

**WASTE MANAGEMENT SYSTEMS PLAN
FOR THE
REGIONAL MUNICIPALITY OF SUDBURY
FINAL ENVIRONMENTAL ASSESSMENT**



JANUARY 1997

CONDENSED VERSION

1.0 INTRODUCTION

1.1 BACKGROUND

The Regional Municipality of Sudbury (hereafter identified as the "Region") proposes to construct and operate a long-term landfill in the City of Sudbury. This landfill (the "undertaking") will involve the expansion of the existing City of Sudbury landfill and would receive wastes requiring disposal from municipalities within the Region. The need for this landfill was identified through the development of a comprehensive Waste Management Systems Plan (WMSP) for the Region.

The Ontario Ministry of Environment and Energy (MOEE) requires that municipal waste management studies be developed in accordance with the requirements of the *Environmental Assessment Act* (EAA). This EA document presents a summary of the proposed undertaking and the planning process that led to its definition. The information is presented in a manner consistent with the requirements of the *Environmental Assessment Act* (EAA).

Most of the information presented in this EA document has been summarized from various technical reports and working papers prepared during the WMSP process. Further details about both the planning process and the undertaking can be found in these documents, which are listed below:

- *Task 1 Report: The Problem or Opportunity, January 1995*
- *Task 2 Report, The Diversion and Disposal Strategy, August 1995*
- *Task 2 Report, Technical Appendices, August 1995*
- *Task 2 Report: Public Consultation, August 1995*
- *Task 3 Final Report: 3Rs Implementation, April 1996*
- *Task 4 Report, Landfill Siting Workplan, August 1995*
- *Task 5 - Draft Candidate Area Identification Working Paper, April 1996*

- *Task 5 - Draft Long List of Potential Sites Identification Working Paper, June 1996*
- *Task 5 - Draft Short List of Potential Sites Working Paper, July 1996*
- *Task 5 - Draft Short List of Potential Sites Working Paper: Public Consultation, July 1996*
- *Task 5 - Draft Short List of Potential Sites Working Paper: Technical Appendices, July 1996*
- *Draft Preferred Site Identification Working Paper: Volume I, October 1996*
- *Draft Preferred Site Identification Working Paper: Volume II - Technical Appendices, October 1996*
- *Draft Preferred Site Identification Working Paper: Volume III - Public Consultation, October 1996*

These reports are available through the Region of Sudbury.

1.2 APPROVAL REQUIREMENTS

The Region will require approval for the landfill undertaking under:

- *The Environmental Assessment Act (EAA)*
- *The Environmental Protection Act (EPA)*

The Region's landfill is subject to the requirements of these statutes by law. At this time, through the submission of this EA Document, the Region is seeking approval under the EAA only. It is intended that detailed site investigations will be conducted and EPA documentation submitted at a later date (1998) after EAA approval is received. As the proposed new landfill will involve the expansion of an existing landfill which already has in place the required infrastructure, it is anticipated that other approvals typically required for landfill development (e.g. *Planning Act*) will not be required.

As a result of Bill 76 and changes to the EAA, proponents submitting an EA within one year of proclamation of the Bill (expected to be early 1997), will have the choice of seeking approval under either the existing or "new" EAA. If submitting under the existing EAA, proponents also have the option of making a request to the Minister that specific aspects of the "new" EAA be applicable to their submission. The Region is requesting that the scoped hearings provision and mediation be available for this submission.

Ontario Regulation 511/95 under the EPA lifted the "ban" on new municipal waste incinerators that had been imposed in 1992. Ontario Regulation 511/95 under the EAA is a companion regulation that provides an EA exemption for proponents that conducted their "alternatives to" evaluation in reliance on the now-lifted incineration ban. As a condition of this exemption, proponents who have substantially completed their "alternatives to" analysis before November 29, 1996 are required to provide notice of this to the Director of the EA Branch. The Region provided such notice in a letter dated October 2, 1996, as contained in Appendix A.

1.3 EA DOCUMENT CONTENTS

This EA document presents key information about the proposed landfill, and provides a summary of the planning process that led to its identification and definition.

Following this introductory chapter, Chapter 2 presents a description, need and rationale for the undertaking. Chapter 3 then provides an overview of the waste management planning process through which the need for the undertaking was identified. Chapter 4 describes the consultation program which was undertaken throughout the planning process.

In Chapter 5, the evaluation of possible waste management options ("alternatives to") is summarized. The "alternative methods" or alternative landfill sites are identified and evaluated in Chapter 6 and the net effects of the preferred site are presented in Chapter 7. Chapter 8 presents conclusions about the proposed undertaking.

2.0 THE UNDERTAKING

2.1 PURPOSE OF THE UNDERTAKING

The purpose of the undertaking is to develop new landfill disposal capacity at the existing City of Sudbury landfill site for the disposal of waste generated within the Region of Sudbury over a period of at least 20 years.

2.2 THE PLANNING PERIOD

The Region's WMSP was initiated in 1994 with an assumed 20 year planning period. The Region has current disposal capacity to meet their needs to the end of 1999. It is anticipated that the expanded City of Sudbury landfill (the new landfill capacity) will be approved and opened by the year 2000. The 20 year planning period for this undertaking therefore extends from the year 2000 to the end of 2019.

2.3 DESCRIPTION OF THE UNDERTAKING

The landfill undertaking is a component of the Region's preferred waste management system. The landfill is to provide disposal capacity for those wastes remaining after the application of waste diversion initiatives.

The proposed long-term landfill for the Region is to be located at the existing City of Sudbury landfill situated on parts of Lots 8 and 9, Concession IV, Township of Neelon in the City of Sudbury. The site is located approximately 1 km from Regional Road 55 (formerly Highway 17 East).

Subject to confirmation through future detailed site investigations, the undertaking will have the following characteristics:

- The design capacity will be approximately 2,125,000 tonnes.
- The waste fill area will be approximately 24 ha in size with a total site area of 62 ha when including a 100 m buffer around the site. This is continuous with a 300 ha parcel of land which the Region currently owns and contains area required for leachate attenuation.

- Based on a preliminary design concept, the height of the existing landfill may be increased by approximately 21 m.
- Leachate will be managed through natural attenuation. Surface water runoff will be directed to a wetland located north and east of the site.
- Only solid non-hazardous waste will be accepted.
- The implementation of waste diversion activities will minimize the amount of wastes requiring disposal at the landfill.

2.4 NEED FOR THE UNDERTAKING

The Region's waste stream is made up of residential, commercial, institutional and non-hazardous solid industrial waste. In the Waste Management Systems Plan, annual solid waste quantities were projected to increase from 127,100 tonnes in 1995 to 142,700 tonnes in the year 2000 to 152,300 tonnes in 2019. These increases are due to projected population growth. Over the 20 year planning period, the total quantity of waste generated is projected to be approximately 2,950,000 tonnes. These quantities are for the total waste stream prior to any diversion efforts.

Based on the WMSP, it was identified that a diversion rate of 28% could be achieved by the Region (see Section 5.11 for details). Assuming this diversion rate, approximately 2,125,000 tonnes of waste will need to be disposed of by the end of the 20 year planning period. It is expected that there will be some remaining disposal capacity at three of the existing landfills within the Region after the year 2000 (Walden, Rayside-Balfour, Valley East). However, given that there is uncertainty with the closure dates of these sites, it was assumed for the purpose of landfill sizing that new landfill capacity would be required to dispose of the total 20 year "after diversion" waste quantities (i.e. there would be no existing capacity available).

Appendix B outlines how waste quantities were estimated.

2.5 RATIONALE FOR THE UNDERTAKING

The rationale for the Region's WMSP undertaking is based on the decisions as described in this EA Document which are summarized below.

Following the identification of the need for additional waste disposal capacity for the Region, a long list of waste management components was considered. These components were then reviewed on the basis of four screening criteria to develop a short list of components.

The short list of components were then assembled into alternative diversion strategies. Five diversion strategies were developed including the existing system (plus Provincial diversion requirements).

Two alternative disposal strategies were then identified and evaluated including: 1) one new landfill site; and, 2) several new landfill sites. A one site system was identified as preferred and then combined with the five alternative diversion strategies to form alternative waste management systems or the "alternatives to". A comparison of the advantages and disadvantages of the alternative systems was undertaken and System 3 was identified as preferred. Key components of this system include: expanded recycling program, household hazardous waste program, composting, user pay, materials recovery facility and additional landfill capacity at a single site. This system also includes the required components as defined in MOEE Regulation 101.

This system was then compared to the "do nothing" alternative which consisted of the existing waste management system with no new landfill capacity. System 3 was identified to be preferred over the "do nothing" alternative.

The next step of the EA was the evaluation of "alternative methods" or alternative landfill sites. The landfill site selection process involved the following steps: constraint mapping to identify candidate areas, identification of the candidate sites, comparative evaluation of the candidate sites (long list and short list of sites evaluation), and selection of a preferred site.

As a result of the comparative evaluation, the preferred location for new long-term landfill capacity is at the existing City of Sudbury Landfill. New capacity will largely be accommodated in the form of a vertical expansion of the existing site.

3.0 OVERVIEW OF THE PLANNING PROCESS

3.1 WASTE MANAGEMENT SYSTEM PLANNING PROCESS

The proposed new long-term landfill is an initiative that was identified as part of the Waste Management Systems Plan for the Region. The planning process was carried out in accordance with Ministry of Environment and Energy (MOEE) planning guidelines and involved completion of the following five tasks:

- Task 1: Assess Problems and Opportunities;
- Task 2: Develop Diversion Strategy and System;
- Task 3: Implement 3Rs;
- Task 4: Landfill Siting Workplan; and
- Task 5: Select Landfill Site.

Work required under Task 1 (i.e. assessment of problems and opportunities) is documented in the Task 1 (January 1995) Report.

Task 2, Develop Diversion Strategy and System, is documented in the August 1995 Report.

Task 3 involved the implementation of the diversion strategies and the waste management system identified in Task 2. This work was identified in the April 1996 report. This is an ongoing activity.

Task 4 involved preparing the Landfill Siting Workplan (August 1995).

Task 5 involved the application of the approach and criteria identified in Task 4 in order to facilitate landfill site selection. This process occurred from September 1995 to October 1996 and was documented in a series of working papers.

The Ministry of Environment and Energy has identified five features for sound planning and approval under the EAA (MOE, *Interim Guidelines on Environmental Planning and Approvals*, 1989). They are:

- consultation with affected parties;
- consideration of reasonable alternatives;
- consideration of all aspects of the environment;
- systematic evaluation of net environmental effects; and
- the provision of clear, complete documentation.

The evaluation framework provided for the fulfilment of these five features. This framework also reflected the study team's understanding of current practices in the administration of the EAA and the interpretations of the EAA made by the MOEE and by boards in environmental hearings.

i) Consult with Affected Parties

The waste management planning process in the Region was carried out with a high regard for public consultation. Members of the public, the Public Liaison Committee, organizations and government agencies were consulted throughout the study. Comments received were integrated throughout the site selection process.

Chapter 4.0 outlines the public consultation activities conducted throughout the study.

ii) Consider Reasonable Alternatives

The process used to consider alternatives was designed to be efficient and effective. Using the landfill siting process as an example, the cost and time involved in conducting a detailed investigation of all lands in the Region is prohibitive. The landfill site selection process therefore involved a series of steps conducted at a greater level of detail as the study progressed.

Areas where landfilling would be considered suitable were identified through a mapping exercise involving screening criteria. Each criterion was used to differentiate between suitable and non-suitable areas for landfilling.

The areas identified as worthy of further consideration (i.e., candidate areas) were refined into sites and evaluated. Criteria were used to explore tradeoffs among sites and comparatively evaluate them. Comparative criteria had different levels of importance to reflect the priorities of the community and the provincial policies and legislation.

iii) Consider All Aspects of the Environment

The broad definition of environment as defined in the *EAA* was used in this study.

iv) Systematically Evaluate Net Environmental Effects

The waste management system and site selection process considered the role of mitigation and used appropriate methods and procedures to conduct the evaluation of net effects.

v) Provide Clear, Complete Documentation

The process used to make decisions has been documented in an understandable and traceable manner. This allows interested parties to scrutinize the decision-making process used to arrive at the preferred landfill site.

By addressing these features for sound planning and approval, a consistent replicable, traceable and publicly acceptable site selection process was followed for the Region. This led to the selection of Site E3, the existing Sudbury Landfill site.

3.2 STUDY AREA

The overall study area for the Regional Municipality of Sudbury Waste Management Systems Plan includes the Area Municipalities of Sudbury, Capreol, Nickel Centre, Onaping Falls, Rayside-Balfour, Valley East and Walden. The purpose of this section is to describe, in general terms, the conditions of the area's existing environment.

The study area (the Regional Municipality of Sudbury) is located in northeastern Ontario at the crossroads of the TransCanada Highway (Highway 17), Highway 69 and the Canadian National and Canadian Pacific Railways. The Region is located about 390 km north of Toronto, 125 km west of North Bay, 290 km east of Sault Ste. Marie and 290 km south of Timmins.

The Region is located within the southern portion of the District of Sudbury and has a land area of 279,244 ha. The population of the Region in 1991 was 161,210 persons based on the most recent (1991 Statistics Canada) census data.

The study area is shown on Figure 3.1.

The following study areas were recognized in the evaluation of alternative components, methods (sites) and the assessment of the preferred method (site).

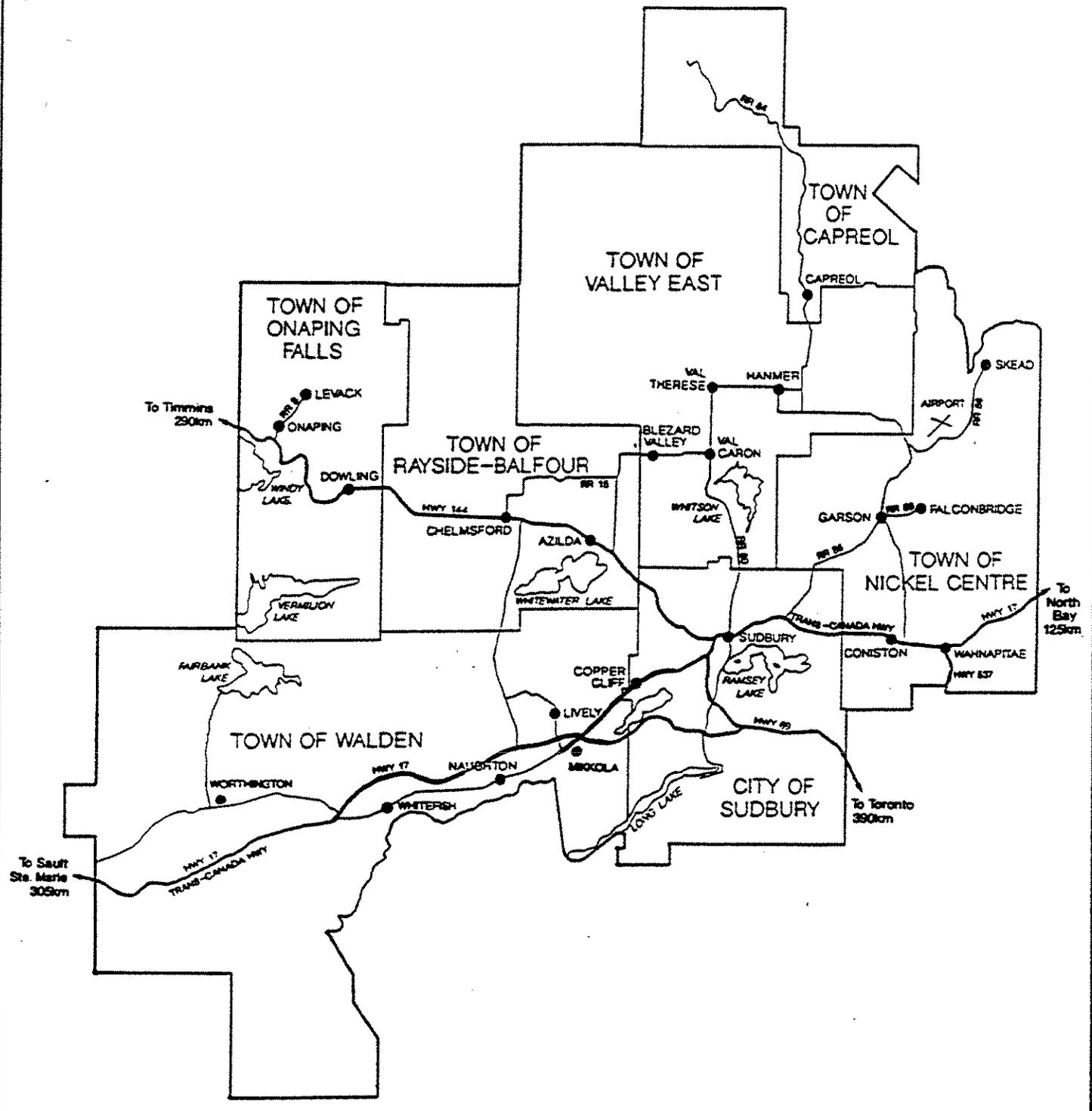
On-Site:	Areas within which features will be displaced or lost by development of a waste management facility.
Off-Site:	Area considered to be influenced by any landfill operation effects including ground and surface water, air, noise, dust, litter, odour or visual effects.
Waste Haul Routes:	The transportation route leading from the waste sources to potential sites.
Community:	A community was defined as any group of residences/cottages in proximity to one another which may interact with one another.
Overall Study Area:	The area defined as the Regional Municipality of Sudbury.

These study areas became more defined as the study progressed.

3.3 TIME FRAME

The potential for effects due to facility operation was the primary time frame considered. For the purposes of assessment, a minimum operating life of 20 years was assumed.

As effects due to the facility construction phase will be short-term and of minor significance, with the exception of removal effects (e.g. of a tree stand), they were considered in combination with facility operation effects.



Note: Distances are from the City of Sudbury

Not to Scale

**Region of Sudbury WMSPP
Environmental Assessment Document
Study Area**



FIGURE 3.1

4.0 PUBLIC AND AGENCY CONSULTATION

4.1 IMPORTANCE OF CONSULTATION

In undertaking an environmental assessment (i.e., WMSP), it is important to implement a comprehensive public and agency consultation program throughout the study process. Consultation can enhance the overall quality of the environmental assessment through the integration of the collective knowledge, experience, values and judgement of the potentially affected public.

An open and interactive approach to the assessment process allows the public to become more familiar with the details of the proposed undertaking. In addition, it also provides the proponent with the opportunity to incorporate information concerning local perspectives, goals, attitudes, values, concerns and potential effects early in the environmental assessment planning process.

The consultation program for this study began early in the process and remained a strong component throughout the project. It was designed to keep the public informed and to provide both formal and informal opportunities for them to become involved in the process. The Public Liaison Committee, the WMSP Project Manager, the Steering Committee and the consultant were all instrumental in carrying out the consultation activities. They were available at all times throughout the process to discuss issues and respond to questions from the public.

4.2 CONSULTATION GOALS AND OBJECTIVES

The main goal of the public and agency consultation program was to facilitate a two-way flow of information between the Region and the potentially affected public and agencies. Key objectives of the consultation process were:

- that the public and agencies were kept informed throughout the planning process;
- that the public and agencies were given the opportunity to be involved at key decision making points;

- that comments and input offered from the public and agencies were considered and responded to; and
- that meaningful input was integrated into the planning process.

The public and agency consultation program was designed to meet these objectives. The program was flexible and tried to respond to the needs of the Region. Substantive opportunity for the public to become aware of and involved in the waste management planning exercise was provided through:

- a Public Liaison Committee;
- the formation of a mailing list;
- telephone "waste line";
- advertisements through television, radio and newspaper;
- bilingual newsletters;
- public displays;
- Open Houses and Workshops;
- information package distribution;
- television programming;
- report availability for review and comments;
- meetings with community representatives;
- short list of sites evaluation video.

In general, it is believed that the consultation program was successful in keeping the citizens of the Region aware of the study, providing adequate vehicles for information exchange between the public and those carrying out the technical work, and working with the public to develop a waste management system plan that will be responsive to the needs of the community.

4.3 PARTIES CONSULTED

Parties consulted throughout the WMSP included:

- the general public;
- potentially affected individuals (e.g. landowners);
- community associations;
- government agencies; and
- the Public Liaison Committee.

4.4 PUBLIC LIAISON COMMITTEE

The public consultation process was initiated prior to the start of the WMSP through the formation of a Public Liaison Committee (PLC) in June 1993. The PLC was responsible for all aspects of the public consultation program. The membership was composed of representatives from across the Region, with the intention of including at least one member from each area municipality. The PLC was composed of a maximum of 16 voting members and 4 non-voting members. The PLC provided input directly to the WMSP Steering Committee through two representatives. Regular monthly meetings were held by the PLC.

The PLC was instrumental in the consultation program, having a key role in the design and implementation of the program. The PLC was responsible for hosting all open houses and workshops, developed the compensation policy and helped to prepare all information releases including the programming for the regular television advertisement.

4.5 CONSULTATION PROGRAM ACTIVITIES

The following describes the key consultation activities that occurred under each of the five tasks in undertaking the WMSP.

Materials prepared and submitted relating to the consultation program have been appended to a number of the WMSP documents as outlined in Section 1.1. Appended to this EA document (in a separate volume) are the consultation materials related to the identification of the preferred landfill site.

4.5.1 Task 1

A number of key activities were undertaken by the Public Liaison Committee during Task 1 of the WMSP. The purpose of these activities was to introduce the study to the public, inform the public of the WMSP, the participants and their specific roles and responsibilities, obtain input on their concerns with existing waste management practices in the Region, and involve the public in reviewing/commenting on Task 1 documentation. The activities undertaken are described below.

Logo Development

As part of generating awareness for the Waste Management Systems Plan and the activities of the PLC, a logo was developed. The logo was used with all displays, newsletters, mailouts and advertisements for the duration of the study.

Slogan Development

To ensure that residents became familiar with the WMSP, two slogans were developed for use in all public consultation activities. The two slogans were: "Let's Talk Trash" and "Your input doesn't end at the curb".

Mailing List

In order to readily provide an exchange of information between the WMSP process and the general public, an initial mailing list was generated by the PLC. The mailing list was developed through public response to various WMSP advertisements. Initially, a letter was sent to all members of the local Chamber of Commerce outlining the purpose of the study and asking each member to respond if they wanted to be added to the mailing list. Ten days of radio advertisement promoting the "Waste Line" also mentioned how the public could add their name to the mailing list. At the end of Task 1, a total of 77 names were on the mailing list.

Telephone "Waste Line"

Historically, public consultation programs have received poor responses in the Region. To combat this problem a telephone "Waste Line" was initiated to receive and record calls from the public. The WMSP Project Manager was responsible for responding to the calls received. The Waste Line was initiated on April 25, 1994 and was advertised through an initial radio spot, a news release and an advertisement in the Northern Life, Sudbury Star and Le Voyageur newspapers. The purpose of the Waste Line was to maximize the opportunity to obtain public input. Approximately 107 calls were received regarding Task 1 of the WMSP.

Advertising/Promotion

A variety of advertisements were used throughout Task 1 to promote the WMSP and the activities of the PLC. This includes television, radio and newspaper advertisements.

A 45-second television commercial, on behalf of the Public Liaison Committee was featured every Thursday and aired throughout the Sudbury District. The commercial provided "waste tips" and provided updates regarding the WMSP. The commercial was also used as a "filler" when there was no commercial air time scheduled. The "Let's Talk Trash" commercial aired approximately 3 times per week at various time periods as a "filler".

A radio advertisement was run for a ten day period on two AM and two FM radio stations for ten days (May 2-12, 1994) to kick-off the WMSP and introduce it to the public.

The Region of Sudbury also conducted two media releases during Task 1. The first release, on April 26, 1994, announced the commencement of the WMSP and the Waste Line.

Newspaper advertisements were also used in Task 1 to promote various aspects of the WMSP. These advertisements provided information on the purpose of the WMSP study, introduced the PLC, promoted the "Waste Line", requested additions to the study mailing list and to announce the release of the Task 1 Draft Report in September 1994. The advertisements appeared twice during the last week of April in the: Northern Life and Sudbury Star newspapers.

A number of letters were received in response to the first newspaper advertisement. Written responses were provided by the WMSP Project Manager.

Displays

The WMSP display was initially set-up at the end of Task 1 (on October 16, 1994). The display outlined the WMSP process and the Problem/Opportunity statement. The display remained at Civic Square for a two week period before being moved to another location.

Newsletter

A newsletter outlining the purpose of the WMSP, the study participants, the role of the public and a request for input from the public was distributed in June 1994 to approximately 55,000 households throughout the Region. A mailback questionnaire was included with the newsletter. A total of 40 questionnaires were completed and returned to the Region. The comments received were considered in the development of waste management systems during Task 2. Also, as a result of these comments the Task 2 newsletter included more educational information relating to waste diversion.

Review of Draft Task 1 Report

The Region of Sudbury Waste Management Systems Plan Task 1 Draft Report was distributed in September 1994 for public and agency review. Review comments were requested within 90 days. All review comments received were tabulated and a response to each provided. Comments received were considered in the finalization of the Task 1 Report.

4.5.2 Task 2

The purpose of public consultation during Task 2 was primarily to obtain input on the alternative waste management systems and waste diversion strategy. A variety of activities were undertaken in Task 2, many building on those initiatives and programs started during Task 1. The public consultation activities undertaken during Task 2 are described below.

Mailing List

At the time the Task 2 Report was finalized, a total of 129 names were on the mailing list.

Telephone "Waste Line"

During Task 2 the "Waste Line" continued to be promoted through periodic newspaper advertisements and a weekly television commercial. A total of 85 calls were received regarding Task 2 of the WMSP.

Advertising/Promotion

A variety of advertisements were used throughout Task 2 to promote the WMSP and the activities of the PLC. This included television, radio and newspaper advertisements. The format and frequency of these advertisements was established in Task 1 and consequently were continued in the same manner during Task 2. Key activities included:

- Radio promotions including a request to residents to provide comments on the recommended diversion and disposal strategy by calling the Waste Line. Residents were also encouraged to obtain a copy of the Task 2 information package on the diversion and disposal strategy.
- Radio, television and newspaper interviews were held with the WMSP Project Manager.
- Newspaper advertisements in January 1995 were used to promote the January 20, 1995 Open House.
- The Region provided two media releases during Task 2. The first, released on January 9, 1995 announced the January 20 Open House. The second (February 2, 1995) invited the public to comment on the recommended waste management system. The release included a description of the various components of the system.

Newsletters

The newsletter Let's Talk Trash II was distributed in November 1994. Similar to the distribution of the Task 1 newsletter, the Task 2 newsletter was circulated as an insert to the Northern Life newspaper. A total of 58,000 copies of the newsletter were

circulated. The newsletter provided background on the Region's existing waste management system including a description of its components, and identified four other possible alternative waste diversion strategies for the Region to follow in the future. A mailback questionnaire was included with the newsletter requesting the reader to provide comments on the five systems and to develop their own system if they had any ideas. A total of 44 comment forms were completed and returned.

Displays

The PLC developed a display board which contained information to educate and inform residents on the progress of the WMSP, and more specifically Task 2. The WMSP display was first set-up for Task 2 at the start of December 1994. The location was determined by the PLC and changed weekly with the initial focus being on schools. Other locations included shopping malls and libraries. The display dealt mainly with the five diversion strategies outlined in Newsletter II.

Open House

A public Open House was held, as part of Task 2, in the Civic Square Council Chamber on Friday, January 20, 1995 from 7:00 p.m. to 8:30 p.m. There were 41 attendees at the event. The Open House was conducted in the form of a live theatre presentation. The 90 minute presentation consisted of four skits performed by local talent to demonstrate the need for long-term waste management planning and the importance of public participation in the decision-making process. Four skits were performed during the evening. Between each skit the PLC and WMSP Project Manager spoke to the audience on the purpose of the Waste Management Systems Plan, the role of the PLC and described the recommended diversion and disposal strategy for the Region. An open forum for questions and answers was held at the end of the skits.

A questionnaire was distributed prior to the event starting. The attendees were requested to comment on their habits relating to the existing waste management system and provide input on the recommended diversion and disposal strategy. A second comment form was distributed at the end of the Open House. A total of 14 forms were completed and returned.

Information Package

Following the identification of the recommended waste management system for the Region, the WMSP Project Manager prepared a detailed information package on the system. The information package outlined in detail the components of the system's diversion and disposal strategy. Distribution of the package began in early February 1995. The information package was sent to all of the people on the WMSP mailing list, Chamber of Commerce members and to Regional Councillors. Comments were requested from those people receiving the package.

Through the radio, television and newspaper advertisements/promotions, the public-at-large was informed that copies of the information package could be obtained by calling the Waste Line. A number of comments were received via letters and calls to the Waste Line. The comments did not result in any changes to the evaluation of systems or the preferred system.

Television Programming

Four shows were produced and began to air in May 1995. Each show ran four times a week. The content of the television shows focused on the waste diversion aspects of the recommended waste management system. Topics of the shows included education on the 3Rs, the Regional Recycling Centre, and how to reduce the quantity of waste generated.

Review of Task 2 Draft Report

The Region of Sudbury Waste Management Systems Plan Task 2 Draft Report was distributed in March 1995 for public and agency review. Review comments received were tabulated and responses provided. As part of the draft report review, the WMSP Project Manager also made a presentation to each Area Municipality Council. The purpose of the presentations was to outline the contents of the Task 2 Report.

4.5.3 Task 3

The purpose of public consultation during Task 3 was to obtain more detailed input on the recommended diversion strategy identified in Task 2. This included input on the implementation schedule for the strategy.

Let's Talk Trash Survey

In order to determine public opinion on the best method and timetable for implementing the diversion and disposal strategies identified in Task 2, a questionnaire was sent randomly to one in every five households in the Region of Sudbury. Of the 12,253 that were sent, 2,767 (23%) were returned and placed into a database.

Newsletter

The newsletter, Let's Talk Trash III, was distributed in February 1996. The newsletter summarized the results of the public survey and outlined the implementation of the diversion strategy components. The newsletter was circulated as an insert to the Northern Life newspaper. A total of 58,000 copies of the newsletter were circulated.

Display

The WMSP Public Liaison Committee developed a display outlining key issues of Task 3 and encouraged comments.

Television Commercial

The Let's Talk Trash commercial outlined the public opinion survey that was conducted in the fall of 1995. The results of the survey were presented in the 15 second introduction of the weekly commercial.

The commercial also played several times per week as a "filler" to replace unsold advertising air time. The commercial ran from January-March 1996.

Mailing List

The WMSP mailing list contained 901 individuals, public agencies and businesses in the Region at the time the Task 3 Report was finalized. All members of the mailing list received the draft and final Task documents and were given the opportunity to comment on the process. All comments received were included in the final document, along with the response.

4.5.4 Task 4

The Landfill Siting Workplan was prepared with the assistance of the Region of Sudbury WMSP Public Liaison Committee (PLC). Opportunities were also provided to the general public and key agencies to comment on the Workplan. Key activities included:

- advertisement of Workplan availability in the newsletter "Still Talkin' Trash!" (June, 1995);
- presentation of Workplan at June 13, 1995 Open House; and,
- mail out draft Workplan to agencies and mailing list for review.

Very few comments were received on the draft Workplan. Those that were received were responded to and appropriate revisions were made to the report text, if required.

4.5.5 Task 5

The following outlines the key consultation activities that were undertaken throughout the landfill site selection process.

Candidate Areas Identification

The candidate areas were advertised through the following means:

- Distribution of the Candidate Area Working Paper to those individuals on the mailing list, the PLC and agencies;

- TV advertisements of identified candidate areas; and
- Candidate area mapping on display at the Region.

The draft working paper (April 1996) was also made available for public review.

Long List of Sites Evaluation

During the long list comparative evaluation step, a number of consultation activities were undertaken. These activities included:

- criteria ranking and weighting information package sent to over 900 members of the WMSP mailing list and the PLC;
- television, radio and newspaper advertisements of the long list of sites;
- distribution of the Draft Long List of Potential Sites Identification Working Paper (June 1996);
- notification letters to residents/landowners located in the vicinity of the long list of sites;
- preparation and distribution of a newsletter;
- calls to the Waste Line; and
- public workshops on June 17, 18 and 19, 1996, to discuss the long list of sites and obtain input on the criteria ranking and weighting for the short list of sites evaluation (Step 4).

The draft working paper describing the long list of sites evaluation (July 1996) was also made available for public review.

Short List of Sites Evaluation

During the short list comparative evaluation step, a number of consultation activities were undertaken. These activities included:

- television, radio and newspaper coverage of the short list of sites;
- notification letters to residents/landowners located in the vicinity of the short list of sites;
- public workshops on June 17, 18 and 19 to discuss criteria ranking and weighting for the short list of sites evaluation (Step 4);
- preparation and distribution of a bilingual information flyer.
- meeting with residents in the communities of Coniston and Wahnapiatae;
- public meetings in Coniston on October 9, 1996 and Lively on October 10, 1996;
- calls to the Waste Line;
- written submissions from the public;
- offers of site tours; and
- short list evaluation video (submitted with this document).

The draft working paper (October 1996) was also made available for public review.

4.6 INCORPORATION OF COMMENTS

The consultation program was designed to increase public awareness on waste management issues and to obtain input on the WMSP as it was developed.

All comments received by the WMSP Project Manager were reviewed and relevant comments passed on to the study team for their consideration. Most of the written

comments received were responded to directly by letter from the WMSP Project Manager.

Throughout this document, reference is made to where public and agency comments were considered in the study.

4.7 FUTURE ACTIVITIES

The Region intends to continue the consultation program in relation to: 1) promoting its waste diversion initiatives to maximize participation; and 2) to involve the public, particularly the local community, in the conducting of the EPA level investigations on Site E3 (the proposed landfill site). It is intended that a Site Liaison Committee be formed prior to the initiation of the EPA level investigations and to continue as a monitoring committee throughout the life of the landfill.

5.0 "ALTERNATIVES TO" - WASTE MANAGEMENT SYSTEM DEVELOPMENT

5.1 INTRODUCTION

This section documents the process used to assess and identify a waste management system for the Region. The system included waste collection and handling, reduction and diversion, processing and disposal.

The following steps were undertaken in identifying a preferred system:

- assessing the adequacy of the existing system;
- identifying possible system components;
- screening out unsuitable components;
- developing alternative diversion strategies;
- developing and evaluating alternative disposal strategies;
- developing and evaluating alternative waste management systems; and
- identifying the preferred waste management system.

5.2 EXISTING ENVIRONMENT

The following presents a description of the existing environment within the entire Region. The existing environment description provided the context for the evaluation of alternative solutions.

5.2.1 Municipal Structure

Prior to 1973 the area now known as the Regional Municipality of Sudbury consisted of the City of Sudbury surrounded by a series of townships, all located in the District of Sudbury. In January 1973, the Regional Municipality of Sudbury was established to provide an infrastructure and planning centre for this rapidly growing northern community.

Although the Region is responsible for waste diversion and disposal the responsibility of waste collection is a function currently undertaken by each Area Municipality.

5.2.2 Land Use

The Region has an area of 279,244 ha of land. With the exception of the City of Sudbury most of the Area Municipalities within the study area are generally designated 'rural' with allowance for settlement growth areas.

The City of Sudbury is comprised predominantly of low-density residential areas, along with a mix of medium and high-density residential areas. The community also supports a commercial core and areas of highway commercial, along with light to heavy industrial development.

In the Area Municipalities surrounding the City of Sudbury, the major growth settlement areas are mainly residential in nature with some commercial, institutional and minor industrial uses concentrated primarily along the major access routes through the community. The majority of residential development within the municipalities is single-family dwellings.

The remaining portions of the study area, outside of the developed areas, are mainly rural in designation although some scattered agricultural areas and farms exist. Scattered resort residential areas, or cottages, have developed around some of the lake areas. Small concentrations of residential and commercial uses exist along area roadways, being more significant along the major highways in the Region.

5.2.3 Population

The Regional Municipality of Sudbury Planning Area Official Plan, approved and adopted in 1978, identified a target population of 228,000 persons by 1996 (20 year planning period). This projected population figure was based on the assumptions that population, employment and development would continue to increase. Present data has shown that this target will not be achieved. This is further compounded by the fact that the Area Municipalities within the Region, with the exclusion of the City of Sudbury, may experience low growth and possible 'out-migration' due in part to a 'No Major Development Policy'.

Based on the 1991 Statistics Canada census of the study area, the Regional Municipality of Sudbury had a population of 161,210 persons. The City of Sudbury comprises approximately 9.5% of the total regional area but contains 58% of the

population. In contrast the Town of Walden comprises 27.5% of the total regional area but only has approximately 6% of the total population.

5.2.4 Economic Activity

For years the economic base of the Sudbury area has revolved around the mining and metal production industries, and to a lesser extent the forestry industry. Even though these industries have declined over the past few decades, the mining and metal production industries still form a major part of employment within the Region. Today the two major industries that form the core of the Region's economic base, Inco and Falconbridge, are still the largest single industrial employers in the area despite a workforce declining from the 1970's. Currently, Inco and Falconbridge combined employ approximately 8,200 persons, or about 10% of the Regional labour force. Other major industrial employers within the Region, with more than 100 full or part-time employees, include Reliable Maintenance Products (250), Neelon Castings (300), and Rainbow Concrete Industries (450). These industries are located within the City of Sudbury. Despite these large employers, most of the industrial and trade activities within the Region are in the form of small businesses whose average number of employees is usually less than ten. The largest non-industrial employer in the Region is Laurentian University with approximately 3,000 employees.

5.2.5 Social Environment

Information pertaining to the communities and social environment are summarized below. The information provided is based on local information sources and material obtained from Statistics Canada 1991 census data.

- The predominant ethnic group within the study area was English, accounting for approximately 75% of the population. This was followed by 19% of French descent and 3% of Italian descent.
- The age distribution for the study area is comparable to the rest of the Province.
- The Region has a total of 58,880 occupied private dwellings, 36,400 of which are single detached houses.

- Two provincial parks, Fairbanks and Windy Lake, are located within the study area. Both parks are recreational and are operated by the Ontario Ministry of Natural Resources.

Although no First Nations exist in the Region of Sudbury, a number of First Nation historical sites including burial grounds, pictographs and roast yards exist in the Region. Generally, these sites are located in the Sudbury, Walden and Onaping Falls areas.

5.2.6 Transportation Facilities

The study area is adequately served by road, rail and air transportation, making it readily accessible both to, and from, outside points. The meeting of three major provincial highways (Highway 17, Highway 69 and Highway 144), the convergence of both national rail systems (Canadian National and Canadian Pacific), major air linkages, as well as inter-city bus services all help to create a comprehensive transportation system.

5.2.7 Natural Features and Environment

The Region lies in the North Bay-Sault Ste. Marie climatic region of Ontario and experiences what is known as a 'modified continental climate'. The climate is characterized by warm, short summers and long, cold winters.

Within the Region there are approximately 23,400 ha of surface water and 2,300 km of rivers and streams. The major rivers in the area are the Wanapitei, Spanish and Vermilion. The largest water body in the area is a part of Lake Panache located in Walden.

Two watersheds cross the Region: the Wanapitei River watershed which drains the eastern portion of the Region, and the Vermilion River watershed which drains the western portions of the Region. Larger subsystems of the Vermilion watershed include the Onaping River, Whitson River and Junction Creek.

The study area lies predominantly within the Sudbury-North Bay section of the Great Lakes-St. Lawrence Forest Region. Over the years tree harvesting, sulphur dioxide

emissions and forest fires have eliminated, or greatly reduced, the abundance of many of the naturally occurring species. Tree cover is predominantly of the hardy pioneer species such as poplar and white birch.

In 1978 a large scale reclamation program was undertaken resulting in approximately 1,139 ha of land being revegetated and a further 200 ha of land being substantially improved. To date, approximately, 2 million trees have been planted by the Region, although this figure is probably higher, as it does not account for those trees planted by schools or service clubs. It has been, and remains the policy of the Region, to continue this work as far as budget allowances will permit.

5.2.8 Topography and Geology

The Region occupies approximately 279,244 ha of land in the Canadian Shield, a landform characterized by Pre-Cambrian rock outcrops, numerous lakes and swamps and an irregular drainage pattern. The terrain is rugged with elevations ranging from 460 m above sea level in the northwest to 230 m above sea level in the south. As the Region is located on the Shield the dominant landscape is composed of mounds, ridges and rolling hills.

Soils in the study area are predominantly sands, ranging in texture from coarse to fine and silty. These sand areas are interrupted by loams in the Chelmsford area and in the southwest quadrant of the Region. There are two major clay deposits: one centred near Azilda and the second in eastern Walden.

The Canada Land Inventory has classed most soils in the area as Class 7, meaning that the soil has no capability for agriculture or permanent pasture. There are some major deposits of soil in the Sudbury Basin, from Hanmer to Chelmsford, which have higher agricultural capabilities. In these areas, the soils have been classed as 2, 3 or 4.

5.3 EXISTING WASTE MANAGEMENT SYSTEM

The following describes the 1995 waste management system within the Region which served as the basis for developing alternative systems. For the purpose of this study, the Region's wastes were characterized into the classifications: residential; institu-

tional, commercial, industrial (IC&I); and other. "Other" wastes included those from parks and conservation areas, and sewage sludge.

Residential, institutional, commercial and some industrial non-hazardous solid wastes comprise the waste stream in the study area and are often referred to as municipal wastes. These wastes are disposed at one of the operating municipal landfill sites located around the Region. Domestic or residential type wastes produced by Inco and Falconbridge are also collected and disposed of at the Region landfills. Industrial type wastes produced by these companies are disposed at on-site facilities, operated by each company.

5.3.1 Existing Waste Collection and Handling Practices

Each of the Area Municipalities are currently responsible for the collection of residential wastes generated within their boundaries. Waste collection throughout the Region is undertaken either by municipal forces, private hauler or private hauler under contract to the municipality. The equipment used in waste collection varies for each municipality, but generally most wastes are collected using a packer vehicle.

In a few residential rural areas (Beaver Lake, Penage Lake, Worthington and Crean Hill Mine Road) there are waste depots set up for the use of the residents. The depots use 40 cubic yard roll-off units which are serviced by a private hauler on a weekly basis. These are the remaining areas within the Region that do not have curbside collection.

5.3.2 Existing Waste Diversion Activities

The Region of Sudbury has actively pursued various forms of waste reduction and diversion for a number of years, amongst which are:

- the Blue Box and depot recycling program;
- distribution of household compost units;
- Household Hazardous Waste collection days;
- acceptance of cardboard and fine paper from the IC&I sectors;
- removal of derelict motor vehicles;
- separation of white goods, scrap metals and tires at the landfills;

- wood waste mulching program;
- public awareness and education.

As of 1995, the Region was achieving a diversion rate of approximately 7%.

Section 2.3 - Need for the Undertaking, described waste quantities that will need to be disposed. Appendix B outlines how waste quantities before and after diversion were estimated. Section 5.11 describes diversion activities that have been initiated by the Region since the completion of the WMSP.

5.3.3 Existing Waste Disposal Facilities

The following landfill sites have available disposal capacity:

- Sudbury Landfill Site
- Nickel Centre Landfill Site
- Onaping Falls Landfill Site
- Valley East Landfill Site
- Walden Landfill Site
- Rayside Balfour Landfill Site

Given that there is uncertainty with the closure dates of these sites (i.e. due to emergency and interim expansions), it was assumed, for the purpose of landfill sizing, that new landfill capacity would be required to dispose of the total "after diversion" waste quantities.

5.4 IDENTIFICATION OF WASTE MANAGEMENT SYSTEM COMPONENTS

Waste management system components represent the pieces that are assembled to make a complete system. A long list of components was identified initially. The long list of components were divided into four categories: Waste Reduction and Diversion, Waste Handling and Collection, Waste Processing, and Waste Treatment and Disposal. Reference to collection in the component list does not necessarily imply curbside collection. Waste materials can also be collected using depots and drop-off facilities. The components contained in the long list are:

Waste Reduction and Diversion

- Waste Reduction and Reuse.
- Promotion and Education of the 3Rs.
- Recycling Program.
- Expanded Blue Box Program.
- Wet/Dry Program.
- Household Hazardous Waste Program.
- Programs for Other Materials (e.g. Tires, White Goods, etc.).
- Recycling and/or Diversion Programs for IC&I Establishments.
- Composting.
- User Pay for Solid Waste.
- Financial Incentives for Waste Diversion (e.g. Graduated Tipping Fees).
- Municipal By-laws to Promote Waste Diversion.

Waste Handling and Collection

- Waste Collection.
- Transfer Stations.
- Export/Import of Wastes.

Waste Processing

- Materials Recovery Facility.
- Baling of Solid Waste.
- Shredding of Solid Waste.

Waste Treatment and Disposal

- Incineration.
- Landfill.

5.5 SCREENING OF SYSTEM COMPONENTS

The alternative waste management system components were subjected to a screening process to remove any components which may not be suitable for the Region. Four criteria were identified and were based on those recommended in the MOEE's

Sectoral Environmental Assessment Proposal for Waste Management Planning. The criteria were presented to the Public Liaison Committee and discussed during their September 13, 1994 meeting to obtain input on the criteria. No changes to the proposed criteria were suggested by the Committee.

The criteria used and their rationale are summarized in Table 5.1.

TABLE 5.1
CRITERIA FOR SCREENING OF LONG-LIST OF AVAILABLE WASTE
MANAGEMENT SYSTEM COMPONENTS

CRITERIA	RATIONALE
1. Economically feasible.	Must be economically feasible so that its capital and operating costs, relative to existing costs for the waste management system, can be financed by the Region.
2. Must be proven in terms of its use.	Considered proven if it has been commercially demonstrated to perform as expected in Ontario. Components that are not proven are not acceptable because they may not be reliable, result in unexpected increased costs and potentially introduce other unexpected and unwanted risks to the Region's long-term waste management system.
3. Consistent with government regulations, policies and guidelines.	If not consistent with government regulations, policies and guidelines will be difficult to obtain approval from the MOEE.
4. Able to manage all or a portion of the waste stream.	Must be capable of managing all or a portion of the waste stream that it is intended to handle.

Each of the potential waste management system components was considered on the basis of each of the four screening criteria. The result was a yes or no conclusion indicating whether or not the component complied with the criteria. Any components that did not comply with all four criteria were removed from further consideration.

Based on the long list of components presented in Section 5.4, the following components did not meet all criteria and were excluded: Export/Import of Waste,

Baling of Solid Waste, Shredding of Solid Waste, and Incineration. The remaining components formed the short list.

The components suitable for the development of waste management systems were then classified into one of two groups:

- Components intended to divert wastes from disposal. This grouping comprised all of the waste reduction and diversion components plus the materials recovery facility component.
- Components intended to collect and transport wastes and dispose of them.

The long-term waste management system for the Region was assumed to consist of waste diversion plus a long-term waste disposal strategy. The goals of the two strategies were considered to be different. The goal of the diversion strategy was to specify the most effective combination of waste diversion components to assist the Region in its efforts to achieve the Provincial Government's objective of 50% diversion by the year 2000. The goal of the disposal strategy was to specify the best combination of waste collection methods, landfill sites and transfer stations to allow the Region to collect and dispose of wastes in the most efficient manner in the future.

5.6 ALTERNATIVE WASTE DIVERSION STRATEGIES - IDENTIFICATION AND EVALUATION

The alternative diversion strategies were developed by creating reasonable combinations of diversion components. The alternative strategies were assessed to determine the waste diversion potential.

5.6.1 Development and Description of Alternative Diversion Strategies

To simplify the development of alternative diversion strategies, the available diversion components were organized into the following four groups:

Core Components

- Recycling Program.
- Expanded Recycling Program.
- Wet/Dry Program.
- User Pay for Solid Waste.

Components Common to all Strategies

- Waste Reduction and Reuse.
- Promotion and Education of the 3Rs.
- Household Hazardous Waste Program.

Required Components (i.e. Required by the "3Rs" Regulation 101)

- Composting

Enhancement Components

- Programs for Other Materials.
- Recycling and/or Diversion Programs for IC&I Establishments.
- Financial Incentives for Waste Diversion (e.g. Graduated Tipping Fees).
- Municipal By-Laws to Promote Waste Diversion.
- Materials Recovery Facility.

When developing a diversion strategy, one "Core" component was identified as being the foundation. In some strategies, a second Core component was included (i.e. user pay for solid waste) to maximize waste diversion. All of the "Common" components were added since they were common to every strategy and currently existed in the Region. "Required" components were also included in each strategy. The appropriate "Enhancement" components were then added.

Each strategy represented an incrementally higher commitment in terms of cost and effort, coupled with the potential benefit of greater waste diversion. The assumption was made that the Region would continue with its current diversion programs. The following describes the five alternative diversion strategies.

Strategy 1 - Existing Plus Required

Strategy 1 was the existing system in the Region, at the end of 1994, plus the components that were required under provincial regulations. It consisted of:

- Recycling Programs.
- Programs for Other Materials.
- Composting.
- Recycling and/or Diversion Programs for IC&I Establishments.
- Materials Recovery Facility.

Strategy 2 - Expanded Recycling Program

The core component was an expanded recycling program which represented a logical step forward from the existing diversion system. The Region's recycling program already includes the collection of several recyclables that are commonly collected in expanded recycling programs (e.g. aluminum foil products, magazines, glossy paper and corrugated cardboard). In addition, the Regional Recycling Centre has capacity to accept additional recyclable materials.

The expanded recycling program would change to twice monthly collection in all of the municipalities that presently receive curbside recycling collection. Additional recycling depots would be provided in high traffic areas in order to provide an alternative means for people to dispose of recyclables. The depots would collect the same materials collected in the expanded recycling program.

Strategy 3 - Expanded Recycling Program With User Pay¹

Strategy 3 was similar to Strategy 2, except it included user pay for solid waste as a core component along with an expanded recycling program. User pay would be applied to the collection of landfilled non-hazardous solid wastes that exceed a pre-determined limit. User pay fees would not be applied to diversion programs. The cost to the resident for waste disposal would be in direct relation to the quantity of waste produced. The user pay program would be designed so that all residents would no longer subsidize individuals that do not participate in diversion programs.

¹ *It would be necessary for the Region to take over the collection of wastes in order to facilitate the implementation of user pay.*

Strategy 3 would include distribution of backyard composters to residents free of charge to maximize participation in household composting.

Strategy 4 - Wet/Dry Program

The core component in Strategy 4 was a wet/dry program. A wet/dry program represented a significant change from the existing waste diversion system, but it also represented a significant increase in the potential to divert residential wastes.

The following assumptions were made regarding the implementation of the wet/dry program.

- The Region would assume waste collection from the Area Municipalities.
- The Region would add curbside collection of household organics in areas that already receive curbside recycling and waste collection.
- Wet wastes would be collected on a weekly basis and dry recyclables and garbage would be collected twice monthly.
- The number of recycling depots would be increased. The depots would be enhanced to allow collection of the same materials collected in the dry stream portion of the wet/dry program.
- Areas that do not receive curbside waste or recycling collection would not receive wet/dry collection, but instead would be provided with enhanced recycling depots.
- Backyard composters would be distributed free of charge to residents to maximize participation in household composting.

The following assumptions were made regarding Strategy 4 and the components required by the 3Rs Regulations:

- Separate collections for leaf and yard wastes would occur only at peak periods during the spring and fall to capture excessive quantities of leaf and yard wastes that cannot be handled by the wet/dry program.

- An enclosed in-vessel composting facility would be constructed to handle household organics collected by the wet/dry program on a year-round basis plus leaf and yard wastes collected on a seasonal basis.

In Strategy 4, the Regional Recycling Centre would be modified to be compatible with the wet/dry program and the number of types of recyclables accepted from IC&I establishments would be increased.

Strategy 5 - Wet/Dry Collection with User Pay

Strategy 5 included user pay for solid waste in addition to a wet/dry program. User pay would be applied to the solid waste portion of the collection program. User pay fees would not be applied to collection of the wet waste (organic) and dry waste (recyclable) streams.

The remaining components in Strategy 5 were similar to Strategy 4.

5.6.2 Assessment of the Alternative Diversion Strategies

Waste Diversion Potential of the Diversion Strategies

The five proposed waste diversion strategies were assessed and evaluated to determine the amount of waste that could potentially be diverted by each strategy. Both the residential and IC&I waste streams were considered in the analysis.

Estimates of the quantities of wastes that could potentially be diverted in the Region were determined using the future waste quantity projections for the year 2000. Future waste quantity projections were developed in the WMSP Task 1 Report.

As there have been no waste composition studies completed in the Region of Sudbury, the results of the MOEE's *Ontario Waste Composition Study* were used.

For determining overall diversion rates, it was assumed at least 25% of wastes generated by IC&I establishments would be diverted by programs operated by the IC&I sector and not the Region. Quantities diverted through programs operated by the Region were added to the quantities attributed to the IC&I operated programs to determine an overall diversion quantity.

The results of the diversion calculations are summarized in Table 5.2. The diversion rates that could potentially be achieved ranged from 27% for Strategy 1 to 55% for Strategy 5. These diversion rates are based on the assumption that all components within a system are being implemented and that there is reasonable level of material capture and participation by the public and waste generators. The specific assumptions were detailed in Appendix C of the Task 2 Report.

**TABLE 5.2
DIVERSION RATES FOR DIVERSION STRATEGIES**

STRATEGY	RESIDENTIAL WASTES		IC&I WASTES		TOTAL WASTES	
	DIVERSION (TONNES/YEAR)	DIVERSION RATE	DIVERSION (TONNES/YEAR)	DIVERSION RATE	DIVERSION (TONNES/YEAR)	DIVERSION RATE
Strategy 1: Existing Plus Required	13,000	23%	25,700	30%	38,700	27%
Strategy 2: Expanded Recycling Program	18,400	32%	30,000	35%	48,400	34%
Strategy 3: Expanded Recycling Program with User Pay	32,500	57%	38,500	45%	71,000	50%
Strategy 4: Wet/Dry Program	29,400	52%	38,500	45%	67,900	48%
Strategy 5: Wet/Dry with User Pay	39,300	69%	38,500	45%	77,800	55%

Impacts of waste reduction and reuse and public promotion and education initiatives were not considered in the analysis. It is difficult to determine the amount of waste that could be diverted by these initiatives. They do not result in the creation of quantities of diverted materials that can be measured (e.g. the quantities of recyclables diverted by a recycling program can be weighed). As a result, the diversion rates shown in Table 5.2 could be marginally higher.

Waste Disposal Requirements

The annual waste disposal requirement for each municipality, associated with each diversion strategy, was determined by subtracting the quantity that was expected to be diverted from the total quantity of waste generated. The total annual waste quantity for the year 2000 was used. Projected waste quantities were developed in the Task 1 Report. The disposal quantities are summarized in Table 5.3 for each municipality.

5.6.3 Public Input on Waste Diversion Strategies

The five waste diversion strategies were presented to the public in the WMSP newsletter entitled "Let's Talk Trash II". The newsletter was circulated in November 1994 as an insert to the Northern Life newspaper which has a circulation of 58,000 copies. The newsletter was also sent to those people on the mailing list and members of the Chamber of Commerce. The diversion strategies were presented using a symbol for each component with an accompanying text description.

A mail-back questionnaire was included with the newsletter, requesting the reader to provide comments on the five systems and to develop their own system (System 6) if they had any ideas. A total of 44 comment forms were completed and returned.

The comment forms were reviewed by the WMSP Project Manager and study consultant. No comments were received which warranted alterations to the five strategies. The preferred strategy based on the public comments was Strategy 3. The exception was in those cases where the respondent identified their own system. The suggested strategies generally reflected the five strategies presented in Newsletter II. Most of the public's strategies included a change to one component within the five strategies identified. Each of these strategy variations was reviewed. None of these strategies offered any additional advantages. As a result, no additional strategies were developed for consideration.

TABLE 5.3
ANNUAL WASTE DISPOSAL REQUIREMENTS BY DIVERSION STRATEGY
FOR THE YEAR 2000

Area Municipality	Diversion Strategies				
	Strategy 1: Existing Plus Required (tonnes)	Strategy 2: Expanded Recycling Program (tonnes)	Strategy 3: Expanded Recycling Program with User Pay (tonnes)	Strategy 4: Wet/Dry Program (tonnes)	Strategy 5: Wet/Dry with User Pay (tonnes)
Capreol	2,550	2,250	1,700	1,750	1,550
Nickel Centre	8,200	7,200	5,500	5,700	4,950
Onaping Falls	3,600	3,150	2,400	2,500	2,150
Rayside-Balfour	9,950	8,750	6,650	6,950	6,050
Sudbury	61,750	54,400	41,350	43,100	37,400
Valley East	14,600	12,850	9,750	10,200	8,800
Walden	6,500	5,750	4,350	4,550	3,950
Region Total	107,150	94,350	71,700	74,750	64,850

5.7 ALTERNATIVE WASTE DISPOSAL STRATEGIES - IDENTIFICATION AND EVALUATION

This section outlines the evaluation of alternative disposal strategies. The recommended disposal strategy was then combined with the five alternative diversion strategies to form alternative systems.

5.7.1 Identification and Description of Alternative Disposal Strategies

The waste management system components intended to collect, transport and dispose of wastes were:

- waste collection
- transfer facility
- landfill.

Waste collection consists of municipal curbside and depot collection programs and private contractors in both urban and rural areas of the Region. Waste collection was assumed to be common to all potential waste disposal strategies.

Landfill disposal was also common to all potential disposal strategies because it is essential for the final disposal of wastes that cannot be diverted through waste reduction, reuse and recycling initiatives. At the time alternative systems were being evaluated, no other legal disposal alternatives (i.e. incineration) were available (see Section 1.2 regarding the removal of the provincial incineration "ban").

The need for transfer stations was dependent on the number of new landfill sites to be provided.

Alternative disposal strategies were identified by considering reasonable options for the number of new landfill sites that would be provided. This analysis led to the identification of two alternative disposal strategies.

Disposal Strategy 1: One New Landfill Site

Existing landfill sites will be kept open as long as possible. Municipalities that do not have their own landfill sites or have sites that are very near capacity may be required to dispose of their wastes at the new site.

Since new landfill capacity would be provided at only one site, transfer stations were included. Transfer stations could help to reduce haul costs to the new site. The potential cost savings that can be provided by transfer stations can only be determined once the site for new landfill capacity has been identified.

Disposal Strategy 2: Several New Sites

The existing landfill sites will be kept open as long as possible. New landfill capacity would be developed at several different sites as needed.

5.7.2 Evaluation of Alternative Disposal Strategies

This section describes the evaluation of the alternative disposal strategies and selection of a recommended strategy. The evaluation steps followed were:

- Identify evaluation criteria.
- Assess the alternative disposal strategies with respect to each criterion.
- Comparative evaluation of the alternative disposal strategies to identify a recommended disposal strategy.

Identification of Evaluation Criteria

Evaluation criteria were identified based on the definition of the environment as outlined in the *Environmental Assessment Act* and on the criteria listed in the MOEE's *Sectoral Environmental Assessment Proposal for Waste Management Planning - Technical Appendices*. The criteria considered the social/economic, natural and cost environments. The service or technical environment was not considered as the strategies could not be distinguished on the basis of this criterion (i.e. each was

assumed to provide the same level of service). The four criteria that were identified and their definitions are listed in Table 5.4.

TABLE 5.4
EVALUATION CRITERIA FOR DISPOSAL STRATEGIES

CRITERIA	CRITERIA DEFINITION
1. Operating Costs	Includes costs for operating and maintaining landfill sites, transfer stations and collection systems. Also includes closure and long-term care costs for landfill sites. Costs for operating landfill sites and transfer stations are expected to vary significantly between the alternative disposal strategies.
2. Development Costs	Includes capital costs for new landfill sites and transfer stations. Development costs for landfill sites and transfer stations are expected to vary significantly between the alternative disposal strategies.
3. Potential for Impacts to Natural Environment Features	The development and operation of existing and new landfill sites and transfer stations could produce loss/removal and disruption effects to natural environment features. The potential to produce negative impacts is expected to vary between the alternative disposal strategies.
4. Potential for Impacts to the Socio-economic Environment	Impacts include negative economic and social impacts to residents and businesses in the vicinity of existing and new landfill sites and transfer stations. Impacts could include decreased property values, loss of business revenues, increased traffic on local roads, and increased dust, odour and noise. Potential for impacts is expected to vary between the disposal strategies.

Assessment and Ranking of the Alternative Disposal Strategies

The assessment and ranking of the strategies within each of the criteria is described below. For all criteria, Strategy 1: one new landfill site, was preferred.

Operating Costs

The data indicates that the cost per tonne to dispose of waste in the Region's landfill sites decreased as the amount of waste disposed at the landfill site increased. The only landfill site that did not follow the trend was Rayside Balfour. This is the only existing landfill for which the Region pays for cover material.

Disposal Strategy 1 was ranked first. Operating costs for Strategy 2 were expected to be higher because the Region would be operating more than one new landfill site in addition to any existing landfills which may still be open. In Strategy 1 the Region would be required to operate only one new landfill site in addition to any existing landfills. The additional costs for operating transfer stations in Strategy 1 was expected to be less than the cost to operate an additional landfill site.

Development Costs

Development costs for transfer stations were insignificant compared to those for new landfill capacity. Strategy 1 was ranked first because new landfill capacity would be provided at one new site. Strategy 2 was ranked second with respect to development costs because new landfill capacity would be provided at more than one site. The cost of obtaining approvals for and developing multiple sites would be higher than obtaining approvals for and developing one site.

Potential for Impacts to Natural Environment Features

In addressing the potential for natural environment impacts from the disposal strategies, consideration was given to: 1) magnitude of effect; and 2) area of effect. It was predicted that the area affected would be greater for strategies with multiple landfill sites while the magnitude of effect at any one landfill location might be greater for strategies with fewer (and thus larger) landfill sites. It was rationalized that affecting a greater number of features, although potentially at a lower magnitude, would be of greater significance than affecting fewer features at potentially a higher magnitude. Therefore, Strategy 1 was ranked first and Strategy 2 was ranked second.

Natural environment effects were considered to be less significant for the strategy with fewer (one) sites.

Potential for Impacts to the Socio-Economic Environment

Effects to the socio-economic environment from landfilling were considered to be a function of: 1) magnitude of effect; and 2) area of effect. Although the magnitude of effect at any one landfill in a multiple landfill strategy might be less, multiple sites would affect a greater area. It was rationalized that affecting a greater number of

features, although potentially at a lower magnitude, would be of greater significance than affecting fewer features at potentially a higher magnitude. Therefore, Strategy 1 was ranked first and Strategy 2 was ranked second.

Comparative Evaluation of the Disposal Strategies

Strategy 1 ranked first for all four of the evaluation criteria. As a result, Strategy 1, which assumes one new landfill site, was the recommended disposal strategy for the Region of Sudbury.

5.8 ALTERNATIVE WASTE MANAGEMENT SYSTEMS - IDENTIFICATION AND EVALUATION

Alternative systems were developed by combining the five waste diversion strategies with the recommended disposal strategy. This resulted in the creation of five alternative waste management systems for the Region. The components included in the five alternative systems are listed in Table 5.5.

5.8.1 Methodology for the Comparative Evaluation of the Alternative Waste Management Systems

The formal evaluation of alternative waste management systems followed a five step process:

- Evaluation criteria were identified.
- Each system was evaluated to identify potential effects, mitigation/enhancement measures and net effects for each criteria.
- Ranks and weights for the criteria were established.
- The advantages and disadvantages of the alternative systems were compared to identify a recommended system.
- Tests were completed to determine the sensitivity of the evaluation to changes in the criteria and to the ranks and weights that were used.

**TABLE 5.5
ALTERNATIVE WASTE MANAGEMENT SYSTEM COMPONENTS**

<p align="center">System 1 Existing Plus Required, and One New Landfill Site</p>	<p align="center">System 2 Expanded Recycling Program and One New Landfill Site</p>	<p align="center">System 3 Expanded Recycling Program, User Pay, and One New Landfill Site</p>	<p align="center">System 4 We/Dry Program, and One New Landfill Site</p>	<p align="center">System 5 We/Dry Program, User Pay, and One New Landfill Site</p>
<ul style="list-style-type: none"> • Waste Reduction and Reuse • Promotion and Education of the 3Rs • Recycling Program • Household Hazardous Waste Program • Programs for Other Materials • Recycling and/or Diversion Programs for IC&I Establishments • Composting • Materials Recovery Facility • Waste Collection • Transfer Stations • Landfill- New Capacity at One Site 	<ul style="list-style-type: none"> • Waste Reduction and Reuse • Promotion and Education of the 3Rs • Expanded Recycling Program • Household Hazardous Waste Program • Programs for Other Materials • Recycling and/or Diversion Programs for IC&I Establishments • Composting • Financial Incentives for Waste Diversion • Municipal By-Laws to Promote Waste Diversion • Materials Recovery Facility • Waste Collection • Transfer Stations • Landfill- New Capacity at One Site 	<ul style="list-style-type: none"> • Waste Reduction and Reuse • Promotion and Education of the 3Rs • Expanded Recycling Program • Household Hazardous Waste Program • Programs for Other Materials • Recycling and/or Diversion Programs for IC&I Establishments • Composting • User Pay for Solid Waste • Financial Incentives for Waste Diversion • Municipal By-Laws to Promote Waste Diversion • Materials Recovery Facility • Waste Collection • Transfer Stations • Landfill- New Capacity at One Site 	<ul style="list-style-type: none"> • Waste Reduction and Reuse • Promotion and Education of the 3Rs • We/Dry Program • Household Hazardous Waste Program • Programs for Other Materials • Recycling and/or Diversion Programs for IC&I Establishments • Composting • Financial Incentives for Waste Diversion • Municipal By-Laws to Promote Waste Diversion • Materials Recovery Facility • Transfer Stations • Landfill- New Capacity at One Site 	<ul style="list-style-type: none"> • Waste Reduction and Reuse • Promotion and Education of the 3Rs • We/Dry Program • Household Hazardous Waste Program • Programs for Other Materials • Recycling and/or Diversion Programs for IC&I Establishments • Composting • User Pay for Solid Waste • Financial Incentives for Waste Diversion • Municipal By-Laws to Promote Waste Diversion • Materials Recovery Facility • Transfer Stations • Landfill- New Capacity at One Site

5.8.2 Criteria Used for the Evaluation of the Alternative Systems

The five alternative waste management systems were compared and evaluated in terms of potential for effects on the natural and social/cultural environments, technical considerations and financial considerations/municipal finance. The criteria and indicators considered in the evaluation of alternative systems were derived from the list of recommended criteria presented in Table B-3 of the MOEE's *Volume 1: Sectoral Environmental Assessment Proposal for Waste Management Planning - Technical Appendices*. The criteria and indicators used in the evaluation are presented in Table 5.6. The definition and rationale are included for each criterion.

5.8.3 Net Effects Evaluation of the Alternative Systems

The following were assessed for each of the systems considered:

- Potential environmental effects for the natural environment, social/cultural environment, technical considerations and financial considerations/municipal finance criteria.
- Mitigation/enhancement measures.
- Net effects.

The assumed mitigation measures and resulting system net effects are contained in Appendix B of the Task 2 Report.

The advantages/disadvantages based on the predicted environmental net effects for each system are summarized in Table 5.7.

5.8.4 Comparative Evaluation of the Alternative Systems

The alternative waste management systems were ranked within each criteria group based on the advantages and disadvantages of each system. The system rankings by criteria group are summarized in Table 5.8.

**TABLE 5.6
CRITERIA FOR EVALUATION OF ALTERNATIVE WASTE MANAGEMENT SYSTEMS**

Criteria Group/Criteria	Criteria Definition	Indicators	Rationale
NATURAL ENVIRONMENT			
<ul style="list-style-type: none"> • Effects on terrestrial systems and resources. 	<p>Addresses the potential for the loss/removal or disruption to terrestrial systems and resources. This includes terrestrial biological systems and forestry, mineral and agricultural resources.</p>	<ul style="list-style-type: none"> • Potential for disruption and/or loss/removal of features. 	<p>To minimize potential effects to the natural environment. Systems that have a higher reliance on landfill disposal (i.e. lower waste diversion rate) will have higher potential to cause negative effects to the natural environment. Negative effects from the development of other facilities (e.g. composting and materials recovery facilities) were not considered in the analysis. These effects were not expected to be significant.</p>
<ul style="list-style-type: none"> • Effect on surface and groundwater resources and aquatic biological systems. 	<p>Addresses the potential for disruption to aquatic systems, including surface and groundwater resources.</p>	<ul style="list-style-type: none"> • Potential for disruption of features. 	
<ul style="list-style-type: none"> • Effect on the atmosphere. 	<p>Addresses the potential effects to the atmosphere from activities that result in emissions in gases, odour and dust.</p>	<ul style="list-style-type: none"> • Potential to impair (methane gas effects on natural features). 	
SOCIAL/CULTURAL ENVIRONMENT			
<ul style="list-style-type: none"> • Effects on local community. 	<p>Some components, particularly facilities such as landfill sites, could potentially create negative effects on communities in the Region.</p>	<ul style="list-style-type: none"> • Potential for disruption effects on existing land use, residents and community features. 	<p>Alternative systems may require the construction of certain facilities (e.g. landfill). These facilities may be considered by some to be disruptive to their day-to-day activities. Potential negative effects from siting other facilities, such as composting and materials recovery facilities, were not considered in the analysis. These effects were not expected to be significant.</p>
<ul style="list-style-type: none"> • Effects on the Region of Sudbury as a whole. 	<p>Changes may be required or may occur in the way residents, government, industry and institutions within the Region operate within a given system.</p>	<ul style="list-style-type: none"> • Anticipated level of public acceptance. • Potential for change to community's lifestyle. 	<p>The public must accept the system for it to become fully operational. Preferable systems are those that have a high potential for being socially acceptable.</p> <p>Systems which promote changes in lifestyle which support or encourage longer term reduction, reuse and recycling and greater diversion of wastes are preferred.</p>

**TABLE 5.6
CRITERIA FOR EVALUATION OF ALTERNATIVE WASTE MANAGEMENT SYSTEMS
(Continued)**

Criteria Group/Criteria	Criteria Definition	Indicators	Rationale
TECHNICAL CONSIDERATIONS			
<ul style="list-style-type: none"> Reliability of the system. 	Measures the reliability of the system in terms of its ability to provide continuous service.	<ul style="list-style-type: none"> Based on experience in other jurisdictions, historical operating experience and operational complexity and sensitivity, can the system be relied upon to provide continuous service. 	Each system must be assessed on its ability to provide a level of reliability. Some systems include more complex components which may not be as reliable as other less complex components.
<ul style="list-style-type: none"> Flexibility of the system. 	Measures the system's ability to accommodate variable waste quantities and characteristics.	<ul style="list-style-type: none"> Compatibility with the existing waste management system. 	The preferred system should be one which is adaptable with the existing waste management system. A system which is not adaptable will be more difficult for the Region to implement.
<ul style="list-style-type: none"> Performance of the system. 	Measures the amount of waste requiring disposal and the portion of the waste stream that will be diverted.	<ul style="list-style-type: none"> Potential to achieve MOEE waste diversion objective. 	The preferred system should attempt to achieve the Provincial waste diversion objective of 50% by the year 2000.
FINANCIAL CONSIDERATIONS/MUNICIPAL FINANCE			
<ul style="list-style-type: none"> Capital costs of the system and effect on municipal finance. 	Considers the one-time cost to develop new facilities and effect on municipal debt burden.	<ul style="list-style-type: none"> Costs for environmental approvals and to develop (including land) and equip facilities. Amount of long-term debt required and potential increase in municipal taxes. 	Capital costs will vary between the alternative systems relative to the need for new facilities and the size and complexity of the facilities. The system that is most preferable will have the lowest capital costs and avoid unnecessary debt burden to local residents and allow for other local capital spending practices. This in turn also minimizes future taxes and local charges to be paid by residents.
<ul style="list-style-type: none"> Operating costs of the system and effect on municipal finance. 	Considers the yearly costs to operate each system after other revenue sources have been taken into account and effect on municipal debt burden.	<ul style="list-style-type: none"> Regular operating costs and amortized capital costs where applicable. Potential increase in municipal taxes to finance the operation of the system. 	Operating costs will vary between the alternative systems relative to the complexity of the system. The preferred system will minimize taxes and local charges to avoid unnecessary or burdensome cost to local residents.

The advantages/disadvantages for each of the five waste management systems provided a relative comparison of the systems based on environmental effects. Based on a preliminary review of the advantages and disadvantages, Systems 3 and 5 appeared to be preferred overall. System 3 was preferred over System 5 for technical and financial considerations, whereas System 5 was preferred with respect to natural and socio-economic environment effects. To assist in identifying a preferred system, a quantitative comparative evaluation of the systems using the Concordance Method was completed. This evaluation method required that weights be developed for each criterion (see Appendix C). Criteria weights were developed by the study team and made available for public review. The weights were as follows:

CRITERIA	CRITERIA WEIGHT
Natural Environment	1
Social/Cultural Environment	15
Technical Considerations	40
Financial Considerations/Municipal Finance	50

The rationale for the weights was presented in the WMSP Task 2 Report. No comments from the public were received on the weights.

The concordance analysis indicated the following order of preference (highest to lowest preference ranking):

- System 3 (Expanded Recycling Program, User Pay, and One New Landfill Site)
- System 5 (Wet/Dry, User Pay, and One New Landfill Site)
- System 4 (Wet/Dry, and One New Landfill Site)
- System 2 (Expanded Recycling Program, and One New Landfill Site)
- System 1 (Existing Plus Required, and One New Landfill Site)

**TABLE 5.7
 ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE
 WASTE MANAGEMENT SYSTEMS**

Advantages	Disadvantages
SYSTEM 1	
<ul style="list-style-type: none"> • Reliability and compatibility with the existing waste management system similar to System 2 and greater than Systems 3, 4 and 5. • Predicted capital costs for new diversion facilities similar to predicted costs for Systems 2 and 3 and less than the costs predicted for Systems 4 and 5. • Annual operating costs less than the costs predicted for Systems 2 and 4. 	<ul style="list-style-type: none"> • Potential for displacement of natural environment features resulting from the development of new landfill capacity is greater than Systems 2, 3, 4 and 5. • Potential for contamination of surface and ground water, methane gas effects, and visual, noise, dust and odour impacts due to landfill disposal of waste greater than Systems 2, 3, 4, and 5. • Potential for positive effects from community involvement in waste diversion less than Systems 2, 3, 4, and 5. • System will not enable the Region to achieve the MOEE waste diversion objective. • Annual operating costs higher than the costs predicted for Systems 3 and 5.
SYSTEM 2	
<ul style="list-style-type: none"> • Potential for displacement of natural environment features resulting from the development of new landfill capacity less than System 1. • Potential for contamination of surface and ground water, methane gas effects, and visual, noise, dust and odour impacts due to landfill disposal of waste less than System 1. • Potential for positive effects from community involvement in waste diversion greater than for System 1. • Reliability and compatibility with the existing waste management system similar to System 1 and greater than Systems 3, 4, and 5. • Predicted capital costs for new diversion facilities similar to predicted costs for Systems 1 and 3 and less than the costs predicted for Systems 4 and 5. • Annual operating costs less than the costs predicted for System 4. 	<ul style="list-style-type: none"> • Potential for displacement of natural environment features resulting from the development of new landfill capacity greater than Systems 3, 4, and 5. • Potential for contamination of surface and ground water, methane gas effects, and visual, noise, dust and odour impacts due to landfill disposal of waste greater than Systems 3, 4, and 5. • Potential for positive effects from community involvement in waste diversion less than for Systems 3, 4, and 5. • System will not enable the Region to achieve the MOEE waste diversion objective. • Annual operating costs are more than the costs predicted for Systems 1, 3 and 5.

**TABLE 5.7
ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE
WASTE MANAGEMENT SYSTEMS
(Continued)**

Advantages	Disadvantages
SYSTEM 3	
<ul style="list-style-type: none"> • Potential for displacement of natural environment features resulting from the development of new landfill capacity is similar to System 4 and less than Systems 1 and 2. • Potential for contamination of surface and ground water, methane gas effects, and visual, noise, dust and odour impacts due to landfill disposal of waste is similar to System 4 and less than Systems 1 and 2. • Potential for positive effects from community involvement in waste diversion similar to System 4 and greater than Systems 1 and 2. • Reliability and compatibility with the existing waste management system similar to System 4 and greater than System 5. • System will enable the Region to achieve the MOEE waste diversion objective. • Predicted capital costs for new diversion facilities similar to predicted costs for Systems 1 and 2 and less than the costs predicted for Systems 4 and 5. • Annual operating costs less than the costs predicted for Systems 1, 2, 4 and 5. 	<ul style="list-style-type: none"> • Potential for displacement of natural environment features resulting from the development of new landfill capacity is similar to System 4 and greater than System 5. • Potential for contamination of surface and ground water, methane gas effects, and visual, noise, dust and odour impacts due to landfill disposal of waste is similar to System 4 and greater than System 5. • Potential for positive effects from community involvement in waste diversion similar to System 4 and less than System 5. • Reliability and compatibility with the existing waste management system similar to System 4 and less than Systems 1 and 2.
SYSTEM 4	
<ul style="list-style-type: none"> • Potential for displacement of natural environment features resulting from the development of new landfill capacity is similar to System 3 and less than Systems 1 and 2. • Potential for contamination of surface and ground water, methane gas effects, and visual, noise, dust and odour impacts due to landfill disposal of waste is similar to System 3 and less than Systems 1 and 2. • Potential for positive effects from community involvement in waste diversion similar to System 3 and greater than Systems 1 and 2. • Reliability and compatibility with the existing waste management system similar to System 3 and greater than System 5. • System will enable the Region to achieve the MOEE waste diversion objective. 	<ul style="list-style-type: none"> • Potential for displacement of natural environment features resulting from the development of new landfill capacity is similar to System 3 and greater than System 5. • Potential for contamination of surface and ground water, methane gas effects, and visual, noise, dust and odour impacts due to landfill disposal of waste is similar to System 3 and greater than System 5. • Potential for positive effects from community involvement in waste diversion similar to System 3 and less than System 5. • Reliability and compatibility with the existing waste management system similar to System 3 and less than Systems 1 and 2. • Predicted capital costs for new diversion facilities similar to predicted costs for System 5 and greater than the costs predicted for Systems 1, 2 and 3. • Annual operating costs greater than the costs predicted for Systems 1, 2, 3 and 5.

**TABLE 5.7
ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE
WASTE MANAGEMENT SYSTEMS
(Continued)**

Advantages	Disadvantages
SYSTEM 5	
<ul style="list-style-type: none"> • Potential for displacement of natural environment features resulting from the development of new landfill capacity is less than Systems 1, 2, 3, and 4. • Potential for contamination of surface and ground water, methane gas effects, and visual, noise, dust and odour impacts due to landfill disposal of waste is less than Systems 1, 2, 3 and 4. • Potential for positive effects from community involvement in waste diversion greater than Systems 1, 2, 3 and 4. • System will enable the Region to achieve the MOEE waste diversion objective. • Annual operating costs less than the costs predicted for Systems 1, 2 and 4. 	<ul style="list-style-type: none"> • Reliability and compatibility with the existing waste management system less than Systems 1, 2, 3 and 4. • Predicted capital costs for new diversion facilities similar to predicted costs for System 4 and greater than the costs predicted for Systems 1, 2 and 3. • Annual operating costs greater than the costs predicted for System 3.

**TABLE 5.8
WASTE MANAGEMENT SYSTEMS RANKING SUMMARY**

Systems	CRITERIA			
	Natural Environment	Socio-Economic Environment	Technical Considerations	Financial Consideration/ Municipal Finance
1	5	5	5	2
2	4	4	4	4
3	2	2	1	1
4	3	3	2	5
5	1	1	3	3

Concordance scores for the systems evaluation were as follows:

System	Concordance Score
System 1	0.90
System 2	1.00
System 3	3.35
System 4	2.15
System 5	2.60

Five tests were also completed to determine the sensitivity of the concordance analysis to changes in the criteria weights. The tests indicated that the evaluation of alternative waste management systems was not sensitive to the criteria weights when reasonable adjustments were made. These tests are described in detail in Appendix F of the Task 2 Report.

As a result, System 3 was identified to be preferred over the other four systems.

5.8.5 Public Input on Preferred Waste Management System

The evaluation of alternative waste management systems was completed in January 1995. The preferred system was presented to the Steering Committee and discussed during their January 17, 1995 meeting. The Committee recommended that additional public input be obtained on the system prior to release of the WMSP Task 2 Draft Report.

A public Open House was held on January 20, 1995. As part of the event, the recommended diversion and disposal strategies were described for the audience by the WMSP Project Manager. No comments were received which resulted in changes to the consideration of the diversion and disposal strategies.

An information package was prepared by the WMSP Project Manager which outlined, in detail, the components of the preferred waste management system. The information package was distributed in early February 1995 to all people on the WMSP mailing list, Chamber of Commerce members and to Regional Councillors. The general public was also informed through media advertisements that the

information package was available for review. A limited number of comments were received via letters and calls to the Waste Line. The comments did not result in any changes to the evaluation of systems or the preferred system. The Task 2 Draft Report was released in March 1995 for public and agency review.

5.9 COMPARATIVE EVALUATION OF THE PREFERRED SYSTEM WITH THE "DO NOTHING"

As described in the Sectoral EAP, the preferred system is to be compared to the "do nothing" system through a net effects analysis. The "do nothing" alternative provides a benchmark against which the advantages and disadvantages to the environment of the preferred system are compared. This comparison serves to demonstrate that there is a need for action and to provide a rationale to initiate Task 4 of the planning process.

The "do nothing" system consists of the existing waste management system in the Region. It is essentially the same as System 1 but without a leaf and yard waste program and no new landfill capacity.

The comparison of the "do nothing" and preferred systems was based on the criteria previously presented in Table 5.6. These were the same criteria used in the overall systems evaluation. The following describes the comparative evaluation of the two systems focussing on their advantages and disadvantages.

Natural environment and social/cultural environment effects from diversion facilities were not considered to be significant. As a result, the effects analysis for these criteria groups focused on disposal facilities.

Natural Environment

System 3 will require the development of a landfill which could result in the disruption and loss/removal of terrestrial/aquatic systems. These effects can be largely mitigated through proper siting and facility design.

Although the "do nothing" system does not include new landfill development, the Region will still have waste disposal requirements. Effects to natural features could

be greater from the "do nothing" system if the waste is improperly disposed (i.e. not in a sanitary landfill facility).

System 3 was considered preferred for this criteria group because of the uncertainty with disposal under the "do nothing" system.

Social/Cultural Environment

Effects on the local community with the "do nothing" system are considered to be greater compared to System 3 because of the improper disposal of waste. With System 3 these effects would likely not occur if the waste was being disposed of at a properly sited and designed facility.

There is expected to be a lack of public acceptance for a system which will have insufficient landfill disposal capacity. In addition, although the "do nothing" system does not require a lifestyle change, it does not promote a conservator society attitude as does System 3.

Technical Considerations

System 3 has a potential diversion rate of approximately 50% and will allow the Region to attain the MOEE diversion objective. The "do nothing" system is only achieving a diversion rate of 7%.

For these reasons System 3 was considered preferred over the "do nothing" system for the technical considerations criteria group.

Financial Considerations/Municipal Finance

With respect to capital costs, the "do nothing" system does not require any new facilities. System 3 requires a new landfill and potentially a leaf and yard waste composting site. As a result, the "do nothing" system would be cheaper and thus preferred.

The operating costs for System 3 were estimated to be \$750,000 per year compared to \$1,500,000 per year for the "do-nothing" system. System 3 was preferred for this criterion.

Although the "do nothing" system has less capital costs, the greater operating costs over the study period result in this system being more expensive in the long-term. As a result, the "do nothing" system was less preferred for this criteria group.

Overall Comparison

For all criteria groups, System 3 was considered to be preferred. System 3 was the recommended waste management system for the Region of Sudbury.

5.10 DESCRIPTION OF THE RECOMMENDED SYSTEM

The recommended waste management system (System 3) for the Region of Sudbury consists of the following components. Additional details on each component are contained in the WMSP Task 2 and Task 3 reports.

Waste Reduction and Reuse

- Establish procurement policies for all municipal offices and publicly funded agencies in the Region.
- Encourage municipal offices, publicly funded agencies and the IC&I sector in the Region to adopt in-house practices such as printing on both sides of paper and reusing fax cover sheets.
- Provide recycling bins and backyard composters to all municipal buildings.

Promotion and Education of the 3Rs

- Continue offering educational packages for schools and the general public promoting the household composting, household hazardous waste and recycling programs.

Expanded Recycling Program

- Expand the Region's recycling program to include materials not collected such as plastic bags and film plastic, foam cups and containers, polycoat milk and juice cartons and textiles.
- New materials should not be added until stable and cost effective markets can be identified.
- The Region should change to twice monthly collection to reduce the cost of the expanded recycling program.
- The Region should install recycling depots so that residents who produce high volumes have somewhere to take their recyclables between collections. Depots should collect the same types of materials collected in the curbside recycling program.

Household Hazardous Waste Program

- The Region has developed a permanent depot for HHW in Sudbury. The facility is scheduled to begin operating in 1997. Satellite depots in other parts of the Region will continue to be operated periodically.

Programs for Other Materials

- The Region currently operates programs for white goods and scrap metals, tires, Christmas tree and wood wastes, and derelict motor vehicles. In addition, potentially reusable goods such as doors, sinks and windows are recovered from the Sudbury landfill by the contractor that operates the site and sold at a store located on the site.
- The disposal of automotive batteries in the Region's landfill sites is prohibited as they are a hazardous waste. However, should batteries be found in the waste stream at any landfill, they are recovered and recycled rather than landfilled.

Recycling and/or Diversion Programs for IC&I Establishments

- The Region accepts recyclable materials from industrial, commercial and institutional (IC&I) establishments.
- Establish depots to collect recyclables from small IC&I establishments.
- Accept materials such as bricks and concrete blocks, shingles and drywall from IC&I establishments once economically viable and stable markets for these materials have been identified.

Composting

- A leaf and yard waste program is required under the 3Rs Regulations, but the collection method is not specified. Collections can be provided on a regular or seasonal basis.
- The municipality is also required to promote public awareness and understanding of the leaf and yard waste program, make reasonable efforts to direct the compost to use as a soil conditioner, and submit an annual report on the operation of the program to the MOEE.
- The Region should consider distributing backyard composters free of charge to all residents to increase the level of diversion through home composting.

User Pay for Solid Waste

- The only user pay program presently operating in the Region is the tire recycling program.
- The recommended waste management system for the Region includes a user pay program for residential solid waste collection.

Financial Incentives for Waste Diversion

- Establish graduated tipping fees where lower tipping fee rates are charged for source separated loads of specific materials, to encourage source separation.
- Graduated fees should be established for wood wastes as markets presently exist and more materials should be included as stable markets are identified.

Municipal By-laws to Promote Waste Diversion

- Implement municipal By-Laws to enhance the effectiveness of diversion components including:
 - banning the disposal of specific materials at the landfill.
 - garbage bag pick-up limits.
 - mandatory participation in waste diversion programs.

Materials Recovery Facility

- The Regional Recycling Centre has a design capacity of approximately 35,000 tonnes per year of material but is currently only receiving 5,800 tonnes per year. It is likely that the Recycling Centre will be able to meet the long-term needs of the Region for a MRF.

Waste Collection

- The recommended waste management system includes the Region assuming responsibility for waste collection from the Area Municipalities.

Transfer Stations

- There are presently four transfer stations operating in the Region to collect wastes from residents that do not receive curbside waste collection.
- Transfer stations would serve areas in the Region where both the distance to the long-term disposal site and the quantities involved are significant.

Landfill

- The Region presently operates six landfill sites located in Sudbury, Nickel Centre, Onaping Falls, Valley East, Walden and Rayside Balfour.
- The recommended disposal strategy is that new landfill capacity be developed at one site and that the existing landfill sites will be closed when their approved capacities are exhausted.

5.11 DIVERSION ACTIVITIES INITIATED BY THE REGION

Since the completion of the Task 2 Report, the Region has begun the implementation of various components of the recommended waste diversion strategy. These activities have included the following:

- Expansion of the Blue Box program to include boxboard, fine paper, junk mail and HDPE plastic containers.
- Construction of the household hazardous waste (HHW) depot.
- Ongoing 3Rs promotion and education.

The Region estimates that their waste diversion rate was in the order of 15% in 1996. This was a substantial increase over the 7% diversion being achieved at the start of the WMSP (i.e. 1994). With the initiation of additional diversion components, the Region's diversion rate will continue to increase and approach the targets set in the WMSP.

The recommended diversion strategy for the Region of Sudbury includes some components which have not been implemented (as of December 1996). The Region has also not made a commitment to their implementation schedule. As a result, for the purpose of landfill sizing and the Region's Environmental Assessment, a 28% waste diversion rate was assumed. This rate was based on the commitments which have been made to waste diversion by the Region and reasonable levels of growth, public participation and material capture rates within the various diversion activities. These assumptions were detailed in Appendix C of the Task 2 Report and summarized below.

- Capture rates for recyclable materials were assumed to be equal, as a minimum, to the rates observed in the existing recycling program in the Region.
- The Region would continue to sell or distribute composters at the rate of 1,000 per year from 1995 to the year 2000. This is equal to a total of 17,000 composters being distributed in the Region by the year 2000.
- Each backyard composter diverts 122 kg of organic wastes from landfill each year with a public participation rate of 80%.
- Up to 25% of the leaf and yard wastes produced in the Region would be captured by the leaf and yard waste diversion program.
- The capture rate for the household hazardous waste (HHW) program would be, as a minimum, equal to the rate observed in the existing program.
- The capture rate for the Programs for Other Materials component would be 35%. This was based on the capture rate of 30% determined for the existing program.
- The capture rate for IC&I wastes collected through municipally run programs would increase from 0.5% to 5%. Most establishments that must comply with the 3Rs Regulations are required to source separate materials that are accepted at the Regional Recycling Centre, such as recyclable materials, fine paper and corrugated cardboard.

- Up to 25% of the municipal IC&I waste stream would be diverted through programs operated by the IC&I sector. These programs would be independent of the programs operated by the Region.

6.0 "ALTERNATIVE METHODS" - LANDFILL SITE SELECTION

6.1 INTRODUCTION

The assessment of the need for the undertaking and the examination of the "alternatives to" (alternative systems) contributed to identifying the Region's undertaking: the development of a long-term waste disposal facility. The next stage of the environmental assessment involved the evaluation of alternative methods for carrying out the undertaking. The alternatives for the Region's proposed landfill undertaking were examined in terms of potential locations for the landfill. Alternative sites for the development of the proposed facility were identified and evaluated, and a preferred site chosen.

6.2 LANDFILL SITE SELECTION APPROACH OVERVIEW

The landfill site selection approach was designed to meet the requirements of the *Environmental Assessment Act* (EAA), the Ministry of the Environment (MOE) *Interim Guidelines on Environmental Assessment Planning and Approvals* (1989) and the *MOEE Sectoral EAP for Waste Management Planning*.

The purpose of the landfill site selection approach was to identify a landfill site in an area which maximizes compatibility with surrounding lands, thereby minimizing potential environmental impacts. In order to identify this site (i.e. the one with least potential to cause negative effects), a process was undertaken whereby lands more likely to be suitable for a landfill were systematically separated from those less likely to be suitable. The suitable lands were then compared, leading to the identification of a preferred site. In an ideal situation, it would be preferable to examine in detail, all land in the study area to arrive at the preferred location for a landfill. This would be prohibitive in terms of time and cost. The alternative, and most reasonable approach, was to focus on those areas which provide the greatest likelihood of containing lands suitable for a landfill.

The four steps in the landfill siting exercise were as follows:

- **Step 1** - the identification of Candidate Areas;
- **Step 2** - the identification of Long List of Potential Sites;

- **Step 3** - the identification of Short List of Potential Sites;
- **Step 4** - the identification of a Preferred Site.

The following describes these steps in more detail.

Step 1: Identification of Candidate Areas

To identify Candidate Areas, criteria were mapped for the entire study area to delineate lands which were less likely to be suitable from those lands which were likely to be suitable for a landfill site. Those lands which were likely suitable were carried forward for further evaluation, and conversely lands that were likely not suitable were eliminated from further consideration. The suitable lands were called Candidate Areas.

Screening criteria were used to identify those lands considered to be more suitable.

Step 2: Identification of Long List of Potential Sites

The next step in the process was to take the remaining irregular shaped tracts of land or Candidate Areas, identified through the application of the Step 1 screening criteria, and identify boundaries to permit the formation of a Long List of Potential Sites.

Only one site per candidate area was identified.

Step 3: Identification of Short List of Potential Sites

Once the Long List of Potential Sites was generated, an assessment was undertaken to determine which sites on the list were better than the others, in order to identify a Short List of Potential Sites. The assessment was facilitated through the use of comparative criteria. Comparative criteria were used to identify differences and make trade-offs between sites as opposed to excluding lands as was done in Step 1. The level of detail in this step was increased from that applied to previous steps by utilizing additional data from secondary sources, agency contacts and from field observations.

Step 4: Identification of Preferred Site

In Step 4, the Short List of Potential Sites were assessed to identify a Preferred Site. Again, comparative criteria were used to assess and compare the potential sites and assist in making trade-offs about which site was best. This step involved studies at a greater level of detail than all previous steps and included on-site investigations to facilitate data collection.

6.3 SCOPE OF ANALYSIS

6.3.1 Site Selection Disciplines

In carrying out the site selection process, the environment as defined in the EAA was addressed through the application of **criteria** and **indicators** organized by study disciplines. Criteria were explicit features or considerations used to make decisions throughout the site selection process. Indicators were specific measures of effects for each criterion. The criteria and indicators related to the overall purpose of the landfill site selection described above. These criteria were organized into groupings referred to as **disciplines**. The following describes the role and importance of each of the disciplines considered in the site selection process. Table 6.1 outlines how these disciplines covered all aspects of the "environment" as defined in the EAA. Some disciplines, such as archaeology, specifically study the cultural aspect of the environment. Other disciplines, such as agriculture, study more than one aspect.

- **Agriculture**

The siting of a landfill in areas of high quality or intensely used farmland results in the permanent loss of farmland. Disruption effects may also be felt by farm operations located near a landfill or along waste haul routes. Ontario is faced with an ever diminishing agricultural land base. The continued loss of good quality soils and highly productive farm operations places additional strain on this depleted resource. Therefore, the landfill should be sited to minimize the loss of high quality or intensely used farm land. This is particularly important in the Region which has a limited supply of agricultural lands.

**TABLE 6.1
DISCIPLINES AS RELATED TO BROAD DEFINITION OF ENVIRONMENT**

Discipline	DEFINITION OF ENVIRONMENT					
	Social	Natural	Cultural	Economic	Technical	Land Use
Agriculture	●		●	●		●
Archaeology			●			
Biology		●				
Cost				●		
Design & Operation					●	
Economics				●		
Hydrogeology		●				
Planned Land Use						●
Social	●					
Surface Water		●				
Transportation	●			●	●	
Visual	●					

- **Archaeology**

The loss of lands considered to have archaeological significance or lands containing heritage resources could represent a major loss to our cultural environment. The presence and significance of both these types of features must be considered in the siting of a landfill.

- **Biology**

The development and operation of a landfill can have impacts on biological features, particularly those identified as significant or sensitive. By incorporating biological considerations into the siting exercise, impacts to terrestrial and aquatic plant and animal species can be minimized.

- **Cost**

Cost considerations include the initial costs of acquiring land and infrastructure, the annual costs for operating the facility, the haulage costs of waste and the cost of site design features.

- **Design and Operation**

Design and operation refers to the technical considerations related to the ability to develop a reliable facility and one with both design and operational flexibility.

- **Economic**

Landfill developments may result in economic implications associated with the displacement or disruption of business on and near the proposed landfill and along waste haul routes. Other economic implications may be associated with impacts on property value.

- **Geology/Hydrogeology**

The potential impact of contaminants in leachate on ground water is a key concern with siting landfills. Although some engineered features may be desirable, certain geologic and hydrogeologic settings can enhance the protection of ground water. Landfills require ground water buffer zones, such that any contaminants from the landfill are adequately attenuated before reaching the site boundaries.

- **Planned Land Use**

The compatibility of a landfill with planned land uses should be a consideration in the site selection. Planned land uses represent a municipality's commitment to a specific pattern of growth and proper planning.

- **Social**

Landfill developments can frequently result in the displacement or disruption of residents and community and recreation features, on and near the proposed landfill and along waste haul routes. In siting landfills, there may be some settings that will experience a higher level of disruption or displacement. The differences in social settings should be considered in the site selection. Social considerations will allow noise and odour sensitive land uses to be identified and the potential impacts determined when choosing a location for a landfill.

Some landscape characteristics are more compatible with a landfill than others. For example, a site with extensive vegetation growth in buffer areas will be less visible as a result of vegetative screening, and undulating topography can "absorb" the landfill to a degree if the landfill respects existing landforms in size and form. The visual impact of a landfill on a community is often a concern and should be assessed.

- **Surface Water**

Surface water considerations relate to both quantity and quality issues. Quantity of surface water poses operation and safety problems for the development and operation of a landfill. In addition, unacceptable impacts to surface water quality can occur if any contaminants escape from a landfill site. The presence and character of surface water should therefore be considered when siting a landfill.

- **Transportation**

Increases in traffic levels associated with landfill operations can have a number of transportation-related implications. It is important to consider the traffic safety and traffic operation issues associated with hauling waste.

Rarely can all negative impacts addressed by these disciplines be totally avoided in the search for the preferred landfill site. It is the aim of the site selection process, however, to identify a landfill site which will have the least potential for impact to the environment.

6.3.2 Study Area and Period

Landfill Site Selection Study Area

The study area for the Waste Management Systems Plan included the entire Region of Sudbury as the Plan was to serve this area. The initial starting point for the site selection process was also the entire Region.

Landfill Study Zones

The landfill study zones refer to the areas in which potential effects to the environment may occur should a landfill site be identified at a specific location. As the site selection process progressed, the study area was modified to address the specific potential sites and potential zones of impact surrounding them. Both on-site and off-site study areas as defined below, were considered in the evaluation of potential sites.

On-Site: Areas within which features will be displaced or removed or lost by landfill development. The on-site study area was 66 ha in size.

Off-Site (Site Vicinity): The area which potentially could be affected by the landfill through effects such as noise, dust, odour, etc., was the off-site study area. It included lands within 1,000 m of the landfill site boundary.

It should be noted that in the short list of sites evaluation stage, the potential for impacts along waste haul routes was considered. However, since each of the sites could be accessed from roadways designed to accommodate high traffic volumes (i.e. provincial highways and regional roads), significant roadway impacts were not expected. Only the Transportation discipline considered roadway-related effects including effects on traffic operations and safety. Waste haulage distance was also taken into account in the Cost analysis.

Time Horizon

Time horizons refer to the time frame over which potential effects to the environment would be predicted. The long and short list evaluation stages considered effects associated with site operation which was expected to last a minimum of 20 years (till the end of 2019).

6.3.3 Number of Landfill Sites

As described in Section 5.7 of this document, one new site was identified as the preferred disposal strategy.

6.3.4 Type of Landfill

The MOEE's Sectoral EAP requires that assumptions regarding size and degree of engineering for leachate management be made at the beginning of the landfill site selection process. The purpose of these assumptions was to identify to the study participants the type of leachate management strategy the proponent intends to undertake. These assumptions may potentially affect the landfill siting process by influencing the criteria for the Geology/Hydrogeology and Design and Operations disciplines. They may also have a bearing on the size of site.

As part of developing the Landfill Siting Workplan (Task 4 Report) for the Region of Sudbury's WMSP, it was identified that a 66 ha natural attenuation landfill site (including a 100 m buffer) was to be sited. The size of the leachate attenuation zone required was not defined. It was proposed that the leachate attenuation zone would be defined once site specific information on the short list of potential sites was available.

Based on the geology of the Sudbury Region and the limited data sources available, Geology/Hydrogeology criteria were not used during the constraint mapping process to identify Candidate Areas. The application of Geology/Hydrogeology criteria at this stage would have eliminated a very significant portion of the study area with very few siting options remaining. Geology/Hydrogeology criteria were not considered until the evaluation of the Long List of Potential Sites. The MOEE's Sudbury Regional Hydrogeologist concurred with this approach.

The site-specific hydrogeological investigations conducted on the short list of potential sites indicated that two of the three sites could be developed as natural attenuation landfills. The third site would require engineered features in the form of a leachate collection system. This resulted in having to compare natural attenuation sites to an engineered site.

Given that the initial assumption was to develop a natural attenuation site, the effect of this changed assumption on the siting process was reviewed. To begin with, since Geology/Hydrogeology criteria were not applied in the site identification step, whether a natural attenuation or engineered site was assumed, the same long list of sites would have been identified.

When comparing the long list of sites, the same Geology/Hydrogeology criteria (see Table 6.4) and evaluation method would have been used for evaluating engineered landfill sites. It would still be important for a site to provide a high level of natural protection from leachate impacts, have a predictable non-complex hydrogeological setting and be located away from water supplies. As a result, those sites on the long list considered less preferred for the Geology/Hydrogeology discipline would not have differed based on the landfill being either engineered or natural attenuation.

6.3.5 Quantity of Waste to be Disposed/Landfill Site Size

The amount of waste that requires disposal depends on the waste diversion rate which the Region can achieve. The Task 2 Report indicated that the preferred system, System 3, has the potential to achieve a 50% diversion rate if all its components are implemented. At this time, the Region has not committed to implementing all of the System 3 components (e.g. user pay). Based on the diversion initiatives, the Region has currently committed to implementing, plus those required by regulation and potential internal IC&I diversion activities, a 28% waste diversion rate may be achieved.

The quantity of waste to be disposed in the new landfill capacity was calculated by considering the amount of waste that will be generated over the twenty year planning period, the amount of waste that will be diverted, and the remaining disposal capacities of the Region's existing landfill sites. New landfill site capacity of approximately 2,125,000 tonnes will be needed.

The size of landfill required, with an assumed 28% diversion rate, was estimated to be approximately 66 hectares. Section 5.1.1 provides a rationale for the assumed 28% diversion rate. It was assumed that the landfill would be square or rectangular in shape, the height would not exceed 15 metres, the depth would not exceed 4 metres, with a 100 m buffer around the perimeter of the waste fill area. These assumptions were generic and for the purpose of the landfill siting. The assumptions would be revised once more site-specific information was available. Also, these assumptions were for a new site and did not preclude the option of expanding any existing sites which do not meet these assumptions.

The 66 ha size assumption was reviewed once the short list of sites were identified, taking into account site specific conditions.

6.4 EXISTING ENVIRONMENT DESCRIPTION

Baseline environmental conditions were reflected in the data/impact tables that were prepared and used as a basis for the comparative evaluation. These tables are referenced in the appropriate sections of this document.

6.5 STEP 1 - IDENTIFICATION OF CANDIDATE AREAS

To identify Candidate Areas, screening criteria were mapped on 1:50,000 scale topographic base maps for the entire study area. The application of these screening criteria delineated lands which were less likely to be suitable from those lands which were likely to be suitable for a landfill site. Those lands which were likely suitable were carried forward for further evaluation, and conversely lands that were likely not suitable were eliminated from further consideration. The suitable lands were called Candidate Areas.

6.5.1 Application of Initial Screening Criteria

Table 6.2, presents the candidate area screening criteria that were applied. It should be noted that for some criteria (e.g. Class 1-3 wetlands), there were no features present and as a result, no lands screened on the basis of these criteria. It should also be noted that the following screening criteria were first applied to the larger study area before the other criteria were applied:

- avoid lands more than 25 km travel distance along provincial highways or regional roads from the City of Sudbury; and
- avoid lands more than 2 km from provincial highways or regional roads.

As these criteria were responsible for quickly narrowing down the large study area to a more reasonable area in which to locate a landfill, there would have been no value in applying the other criteria to lands throughout the Region which would have then been screened by the above criterion. It should be noted that the road accessing the existing City landfill was also included as a regional road.

**TABLE 6.2
SCREENING CRITERIA FOR CANDIDATE AREA IDENTIFICATION**

Discipline/Criteria	Rationale	Data Source
Agriculture		
1. Avoid lands identified as Agricultural Reserve in the Regional Official Plan where Canada Land Inventory Soil Capability Maps (1:50,000 scale) show organic or Class 1 to 3 agricultural soils predominate	Important agricultural resources should be protected according to the Food Land Guidelines.	<ul style="list-style-type: none"> • Sudbury planning Area Official Plan - Agricultural Reserve Map • Canada Land Inventory Soil Capability Maps (1:50,000 scale) • Soil Maps
Cost/Transportation		
1. Avoid lands more than 25 km travel distance along provincial highways or regional roads from the City of Sudbury	As the City of Sudbury is the predominate waste generator in the Region, costs and transportation impacts can be minimized by limiting waste haulage distance to the landfill. In the event that suitable alternative sites cannot be identified within this area, the 25 km travel distance will be increased.	<ul style="list-style-type: none"> • National Topographic Maps (1:50,000 scale) • Regional Municipality of Sudbury - Regional Roads Map (1:125,000 scale)
2. Avoid lands more than 2 km from provincial highways or regional roads	By avoiding lands not accessible by provincial highways or regional roads, road construction and upgrade costs are minimized. Also, as provincial highways and county roads are designed for high traffic volumes, transportation effects are minimized if only these roads are used to access the landfill.	<ul style="list-style-type: none"> • National Topographic Maps (1:50,000 scale) • Regional Municipality of Sudbury - Regional Roads Map (1:125,000 scale)
Land Use and Social Environment		
1. Avoid built-up areas including a 500 m buffer Note: The built-up area is defined as clusters of five dwellings or institutional or commercial businesses or public buildings or facilities and/or any combination of these identifiable on 1:50,000 scale topographic maps within a 500 m radius of each other.	Areas of concentrated human settlement represent significant financial and social investment in the form of building infrastructure and planning. MOEE Guideline D4: "Guidelines for Land Use On or Near Landfills or Dumps" indicates majority of nuisance effects would be felt within 500 m of landfill.	<ul style="list-style-type: none"> • National Topographic Maps (1:50,000 scale)
2. Avoid major institutional uses including schools, churches, hospitals, cemeteries and old age homes including a 500 m buffer	These institutional uses represent significant financial and social investment and area potentially sensitive to landfill operations.	<ul style="list-style-type: none"> • National Topographic Maps (1:50,000 scale)

**TABLE 6.2
SCREENING CRITERIA FOR CANDIDATE AREA IDENTIFICATION
(Continued)**

Discipline/Criteria	Rationale	Data Source
3. Avoid federal, provincial, conservation authority and municipal, regional and local recreation areas and recreation facilities	Parks and lands with a natural capability for outdoor recreation have provincial and regional significance. Local recreational facilities offer recreational opportunities to the community and should be excluded from landfill siting process.	<ul style="list-style-type: none"> • Sudbury Planning Area Official Plan • National Topographic Maps (1:50,000 scale)
4. Avoid existing large industrial complexes	Recognizing the level of investment in these lands and the economic value which they provide, these lands are to be avoided.	<ul style="list-style-type: none"> • National Topographic Maps (1:50,000 scale) • Sudbury planning Area Official Plan • INCO Mine Complex Maps
5. Avoid First Nation Lands	In order to respect traditional land settlement treaties signed with native people, First Nation Lands are screened out.	<ul style="list-style-type: none"> • National Topographic Maps (1:50,000 scale)
6. Avoid lands subject to Airport Zoning Regulations	Transport Canada recommends in their "Land Use in the Vicinity of Airports Guideline" (TP1247) that landfill sites not be located within 8 km of airports to avoid potential interference with airport operations through bird population hazards that may be attracted to a landfill.	<ul style="list-style-type: none"> • Sudbury Planning Area Official Plan • National Topographic Maps (1:50,000 scale) • Canada Flight Supplement • Ontario Airport Facilities Maps
7. Avoid major communication facilities including microwave towers, television stations, and radio towers	Avoids financial costs and environmental impacts associated with relocation.	<ul style="list-style-type: none"> • National Topographic Maps (1:50,000 scale)
Natural Environment		
1. Avoid removal of environmentally significant areas including: <ul style="list-style-type: none"> • Life Science Areas of Natural and Scientific Interest (ANSIs) including a 500 m buffer • Earth Science Areas of Natural and Scientific Interests including a 500 m buffer • Class 1-3 wetlands classified by the Ministry of Natural Resources using a standard wetland classification system including a 500 m buffer 	<p>ANSIs are defined by Ministry of Natural Resources to be of provincial or regional significance and not suitable for landfill site location.</p> <p>A 20 m buffer is included around Earth Science areas to ensure that there is access to these areas.</p> <p>Class 1-3 wetlands contain critical habitats, an essential hydrological role and/or significant social/economic benefit.</p>	<ul style="list-style-type: none"> • Ministry of Natural Resources • Ministry of Natural Resources • Ministry of Natural Resources
2. Avoid major aquatic habitat defined as named lakes or double-lined streams on standard 1:50,000 scale topographic maps with a 200 m buffer.	Harmful disruption of fish habitat is prohibited and related aquatic systems are important as water sources and corridors for adjacent terrestrial habitats.	<ul style="list-style-type: none"> • Topographic mapping (1:50,000 scale) with consultation with Ministry of Natural Resources

TABLE 6.2
SCREENING CRITERIA FOR CANDIDATE AREA IDENTIFICATION
(Continued)

Discipline/Criteria	Rationale	Data Source
3. Avoid important natural habitats and natural environment designations identified by Ministry of Natural Resources and Regional Official Plan, i.e. Environmental Protection Area, Environmentally Sensitive Area, Hazard Land, Wetlands	Such areas are intended for environmental protection.	<ul style="list-style-type: none"> · Ministry of Natural Resources · Official Plan
Hydrogeology/Geology		
1. Avoid municipal wells plus a 1 km buffer.	Municipal water supplies must be avoided and an appropriate buffer put around them to minimize contamination potential.	<ul style="list-style-type: none"> · Regional Municipality of Sudbury - Regional Plants Waterworks and Sewage Plan, 1985, File No. C-3241
Surface Water		
1. Avoid regulated flood plain areas and large surface water bodies (lakes)	The presence of flood plains would be unsuitable for a landfill due to flooding susceptibility. A landfill cannot be located on large bodies of water.	<ul style="list-style-type: none"> · Sudbury Planning Area Official Plan - Flood Plain Map

Note: All buffers are measured from the perimeter of the landfill site boundary.

As a result of applying the initial screening criteria, approximately 50 candidate areas were identified. These candidate areas ranged in size from being too small to site the assumed 66 ha landfill to a size which provided several possible locations.

6.5.2 Application of Second Set of Screening Criteria

Given the large number of candidate areas, it was felt that too many candidate sites would be identified. To further reduce areas in which to locate alternative sites, it was necessary to apply additional screening criteria. These criteria are presented in Table 6.3.

The criterion which had the greatest impact in eliminating lands within the candidate areas was the criterion "screen lands further than 2 km from regional roads and provincial highways". The alternative to using this criterion would have been to reduce the 25 km travel distance from the City of Sudbury. The reduction in travel distance would have eliminated a number of candidate areas and reduced the range of siting locations. Alternatively, the application of the criterion "screen lands further than 2 km from regional roads and provincial highways" primarily reduced the size of candidate areas as opposed to eliminating them entirely. Thus, to ensure that a full range of siting location alternatives was still being considered, the application of the criterion "screen lands further than 2 km from regional roads and provincial highways" was considered to be more appropriate. Only if too many candidate areas still remained after the application of these criteria would consideration be given to reducing travel distance.

In applying the second set of screening criteria, as presented in Table 6.3, although the actual number of individual candidate areas increased, the size of these candidate areas decreased significantly. Many of the remaining areas were no longer large enough to contain a 66 ha site.

**TABLE 6.3
ADDITIONAL SCREENING CRITERIA APPLIED WITHIN CANDIDATE AREAS**

Discipline/Criteria	Rationale	Data Source
Cost/Transportation		
1. Avoid lands more than 1 km from provincial highways or regional roads.	By avoiding lands not accessible by provincial highways or regional roads, road construction and upgrade costs are minimized.	<ul style="list-style-type: none"> · National Topographic Maps (1:50,000 scale) · Regional Municipality of Sudbury - Regional Roads Map (1:125,000 scale)
Natural Environment		
1. Avoid lands within 100 m of streams in forested areas or downstream from forested areas.	These lands provide a buffer to important aquatic systems and are important as water sources and corridors for adjacent terrestrial habitat.	<ul style="list-style-type: none"> · National Topographic Maps (1:50,000 scale)
2. Avoid stocked site class X,1 and 2 or Oak forest.	Remaining representative forest areas with reasonably good growth have relatively low representation in the Sudbury area, are difficult to replace and are important for the remaining woodland plants and animals. Oaks are particularly valuable to a wide variety of species.	<ul style="list-style-type: none"> · Ministry of Natural Resources Forest Resource Inventory Maps
3. Avoid Municipality of Sudbury Natural Assets with a 200 m buffer.	These natural asset areas are of recognized municipal significance and should be protected.	<ul style="list-style-type: none"> · Sudbury Municipality Natural Assets Report
4. Avoid unlicensed sand and gravel resource areas of primary or secondary significance.	These natural resource areas are of recognized value and should be avoided.	<ul style="list-style-type: none"> · Aggregate Resources Inventory (available for western and northern parts of study area only)

Note: All buffers are measured from the perimeter of the landfill site boundary.

6.5.3 Public Input on Candidate Areas

No comments were received from the public with respect to the suitability of these candidate areas. Comments were however, received from the Region of Sudbury Planning Department in regards to the candidate area located along the Highway 17 southeast by-pass. They were concerned with this area as it may be within the Ramsey Lake aquifer. In addition, although these lands were designated rural, they were viewed as one the few remaining areas considered suitable for long-term (20 years plus) expansion of the City. Ultimately, none of the lands within this candidate area were identified to be suitable for landfill development.

6.6 STEP 2 - IDENTIFICATION OF LONG LIST OF POTENTIAL SITES

6.6.1 Introduction

The following describes, by candidate area, the rationale for locating each of the long list of potential sites. The sites were located based on the 1:20,000 scale mapping, the Site Boundary criteria (see Table 6.4) and road-side field visits to obtain more information with respect to their suitability for landfill development. Reference is only made to the candidate areas that were large enough based on the 1:50,000 scale mapping that was presented to the public.

6.6.2 Results of Step 2

Each site was positioned within the candidate area taking into account the boundary criteria (Table 6.4) and the following "location rules":

- maximize distances from residences and other sensitive land use features (i.e. recreation features);
- minimize distance from existing roads;
- maximize the potential for visual screening;
- maximize distance from sensitive environmental features (i.e. water bodies);
and

TABLE 6.4
REGION OF SUDBURY WASTE MANAGEMENT SYSTEMS PLAN
STEP 2: SITE BOUNDARY CRITERIA

Criteria	Rationale	Data Source
1. Provincial highways and planned Provincial highway(s) with Planning and EA approval shall define a site boundary	Financial costs, environmental impacts and social disruption of relocating or closing Provincial highways.	<ul style="list-style-type: none"> • Road Maps • Ministry of Transportation • National Topographic Maps (1:50,000 scale)
2. County roads (existing or planned with EA approval) shall define a site boundary	Financial costs, environmental impacts and social disruption of relocating or closing county roads.	<ul style="list-style-type: none"> • Road Maps • Ministry of Transportation • National Topographic Maps (1:50,000 scale)
3. Active railway line right-of-way shall define a site boundary	Financial costs and environmental impacts associated with closing or relocating active railway line.	<ul style="list-style-type: none"> • Official Plans • CN/CP Maps • National Topographic Maps (1:50,000 scale)
4. Main oil and gas pipeline rights-of-way shall define a site boundary	Underground locations, financial costs and environmental impacts associated with relocation may restrict landfill siting.	<ul style="list-style-type: none"> • Pipeline Owners • Ontario Pipeline Co-ordinating Committee
5. High voltage hydro line right-of-way shall define a site boundary ¹	Financial costs and environmental impacts associated with relocation may restrict landfill siting.	<ul style="list-style-type: none"> • Ontario Hydro • National Topographic Maps (1:50,000 scale)
6. Obvious property boundaries	Site acquisition will likely exert less hardship on owners if property boundaries are followed.	<ul style="list-style-type: none"> • MNR Maps • Municipal Maps

¹ The type of support structure and voltage levels will determine whether the hydro line can be moved. Consult with appropriate authorities.

- consider topography to minimize construction/operation difficulties and costs. A landfill site selection process is a complex undertaking. In order to ensure that the development and analysis of alternative sites is reasonable and appropriate, it is necessary to identify the scope of analysis to be used during each step of this site search. The scope of analysis refers to study areas and time frames as described below.

A total of eight potential sites were identified. It should be noted that it was assumed that the position of the sites may be modified as the process continued and more detailed information became available (i.e. as a result of on-site field visits).

The potential sites that were identified are outlined below. The potential sites were identified based on their location in proximity to the City of Sudbury (e.g. north (N), west (W) and east (E)).

Candidate Area 1

This candidate area was located west of the City and extends along Highway 17 from approximately Highway 144 to two kilometres east of the Vermilion River. Much of this area was constrained by the presence of streams within forested areas. Two potential sites were identified. The first potential site - W1, was located north of Highway 17 at the far west end of the study area. The site was located in Graham Township, Concession 3, Lots 8-10 and Concession 4, Lots 9-10.

The second potential site - W2, was located further east on the north side of Highway 17 and was located between two constrained streams. A small portion of the site at the north extended onto lands located beyond 1 km of an all-weather road (approximately 100 m). As there were no other constraints on these lands, and that without this extension, the site would not have been large enough, this extension beyond the siting area was considered to be reasonable by the study team. The site was located in Graham Township, Concession 3, Lots 5-6 and Concession 4, Lots 6-7.

A large area of unconstrained lands was identified south of potential Site W1. The topography was considered to be too hilly for landfill development and as a result, a potential site was not identified in this area.

Candidate Area 2

Candidate Area 2 was located along the northwest by-pass, north and west of Creighton. Four potential sites were identified within this candidate area. For the most part, the unconstrained land parcels were just large enough for a site offering little choice in site positioning. Three of these sites were constrained by the presence of extensive bedrock at surface. Only Site W6 was carried forward for further consideration.

Site W6 was located west of the northwest by-pass within Creighton Township, Concession 1, Lots 3-4, and was bounded to the south by an east-west secondary road.

An existing open pit mine was located on the site. This site was carried forward subject to confirming its capacity/suitability for waste disposal.

Candidate Area 3

This candidate area was located north of the Clarabelle Mine and bounded by Highway 144 to the north. Most of the candidate area was constrained by topography or existing corridors (rail line, roads, hydro lines). At the time, there appeared to be enough area at the south base of the hill to contain a site (N1), although potentially constrained by hydro lines. The site was primarily located within the City of Sudbury (McKim Township) Concession 4, Lots 11 and 12 and Concession 3, Lot 12. A small portion of the site was also within Snider Township to the west.

Candidate Area 4

This candidate area was located east of the Clarabelle mine, extending south from Highway 144. The topography of this site was considered to be too steep for landfill development. No sites were identified within its boundaries.

Candidate Area 5

This candidate area was located southwest of the community of Boninville. One site (N2) was originally identified within the candidate area and was positioned in the north end to avoid the steep slopes at the south end of the site. The site was bounded by a hydro line to the south and a small stream passed through the site which would

need to be diverted. The site was located in Rayside Township, Concession 4, Lots 1-2. In presenting this site to the Steering Committee at their May 28, 1996, meeting, the Steering Committee became concerned with this site as it was within the Region's Agricultural Reserve as defined in the Official Plan. As this site was on Class 4 agricultural land and only Class 1-3 lands were originally constrained, lands were identified to be available. Due to the scarcity of agricultural land within the Region, the Steering Committee passed a resolution to include Class 4 agricultural lands within the Agricultural Reserve as part of the constraint area. As a result, a potential site was not identified in this candidate area.

Candidate Area 6

Candidate Area 6 was located between the Vermilion River and the community of Val Therese along Regional Road 96. Two potential sites were originally identified: N3 and N4. Site N3 was positioned adjacent to Regional Road 96 to minimize distance from an existing road and maximize distance from a constrained stream to the west. The site was located in Hanmer Township, Concession 4, Lot 7. Site N4 was on the east side of the road and located west of the constrained aggregate area. It was within Hanmer Township, Concession 4, Lot 6. As Site N4 was located on Class 4 agricultural land within the Region's Agricultural Reserve, it was eliminated for reasons as outlined above. Site N3 was carried forward for further consideration.

Candidate Area 7

This candidate area was located southeast of Garson Mine and east of Regional Road 90. Much of the south half of the area was constrained by steep slopes. The only possible area for a site would be in the middle of the area on top of a tributary of Coniston Creek. Given the size of this watercourse, it was recognized that the site may prove not to be practical and would need to be confirmed. The site also extended onto lands beyond 1 km from the regional road and was bounded by a 500 m buffer around residences located to the east. The site was mostly within Garson Township, Concession 1, Lots 1-3 with a small portion in Neelon Township. This potential site was identified as E1.

Candidate Area 8

This candidate area was positioned north of Highway 17, east of Coniston. The west and east end of the candidate area were constrained by steep slopes. The only

suitable lands were within the middle of the candidate area west of the CPR tracks. The site area contained the Region's water treatment plant which would have to be located within the buffer area of this site. The site was within Dryden Township (Town of Nickel Centre), Concession 3 and Concession 4, Lot 12 and Neelon Township, Concession 3 and Concession 4, Lot 1. This site was identified as E2.

Candidate Area 9

Candidate Area 9 contained the existing Sudbury landfill. Given the steep topography in much of this candidate area, the site would have to involve an expansion of the existing site. This site was identified as E3.

Candidate Area 10

This candidate area was located east of Ramsey Lake along the Highway 17 southeast by-pass. The presence of water bodies, rock out croppings and steep slopes resulted in no suitable lands being identified within this candidate area for a landfill. No sites were identified.

Candidate Area 11

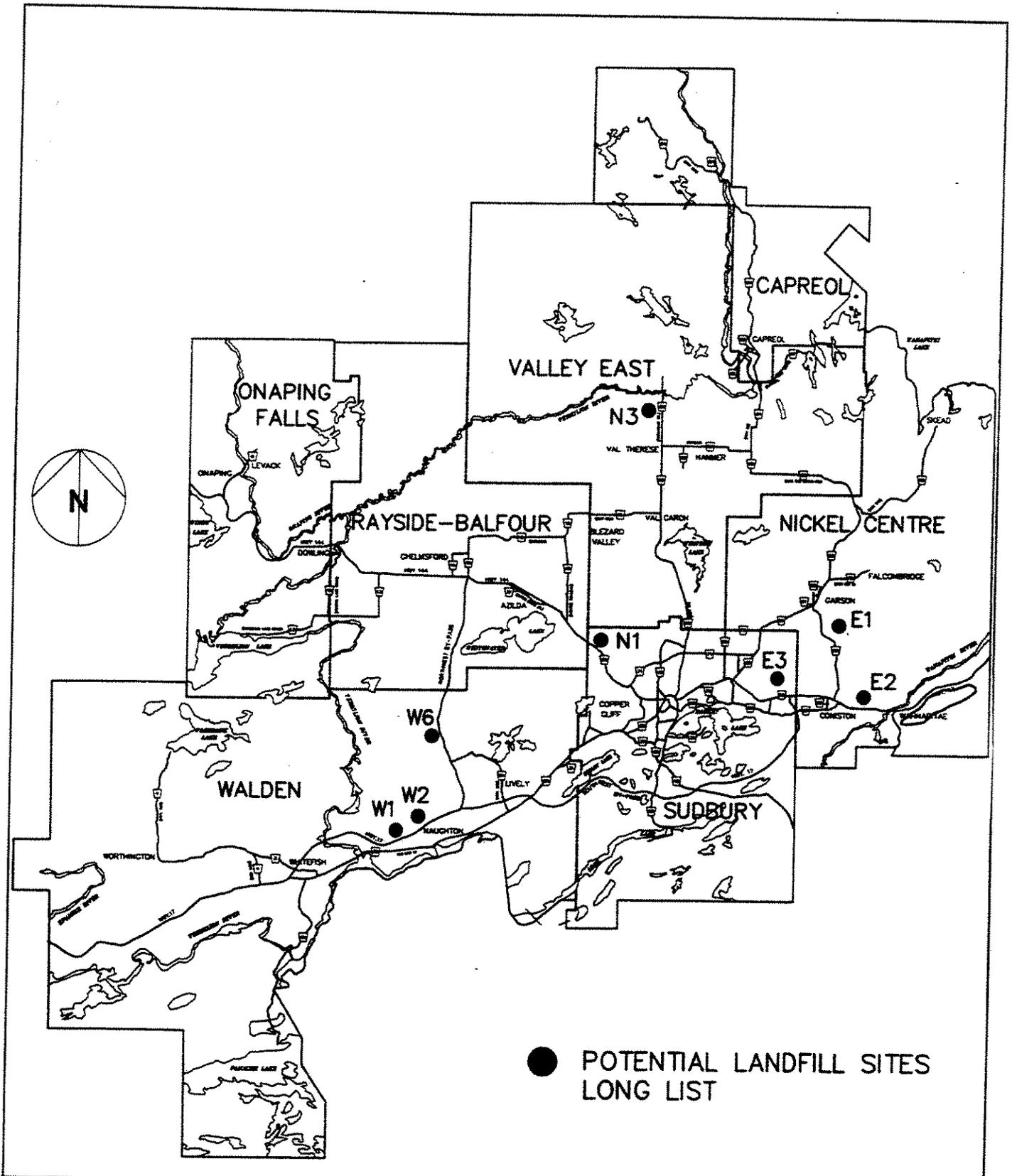
Candidate Area 11 was located east of Wahnapiatae and south of Highway 17 West. The only area potentially suitable for a landfill was at the far east end of the candidate area. The remainder of the candidate area was identified to be too narrow. As a result of field visits, it was identified that the site would be situated on bedrock. Due to anticipated difficulties in controlling leachate and other site operations, this site was not considered to be suitable for landfill development. No site was identified within this candidate area.

6.6.3 Long List of Potential Sites

In summary, the following long list of potential sites were identified:

Sites: W1, W2, W6, N1, N3, E1, E2, E3

The location of the long list of sites is presented in Figure 6.1.



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Long List of Potential Sites

FIGURE 6.1



6.6.4 Public Input on Long List of Potential Sites

A number of comments and questions were received regarding the application of the constraint criteria through letters and the June 17-19, 1996 public workshops. Despite these, no comments were received that resulted in the alteration to any of the long list of sites.

6.7 STEP 3 - IDENTIFICATION OF SHORT LIST OF POTENTIAL SITES

6.7.1 Introduction

In Step 3, the Long List of Potential Sites were analyzed and compared to identify a Short List of Potential Sites. The assessment used "comparative evaluation criteria and indicators" to identify differences and make trade-offs among the potential sites. Draft criteria were initially presented in the Candidate Areas and Long List of Potential Sites working papers. This was done to allow public review and comment on the evaluation criteria prior to their application. Table 6.4 lists the comparative evaluation criteria and indicators that were applied in Step 3. Text in italics indicates revisions that were made to the criteria as originally presented in the Long List of Potential Sites Identification Working Paper. These revisions were primarily made by the disciplines in light of the long list of sites and available data. The criteria were grouped under nine discipline headings: Agriculture, Biology, Design and Operations, Economics, Geology/Hydrogeology, Planned Land Use, Social, Surface Water and Transportation.

The Step 3 assessment of the Long List of Potential Sites involved six specific activities leading to the identification of the Short List of Potential Sites. These activities were:

- Activity 1:** Review of Candidate Site Boundaries;
- Activity 2:** Data Collection by Disciplines;
- Activity 3:** Assessment of the Long List of Potential Sites by Discipline;
- Activity 4:** Development of Discipline Weights;
- Activity 5:** Overall (Multi-Discipline) Comparative Evaluation of the Long List of Potential Sites; and
- Activity 6:** Identification of the Short List of Potential Sites.

The following is a description of each of these six activities.

6.7.2 Activity 1: Review of Potential Site Boundaries

While carrying out the Step 3 analysis, the results of Steps 1 and 2 and the public comments received were reviewed. The Long List of Potential Sites, now mapped at a scale of 1:20,000 (as opposed to 1:50,000 for the Candidate Areas), were reviewed against the Steps 1 and 2 criteria. The purpose of this comparison was to identify if there were any necessary boundary revisions that could be identified with sites mapped at a larger scale. As a result of this review, there were modifications to two of the long list potential sites:

Site N3

The east and north boundaries of Site N3 were modified. These modifications were the result of the inclusion of Class 4 agricultural soils, within the Region's designated Agricultural Reserve, as part of the screening criterion and the identification of a cluster of at least five residences.¹

Site N1

Site N1 was identified to contain several hydro lines crossing the site at a number of locations. The occurrence of bedrock at surface was also identified to be extensive across the site. The site could not be reconfigured to avoid these features while still maintaining a site size of 66 ha. As a result of these limitations to site design and development, Site N1 was dropped from further consideration.

6.7.3 Activity 2: Data Collection by Disciplines

Data were collected for each of the Step 3 indicators. Results of data collection activities are presented in Table 6.5 for each criteria.

The Step 3 data sources involved a greater level of detail than the data sources used in Steps 1 and 2. This was due to the site search principle that the level of detail should increase as the area of lands being studied decreases. In Step 1, when the entire Region of Sudbury was being considered, the data sources were regional in scale (i.e. 1:50,000 scale mapping). In Step 3, government agencies were contacted

¹ Class 4 agricultural land was included as part of the original Step 1 agricultural screening criteria at the request of the Steering Committee in May 1996 recognizing the limited amount of agricultural land within the Region.

for location-specific information, 1991 aerial photography was reviewed, published and unpublished Ministry of Environment and Energy well log records were examined and road side visits of the lands surrounding the sites were undertaken.

Data collection was primarily focussed within the following study areas:

- 1) On-Site - consisted of lands within the proposed landfill site boundaries.
- 2) Off-Site (0-500 metres) - consisted of lands within 500 metres of the site boundaries. This 500 metre distance was based on MOEE Guideline D-4 "Land Use on or Near Landfills and Dumps" which states that "the most significant adverse environmental effects are normally within 500 metres of the perimeter of a fill area".
- 3) Off-Site (501-1,000 metres) - consisted of lands which were 501-1,000 metres from the site boundary. Recognizing that the MOEE's 500 metre guideline (noted above) is based on an average distance over which landfill effects are anticipated, this additional 500 metres was added in order that potential impacts extending beyond 500 metres could be assessed and compared.

6.7.4 Activity 3: Assessment of the Long List of Potential Sites by Discipline

The methodologies used to assess potential environmental effects were specific to each discipline. Conclusions were drawn about the potential for environmental effects of each site, based on the discipline's Step 3 indicators and criteria and the data that was collected. Indicator and criteria specific information were then combined to allow a discipline specific ranking of the Long List of Potential Sites.

**TABLE 6.5
LONG LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA**

Discipline/Criteria	Indicators	Site E1	Site E2	Site E3	Site N3	Site W1	Site W2	Site W6
AGRICULTURE								
1. Compare potential for loss or displacement of agriculture on-site. ¹	Area and soil capability on-site outside of lands designated for non-agricultural uses	76.0 ha Class 7	73.2 ha Class 7	16.8 ha (rural) Class 7	Class 5=62.6 ha Class 6= 3.3 ha	63.0 ha Class 7	68.0 ha Class 7	72.0 ha Class 7
	Area on-site in agricultural production which is outside of lands designated for non-agricultural uses	0 ha	0 ha	0 ha	0 ha	0 ha	0 ha	0 ha
2. Compare potential for disruption of agriculture off-site ¹	Area within 0-1000 m which is in agricultural production outside of lands designated for non-agricultural uses. ³	0 ha	0 ha	0 ha	12.5 ha	0 ha	0 ha	0 ha
	Area and soil capability within 0-1000 m outside of lands designated for non-agricultural uses.	Class 7=621.0 ha (rural and extractive)	Class 7=652.0 ha (rural and general industrial)	Class 7=196.8 ha (rural)	Class 4=16.0 ha Class 5=233.0 ha Class 6=205.0 ha (no policy)	Class 2=39.0 ha Class 5=9.0 ha Class 7=500.0 ha (no policy)	Class 2=49.6 ha Class 5= 2.0 ha Class 7=489.0 ha (no policy)	Class 4=16.0 ha Class 7=520.0 ha (no policy)
BIOLOGY								
1. Compare potential for loss or disruption of terrestrial systems on-site.	Area and type of noteworthy terrestrial systems on site, i.e.:							
	a) area of well-stocked woodlands (ha);	0 ha	4 ha	0 ha	42 ha	0 ha	0 ha	0 ha
	b) area of partially-stocked woodlands (ha);	34 ha	4 ha	8 ha	6 ha	42 ha	46 ha	54 ha
c) area of open wetlands (ha)	16 ha	18 ha	16 ha	12 ha	16 ha	16 ha	12 ha	
2. Compare potential for loss or disruption of aquatic systems on-site.	Amount and type of aquatic systems on-site, i.e.:							
	a) area of ponds (ha) b) length of streams (m)	1 ha 900	0 1,600	1 600	2 200	2 200	6 0	0 200
3. Compare potential for loss or disruption of terrestrial systems within 0-500 m off-site.	Area and type of terrestrial systems within vicinity of landfill, i.e.:							
	a) area of well-stocked woodlands (ha) b) area of open wetlands (ha)	0 72	0 28	0 34	132 28	0 36	32 40	0 40

**TABLE 6.5
LONG LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)**

Discipline/Criteria	Indicators	Site E1	Site E2	Site E3	Site N3	Site W1	Site W2	Site W6
4. Compare potential for loss or disruption of terrestrial systems within 501-1,000 m off-site. ²	• Area and type of terrestrial systems within vicinity of landfill, i.e.:							
	a) area of well-stocked woodlands (ha)	8	0	0	132	0	70	0
	b) area of open wetlands (ha)	36	16	48	26	24	24	60
5. Compare potential for loss or disruption of aquatic systems within 0-500 m off-site. ²	• Amount and type of aquatic systems within vicinity of landfill, i.e.:							
	a) area of ponds or lakes (ha)	2	0	8	5	10	20	32
	b) length of streams (m)	3,300	3,000	1,400	2,800	2,400	3,800	2,400
6. Compare potential for loss or disruption of aquatic systems within 501-1,000 m off-site. ²	• Amount and type of aquatic systems within vicinity of landfill, i.e.:							
	a) area of ponds or lakes (ha)	3	0	4	14	12	4	6
	b) length of streams (m)	6,200	1,800	1,200	4,200	2,100	2,800	5,000
DESIGN AND OPERATION								
1. Compare potential for obtaining cover material	• The presence on site of suitable materials for use as cover material	Sand and silt glaciolacustrine and peat organic materials on-site, suitable for cover material	Sand and silt glaciolacustrine and peat organic materials on-site, suitable for cover material	Sand and silt glaciolacustrine and peat organic materials on-site, suitable for cover material	Small portion of site underlain by glaciolacustrine materials. Remainder of site underlain by deltaic deposits, not suitable for cover material	Till ground moraine or peat organic terrain over bedrock. Suitable cover material not likely on-site	Till ground moraine or peat organic terrain over bedrock. Suitable cover material not likely on-site	Till ground moraine or peat organic terrain over bedrock. Suitable cover material not likely on-site

**TABLE 6.5
LONG LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)**

Discipline/Criteria	Indicators	Site E1	Site E2	Site E3	Site N3	Site W1	Site W2	Site W6
2. Compare potential for disruption of planned land uses off-site. ²	Number of units/area (hectares) of designated/planned residential community/recreational facilities, commercial and institutional uses	241 ha	0	244 ha	0	0	0	0
SOCIAL								
Evaluation Criteria	Indicators							
1. Compare potential for displacement of residents living on-site.	Number of residents on-site.	0	0	0	0	0	0	0
2. Compare potential for disruption to residents within 0-500 m off-site ²	Number of residents off-site within the 0-500 m study area.	15	0	0	7	0	0	0
3. Compare potential for disruption to residents within 501-1,000 m off-site. ²	Number of residents off-site within the 501-1000 m study area.	315	0	358	109	0	0	0
4. Compare potential for displacement of institutional, community and recreation features located on-site.	Number and type of institutional, community and recreational features on-site.	0	0	0	0	0	0	0
5. Compare potential for disruption of institutional, community and recreation features within 0-500 m off-site. ²	Number and type of institutional, community and recreational features off-site within the 0-500 m study area.	0	0	0	0	0	0	0
6. Compare potential for disruption of institutional, community and recreation features 501-1,000 m off-site. ²	Number and type of institutional, community and recreational features off-site within the 501-1000 m study area	2, playground gun club	0	3, baseball field church snowmobile trail	0	1, snowmobile trail	1, snowmobile trail	0

**TABLE 6.5
LONG LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)**

Discipline/Criteria	Indicators	Site E1	Site E2	Site E3	Site N3	Site W1	Site W2	Site W6
SURFACE WATER								
1. Potential for impairment of surface water quality.	Number of watersheds and subwatersheds receiving surface water from site	1 Coniston Creek	1 Wanapitei River	1 Romford Creek	1 Vermillion River	1 Vermillion River	1 Vermillion River	1 Vermillion River
2. Compare potential flood hazard.	Upstream drainage area of watercourses at site outlet (ha) and length (m) of larger watercourses	286 ha/3,500 m	454 ha/5,050 m	236 ha/1,100 m	74 ha/0 m	93 ha/0 m	198 ha/0 m	232 ha/0 m
	Number of watercourses entering the site and receiving surface runoff from site	1	1	1	0	0	0	0
	Total length of streams (m) crossing the site and area of flood storage (ha) ¹	2,700 m/11.2 ha	6,800 m/26 ha	700 m/14 ha	2,700 m/11 ha	1,700 m/14.4 ha	300 m/4.2 ha	1,700 m/10 ha
TRANSPORTATION								
1. Compare potential for impacts of hauling waste to potential sites.	Annual tonne-kms travelled on public roads from waste centroids, to each landfill site	2,217,751	2,028,077	1,479,455	2,306,693	2,976,944	2,689,222	2,434,078

1. Criterion applies only to lands not designated in municipal official plans for urban uses.
2. The Ministry of the Environment and Energy's Policy Guideline D-4, *Guidelines for Land Use on or Near Landfills and Dumps*, states "the most significant adverse environmental effects are normally within 500 m of the perimeter of a fill area". Taking into account that this is based on average distances over which landfill related nuisances tend to disperse, an additional 500 m has been added to provide a broader consideration of off-site effects.
3. Text in italics outlines changes that were made to the indicators original presented to the public for comment.

Both qualitative and quantitative evaluation methods were used by the disciplines in comparing sites. In situations where there were obvious and clear differences among the potential sites or where nominal data were being considered, a qualitative or "common sense" evaluation method was employed. This typically involved making trade-offs among the alternatives in terms of their advantages and disadvantages in a descriptive manner. The Agriculture, Geology/Hydrogeology and Planned Land Use disciplines used a qualitative analysis to compare each of the sites.

For disciplines that used a quantitative evaluation method to rank the long list of potential sites, one of two methods were used: 1) the Concordance Method; or, 2) the Simple Additive Weighting Method. The choice of method was based on the type of data that each of the disciplines collected. Appendix C contains a brief description of the Concordance Method and the Simple Additive Weighting Method.

The Concordance Method was used by the Surface Water discipline. The Biology, Economics, and Social disciplines used the Simple Additive Weighting Method.

Two disciplines, Design & Operations and Transportation, had only one criterion for this step, thus a formal evaluation method was not needed to make tradeoffs among the sites. These disciplines were able to compare the sites based on the specific data collected for the one criterion.

Table 6.6 presents the rank ordering of the long list of potential sites by discipline.

6.7.5 Activity 4: Development of Discipline Weights

An important part of the comparative evaluation of the Long List of Potential Sites was deciding if all disciplines were of equal importance or if some were more important than others and by how much. Weighting was used to establish the relative importance of disciplines.

Weights can be based on a number of considerations including:

- i) Public Input - How does the public value the features which may be affected?

**TABLE 6.6
LONG LIST OF POTENTIAL SITES
RANKINGS BY DISCIPLINE**

Site	Agriculture	Biology	Design and Operations	Economics	Geology/ Hydrogeology	Planned Land Use	Social	Surface Water	Transportation
E1	1	5	1	3	4	6	7	5	3
E2	1	4	1	4	1	1	1	5	2
E3	1	1	1	7	3	6	6	5	1
N3	7	7	4	4	7	1	5	1	4
W1	5	2	5	1	5	1	3	1	7
W2	5	5	5	1	5	1	4	1	6
W6	1	3	5	6	1	1	1	1	5

The above table lists the ranks given to each site by each discipline. In some instances, more than one site was given the same rank by a discipline. For example, Social ranked E2 and W6 as "1". Since two ranks of "1" have been given, the next rank was a "3".

- ii) Mitigation Potential - Can the impacts associated with the discipline be easily addressed through mitigation?
- iii) Public Health and Safety - Does the discipline relate to the protection of public health and safety?
- iv) Degree of Impact - Are there highly significant impacts associated with a specific discipline?

In order to help develop the discipline weights, input was sought from the public. Following the identification of the Candidate Areas, a discipline ranking and weighting information package was mailed to over 900 members of the WMSP Mailing List and the Public Liaison Committee.

Fifty-four criteria ranking/weighting tables were returned. As some of these tables were not completely filled in, 49 tables were used to help establish the discipline weights.

Both the average and median (the point at which half of the responses identified a higher rank and half identified a lower rank) weight of each discipline was identified from the 49 completed tables. It should be noted that the total of the median weights for each discipline did not add to 100 points (which was the total amount of "points" available from which to select the discipline weights). To keep the total "median weight" consistent with the total "average weight", the extra points needed to arrive at 100 points were redistributed proportionally among the disciplines. Table 6.7 presents the median and average weight for each discipline and some of the key comments received from the public.

6.7.6 Activity 5: Overall (Multi-Discipline) Comparative Evaluation of the Long List of Potential Sites

The overall comparative evaluation involved making trade-offs between sites since some sites were preferred by some disciplines and others were preferred by other disciplines. The site rankings by discipline are presented in Table 6.6.

TABLE 6.7
LONG LIST OF SITES EVALUATION WEIGHTING SCENARIOS

Discipline	Median/Average of Weights Received From Public	Key Public Comments from Returned Forms
Agriculture	10.5/10	<ul style="list-style-type: none"> • low impact to prime agricultural areas • criteria group not given top priority due to Sudbury's soil type and climate • importance was placed on the preservation and protection of the small amount of agricultural land that does exist • viewed as an important resource that would be permanently lost due to landfilling activities • viewed as an important part of the local economy
Biology	12.5/13	<ul style="list-style-type: none"> • important criteria that effects all other criteria • the natural environment is an important resource that should be protected • impacts to aquatic systems, wildlife habitat and plant life should be minimized
Design and Operations	10.5/10	<ul style="list-style-type: none"> • an efficient operation will save money and reduce impacts on the environment • current landfill design standards should be followed • protection of ground water is important • the other criteria groups depend on proper design and operations • this criteria influences capital and operating costs, noise, air quality, and safety
Economics	10.5/9	<ul style="list-style-type: none"> • cost should be reduced at every opportunity, however, safety and the environment must also be considered • the site location must be economically viable • concerned about tax increases and property values • businesses have less of an emotional attachment to an area compared to residents, businesses can be relocated
Geology/ Hydrogeology	16/15	<ul style="list-style-type: none"> • contamination of water quality should be avoided at all costs • geology could be a concern, further investigations should be conducted • the location of the site should minimize the pollution of the environment • monitoring and contingency plans required
Planned Land Use	7.5/8	<ul style="list-style-type: none"> • future development can be relocated • consider the after use of the landfill site in relation to future development • sensitive land uses such as residential and agricultural should be avoided • consider the current surrounding land uses
Social	8.5/9	<ul style="list-style-type: none"> • displacement and disruption to residents should be minimized • should be located away from a built-up area • consider visual and air quality impacts • consider perceived social impact living near a landfill • increase 3Rs awareness • public consultation is important
Surface Water	15.5/18	<ul style="list-style-type: none"> • important health and safety issues for people and animals • surface water has impacts to other areas downstream • water is an important resource, contamination should be avoided at all costs • the quality and quantity of run-off/surface water should be monitored
Transportation	8.5/8	<ul style="list-style-type: none"> • site chosen should be efficient providing the minimum travel distance and adequate roads • this criteria group is easily mitigated • safety is an issue • haul routes should avoid residential areas, schools and parks • sites seem to be within desirable distances • this criteria group is linked to the economics criteria group
Total	100	

The trade-offs were made giving consideration to the discipline weights (see Table 6.7) developed from the public input. For example, Geology/Hydrogeology considerations were given much more importance than Planned Land Use considerations. In order to assist with the Step 3 multi-discipline comparative evaluation of the Long List of Potential Sites, the Concordance Method was used.

The results of the Concordance Method using both the average and median weights are presented in Table 6.8. It should be noted that the same four sites (E2, W6, E3 and W1) ranked highest on the basis of both the median and average discipline weights. In addition to the Concordance Method, a descriptive, qualitative review, of the environmental effects of the sites was undertaken to ensure the results were reasonable.

6.7.7 Activity 6: Identification of the Short List of Sites

An analysis of the site ranks, presented in Table 6.7, was conducted to identify the short list of four sites. The objective of the Step 3 evaluation was to identify the most suitable short list of sites to be studied in more detail in Step 4. The following provides the rationale for the selection of the short list of sites considering both the median and average discipline weights and the results of the Concordance Analysis.

Site E2 was ranked first (i.e. preferred) based on the Concordance Method. It was clearly the preferred site based on the data collected. Five of the nine disciplines, with a combined weight of 53/52% (median/average weight) ranked this site as first. It was ranked second for 2 disciplines with a combined weight of 24/26%. No discipline ranked E2 as the worst site. **This site was placed on the short list.**

Site W6 was ranked second based on the Concordance Method. It was ranked first by 5 of the 9 disciplines with a combined weight of 58/60%. No discipline ranked this site as second. It was considered least preferred by one discipline with a weight of 10.5/10%. **This site was placed on the short list.**

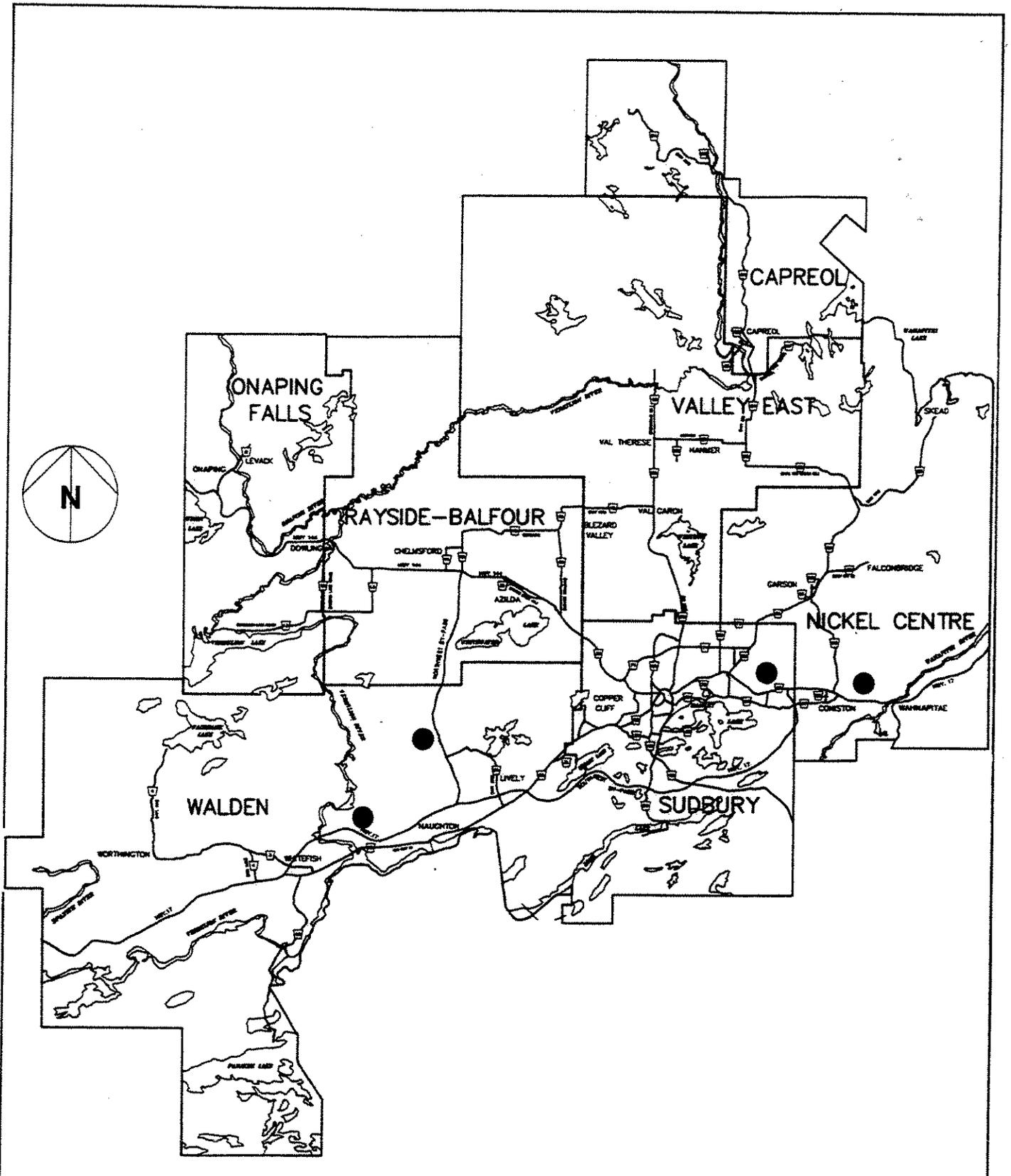
Site E3 was ranked third based on the Concordance Method. It was ranked as preferred by 4 disciplines with a combined weight of 42/41%. It was considered second by two disciplines with a combined weight of 31.5/33%. Two disciplines with a combined weight of 18/17% ranked this site as least preferred. **This site was placed on the short list.**

TABLE 6.8
RANK OF LONG LIST OF SITES BASED ON
MULTI-DISCIPLINE CONCORDANCE METHOD

Rank	Site	Concordance Score* (Median Weight/ Average Weight)
1	E2	3.86/3.78
2	W6	3.70/3.77
3	E3	3.17/3.12
4	W1	3.04/3.11
5 (6)	E1	2.62/2.49
6 (5)	W2	2.61/2.64
7	N3	2.00/2.07

* These values were derived using the Concordance Method. The Concordance Method is a mathematical evaluation that compares sites on a pair-wise basis for each discipline. Whichever site of the pair wins gets the "points" equal to the weight of the discipline. This is repeated for all pairs of sites and all disciplines.

The higher the Concordance score, the better the site. However, if one site has a concordance score of 10 and another site has a score of 5, it does not mean the site with the score of 10 is twice as good as the site with the score of 5.



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Short List of Potential Sites

FIGURE 6.2



Site W1 was ranked fourth based on the Concordance Method. It was ranked first by 3 disciplines with a combined weight of 33.5/35% and second by 3 disciplines with a combined weight of 31.5/32%. It was ranked least preferred by two disciplines with a weight of 19/18%. **This site was included on the short list of potential sites.**

The next preferred site, **Site E1**, was preferred by only 2 disciplines with a combined weight of 21/20% and second by 2 disciplines with a combined weight of 26/27%. This site was considered least preferred by 2 disciplines with a combined weight of 16/17%. Recognizing that this site had fewer advantages than the other four sites and a clearly lower concordance score than the four previously mentioned sites (see Table 6.7), it was not included on the short list of potential sites.

The other two remaining sites, **W2** and **N3** were also identified to be less preferred and not included on the short list.

Based on the results of the Step 3 comparative evaluation, **Sites E2, W6, E3 and W1** were included on the Short List of Potential Sites. These sites were to be studied in more detail in Step 4, the identification of a Preferred Site.

The location of the Short List of Potential Sites is presented in Figure 6.2.

6.7.8 Sensitivity Tests

To test the concordance scores and rankings of the sites, three sensitivity tests were carried out as follows:

- The median weights (prior to proportionately increasing all discipline weights so as to add to 100) with the allocation of the five remaining points to only Social (3) and Transportation (2). This allocation was based on public comments received during the June 17-19, 1996 public workshops, indicating a greater level of concern for these two disciplines. This resulted in the same four sites (E2, W6, E3 and W1) being preferred.
- The median weights (adjusted to add to 100) with a reduction in the Surface Water discipline weight from 15.5 to the average weight of 11. The remaining points were proportionately divided between the other disciplines. The rationale for reducing the weight of Surface Water was due to the fact that for the most

important Surface Water criterion (potential for impairment of surface water quality), all the sites were considered equal. This resulted in the same four sites (E2, W6, E3 and W1) being preferred.

- Decreasing the weight of the Design and Operations and Economics disciplines to 8.5 and 9 points, respectively, and increasing the Social discipline weight to 12.5. Again, this was done to reflect public concern with respect to the potential for Social impacts. This resulted in the same four sites (E2, W6, E3 and W1) being preferred.

Based on the results of the sensitivity tests, the Short List of Potential Sites was confirmed as **Sites E2, W6, E3 and W1**.

6.7.9 Public Input on the Long List Evaluation

At the June 17-19, 1996 public workshops, information was obtained regarding the characteristics of the long list of sites. Relevant information was passed on to the disciplines for consideration in the comparative evaluation.

6.8 STEP 4 - IDENTIFICATION OF A PREFERRED SITE

6.8.1 Introduction

In Step 4, the Short List of Potential Sites were analyzed and compared to identify a preferred site. The assessment used "comparative evaluation criteria and indicators" to identify differences and make trade-offs between the potential sites. Draft criteria were initially presented in the *Task 5 - Draft Long List of Potential Sites Identification Working Paper* (June 1996). This was done to allow public review and comment on the evaluation criteria prior to their application. Table 6.8 lists the comparative evaluation criteria that were applied in Step 4. Text in italics indicates revisions that were made to the criteria tables as originally presented in the June 1996 Working Paper. These revisions were primarily made by the disciplines in light of the short list of sites and available data. The criteria were grouped under eleven discipline headings: Agriculture, Archaeology, Biology, Cost, Design and Operations, Economics, Geology/Hydrogeology, Planned Land Use, Social, Surface Water and

Transportation. It should be noted that a Visual assessment was also undertaken and the results were incorporated into the Social analysis.

The Step 4 evaluation of the Short List of Potential Sites involved five specific activities leading to the identification of a preferred site. These activities were:

- Activity 1:** Data Collection by Disciplines;
- Activity 2:** Assessment of the Short List of Potential Sites by Discipline;
- Activity 3:** Development of Discipline Weights;
- Activity 4:** Overall (Multi-Discipline) Comparative Evaluation of the Short List of Potential Sites; and
- Activity 5:** Identification of the Preferred Site.

The following is a description of each of these five activities.

6.8.2 Activity 1: Data Collection by Disciplines

When the long list of sites was first identified, it was recognized that Site W6 was located within an open pit mine. Initial contact with INCO, the owner of the site, identified that the mine may cease operation within the next 3 to 5 years. When the short list of sites were identified, INCO then provided more detailed and specific information regarding their plans for the site. Following the completion of the open pit mining phase, the life of the mine could be extended by sinking a mine shaft, at the bottom of the pit, to mine ore at greater depths. As part of the closure plan for the mine, it was also identified that the pit would be filled with the waste rock. These plans left little opportunity to develop a landfill site. On-site meetings with INCO staff confirmed these plans and Site W6 was taken off the short list. This left a short list of three sites - W1, E2 and E3.

Data were collected for each of the Step 4 criteria and indicators as presented in Table 6.9.

**TABLE 6.9
SHORT LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA**

Discipline/Criteria	Indicators	Site E2	Site E3	Site W1
AGRICULTURE				
1. Compare potential for loss or removal of agriculture "on-site".	<ul style="list-style-type: none"> • Approximate area and soil capability class in active agricultural production. • Approximate area on-site with soil capability Class 1 to 3, but not in agricultural production. • Approximate area on-site with soil capability Class 4 to 6, but not in agricultural production. • Number and type of farm infrastructure removed. 	0	0	0
		0	0	0
		0	0	0
		0	0	0
2. Compare potential for disruption of agriculture "off-site".	<ul style="list-style-type: none"> • Area currently in active agricultural use within 500 m of site boundary. This includes specialty crops, field crops, improved pasture. • Area currently in active agricultural use within 500 m to 1,000 m of site boundary. • Impact on farm operations based off-site which lose on-site lands. 	0	0	0
		0	0	0
		0	0	0
ARCHAEOLOGY				
1. Compare potential for impact to known archaeological resources "on-site".	<ul style="list-style-type: none"> • Presence of known archaeological resources "on-site". 	<ul style="list-style-type: none"> • 9 registered sites within 5 km radius of site 	<ul style="list-style-type: none"> • 8 registered sites within 5 km radius of site 	<ul style="list-style-type: none"> • 1 registered site within 10 km radius of site
2. Compare potential for impact to areas of moderate to high archaeological potential "on-site".	<ul style="list-style-type: none"> • Proximity to water. • Soil type. • Topographical features. • Historical settlement and land uses. 	<ul style="list-style-type: none"> • Flat and wet area (due to low permeability soils) surrounded by high rock outcrops to the south and west, unsuitable for settlement; intermediate ground could support settlement 	<ul style="list-style-type: none"> • No potable or navigable waters; highly disturbed area due to existing landfill; rock outcrops unsuitable for settlement. 	<ul style="list-style-type: none"> • Site consists of wetland and water, bordered to west and east by high ground which has soil overburden for settlement; central to Vermillion River and McCharles Lake; possible existence of portage route/trail over site ridge.

**TABLE 6.9
SHORT LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)**

Discipline/Criteria	Indicators	Site E2	Site E3	Site W1
BIOLOGY				
1. Compare potential for loss or disruption of terrestrial systems "on-site".	<ul style="list-style-type: none"> • Area (ha) of terrestrial systems "on-site". <li style="padding-left: 20px;">wetlands <li style="padding-left: 20px;">woodlands 	26.3 4.6	20.0 13.0	20.6 47.4
2. Compare potential for loss or disruption of aquatic systems "on-site".	<ul style="list-style-type: none"> • Amount (ha) and priorities of aquatic systems "on-site". <li style="padding-left: 20px;">1st order streams <li style="padding-left: 20px;">2nd order streams <li style="padding-left: 20px;">3rd order streams <li style="padding-left: 20px;">4th order streams 	0.048 0.132 0.333 0.0	0.067 0.20 0.0 0.0	0.032 0.188 0.0 0.0
3. Compare potential for loss or disruption of terrestrial systems "off-site". ¹	<ul style="list-style-type: none"> • Area (ha) of terrestrial systems within vicinity of landfill. <li style="padding-left: 20px;">wetlands <li style="padding-left: 20px;">woodlands 	41.0 0.0	47.1 26.2	46.1 216.8
4. Compare potential for loss or disruption of aquatic systems "off-site". ¹	<ul style="list-style-type: none"> • Amount (ha) of aquatic systems within vicinity of landfill. <li style="padding-left: 20px;">1st order streams <li style="padding-left: 20px;">2nd order streams <li style="padding-left: 20px;">3rd order streams <li style="padding-left: 20px;">4th order streams 	0.110 0.440 0.620 0.0	0.185 0.212 0.0 0.0	0.146 0.284 0.0 0.560
COST				
1. Compare potential initial development cost ²	<ul style="list-style-type: none"> • Land acquisition cost estimate • Road improvement cost estimate 	\$0.5-\$1.1 M \$9.7-\$17.5 M	\$3.0-\$4.3 M -	\$1.1-\$2.1 M \$1.8 M
2. Compare potential haul cost	<ul style="list-style-type: none"> • Haul cost estimate. 	\$9.7-\$17.5 M	\$7.6-\$13.7 M	\$11.5-\$20.8 M
3. Compare potential cover material import cost	<ul style="list-style-type: none"> • Cover material import cost. 		\$6.7 M	\$6.2 M
4. Compare potential leachate control and treatment/disposal cost	<ul style="list-style-type: none"> • Capital cost estimate for leachate. • Capital and operating cost estimate for leachate control and treatment/disposal 	\$6.9 M \$4.0 M \$5.5 M	- - -	- - -

**TABLE 6.9
SHORT LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)**

Discipline/Criteria	Indicators	Site E2	Site E3	Site W1
DESIGN AND OPERATION				
1. Compare potential for reliability.	<ul style="list-style-type: none"> • Construction quality assurance/quality control requirements. • Maintenance requirements during normal operations. • Long-term maintenance requirements. 	Soils are of low permeability, water table is near ground surface and there are upward ground water gradients. Site cannot operate as an attenuation site. <ul style="list-style-type: none"> • Required for leachate collection and treatment systems (for each indicator). 	Site will operate as a natural attenuation landfill. <ul style="list-style-type: none"> • Not required (for each indicator). 	Site will operate as a natural attenuation landfill. <ul style="list-style-type: none"> • Not required (for each indicator).
2. Compare potential for flexibility.	<ul style="list-style-type: none"> • Design flexibility. 	<ul style="list-style-type: none"> • Bedrock outcrops at south end of site is constraint for fill area location. 	<ul style="list-style-type: none"> • The fill area location is constrained by topography and geology (surrounding bedrock hills) on the west and east sides. 	<ul style="list-style-type: none"> • Middle of the site contains a wetland. Extensive topographic variations on the site with high points to the east, north and west. Direction of development (north to south) constrained by surface water drainage.
ECONOMIC				
1. Compare significance of potential displacement of "on-site" businesses.	<ul style="list-style-type: none"> • Number of businesses and estimated number of employees in "on-site" businesses. • Relocatability score as defined by the degree of dependence of the enterprise on that site. 	<p align="center">0</p>	<p align="center">0</p>	<p align="center">0</p>
2. Compare significance of potential disruption of "off-site" businesses.	<ul style="list-style-type: none"> • Impact index rating based on compatibility analysis, location and estimated number of employees. 	<p align="center">2 (water treatment plant)</p>	<p align="center">46 (25 businesses, of which four are considered sensitive, i.e. accommodation/food services)</p>	<p align="center">0</p>

TABLE 6.9
SHORT LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)

Discipline/Criteria	Indicators	Site E2	Site E3	Site W1
<p>2. Compare potential for predicting ground water migration pathways.</p>	<ul style="list-style-type: none"> · <i>Uniform hydrogeologic/geologic conditions.</i> · <i>Uniform (uni-directional) ground water flow direction.</i> 	<ul style="list-style-type: none"> · Exceptional uniform and predictable geology. Bedrock surface is variable at the site but dips predictably. · Low permeability soils cause ground water flow paths to be controlled by surface topography and drainage system. Uniform geology causes predictable flow directions. 	<ul style="list-style-type: none"> · Ground water flow pathways understandable without complex geology. Some stratigraphic units are not persistent throughout the site. Ground water flow is to the north through bedrock lows. · Bedrock topography directs flow in one direction, to the north. 	<ul style="list-style-type: none"> · Complex geology with variable stratigraphy and bedrock topography. Bedrock occurs at the surface at many areas of the site but two boreholes were terminated in overburden at depths of 15 m. · Variable bedrock topography causes divergent flow. Flow is expected to be towards the swampy area in the central portion of the site, except in the north where flow is interpreted to be to a swampy area north of the site.
<p>3. Compare potential for <i>not</i> impacting/ disrupting ground water supplies/ resources.</p>	<ul style="list-style-type: none"> · <i>Absence of regional aquifers.</i> · <i>Minimal use by individual domestic uses.</i> · <i>Absence of municipal/communal wells.</i> 	<ul style="list-style-type: none"> · No significant regional aquifer identified. · No wells identified in review of available well records from the MOEE. · Nearest municipal well is 5.7 km away. 	<ul style="list-style-type: none"> · No significant regional aquifer identified. · Six wells were identified as being potentially within the study area. · Nearest municipal well is 6.0 km away. 	<ul style="list-style-type: none"> · No significant regional aquifer identified. · Eleven wells identified from MOEE records potentially in study area. However, based on lack of settlement in the area, wells are probably located outside of the study area. · Nearest municipal well is 30.0 km away.

TABLE 6.9
SHORT LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)

Discipline/Criteria	Indicators	Site E2	Site E3	Site W1
3. Compare significance of potential impact to "off-site" property values.	<ul style="list-style-type: none"> • Number of existing residential uses in off-site areas. • Number of hectares of land designated for residential uses. • Number of hectares of land designated for commercial uses. • Number of hectares of land designated as mixed use. 	<p>0</p> <p>0</p> <p>0</p> <p>0</p>	<p>40</p> <p>10</p> <p>0</p> <p>4</p>	<p>0</p> <p>0</p> <p>0</p> <p>0</p>
GEOLOGY/HYDROGEOLOGY				
1. Compare potential for provision of natural protection from leachate impacts.	<ul style="list-style-type: none"> • <i>Surficial soil types.</i> • <i>Absence of confined aquifers.</i> • <i>Absence of significant gradients causing downward ground water flow.</i> 	<ul style="list-style-type: none"> • Low permeability soils found consistently in all test locations. These low permeability soils are considered to be very suitable for an engineered site. • No significant aquifers identified in any drilling location. Aquifers may exist below the bottom of the boreholes terminated in overburden. • Upward gradients found at three or four drilling locations. Water level in deeper soil near ground surface. 	<ul style="list-style-type: none"> • Most of area already occupied by landfill. Presently ground water migrates downward to a permeable basal sand and gravel unit, then moves horizontally in this unit northward and is expressed in swampy area north of the site. There is some variability in soil types with a less permeable silt soil found at some locations. • No significant confined aquifers identified. • Variable vertical gradients (sometimes upward, sometimes downward). 	<ul style="list-style-type: none"> • Variable surficial soil types. At some locations granular soils occur at surface while at other locations fine-grained low permeability soils occur at surface. Bedrock exposed at some locations. • Significant confined aquifer identified in one monitoring well. • Gradients at some locations are downward.

**TABLE 6.9
SHORT LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)**

Discipline/Criteria	Indicators	Site E2	Site E3	Site W1
PLANNED LAND USE				
1. Compare potential for removal of planned and proposed land uses "on-site".	<ul style="list-style-type: none"> • Number of units/area (hectares) of designated or actively planned residential (and Municipality identified), community/recreational facilities, commercial and institutional uses. • Number of units/area (hectares) of proposed residential, community/recreational facilities, commercial and institutional uses, and transportation routes and status. 	0	0	0
2. Compare potential for disruption of planned and proposed land uses "off-site". ¹	<ul style="list-style-type: none"> • Number of units/area (hectares) of designated or actively planned residential (and Municipality identified), community/recreational facilities, commercial and institutional uses. • Number of units/area (hectares) of proposed residential, community/recreational facilities, commercial and institutional uses, and transportation routes and status. 	0	15.8	0
3. Compare potential for integration of end use with surrounding community.	<ul style="list-style-type: none"> • Potential for physical integration with existing, planned and proposed land uses in the surrounding area. 	Medium	High	Medium
SOCIAL				
1. Compare potential for displacement of residents "on-site".	<ul style="list-style-type: none"> • Number of residents "on-site". 	None	None	None
2. Compare potential for disruption of residents "off-site". ¹	<ul style="list-style-type: none"> • Number of residents "off-site". • Resident location characteristics (e.g. proximity of residents to site, presence of existing barriers). • Resident characteristics (e.g. number of potentially vulnerable residents, uses of property, satisfaction with place). 	None within 1,000 m	Approximately 42 residences within 1,000 m	None within 1,000 m

TABLE 6.9
SHORT LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)

Discipline/Criteria	Indicators	Site E2	Site E3	Site W1
3. Compare potential for removal of institutional, community and recreation features "on-site".	<ul style="list-style-type: none"> • Number and characteristics of features "on-site" (e.g. number of users, services provided, hours of operation). • Availability of alternatives. • Hardships/problems in moving. 	None	None	None
4. Compare potential for disruption to institutional, community and recreation features "off-site". ¹	<ul style="list-style-type: none"> • Number and characteristics of features "off-site" (e.g. number of users, services provided, hours of operation). • Uses of property. • Special characteristics of users. 	<ul style="list-style-type: none"> • Snowmobile trail (Sudbury Trail Plan) 	<ul style="list-style-type: none"> • Church • Snowmobile trail (Sudbury Trail Plan) 	<ul style="list-style-type: none"> • Snowmobile trail (Sudbury Trail Plan)
5. Compare potential for disruption to communities.	<ul style="list-style-type: none"> • Community cohesion. • Community character. • Community viability. 	<ul style="list-style-type: none"> • Is in a rural area and has no residences within the vicinity. Concerns have been expressed relating to visual impacts and other nuisances and expect that the facility could affect the character of the area. 	<ul style="list-style-type: none"> • Involves the vertical expansion of the existing landfill. The area has developed and grown with this landfill in operation. It is expected that visibility of the landfill will increase with the expansion, particularly in the residential area to the south and from Highway 17 East. Potential for community character effects therefore exist. 	<ul style="list-style-type: none"> • Community impacts from the proposed site are not expected as the site is located in a rural area away from built-up areas and is likely to be screened from view.

TABLE 6.9
SHORT LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)

Discipline/Criteria	Indicators	Site E2	Site E3	Site W1
SURFACE WATER				
1. Compare potential for Impairment of off-site surface water quality.	<ul style="list-style-type: none"> · <i>Number of watersheds and subwatersheds receiving surface water from site.</i> · <i>Number of watercourses receiving surface water discharges.</i> · <i>Distance (m) to nearest continuously flowing watercourse.</i> · <i>Drainage area (ha) of receiving watercourses.</i> · <i>Characteristics of downstream surface water usage</i> 	<ul style="list-style-type: none"> · 1 watershed, Wanapitei River; 1 subwatershed, Moose Creek <li style="text-align: center;">1 <li style="text-align: center;">0 <li style="text-align: center;">170 · Surface water uses may include agriculture, livestock watering and recreation 	<ul style="list-style-type: none"> · 1 watershed, Wanapitei River; 2 subwatersheds, Conlston Creek and Romford Creek <li style="text-align: center;">1 <li style="text-align: center;">0 <li style="text-align: center;">100 · Surface water uses may include agriculture, livestock watering and recreation 	<ul style="list-style-type: none"> · 1 watershed, Vermilion River; 1 subwatershed, unnamed <li style="text-align: center;">1 <li style="text-align: center;">0 <li style="text-align: center;">0 · Surface water uses may include agriculture, livestock watering and recreation
2. Compare the potential for flood hazard	<ul style="list-style-type: none"> · <i>Total peak flow conveyed through the site (m³/s).</i> · <i>Length of watercourse realignments (m).</i> · <i>Number of watercourses entering the site and receiving surface water runoff from the site.</i> · <i>Total length (m) of watercourses crossing the site.</i> · <i>Area (ha) of flood storage.</i> 	<ul style="list-style-type: none"> <li style="text-align: center;">14.8 <li style="text-align: center;">1,000 <li style="text-align: center;">1 <li style="text-align: center;">1,200 <li style="text-align: center;">10 	<ul style="list-style-type: none"> <li style="text-align: center;">10.8 <li style="text-align: center;">0 <li style="text-align: center;">1 <li style="text-align: center;">0 <li style="text-align: center;">0.5 	<ul style="list-style-type: none"> <li style="text-align: center;">12.2 <li style="text-align: center;">700 <li style="text-align: center;">1 <li style="text-align: center;">500 <li style="text-align: center;">10

TABLE 6.9
SHORT LIST OF SITES EVALUATION
CRITERIA AND COLLECTED DATA
(Continued)

Discipline/Criteria	Indicators	Site E2	Site E3	Site W1
TRANSPORTATION				
1. Compare potential for impacts to traffic safety along waste haul routes. ³	• Potential number of annual accidents ⁴ .	1.52	1.32	1.73
	• Annual number of potential at-grade truck/train accidents ⁴ .	230 million	42 million	167 million
	• Annual number of trucks travelling through intersections ⁴ .	332,000	307,000	414,000
2. Compare potential for impacts to traffic operations along waste haul routes. ³	• Annual truck-kilometres travelled on single-lane (in one direction) on public roads ⁴ .	329,000	229,000	251,000
	• Annual truck-kilometres travelled on multi-lane (in one direction) on public roads ⁴ .	136,000	136,000	366,000
	• Annual number of trucks travelling through intersections ⁴ .	332,000	307,000	414,000

1. "Off-site" is defined as within 1 km of the proposed landfill site property boundaries. This 1 km study boundary is based on the Ministry of Environment & Energy's *Guideline D-4* which states "the most significant adverse environmental effects are normally within 500 m of the perimeter of a fill area". Taking into account that this is based on average distances over which landfill related nuisances tend to disperse, an additional 500 m has been added to provide a broader consideration of "off-site" effects.
2. Text in italics indicates changes that were made to the criteria/indicators as originally presented to the public.
3. The study area for assessing impacts associated with waste haul routes includes public roads from each waste centroid to each potential site.
4. Annual criteria consider the yearly waste haul truck volumes. The return trip will be evaluated to allow for the possibility that the route from a waste centroid to the potential site is different from the route used for the return trip (e.g. one way streets). For each road section or intersection along a route, a measure for each indicator is multiplied by the number of trucks. This product is then summed along each route and all routes are then summed for each site.

The Step 4 data sources involved a greater level of detail than the data sources used in previous steps. This was due to the site search principle that the level of detail should increase as the area of lands being studied decreases. The key data collection activities which occurred in this step were on-site field investigations including intrusive methods such as the drilling of boreholes for hydrogeological and geological analysis.

Data collection was primarily focussed within the following study areas:

- 1) On-Site.
- 2) Off-Site (0-500 metres).
- 3) Off-Site (501-1,000 metres).

It is typical to consider impacts along the landfill access roads at this stage of a landfill site selection process. Since each of the sites could be accessed from roadways designed to accommodate high traffic volumes (i.e. provincial highways and regional roads), significant roadway impacts were not expected. Only the Transportation discipline considered roadway-related effects including effects on traffic operations and safety. Waste haulage distance was also taken into account in the Cost analysis.

As previously outlined, it was assumed that a natural attenuation landfill would be developed for the Region. Natural attenuation sites depend on natural features of a site to renovate leachate to prevent unacceptable impacts on groundwater. These sites typically rely on large buffer lands where contaminant concentrations are reduced by dilution from infiltration in the buffer land. As indicated in the Landfill Siting Work plan, it was intended that the attenuation zones also be recognized as a study area.

Natural attenuation sites that rely on large bufferlands to renovate leachate contamination require consistent predictable geology in the bufferlands. Given the size of the proposed landfill, the size of the bufferland would have to be at least 1 kilometre. Data indicated that Sites W1 and E3 did not have predictable geology over such a distance and therefore, these sites could not be developed as natural attenuation sites that rely on large bufferlands.

Natural attenuation sites can also be developed at locations where groundwater discharges to surface water within the site boundaries. Impacts on surface water must be addressed and usually require long residence time of surface water on the site. Site E3 has been developed as this type of natural attenuation site and relies

on an extensive swampy area located north and east of the landfill. Site W1 was located in an area of groundwater discharge to a swamp located in the middle of the site. This site could be developed in a similar fashion as the existing landfill at Site E3.

Therefore, it was concluded that Sites E3 and W1 could be developed as natural attenuation sites that rely on groundwater discharging to swamps for further renovation of potential leachate contamination. Site E2 could not be developed as a natural attenuation site due to low permeability surficial soils. Consequently, a leachate attenuation zone was not identified for any of the short list sites.

6.8.3 Activity 2: Assessment of the Short List of Potential Sites by Discipline

The methodologies used to assess potential environmental effects were specific to each discipline. Conclusions were drawn about the potential for environmental effects of each site, based on the discipline's Step 4 indicators and criteria and the data that was collected. Indicator and criteria specific information were then combined to allow a discipline specific ranking of the short list of potential sites.

In conducting the comparative evaluation of the short list of sites, it was assumed that standard mitigation measures would be available for all the sites. Potential measures assumed to be available included:

Mitigation Measures

In conducting the short list of sites evaluation, the following mitigation measures were assumed to be available. In addition to these measures, compensation to surrounding landowners and residents was also assumed. The Compensation Policy that was developed by the Region is contained in Appendix D.

Agriculture

- maintenance of buffer (100 m minimum) between site and adjacent farms
- screening and litter pick-up

Archaeology

- that more detailed archaeological/historical investigations will be undertaken during the EPA site investigation stage

Biology

- avoid as much as possible, the most significant natural areas located on site
- maintain the buffer zone in a natural state as much as possible
- revegetate site as much as possible following site closure and be compatible with surrounding vegetation
- protection of ground and surface water quality
- minimize alteration to surface water movement
- good construction practices to minimize siltation and erosion
- monitor downstream water quality
- minimize extent of diversion works

Geology/Hydrogeology

- that the landfill be a natural attenuation site for Site E3 and W6 and an engineered site for Site E2
- ground water monitoring program pre- and post- closure
- preventive inspection and maintenance program for all landfill design components
- limit waste types accepted at the landfill
- provision of contingency measures (e.g. purge wells)

Surface Water

- isolation of surface water from refuse
- provisions for site drainage
- implementation of a surface water monitoring program
- provision to intercept, collect and treat contaminated surface waters within the site should monitoring detect on-site surface water contamination with potential to migrate off-site
- provision of storm water management for release of pre-development flows
- buffer zones to contain natural vegetation

- perimeter ditches around the fill area to convey all surface water run-off generated by rainfall events up to the 25-year storm event
- use of grass swales as much as possible instead of conventional ditches

Social

- on-site controls to minimize nuisance effects (e.g. regular waste covering, small working face, litter fencing, dust control measures, speed limits)
- establish a complaint recording and response program
- development of a Site Liaison Committee
- site screening through berming and/or vegetation in affected viewsheds
- bird control program if necessary
- litter clean-up program in site vicinity and along waste haul route
- require vehicles delivering waste to be covered

Economics

- on-site controls to reduce nuisance (dust, odour, noise, litter) impacts and site landscaping to reduce visual impacts
- support local businesses, where possible, through purchasing practices
- implement property value protection plan

Planned Land Use

- same measures as for Social and Economics

Transportation

- use of higher order roadways
- re-route around critical areas
- truck scheduling to off-set peak road loadings if there are problems
- enforcement of speed limits
- site access intersection to be designed in a manner to minimize potential impacts/accidents (e.g. turning lanes)
- consider use of transfer stations to minimize truck numbers
- site entrance/scales to be positioned so that trucks queue on site

Despite the recognition of mitigation measures, there still existed the potential for effects for all disciplines at each of the sites. Thus, the preferred site would still be the one which is most compatible with the surrounding environment. Thus, despite the recognition of mitigation measure availability, the site comparative evaluation was based on the data/impact tables as presented in Table 6.9.

Qualitative and quantitative evaluation methods were used by the disciplines in comparing sites.

The Biology, Surface Water and Transportation disciplines employed a quantitative evaluation method to rank the short list of potential sites, using the Simple Additive Weighting Method (SAWM). Appendix C contains a brief description of the Simple Additive Weighting Method.

Table 6.10 presents the rank ordering of the short list of potential sites by discipline. Further information regarding how these site ranks were developed, is in the *Draft Preferred Site Identification Working Paper, Volume II - Technical Appendices*.

6.8.4 Activity 3: Development of Discipline Weights

The comparative evaluation of the short list of potential sites determined if all disciplines were of equal importance or if some were more important than others and by how much. Weighting was used to establish the relative importance of disciplines.

To develop the discipline weights, input was sought from the public. Following the identification of the long list of sites, public workshops were held in the communities of Lively (June 17, 1996), Valley East (June 18, 1996) and the City of Sudbury (June 19, 1996) to obtain input on the relative importance of the disciplines for the short list evaluation. A total of 137 discipline weighting forms were received. A number of the forms received, however, could not be used as they were not correctly filled out. A total of 84 forms were used to establish the discipline weights.

The average weight was identified from the completed tables for the three individual workshops and for the workshops combined. For the combined weights of the three workshops, the median weight was also identified (the point at which half of the responses identified a higher rank and half identified a lower rank). Table 6.10

**TABLE 6.10
SITE RANKINGS BY DISCIPLINE**

Site	Agriculture	Archaeology	Biology	Cost	Design and Operations	Economics	Geology/ Hydrogeology	Planned Land Use	Social	Surface Water	Transportation
W1	1	3	3	2	2	1	3	1	1	1	3
E2	1	2	2	3	3	1	1	1	2	3	2
E3	1	1	1	1	1	3	2	3	3	2	1

Note:

- 1) A ranking of "1" identifies a site as most preferred and "3" as least preferred.
- 2) The above table lists the ranks given to each site by each discipline. In some instances, more than one site is given the same rank by a discipline. For example, Planned Land Use identified W1 and E2 as "1". Since two ranks of "1" have been given, the next rank was a "3".
- 3) The site ranking assumed an engineered landfill for Site E2 and a natural attenuation landfill for Sites E3 and W1.

presents the average and median weights for each discipline and some of the key comments received from the public in support of the weights.

An additional weighting scenario was also developed by the study team which took into account the public suggested weights and the study team's knowledge of the potential for site impacts and mitigation potential.

Thus a total of 6 weighting scenarios were considered in the evaluation. How these various scenarios were considered is described in the following sections.

6.8.5 Activity 4: Overall (Multi-Discipline) Comparative Evaluation of the Short List of Potential Sites

The overall comparative evaluation involved making trade-offs among sites since some sites were preferred by some disciplines and others were preferred by other disciplines. The site rankings by discipline are presented in Table 6.10.

The trade-offs were made giving consideration to the discipline weights (see Table 6.11) developed from the public input. For example, Geology/Hydrogeology considerations were given much more importance than Planned Land Use considerations. In order to assist with the Step 4 multi-discipline comparative evaluation of the short list of potential sites, the Concordance Method was used.

The results of the Concordance Method (using all weighting scenarios) are presented in Table 6.12.

6.8.6 Activity 5: Identification of the Preferred Site

An analysis of the site ranks presented in Table 6.10 was conducted to identify the preferred site. The following provides the rationale for the selection of the preferred site considering both the median and average discipline weights and the results of the concordance analysis.

**TABLE 6.11
DISCIPLINE WEIGHTS**

Discipline	Average Weight from June 17	Average Weight from June 18	Average Weight from June 19	Average Combined Weight	Median Combined Weight	Study Team Weights	Key Public Comments from Returned Forms
Agriculture	6	5	4	5	4	2	<ul style="list-style-type: none"> • agriculture is not a priority in the north and there is not much agriculture
Archaeology	2	2	3	2.3	1	2	<ul style="list-style-type: none"> • no relevance for this area as there are no known historical sites
Biology	7	14	6	9	9	9	<ul style="list-style-type: none"> • environmental concerns are important • areas in Sudbury have been previously devastated so the few remaining area should be protected • there is wildlife in the area of the sites and they should be protected; diversity should be maintained • the landfill will attract unwanted animals who could spread disease
Cost	8	5	4	5.5	4	12	<ul style="list-style-type: none"> • cost is of importance • important factor, however, environment should be protected and social concerns should come before cost • a secondary concern • concerned about tax increases/compensation
Design and Operations	5	5	3	4.3	4	4	<ul style="list-style-type: none"> • landfill should be well planned • the leading technology should be used • testing and monitoring while site is operating is important
Economics	5	4	4	4.3	2	4	<ul style="list-style-type: none"> • several sites located in isolated areas so economic impact should be negligible
Geology/ Hydrogeology	18	23	19	20	24	20	<ul style="list-style-type: none"> • ground seepage from landfill sites can pollute existing wells and drinking water, hence affect health and safety of residents
Planned Land Use	6	5	5	5.3	5	2	<ul style="list-style-type: none"> • landfill will affect future development

**TABLE 6.12
SHORT LIST OF SITES EVALUATION
SITE CONCORDANCE SCORES**

Site	Workshop 1	Workshop 2	Workshop 3	Workshop Overall Average	Workshop Median	Study Team
W1	0.926	0.885	1.090	0.967	.945	0.930
E2	0.955	0.995	0.964	0.959	.955	0.880
E3	1.110	1.160	0.940	1.070	1.100	1.190

* Note: The higher the concordance score the more preferred the site is.

In observing the concordance scores (Table 6.12), it was clear that the site scores were all quite similar indicating that the relative difference among the sites was small. Of the 6 concordance runs, Site E3 was identified as being slightly preferred for 5 of them. Using the three workshop average weights as an example, Site E3 was ranked first (most preferred) by 6 of the 11 disciplines which accounted for 36% of the total weight and was ranked second by two disciplines which accounted for 30% of the weight. Site E3 was, therefore, ranked first or second by 8 of the 11 disciplines which accounted for 66% of the total weight. Site E3 was ranked least preferred by the Social, Planned Land Use and Economics disciplines largely because the site was located in an area which was much more developed than the other two sites. These three disciplines did not however, identify the potential for significant effects. Site E3 involves the vertical expansion of the existing Sudbury Landfill and there was no evidence identified that the presence of the existing landfill had resulted in significant effects to residents, planned land uses or local industries and businesses.

The other sites also had advantages, including Site W1 being preferred by the Social, Surface Water, Planned Land Use and Economics disciplines. Significant disadvantages for Site W1 include it being least preferred from a Geology/Hydrogeology and Transportation perspective.

The major advantage of Site E2 was that it was ranked first by the Geology/Hydrogeology discipline if the site was engineered. This requirement for engineering, however, made this site more expensive than the others. Other disadvantages for this site were with respect to Design and Operations and Surface Water.

Site E3 was identified to have an overall advantage over the other two sites based on the discipline site rankings and the discipline weighting scenarios. The disadvantages with respect to Site E3 (Social, Planned Land Use and Economics) were considered to be less significant than the disadvantages to Site E2 (Cost, Surface Water) and Site W1 (Geology/Hydrogeology and Transportation). Site E3 also had some other advantages which may not have been reflected in the site rankings including: municipal/local acceptance, and that the infrastructure being already in place for landfill development.

For these reasons, Site E3 was recommended as the preferred site for the Region's proposed new landfill. Confirmation of Site E3 being a suitable site

cannot be made until *Environmental Protection Act* (EPA) level investigations are undertaken. EPA investigations involve a more detailed analysis including the development of a site specific design.

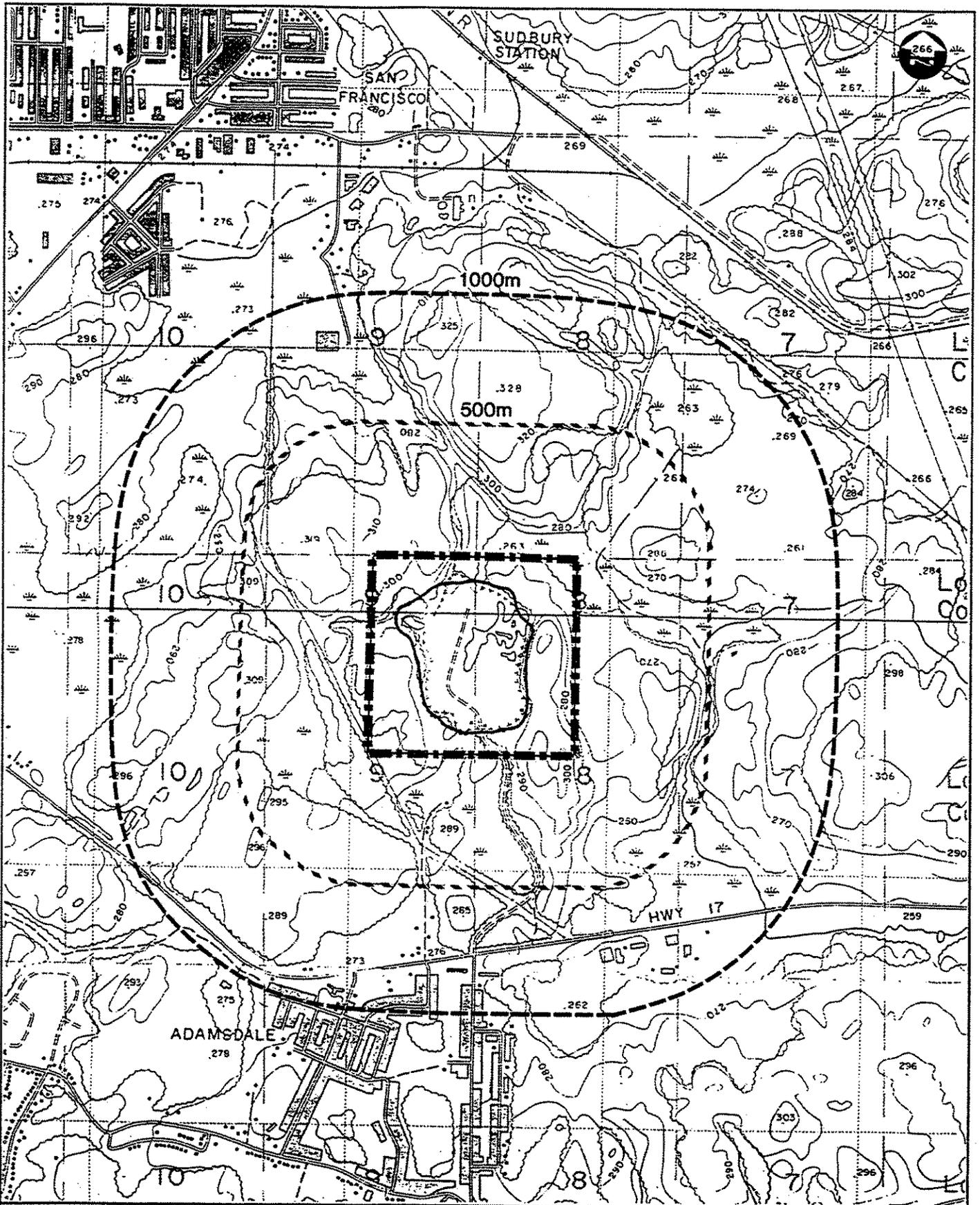
The location of the preferred site is shown on Figure 6.3.

6.8.7 Public Input on the Preferred Site

In addition to obtaining public input on the relative importance of the evaluation disciplines, specific input was also obtained on each of the sites. For example, as previously described, consultation with INCO resulted in the elimination of Site W6 given INCO's plans to continue mining operations at this location.

Meetings/discussions were also held with representatives of each of the three remaining sites. As a result of these discussions, additional site specific information was obtained that was considered in the short list evaluation.

After the identification of Site E3 as the preferred site, additional meetings were held with the Adamsdale community. Additional information, particularly pertaining to their concerns, will be addressed as part of the EPA level investigations.



Scale 1:20,000

LEGEND

-  Site Boundary
-  Fill Area

**Region of Sudbury WMSP
Environmental Assessment Document
Preferred Site E3**



FIGURE 6.3

7.0 NET EFFECTS OF THE UNDERTAKING

7.1 DESCRIPTION OF THE UNDERTAKING

The undertaking, as previously defined in Section 2.2 of this document, is the expansion of the existing City of Sudbury landfill. The location of the landfill is in the City of Sudbury on parts of Lots 8 and 9, Concession IV, Neelon Township. The design capacity of the site expansion is 2,125,000 tonnes and is to have a fill area of approximately 24 ha. The proposed site is 62 ha in area when considering a 100 m buffer zone width on all sides of the proposed fill area. Additional area for the natural attenuation of leachate will be required and included as part of the total site area.

7.2 EFFECTS OF THE UNDERTAKING

The following describes the potential effects of the undertaking based on the information obtained as part of the environmental assessment (i.e. the Waste Management Systems Plan).

As in the site comparative evaluation process, the effects of the undertaking are based on a set of environmental criteria/indicators. This set of criteria/indicators are the same as those used to compare the short list of potential sites and identify the preferred site. However, the effects of the undertaking are now described in absolute terms versus relative.

Detailed site investigations to satisfy the requirements of the *Environmental Protection Act* have not been undertaken at the site. As a result, specific mitigation measures for the landfill design and operation have not been identified and incorporated into the assessment of effects for the undertaking.

7.2.1 Agriculture

Description of the Environment Affected

There is no agricultural activity occurring on the proposed site or within the off-site area. The soils on-site were Class 7. Based on the Provincial Policy Statement, these lands have no agricultural significance.

The Ministry of Agriculture, Food and Rural Affairs, through field inspections, concurred that the site had no agricultural capability.

Potential Effects

The establishment of the landfill expansion will have no impact in terms of losses and disruption to agricultural activities.

Mitigation

No mitigation measures are required on-site since there is no agricultural capability.

It is recommended that waste truck drivers respect posted speed limits and take extra caution when approaching or passing farm vehicles.

To minimize the amount of litter blowing from trucks, it is recommended that all open loads of waste be secured with a tarpaulin to prevent litter from blowing out and onto any adjacent crop fields.

Net Effects

Any disruption to the movement of farm equipment due to waste haul vehicles or to crops due to litter is expected to be infrequent and potentially non-existent. The site is not in close proximity to any agricultural areas.

7.2.2 Archaeology

Description of the Environment Affected

The proposed landfill site is a vertical expansion of an existing landfill. Due to the present use of the site, there is a high degree of disturbance to the area. The landfill is surrounded by rock outcrops and has no potable and/or navigable waters on-site.

Eight registered archaeological sites exist within a five kilometre radius of the site.

Potential Effects

Due to the high degree of disturbance from ongoing landfill activities at the site, any archaeological resources would have been previously removed or disturbed out of context.

The lack of potable and/or navigable waters and the rock outcrops surrounding the site make this location unsuitable for historical settlement.

Based on the above, the site has little potential for the discovery of archaeological resources.

Mitigation

No archaeological resources were identified on-site or off-site. Based on the characteristics of the site, there is little potential for the discovery of archaeological resources. As a result, no impact mitigation measures are required.

Net Effects

There is low potential for the discovery of archaeological resources at the site due to the disturbance caused by the existing landfill operations and unsuitable features for the historical settlement of the site. The landfill will have no effect on archaeological resources.

7.2.3 Biology

Description of the Environment Affected

The fill area is situated within a horse-shoe depression with the west and east sides being formed by two large rocky outcrops and the southern side being upland in nature with a thin layer of soil and scattered trees. The south side also has a 2.8 ha wetland with some open water areas as well as a large expanse of broadleaved emergents (cattails). To the north of the landfill, there is a large (50 ha) wetland that acts as an attenuation area for the leachate from the existing landfill.

The landfill area does not have large expanses of forests, but small woodlots containing a good mix of species do exist in the upland areas along the sides of the wetlands. The species includes white birch, black spruce, balsam fir, trembling aspen, willow, choke cherry, red oak, elderberry with an understorey of blueberry, aster, goldenrod and sweet fern.

The rocky ridges are sparse and have minimal to no soil. The dominant species are white birch which grow in the crevices of the rock along with scattered patches of blueberries, redbud, lichens and mosses.

The wetlands had considerable more diversity in terms of plant life. Although the wetland to the north of the fill area was being partially used for attenuation purposes, there were many aquatic plants within the cattail areas and channels flowing north and north east from the landfill. Plants that were noticed included cattails, beggarticks, soft-stem bulrush, water horehound, rattlesnake grass, common reed grass, blue-joint grass, green fruited sedge, tussock sedge, rice-cut-grass and water plantain. The wetland was found to contain a number of bait fish species.

A number of different wildlife tracks and scats were noticed in the site area. Tracks of both moose and deer were found as well as the scats of fox, bear and raccoon. The feeding activity of beaver and muskrat was also observed. In terms of bird life, the dominant avian forms were gulls and ravens that fed on food scraps within the landfill area. This activity occurs year-round. It was indicated that a flock of 20 to 30 glaucous gulls (an arctic gull species) visits the area in the winter months. Other birds identified included marsh wren, hairy woodpecker, red-winged blackbird, great blue heron, American bittern and black-capped chickadee.

Potential Effects

The proposed landfill site is a vertical expansion of the existing Sudbury landfill. As a result, no loss or removal of terrestrial and aquatic systems is expected. However, the wetland that is currently being used for attenuation purposes may experience negative impacts with the increased capacity. These impacts may include a reduction in benthic species and populations within the wetland and a reduction in the plant population near the outlet of the landfill.

Mitigation

Previous work by Golder Associates (1993) have indicated that the wetland to the north of the landfill is cleaning leachate within acceptable biological parameters. It is recommended that additive channels be formed within the wetland so that a greater portion of the wetland is available for attenuation purposes.

It is also recommended that the rock dam/berm at the north end of landfill be strengthened so that all leachate is filtered before entering the wetland.

Net Effects

It is expected that the impacts of the expansion of the landfill are expected to be minimal. However, it is recommended that continued ground and surface water monitoring be continued and a biological monitoring program be implemented. These programs should be in place before expansion begins and should be conducted at least twice a year to ensure leachate components are at safe levels.

7.2.4 Cost

Description of the Environment Affected

The landfill site is located on five separate properties which have four owners. The Region of Sudbury owns two of these properties, the Ministry of Natural Resources (Province) owns one of the properties and the other two are privately owned. These properties are designated and zoned for industrial uses.

The landfill will be a vertical expansion of the existing Sudbury Landfill. Access roads to the site are already in place.

The site is located a total distance of 448 km from the identified waste centroids within the Region.

There is no on-site source of cover material and all cover soils will have to be imported.

The landfill will continue to operate as an attenuation site, with leachate impacts being attenuated by the wetland to the north and east that drains to Romford Creek. Leachate collection and treatment/disposal is not required.

Potential Effects

Costs were developed for specific aspects of the landfill site development and operation. A complete cost assessment cannot be undertaken until the conceptual design of the landfill has been prepared. The estimated cost for land acquisitions at the site is between \$3.0 - \$4.3 million. The range is based on the level of uncertainty with real estate prices for industrial lands. Land already owned by the Region is not included in the cost.

The net present value (1996) of the cost to haul wastes to the site over the 20 year site life was estimated between \$7.6 - \$13.7 million. The range of costs was based on the assumed hourly haul cost (i.e. \$50 to \$90 per hour) which includes crew plus all operating costs.

The cost to import waste cover material to the site, over a 20 year period, was estimated to be \$6.7 million.

Mitigation

As part of the detailed assessment of the site, a complete capital and operating cost estimate should be prepared. This estimate would be based on the conceptual design of the site and proposed operations plan. The detailed cost estimate will provide a more complete cost to the Region of the landfill development and operation.

Net Effects

A complete assessment of costs for the construction and operation of the landfill, over the 20 year planning period has not been completed. The estimated cost for initial site development, cover material import and waste haul range from \$17.3 - \$24.7 million. A complete detailed cost estimate for the landfill will be prepared once a conceptual design and operating plan is prepared.

7.2.5 Economics

Description of the Environment Affected

No public or private sector enterprises, with the exception of the existing landfill are located on-site.

Approximately 25 businesses are situated in the off-site area (i.e. within 1 km). Out of these businesses, four are considered to be "sensitive" businesses (i.e. accommodation/food services).

There are approximately 42 residences situated within 1 km of the site. Lands within this off-site area include some lands designated and zoned for residential and commercial uses.

Potential Effects

No displacement of on-site businesses will occur.

The existing Sudbury Landfill has been operating for over 30 years. The landfill is well buffered from existing sensitive uses. It does not appear to have adversely impacted business growth in the area, and much of the existing commercial and industrial development in the area located there after the existing landfill had been established.

The site will be visible from the highest points of land around the site, which includes a number of residences. The site may also be visible to additional residences to the south of the site. The actual viewshed of the proposed landfill can be determined based on the conceptual design of the site. This visual nuisance may have some effect on property values. There is no data showing that the current landfill has impacted property values.

Mitigation

Mitigation is not required due to the expected low level of impact. No businesses will be displaced. Much of the commercial and industrial development has occurred during the period since the landfill began operation. Data for residential property sales does not indicate any loss of property values over the past 20 years.

Net Effects

No business displacement will occur and no business disruption impacts are anticipated for the off-site area.

Based on the long-term existence of the Sudbury Landfill, property value impacts due to the proposed long-term expansion are not expected.

7.2.6 Geology/Hydrogeology

Description of the Environment Affected

Regional Geological Setting

The general area of the site is underlain by Precambrian metasedimentary bedrock, diabase dikes and meta-gabbro. Major rock types include Wahnapiatae quartzite, and arkose, subarkose and arkosic wacke of the Mississagi Formation. Numerous faults occur within the general area of the site.

The overburden deposits in the general area of the site have been characterized as discontinuous drift deposits and swamp deposits of peat, muck and mud.

Local Subsurface Conditions

The site lies within a bedrock depression consisting of a syncline bounded on the east and west by south-southwest to north-northwest trending faults. These bedrock faults intersect the Coniston Fault located to the south of the landfill.

Based on topography, groundwater flow is to the north of the site with groundwater discharge to the swamp, located north of the site, through a "notch" in the bedrock that is presently occupied with a rock-filled dam (or berm).

On-Site Conditions

An extensive hydrogeologic investigation was completed in 1987 and 1989 by Golder Associates Limited. These investigations consisted of a ground penetrating radar

survey, and the installation of 20 overburden monitoring wells and 8 bedrock monitoring wells. The results of the investigations are presented below.

Borehole Stratigraphy

Six major stratigraphic units were identified in the investigation and are summarized in order of encounter from ground surface as follows:

Refuse was encountered in all of the overburden boreholes within the fill area.

Organic silt: Considered to be a swamp deposit that is mapped regionally and was identified in 6 boreholes. The thickness of this unit ranged from 5.5 metres to 2.0 metres where identified.

Silt to Clayey Silt: This unit was identified in all but 4 boreholes and ranged in thickness from 0.5 metres to 7.0 metres.

Glacial Till: Dense sandy silt containing some gravel and trace clay. This unit was identified in 4 boreholes with thickness ranging from 0.4 metres to 1.4 metres.

Basal Sand and Gravel: Sand and gravel to silty sand stratum. This unit was encountered directly overlying bedrock in all but 2 overburden boreholes. This stratum is generally thinnest along the bedrock flanks of the site but is thicker in the central portion of the site (4.5 metres). In three boreholes, refuse was found directly overlying this unit.

Bedrock: Metasediment and granitic gneiss bedrock unweathered to slightly weathered. Generally, the upper portion of the bedrock was more fractured and rock quality improved with depth.

Water Levels

Horizontal gradients at the site were identified as being variable. Generally, the horizontal gradient was 0.019 causing groundwater flow from south to north. Vertical hydraulic gradients were determined in the overburden at three sites and were all downward (averages of 0.144, 0.040 and 0.067). The downward gradients indicate

that there is the potential for leachate to migrate downward to the basal sand and gravel layer.

In the nested overburden/bedrock sites, the vertical hydraulic gradient is upward from the bedrock to the basal sand and gravel. Subsequent water level monitoring indicates that there is variability in the direction of the gradient between the basal sand and gravel and the bedrock.

Hydraulic Conductivity

In situ hydraulic conductivity tests were completed on selected monitoring wells. The hydraulic conductivity of the silt and stratigraphic unit ranged from 3.4×10^{-4} cm/s to 1.2×10^{-4} cm/s. The hydraulic conductivity of the basal sand and gravel was 1×10^{-2} cm/s.

The bedrock hydraulic conductivity ranged from 7.0×10^{-5} cm/s to 8.9×10^{-4} cm/s. The bedrock wells were purposefully installed within fractured bedrock and the "bulk" hydraulic conductivity of the bedrock would be expected to be much less than that measured in the vicinity of the monitoring wells. In addition the hydraulic conductivity in the direction of the lineations in the bedrock (southwest to northeast) would be several orders of magnitude higher than the hydraulic conductivity perpendicular to the lineations.

Groundwater Chemistry

The results of chemical analyses of groundwater samples indicate that all overburden wells and downgradient bedrock wells have been impacted to some degree by leachate from the existing landfill at this site.

Mitigation

The landfill is proposed to operate as a natural attenuation site. The wetland located to the north and east of the site will continue to be used to naturally attenuate leachate from the site.

Specific mitigation measures will be developed as part of the detailed site investigations to satisfy the EPA approval requirements.

Net Effects

The existing Sudbury Landfill has been operating for over 30 years as a natural attenuation landfill. The geology and hydrogeology of the site have been substantially investigated. Groundwater flow pathways are understandable and without complex geology. Groundwater flow is to the north through bedrock lows.

Groundwater migrates downward to a permeable basal sand and gravel unit, then moves horizontally in this unit and is expressed in the swampy area north of the site. There is some variability in soil type with a less permeable silt soil found at some locations. Vertical gradients are variable across the site.

No significant pathway was identified for leachate-contaminated groundwater to migrate off-site.

There are no locally or regionally significant aquifers in the site area. The nearest municipal well is 6 km away. There will be no effect to any local water wells.

7.2.7 Planned Land Use

Description of the Environment Affected

The landfill site is located within the City of Sudbury. The on-site lands are both publicly and privately owned.

The on-site area is designated in the City of Sudbury Official Plan for a combination of heavy and light industrial uses.

There is no displacement of on-site land uses associated with this site. However, this site has 15.8 ha of land provincially approved for residential, commercial, institution and community/recreational uses within 1,000 m of the site boundary.

Potential Effects

There are no impacts to planned or proposed land uses on site.

There is the potential for impacts to planned and proposed land uses within 1,000 m of this site from landfill nuisance effects.

Mitigation

The existing landfill has been operating for over 30 years. Development in the off-site area has continued to occur along with the ongoing landfill operation. The most viable mitigation option would involve allowing development of the adjacent lands for land uses compatible with the landfill.

Net Effects

There is no on-site displacement associated with the site. However, there is the potential for impacts to planned and proposed land uses within 1,000 m due to landfill nuisance effects. The off-site disruption will potentially affect a total of 15.8 ha of designated land as identified in the provincially approved City of Sudbury Secondary Plan. Since development activity has been occurring in proximity to the existing landfill, the impacts to these designated land uses are expected to be minimal.

In addition, the site has a high potential for end use integration into the surrounding community. The reasons for this are the proximity to the City of Sudbury, the existing City of Sudbury landfill is located on-site, the on-site area is designated for a mixture of industrial and rural uses, and the surrounding area has been developing with ongoing landfill activity.

7.2.8 Social

Description of the Environment Affected

The proposed landfill is an expansion of the Region's existing landfill site located in the east end of the City of Sudbury, north of Highway 17 East. Since the site will be developed as a vertical expansion, there will be no displacement of residents or community/recreation features. This site is located in a developed area, primarily industrial. There are also approximately 42 residences within the 1,000 m of the site area. In addition, a church and snowmobile trail are located within this same area.

Potential Effects

Impacts to residents located south of the landfill and along Highway 17 East are possible due to landfill nuisance effects. These nuisance effects are expected to include visual impacts due to the increased height of the existing landfill.

Residents in the nearby community indicated that they have experienced nuisance effects from the existing landfill operation in the past. These nuisance effects include birds, blowing litter and litter along the roadways from truck haulage. Effects from the site itself, such as noise and odours, were not identified to be a problem. It was also commented that site operations have significantly improved over the last few years and again quite recently, corresponding with the new landfill operator. Litter along Highway 17 was noted to still be a problem on occasion.

The snowmobile trail is not expected to be impacted by the landfill.

Mitigation

As part of the detailed assessment of the site, a number of impact studies should be undertaken to address the potential nuisance effects of the site. The completion of these studies will allow development of site-specific mitigation measures for any potential effects. These impact studies should address the issues of visual and bird nuisances. Additional studies may also be undertaken to assess air quality (i.e. dust, odour, landfill gas) and traffic impacts as some related concerns were expressed by local residents.

A Site Liaison Committee should be formed by the Region. This Committee would include representatives of the local residents and community. One of the roles of the Site Liaison Committee would be to provide input to the operations and development plan for the site. This would include the incorporation of appropriate mitigation measures identified through site specific impact studies.

Net Effects

Residents generally seem to have been minimally affected by the existing landfill in the past. However, some concerns were expressed by the public related mainly to

nuisance effects. In addition, increasing the height of the existing landfill will also make the site more visible.

A number of mitigation measures are available to minimize the potential social impacts of the site. However, it is necessary to first prepare the conceptual design and operating plan for the landfill. Based on this plan, detailed impact assessment studies can be undertaken to address issues such as visual, bird nuisance, air quality and transportation impacts. Each of these studies would identify site specific mitigation measures for incorporation into the landfill design and operations plan.

The formation of a Site Liaison Committee will allow the residents to provide direct input to the types of mitigation measures identified and to directly monitor their implementation.

7.2.9 Surface Water

Description of the Environment Affected

The proposed landfill site is located within the watershed of the Wanapitei River. Surface water generated from the site flows to the north and into a marsh. This marsh is the western branch of Romford Creek and flows to the east. This tributary then joins with the south branch of Romford Creek at a point considered to be the start of Romford Creek. Romford Creek eventually flows into Coniston Creek which then flows into the Wanapitei River.

The drainage area of the single watercourse receiving surface water discharges from the site is 100 ha.

Downstream surface water usage was characterized as agricultural, livestock watering and recreational. Records of surface water taking permits do not indicate any uses at the tributary or watershed level. The intake for the Region of Sudbury water supply is located further upstream from the point where the surface water from the site is received.

Since this site is currently an operating landfill, there will be virtually no loss of on-site flood storage area. There are no watercourses on-site and consequently no realignments are required.

Potential Effects

There is no potential for an increase in flow levels upstream of the site as no watercourses drain through the site and the external drainage areas contributing to the site runoff will not be altered.

An increase in peak flows and runoff volumes are not expected to result in flood concerns since there is presently very minimal on-site flood storage area.

Site drainage and groundwater from the site both discharge to the north into the wetland area. The continuation of landfilling at this site will result in some additional or prolonged surface water quality impacts. Water quality monitoring at the existing landfill indicates that surface quality is not being impacted beyond the property boundaries.

Mitigation

As part of the development of the conceptual design and operating plan for the landfill, a surface water management plan will be developed. This plan will identify site specific measures to provide flood and erosion control for downstream watercourses. Such measures include source controls, storm water conveyance systems and end-of-pipe controls (e.g. surface water management pond).

Leachate produced on-site will be naturally attenuated in the wetland area to the north and east of the site. No discharge of untreated leachate to off-site watercourses will occur. A water quality monitoring program will continue at the site to ensure that off-site watercourses are not being impacted and are within the Provincial Water Quality Objectives (PWQO).

Net Effects

Development of the landfill site will not create an adverse effect on the downstream surface water flow regime. Specific measures to control stormwater runoff volumes and erosion will be identified as part of a storm water management plan for the site.

The landfill will be operated as a natural attenuation site. Leachate-contaminated groundwater discharges to the wetland north of the waste fill area. Surface water quality at the property boundary will not be impaired above PWQO.

7.2.10 Transportation

Description of the Environment Affected

The proposed site was considered with respect to potential for impacts to traffic safety and to traffic operations along the haul routes to the site.

It is estimated that the waste haul vehicles travelling to the landfill will create approximately only 1.32 accidents annually. This is due to the relatively small volume of traffic generated by the site. In addition, an estimated 42 million at-grade truck/train conflicts may potentially occur annually with waste haul vehicles. The total number of waste haul trucks travelling through intersections requiring the vehicle to stop was estimated at 307,000 annually.

The annual truck-kilometres travelled on single-lane (in one direction) public roads to the landfill site was estimated at 229,000. The estimated annual truck-kilometres travelled on multi-lane (in one direction) public roads to the landfill was 136,000.

Potential Effects

There will be an increase in traffic due to the proposed landfill. Truck traffic will be arriving at the site from areas within the Region currently using the site along with additional points across the Region.

The traffic generated by the landfill may create impacts along the roadways to the site. The potential effects of the landfill traffic on the traffic safety and operations near the site include: delays to non-landfill road users; adequacy of the road design to accommodate an increase in the number of trucks; and, any possible safety concerns arising from an increase in truck traffic.

Mitigation

As part of the development of the conceptual design for the landfill, a detailed transportation impact assessment will be undertaken. This study will include a more detailed assessment of traffic operations and safety. Specific mitigation measures will be identified including such measures as upgrades to the intersection of Regional Road 55 and the existing landfill site access road.

The need for designated haul routes to the site, driver education and enforcement will also be considered.

Net Effects

The haul routes to the landfill site will maximize use of Regional and provincial roads that are or will be at appropriate design standards after mitigation.

An increase in the amount of travel on the haul routes, due to landfill related traffic, may increase slightly. The majority of waste haul traffic in the Region is already travelling to this site.

The need for upgrading of intersections will be determined as part of the detailed site assessment. In particular, the site access road and Regional Road 55 intersection will be reviewed to determine if it will provide the appropriate level of service.

8.0 CONCLUSIONS

The Regional Municipality of Sudbury proposes to construct and operate a long-term waste disposal site on parts of Lots 8 and 9, Concession IV, Neelon Township, within the City of Sudbury. The landfill is an expansion of the Region's existing landfill site. The landfill undertaking is intended to serve non-hazardous solid waste generators within the Region.

The Region of Sudbury landfill undertaking has been planned in accordance with the requirements of the *Environmental Assessment Act*. The planning process which led to the identification of this undertaking was completed through the Region of Sudbury Waste Management Systems Plan.

8.1 APPROVAL SOUGHT BY THE REGION OF SUDBURY

The Regional Municipality of Sudbury is seeking approval for the undertaking under the *Environmental Assessment Act*. Additional approvals (i.e. *Environmental Protection Act*) will be sought at a later date. These approvals will be requested after the conceptual design and operating plan for the landfill has been prepared and detailed impact assessment studies completed.

8.2 PROPOSED TERMS AND CONDITIONS

The Region of Sudbury proposes the following terms and conditions as part of the approval of the undertaking under the *Environmental Assessment Act*.

- Formation of a landfill Site Liaison Committee comprised of local public representatives, the public at large, regional staff and regional councillors. The role of the Committee will be to ensure that the concerns of the public are addressed in the landfill design and operating plan. This will include the incorporation of mitigation measures, identified through detailed impact assessment studies, into the plan. The Committee will then monitor the operation and performance of the landfill to ensure public concerns are addressed. The Site Liaison Committee will be established in Spring 1997 prior to the detailed impact assessment studies being undertaken.

- The Region will prepare an Operation and Development Plan and Hydrogeological Investigations report in support of *Environmental Protection Act* approval for the site. In conjunction with this work, a number of impact assessment studies will be completed. The purpose of these studies will be to identify site-specific impact mitigation measures for incorporation into the Operation and Development Plan. These impact assessment studies will include, but not be limited to, the following:
 - . Air Quality (including dust, odours, landfill gas)
 - . Bird Nuisance and Health Hazard
 - . Noise
 - . Surface Water
 - . Transportation
 - . Visual

- Submission of a report to the MOEE once the landfill has commenced operation, outlining the success and progress of 3Rs activities in the Region of Sudbury. The report will outline any proposed activities or programs to improve the level of waste diversion from landfill.

**APPENDIX A
INCINERATION LETTER**



The
Regional
Municipality
of
Sudbury

La
Municipalite
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Environmental Assessment Branch, M.O.E.E.
5th Floor, 250 Davisville Ave.
Toronto, On
M4S 1H2

Re: Exemption From Investigation of Incineration

Dear Sir

Please be advised that the following resolution was ratified by Regional Council on September 27, 1995:

That the Regional Municipality of Sudbury's Waste Management Systems Plan not investigate incineration as an alternative to landfill and further;

That if the ban on incineration is lifted, that the Project Manager apply for an exemption order to ensure that the Waste Management Systems Plan is in compliance with the Environmental Assessment Act.

The Region of Sudbury is currently in the final stage of the landfill site selection process of it's waste planning project. Therefore, it would not be feasible or practical to consider incineration as an alternative to landfill.

I would like to request, on behalf of the Regional Municipality of Sudbury, that the Waste Management Systems Plan be exempt from considering incineration.

Thank you for your co-operation in this matter. Please feel free to contact me at (705) 674-4455 ext. 4255 if there are any concerns or questions.

Respectfully

Lori Whyte
Project Manager, WMSP

cc D. Saunders, MOEE
S. Hayduk, Chair WMSP Steering Committee
P.J. Morrow, RMOS

APPENDIX B
PROJECTION OF FUTURE WASTE QUANTITIES

APPENDIX B PROJECTION OF FUTURE WASTE QUANTITIES

To assess the long-term viability of the Region of Sudbury's existing waste management system, the quantity of waste requiring management in the future was projected. Waste quantity projections were developed by multiplying the projected population of each municipality by the municipal waste generation rate.

In May 1993, the Planning and Development Department of the Region of Sudbury developed long range population projections for the period 1992 to 2001. The base year for these projections was the 1991 Census population for the Region of Sudbury. Three projection scenarios were developed to demonstrate the potential range of populations under different circumstances. These scenarios were "natural growth", "in-migration" and "out-migration". Projections were done only on the Regional base population and the City of Sudbury base population to enhance the accuracy of the projection model. Each of the Area Municipalities was allocated a projected population based on its relative share of the Regional population as it existed at the time of the 1991 Census. Based on the existing conditions of the Region, there has been little or no growth in the Region since 1991. Consequently, for planning purposes, it is appropriate that the "natural growth" population growth scenario be used. Population growth in the Region over the period 1996 to 2001 was projected to be 1.74% under this scenario. These population figures are shown in Table B.1 by Area Municipality. For the WMSP, long-term projections were developed for a 40-year period. The population growth was assumed to remain constant at 1.74% (over five years) for this time period.

The future waste quantity projections were developed by multiplying the population projections by the per capita waste generation rate developed. The generation rate (2.33 kg/person/day) was assumed to remain constant (on a per capita basis) over the WMSP planning period. As a result, any annual increases in waste generation are due to an increase in the population of the municipality. Table B.2 shows total cumulative waste generation for a 20 year period from the start of 2000 to the end of the year 2019. These waste quantities represent 100% of the municipal wastes that may be generated and do not account for waste diversion that will occur in the future.

**TABLE B.1
POPULATION PROJECTIONS**

Area Municipality	YEAR											
	1995	1996	1997	1998	1999	2000	2001	2006	2011	2016	2021	2026
Capreol	3,941	3,958	3,974	3,990	4,003	4,016	4,027	4,097	4,168	4,240	4,313	4,388
Nickel Centre	12,759	12,816	12,867	12,917	12,961	13,003	13,039	13,265	13,495	13,729	13,967	14,210
Onaping Falls	5,589	5,614	5,636	5,658	5,678	5,696	5,712	5,811	5,912	6,014	6,118	6,224
Rayside-Balfour	15,559	15,629	15,691	15,691	15,752	15,807	15,857	16,132	16,412	16,697	16,987	17,282
Sudbury	96,175	96,602	96,996	97,363	97,705	98,013	98,288	99,998	101,737	103,507	105,308	107,140
Valley East	22,698	22,799	22,891	22,479	23,059	23,132	23,196	23,599	24,009	24,426	24,851	25,283
Walden	10,144	10,190	10,230	10,270	10,305	10,338	10,367	10,547	10,730	10,916	11,105	11,298
Region	166,865	167,608	168,286	168,868	169,463	170,006	170,486	173,449	176,463	179,529	182,649	185,825

**TABLE B.2
PROJECTED CUMULATIVE WASTE QUANTITIES**

Area Municipality	CUMULATIVE WASTE GENERATION TO END OF YEAR (TONNES)							
	2000	2001	2002	2003	2004	2009	2014	2019
Capreol	3,370	6,750	10,140	13,540	16,960	34,220	51,800	69,670
Nickel Centre	10,920	21,870	32,850	43,870	54,930	110,800	167,640	225,470
Onaping Falls	4,780	9,580	14,390	19,220	24,070	48,550	73,450	98,780
Rayside-Balfour	13,270	26,580	39,940	53,340	66,790	135,190	204,470	274,800
Sudbury	82,280	164,790	247,590	330,680	414,050	839,640	1,269,630	1,705,620
Valley East	19,420	38,890	58,430	78,040	97,720	197,140	298,290	401,180
Walden	8,680	17,380	26,110	34,870	43,660	88,080	133,280	179,260
Region	142,720	285,840	429,450	573,560	718,180	1,453,620	2,198,560	2,954,780

The waste quantity projections indicate that the Region of Sudbury will have to manage approximately 3,000,000 tonnes of waste over the 20 year planning period beginning at the start of 2000, and ending at the end of year 2019.

APPENDIX C
DESCRIPTION OF QUANTITATIVE EVALUATION
METHODS

APPENDIX C DESCRIPTION OF QUANTITATIVE EVALUATION METHODS

THE CONCORDANCE METHOD

The Concordance Method is particularly useful for nominal, ordinal and interval data or where there is a combination of data types. The Concordance Method compares alternative sites in pairs for each criterion, identifying the better of the two sites. The site which is the best of the pair receives "points" equivalent to the weight of the criterion under which the two sites are being compared. If the sites are equally good for that criterion, the points are divided equally between the sites. This pair-wise comparison is carried out for all sites for each criterion. The results of each pair-wise comparison is placed in a Concordance Matrix. The "points" attributed to each site are then added across rows and divided by the total weights for the criteria. The scores can then be used to identify differences in levels of impacts between sites and to rank the sites.

This methodology can be summarized with the following formula:

$$CS_x S_y = \frac{\text{Sum of the weights for those criteria where Site X is better than Site Y} + \text{Sum of the weights for those criteria where Site X is equal to Site Y} \div 2}{\sum \text{Weights for the full set of criteria}}$$

(\sum = sum of)

where $CS_x S_y$ is the Concordance Index for Site X and Site Y.

The range of values for the Concordance Index are 0 to 1. If $CS_x S_y = 1.0$, then Site "x" (S_x) is better than Site "y" (S_y) for all criteria. If $CS_x S_y = 0$, then Site "x" (S_x) is worse than Site "y" (S_y) for all criteria.

SIMPLE ADDITIVE WEIGHTING

The Simple Additive Weighting Method (SAWM) is used for evaluations that have ratio data. It is a formal mathematical technique that reduces the evaluation exercise to one in which each site is classified using a single score representing the potential impact on that site relative to the other sites. This is done at an indicator level and

then at a criterion level. The SAWM requires the numerical raw data which have been measured on different scales (e.g. hectares, kilometres, dollars) to be standardized or normalized onto a common scale.

The standardization exercise is achieved by establishing a value for each site relative to the site which is most impacted based on the criterion results.

Once data are standardized to a common scale, mathematical analyses can be performed. Specifically, the standardized numbers can be multiplied by indicator and criterion weights and the weighted scores can be added to give the final weighted score for a given criterion or discipline.

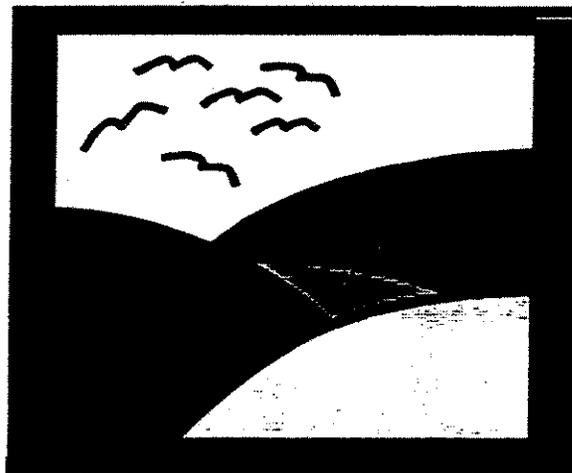
**APPENDIX D
COMPENSATION POLICY**

Compensation Policy

for the

Regional Municipality of Sudbury's

Waste Management Systems Plan



1. INTRODUCTION

In April 1994, the Regional Municipality of Sudbury formally began work on a Waste Management Systems Plan (WMSP) study. A Waste Management Systems Plan is a multi-task planning and evaluation process undertaken to develop a long-term comprehensive waste management strategy for the Region.

The WMSP is a five task planning process;

- Task 1: The Problem or Opportunity
- Task 2: Alternative Waste Management Systems and Diversion
- Task 3: 3R's Implementation
- Task 4: Landfill Siting Workplan
- Task 5: Select Landfill Site and Prepare Environmental Assessment (EA) Documentation

Task 1, completed in January 1995, was able to identify waste quantity projections for the length of the study period and project waste management requirements for the Region of Sudbury. From this information the result of Task 1 was presented in the form of a problem/opportunity statement;

"The focus of the Waste Management Systems Plan is to provide a system to manage the projected 3,000,000 tonnes of solid waste generated within the Region of Sudbury over the next 20 years. The system must provide for the diversion of the maximum amount of waste and the appropriate disposal of the remainder. All of this must be achieved with no detrimental impact to the environment, any individual or the economy of the Region of Sudbury"

Task 2, completed in September 1995, outlined the diversion and disposal strategy that the Region should undertake to achieve maximum diversion from landfill, and the preferred disposal option. The disposal option identified was ***One New Site, Keep Existing Sites Open As Long As Possible***. One new site may be an existing site. As long as possible refers to landfill closure when they have reached their existing capacity. This allows for capital costs associated with landfill closure to occur over a long period of time.

Task 3, which is the implementation schedule for the diversion of wastes from landfill is currently undergoing public review. It is anticipated that the draft document will be finalized in the spring of 1996.

Task 4, completed in September 1995, outlined the method in which the WMSP intends to recruit, solicit and respond to public comment and opinion during the Task

- 5 - Landfill Site Selection Process. At this stage, the Public Liaison Committee began to develop the Compensation Policy.

2. TASK 5 - SELECT LANDFILL SITE AND PREPARE EA DOCUMENTATION

Task 5 is scheduled to begin in April 1996 and it is anticipated to take one year to complete. 17 criteria, identified in Task 4 will be used to eliminate unsuitable areas. The elimination process is designed to provide potential candidate areas in which a landfill site can be identified. Potential sites will be evaluated to reach a preferred site.

The identification of Candidate Areas, involves the use of constraint mapping to eliminate areas that are unsuitable (i.e. lakes, flood plains, recreational areas). From the Candidate Areas, a long list of potential sites will be determined. There will be a maximum of 10 sites identified at this stage.

The long list of sites will be evaluated and compared to arrive at a short list of sites. At this stage, the maximum number of sites will be five. Some examples of the criteria that will be applied are: transportation, current and potential land use and surface water. At this stage, all work will be non-intrusive.

A preferred site will be selected from the short list of sites. It is at this stage of the planning process that the Compensation Policy may apply. Data collection will require the need to access the sites and test for their suitability. It is imperative that testing be completed to demonstrate that the Waste Management Systems Plan has followed all parameters established in the Environmental Assessment Act and that the Region has chosen the best possible site.

3. WHY A COMPENSATION POLICY?

The landfill site selection process may involve the need to access privately owned property to determine the suitability of the site. Access may be requested to walkover the property or may involve intrusive soil and water testing. The Region of Sudbury currently has no defined policy in place that outlines to individuals the minimum/maximum requirements that the Region of Sudbury will observe when there is need to access privately owned property.

The policy also outlines how the Region intends to deal with potentially affected landowners, should a landfill site be placed in their area. Further to this, the policy defines the criteria used to determine who is considered to be "affected".

The policy has been developed prior to the initiation of Task 5 to ensure that all individuals are treated in a fair and equitable manner. In an attempt to safeguard that the policy addresses the potential concerns of the public, the policy was developed by the Waste Management Systems Plan's Public Liaison Committee (PLC). The PLC approach the policy with a view of how they would like to be treated if the situation were to happen to them.

The Project Manager facilitated the transcribing of the document and provided the PLC with information on other Compensation Policies that have been developed with other waste planning studies in Ontario. The Steering Committee approved that the draft policy be presented to the Region's Finance Committee and the Regional Solicitor at their quarterly meeting held January 29, 1996.

4. PUBLIC LIAISON COMMITTEE

The Public Liaison Committee for the Regional Municipality of Sudbury's Waste Management Systems functions to allow the flow of information between the Steering Committee, the technical consultants and the public.

The Committee is comprised of volunteers and has a maximum of fourteen members. They represent all facets of the community. Currently, the Committee encompasses, municipal employees, seniors, engineers, teachers, environmentalists, students, skilled labourers and members of the waste management business community. Whenever possible, the Committee strives to have representation from all seven municipalities.

The Committee has a Chair and Vice-Chair, which are members of the Steering Committee. They have a vote on all matters except financial.

The Public Liaison Committee is divided into voting and non-voting members. Non-voting members have full input on Committee issues. Currently the non-voting members represent the Whitefish Lake First Nations.

The Committee meets monthly, reviews the Task documents, and organizes Open Houses, displays and all forums for public consultation.

5. POLICY STRUCTURE

5.1 POLICY APPLICATION

- ▶ **Access Payments** Any property owner(s) that the Region may wish access to at the short list stage.

- ▶ **On-Site Compensation** Any property owner(s) whose entire or portion of their property is determined to be on the waste fill area and buffer zone of the preferred landfill site.

- ▶ **Off-Site Compensation** Any property owner(s) whose entire or portion of their property is on the periphery of the preferred landfill site.

5.2 PAYMENTS FOR ACCESS TO PROPERTY

The Project Manager would request permission to access the property on behalf of the Regional Municipality of Sudbury's Waste Management Systems Plan, with a full explanation for the request. The Public Liaison Committee has determined that these requests should be executed by personal home visit and follow-up with a formal written request and full explanation of the process and scope of work to be conducted.

Permission to access property will be requested for both non-intrusive and intrusive testing. The technical consultants, M.M. Dillon Ltd. and the WMSP Project Manager would be the primary persons that would be on the property.

5.2.1 Non-Intrusive Inspections

Once the short list of sites has been determined, the Region will approach all property owners and request permission to walk the property to determine the suitability of the site.

Walkovers include any testing that is non-intrusive such as observing the types and range of vegetation, amount of overburden, location of any surface water and surveys.

The owner(s) of each property would receive a one time payment of \$100.00 to access property for inspection of land and non-intrusive testing, on execution of a release.

5.2.2 Intrusive Testing

At the short list stage of the process, intrusive testing such as drilling to determine the hydrogeology of the property will have to be conducted. Prior to any testing, the Region and the property owner will negotiate the condition to which the landscape will be returned to once testing is complete. The amount of work required will be site specific.

The property owner(s) is to be financially compensated up to \$250.00 per day of intrusive testing. Often drilling or other intrusive investigation involves several bore holes, trenches or test pits in clusters. The compensation payment is fixed, regardless of the number of areas affected. The length of time for intrusive testing will be site specific. An upset limit has yet to be determined.

5.3 ON-SITE COMPENSATION

For the purpose of this policy, on-site is defined as any property that would be part of the waste fill area and buffer zone. On-site compensation would apply only if the land in question was selected as the preferred site.

The Region would assume all legal costs for the transfer of the property. Any necessary surveys would be the financial responsibility of the Region.

In the event that a portion of the property extends beyond the immediate waste fill area and buffer zone, the Region would assume all survey and legal costs for the severance of the property.

5.3.1 Process

Each property owner affected by the project will be contacted on an individual basis and advised of the interest of the Region. The concerns of each owner will be noted and addressed.

The Region will prepare or contract an appraisal report for each property to be acquired, arrange for and carry out negotiations with individual owners, prepare and obtain offers and prepare and present appropriate reports to Council, through the Public Works Committee.

Once a settlement has been reached, an Agreement of Purchase and Sale will be prepared in duplicate by the Property Negotiator, a copy of which shall be left with the property owner.

The Property Negotiator will prepare and present to the Public Works Committee a Negotiation Report. The Report will contain a brief description of the property and the Region's offer. If no agreement has been reached, the Report will contain a full outline of the owner's demands, and reasoning for the demands, and the Negotiator's recommendation for further action.

When appropriate, Legal Services will make recommendations to Council on expropriations, and if approved, proceed with the acquisition under the Expropriations Act.

In cases of expropriation, negotiations with owners will continue in order to achieve settlements of the purchase price and compensation payable for the required land.

Whether or not land is expropriated, the compensation for the acquisition of land will be based on the total of the following, if applicable:

- (a) The market value of the land.
- (b) Damages attributable to disturbance.
- (c) Damages for injurious affection.
- (d) Any special difficulties in relocation.
- (e) Reasonable legal, appraisal and other costs.

If a property is being offered for sale at the time of purchase by the Region, the owner may not be entitled to compensation for relocation.

5.4 OFF-SITE COMPENSATION

5.4.1 Relocation

Off-site compensation would apply to any landowner(s) that have property located on the periphery of the waste fill area and buffer zone. The property owner would be given the opportunity to relocate. The same appraisal process would be followed as recommended for on-site parties.

The off-site compensation would be limited to a range of 500 - 1,000 metres from the edge of the on-site area and would be determined by land use (i.e. residential, agricultural, industrial) and would be dealt with individually. If a portion of a given parcel of land exceeds the 1,000 metre criteria, the Region would offer a severance proposal and pay 100% of legal and survey costs.

Off-site parties will be given a time limit of six months to make their decision regarding the Region's offer of compensation. If no decision has been made at the end of the six month period, the Compensation Policy will cease to be applicable.

5.4.2 Remaining Property Owner(s)

Should the off-site owner(s) choose not to accept the offer, the Region will work with the owner(s) both individually and as a group with respect to the following issues:

- ▶ **Water Quality & Supply** There will be testing prior to the operation of the site to determine the existing water quality. Monitoring will continue on a prescribed basis and results provided to the owner. If testing requires the use of monitoring wells, the owner will be compensated as per the intrusive testing portion of the policy. Ongoing monitoring and maintenance of wells will be the responsibility of the Region.

- ▶ **Social Impact** The Region will conduct an assessment of the impact that the landfill will have on dust, noise, litter, traffic etc...and provide information to the owner(s) prior to the operation of the landfill.

The Region will develop contingency plans prior to operation of the landfill, and will allow input from off-site landowners. The Region will also provide a forum for those individuals to express concerns once the landfill is in operation.

5.5 HOST MUNICIPALITY

The Region will assume responsibility for all road maintenance that is the main traffic corridor to the landfill. If a municipal road, the municipality will have the option to transfer the road to the Region or continue maintenance and snow removal etc.. at a cost recovery basis.

5.6 CONTINGENCY PLANS/FUND

The Regional Municipality of Sudbury will develop, prior to the operation of the landfill, a contingency plan to address any situations that may arise from the daily operation of the site. This plan must be distributed to affected property owners, and any interested members of the public, such as the Waste Management Systems Plan mailing list.

1% of tipping fee revenues will be placed into a reserve that is to be used only for addressing and resolving issues that fall under the mandate of the contingency plan. A Site Liaison Committee will oversee the management of these funds. The fund will allow for immediate action when required.

The contingency plan is to be reviewed and updated annually.

5.7 SITE LIAISON COMMITTEE

Prior to the operation and/or development of the landfill, the Regional Municipality of Sudbury will set up a Site Liaison Committee (SLC).

The Site Liaison Committee will be structured as follows;

- Chair** A staff member of the Regional Municipality of Sudbury who functions to facilitate the requests of the Committee and ensure that the appropriate course of action is followed. The Chair will also ensure that a mailing list is developed and maintained. Mailing list members will be kept abreast of the issues raised and addressed by the Committee.
- Landfill Operator** Functions to provide details regarding the daily operation of the site.
- Regional Council** A maximum of three members of Regional Council, with at least one member being a representative of the host municipality. They are to serve a minimum of three years on the Committee. Their function is to ensure that Regional Council is aware of the activities of the Site Liaison Committee and raise any concerns that the Committee may have.
- Public** A maximum of three members of the public, for a three year term. Their function is to raise concerns and issues surrounding the daily operation of the landfill.
- Mailing List** A mailing list will be developed and maintained to keep the public informed of concerns and how they have been handled.

The SLC will deem when monetary action is appropriate and request that funds be accessed from the reserve account. Some examples that would require monetary action would be reparations to litter fencing, improved signage and vegetation enhancement in buffer zone.

APPENDIX E
CONSULTATION ON THE PREFERRED SITE

SIGN-IN SHEET

①

REGION OF SUDBURY WASTE MANAGEMENT SYSTEM PLAN

PUBLIC OPEN HOUSE DEC. 4, 1996

NAME	ADDRESS
Mr. & Mrs	2727 Bancroft Dr.
John Malin	
John Cook	
Theresa Cook	100 Ridgemanment
Patricia Malin	2727 Bancroft Dr.
Tom Ladd	36 MOONLIGHT AVE
Jen & Jim	183 Lonsdale
Theresa Jean	183 Lonsdale Sudbury, On
L. Lacy	2807 Raymond
Lea Johnson	4 Moonlight
C. Ovenspool	NIM
GARY MCCARTHY	NIM
Carole Deane	87 MOONLIGHT AVE.
Jillan Wellington	161 Eugene St. Sud.
Brad Bowler	1130 Southlane Rd, Sudbury, P3B 1N6
KEITH Gilroy	257 BANCROFT DR.
Zeke Koober	2787 Bancroft Dr.
Aurea Lavene	Hannu.

PUBLIC MEETING

WASTE MANAGEMENT SYSTEMS PLAN
 PREFERRED SITE PUBLIC MEETING DEC. 12/96

NAME	ADDRESS
Tammy Dixon	27 Falcon St. GATSON
Sheresa Vian	77 Moonlight St. Sudbury
Edward Jean	77 Moonlight Ave Sudbury
Tom & Edal	36 MOONLIGHT AVE. Sudbury
Jolita Cook	100 Ridgemount
L. Mallett	2736 Raymond
P. Mallett	2736 Raymond St.
L. Ducharme	2782 Bancroft Dr.
R. Ducharme	2782 Bancroft Dr.
L. Desjardis	87 MOONLIGHT.
A. Larose	Hannover
DON GROSS	350 MOONLIGHT AVE
PAVLETTE GROSS	" " "
Bert Duchaine	291 " "
Albert Rovinelli	282 Moonlight Ave
M. O'Millon	3075 BANCROFT DRIVE
Greg & Jean	183 Lenore
Theresa Jean	183 Lenore Sudbury
Danielle Fournier	2848 Rheel
Tanara Fracconi	2800 Kingsway (5601224)
Nick Dellelce	

December 13, 1996
Public Meeting on the Preferred Landfill Site
Council Chambers, Civic Square

- Q. The outline for the landfill on the map, is that 66 hectares?
- A. The site is larger than the 66 hectares. The recommendation for the Sudbury landfill is a vertical expansion of the existing waste fill area.
- Q. There are some sites where there are methane gas systems for power use, some sites in the States have been turned into ski hills. Has anything been decided for the future of the dump?
- A. It depends on the EPA level of detail for the design, operation and ultimate use of the site once it has been closed. The final topography of the site will determine the end use.
- Q. If you bring that landfill site up and you bring above the point of the hills you have no concerns regarding drainage.
- A. The final design will be determined as part of the EPA process. I cannot tell you exactly what the final height will be. It will be necessary to develop a drainage plan for the site. At the present time the ground water drains out to the marsh. The present drainage is not considered a problem. There is annual monitoring program with respect to ground and surface water. The monitoring report is prepared by a consultant. They have not indicated that there is trend occurring that indicates that the marsh is not able to attenuate the leachate or will not be able to in the future. We have been advised that we are in compliance with the Provincial Water Quality Objectives.
- Q. The video regarding public consultation was very important. At the meeting in Coniston there were 260 plus residents in attendance. Someone must have contacted them personally. There are not that many people here tonight. We heard nothing about this until two weeks ago. I am disappointed in the process involved in notifying us. I do not think that we were made aware of this meeting. I was upset that the dump was going in my backyard. I believe this was a done deal. I really think we spent a lot of money for nothing. I did some investigating. I am satisfied that it will not hurt the water supply. Regardless of what we think it is going to be the site. I went to the dump and talked to the people there. It looks good. It does not look like a dump anymore.

- A. When the notification of affected landowners was delivered at the long list and short list stage, there were no residences notified at Site E2 by Coniston. What you saw was a grass roots movement of concerned citizens. However, the number of attendees does not affect the site selection process.
- Q. At one time they used to go so high, now they are going to go higher.
- A. The final design and operation of the site would not allow for a steep grade because the waste haul vehicles would not be able to deposit waste. The site will be designed to prevent the sides from collapsing.
- Q. The document says that the site will be raised 21 metres. But what you are really going to do is raise it by 33 metres, or over 100 ft.
- A. The document states that, based on current waste generation rates and diversion targets, the site will be raised 21 metres. When the Region applied for the five year interim expansion the approval was not to exceed 292 metres about sea level. The Certificate of Approval is for a five year period, or a final elevation of 292 metres above sea level, whichever one is reached first. Based on current waste diversion rates, 20 years of waste will mean an elevation rate of 21 metres above the elevation level of the site at the year 2000.
- A. The consultants or Lori can not definitively state the actual final height of the landfill at this stage of the process. That information will be available after the development of the conceptual design as part of the EPA studies. There is no definitive design as yet.
- Q. We should get them to spend some money for example a set of lights at the intersection at Moonlight. We need some cleanup too.
- A. You can provide input into what the site's final design will be. Next week at the Steering Committee we are asking for the dissolution of the PLC. Their job of informing the public about the Environmental Assessment process is finished. The next step which is the actual EPA studies recommends the establishment of a Site Liaison Committee. The members will include three from the public. The public will listen to the community and provide their input, for example, litter control program, waste haul routes, make sure that there is a permanent vegetation barrier between residents and the landfill site, etc. It is the intention of the Region to work with the community and ensure that we dot our "i's" and cross our "t's". Let's make sure the Region has every opportunity to keep in touch with the community.
- Q. How are we going to police cleanup. I saw a fridge on the side of the road. There are mattresses thrown in the bushes. We pay taxes for nothing.

- A. That's correct. If the Waste Management Systems Plan had been done 20 years ago, we would not have conceived that there was going to be a blue box program, mandatory leaf and yard waste composting system, etc. There are things that could happen in the next 15 to 20 years that may knock garbage generation rates down. All we can do is base it on what is here today.
- Q. I have my own composting unit. There are many smells etc. If you put a composting site at the dump for the whole Region it will smell very bad.
- A. I can't say that there will be a composting facility at the site. to date, Regional Council has no current plans regarding composting.
- Q. Tom calling me was the only way I found out about this meeting. I am very insulted. There should have been a door to door campaign.
- A. The public consultation program is designed to reach all individuals within the Region, not just those individuals who may be directly affected. With respect to public consultation, we have had advertising on radio and in print. We sent notifications to the 231 affected landowners within 1 km of the site. There is not much more that we can do other than tv, radio and newspapers.
- A. There also is a responsibility to know what is going on in your community. I received no phone calls from people. None.
- Q. I am afraid the mountain is going to get so big I am going to see trucks on the hills.
- A. That is where the Site Liaison Committee can assist the residents, by ensuring that the landfill design includes a barrier to reduce visibility of the site.
- Q. We did not show up at the other open houses, etc. between we thought that the Sudbury Landfill site was being phased out in five years. In print it said the site was too small and in five years you were looking for another site so therefore we were not concerned.
- A. The Region has never said that the Sudbury landfill would be closed at the end of the five year expansion period. What was said was that they were seeking approval to operate the site for five years, not that the existing site was too small. Under the current Certificate of Approval, we cannot exceed 292 metres.
- Q. Why do you go so high in the first place. How is that going to be covered?

- A. If you see illegal dumping, get the licence of the vehicle and report it to the Ministry of the Environment and Energy. It's their job to track down and fine illegal dumpers.
- Q. At the Open House there was an engineer that said studies were being done because wetlands could collapse and not handle the leachate. Will this not happen at site E3?
- A. The gentleman was referring to constructed wetlands for mine tailings. That is a form of engineering. He was not referring to wetlands that have formed naturally.
- Q. And the seagulls eat the garbage and the rat poison. And the seagulls shit on my yard and in Ramsey Lake. What are you going to do with all the rats?
- A. There has been no rats at the site since they stopped incinerating there over 20 years ago. I checked with the company that does the pest control as you asked me to do at the Open House. They stated that they do not lob bread soaked with arsenic on the garbage as you suggested at the Open House. They use little foil packets the same size as small bags of chips. This is placed into the waste and compacted and covered. Any rodents that are burrowed in the waste would eat the packets and die there. The pest control company stated that there were no unusual incidents of vermin except seasonal occurrences of field mice in the fall. But that happens whether there is a landfill around or not. It is not unusual to have field mice around in the fall.
- Q. I don't want the dump.
- A. The MOEE does not take "I do not want it" as a valid reason. The decisions are based on the criteria presented to the public throughout the site selection process.
- Q. We have to go and block that dump.
- A. I am trying to give you the tools to work with the Region.
- Q. What you said makes sense. What Tom says makes sense. I have to admit that what we have out there now is much better than what we had 6 months to a year ago. This is what is there now. Something can happen in the future that may make garbage disappear. There may be distillation, incineration. That may happen before the 20 years is up. It's difficult to plan ahead. All you can go by is what is available today.

- A. The sites are divided into cells. The operations manual approved by the Ministry of the Environment and Energy states that we have to fill one cell first before we can move on to another. The sites operates in accordance with the Certificate of Approval. You have to fill one area before you can start on the other.
- Q. It was better the other way spreading it all across and covering it at the same time.
- A. The waste is currently covered daily, regardless of the area.
- Q. In 20 years time you will be applying again.
- A. Before we were applying for all landfills every few years. This is long term strategy to deal with the entire waste management system in the Region. Otherwise we might have to meet here every three years.
- Q. Why do you have to go so high in one area before filling in another?
- A. The current Certificate of Approval has identified that the site be developed in three cells. Currently Cell 1 is being used. It must be completely filled before moving to Cell 2 and then to Cell 3. With respect to when we would reach our approved contours, 292 metres, we may not achieve that at the end of the five years. 313 metres is a theoretical figure. It is based on 20 metres above the contours for a five year period without a design for the purposes of the EPA. 60 feet above the height of the landfill not above the surrounding hills.
- Q. What is the current elevations?
- A. As per your request at the Open House last week, I asked the Region's Construction Services to do three elevations at the landfill site. The highest area, which is covered waste is 284m, the area where the waste is currently deposited is 277m and the lowest are is 270m.
- Q. I don't mind Sudbury using the dump, but the whole Region is too much. There will be a million more seagulls than is there now.
- A. Based on waste coming in from the Region as other landfills reach their capacity. Nickel Centre landfill is currently receiving a five year expansion. Onaping Falls the same thing. It is very reasonable that we will never receive waste from Rayside-Balfour. Walden and Valley East have significant time for their landfills. You cannot expect the Region to be able to say that the landfill will have such a percentage at a certain time. The EPA guarantees that you do very detailed and very site specific studies after a site has been selected. A bird control program could be part of those studies.

- Q. We live in the affected area and did not receive written notice of the Open House held last week on December 5, 1996. Everyone in the subdivision should have gotten them.
- A. We have never provided notices of these meetings. We have people that have come to the open houses that are not affected individuals. To only advertise the meetings to people in the community would be catering to special interest groups.
- Q. We live within the area of E3. We were told that the dump would be full in five years.
- A. You have to reach everyone in the Region. The lifespan of the landfill has nothing to do with whether or not you can fit waste in it. We only get approval from the Ministry for a period of time regardless if it can be used for a longer period of time.
- A. To do an environmental assessment is the only way we can get more than 5 year capacity. The Region has a Certificate of Approval for every landfill. The maximum the Region can apply for, without doing an environmental assessment is a five year expansion.
- Q. You say in your Task 1 document that the population is 163,000 in the Region. Therefore there will be an 78% increase of waste going to site E3.
- A. You are basing your numbers on the number of homes. There will not be a 78% increase in the amount of waste. The City of Sudbury produces 62% of the waste because you have an industrial sector that operates within the City of Sudbury. Only 40% comes from homeowners. The waste tonnages are based on the entire waste stream. The City of Sudbury has the majority of commercial, industrial and institutional waste. Some examples are INCO, the hospitals, Cambrian College and Laurentian University. Therefore, Sudbury produces the majority of waste.
- Q. You also said in the Task 1 report that the Sudbury, Nickel Centre and Onaping Falls landfill had limited lifespan. You also said that Site E3 was operating under an emergency Certificate. But now you say it is good for another 20 years?
- A. Other landfills in the area have greater than five years. At the time that the document was produced, those landfills were operating under emergency Certificates of Approval. Since that time, the Region has received a 5 year interim expansion of the Sudbury site and Onaping Falls. The Region is waiting for approval for the Nickel Centre site.

- Q. We pay taxes and for what? To have a dump?
- A. The Region is responsible for waste management disposal and 3R's programs such as the Bluebox and Household Hazardous Waste program. Tipping fees collected at the landfills currently fund these programs. The City of Sudbury is only responsible for garbage collected which is paid for by taxpayers.
- Q. If you make an application under the environmental assessment, is there a record of any applications turned down?
- A. Yes. Some examples are Guelph and Northumberland.
- Q. How much money is being set aside for clean up in the outlying areas. I cannot see someone driving in from Onaping Falls with their garbage.
- A. The Waste Management Systems Plan recommends that waste transfer stations be installed when a landfill closes. This will allow members of the public to have a convenient method of disposal. The only additional vehicles going to the landfill would be commercial waste vehicles and municipal trucks. The waste stations are designed to reduce the possibility of illegal dumping of waste.
- Q. Who is responsible for the blue box program.
- A. The Region.
- Q. I put my box out and it doesn't get picked up for three weeks, or it gets thrown all over the street. I have phoned and complained, but nothing changes.
- A. Can I get your name and address after the meeting and I will see to it.
- Q. When you did your environmental criteria, you have the same complaints from everyone and you still pick this site, it really does not matter. The social criteria should have been higher.
- A. You want to make sure overall that you will not be contaminating municipal wells, a major water supply source etc. The criteria have been brought to the public throughout the process for comment and we used their comments to help us select the site. There has to be a traceable process. You cannot change rules and make one criteria more important than the other without justification.
- Q. There are new regulations on landfill standards being introduced in January 1997. Will the Region have to abide by these new laws?

- A. The Certificate of Approval sets out conditions that a Region has to abide by unless there is legislation that supersedes it.
- A. The Landfill Design Standards may not take effect until late next year or early 1998. The work being done now is under the Environmental Assessment Act.
- Q. Why can't you wait and see what this new legislation brings?
- A. We could not wait. It took over 7 years to get the five year expansion.
- Q. 3 million tonnes of garbage will have a lot of toxins. Not one area was in an area of wetlands?
- A. There are no classified wetlands in the area. The MNR has classifications of wetlands and there are none in the Region. Examples of classified wetlands would be estuaries, or areas that were important breeding grounds for birds.
- Q. What does a Certificate of Approval look like.
- A. It is a licence to operate a site and how to operate it, when to cover it, various monitoring locations, waste diversion programs, development plans, wide range of topics. In our case it is 12 pages long. The development plan that goes with it is approximately one inch thick.
- Q. How much of the land for the other sites belongs to mining companies.
- A. Out of the long list of sites, four of them were owned by mining companies and 3 out of the short list.
- Q. How many kilometres did you go out.
- A. 25 km circumference.
- Q. There is so much area that is not near homes. Surely there is somewhere out there that could be used for a dump.
- A. Unfortunately, the Region has vast amounts of land that has bedrock at the surface and those areas had to be eliminated. You cannot place garbage on rock.
- Q. But did it have to go somewhere where everyone can see it?
- A. It may be a condition of the Certificate of Approval that a visual barrier be constructed to screen the site. That is something that is negotiated between the MOEE and the municipality.

Q. So what happens next? What can we do now?

Councillor Nicholson made an announcement regarding the establishment of the Site Liaison Committee and requested that they participate in order to voice all of their concerns. He also stated that he voted yes for the preferred site because he had knowledge of the work that was put into coming to this decision.

- A. A positive outlook should be taken. The Site Liaison Committee can work towards making sure that the diversion programs identified in the Task 3 document can be implemented so that everyone else in the Region cuts down on garbage.
- Q. I really appreciate your work and you are doing good work. I think using trees for a buffer is an excellent idea. I think it is not a bad site. The buffer and new road is a good idea. We can all work together to beautify the area.
- A. Exactly. The Site Liaison Committee, with the members of the public can work to ensure that the needs and concerns of the community are addressed.
- Q. We need to keep a close watch on this. It is in the cards that this is going to be there. We are going to have to get our needs known and have them spend some money. Like improving the intersection at the dump.
- A. Traffic impact studies and development of waste haul routes can be part of the EPA studies.
- Q. There are other properties in the area that need to be cleaned up.
- Q. The dump has improved 100% since Day took over the site. And on my property there is nothing on our land except metals and rubber tires. It is clean. Before the 20 years is up there will be some other ways to eliminate waste disposal to a landfill. There could be incineration.
- Q. The documents say that there was testing done at the other sites, but no mention of what was done at site E3. Why was there no testing of groundwater at site E3?
- A. There is considerable data available on this site regarding water testing. During this process they did not spend time doing testing of their own, they used existing data from other consultants reports.
- A. Anyone that wants a copy of the monitoring report can obtain one.

- Q. What about toxins and the formation of toxins from the organic decay of the garbage? This is a risk to public health. And what about the seagulls that eat these toxins and bring them to Ramsey Lake which is a drinking water source.
- A. Sudbury and District Health Unit do not believe that there is anything that poses a health risk from a landfill site.
- Q. What about the methane gas? And the seagulls?
- A. Studies show over and over again that air quality is not a problem and the MOEE does not even include that. Seagulls are a nuisance and are site specific.
- Q. How long before we now if the Ministry of the Environment will let the Region use the site for 20 years?
- A. If we get EA approval we will have to do a great deal of study before a Certificate of Approval would be issued. We are suggesting that the EPA studies be part of the 1998 budget. Approval to use site E3 is a two step process. Step 1 has been completed; the selection of the site and why it was selected. Step 2 will be related to its operation, and very specific details such as haul routes, buffer, etc. We expect 28% diversion next year based on the current program and the implementation of leaf and yard waste composting.

Jean-Louis Jean
and/or
Thérèse Jean

183 Levesque Street
Sudbury (Ontario)
December 12 1996

WASTE MANAGEMENT SYSTEMS PLAN for the
Regional Municipality of Sudbury

Re : Region of Sudbury Landfill Site Selection

We live in the offsite limit (within 1000 metres) of site E3, and did not receive a written notice in respect of the December 4 1996 public meeting held at the Sudbury Sports North Villa.

- Please explain..

WMSPTASK 1 FINAL REPORT, THE PROBLEM/OPPORTUNITY, JANUARY 1995,p56 :

"Three of the Region's six landfill sites (i.e. Sudbury, Nickel Centre, Onaping Falls) have limited lives. Each of these sites are operating under an emergency C of or a five year interim expansion".Page 47 of the same report states : "Sudbury Landfill Site expected life : approximately 5 years".

- How can you explain , that in October of 1996, there is still room in site E3 for the whole Region's wasteload of 3,000,000 tonnes in the next 20 years ? ... WMSP VOL. III, p3.

- And how can one make a complete 360° turn in opinion like this ?

- We stop complaining about rats, seagulls droppings, dead seagulls at Moonlight Beach, three or four years ago, because our local politician told us that the Sudbury Landfill site will be closed off or phased out at the term of its five year expansion certificate. Now, it has been selected as the Region's preferred landfill site or **SUPER DUMP**.

- The increase in pollution caused by a 78% increase of waste at site E3 was not addressed in the EA study or are we mistaken. Also the increase population of rats, (rat poison), seagulls and the adverse effect of their presence in our neighbourhood and recreational areas.

- Is the rat poison monitored in any way ?

- Ms Lori Whyte stated at the December 4 1996 meeting : "That nothing can be done to control the seagulls, they are everywhere".

- Were there any studies made on the future impact of increased air pollution by a heavier wasteload and water pollution by seagulls in particular ? Ms Whyte, please explain.

- Maximum elevation of 101.75', plus the organic waste toxins and possible leachate problems (apparently there are studies made to try and forecast at what point in time a landfill site may become saturated and stop the attenuation of leachate) because no one knows at this time when saturation may occur. Correct us if we are wrong.

- As one can see, the selection of site E3 as the Regional Landfill Site would bring about an entirely new set of conditions or references that would have to be dealt with by the Region's AE studies. We are disturbed by the Region's attitude of ignoring our community of Adamsdale future quality of life, air and water pollution, visual impairment and traffic increase endangering our children and seniors in particular, flying debris, scattered waste. All these factors would depreciate our property's value. Consequently, our community would suffer a poor image and economic loss. Land planning would change, especially residential properties would lose the most.

- Was the ground water of site E3 conducted in the same manner as for the other preferred sites ?

Jean-Louis Jean
and/or
Thérèse Jean

183 Levesque Street
Sudbury (Ontario)
December 12 1996

WMSP, VOL. III, October 1996, p3...letter addressed to Ms Lori Whyte by sender Mr David Caverson, states : "Site E3 is the existing Sudbury landfill site. Considerable data already exist on this site which may reduce or eliminate entirely any further work which must be performed in evaluating the site as part of the Task 5 process. I will make this information available to you upon your request".

- Was not Dillon Consulting appointed and paid to do the same studies using the same criteria for all preferred sites ?

CONCLUSION : We respectfully urge the Region to reconsider the position they have taken regarding site E3 . We thank you for your attention.