

HALTON REGION LANDFILL
TECHNICAL STUDY
BIOPHYSICAL ANALYSIS
SUMMARY REPORT AND
COMPARATIVE EVALUATION
SITE D AND SITE F

prepared for

The Regional Municipality of Halton

prepared by

Bird and Hale Limited

SUMMARY REPORT AND COMPARATIVE EVALUATION

1. Purpose of Studies

The biological characteristics of two candidate sites for the landfilling of municipal waste of the Regional Municipality of Halton have been investigated and evaluated to determine their suitabilities for this land use, adverse impacts that may occur, and mitigation measures that can be employed to reduce these impacts. These two sites are referred to as "D" and "F", and their locations and areal extents are shown on the accompanying Key Map.

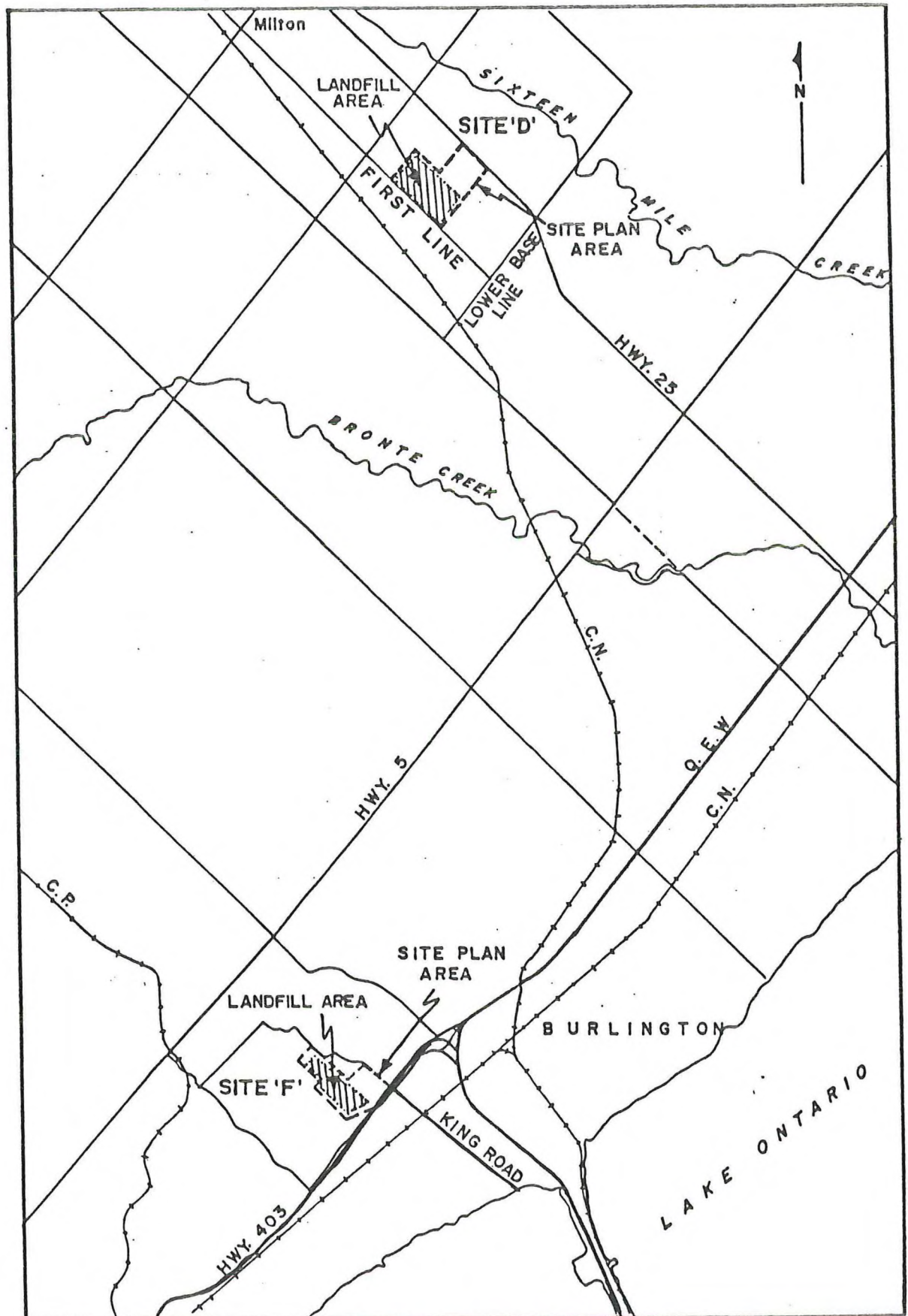
2. Stage 2C Findings

The current work is an extension of work that has been undertaken under the auspices of the Environmental Assessment Act. The stage immediately preceding this work, categorized as "Stage 2C", evaluated six candidate sites. The results of the studies during Stage 2C indicated that both Sites D and F potentially were suitable to support a municipal landfill, based on the level of detail available at that time (Walker Wright Young Associates Limited, 1985). The comparative analysis that lead to this conclusion (contained in the previously cited report) was based on a consideration of all factors that comprise the "environment" as defined by the Environmental Assessment Act.

The biological investigation of the Stage 2C study (Bird and Hale Limited, 1985) included a review of existing data, discussions with government agency personnel and other knowledgeable individuals, and field investigations.

Key Map

SCALE 1 : 100,000



Consideration was given to vegetation community types and species, wildlife habitat and species, landforms, soils, drainage, and environmental impact.

On Site D, at the time of the publication of the Stage 2C report, using the available plant species authorities, no plants were classified as provincially rare, and three species Carex laxiculmis (sedge), Allium tricoccum (wild leek), and Geum laciniatum (rough avens) were referred to as "significant". Thus, the study concluded that from a biophysical perspective, Site D exhibited only minor constraints to the development of a landfill site.

The biological investigation of Site F at Stage 2C concluded that of the six sites that were investigated at Stage 2C, Site F, with the presence of provincially rare plant species and numerous regionally significant species, and a diversity of vegetation community types, had the most severe constraints, from the perspective of the biological characteristics.

The conclusion of the Stage 2C biophysical study was that, of the six sites that were investigated, Site D exhibits only minor constraints to the location of a landfill, and Site F exhibits much more severe constraints, based on an assessment only of the biophysical features.

3. Results of Current Technical Study

At the end of Stage 2C of the Environmental Assessment Study, the site plan areas for D and F were delineated. Subsequently, after the current studies had commenced, modifications to the waste quantities estimates, and further

detailed hydrogeological work and engineering site design combined to reduce the areal extent required for a landfill site that would accommodate the municipal waste of the Region of Halton for a twenty year period. The Key Map (page 2) illustrates the preferred option for each site, including the site plan area and the area to be landfilled.

The information sources for the current study were similar to those for the Stage 2C study, but the investigations were carried out to a greater level of detail. The sources included: previously undertaken studies specific to the two sites and environs, including the reports that were prepared for previous stages of this investigation; literature review, specific to the objectives of this study, such as floras, and landfill vermin control measures; on-site field work; visits to operating municipal landfill sites and discussions with the operators; and, discussions and interviews with government agency personnel and individuals knowledgeable about specific topics.

A summary of the biological characteristics of each of the two sites is presented in subsequent sections. Emphasis is placed on the areas that will be landfilled, not the site plan areas.

In general, the findings of this study verify and substantiate the findings of the Stage 2C report. The main difference relates to the significance designations of various plant species that have been found to occur on the sites. In the Stage 2C report, native plant species were classified as "rare" if they were classified as provincially rare in the "Atlas of the Rare Vascular Plants of Ontario", and its supplements (Argus and Keddy, 1984; Argus and White, 1977, 1982, 1983). Other species that had been classified,

by knowledgeable persons or in existing reports, as being rare, uncommon or significant in Halton Region, were classified as "significant" in the Stage 2C report.

In the current report, provincially rare native species were determined in the same manner; however, regionally significant native species have been classified as: rare - 1 to 5 locations within the Region; scarce - 6 to 10 locations with the Region; occasional - 11 to 15 locations with the Region; and, common - 16 or more locations within the Region. These designations are based primarily on the work of Crins (1981, 1983, 1985, 1986), supplemented by study team knowledge. Crins' work has only recently been completed (March, 1986) and his findings have resulted in changes in status designations for some species, from those given in the Stage 2C report.

4. Biophysical Conditions

4.1 Site D

The relatively flat site of clayey till soils is drained by natural intermittent channels and ditches. There are no perennial drainage channels on the site. A drainage divide results in, eventually, the southwestern portion draining into the Bronte Creek system and the north and eastern portion draining into the 16 Mile Creek.

Most of the site is utilized for agriculture. There are two small areas of naturally occurring vegetation, with areas of approximately 7 ha and 2.8 ha within the Site Plan Area, and which are referred to as woodlots D1 and D2, respectively. These areas contain plant communities typical to Halton,

including wet-to-moist deciduous forest, moist upland deciduous forest, moist deciduous successional forest, upland thicket, hedgerow thicket, lowland swamp thicket, dry meadow, wet meadow, cattail marsh, and graminoid-forb marsh cover types. Approximately 4.8 ha of natural vegetation, comprising approximately 2 ha of D1 (northwest portion) and all of D2 (2.8 ha) would be eliminated to accommodate a landfill operation. This loss of natural areas would not constitute a loss of regional representation of these cover types, since these cover types are common and typical to the area and contain mostly species which are common and typical for the Halton Region.

No provincially rare species are confirmed as occurring on the site. The report of Crataegus corusca (hawthorn) is not likely. Various levels of significance can be attached to an additional forty-one of the native species which have been reported from the Site. The increase in the number of reported significant plant species over the number presented in the Stage 2C report results mainly from the preparation of a preliminary vascular plant species checklist for the Regional Municipality of Halton (Crins, 1986). Of the three species classified as significant in the Stage 2C report, the status of the sedge (Carex laxiculmis) has been revised to regionally scarce (with six to ten known locations in Halton), and of wild leek (Allium tricoccum) and rough avens (Geum laciniatum) to regionally common (sixteen or more locations in Halton).

The status of the forty-one significant native species are summarized as follows: two regionally rare species (Potamogetan natans [common floating pondweed]), Sanicula gregaria [black snakeroot]; six regionally scarce species; and, thirty-three regionally occasional species. Landfilling

will result in the loss of all known representatives on the site of one regionally rare plant (black snakeroot), three regionally scarce species, and nine regionally occasional species, leaving representatives of one regionally rare species, three regionally scarce species, and twenty-four regionally occasional species.

The mammal, bird, reptile and amphibian species found on the site are common to the area and, due to their mobility, ranges, seasonal movements and activities, can adapt to a small area loss of habitat. The on-site habitats for these species are common throughout Halton and therefore their elimination would not be detrimental to the survival of the particular species, and would only have minimum effect on members of the species.

The natural vegetation communities on the site are common in Halton, and are not part of a larger forest stand or wildlife corridor and therefore loss of a portion of them would neither disrupt nor impact on a larger, more integrated forest ecosystem. A landfill will result in the loss of the significant floral species that add to the biological diversity of Halton. However, because approximately two-thirds of D1 will remain intact, loss of plant and wildlife habitat will be minimal if landfilling should occur on Site D.

4.2 Site F

Site F is a diverse environment supporting a variety of terrain, vegetation communities, and floral and faunal species.

The terrain ranges from a series of parallel, deeply incised valleys and ridges in the central area, giving way to generally flat terraces in the northwest and southeast. The overall slope of the land is from the northwest to the southeast, with an overall drop in elevation of approximately 68 m. Drainage is from the ridge and upland areas to the valley bottoms, where there are intermittent streams that transmit water off the Site into the Falcon Creek and Indian Creek drainage systems.

The vegetation is composed of twenty-one different vegetation habitat types which fall into the categories of forest, plantation, shrub thicket, meadow, wetland meadow, anthropogenic, and open water, none of which are uncommon or unusual in Halton. These habitat types are quite diverse and consequently support a large number of diverse plant species. Many of the forest habitat areas are typical of the Deciduous Forest Region and the Carolinian Floristic Zone. In particular, areas support associations of oak and hickory. Although hickory is a common component of the deciduous forest stands in southwestern Ontario, this association is reaching the northern limits of its range in Halton. Thus, this association is indicative of the diverse and floristically rich nature of the Site.

A total of 116 significant native plant species are recorded from the Site: 4 provincially rare; 8 provincially uncommon; 13 regionally rare; 28 regionally scarce; and, 63 regionally occasional. This large number of significant plant species gives the Site biological importance in having a rich, significant, natural flora.

The final proposed areal extent of the landfill, under the preferred engineering site design (see Key Map, page 2),

mitigates, to a certain extent, the loss of biological resources from the area that would be landfilled. A substantial portion of the natural vegetation communities will not be disturbed. In this area, all but some of the anthropogenic habitat types are represented. However, the area that would be utilized for landfilling has a more diverse terrain, and supports a greater number of habitat combination types. In addition, there is a greater concentration of significant species in this area. Specific site locations are known for 27 of the 116 significant native species; of these, landfilling will result in the loss of all known representatives of at least 14 species. This includes 2 of the provincially rare species: sedge (*Carex gracilescens*) and American columbo (*Frasera caroliniensis*). In addition, although the specific location is not known for the provincially rare species nodding wedge grass (*Sphenopholis nitida*), field notes indicate that it is located within the proposed boundaries for landfilling. The specific site location of the fourth provincially rare species, hawthorn (*Crataegus corusca*) (which, in addition, is a tentative record), is not known.

Not
true

None of the wildlife species that were determined or thought to be present on Site F are considered unusual or unexpected in this area of the province. Due to the mobility, ranges, seasonal movements and activities of the wildlife species, and the availability of similar habitats in the area that is not proposed for landfilling, and the nearby Sassafras Woods, the landfill would not be detrimental to the survival of a particular species, and would only have minimal effect on the members of the species. In addition, because of the Highway 403 complex to the south of the Site which acts as a barrier, movement of animals would not be significantly adversely affected by the proposed landfill. Most animals would

utilize Sassafras Woods to the west and immediately to the north of the Site.

5. Vermin Control

The creation of a landfill at either site will not cause vermin problems as long as the necessary operating procedures are in place. These include uniform compaction of the waste and cover material, applying sufficient depth of cover, minimizing the size of the working face, grading the site to prevent water ponding, keeping the grass on stabilized areas of the landfill and adjacent fields sufficiently long to discourage loafing by birds, and keeping the roadways, buildings, equipment and areas on and adjacent to the site clean of garbage. In addition, periodic inspection of the site by a pest control contractor is recommended so that problems do not develop.

Birds, and specifically gulls, already occur in the vicinity of both sites. Increased congregations of birds may be expected in the vicinity of a landfill site but good housekeeping practices will help ensure that gull populations do not become a problem.

The proximity of the Site D to the Burlington Airpark may increase the potential for bird-plane collisions as the population of gulls in the vicinity may increase. Procedures which can be implemented to prevent this problem from developing include implementing similar site management techniques at the airpark as for the landfill (for example elimination of ponded water, maintaining longer grass, and cleanup of any garbage), use of a pyrotechnic device when and where birds congregate, and application of worm repelling

chemicals to the runway. Evidence from other airports situated near congregations of gulls (Maple Airport, Toronto Island Airport) indicates that it will be possible to operate the Burlington Airpark safely, with a minimum of modification to existing practices, with a landfill in the vicinity.

6. Impacts of Landfilling

The implications of a landfill on both of these sites can be categorized and analyzed with regard to vegetation community types, plant species types, wildlife habitat characteristics, and biological aquatic systems characteristics, in accordance with the format used in the Stage 2C report. The categories of biophysical resources (e.g., Vegetation Community Types), the measures (e.g., preserve uncommon communities) by which the severity of the impacts of landfilling on these resources are considered, and the primary objectives which should be met to minimize/eliminate adverse impacts are defined as in the Stage 2C report and are presented below. Since vermin problems have been analyzed during this current study, another category entitled "Land Use Conflict" has been added to the list and is included in the analysis. The categories, measures, and primary objectives are presented in the following Table 1.

TABLE 1 - FRAMEWORK FOR THE EVALUATION OF IMPACTS

<u>Biophysical Resource Categories</u>	<u>Evaluation Measures</u>	<u>Primary Objectives</u>
Vegetation Community Types*	Uncommon Communities	- preserve atypical/rare, stable, natural communities;
	Important Communities	- conserve as much as possible of non-field communities, for wildlife

	Managed Woodlots	habitat, soil maintenance and erosion control, aesthetics, and buffers; - conserve areas that are, or have potential to be managed as productive woodlots.
Plant Species Type	Rare Species	- preserve rare plant species.
Wildlife	Habitat	- preserve habitat of locally present rare or endangered species; preserve significant habitats of other species;
	Corridors	- protect movement corridors;
	Species	- avoid areas utilized by rare or threatened species.
Aquatic Systems	Drainage Pattern	- preserve existing drainage pattern of permanent flowing channels;
	Water Resources Characteristics	- protect biologically significant water resources by preventing downstream adverse modifications in water quality, quantity, and sediment load.
Land Use Conflict	Vermin	- control vermin so that problems do not develop and conflicts do not arise among various land uses.

where:

- atypical/rare communities are considered more significant than typical/common communities;
- stability is the ability of a biological community to sustain itself, and relates to on-site size, continuity off-site, age, and regeneration capabilities;
- naturalness relates to the existing level of man-induced disturbance within the community.

For all categories, the general objective is to minimize adverse impacts. The primary method by which adverse impacts on the biological resources of both Site D and Site F have been minimized is the reduction in the areal extent of the potential landfill sites (see Key Map, page 2). Possible remaining impacts are considered with respect to each measure of each category and are assigned a level of magnitude according to how well the primary objectives (as presented above) are met. Thus, the severity, and consequently the rating of the impact for each measure is specific to that measure. The ratings that are applied are as follows:

- Nil - the measure does not apply or, there are no significant impacts related to the measure
- Low - low impacts remain
- Medium - moderate impacts remain
- High - high impacts remain

Table 2 outlines the consequences of any remaining impacts of landfilling for each category and measure. The severity of these remaining impacts is then presented in accordance with the above ratings. The discussion is specific to the areas to be landfilled.

Some of the points presented in Table 2 differ from those stated in the Stage 2C report. In Table 2, these differences are highlighted with an asterisk(*), and the reasons for these differences are categorized as follows:

- *¹ - as a result of further investigation, more detailed information became available (e.g., further botanical inventory);
- *² - the publication of a preliminary vascular plant

species checklist for the Regional Municipality of Halton (Crins, 1986) permitted the classification of plant species according to their known regional representation (see Section 3.2.4);

*¹ - difference is a consequence of the reduction in the proposed areal extent of the landfill site;

*⁴ - this is a new evaluation category and/or measure that was not applied in Stage 2C report.

TABLE 2 - COMPARISON OF THE EFFECTS OF LANDFILLING ON THE BIOLOGICAL FACTORS FOR SITE D AND SITE F

Biophysical Factor -----	Site D -----	Site F -----
Vegetation Community Types		
Uncommon	no uncommon vegetation communities; thus, measure does not apply. Nil impact rating	loss of wide range of vegetation habitat types not well represented elsewhere, and indicative of Carolinian conditions and including oak-hickory* ¹ . High impact rating* ¹
Important	loss of D2 woodlot and a small portion of D1 woodlot* ³ ; the vegetation that will be lost provides habitat that has only local significance; wildlife populations will not be adversely affected. Nil impact rating* ³	loss of vegetation which provides wildlife habitat but because of adjacent natural areas, wildlife populations will not be significantly adversely affected. Low impact rating
Managed Woodlots	potential for management is lost but D1 is too small to manage and D2 is not physically suitable. Nil impact rating	the only plantation on the Site is not being managed currently and will not be affected by landfilling* ³ ; traditional woodlot management practices are not recommended

as they are not compatible with maintenance and encouragement of a diverse, natural environment.
Nil impact rating*³

Plant Species

Rare	potential loss of 1 provincially rare species, loss of 1 regionally rare species, 3 regionally scarce species, and 9 regionally occasional species* ^{1,2} . Low impact rating* ^{1,2}	loss of representatives of at least 3 provincially rare species and numerous species of regional significance, including rare, scarce, and occasional species* ^{1,2} . High impact rating
------	---	---

Wildlife Habitat

Habitat	no habitat for rare or significant species present; thus, measure does not apply. Nil impact rating	no habitat for rare or significant species present; thus, measure does not apply. Nil impact rating
Corridor	some animals may be disrupted in movement but Site is not well situated to act as a corridor and the area around the tributary of 16 Mile Creek is not affected. Nil impact rating	some animals may be disrupted in movement; wildlife movement to south of Site does not occur and east-west movement, because of presence of Sassafras Woods and area that is excluded from landfilling, should not be significantly affected. Low impact rating* ¹

Species* ⁴	not unusual or unexpected in this region of the province* ^{1,4} . Nil impact rating* ^{1,4}	not unusual or unexpected in this region of the province* ^{1,4} . Nil impact rating* ^{1,4}
-----------------------	---	---

Aquatic Systems

Pattern	measure does not apply. Nil impact rating	measure does not apply; the only are of permanent flowing water is in area that would be excluded from landfilling* ³ . Nil impact rating* ³
Water	run-off will be managed	run-off will be managed

Characteristics	to protect off-site streams; sediment load to tributary of Bronte Creek may be reduced from current conditions when stormwater management is in place. Nil impact rating	to protect off-site streams* ³ . Nil impact rating* ³
-----------------	---	--

Land Use Conflict*⁴

Vermin* ⁴	birds may interfere with operation of Burlington Airpark; potential for hazards minimal if recommended mitigation at landfill site is followed* ^{1,4} . Low impact rating* ^{1,4}	no vermin problems or subsequent conflicts with surrounding land uses are anticipated if recommended mitigation at landfill site is followed* ^{1,4} . Nil impact rating* ^{1,4}
----------------------	---	---

5. Conclusions

Considering the biological characteristics of the Sites, as summarized above, the following conclusions can be drawn:

Site D:

- Reduction of areal extent of the landfill site (from that proposed in Stage 2C) mitigates the extent of the adverse biological impacts.
- There are minor biological constraints to the development of a municipal landfill site.
- Vermin problems should not occur if the recommended mitigation measures are followed.
- Land use conflicts should not develop with regard to the presence of the Burlington Airpark.

Site F:

- With the diversity of vegetation habitat types and the presence of rare plants, the site exhibits major biological constraints to the development of a municipal landfill site.

- The reduction of areal extent of the landfill site (from that proposed in Stage 2C) helps to mitigate the impact by leaving representative units of vegetation resources.

- Vermin problems should not occur if the recommended mitigation measures are followed.

Table 3 below presents the ratings that are included in Table 2. This Table serves to highlight the overall biological environmental effects of a landfill at each of the sites for each of the categories presented above.

TABLE 3: NET ENVIRONMENTAL EFFECTS

<u>Categories and Measures</u>	<u>Site D</u>	<u>Site F</u>
Vegetation Community Types:		
Uncommon	Nil	High
Important	Nil	Low
Managed Woodlot	Nil	Nil
Plant Species:		
Rare	Low	High
Wildlife Habitat:		
Habitat	Nil	Nil
Corridor	Nil	Low
Species	Nil	Nil
Aquatic Systems:		
Pattern	Nil	Nil
Water Characteristics	Nil	Nil
Land Use Conflict:		
Vermin	Low	Nil

Considering the biological characteristics of the Sites, as summarized above, it can be seen that Site D has minor and Site F has major biological constraints to the development of a municipal landfill site. Therefore, from a biological perspective, Site D is the preferred site for the landfill. However, for Site F, in light of the mitigation introduced by the reduction of the areal extent of the landfill, if when evaluating all aspects of the "environment", as defined in the Environmental Assessment Act, Site F is found acceptable as a landfill site, there are no biological conditions within the proposed area for landfilling that would absolutely preclude the use of Site F as a landfill site, since none of the biological resources, although very significant, are categorized as endangered.

Does a species or community ^{have} to be endangered (definition - threatened with imminent extinction) Surely if the community or its constituent species are rare they should be protected