hour L_{eq} of 78 to 85 dBA at 30 m. The range results from allowing a 10 decibel spread in the sound level output of the trucks, and also a variety of combinations of equipment operating together in close proximity.

what is range for trucks?

1. Peak hour truck volume of 28 vehicles. (Peak hour traffic of 27 trucks, plus one additional truck for hauling containers from scale house to the working face).
2. Total time spent by each truck in the vicinity of the operating face for manoeuvring and unloading of 5 minutes.
3. Two refuse compactors in use, meeting the MOE criterion of 72 dBA at 30 m.
4. One tractor crawler (dozer) in use, meeting the MOE criterion of 72 dBA at 30 m.
5. One track loader, meeting the MOE criterion of 72 dBA at 30 m.
6. One self-powered, wheeled, tractor scraper, meeting the MOE criterion of 72 dBA at 30 m.
7. The rated sound level output is present for 100% of the time, for items 3 to 5, and 50% of the time for item 6.

The above model is obviously pessimistic in that it would not be expected that all vehicles and equipment would produce their maximum sound output continuously (if at all), nor would they all necessarily be present at the working face simultaneously.

The range for truck sound output allows for the presence of older vehicles which either may have been manufactured prior to the current regulations or may have grown noisier. Table 5 provides a breakdown of the various combinations resulting in the L_{eq} range given above.

Using the attenuation factors in Table 6, the sound exposure effects at different off-site locations may be determined. Allowing the conservative amount of ground attenuation shown, it is seen that the resultant sound exposure will reach the MOE criterion of L_{eq} 55 dBA at about 300 m from the operating face, and L_{eq} 45 dBA at about 500 m.

At any given time, the indicated distance from an existing residence to the working face may actually be double the distance to the closest operational site boundary. Thus, in general, the surrounding residences will experience peak hour sound exposure of L_{eq} 55 or less, and in many cases, considerably less.

If the United States standard for construction equipment of 85 dBA at 15 m (79 dBA at 30 m) is used, the sound exposure (L_{eq}) on the Elstone property could be as high as 53 to 59 dBA during operating hours of the day, when the equipment is in the immediate area and at sufficient elevation that ground attenuation is minimized; and the sound exposure (L_{eq}) on the Johnson and Aitkin/Walker properties could be 47-52 and 46-49 dBA, respectively. The sound exposure on the Aitkin property could be up to 61 dBA if no excess ground attenuation were allowed.

It must be emphasized that these results should be considered "worst case" since they are derived from assuming the peak volume of traffic and the full complement of landfill equipment contributing their maximum sound output.

The truck traffic along the internal access road may be expected to result in a peak hour sound exposure of L_{eq} 40 or less at the closest residences. Thus, this component of the operation is not considered of significance with respect to environmental noise.

The noise emissions from cars, vans, and pick-up trucks at the working face and along the internal access road are considered insignificant because of their much lower levels of noise emission than trucks.

Consideration has also been given to noise arising from trucks banging their tailgates or bins to shake loose the load during unloading at the working face. If impulsive sound levels of 95 to 105 dBAI at 30 m are assumed, this could result in impulsive sound levels of 66 to 76 dBAI at the Elstone property, and 59 to

(69 dBAI, and 56 to 66 dBAI at the Johnson and Aitkin/Walker properties, respectively.

There are existing forests of 100 to 150 m extent to the north, east and west of the site. Under normal circumstances, an excess attenuation of 2-3 dB per 30 m of forest could be expected. Taking the terrain into consideration, an excess attenuation of 3 to 5 dB might be expected at the Elstone, Johnson, and Aitkin/Walker properties during the summer months. However, this factor has not been accounted for in the analysis discussed herein.

5. SOUND LEVEL MEASUREMENTS OF EXISTING LANDFILL

Off-site sound monitoring of the existing landfill operation was done on March 14, 1984 at the residences listed below. Data was taken continuously for the time periods indicated.

Aitkin	08:22 to 10:53 hours
Johnson	11:26 to 13:33 hours
Elstone	14:53 to 16:53 hours

Sound exposure, in terms of L_{eq} (dBA) over consecutive one half hour intervals was measured using a Metrosonics dB 602 Sound Level Analyser. An anemometer was used to automatically inhibit data when wind gusts were of sufficient speed to invalidate data due to direct actions of airflow on the microphone. During the measurements, the operational face was located in an area near the currently approved easterly limit of fill and approximately 100 m south of the currently approved northerly limit of fill, at an approximate elevation of 176 to 178 m. It was understood that the measurement period was typical of a "heavy load" day.

During the sound measurements there was a light wind generally in a northerly direction in the morning and generally in a southerly direction in the afternoon.

Table 7 shows the measured sound exposures for one-half hour intervals, the computed L_{eq} for one hour intervals, and the computed L_{eq} for one hour intervals normalized to a distance corresponding to the closest operational boundary. The normalized sound exposures were adjusted for distance and excess ground attenuation as detailed below:

- (1) Allowance of 6 dB per doubling of distance, and
- (2) Allowance for additional ground attenuation of 0.5 dB per 30 m.

Table 8 compares the predicted and normalized measured sound energy exposures.

It must be emphasized that the measured sound exposures represented the overall sound environment, which was composed of not only the sound from the landfill operation, but also that of the existing environment. Included in the measurement results were light aircraft flyovers, distant traffic, distant train whistles, birds chirping, etc. Taking the above into

consideration, it is concluded that the predictions reported herein are consistent with the measured results.

During the monitoring periods, impulsive sound level measurements were obtained at two locations, of sound arising from trucks banging their tailgates or emptying bins. The results were:

RESIDENCE	NO. OF MEASUREMENTS	RANGE (dBAI)
Aitkin	5	55 to 65
Johnson	6	51 to 69

? Elstone ? Since Elstone closer than A. and J., if there had been instances of impulsive sounds, readings would be higher than those measured for A. and J. ?
up to perhaps 76 dBAi ?

6. CONCLUSIONS

1. The traffic attributable to the landfill operation will have negligible noise impact on land uses along the North Service Road.
2. Truck traffic along the internal site access road(s) is expected to have no significant effect on the noise environment of the closest existing residences.
3. Public traffic including cars, vans, and pick-up trucks along the internal access road(s) and at the working face are expected to have no significant effect on the noise environment of the closest existing residences.
4. For the Johnson and Aitkin/Walker residences the potential increases in sound exposure are expected to result in the MOE criterion of L_{eq} 55 being met.)
5. The Elstone residence could potentially experience sound exposure of up to about 53-59 dBA in the worst case, when the operations are in close proximity and above existing grade during the winter months. When the operational face is moved a distance of about 100 m to the south, the sound exposures are expected to not exceed 55 dBA.
6. The banging of tailgates or bins on some trucks unloading at the working face may be easily audible outdoors, and in some cases indoors, within a distance of about 800 m of the operating face. Because of the relative infrequency of occurrence (significantly less than 20 events in any 20 minute period) these sounds are not considered of major significance. (There are no Ministry of Environment guidelines that are applicable.)
7. In the analysis presented herein, worst case assumptions have been used which can be reasonably expected to over-predict the potential noise impact. It is concluded from this analysis that the proposed landfill operations will meet the Ministry of the Environment criteria for environmental sound exposure for a landfill, with the potential exceptions discussed above, involving short periods of operations, where the criterion may be marginally exceeded.

*(worst case,
they are
computed
residencies
Table 3)
higher than
predicted
assumptions?
- because latter
include other sounds.*

The above conclusions do not imply that the operations will be inaudible. Particularly when local non-site related activities are at a minimum, the residual ambient sound levels in the area can be quite low, increasing the potential audibility of any given sound source. However, audibility does not in itself imply adverse impact.

8. The noise abatement measures listed below would be useful in minimizing any potential environmental noise impact. It is therefore recommended that they be incorporated into the continued operation of the site.

*how do
you do
this?*

- a. Deny access to vehicles in poor repair or not in conformity with the requirements of the Highway Traffic Act.
- b. Only permit construction and operating equipment on site that meets the appropriate noise emission standards.
- c. Well maintained mufflers should be used on all construction equipment on site.

RESPECTFULLY SUBMITTED

VALCOUSTICS CANADA LTD



A.D. LIGHTSTONE, PH.D., P. ENG.

*Noise is subjective?
∴ there could be adverse impact*

REFERENCES

1. "Model Municipal Noise Control By-Law, Final Report", August, 1978, Ontario Ministry of the Environment.
2. "Burlington Landfill Site, Design and Operations Report", M. M. Dillon Limited.
3. The Canada Gazette, Part I, April 28, 1978.

TABLE 1
BURLINGTON LANDFILL SITE
ROAD TRAFFIC DATA (NON-SITE RELATED)

Roadway	Year	AADT ⁽¹⁾	% Trucks
Highway 403	1982	45,450	10 ⁽³⁾
North Service Road	1983	9,550 ⁽²⁾	10 ⁽³⁾

1. Annual Average Daily Traffic
2. Includes traffic to the existing landfill site
3. Assumed.

TABLE 2
BURLINGTON LANDFILL SITE
PREDICTED SOUND ENERGY EXPOSURE FROM EXISTING TRAFFIC
(NON-SITE RELATED)

Location	@ 30 m	L _{eq} (dBA)*	
		@ 60 m	@ 150 m
North of North Service Rd.	66	64	60
South of Highway 403	70	66	61

*Distances are to the closest lane of the respective source.

TABLE 3
BURLINGTON LANDFILL SITE
SITE RELATED TRAFFIC VOLUMES

	Existing 1983				Future 1987			
	Trucks In	Trucks Out	Total In	Total Out	Trucks In	Trucks Out	Total In	Total Out
a.m. peak hr. (7:30-8:30)	12	12	25	25	14	14	28	28
p.m. peak hr. (4:40-5:30)	7	7	36	36	8	8	41	41
truck peak (8:00-9:00 a.m.)	24	24	51	51	27	27	58	58

TABLE 4
BURLINGTON LANDFILL SITE
PREDICTED SOUND ENERGY EXPOSURE FROM TRAFFIC
INCLUDING LANDFILL TRAFFIC

Location	L _{eq} (dBA)*		
	30 m	60 m	150 m
North of North Service Rd.	67	64	60
South of Highway 403	70	66	61

*Distances are to the closest lane of the respective source.

TABLE 5
BURLINGTON LANDFILL SITE
OPERATING FACE SOUND EMISSION MODEL
PEAK HOUR 1987

Sound Exposure ⁽¹⁾	Truck Sound Level (dBA)			Add ⁽²⁾
	70	77	80	
L _{eq1}	74	81	84	28 Trucks
L _{eq1}	78 (83)	82 (85)	85 (86)	2 refuse compactors
L _{eq1}	79 (84)	82 (86)	85 (87)	1 front end loader
L _{eq1}	80 (85)	83 (87)	85 (88)	1 bulldozer
L _{eq1}	80 (86)	83 (87)	85 (88)	1 tractor-scraper

1. At 30 m for one hour
2. Construction equipment meeting proposed MOE guidelines of 85 dBA at 7 m (72 dBA at 30 m). Numbers in brackets apply if 85 dBA at 15m (79 dBA at 30 m) applies.

TABLE 6
BURLINGTON LANDFILL SITE
SOUND ATTENUATION AS A FUNCTION OF DISTANCE

Distance	Geometric Attenuation (dB)	Ground Attenuation (dB)	Potential Total (dB)
30	0	0	0
60	6	0	6
120	12	2-4	14-16
240	18	4-8	22-26
300	20	5-10	25-30
350	21	6-12	27-33
400	22	7-13	29-35
500	24	8-15	32-39
600	26	10-15	36-41
700	27	12-15	39-42
800	29	13-15	42-44
1000	30	15	45
1500	34	15	49

TABLE 7
BURLINGTON LANDFILL
SOUND EXPOSURE MEASUREMENTS

RESIDENCE	TIME PERIOD	MEASURED HALF HOUR L_{eq}	COMPUTED ONE HOUR L_{eq}	ONE HOUR L_{eq} AT NORMALIZED DISTANCE
Aitkin	0822 - 0852	48	48	54
	0852 - 0922	48		
	0922 - 0952	48	48	54
	0952 - 1022	47		
	1022 - 1052	49	49**	55
Johnson	1126 - 1156	50	48	53
	1156 - 1226	46		
	1233 - 1303	48	49	54
	1303 - 1333	49		
Elstone	1453 - 1523	51	52	60
	1523 - 1553	52		
	1553 - 1623	49	48	56
	1623 - 1653	46		

* Normalized to a distance corresponding to the closest operational boundary.

** Assuming the measured one-half hour L_{eq} would apply to the next half hour.

TABLE 8
BURLINGTON LANDFILL
COMPARISON OF PREDICTED AND MEASURED SOUND EXPOSURE

RESIDENCE	L _{eq} (dBA)	
	(1)	(2)
Aitkin	46-49 (61)*	54-55
Johnson	47-52	53-54
Elstone	53-59	56-60

(1) Predicted worst case sound exposures.

(2) Computed from March 14, 1984 measurements normalized to a distance corresponding the closest operational boundary as used in (1).

* No allowance for excess ground attenuation.

APPENDIX K-1

APPENDIX K-1

The MOE noise guidelines for landfill sites were first issued in connection with the Glanbrook Landfill site. The guidelines consist of maximum one hour sound exposures at the nearest residential receptor, of 45 dBA L_{eq} during nighttime between 1900 hours of one day and 0700 hours of the following day, and of 55 dBA L_{eq} during the daytime between 0700 and 1900 hours. These limits have the inherent considerations and assumptions noted below:

- (a) The existing ambient noise climate is assumed to be rural, i.e. the daytime and nighttime environmental noise level is normally below the stated limitation. Should the environment have noise sources of man-made activity, such as industry, commerce, and road transportation, which produce sounds in excess of the above limits, these higher sound levels may be used as the limits.
- (b) The landfilling operation involves only "construction equipment" or "conveyances" as specified in the Model Municipal Noise Control By-Law, Final Report, 1978.
- (c) If the condition in Clause (b) above is fulfilled, the landfill site itself is not considered a stationary noise source and will not be governed by the limitations set out in Publication NPC-132, "Guidelines for Noise Control in Rural Areas".
- (d) If a landfill site utilizes equipment that does not fall under the aforesaid definition of "construction equipment" or "conveyance", the site will be considered to be a stationary noise source and the limitation applicable to the control of the noise emissions will be those set out in Publications NPC-132 and NPC-133.

Note: In the case of the Burlington Landfill, assumption (b) is valid. Assumption (a) applies to some of the study area at least part of the time.

M-W-010





Consulting Engineers & Planners

OUR FILE: 9319-02
YOUR FILE:

30 March 1984

M.M. Dillon Limited
47 Sheppard Avenue East
WILLOWDALE, Ontario
M2N 5X5

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

Burlington Landfill Continued Use -
Application for a Certificate of
Approval

Dear Sirs:

We are pleased to present the Parkway Belt West Plan Amendment Requirement Assessment and the Planning Assessment contained as Appendix 'L' and Appendix 'M' of the Technical Report filed in support of an Application for a Certificate of Approval for the continued use of the Burlington Landfill Site.

Yours truly,

M.M. DILLON LIMITED

J.R. Balfour, P.Eng., M.C.I.P.
Senior Associate

JRB:lly
Encls:

SECTION L
PARKWAY BELT WEST PLAN
AMENDMENT REQUIREMENT ASSESSMENT

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SECTION L
PARKWAY BELT WEST PLAN
AMENDMENT REQUIREMENT ASSESSMENT

1. PURPOSE

get reqs

The Burlington Landfill site and its proposed continued use are within the Parkway Belt Planning Area controlled by Ontario Regulation 472/73.

This report is an assessment of the continued use of the Burlington landfill site and proposed operational changes in relation to the goals and objectives of the Parkway Belt West Plan. The report also assesses whether there is a necessity to amend the Parkway Belt West Plan in order to permit the continued use plans for the Burlington Landfill.

2. BACKGROUND

In 1973 the Province of Ontario enacted Ontario Regulation 472/73 establishing the Parkway Belt Planning Area. Following an extensive planning and public hearing process, the Parkway Belt West Plan was approved by the Lieutenant Governor in Council on 19 July 1978. Subsequently, Ontario Regulation 262/79 was enacted, which exempted municipalities from complying with Regulation 472/73 provided it was for a public service undertaking. While exempt from the Regulation for undertakings which provide a public service, municipalities were not exempted from complying with the requirements of the Parkway Belt West Plan.

The location of the landfill site is within the Parkway Belt planning area and the approved land use plan. Ontario Regulation (472/73) superceded all existing land use by-laws in the Parkway Belt Planning Area. From that time onward, lands covered by the Regulation could only be developed for agricultural purposes or uses approved prior to the passing of the Regulation. Existing uses are also permitted.

The Burlington Landfill site, established by the City in 1972, was in existence prior to the passing of the Regulation and as such is a permitted use in the Parkway Belt Planning Area.

Gold Landfill,

3. PLANNING EVALUATION

3.1 Goals and Objectives of the Plan

The Parkway Belt West Plan established the goals, objectives and land use designations for the attainment of the Parkway Belt West. The Plan defines a goal as:

"The ideal or end to which a planned course of action is directed. It is a value to be sought, rather than a set of attainable conditions".

The Parkway Belt West Plan has four goals:

- 'Identification of urban area'
- 'Integration of the system of urban areas'
- 'Land Reserve for future flexibility'
- 'Linked open space framework'

For each of these goals, the Plan includes a list of objectives as a means of moving toward the desired goal. These goals and objectives are general in nature, and are intended to be applicable on a broad scale through the Parkway Belt Planning Area.

The goals and objectives of the Plan cannot be specifically used to assess the conformity of development applications with the Parkway Belt Plan. Rather, the goals and objectives are directed towards establishing a Parkway Belt.

The Parkway Belt West Plan also contains objectives for each of the various links in the Plan. While the objectives of each link are more specific, they are still not intended to be used as a means of assessing development.

3.2 Land Use Designation

The Burlington Landfill site is designated on Map 2 "Escarpment Link" of the Parkway Belt Plan as "Public Use Area - Public Open Space and Buffer Area". An area of the proposed continued use of the site is also designated on the same map as "Complementary Use Area - General Complementary Use Area".

a) Public Use Area

The uses permitted in this designation are not specifically defined and therefore, flexibility in interpretation exists. Development of the landfill under the Public Use Area category is permitted under subsection 5.4.1(e) "Other Public Use". This subsection is very broad in the uses permitted including "Other public uses of land, building and structures..." subject to satisfying the following conditions:

- i) "All natural features are preserved to the maximum possible degree".
- ii) "Buildings and structures have a very low lot coverage and are of limited height and low mass appearance".
- iii) "Buildings and structures are located in a manner that will secure an open space character of the area".
- iv) "Landscaping and berms are provided where necessary to secure the objectives of the Plan".
- v) "Any other conditions required to attain the provisions of the Plan are satisfied".

contain
plume
expansion

landfill

None of these conditions are intended to prohibit development but rather to guide the development in a manner which helps to achieve the goals and objectives of the Plan.]

mountain
The portion of the landfill proposed within the Public Use Area has no permanent building or structures which will need to be regulated by conditions (ii) and (iii). Similarly, there is very little in the way of natural vegetation on site within the area proposed for landfilling to be protected and therefore condition (i) is not affected. Condition (iv) relates to the design and rehabilitation of the landfill. As part of the design process for the continued use, (a landscaping, planting and rehabilitation plan is being prepared for the entire site. There are currently no other known requirements in accordance with condition (v).]

Of the stated conditions, none would appear to restrict the continued landfilling at the Burlington site.

b) Complementary Use Area

A portion of the proposed continued use plans takes place on lands designated on Map 2 of the Parkway Belt West Plan as "Complementary Use Area - General Complementary Use Area". The permitted uses here are broad. The expansion of the landfill is permitted under subsection 5.5.1(e) "Public Uses" which states:

"Public uses such as road, utilities, and their accessory facilities and other public uses of low-density, low-intensity character. Buildings and structures associated with those uses shall meet to the maximum degree the conditions set out in Paragraph 5.5.1(b)".

Since the landfill is an "other public use" it is permitted. Similarly, as there are no new buildings proposed on the site, the conditions on paragraph 5.5.1(b) are not applicable. 'Density of the development' is not applicable. Low-intensity uses are defined as:

"a use of land that has an average low level of activity: e.g. small number of employees, few visitors per acre, low traffic generation".

The proposed expansion of the landfill is a low-intensity use according to this definition.

Of the conditions to be met none preclude the continuation of the landfill operation.

3.3 Implementation

→ what is diff between NSP & LF here re Plan. ? pnv ✓ pub. access

The implementation procedures set out in the Plan deal clearly with municipal actions within the Parkway Belt Planning Area. Subsection 5.1.3 states:

was there a request ?
"The Minister may, upon requests from municipalities, declare by-laws, improvements, or undertakings to conform with the intent and purpose of the Plan".

The Plan provides for no other means of determining whether a public undertaking in the Parkway Belt Plan conforms with the intent of the Plan.

Under the provisions of the Ontario Planning and Development Act all municipal official plans and zoning by-laws must be brought into conformity with the Provincial document.

a) Regional Official Plan

The Region of Halton Official Plan designates the Burlington landfill as Public Use Area and Complementary Use Area in accordance with the Provincial Policy of the Parkway Belt West Plan. The Official Plan states in Section III 2(b):

"For a detailed description of the boundaries of and uses permitted in the Public Use and Complementary Use Areas, reference should be made to the Province's "Parkway Belt West Plan", July 1978".

b) Burlington Official Plan

Under the Halton Region Act, the City of Burlington Official Plan must conform with the policies and provisions of the Region of Halton Official Plan. Furthermore, legislation also requires that where provincial policy is in effect, such as the Parkway Belt Planning Area, that these provincial policies supercede all others. Therefore, the prevailing policies are the Parkway Belt West Plan and the Halton Region Official Plan.)

3.4 Need for Amendment

The proposed continued use of the Burlington Landfill does not interfere with the achievement of the goals and objectives expressed and established in the Parkway Belt West Plan. The impact on the integrity of the surrounding area is considered minimal and will be mitigated through site rehabilitation.

The continued use of the Burlington landfill within the existing approved site boundaries conforms with the Parkway Belt West Plan. No amendment to the Plan is, therefore, required.

4. CONCLUSION

The Parkway Belt West Plan provides goals, objectives and criteria for establishing a Parkway Belt West. The Plan acknowledges that the concept of the Parkway Belt is, in part, to provide land for public activities and undertakings. Nothing in the Plan states that a landfill operation is not an acceptable use within the Parkway Belt.

The operation of a landfill is low intensity and low density and it can be designed and regulated to meet the development criteria set out in the plan for current landfill operations and after use activities.

The continued use of the Burlington Landfill conforms to the Parkway Belt West Plan and will, after it is completed and rehabilitated, assist in achieving the goal of a "Link Open Space Framework."

divides area, not a link



OUR FILE: 9319-02
YOUR FILE:

30 March 1984

M.M. Dillon Limited
47 Sheppard Avenue East
WILLOWDALE, Ontario
M2N 5X5

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

Burlington Landfill Continued Use -
Application for a Certificate of
Approval

Dear Sirs:

We are pleased to present the Parkway Belt West Plan Amendment Requirement Assessment and the Planning Assessment contained as Appendix 'L' and Appendix 'M' of the Technical Report filed in support of an Application for a Certificate of Approval for the continued use of the Burlington Landfill Site.

Yours truly,

M.M. DILLON LIMITED



J.R. Balfour, P.Eng., M.C.I.P.
Senior Associate

JRB:lly
Encls:

SECTION M
PLANNING ASSESSMENT

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SECTION M PLANNING ASSESSMENT

1. PURPOSE

A planning assessment was carried out to determine possible impacts of the continued use of the Burlington landfill with respect to the planning instruments already in place.) The surrounding land use and economic activities are also assessed and an analysis carried out to evaluate the potential effects upon them from continued landfilling at this site.

2. PLANNING INSTRUMENTS

2.1 Parkway Belt Plan

The Burlington landfill site is partially designated under the Parkway Belt West Plan as "Public Use Area - Public Open Space and Buffer Area". Portions of the landfill proposed for continued use are also designated as "Complementary Use Area - General Complementary Use Area". The two land use designations are general in nature and do not specifically restrict uses. Landfill operations are permitted uses in the Plan.

The continued use of the Burlington landfill, conforms to the Parkway Belt West Plan (see Section L).

2.2 Halton Region Official Plan

The Halton Region Official Plan was approved by the Minister of Municipal Affairs and Housing on 8 August 1980. That Plan designates the Burlington site as "Parkway Belt - Public Use Area and Complementary Use Area" and specifies that a detailed description of the boundaries of and uses permitted therein is provided in the Parkway Belt West Plan. The Official Plan also states:

...Provincial planning areas for the Niagara Escarpment and Parkway Belt (which do not overlap each other) and, within these, the respective Provincial policies take precedence.

The Region's Official Plan echoes the Provincial desire for a Parkway Belt West and also acknowledges the Provincial jurisdiction to control and regulate uses within the Parkway Belt West.

Portions of the landfill property have been designated in the Official Plan as Regional Open Space, Environmentally Sensitive Areas, Hazard Lands and Major Wooded Areas. The Environmentally Sensitive Areas designation applies to the adjacent Sassafras Woods, none of which will be removed by the landfill operation. These woods are discussed in detail in this report's Environmental Analysis.

Impact on Sassafras Woods?

The Regional Official Plan also contains policies for solid waste management. These policies have been considered and form the basis for guiding the continued use of the Burlington landfill. Prior to recommending the continuance of the landfill operation at the Burlington site, alternatives for waste disposal were considered in accordance with Regional Official Plan Policy.

The Regional Official Plan policies also state that landfill sites should be considered an interim use. The short life-span proposed for the Burlington site as well as the considerations for an after-use, all reflect the interim nature of the operation.)

By undertaking ground water and surface water investigations the Regional policy to protect such features is being implemented.

2.3 City of Burlington Official Plan

Land use within the Burlington landfill site area were regulated by Official Plan Amendment 49, prior to the institution of the Parkway Belt Regulation and subsequent Parkway Belt West Plan.

Under the Region of Halton Act 1974, it became necessary for all local plans to conform to the Regional Official Plan. Since the Region of Halton Official Plan maintains Provincial jurisdiction over the Parkway Belt West Plan, the City of Burlington OPA 49 must also provide that recognition.)

2.4 City of Burlington By-law 4000-3

Under Ontario Regulation 472/73, all By-laws within the defined Parkway Belt Planning Area are superseded. Therefore, Zoning By-law 4000-3 is not applicable unless Ontario Regulation 472/73 is amended to delete it from covering areas in the City of Burlington.]

3. EXISTING CONDITIONS

The existing conditions, both off-site and along the site access routes (North Service Road) provide a planning context for the evaluation of the proposed landfill operation. Existing conditions included in the analysis are land use, economic activities and population.

3.1 Land Use and Economic Activities

In accordance with the Parkway Belt West Plan, uses permitted in the "Public Use Area" to the north, northeast and west of the landfill site are:

- i) existing uses
- ii) linear facilities
- iii) public open space and buffers
- iv) other open space uses
- v) other public uses
- vi) interim uses

In the Special Complementary Use Area to the east of the site, the Parkway Belt West Plan permits: "...some further industrial development in the area." However, the development must be preceded by a comprehensive zoning by-law and development agreements.]

Figure M-1 illustrates the existing land use pattern in the study area. This area extends approximately 1.2 km around the site, north of Highway 403. Land uses in this area include Residential, Industrial Commercial and Open Space (Recreational).

a) Residential

A survey of the surrounding area shown on Figure M-1 identifies 139 residential units. Of these, only six will be able to see portions of the completed landfill site. The remaining houses are well screened by existing vegetation. No residential dwellings are located on the North Service Road which serves as the main access road to the site.

b) Industrial/Commercial

Located on the North Service Road adjacent to the site are Tridon Limited and Cumis Group. These are the only two industrial/commercial facilities in the immediate area.

c) Open Space (Recreation)

Bayview Park is situated on King Road to the east of the site. The Burlington Rod and Rifle Club is also located in this area. From the Park a limited view of the landfill exists, however, present tree cover screens the majority of the site. }

4. POTENTIAL EFFECTS

a) Residential

Surrounding residential areas are well removed from the landfill site. As such, no impacts are anticipated excepting some increased visual exposure to six dwellings.

b) Industrial/Commercial

A small portion of the truck traffic bound for the landfill will pass the Industrial/Commercial operations located along the North Service Road. Information on truck traffic projections shows no major increase from existing traffic levels.

c) Open Space (Recreation)

The open space-recreational activities east of the landfill site are not contiguous to the landfill and will not be affected by its continued operation. Landfill related traffic does not use King Road in the area of the Park and therefore will not conflict with recreational traffic.



March 14, 1984.

M. M. Dillon Ltd.,
47 Sheppard Avenue East,
WILLOWDALE, Ontario.
M2N 6H5

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

Dear Sir:

RE: BURLINGTON LANDFILL SITE
VISUAL IMPACT OF CONTINUED USE PROPOSALS
OUR FILE: G83069

Please find attached our visual assessment of the Burlington Landfill Site.

Yours very truly,

THE LANDPLAN COLLABORATIVE LTD.,



Robert M. Wright.
RMW/cb.

the
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SECTION N

VISUAL ANALYSIS

**BURLINGTON LANDFILL SITE
PROPOSED CONTINUED USE**

PREPARED FOR

M.M. DILLON LIMITED

BY

LANDPLAN COLLABORATIVE LIMITED

MARCH 1984

SECTION N
VISUAL ANALYSIS

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LIST OF FIGURES

FIGURE N-1	VIEWS - EXISTING
FIGURE N-2	VIEWS PROPOSED

STUDY METHOD

The visual assessment was undertaken in the following manner:

1. Reports were reviewed and features pertinent to the visual assessment of the landfill site were identified, for example, vegetation and landform. ✓
2. Maps and aerial photographs of the site were reviewed including: the staging of continued use phases A, B, C, D, scale 1:1500; a photo mosaic at 1:1500; detailed topographic maps at 1:2000; and two air photographs at 1:10,000. ✓
3. Photographs were taken on and off the site. These were shot on 100 ASA colour film using two cameras equipped with a 50 mm and an 80 mm to 200 mm zoom lenses. The 50 mm lens was used to create panoramas, with the zoom used only for detailed shots (due to the foreshortening effect). ✓
2. { 4. Proposed grades of the landfill were approximated using a 4.5 m rod.
5. The boundaries and characteristics of views from various positions surrounding the landfill were determined for conditions before and after proposed grade changes to the landfill.

FIELD SURVEY

A preliminary field visit for orientation purposes was conducted on 2nd February 1984. The major portion of the field survey and photographic inventory took place on 4 February 1984. A final field check was conducted on 14 February 1984.

Photographs, not included with this report, were taken from ten areas (see Figure N-1):

1. The top of a central knoll on the landfill site.
2. Below the knoll on both the north and south sides at the existing grades of the landfill.
3. The south side of residences A, B, C and D.
4. The east side of residence (E). *? not marked on Fig. N-1*
5. King Road along Bayview Park to the east of the site (F).
6. East and westbound lanes of Highway 403 (G).

EXISTING CONDITIONS

NB { The Burlington Landfill site is located along the North Service Road of Highway 403, northwest of the old town of Aldershot (now West Burlington). The site lies near the base of the Niagara Escarpment in a highly dissected landscape consisting of forested valleys, ridges, and gently rolling hills. The predominant surrounding land uses are: (residential (on the escarpment), agriculture (on the level lowlands), and industrial development (along the North Service Road)).

which lower are to NE?

{ The current size and shape of the landfill corresponds closely to the surrounding topography. The top crest line of the landfill is now at a point which follows the tops of the trees of the surrounding area (as seen from the residences to the northeast and north of the landfill site). From Highway 403, the landfill slopes partially obscure the view of the escarpment but only for a short period of time considering the limited viewing opportunity of the motorists. }

VISUAL ASSESSMENT

To identify the area of the existing and proposed landfill grades which could be seen by surrounding residents, motorists and park users, viewshed limits were determined. The following parameters were used in this analysis:

- the approximate height of vegetation (15 m)
- the existing landfill contours
- the final grades of the proposed phases
- an approximate viewer height (1.8 m)

*is this reasonable?
(a 50' tree)*

To determine lines of site and view planes, positions were set at locations representing typical viewing opportunities. For example, the central portion of a principal residence.

Considering the above parameters along with the working photographs, the existing landfill area as seen from surrounding residences, the park and Highway 403 was mapped (Figure N-1).

To identify the site's future visual impact, the 1:2000 contour maps, proposed landfill grades and photographs were analyzed. This examination had the benefit of a visual indicator, a point of reference corresponding to the proposed final grade changes at the site. That reference point was the small knoll on the top of the central plateau (Figure N-1). The elevation of this knoll was estimated as 180.5 m. The proposed elevation at this location is 184 m.

The information from the study was transferred onto two photo mosaics to show existing and future views (Figures N-1 and N-2, respectively). Table 1 quantifies the results of the visual assessment.

NB { As evident from the Table and Figures, there is presently a view from four residences of portions of the existing landfill. The area visible will increase in varying amounts with the site's continued use. There will also be a view of portions of the proposed future landfill grades from one additional house (E). The area of the landfill visible from Bayview Park will increase and there will be a slight reduction in views from Highway 403. }

CONCLUSION

The existing Burlington landfill site is visually well integrated with the surrounding landscape. The changes in final grades identified in the Design and Operations Report will generally increase the visibility of the landfill from the residences located to the west, northwest, and north of the site along the Niagara Escarpment.

The concepts for site after use and rehabilitation proposed in Section H will help screen views of the landfill.

TABLE 1
VISUAL ASSESSMENT

RESIDENCE	View of Existing Site In Hectares	View of Proposed Site In Hectares*	Difference In Hectares
A	2.7	10.3	7.6
B	2.7	10.3	7.6
C	2.7	10.3	7.6
D	2.3	3.8	1.5
E	0.0	7.7	7.7

BAYVIEW PARK

F	5.0	7.7	2.7
---	-----	-----	-----

An additional 1.5 ha is visible from the park through the trees only in winter (Figure N-2 - Area 3).

HIGHWAY 403

G	1.4	1.2	-0.2
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The viewshed was calculated at various locations along Highway 403 to take into consideration vehicle movement.

* Total area of future landfilling to be 34.5 ha.