



ENVIRONMENTAL ASSESSMENT REPORT

MADAWASKA VALLEY WASTE MANAGEMENT STRATEGIC PLAN VOLUME I OF II

**TOWNSHIP OF MADAWASKA VALLEY
COUNTY OF RENFREW, ONTARIO**

Prepared for

THE CORPORATION OF THE TOWNSHIP OF MADAWASKA VALLEY

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Greenview also wishes to acknowledge the assistance of the Public Liaison Committee (PLC) for their dedication and important role in the study.

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EXECUTIVE SUMMARY

The Township of Madawaska Valley is a small, rural municipality situated in western Renfrew County at the western end of the Ottawa Valley of eastern Ontario. In 2001, the geographic townships of Sherwood, Jones, and Burns, and Radcliffe, joined the urban centre of the Village of Barry's Bay to form the Township of Madawaska Valley.

The region is rich with forested lands, cultural heritage, and recreational opportunities for permanent, seasonal, and visiting residents. The urban centres of Barry's Bay, Combermere, and Wilno provide residents with all basic needs, services, and other amenities typical in small, rural communities.

Prior to amalgamation, the former Village of Barry's Bay was faced with the closure of its municipal waste disposal site and needed a waste management solution for the urban centre. As a result of amalgamation, the three new municipalities were challenged with a deficiency in long-term waste disposal security, with decreasing capacity in the available waste disposal sites within the amalgamated Township.

In 2003, the Township of Madawaska Valley acknowledged its waste management challenges and, in parallel with a comprehensive waste disposal site compliance action program, initiated a Waste Management Strategic Plan to identify the best solution for long-term solid waste management for the residents of the Township. In the meantime, the Township continues to operate its waste management system consisting of two depot locations transferring to one disposal site, Bark Lake, which is now operating under an emergency Provisional Certificate of Approval issued by the Ontario Ministry of the Environment.

In 2004 and in consultation with the public, the Township submitted Terms of Reference to the Ontario Minister of the Environment in accordance with Section 6 (1) of the *Environmental Assessment Act, R.S.O. 1990, Chapter E.18*, which defined the purpose and rationale for the Waste Management Strategic Plan, and the various requirements of the *Environmental Assessment Act* as a framework for the undertaking. The Terms of Reference were approved in November 2004, formally commencing the development of the Waste Management Strategic Plan.

In order to appropriately assess the best solution for long-term waste management, the Township established a set of alternatives for consideration in the project that were reasonable and justifiable for a small, rural municipality with limited resources. These alternatives to the undertaking identified increased waste diversion measures at the forefront, as maximized diversion of waste within the municipality should result in conversely minimized quantities of residual waste to be managed. The alternatives considered for residuals management included: landfill, waste export outside of the Township, waste incineration, and do

nothing. As identified in the approved Terms of Reference, the Township would consider and evaluate the alternatives to the project with regard to the natural, socio-cultural, technical and built, and economic environments. For a small, rural municipality, economics and technical viability of alternatives are fundamental evaluation criteria for any municipal undertaking. Further, public support of these undertakings must be considered, and was elicited throughout the project.

Upon completion of a comprehensive campaign of background data collection and an initial assessment of the alternatives, the incineration alternative was screened out due to economic burden, and the anticipated complicated approvals process for facility permitting. The do nothing alternative was maintained with the understanding that doing nothing was not a responsible approach to the issue; however, would provide a control alternative for consideration if a reasonable residuals management solution were not identified for the Waste Management Strategic Plan.

The remaining alternatives of landfill, and waste export were carried forth for more detailed consideration in the development of the project. These alternatives to the undertaking were complemented by examinations of increased waste diversion that would be feasible for the municipality, with an admirable blue-box diversion rate of over thirty percent. The high diversion rate is attributed to an effective participation rate of Township residents via curbside collection, an established user-pay program, and enhanced material acceptance program through the Ottawa Valley Waste Recovery Centre in Pembroke. Further consideration of mandatory recycling, increased household hazardous/special waste days, and the establishment of bags limits were identified in the early stages. The management of organic waste was also identified for consideration as a method to the diversion alternative.

For residuals management, the landfilling of waste at an expanded (existing) waste disposal site, or the development of a new landfill site was considered. From the background and preliminary studies completed, only the Township's Bark Lake site had potential as an existing site for expansion. Based on a constraint mapping exercise for lands compatible for the development of a new landfill site, only two locations were identified based on key selection criteria including: topography, adjacent land use, and proximity to surface water.

The waste export alternative was identified for managing the Township's residuals with three possible export destinations in Pembroke, Carp, and Moose Creek, Ontario. The export of waste was considered primarily on the aspects of cost, and security of the alternative – could a receiving facility commit to a long-term contract to take the Township's waste?

From a comprehensive set of studies undertaken for the landfill, and waste export alternatives, including an assessment of potential impacts to the natural, socio-cultural, technical/built, and economic environments, one concept for residuals management clearly led all others – the capacity expansion of the Bark Lake waste disposal site.

This report (Volume I), supported by a comprehensive consultation program with the Ontario Ministry of the Environment, government review agencies, First Nations peoples, and the interested public (Volume II), presents the rationale, need, and detailed evaluation of the alternatives considered in the development of the Waste Management Strategic Plan, on the natural, socio-cultural, technical and built, and economic environments, as pertinent to the study.

The best solution for the Township of Madawaska Valley's Waste Management Strategic Plan is to maximize waste diverted via: the establishment of mandatory recycling and bag limits to complement the established user-pay system, and the expansion of the current curbside blue-box program. The most suitable alternative to manage residuals not feasible (currently) for diversion in the Township is with the expansion of the Township's Bark Lake waste disposal site.

Based on this conclusion, the recommendation of this report is for the Ontario Minister of the Environment to approve the preferred alternative of the Waste Management Strategic Plan in accordance with the requirements of the *Environmental Assessment Act*, in order for the Township of Madawaska Valley to proceed with the necessary measures for implementation.

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1.0 INTRODUCTION

1.1 BACKGROUND

In 2001, the municipalities of Sherwood, Jones, and Burns, Radcliffe, and the Village of Barry's Bay amalgamated to form the Corporation of the Township of Madawaska Valley (Township). The Township is located approximately seventy-five (75) kilometres north of Bancroft and ninety-five (95) kilometres west of Renfrew. The Township is the most westerly municipality in the County of Renfrew in eastern, rural Ontario (Figure 1).

Post-amalgamation, the Township completed various waste management compliance and planning activities to accurately assess existing waste management assets, and to develop short-term waste management initiatives to effectively implement amendments to various waste disposal site operations and development with the objective of achieving waste management operational compliance at the amalgamated Township's five (5) waste disposal sites. Further, the Township considered the initiation of longer-range planning to ensure waste management services to the ratepayers of the Township were secure.

The results of the Township's waste management compliance actions in 2003 identified a waste disposal crisis, as remaining disposal capacity at the Township's existing waste disposal sites was limited and reaching a status of emergency. As a result, the Township formally initiated the undertaking of a long-term, waste management strategic plan, with the objective of determining a long-term solution for a period of twenty-five (25) years (to the year 2030) for managing the Township's solid waste in an economical and technically feasible manner.

In late 2003, the Township formally initiated the Waste Management Strategic Plan (WMSP) in consultation with the Ontario Ministry of the Environment (OMOE). The Township prepared *Terms of Reference for Environmental Assessment* (ToR; SGS Lakefield Research Limited [SGS], June 2004, amended September 2004; Appendix I-A) to provide methodology and a guiding framework to the undertaking. The ToR was approved by the Ontario Minister of the Environment on November 15, 2004 (Appendix I-A) at which point the Township formally commenced the WMSP EA, in accordance with the requirements of the *Environmental Assessment Act, R.S.O. 1990, Chapter E.18* (EAA).

1.2 LEGISLATION AND ACTS GOVERNING THE UNDERTAKING

With detailed consultation with the OMOE for this project, the Township has completed the undertaking of the WMSP in accordance with the purpose of the EAA:

“...the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment.” R.S.O. 1990, c. E.18, s. 2.

Further, Section 3 of the EAA details the application of the act in general as follows:

- (a) enterprises or activities or proposals, plans or programs in respect of enterprises or activities by or on behalf of Her Majesty in right of Ontario or by a public body or public bodies or by a municipality or municipalities;*
- (b) major commercial or business enterprises or activities or proposals, plans or programs in respect of major commercial or business enterprises or activities of a person or persons, other than a person referred to in clause (a), designated by the regulations;*
- (c) an enterprise or activity or a proposal, plan or program in respect of an enterprise or activity of a person or persons, other than a person or persons referred to in clause (a), if an agreement is entered into under section 3.0.1 in respect of the enterprise, activity, proposal, plan or program. R.S.O. 1990, c. E.18, s. 3; 2001, c. 9, Sched. G, s. 3 (3).*

The Township is therefore bound by the requirements of the EAA, and understands the need for these requirements in the development of the WMSP for the ratepayers of the Township. Consequently, the Township has prepared this report as a summary of the WMSP undertaking in accordance with the following requirements of the EAA:

Table 1 Fulfillment of EAA Requirements in the WMSP

EAA Requirement	Description	Date of Completion
<i>Section 6 (1)</i>	Preparation of ToR for the WMSP	June 2004, amended September 2004
<i>Section 6 (4)</i>	Approval of ToR by Ontario Minister of the Environment	November 2004
<i>Section 6.1 (1)</i>	Preparation of Draft EA (WMSP) in accordance with the ToR	October 2006
<i>Section 6.1 (2)</i>	The EA (WMSP) shall consist of specific components	Forms this EA Report, November 2006
<i>Section 6.2 (1)</i>	The Proponent shall submit the EA (WMSP) to the OMOE for approval	This Report forms part of the application, November 2006

1.3 STUDY AREA AND PLANNING HORIZON

The study area for the WMSP has been defined to the Township of Madawaska Valley as shown on Figure 1.

The planning period for the undertaking was set at twenty-five (25) years to the year 2030, consistent with other long-range infrastructure planning projects and to account for sufficient time for implementation and operation of necessary components of the WMSP within the planning period.

1.4 PURPOSE OF THE UNDERTAKING

The purpose of the WMSP undertaking is to determine a long-term solution for the management of solid waste for the Township of Madawaska Valley for a twenty-five (25) year planning period. The Township has incorporated diligent decision making criteria of economic feasibility, technical viability, and has considered public opinion throughout the development of the WMSP and in developing a sustainable solution for the Township. The application of these criteria is documented throughout this report.

The purpose of this report is to provide documentation of the EA in support of the Township's application for approval to the Ontario Minister of the Environment for the Preferred Alternative of the WMSP under the requirements of the EAA. Specifically, the portion of the "Preferred Alternative" subject to EAA approval is the expansion of the Township's existing Bark Lake waste disposal site for the management of solid waste

generated from the Township of Madawaska Valley for the twenty-five (25) year planning period. In order to minimize the residual waste from the Township requiring disposal, further enhancement of the Township's waste diversion program has been identified for implementation to minimize potential affects on the environment.

At the Township's Council meeting of September 5, 2006, a resolution recognizing the comprehensive efforts of the municipality in conducting the WMSP and supporting the "Preferred Alternative" and the documentation of the EA was passed (Appendix I-B). As part of this resolution, the Township has also confirmed the submission of the EA to the Ontario Minister of the Environment for review and approval, in accordance with the EAA.

At this time, this report has not been prepared in support of any application under the *Environmental Protection Act* (EPA); however, the outcome of the OMOE's review of the EA is anticipated as supporting documentation for a future application under the EPA for the expansion of the Bark Lake waste disposal site, identified within the WMSP as part of the "Preferred Alternative".

1.5 SCOPE OF REPORT

This report has been prepared to document the work completed through the process of the EA by the Township for submission to the OMOE for approval. This report has been organized in a format consistent with the requirements of Section 6.1 (2) of the EAA, as follows:

- Section 1.0 – provides context of the methodology of the WMSP as undertaken by the Township, in consideration of applicable legislation, policies, and acts relevant to, and in consideration of, the need for the undertaking.
- Section 2.0 – defines the need for the WMSP undertaking based on the current status of the Township's waste management system, and projections of need of the Township for waste management infrastructure over the twenty-five (25) year planning period.
- Section 3.0 – provides a general account of the existing environment within the Township to provide a description of the natural, socio-cultural, technical/built, and economic environments of the Township.
- Section 4.0 – provides context, per the EAA and consistent with the approved ToR, of the alternatives considered ("Alternatives To") by the Township for the undertaking with the objective of defining the best solution for managing the Township's waste in the long-term.

- Section 5.0 – summarizes the results of the screening of “Alternatives To” and “Alternative Methods” undertaken in the WMSP, including economic assessments, technical studies, and where appropriate, public opinion that was considered in the screening of alternatives in the WMSP. The results of the screening process provide the context for final evaluations in determining the “Preferred Alternative” for the WMSP.
- Section 6.0 – presents a comparative evaluation of the candidates for the “Preferred Alternative”, and identifies the “Preferred Alternative” based on the results of these evaluations.
- Section 7.0 – summarizes the evaluation of potential effects on the environment associated with the “Preferred Alternative” for the WMSP based on the application of the screening criteria in Section 6.0 and the comparative evaluations completed in Section 7.0.
- Section 8.0 – presents the Township’s recognition of the need for a monitoring system or established program to evaluate the potential effects of the “Preferred Alternative” on the environment, if implemented.
- Section 9.0 – details of conclusions and related recommendations pertaining to the results of the WMSP, and the specific recommendations for action as it relates to the “Preferred Alternative” and the WMSP.
- Section 10.0 – a summary of other approvals, further to the approval of the WMSP under the EAA, which may be required prior to implementation of the identified “Preferred Alternative”.

Each of the Sections of this report have been documented in significant detail to ensure that the WMSP has been undertaken in a reasonable, transparent, and defensible manner consistent with the approved ToR (Appendix I-A), the requirements of the EAA, consistent with the objectives and policies of the Provincial Policy Statement (PPS; 2005) and in focus of small, rural municipal needs in long-term waste management planning.

1.6 CONSULTATION PROGRAM

As part of the WMSP undertaking, the Township was required to consult with interested parties in the preparation of the ToR and EA per Section 5.1 of the EAA:

“When preparing proposed terms of reference and an environmental assessment, the proponent shall consult with such persons as may be interested.” 1996, c. 27, s. 3.

1.6.1 CONSULTATION IN PREPARATION OF THE WMSP EA

For the WMSP, the Township has completed a comprehensive consultation program to ensure that interested persons, groups, organizations, agencies, local First Nations, and any other party that may have interest in the WMSP, have had the opportunity to comment and provide input into the WMSP throughout the EA. Specific efforts by the Township to ensure comment/input from interested parties and groups have included:

- Four (4) major public consultation events, scheduled strategically along the timeline of the EA to collect input from interested parties at various stages and milestones of the WMSP.
- The establishment of an active and engaged Public Liaison Committee (PLC) that met regularly with the Township to collect and disseminate information pertaining to the WMSP, between the public, local property owner associations, and other interested groups/parties in the Township.
- An extensive media advertising and information program consisting of regular newsletters, media releases, newspaper articles, radio announcements, and formal notices to ensure interested parties were aware of public consultation events to maximize participation in the WMSP.
- The establishment and on-going maintenance of an information “base station” of the Township’s municipal webpage (<http://www.madawaskavalley.on.ca/municipal/waste.php>) for interested parties to access relevant project documentation, reports, studies, etc., for the purpose of project knowledge and understanding.

Due to the extensive nature of the WMSP’s consultation program, a summary *Record of Consultation* (RoC) has been prepared as an Appendix to this Report, as Volume II. Whenever necessary, reference to specific aspects of the RoC will be provided within this report; however, the Township encourages the reader to review the RoC in its entirety to appreciate the level of effort the Township has undertaken to ensure participation of interested parties has been considered in the WMSP.

1.6.2 CONSULTATION IN PREPARATION FOR WMSP EA SUBMISSION

The Township of Madawaska Valley prepared a Draft Environmental Assessment Report for the Madawaska Valley Waste Management Strategic Plan (Greenview, November 6, 2006) which was circulated to the project’s review parties including the OMOE and First Nations, and was also available at the Township office and on the Township Webpage for interested public viewing.

Review comments on the Draft EA were received and summarized in Table 2 of Volume II of this submission. Amendments to this final version of the EA Report have been made where applicable/appropriate per comments received from the Draft EA review.

Volume II of this report summarizes the comprehensive consultation efforts undertaken by the Township for the WMSP EA.

2.0 RATIONALE FOR THE UNDERTAKING

This Section presents the current and projected future waste management needs of the Township. Consequently, the rationale and the need for the WMSP undertaking are defined.

2.1 SUMMARY OF THE EXISTING WASTE MANAGEMENT SYSTEM

The following provides a summary of the existing waste management system within the Township, inclusive of all waste transfer and waste disposal operations.

2.1.1 WASTE TRANSFER AND DISPOSAL

The Township of Madawaska Valley currently operates two (2) solid waste transfer stations (Wilno and Radcliffe) and one (1) solid waste disposal site, Bark Lake. Domestic waste from each of the two (2) transfer stations is transported to the Bark Lake site for disposal (Figure 2).

There are also recycling depots operated at the three (3) sites noted above. Regular blue-box recyclables are collected at recycling depots established at the Wilno, Radcliffe, and Bark Lake waste disposal sites and is transferred to regional facilities for processing and marketing. Bulk recyclables such as scrap metal and tires are collected and transferred routinely to designated recycling/reuse facilities.

The Township has a fourth waste disposal site, Paugh Lake, located approximately twelve (12) kilometres north of the Village of Barry's Bay. Waste management operations at the Paugh Lake waste disposal site have been postponed by the Township since February 2004 at the recommendation of the OMOE in relation to public opposition to a 2003 application to amend the Provisional Certificate of Approval (PC of A) for amended site operations and continued waste disposal at the site (Figure 2).

A fifth waste disposal site, Barry's Bay, exists immediately north of the Village of Barry's Bay, but has been closed since 1998. No waste management operations exist at this site (Figure 2).

The Township also owns another site designated as the "Other" Radcliffe waste disposal site, which was designated for waste disposal by the former Township of Radcliffe, but has never been utilized as a waste disposal site (Figure 2).

The Township's Waste Management System PC of A (A410550) was recently updated in 2006 to reflect the current waste operations of the entire Township and an updated vehicle fleet.

A summary description of the Township's current waste management operations are summarized in Table 2 and are detailed further below.

Table 2 Summary of Existing Waste Management Facilities

Site	Waste Operation	Status
Wilno	Solid Waste Transfer Station and Recycling Depot Historical Waste Disposal Site	Closure Plan for historical waste mound to be submitted to OMOE in 2007.
Paugh Lake	Seasonal Solid Waste Transfer Station Waste Disposal Site	Temporarily closed to all operations pending OMOE approval of 2003 application.
Radcliffe	Solid Waste Transfer Station and Recycling Depot Historical Waste Disposal Site	Closure Plan for historical waste mound submitted to OMOE in 2005. Waste mound closure completed in 2006.
Barry's Bay	Closed Historical Waste Disposal Site	Closed to all operations.
"Other" Radcliffe	Never utilized for waste disposal operations	Closed to all operations.
Bark Lake	Solid Waste Disposal Site and Recycling Depot	Continued Waste Disposal Operations granted to August 2008 under emergency PC of A.

The Township's Wilno waste disposal site is located approximately seven (7) kilometres east of the Village of Barry's Bay and operates in accordance with PC of A A413401. The Wilno site has been closed to waste disposal since 1997 and currently operates as a solid waste transfer station with a recycling depot, with waste transfer to the Township's Bark Lake waste disposal site. The Wilno solid waste transfer station receives solid, non-hazardous, residential, and commercial waste generated within the Township of Madawaska Valley.

The waste capacity status of the Wilno site was investigated by the former Township of Sherwood, Jones and Burns (pre-amalgamation), and as a result, it was determined that approximately 36,300 cubic metres

(m³) of waste has been disposed of at the site, including an estimated 4,800 m³ of fill beyond approved limits (FBAL). Although no specific value was indicated on the original PC of A for the site (expired), the supporting information to the PC of A application dated November 6, 1997, identified a calculated volume of 24,300 m³. This determination has resulted in an apparent overfilling situation at the site of approximately 12,000 m³ (SGS, 2004b). Consequent to the apparent overfilling situation, the former Township submitted information in support of a waste disposal site expansion; however, due to amalgamation and strong public opposition, the expansion has been considered an inactive file by the OMOE. As a result of the above and the results of the technical studies completed during the WMSP, the Township has decided to close the Wilno waste disposal site to future landfilling operations with a Closure Plan to be submitted to the OMOE prior to December 31, 2006. In an effort to provide continued waste disposal operations to ratepayers in the western portion of the Township, the Wilno site will maintain transfer station operations after final closure of the landfilling area of the site, anticipated by the end of year 2008.

The Paugh Lake waste disposal site (A413402) is located approximately twelve (12) kilometres north of the Village of Barry's Bay on the north shore of Paugh Lake. The Paugh Lake site is temporarily closed to all waste disposal operations since February 2004, by recommendation of the OMOE, whilst the Township and the OMOE work toward resolution of matters raised in response to the Township's 2003 application to amend the PC of A. As part of the Township's 2003 application various site operational upgrades and environmental compliance measures, including the allowance of construction and demolition waste disposal, the operation of a municipal solid waste transfer station, and the expansion of the service area to include the entire Township of Madawaska Valley were proposed for the Paugh Lake site. Current estimates of remaining waste capacity for the Paugh Lake site are approximately 6,000 m³ (SGS, 2006b).

The Radcliffe waste disposal site is located approximately two (2) kilometres north of the Village of Combermere on Old Barry's Bay Road and operates as a municipal solid waste transfer station and recycling depot in accordance with PC of A A412901. Waste disposal at the site ceased in December 2001, and waste transfer station operations are on-going at the site, with transfer to the Township's Bark Lake site for disposal. As a result of the technical studies completed during the WMSP, the Township is currently in the process of final closure construction activities at the Radcliffe site with finalization anticipated in December 2006. The establishment of a CAZ for the site, consisting of municipally-owned lands (currently in the process of purchase), and Crown lands under long-term lease, is anticipated for completion in 2007.

The Barry's Bay waste disposal site (PC of A A413403), located approximately two (2) kilometres north of the Village of Barry's Bay, has been closed by the OMOE since September 1998. The Township submitted a *Closure Plan* (SGS, 2005a) for the Barry's Bay site (under OMOE review), and is currently in the process of negotiations to acquire land adjacent to the landfill for operational buffer and the establishment of a CAZ. Due to the nature of the current waste pile, physical topography, and adjacent private lands, the Township concluded that there is no potential for future waste management operations (disposal or transfer) at the Barry's Bay site.

The "Other" Radcliffe waste disposal site is located between the Village of Combermere and the Village of Barry's Bay off Highway 62. The site currently has an existing PC of A; however, the Township has not used the site for waste disposal. Prior to amalgamation, the former Township of Radcliffe attempted to proceed with waste disposal operations at the "Other" Radcliffe site; however, environmental concerns related to the immediate proximity of wetlands and watercourses to the site were not adequately addressed to the satisfaction of the OMOE in order to implement waste disposal activities.

The Bark Lake waste disposal site is located twelve (12) kilometres west of the Village of Barry's Bay on Highway 60 and is the only site that receives solid waste from the municipality for disposal in accordance with PC of A A413404 (SGS, 2006a; Appendix I - C). In 2002 and 2003, during short-term waste management compliance work at the Bark Lake site, the Township identified that limited waste capacity remained at the site. As a result, an emergency application was submitted to the OMOE for continued operations, while the WMSP was being undertaken. Subsequent applications for continued operations have been submitted to the OMOE and approved, to allow safe and responsible waste disposal operations at the site during the completion of the EA, as follows:

- November 5, 2003 – Emergency application for amendment of PC of A A413404 for a short-term waste disposal extension was submitted to the MOE, which was approved on April 21, 2004 allowing operations to continue under an emergency extension until November 1, 2004 at the site.
- September 28, 2004 – A progress report regarding the status of the Township's WMSP was submitted to the MOE EAAB Director to approve continued operations under a short-term emergency waste disposal extension, which was granted on October 27, 2004 allowing disposal operations to continue at the site until August 1, 2005.
- June 2005 – Emergency application for amendment of PC of A A413404 for extended waste disposal operations (18-months) was approved July 27, 2005, granting an emergency operating extension until February 1, 2007.

- December 20, 2006 – Emergency application for amendment of PC of A A413404 for an extension to waste disposal operations (18-months) was approved on January 30, 2007 allowing continued waste disposal operations at the site until August 1, 2008.

In accordance with its PC of A, the Bark Lake waste disposal site currently has a defined site life to August 1, 2008. Through the duration of the EA time period of completing the WMSP, the Township has undertaken several strategic measures to maximize the available capacity granted under the emergency extensions for continued landfilling operations at the Bark Lake site. These efforts include the establishment of a leaf and yard composting area, and the approval for alternative daily cover systems/materials as part of regular landfilling operations.

2.1.2 WASTE DIVERSION

The Township realized the benefits of minimizing waste being landfilled early in Ontario's waste diversion program implementation in the mid 1990's. For a small municipality in rural south eastern Ontario, the municipality is proud of a waste diversion rate of 31% (2005 WDO Datacall). The implementation of a user-pay program, enhanced blue-box material program, and curbside collection in the Village of Barry's Bay has resulted in high public participation and correspondingly an excellent base waste diversion program; however, the Township has maintained focus on proper residuals management.

2.1.3 LIMITATIONS OF THE EXISTING WASTE MANAGEMENT SYSTEM

At the present time, remaining waste disposal capacity within the Township is limited to the Township's Bark Lake and Paugh Lake waste disposal sites, with the Wilno, Radcliffe, Barry's Bay, and "Other" Radcliffe waste disposal sites not accepting waste for disposal.

The Bark Lake waste disposal site is currently approved to accept domestic waste for disposal, in accordance with an emergency 18-month extension of PC of A A413404, until August 1, 2008, at which time, pending a forthcoming application for continued disposal operations, there will be no secure waste disposal alternatives for the Township.

The Township's Paugh Lake site has a reported remaining capacity of approximately 6,000 m³ (SGS, 2006b); however, public response to the Township's 2003 application to amend the site's PC of A for the utilization of this capacity, has resulted in a postponement of all operations due to public opposition, which is a matter yet to be resolved.

The following section presents a summary of the current and predicted waste generation rates and population growth within the Township of Madawaska Valley. This information was used to establish the future waste management needs of the Municipality, thus providing the rationale for the proposed undertaking.

2.2 PROJECTIONS OF FUTURE WASTE MANAGEMENT NEEDS

Although the Township's current waste diversion rates are excellent, residual waste generation from within the Township must be accounted for and appropriately managed.

Consistent with the approach presented in the ToR (Appendix I-A), estimations of waste generated in the Township have been calculated based on industry accepted principles, OMOE guidelines, and annual assessments of waste disposal and diversion. Updated estimations have been provided in the following tables:

Table 3 Projected Population Change to 2032

Item	Estimated Value
Permanent Population (P_p , 2006, StatsCan, 2006 Census)	4,381
Seasonal Population (P_s , 2006)	2,119
Equivalent Population ¹ (P_{eq} , 2006)	4,911
Population Growth (2001 - 2006, StatsCan, 2006 Census)	- 0.6 %
Projected Equivalent Population in Year 2030 ²	5,277
Change in Population as of Year 2030	366 persons or 7.5 %

Notes:

- 1 Equivalent Population calculated using, $P_{eq} = 9/12 P_p + 3/12 (P_p + P_s)$, representative of a 3-month summer season, and corresponding seasonal population influx.
- 2 Projected Equivalent Population in Year 2030 based on historical population increase of 1.5% per five-years (1996-2001, StatsCan, 2001 Census) to account for expected future population increase, despite the reported -0.6% decline in population reported between years 2001-2006 (StatsCan, 2006 Census).

The population figures obtained for 2006 are slightly increased (as expected) from the 2003 permanent and seasonal populations noted in the ToR (SGS, 2004a); however, the population within the Township appears to be decreasing based on 2006 StatsCan information. Population growth is not expected to

continually decline, however, during the 25-year planning horizon, therefore, a conservative 0.3 % per annum population growth factor was used for projected waste generation rates (Table 4).

As evidenced in Table 3, the Township experiences a significant influx of seasonal residents, which can be attributed to the increasing development of waterfront (seasonal residences), resultant of the natural aesthetics of the Township's many scenic lakefront and riverfront properties.

Table 4 Projected Waste Generation Rate to 2032

Item	Estimated Value ¹ (tonnes)	Estimated Value ² (m ³)
Current Waste Generation Rate (2006)	2,122	5,304
Projected Waste Generation Rate in Year 2032	2,052	5,130
Projected Fill Rate in Year 2032 ³	2,286	6,156
Cumulative Waste Generation (2032) ⁴	51,924	129,810
Cumulative Waste Requiring Management (2032) ⁵	57,858	155,772

Notes:

- 1 Waste generation (current and cumulative), and fill rates based on estimated population and generally accepted waste disposal rate of 1.0 kg/person/day (with future rates discounted to include additional diversion efforts).
- 2 Waste generation (current and cumulative), and fill rates converted to a volume based on an assumed landfill waste density of 400 kg/m³.
- 3 Projected fill rate based on Projected Waste Generation Rate in Year 2032 including an additional 20% volume increase for waste cover application during landfill operations.
- 4 Cumulative waste generation (2032) based on estimated population and generally accepted waste disposal rate of 1.0 kg/person/day (with future rates discounted to include additional diversion efforts), from 2006 to 2032.
- 5 Cumulative waste disposed (2032) includes a cumulative additional 20% volume increase for waste cover application during landfill operations, from 2006 to 2032.

Table 5 Population and Waste Generation Data Projections

Year	Estimated Population	Estimated Waste Generation		Estimated Diversion Rate	Total Estimated Fill Rate	
	(persons)	(tonnes/a)	(m ³ /a)	(%)	(tonnes/a)	(m ³ /a)
2005	4,700	1,681	4,203	35%	1,873	5,044
2006	4,726	2,122	5,304	39%	2,364	6,365
2007	4,740	2,107	5,267	40%	2,348	6,320
2008	4,754	2,071	5,177	42%	2,308	6,213
2009	4,769	2,015	5,037	45%	2,245	6,044
2010	4,783	1,980	4,951	47%	2,207	5,941
2011	4,797	1,927	4,817	50%	2,147	5,780
2012	4,812	1,933	4,831	50%	2,153	5,798
2013	4,826	1,938	4,846	50%	2,160	5,815
2014	4,841	1,944	4,860	50%	2,166	5,832
2015	4,855	1,950	4,875	50%	2,173	5,850
2016	4,870	1,956	4,890	50%	2,179	5,867
2017	4,884	1,962	4,904	50%	2,186	5,885
2018	4,899	1,968	4,919	50%	2,192	5,903
2019	4,914	1,973	4,934	50%	2,199	5,920
2020	4,928	1,979	4,949	50%	2,206	5,938
2021	4,943	1,985	4,963	50%	2,212	5,956
2022	4,958	1,991	4,978	50%	2,219	5,974
2023	4,973	1,997	4,993	50%	2,226	5,992
2024	4,988	2,003	5,008	50%	2,232	6,010
2025	5,003	2,009	5,023	50%	2,239	6,028
2026	5,018	2,015	5,038	50%	2,246	6,046
2027	5,033	2,021	5,053	50%	2,252	6,064
2028	5,048	2,027	5,069	50%	2,259	6,082
2029	5,063	2,033	5,084	50%	2,266	6,100
2030	5,078	2,040	5,099	50%	2,273	6,119
2031	5,094	2,046	5,114	50%	2,280	6,137
2032	5,109	2,052	5,130	50%	2,286	6,156
Totals		51,924	129,810		57,858	155,772

Notes:

- 1 Waste generation (current and cumulative), and fill rates based on estimated population and generally accepted waste disposal rate of 1.0 kg/person/day (with future rates discounted to include additional diversion efforts).

- 2 Waste generation (current and cumulative), and fill rates converted to a volume based on an assumed landfill waste density of 400 kg/m³.
- 3 Projected fill rate based on Projected Waste Generation Rate in Year 2032 including an additional 20% volume increase for waste cover application during landfill operations.
- 4 Cumulative waste generation (2032) based on estimated population and generally accepted waste disposal rate of 1.0 kg/person/day (with future rates discounted to include additional diversion efforts), from 2006 to 2032.
- 5 Cumulative waste disposed (2032) includes a cumulative additional 20% volume increase for waste cover application during landfill operations, from 2006 to 2032.

The ToR for the WMSP defined a waste volume for management of 150,000 m³ to 175,000 m³ of solid municipal waste to the Year 2032. Sufficient capacity has been incorporated into this estimate to manage other municipal solid waste, including, but not limited to:

- IC&I waste sector.
- Disaster waste materials (fire, tornado, etc.).
- Biosolids (solid, per Ontario Regulation 347).
- Other municipal solid wastes that may be generated within the Township.

2.3 DESCRIPTION OF THE UNDERTAKING

The information summarized in Sections 2.1 and 2.2 demonstrates the rationale or need for the WMSP undertaking. In order for the Township to responsibly manage solid waste generated by the municipality, a long-term solution is clearly necessary, to ensure this service is provided to ratepayers in a safe and sustainable manner.

The Township of Madawaska Valley Waste Management Strategic Plan is a long-term waste management planning undertaking to identify a waste management solution that is:

- sustainable for a small, rural municipality in the long-term;
- economically feasible;
- minimizes potential impacts to the environment; and,
- considers public opinion.

The following Sections of this report present in detail the development of the WMSP (the undertaking) with the above aspects in focus.

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

This section presents a general account of the existing environment of the study area of the Township, based on pertinent environmental criteria to the WMSP.

3.1 NATURAL ENVIRONMENT

The following sections present a summary description of the various aspects of the existing natural environment for the Township.

3.1.1 AIR

Daily climate data was obtained from the Environment Canada internet site for weather stations in Combermere and Madawaska. The data included daily average, minimum, and maximum temperature and precipitation values from years 1915 to 2004.

The Combermere weather station, located at a latitude and longitude of 45° 22' N and 77° 37' W, respectively, is the weather station that provides the best representative data for the Township.

The average daily temperature in the Township ranges from approximately -18.3°C in January to approximately 25.3°C in July. The average temperature throughout the year is approximately 4.6°C (Environment Canada, 2006).

The average annual precipitation in the Township is approximately 869.2 millimetres (mm). The average annual rainfall amount in the Township is approximately 662.1 mm and the annual snowfall amount is approximately 2072 mm (Environment Canada, 2006).

The closest weather station for which wind data is available is the Ottawa MacDonald-Cartier International Airport, located at a latitude and longitude of 45° 19' N and 75° 40' W, respectively. The average wind speed recorded is approximately 12.9 kilometres per hour (km/hr). The most frequent wind direction is southerly from May until October and westerly for the remainder of the year (Environment Canada, 2006).

3.1.2 LAND

The physiography of the Township consists of shallow till and rock ridges with some spillways and peat and muck. There are also two drumlins present in the southern portion of the geographic Township of Jones and one drumlin in the south-western portion of the geographic Township of Radcliffe (Ontario Ministry of Natural Resources [OMNR], 1974).

The bedrock geology in the Township consists mainly of mesoproterozoic felsic igneous bedrock from the central gneiss belt. In the southern portion of the geographic Township of Radcliffe, there exists some Proterozoic tectonite bedrock and Proterozoic alkalic plutonic bedrock from the central metasedimentary belt (Ontario Ministry of Northern Development and Mines [OMNDM], 1991a).

In terms of surficial geology, the majority of the Township has exposed Precambrian bedrock or glacial till overburden with a sand to silty sand matrix. Glacio-fluvial ice-contact deposits such as gravel, sand, and till can be found in the northeastern portion of the geographic Township of Burns and in the central portion of the geographic Township of Sherwood. Glacio-fluvial outwash deposits such as gravel and sand can be found in the southern portion of the geographic Township of Sherwood and in most of the geographic Township of Radcliffe. Organic deposits such as peat, muck, and marl can be found in an area in the northern portion of the geographic Township of Sherwood (OMNDM, 1991b).

The geographic Township of Burns has approximately 11.65 million m³ of sand and gravel deposits. Most of the reserves are located within an outwash system along the Bonnechere River. There are also glaciofluvial deposits south of the Bonnechere River, an ice-contact deposit west of Bear Lake, and a glaciofluvial deposit north of Paugh Lake. These deposits are effectively shallow due to the high water table and variable bedrock topography. Several small ice-contact ridges and small outwash deposits are scattered throughout the geographic Township of Burns (OMNR, 1986).

The geographic Township of Jones has approximately 4.12 million m³ of sand and gravel deposits. Most of the reserves are located along a valley north of Bells Bay, which is part of Bark Lake (OMNR, 1986).

The geographic Township of Radcliffe has approximately 46.36 million m³ of sand and gravel deposits. Major glaciofluvial systems that trend along bedrock-controlled valleys and basins provide substantial reserves of usable sand and gravel within this geographic Township (OMNR, 1986).

Approximately 60.72 million m³ of sand and gravel deposits are located within the geographic Township of Sherwood. The main sources of this material are several large glaciofluvial systems consisting of eskers and outwash terraces. The most significant of these systems is an extensive glaciofluvial system which

trends along a fault-controlled valley between Barry's Bay and Wilno. There are also smaller glaciofluvial systems in the vicinity of Paugh Lake and northeast of Carson Lake (OMNR, 1986).

3.1.3 WATER RESOURCES

There are many lakes within the Township of Madawaska Valley as well as several navigable waterways. The major lakes in the Township are Bark Lake, Paugh Lake, and Kamanisseg Lake. Many of the lakes within the area of the Township are identified as cold water lakes and likely receive significant baseflow from the surrounding local recharge areas (Golder Associates, 2003). These cold water lakes provide habitat for Lake Trout and Brook Trout species, a common target for anglers.

Within the County of Renfrew, within which the Township of Madawaska Valley is contained, Precambrian igneous and metamorphic rock is the main aquifer, with groundwater flowing through fractures along the bedrock. Since fractures near the ground surface allow surface water to enter the subsurface, bedrock aquifers are often susceptible to potential contamination (Golder Associates, 2003).

During the summer months when there is less precipitation, there is a reduction in groundwater recharge which can reduce well pumping yields. Groundwater use within the Township of Madawaska Valley is sensitive to this since the majority of groundwater wells within the Township pump from regionally unconfined fractured bedrock or sand and gravel aquifers. The groundwater levels then replenish with the autumn rains (Golder Associates, 2003).

The most common water quality problems within the Township are elevated concentrations of chloride and nitrate. Elevated values of chloride could be naturally-occurring or a result of road de-icing. A common source of nitrate is septic systems. Both chloride and nitrate impacts to groundwater are often found in areas where the bedrock is shallow (Golder Associates, 2003).

3.1.4 BIOLOGY / ECOLOGY

A historical biological study exists for an area at the western end of the Township. The report entitled, *Life Science Inventory of Bell Bay Candidate Perimeter Park* (Simpson, 1976), was prepared to determine the biological significance with respect to a proposed park in the area of Bell's Bay, which borders Highway 60, approximately thirteen (13) kilometres west of the Village of Barry's Bay (Figure 3).

The Bell's Bay area is part of the Canadian Transition Life Zone. This zone is a transition between the coniferous forests of the northern Boreal Zone and the deciduous forests of the southern Carolinian Zone

(Simpson, 1976). This transition zone provides excellent habitat for white-tailed deer and other wildlife species, which are commonly observed throughout the Township and the Bell's Bay area.

The Bell's Bay area has a long history of disturbance. Several activities have materially modified the environment, such as fire, logging, farming, mining, and recreational/residential use (Simpson, 1976).

Approximately 60 years ago, a hydro-electric dam raised the water level of Bark Lake, which enlarged Bell's Bay. This caused large portions of the forest surrounding the bay to become submerged. Bark Lake is now used as a reservoir lake for hydro-electric generation operations, exhibiting an annual drawdown of approximately nine (9) metres (Simpson, 1976).

In general, the Bell's Bay area is of low biological significance and is representative of a highly disturbed area. The significant features which are present are localized and occur in only a few small areas, most of which are of only local significance (Simpson, 1976).

3.2 SOCIO-CULTURAL ENVIRONMENT

The following sections present a summary description of the various aspects of the existing socio-cultural environment for the Township.

3.2.1 HUMAN POPULATION AND SOCIAL COMMUNITY

"The Township of Madawaska Valley – Come for a visit, stay for a lifetime".

Originally settled over one hundred years ago by loggers and farmers, the Township of Madawaska Valley has forests, plentiful wildlife, and navigable waterways. The Township is in close proximity to the world famous Algonquin Provincial Park and provides an abundance of recreational, eco-tourism, and business opportunities (County of Renfrew, 2006b). The area is extensively used for recreational use, seasonal residency, hunting, fishing, and trapping.

There are three main settlements within the Township: Barry's Bay, Combermere, and Wilno. Each offers a unique cultural experience and a welcoming environment that makes both tourism and retirement living an integral part of the economy (County of Renfrew, 2006b).

From its early roots as a lumbering town, the Village of Barry's Bay has been the main service and urban centre for the surrounding area. Barry's Bay has municipal water and sewer infrastructure, two elementary schools, and the Madawaska Valley District High School. St. Francis Memorial Hospital and ambulatory services are located just outside the village. The Township of Madawaska Valley is serviced by the

Ontario Provincial Police (Killaloe Detachment) and has a volunteer fire department with fire halls in Barry's Bay and Combermere (County of Renfrew, 2006b).

Combermere has grown from a summer vacation destination to a year-round tourism and retirement living community. Situated on the Madawaska River, both residents and visitors enjoy the fishing, swimming, boating, white-water rafting, canoeing, and bird-watching opportunities of this extensive waterway leading to Conroy's Marsh. There is a local Farmer's Market during the summer, while ice fishing, snowmobile trails, and cross-country and downhill skiing activities are enjoyed throughout the winter (County of Renfrew, 2006b).

The Hamlet of Wilno is proud to be Canada's oldest Polish Settlement. Local descendents have nurtured and cultivated the culture, arts, and crafts of their ancestors, transforming Wilno into a truly unique and colourful experience.

Population information was available from the Statistics Canada website (Statistics Canada, 2006). Since the 2006 census information was not yet available at the time of this report, 2001 data were used and the 2006 population was interpolated. Therefore, the 2006 population for the Township of Madawaska Valley has been calculated to be 4,470 permanent residents. Approximately 1,145 of these 4,470 persons (approximately 26%) live within the Village of Barry's Bay, which is the main urban centre within the Township. The remainder of the residents are rural (County of Renfrew, 2006a).

There is a high seasonal population within the Township and a large amount of tourism; therefore, the population within the Township is much higher in the summer months (County of Renfrew, 2006a). It has been estimated that as of 2006, approximately 2,119 seasonal residents reside in the Township. As stated in the ToR, the equivalent population for the Township in 2006 was calculated to be approximately 4,813 persons, representing the total population for the Township, considering the seasonal residents living within the Township for a 3-month summer season.

3.2.2 LAND USE / PLANNING

The Township passed a comprehensive Zoning By-Law on May 1, 2006. This By-law is for the amalgamated Township of Madawaska Valley. Prior to this, the Township of Sherwood, Jones, and Burns had a zoning By-law dated August 1995.

According to the comprehensive Zoning By-Law, the majority of the Township is Crown, forested land. There are several open-water lakes and some lakes within the Township are classified as sensitive lakes. The majority of privately-owned land has the rural designation (County of Renfrew, 2006a).

3.2.3 CULTURAL HERITAGE / ARCHAEOLOGY

The Township has a rich, diverse, cultural heritage consisting of settlers of Polish, German, and Irish descendants who settled in the Barry's Bay area in the late 1800s, with Wilno recognized as the first Polish settlement in Canada. These settlers pioneered the future Township of Madawaska Valley with perseverance and hard work in the local forest industry. The Township's lumbering heritage is celebrated annually with the Barry's Bay Timberfest, held each year in February.

From an archaeological perspective, there are only a few areas in the upper valley of the Ottawa River where prehistoric or contact period archaeological sites exist. The Allumette Lake sites are located on the banks of the Morrison and Allumette Islands and span the cultural time periods from Late (Laurentian) Archaic, through the Middle Woodland, to the Late Woodland, which is a span of over 5,000 years. Archaic burials, with elaborative grave goods of native copper and other exotic materials are of interest within this area (Kinickinick Heritage Consultants [Kinickinick], 2005).

The Wilbur Lake sites, located on the Bonnechere River, near Eganville, are located radially around the Kant site. Although primarily related to aspects of the Middle Woodland cultural period, the Wilbur Lake sites also span five millennia from Late Archaic to Late Woodland. The Mud Lake area, in the Muskrat River Basin, has several sites spanning the last 5,000 years, mostly from the Middle Woodland (Kinickinick, 2005).

3.2.4 FIRST NATIONS

There are several local First Nations groups who have interest in potential land-related aspects of the WMSP based on historical Algonquin land claims. The Township of Madawaska Valley has an estimated aboriginal population of 60 persons (Statistics Canada, 2006) whom live among the Township's population and utilize the Township's waste management facilities. In recognition of the First Nations claims, the Township has been in regular contact with local First Nation communities to ensure their comments were considered in the development of the WMSP.

The following First Nations groups have been consulted with throughout the EA process:

- Algonquins of Pikwakanagan – Golden Lake, Ontario.
- Algonquin Nation Tribal Council – Sharbot Lake, Ontario.
- Greater Golden Lake Algonquins – Killaloe, Ontario.
- Whitney Algonquins – Whitney, Ontario.

3.2.5 AESTHETICS

Permanent and seasonal residents in the Barry's Bay area are privileged with exceptional aesthetics within the boundaries of the Township, including rolling hills, lush highlands, and numerous lowland/marsh environments found throughout the Ottawa Valley. Many miles of abandoned rail bed and marked trails offer easy biking and walking conditions to enjoy scenic access to the many sparkling lakes and rivers, forests, and wildlife that the Township has to offer.

3.3 TECHNICAL AND BUILT ENVIRONMENT

The following sections present a summary description of the various aspects of the existing technical and built environments for the Township.

3.3.1 RESIDENTIAL AND COMMERCIAL STRUCTURES

The majority (approximately 67%) of residents within the Township are permanent residents and reside in the Township year-round. Most of these residents live in single-family households. There are some households which are not single-family; for example, Madonna House, located in Combermere, is a Christian community of more than two-hundred (200) men and women.

The seasonal population within the Township consists of mainly single-family summer residences and cottages, and seasonal tent/trailer campgrounds.

A healthy commercial core within the Village of Barry's Bay incorporates a wide range of retail and professional services including grocery and clothing stores, banks, restaurants, hardware/building centres, legal, dental, and family medical practices. Community recreational facilities include an arena, three outdoor ice rinks, sports fields, tennis courts, playgrounds, beaches, and parks (County of Renfrew, 2006b).

3.3.2 WATER/WASTE WATER TREATMENT

There is a municipal drinking water treatment plant as well as a municipal wastewater treatment plant within the Village of Barry's Bay. The source of water for the Village of Barry's Bay water treatment plant and the discharge point for the Village's waste water treatment plant are both on Kamaniskeg Lake; however, they are located on separate portions of the lake, located a considerable distance apart.

Both of these facilities service private residences and commercial establishments within the urban centre of the Village of Barry's Bay only. Residences in areas outside the Village of Barry's Bay are serviced by

individual, on-site groundwater source drinking water wells and septic systems. Groundwater is a major source of water for domestic, commercial, agricultural, and ecological activities (Golder Associates, 2003).

3.3.3 TRANSPORTATION

The main transportation route within the Township is Highway 62, which is oriented north/south between the Village of Combermere and the Village of Barry's Bay. Highway 60 is situated east/west between the northern portion of the geographic Township of Jones and the Hamlet of Wilno. Highway 60 is also a main thoroughfare within the Township and provides access for public and commercial travel and transport between the Ottawa Valley and Algonquin Park, continuing west to the Highway 11 corridor. The travel route of Highway 60 through the Ottawa Valley to Algonquin Park is an aesthetically pleasing travel route, connecting rural communities such as Eganville, Killaloe, Barry's Bay, Madawaska, and Whitney, before entering Algonquin Park's east gate. Maintenance of the Highway 60 travel way is an important infrastructure component to the public and commercial sector in Eastern and Central Ontario.

Other, smaller travel routes, including the Opeongo Line (Old Barry's Bay Road) and County Road 69 (Siberia Road), also provide alternative transportation routes between the Village of Combermere and the Village of Barry's Bay.

Marine transportation within the Township consists of over 60 km of navigable waterways (County of Renfrew, 2006b).

Small aircraft traffic, consisting mainly of private casual flyers in the vicinity of the Village of Barry's Bay, utilize two (2) small private airfields, one located slightly north of Combermere at the southeast corner of Kamanisseg Lake, and another located northeast of the Village of Barry's Bay accessed from Airport Road which is available for use on a "Prior Permission Required" basis.

Presently, there are no active railways within the Township; however, remnants of the Opeongo Line railway bed and the historic Barry's Bay railway station still exist within the Township, reminding local residents and seasonal tourists of the rich, natural history of the region.

3.3.4 WASTE MANAGEMENT

The Township currently operates two (2) solid waste transfer stations (Radcliffe and Wilno) and one (1) solid waste disposal site (Bark Lake) to service the waste management needs of Township residents.

3.3.4.1 WASTE DISPOSAL

The Bark Lake waste disposal site is located twelve (12) kilometres west of the Village of Barry's Bay and is currently the only site that receives regular domestic waste from the Township for disposal. The Bark Lake waste disposal site has been operating under an emergency PC of A, which expires on August 1, 2008. Landfilling at the site will cease at the expiry of the emergency C of A regardless of remaining capacity which was approximately 12,060 m³, as of October 16, 2006.

3.3.4.2 WASTE TRANSFER

The Radcliffe waste disposal site is located on Lot 10, Concession 6 in the geographic Township of Radcliffe, in the Township of Madawaska Valley. Waste disposal at the site ceased in December 2001 and the site currently operates as a municipal solid waste transfer station and a recycling depot with transfer of the solid waste to the Bark Lake site for disposal.

The Wilno waste disposal site, is located on Part Lots 5 and 6, Concession IV, in the geographic Township of Sherwood, in the amalgamated Township of Madawaska Valley. The Wilno waste disposal site has been closed to waste disposal since late 1997 and currently operates as a solid waste transfer station with a recycling depot, with waste transfer to the Bark Lake waste disposal site.

3.4 ECONOMIC ENVIRONMENT

3.4.1 MUNICIPAL TAX BASE

In 2005, the waste disposal operating cost was \$309,700 and the waste transfer operating cost was \$132,100. The waste disposal capital cost was \$308,800 and the waste transfer capital cost was \$43,000 in 2005, of which, an estimated capital cost component of \$150,000 has been the finalization of the WMSP EA.

The 2005 Tax Base (revenue received from municipal taxes) was \$ 2,110,800. In comparison, the anticipated 2006 Tax Base is \$ 2,423,400, based on Township budget projections. 2006 cost information was not available at the time of publication of this report.

4.0 DESCRIPTION OF THE “ALTERNATIVES TO” THE UNDERTAKING

Consistent with the Township's approach to the WMSP to determine the best solution for the municipality to manage their waste in the long-term, alternatives to the undertaking (“Alternatives To”) were identified in accordance with Section 6.1 (2) of the EAA.

The “Alternatives To” were developed by the Township and are consistent with those presented in the ToR (Appendix I-A).

4.1 WASTE DIVERSION

The Township is committed to increasing waste diversion within the municipality by whatever means are practical and economically feasible to a small, rural municipality in order to reduce the quantity of waste in need of management as part of the WMSP. The OMOE has put forth a target for municipal waste diversion, urging municipalities to reach a waste diversion rate of 60% by the end of year 2008.

Waste diversion is assumed to have a fundamental role in the WMSP, regardless of the solution determined for residuals management.

4.2 LANDFILL

The majority of lands within the Township are vacant and undeveloped, which may present suitable conditions for a new landfill site development. Existing waste disposal sites within the Township also may have the potential for expansion of capacity. The expansion of capacity at an existing waste disposal site within the municipality or the developments of a new waste disposal site were both examined for this “Alternative To” the undertaking.

Only the existing waste disposal sites, and potential new waste disposal sites (Greenfield's) having a feasible probability of being expanded were evaluated, based on current physical setting, environmental compliance, public opinion, and economic factors. Consideration was also given to waste support services to a new and/or expanded landfill site, primarily with regard to the feasibility and importance of continued service provision throughout the Township with regard to waste transfer stations as ‘local’ waste facilities to residents.

4.3 WASTE EXPORTATION OUTSIDE OF THE MUNICIPALITY

There are large-scale facilities capable of accepting the Township's waste within a reasonable distance of the municipality. Waste exportation to a facility outside of the municipality for final disposal was examined based on duration of service contract and economic factors. This alternative was assessed for the

transportation and disposal of all solid waste generated within the municipality to an approved facility outside of the Township's boundaries.

4.4 WASTE INCINERATION

Waste disposal via incineration (or thermal) technologies is a new and emerging waste disposal alternative in the province of Ontario. The Township included a wide variety of waste management options for consideration as part of this waste management strategic plan, which includes emerging technologies. Waste incineration was reviewed based on its feasibility to a small, rural municipality in the WMSP.

4.5 DO NOTHING

The approach to this alternative was considered based on the premise that remaining waste capacity at existing waste disposal sites would be utilized and all waste management services within the municipality would be subsequently ceased. The "do nothing" approach is contrary to the proactive development of a long-term plan for waste management, and was considered as a control variable within the development of the WMSP.

4.6 OTHER ALTERNATIVES

In the ToR, the Township provided the above-mentioned five (5) alternatives for consideration in developing the WMSP. Through the process of the EA, the Township maintained the ability to consider additional alternatives or combinations of the proposed alternatives that had not been specified in the ToR, but would be detailed during the completion of the EA itself.

5.0 SCREENING OF ALTERNATIVES

This section presents a summary of the consideration and screening of alternatives to the undertaking. The screening of “Alternatives To”, and secondly, “Alternative Methods”, via the application of screening criteria, resulted in a set of candidates for consideration for the “Preferred Alternative”.

5.1 SCREENING CRITERIA AND METHODOLOGY

The Township has developed general screening criteria for the WMSP: economic feasibility, technical viability, and the consideration of public opinion. These criteria are reasonable aspects for general screening criteria for any small, rural municipality, where financial resources are limited.

The application of these general screening criteria has been developed further, as follows:

- Economic – consideration of long-term capital, operating, and related costs associated with any particular “Alternative To” or “Alternative Methods”, and its relative impact on financial resources of the Township and its ratepayers.
- Technical – “Alternatives To” and “Alternative Methods” to the WMSP were considered, investigated, and evaluated based on their technical nature, potential impacts to the environment, and technical complexity for implementation and long-term operations (significant technical complexity with respect to a particular “Alternative To” or “Alternative Method” would likely result in a negative economic impact).
- Public Opinion – as identified in Section 1.6, and as compiled in the RoC (Volume II), the Township has expended great effort to gather and include public opinion in the WMSP. Accordingly, the Township has considered the public’s preferences as received from various public venues, in the application of screening criteria to the “Alternatives To” and “Alternative Methods”.

Further to the general screening criteria presented above, specific environmental criteria were also used in the screening of the “Alternatives To” and “Alternative Methods” for the WMSP as presented in the ToR (Appendix I-A). The specific environmental criteria included pertinent aspects of the natural, socio-cultural, technical/built, and economic environments. The detailed screening criteria for the alternatives is summarized in Table 6 below, and are directly applied in Section 6.0 on “Alternative Methods” that warranted further evaluation as potential components of the WMSP as the “Preferred Alternative”.

Table 6 Detailed Screening Criteria

Environmental Criteria	Assessment Parameters
Natural	Air/Climate (noise, odour, dust, greenhouse gas emissions) Land, soils, physiography Surface Water (quantity, flow, velocity, chemistry) Groundwater (quantity, flow, velocity, chemistry) Biology / Ecology
Socio-Cultural	Planning Archaeology / Cultural Heritage Visual
Technical and Built	Infrastructure, roads, highways, municipal buildings
Economic	Cost
Other	Potential Risk, Public Acceptance Potential Risk, Vulnerability Public Opinion Service Provision Level

The screening process for the WMSP was straightforward. For small, rural municipalities, the general screening criteria identified above, presents a reasonable screening approach for the WMSP. That is, if the Township could not financially afford, or the public was strongly opposed to, the implementation of a particular “Alternative To” or a respective “Alternative Method”, then as presented in the ToR, screening out of these considerations was justified.

Where “Alternatives To” and “Alternative Methods” suggested potential for candidacy as the “Preferred Alternative” for the WMSP, these considerations were carried forth for detailed review.

The following Sections detail the screening considerations undertaken to identify “Alternative Methods” that, through the application of the general screening criteria, present reasonable and justifiable potential as part of the WMSP.

5.2 SCREENING OF “ALTERNATIVES TO” AND DETAILS OF “ALTERNATIVE METHODS”

For the “Alternatives To” presented in Section 4.0, the following presents a summary of background studies undertaken at the outset of the EA, and the application of general screening criteria as an initial screening measure.

5.2.1 WASTE DIVERSION

As stated in Section 4.1, the Township is committed to further enhancing their waste diversion program in an effort to minimize the residual waste material requiring management. However, the Township also must consider the economics of further waste diversion efforts, on a small, rural municipal scale.

When considering waste diversion methods suitable to the community profile and demographics of the Township, the most effective and frequently-used waste diversion systems within the province were examined. The following waste diversion enhancements were considered:

- the implementation of enforceable (i.e. via by-law) waste diversion enhancements to complement the user-pay system already in existence such as: mandatory recycling, and implementing bag limits in coordination with the user-pay or “pay-as-you-throw” systems. The diversion systems were considered primarily based on an economic feasibility (i.e. cost vs. diversion increase) and public acceptance of ‘enforceable’ recycling;
- expanding the existing curbside collection program, currently within the Village of Barry’s Bay only; and,
- the development of a defined organics diversion program suitable to the Township.

The results of the initial studies are presented as follows.

5.2.1.1 WASTE MANAGEMENT BY-LAW

5.2.1.1.1 Mandatory Recycling

The implementation of a waste management by-law, including a mandatory recycling component is an option for consideration to increase local diversion rates. The use of clear bags and random bag inspections are relatively effective methods of enforcing a mandatory recycling by-law. Enforcement in this regard would require the assistance of a by-law enforcement officer to investigate reports of non-compliance and fines may be incurred for non-compliance.

The mandatory recycling by-law would also require promotion and education to inform residents about the by-law and the waste diversion system available. This should include advertising (mail-outs, annual calendar, etc.) and public consultation events to provide the ratepayers with information about the waste management system available to the Township and discuss any concerns/ideas ratepayers may have.

In addition to promotion and education, a supplementary household hazardous waste event held subsequent to the one (1) event presently held annually by the Township, would provide more opportunity for participation and the potential for increased recovery of household hazardous material and would result in increased diversion of these materials from landfill.

Other small, rural municipalities located in Central and Eastern Ontario, similar to the Township of Madawaska Valley, that have instituted mandatory recycling by-laws have experienced significant increases in waste diversion tonnages since inception of the by-law, reported in the range of 20-50%.

5.2.1.1.2 Bag Limits

The Township currently operates a user-pay system with no maximum bag limit. Based on 2003 WDO waste management program summaries, there are a total of 190 municipal programs within the province that currently have a reported waste management program. Within the 190 programs, there are an estimated 75 municipal programs that have implemented a bag limit program to support their waste diversion initiatives. The more common choice of municipal bag limits per individual household range from two to three bags per household per week.

Municipalities offering curbside collection to both residential and commercial sector establishments with a bag limit and user pay system incorporate flexible limits to the commercial establishment based on the size of the business or the number of employees.

Information gathered from Public Consultation Event No. 3 in August 2005 indicated that 64% of the respondents were seasonal residents, which demonstrates the importance of a bag limit program that is flexible enough to accommodate seasonal participation at the waste disposal sites.

The implementation of a bag limit program within the Township was selected for further evaluation as part of the WMSP, with consideration of the operational costs associated with the program, the consideration of potential impact bag limits may have on the overall diversion of municipal solid waste, the public willingness and acceptance of a specific limit to waste generation per household, and the long-term benefit of a bag limit program. Consequent illegal dumping and backyard burning were also considered when evaluating the effectiveness of a bag limit program for the Township.

5.2.1.1.3 *User-Pay*

Many municipal programs throughout Ontario have introduced full user pay programs in conjunction with the implementation of strict bag limits on household garbage to assist with municipal waste diversion initiatives. Based on information gathered from the Association of Municipal Recycling Co-ordinators (AMRC), studies have indicated that in Ontario, the typical charge per bag using a bag tag system and bag limit ranges from \$1.00 per bag to \$5.00 per bag, with a range of \$1.00 to \$2.00 per bag being the most common.

In Ontario, programs with maximum bag limits where residents cannot exceed a specific number of bags per week have ranges of bag limits from two (2) to four (4) bags per household per week. Bag limits and user pay programs were further evaluated as part of an enhanced diversion program for the WMSP.

The Township's user pay program, which has been in place since prior to amalgamation, has been a success to date for the Township. Enhancement of this system with increased unit fees, supported by bag limits (Section 5.2.1.1.2) were carried forward for evaluation in the WMSP.

5.2.1.2 *CURBSIDE COLLECTION*

Based on Waste Diversion Ontario (WDO) Datacall information, the average curbside recycling program within the province incurs a higher recovery rate of recyclable material per household than rural depot systems. Based on the 2004 WDO Tonnage Datacall for 190 municipal programs within the province, the average recovery rate for a recycling depot site was approximately 75 kilograms per household per year and the average recovery rate for a curbside recycling program was 178 kilograms per household per year (WDO, 2005). The curbside recycling program costs per household throughout various municipalities range from \$2.50 per household per week to \$6.00 per household per week, depending on collection frequency, method of collection, and distance to suitable processing facilities.

Based on the Township's 2005 WDO Datacall, a total of 486 tonnes of material was recycled within the Township through the curbside blue box program in the Village of Barry's Bay and the outlying depot sites at Wilno and Radcliffe. In 2005, the recycling depot program that is being serviced by the Ottawa Valley Waste Recovery Centre (OVWRC) offered an expanded level of recyclable categories, including all grades of plastic and all grades of fibres. The curbside recycling program for the Village of Barry's Bay had a similar range of material categories with the exception of empty paint and aerosol cans and the lower grade composite plastic (#7). The total tonnage collected for the 2005 curbside residential program was 211 tonnes, which represents an increase in material collected compared to the 2004 curbside tonnage of 165 tonnes. In 2006, both curbside and depot blue-box materials are processed under the enhanced program at the OVWRC in Pembroke, Ontario.

When evaluating the current recycling program within the Township, the total recovery rate of recyclable material was examined. Within the Township, approximately 275 tonnes of recyclable material were collected from the recycling depots in 2005. The aggregate quantity of material is generated from both the permanent and seasonal residential sector and the commercial sector within the Township without any tracking of sector ratios; therefore, an estimated capture rate per household has not been determined. Township records indicate that the curbside blue box collection program services approximately 640 households. The 2005 Township WDO Datacall indicates that the curbside blue box collection program recovered approximately 211 tonnes of recyclable material, which represents a curbside recovery rate of approximately 385 kilograms per household per year.

Based on 2005 data, the Township's curbside collection program greatly exceeds the 2005 provincial average annual capture rate (181 kg/household) for curbside collection programs. Using the Township's high recovery rate for curbside collection as a benchmark for waste diversion initiatives, it was important to consider if there are long-term benefits associated with extending the recycling curbside collection program to populated areas throughout the Township. Information received from Public Consultation Event No. 3 in August 2005 indicated that 70% of the respondents considered it valuable to examine the costs associated with expanding the curbside blue-box collection service in the Township. In the initial stages, curbside collection costs were identified for comparison to recycling depot site costs to determine if there are cost benefits for a curbside program as a method to increase waste diversion from landfill.

Based on the above, the expansion of the curbside collection program within the Township was selected for further evaluation as part of the WMSP to determine the cost benefit of expanded curbside collection, the diversion potential the system may provide the Township, the public acceptance of expanded service, and the long-term sustainability of the Township's collection program.

5.2.1.3 COMPOSTING

Based on an initial review of Ontario municipal organics programs, it was determined that source separated organic (SSO) programs have the potential to divert an average of approximately 15% to 20% of the municipal solid waste stream, provided there is a focused education program to support the initiative and a strong public participation rate. Municipalities that have developed leaf and yard waste composting programs (for sale or giveaway) at existing waste disposal sites or other public facilities have experienced a range in waste diversion rates from 5% to 10% of the municipal waste stream, depending on the level of community participation and the location of the composting site.

SSO programs are most commonly comprised of all kitchen organics, including meat and dairy products. Public Consultation Event No. 3 in August 2005 indicated that 67% of the respondents were willing to

segregate their kitchen organic wastes from other household waste and bring it to a centralized area for further processing. Based on this information, the Township residents appear to be willing to implement a SSO program, if available.

For the in-site SSO diversion program option, the Omega Organics system was evaluated. The Omega Organics system is a rotary drum digester which is capable of handling all organic material. This is achieved through an aerobic process conducted inside a closed vessel that rotates to constantly mix and blend the materials (Omega Organics Incorporated, 2005).

The leaf and yard waste facility option includes the use of the current facility in operation at the Bark Lake waste disposal site. Residents are encouraged to deposit leaf and yard waste material at this site for compost processing, at which time it can be used as alternative daily cover as specified in the PC of A for the site. The sale or giveaway of these materials was identified for consideration as part of the WMSP.

The kitchen organics portion of the waste stream can be managed at each individual household through the use of backyard composters. These units are available at the Township office and information on the use of these units should be considered as a portion of the Township's waste management promotion and education program.

The implementation of organics programs within the Township was selected for further evaluation as part of the WMSP with the goal of maximizing the diversion potential from the Township's waste stream. Consideration of the total costs associated with an organics program, the relative or organics program impact would have on the Township's diversion, the public willingness to segregate organic material, and the long-term sustainability of organics diversion in a rural municipality was identified. The cost of implementing on-site SSO diversion programs within municipal boundaries were compared to the costs associated with employing a leaf and yard waste composting facility at an existing waste disposal site and kitchen organics being managed within the household.

5.2.2 LANDFILL

Several methods for considering the Landfill "Alternative To" were examined. The Township identified five (5) existing waste disposal sites to be evaluated for possible capacity expansions: Barry's Bay, Bark Lake, Radcliffe, Paugh Lake, and Wilno. The Township also identified the "Other" Radcliffe site which was designated for waste disposal by the former Township of Radcliffe, but has never been utilized. Each of the respective sites were evaluated under three separate scenarios for waste management within the Township: landfilling at the respective site with no outlying transfer stations, landfilling at the respective sites with one transfer station, and landfilling at the sites with two transfer stations. The transfer stations used for evaluation purposes are the Township's currently operating Wilno and Radcliffe waste transfer

stations, as they are ideally located near relatively higher population density areas in the eastern and southern portions of the Township, respectively (Figure 2).

The development of a new waste disposal site was also identified as a method for the implementation of the Landfill “Alternative To”.

From the basis of the existing waste management system within the Township as presented in Section 2.1, initial considerations of the Township’s existing waste disposal sites with PC of A’s were investigated, and the initial results are detailed as follows.

5.2.2.1 EXPANSION OF AN EXISTING WASTE DISPOSAL SITE

5.2.2.1.1 Barry’s Bay Waste Disposal Site

The Barry’s Bay waste disposal site, located approximately two (2) kilometres north of the Village of Barry’s Bay, has been closed since 1998. The Township submitted a final closure plan in June 2005 as part of a process of securing adjacent lands for the establishment of a CAZ. Due to the physical nature of the current waste pile, physical topography, adjacent private lands, the current compliance status of the site, and consultation with the OMNR Pembroke and OMOE Ottawa District offices, it was determined that there is no potential for future waste disposal at this site. Therefore, expansion of capacity at the Barry’s Bay waste disposal site was not considered further as a candidate for the “Preferred Alternative”.

5.2.2.1.2 Bark Lake Waste Disposal Site

The Bark Lake waste disposal site, located approximately twelve (12) kilometres west of the Village of Barry’s Bay, is currently the only Township site that receives waste for disposal. With consideration of the current compliant operating status, the environmental setting at the Bark Lake site, and local topography, it was determined that the expansion of capacity at this site may be a suitable candidate for the “Preferred Alternative”. Therefore, this method for implementing the Landfill “Alternative To” was selected for further evaluation.

5.2.2.1.3 Radcliffe Waste Disposal Site

The Radcliffe waste disposal site, located approximately two (2) kilometres north of the Village of Combermere, operates as a municipal solid waste transfer station and recycling depot. Waste disposal at the site ceased in December 2001 and a closure plan was submitted to the OMOE in October 2005.

There has been historical opposition from regulatory agencies in regards to potential impacts to the environment from the Radcliffe site operations. Preliminary hydrogeological interpretation suggests that expansion of capacity of the Radcliffe site would potentially result in surface water impacts to Rockingham

(Byers) Creek. Therefore, given the current compliance status of the site, and consultation with the OMNR Pembroke and OMOE Ottawa District offices, expansion of capacity at the Radcliffe waste disposal site was not considered further as a candidate for the “Preferred Alternative”. The site is currently undergoing final closure activities for the historical waste mound, consistent with the submitted Closure Plan (SGS, 2005b).

5.2.2.1.4 Paugh Lake Waste Disposal Site

The Paugh Lake waste disposal site is located approximately twelve (12) kilometres north of the Village of Barry’s Bay near a cottage community on the north shore of Paugh Lake. The Paugh Lake site operated as a seasonal domestic waste and recycling transfer station until November 2003. As a result of recommendations from the OMOE concerning strong public opposition to continued operations at the site, the Paugh Lake waste disposal site is currently closed until resolution of technical and public concerns associated with the Township’s 2003 application for continued site use.

Preliminary hydrogeological interpretation suggests that expansion of capacity at the Paugh Lake waste disposal site to accommodate the Township’s waste for the next 25 years would likely result in leachate migration with potential of impacting Paugh Lake. Furthermore, the site is located in close proximity to residential dwellings and there has been strong public opposition raised by local residents to continued operations at the Paugh Lake site. Therefore, given the current compliance status of the site, expansion of capacity at the Paugh Lake waste disposal site was not considered further as a candidate for the “Preferred Alternative”; however, the Township does recognize the remaining capacity at the site of 6,000 m³ (SGS, 2006b).

5.2.2.1.5 Wilno Waste Disposal Site

The Wilno waste disposal site, located approximately seven (7) kilometres east of the Village of Barry’s Bay, currently operates as a solid waste transfer station and recycling depot. The Wilno site has been closed to waste disposal since late 1997.

The Wilno waste disposal site is located in close proximity to residential dwellings and based on historical account, it is probable that strong public opposition to a proposed capacity expansion would be generated. Background information suggests that expansion of capacity at the site on municipally-owned lands to the east would potentially result in off-site impacts to the watercourse located to the east of the site. Correspondence received from the OMNR indicated that the Wilno site capacity is not compatible for expansion due to the close proximity to sensitive creek or lake values. Therefore, based on the geographic location of the site, and consultation with the OMNR, expansion of capacity at the Wilno waste disposal site was not considered further as a candidate for the “Preferred Alternative”.

5.2.2.1.6 "Other" Radcliffe Waste Disposal Site

The "Other" Radcliffe waste disposal site has an existing PC of A and is located between the Village of Combermere and the Village of Barry's Bay off Highway 62. To date, the Township has not utilized this site for any waste management operations. Background information collected from the OMOE suggests that prior to amalgamation; the former Township of Radcliffe conducted hydrogeological studies to support utilization of the site. The potential for surface water impacts was never adequately addressed to the satisfaction of the OMOE. The site is surrounded by surface water in the form of wetland and watercourses. The fill area of the site, as originally proposed, was one hectare since the site was intended to only serve the residents of the former Township of Radcliffe.

Correspondence from the OMNR indicated that the "Other" Radcliffe site was not compatible for expansion due to the close proximity to sensitive creek or lake values. Given the potential for surface water impacts, similar concerns exist for the implementation of a larger site. Therefore, expansion of capacity at the "Other" Radcliffe waste disposal site was not considered further as a candidate for the WMSP's "Preferred Alternative".

5.2.2.2 NEW WASTE DISPOSAL SITE DEVELOPMENT

The Township assessed the feasibility of developing a new landfill site on lands not previously developed (Greenfield). Areas were identified within the Township by conducting a desk-top analysis of Ontario Base Maps (OBM) using large-scale criteria such as: land use, infrastructure, proximity to surface water, and topography. The Township identified six (6) potential areas for a new landfill site. The identified areas were further assessed at a more detailed level through visual surveys, site inspections, and site-specific analysis to determine preliminary suitability for landfilling operations. Upon completion of the visual surveys, four (4) of the sites were eliminated due to limited infrastructure, proximity to surface water or sensitive land-use, and/or topography.

Two remaining identified areas (Lot 3, Concession 11, geographic Township of Radcliffe, and Lot 21, Concession 13, geographic Township of Sherwood) were selected for further evaluation as part of the WMSP (Figure 4).

5.2.3 WASTE EXPORTATION OUTSIDE THE MUNICIPALITY

Several methods for implementing the waste exportation "Alternative To" were examined by the Township. A request for expression of interest (RFEOI) was prepared in December 2004 and distributed to seven (7) facilities licensed to accept the Township's waste: Greenlane Environmental Incorporated, Halton

Recycling Limited, Lafèche Environmental Incorporated, Miller Waste Systems, Ottawa Valley Waste Recovery Centre, Tomlinson Environmental Services Incorporated, and Waste Management Incorporated.

The results of the RFEOI are presented below.

5.2.3.1 GREENLANE ENVIRONMENTAL INCORPORATED

Greenlane Environmental Incorporated, located in London, Ontario, is a large waste disposal site, a Material Recovery Facility (MRF), and an organics processing facility licensed to accept material from the Township. Greenlane Environmental Incorporated did not provide any response to the RFEOI. Follow-up communications revealed that based on the small volume of material generated by the Township, Greenlane Environmental Incorporated was not willing to provide long-term cost agreements with the Township at this time.

Based on the facility's geographical location and position with respect to long-term agreements, Greenlane was not considered further as part of the WMSP.

5.2.3.2 HALTON RECYCLING LIMITED

Halton Recycling Limited, located in Newmarket, Ontario, is a processing facility for source-separated organic material. This facility processes wet waste material using an anaerobic process. Halton Recycling Limited did not provide any written or verbal response to the RFEOI or to follow-up inquiries. It is anticipated that the estimated volume generated by the Township is lower than typical volumes entering this facility; therefore, the processing costs per tonne may not be competitive at this time. Consequently, exportation of waste to the Halton Recycling Limited facility was not considered further as a candidate for the "Preferred Alternative".

5.2.3.3 LAFLÈCHE ENVIRONMENTAL INCORPORATED

Lafèche Environmental Incorporated (Lafèche), located in Moose Creek, Ontario, is a waste disposal site licensed to accept waste from the Province of Ontario. Lafèche did not provide any written response to the RFEOI. This facility is willing to enter into long-term contracts, but would not provide long-term costs until the Township were to submit a formal tender document or intent to haul material to Lafèche. However, preliminary tipping fee information was provided. The exportation of waste to Lafèche was selected for further evaluation as part of the WMSP.

5.2.3.4 MILLER WASTE SYSTEMS

Miller Waste Systems, a division of Miller Paving Limited, is located in Markham, Ontario and is a waste transfer facility, a MRF, and an organics processing facility licensed to accept material from the Township.

Miller Waste Systems responded to the RFEOI in writing in February 2005 declining to provide service information, indicating that it would not be economically feasible to receive the low volume of material generated in the Township at this time. Therefore, exportation of waste to the Miller Waste Systems facility was not considered further as a candidate for the "Preferred Alternative".

5.2.3.5 OTTAWA VALLEY WASTE RECOVERY CENTRE

The Ottawa Valley Waste Recovery Centre (OVWRC), located in Pembroke, Ontario, is a MRF for processing expanded blue-box material, a licensed waste disposal site, and an organics processing facility. The OVWRC submitted a response to the RFEOI in January 2005. This facility is willing to enter into long-term contracts to accept waste, recyclables, and source separated organic material generated from both the residential and commercial sectors of the Township through the facility's current partnership program. The exportation of waste to the OVWRC was selected for further evaluation as part of the WMSP.

5.2.3.6 TOMLINSON ENVIRONMENTAL SERVICES INCORPORATED

Tomlinson Environmental Services Incorporated (Tomlinson), located in Gloucester, Ontario, provided curbside collection services for the Village of Barry's Bay until December 2004 and hauled material to Beaumen Waste Management/Recycling in Renfrew, Ontario. Tomlinson did not provide a written response to the RFEOI and follow-up communications revealed that Tomlinson was not willing to enter into long-term hauling/contract arrangements. Therefore, exportation of waste by Tomlinson Environmental Services Incorporated was not considered further in the WMSP.

5.2.3.7 WASTE MANAGEMENT INCORPORATED

Waste Management Incorporated (WMI) has a waste disposal site licensed to accept waste from the Township, located in Carp, Ontario. WMI did not submit a written response to the RFEOI. Verbal inquiries with WMI indicated that they were not willing to commit to long-term contract arrangements and established tipping fees until the Township submits a formal intent to haul material to the WMI facility. However, preliminary tipping fee information was provided. The exportation of waste to the WMI facility was identified for further evaluation.

5.2.4 WASTE INCINERATION

Within Ontario, there are limited waste incineration facilities designed and licensed to accept municipal solid waste. Although there is limited information for operational incinerators within the province, information was available for modular systems that are apparently capable of handling lower volumes of municipal waste.

New and emerging technologies such as gasification and pyrolysis involve subjecting waste to high temperatures without the use of oxygen, thereby generating fewer toxins into the environment. Within the past decade, thermal treatment and plasma gasification have been developing for the processing of municipal solid waste, primarily thermal treatment processes for the residuals of municipally-processed waste. Pre-processing of municipal solid waste is still preferred with all systems operating specifically for municipal solid waste on a fully operational scale in North America. Most of the systems are in the pilot stage or only structured to process non-municipal solid waste (i.e. hospital waste). The only operational thermal treatment facility in Ontario is owned and operated by the Region of Peel, and is currently not licensed to accept material from the Township. Most of the full-scale operating facilities are located in Europe or Japan (MacViro, 2003).

Due to cost, environmental uncertainty, and the complex regulatory processes involved with this waste management approach, thermal treatment was not considered further in the WMSP.

5.2.5 DO NOTHING

This scenario can be evaluated from a risk to human health and environment perspective. Once all possible waste disposal options within the Township have been exhausted, and no other disposal options are available, it is likely that illegal dumping and backyard burning would commence, particularly in the less populated areas of the Township, resulting in adverse impacts on the natural environment and posing a risk to human health.

The Township considered the “Do Nothing” approach to be irresponsible and negligent; however, as part of the WMSP, this “Alternative To” needs to be considered. As such, this alternative was evaluated as a “control”, whereby the anticipated results of doing nothing with respect to waste management in the future would be compared to a proactive “Preferred Alternative” for the WMSP.

5.3 IDENTIFICATION OF “ALTERNATIVE METHODS”

In Section 5.2, a summary of the evaluation of the “Alternatives To” was presented. Through this initial screening process, “Alternative Methods” were identified for further consideration for the “Preferred Alternative” for the WMSP. A summary table of the “Alternatives To” and “Alternative Methods” identified for further consideration is presented as Table 7, below.

Table 7 “Alternatives To” and “Alternative Methods” Considered for Further Evaluation

“Alternative To”	“Alternative Methods”
Waste Diversion	- Waste Management By-Law <ul style="list-style-type: none"> - Mandatory Recycling (includes promotion and education component) - User Pay System (includes bag limits) - Expanded Curbside Collection - Organics Composting
Landfill	- Expansion of the Bark Lake Waste Disposal Site - New Waste Disposal Site(s) Development <ul style="list-style-type: none"> - Lot 3, Concession 11, Geographic Township of Radcliffe - Lot 21, Concession 13, Geographic Township of Sherwood
Waste Export	- Lafèche (Moose Creek, Ontario) - OVWRC (Pembroke, Ontario) - WMI (Carp, Ontario)
Do Nothing	- Do Nothing

From the candidates summarized above, detailed investigations into each of the “Alternative Methods” were undertaken to determine the feasibility of each “Alternative Method” in determining the “Preferred Alternative” for the WMSP. Detailed studies undertaken and referenced in this Section are appended to this report for detailed reference.

As part of the detailed investigations conducted for each of the “Alternative Methods” a costing assessment was completed and the resultant relative economic outcomes were used as the primary fundamental screening criteria for determining the “Preferred Alternative”.

The costing assessment for each “Alternative Method” included cost projections over the identified 25-year planning period using the following information and fixed variables:

- Population and household data.
- Waste and recycling tonnage data.
- Population, waste tonnage, and recycling tonnage projections included in the ToR.

- Amortization period of 25 years and interest rate of 5.25%.
- Inflation rate of 5.0% on all operating costs (conservative estimate for planning and contingencies for the operating costs associated with the evaluated alternatives during the term of study including, but not limited to, wages, equipment maintenance, fuel, etc., as applicable to each respective alternative).
- Maintenance and monitoring costs for all waste disposal sites.

Results of the detailed cost assessments for each “Alternative Method” are summarized in tables provided as part of the following sections.

5.3.1 WASTE DIVERSION

As detailed in Section 5.2.1, several enhancements to the existing waste diversion system were considered. The following alternative methods were identified for further study:

- Implementation of a waste management by-law.
- Expanded curbside collection to areas outside of the current curbside collection program.
- Organics composting.

The waste diversion “Alternative To” has been considered independent of other “Alternatives To”; however, the waste diversion “Alternative To” will be incorporated into the selected “Preferred Alternative” to maintain an enhanced recycling program within the Township that will reduce overall volumes of residual waste needing management. The Township is committed to promoting and educating residents on the benefits of recycling and will continue to develop and enhance waste diversion initiatives within Township, as economically viable, over the presented 25-year planning period.

A summary table of the waste diversion “Alternative To” costing assessment is presented in Table 8.

Table 8 Costing Assessment Results for Waste Diversion “Alternative Methods”

		Total Cost	Average Annual Cost	Average Annual Cost / Household	Estimated Increase in Diversion Rate
Status Quo		\$4,160,000	\$167,000	\$58	0%
Waste Management By-law		(\$70,000)	(\$3,000)	(\$1)	13%
Expanded Curbside	1.0 km radius from centre of Barry's Bay	\$1,030,000	\$41,100	\$14	5%
	1.5 km radius from centre of Barry's Bay	\$1,100,000	\$43,900	\$15	6%
	2.0 km radius from centre of Barry's Bay	\$1,560,000	\$63,000	\$22	7%
	3.0 km radius from centre of Barry's Bay	\$1,960,000	\$79,000	\$27	9%
	4.0 km radius from centre of Barry's Bay	\$2,740,000	\$110,000	\$38	13%
	Old Barry's Bay Road	\$740,000	\$30,000	\$10	3%
	Smaglinski Stoppa Parkway	\$80,000	\$4,000	\$1	0.4%
	Combermere	\$1,010,000	\$41,000	\$14	5%
	Wilno	\$90,000	\$4,000	\$1	0.4%
Organics	Backyard Composting	\$40,000	\$2,000	\$0.50	6%
	Leaf and Yard Waste (current operations at Bark Lake)	\$530,000	\$22,000	\$42	0%
	Leaf and Yard Waste (compost for sale or give away)	\$710,000	\$29,000	\$56	7%
	Omega Organics System	\$1,130,000	\$45,000	\$16	11%

An evaluation of each of the waste diversion “Alternative Methods” and subsequent costing analysis results are detailed in the following sections.

5.3.1.1 WASTE MANAGEMENT BY-LAW

The consideration of a formal waste management by-law to incorporate specific requirements of user-pay systems, bag limits, mandatory recycling, and hazardous/special waste restrictions is a necessary part of instituting and measuring compliance with enhanced waste diversion efforts.

The implementation of a waste management by-law, including a mandatory recycling component was considered to increase the Township's current diversion rate. The use of clear bags and random bag inspections are relatively effective methods of enforcing a mandatory recycling by-law. The enforcement of

this by-law would require the assistance of a by-law enforcement officer to investigate reports of non-compliance, and fines may imposed by the appropriate enforcement authority.

The mandatory recycling by-law would also require promotion and education to inform residents about the by-law and the entire waste diversion system available. This should include advertising (mail-outs, annual calendar, etc.) and public consultation events to provide the ratepayers with information about the waste management system available to the Township and discuss any concerns/ideas ratepayers may have.

The current user-pay system of bag tags (and special "MV" bags) affixed to bags of waste in order for them to be acceptable for disposal should be maintained. In addition to this, a limit of two (2) bags per household per week was examined to increase the waste diversion rate. Additional bag tags could be purchased at a higher rate if necessary.

The Township currently hosts one (1) household hazardous (special) waste event per year. Increasing the frequency of these events to two (2) per year would allow more opportunity for participation and potential for higher recovery of household hazardous material and diversion of these materials from landfill.

The detailed cost assessment related to the implementation of the waste management by-law is summarized in Table 8. The waste management by-law "Alternative Method" of waste diversion, with the application of user-pay, bag limits, promotion/education, and two (2) household hazardous waste events per year would result in total revenue for the Township of approximately \$70,000 over the 25-year planning period (Table 8). The resultant average annual benefit to the Township is approximately \$3,000 with an anticipated increase in the diversion rate of 13%, with the majority of the funds received being generating from the sale of bag tags, to offset program costs.

5.3.1.2 EXPANDED CURBSIDE COLLECTION

This "Alternative Method" considered expanding curbside collection for waste and recyclables in areas of the Township where it was deemed practical (i.e. high population density, no transfer station in the vicinity). Data on the existing curbside collection program in the Village of Barry's Bay was used for the assessment of each area. Consequently, as a result of a detailed review of residential dwellings in the Township, the following areas were considered: Old Barry's Bay Road, Smaglinski Stoppa Parkway, hamlets of Wilno and Combermere, and areas within a 1.0 to 4.0 kilometre radius from the centre of the Village of Barry's Bay, the main urban centre of the Township (Figure 5; Table 7). For each service area considered, the total number of additional households was determined to calculate the cost for this service. The practicality of expanded curbside collection for each service area was also examined given the proximity to transfer station operations with established recycling depots.

The total costs for this alternative ranged from approximately \$80,000 to approximately \$2,740,000, depending on the area and the increase in waste diversion rate ranged from approximately 0.4% to approximately 13%. At present, expanded curbside collection for a 1.5 kilometre radius from the centre of the Village of Barry's Bay was deemed to be the most practical and cost-effective option, given the parcel fabric, population density of the Village of Barry's Bay, and the location of waste and recycling transfer station operations within the Township (Table 8). This system would result in a total cost of approximately \$1,100,000 with an increase in waste diversion rate of approximately 6%.

5.3.1.3 ORGANICS COMPOSTING

Further to the aspects presented in Section 5.2.1.3, an organics composting program best suited for a small, rural municipality was considered. This "Alternative Method" considered increased participation in backyard composting by promotion and education and reduced costs to ratepayers for backyard composters, the option for the availability of leaf and yard waste compost for reuse at the Bark Lake waste disposal site (in operation in fall 2005), and the consideration of a batch process organics system for potential SSO management for composting (such as the Omega Organics system).

Organics composting is an effective way to increase the diversion of waste from landfill since a large portion of the waste stream is organic material. According to the *Residential Waste Composition Study* (Gore and Storrie Limited, 1991), approximately 15% of all residential solid waste in Southern Ontario is yard waste and 22% is food waste. For this aspect of waste diversion, three (3) different concepts were considered, as described in Section 6.2.

Backyard composting would include making pre-fabricated compost units available to ratepayers for a cost subsidized by the Township. According to Township records, as of 2005, approximately 16% of households currently have backyard composting units. It is assumed that this participation rate would increase to approximately 30% in year 1, 35% in year 2, 40% in year 3, 45% in year 4, 50% in year 5, and would remain at 50% for the remainder of the project planning period. An increase in promotion and education would be part of the waste management by-law and would also include education about using backyard compost units for kitchen organic waste. This increase in backyard composting would result in a total cost to the Township of approximately \$40,000 with an increase in the waste diversion rate of approximately 6%.

Leaf and yard waste composting commenced within the Township in the autumn of 2005 with the establishment of a leaf and yard waste composting area at the Bark Lake waste disposal site. Since the composted leaf and yard material is used at the Bark Lake waste disposal site as an alternative waste

cover, it is not recognized as a diversion by WDO. However, consideration should be given to the sale/give away of this composted material to residents, which would then be recognized as a diversion measure. However, the sale or give away of this material would require sampling and analysis of the compost and specific guidelines would need to be followed regarding the temperature, turning, and arrangement of composting operations as well as the chemical quality of the final product. This would result in additional cost to the Township.

The use of the leaf and yard waste composting facility at the Bark Lake waste disposal site keeping with current operations would result in a total cost to the Township of approximately \$530,000 and would not increase the Township's diversion rate, but would offer significant operational benefits reducing the amount of soil cover required to be transferred to the site. Alternatively, the use of the leaf and yard waste composting facility at the Bark Lake waste disposal site for the sale or give away of the composted material would result in a total cost to the Township of approximately \$710,000 with an increase in the waste diversion rate of approximately 7%.

The use of the leaf and yard waste composting facility at the Bark Lake waste disposal site for the sale and/or give away of the compost material are not part of the recommended "Preferred Alternative" at this time. Should the Township wish to increase the diversion rate further, this can be considered at that time.

The Omega Organics system is a rotary drum digester in which aerobic composting is conducted. The closed vessel rotates to constantly mix and blend the feed materials. The Omega Organics system is designed to ensure that the raw materials are raised to a temperature inside the vessel that hastens the rate of composting, while killing all pathogenic substances and weed seeds. This results in a very consistent compost product. The raw material is converted into a digested blend in three days and an additional twenty one days outside the drum is required for maturing (Omega Organics Incorporated, 2005). The use of the Omega Organics system at the Bark Lake waste disposal site would result in a total cost to the Township of approximately \$1,130,000 with an increase in the waste diversion rate of approximately 11%. However, the use of the Omega Organics system is not a proven technology in Ontario, and with the relative high cost of this technology, the use of the Omega Organics system was not considered further as part of the "Preferred Alternative".

5.3.2 LANDFILL

The following alternative methods of the Landfill “Alternative To” were identified for further study, as reviewed in Section 5.2.2:

- Expansion of the Bark Lake waste disposal site.
- New waste disposal site development.

A summary table of the landfill “Alternative To” costing assessment is presented in Table 9.

Table 9 Costing Assessment Results for Landfill “Alternative Methods”

Existing Waste Disposal Site Expansion (Bark Lake)				
Scenario	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
0 Transfer Stations	\$7,220,000	\$290,000	\$301	\$100
1 Transfer Stations	\$9,500,000	\$380,000	\$396	\$132
2 Transfer Stations	\$11,660,000	\$470,000	\$486	\$162
New Waste Disposal Site Development (Radcliffe Township)				
Scenario	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
0 Transfer Stations	\$8,660,000	\$350,000	\$361	\$120
1 Transfer Stations	\$11,070,000	\$450,000	\$461	\$154
2 Transfer Stations	\$12,980,000	\$520,000	\$541	\$180
New Waste Disposal Site Development (Sherwood Township)				
Scenario	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
0 Transfer Stations	\$8,660,000	\$350,000	\$361	\$120
1 Transfer Stations	\$11,070,000	\$450,000	\$461	\$154
2 Transfer Stations	\$13,110,000	\$530,000	\$547	\$182
Status Quo				
Scenario	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
	\$9,880,000	\$400,000	\$412	\$137

A more detailed description of each of the landfilling “Alternative Methods” is presented; complete with costing assessment details, in the following sections.

5.3.2.1 EXPANSION OF THE BARK LAKE WASTE DISPOSAL SITE

The Bark Lake waste disposal site was determined to be the only existing waste disposal site within the Township with potential for a capacity expansion. The Bark Lake waste disposal site is located twelve (12)

kilometres west of the Village of Barry's Bay and is currently the only site that receives solid waste from the Township for disposal.

Consistent with the PPS (2005), the Township conducted a series of detailed technical studies to evaluate the potential for the Bark Lake waste disposal site as part of the "Preferred Alternative" for the WMSP. As the capacity expansion of the Bark Lake waste disposal site could suggest a footprint enlargement, the technical studies have been focused on these aspects of land use that could reasonably be expected to be affected by a potential landfill expansion.

These detailed studies included:

- A waste disposal site expansion feasibility assessment, to evaluate expanded landfill design concepts and potential groundwater, surface water, and air impacts, as documented in, *Feasibility Study for the Potential Expansion of the Bark Lake Landfill, Township of Madawaska Valley*, Azimuth Environmental Consulting Inc. (Azimuth), September 2005 (Appendix I - D).
- Natural heritage impact studies to evaluate potential impacts to wildlife, habitat, etc.:
 - *Initial Environmental Impact Study, Bark Lake Waste Disposal Site, Township of Madawaska Valley*, Snider's Ecological Services (SES), January 2006 (Appendix I - E).
 - *Supplemental Studies of Natural Heritage Features of Bark Lake Waste Disposal Site*, SES, September 2006 (Appendix I - F).
- Cultural heritage studies to determine if any significant cultural heritage features exist at or near the Bark Lake site:
 - *A Stage 1 & 2 Archaeological Assessment of the Potential Expansion Area, Bark Lake Waste Disposal Site*, Kinickinick Heritage Consultants (Kinickinick), November 2005 (Appendix I - G).
 - *A Stage 3 Archaeological Assessment of BjGk-7, Bark Lake Waste Disposal Site*, Kinickinick, August 2006 (Appendix I - H).
- Economic analyses of estimated and projected capital and operating costs associated with long-term operations of an expanded landfilling area at the Bark Lake waste disposal site, including an analysis of operating waste transfer stations presently existing within the Township at the Wilno and Radcliffe waste disposal sites.

The results of the above studies undertaken in consideration of the expansion of the Bark Lake waste disposal site and ensuing alterations to site specific natural, socio-cultural, technical and built, and

economic environments, are summarized in the following sections. Complete reports can be viewed in Appendices to this Volume as indicated.

5.3.2.1.1 Natural Environment

Geology, Hydrogeology and Groundwater Quality

The Bark Lake waste disposal site is situated within the physiographic region known as the Haliburton Highlands, which predominantly consists of overburden material ranging from layers of sand, silty sand, and mottled sand and gravel (Chapman and Putnam, 1984). Bedrock beneath the site consists largely of metamorphic gneiss, and is characterized as part of the Central Gneiss Belt unit of the Canadian Precambrian Shield. Groundwater flow beneath the site is controlled by fractures within the bedrock formation, is generally characterized by low permeability, and is interpreted to flow toward to the west and southwest of the site (Azimuth, 2005). Depth to bedrock underlying the site ranges from 8 to 15 metres below ground surface northwest of the current approved waste disposal area, and between 6.5 to 13 metres below ground surface southeast of the approved waste disposal area (Azimuth, 2005). A large bedrock outcrop dominates the landscape to the immediate northeast of the site forming a steeply sloped ridge that flanks the current approved waste disposal area, and provides a potential backstop for a waste disposal area expansion.

Local, shallow and intermediate groundwater flow at the Bark Lake site is directed by the underlying bedrock formation beneath the site. Groundwater flow at the site follows the general slope of the local bedrock unit, in the general direction of Peters Marsh to the west and southwest of the site, which flows into Bells Bay of Bark Lake (SGS, 2006a; Appendix I - C). The aggregate extraction pit located to the north of the site does not have potential to influence the groundwater configuration at the site, as the aggregate extraction area is interpreted to be hydraulically separated, with discharge being directed to local surface water systems northwest of the Bark Lake site.

Consistent with the site's PC of A, groundwater quality at the Bark Lake waste disposal site is assessed during routine annual groundwater sampling events conducted at the site through an established network of fourteen (14) groundwater monitoring wells at the site (Figure 6). The monitoring well network was been developed such to detect potential contaminants in the shallow, intermediate, and deep groundwater aquifers beneath the site. A comprehensive groundwater sampling and analysis program has historically been completed in the spring, and one (1) groundwater sample is collected in the summer and fall from one downgradient monitoring well, BH9B. The water quality results of each respective sample event are compared to background water quality at the site, obtained from monitoring well BH12.

The 2007 environmental monitoring program at the site has been amended consistent with recent OMOE review comments provided on the draft EA. These monitoring program amendments were made to the groundwater monitoring program to include an additional fall groundwater sampling event (at all groundwater monitors in the current program) at the site. Additional sampling for benzene, toluene, ethylbenzene, and xylenes (BTEX) at select monitors, and field measurements of dissolved oxygen at all monitoring wells, were also incorporated into the 2007 groundwater monitoring program. The 2007 surface water monitoring program was also amended to include one (1) additional surface water sampling station on the Burnett's Pond Creek tributary, to monitor background water quality adjacent to Highway 60.

The 2006 groundwater monitoring results for the Bark Lake waste disposal site indicate that a groundwater leachate plume exists downgradient of the site (Greenview, 2007; Appendix I - C). Monitoring wells BH3A, BH3B, BH9A, BH9B, and BH10C exhibit water quality generally elevated above background levels, indicating local impact from landfill leachate emanating from the waste mound. The groundwater quality in the shallow monitoring wells was generally of reduced quality than the groundwater from the deeper monitoring wells. The concentrations of some leachate parameters at monitors in close proximity to the waste mound appear to be increasing over time, with the inclusion of 2006 water quality (Greenview, 2007; Appendix I - C). However, the leachate plume from the waste mound appeared to be decreasing in concentration with distance from the waste mound as water quality improved at monitoring further downgradient from the waste mound. Continued monitoring should verify the water quality results observed in close proximity to the waste mound in 2006.

In December 2006, consistent with comments provided on the draft EA, field dissolved oxygen levels were recorded for monitoring wells at the Bark Lake site. The results of the December 2006 sampling event indicate that dissolved oxygen values immediately downgradient of the waste mound were generally similar to wells downgradient of the site and adjacent to the Peters Marsh Creek tributary.

In previous years, OMOE Guideline B-7: Reasonable Use Concept (RUC; OMOE, 1994) has not been applied to the groundwater quality results at the Bark Lake waste disposal site, as groundwater in the vicinity of the site has been interpreted to discharge to the Peters Marsh Creek tributary to the west of the waste mound, and there are no present (or historic) groundwater users immediately downgradient of the site (SGS, 2006a; Appendix I - C). Alternatively, a surface water trigger mechanism has been established in the creek to the west of the site to detect downgradient impacts from the waste mound, with no recorded trigger exceedances being noted in 2005 or 2006 (SGS, 2006a; Greenview, 2007; Appendix I - C).

Based on the groundwater configuration at the site, a component of groundwater flow appears to be in the general direction of Highway 60, southwest of the site, and does not appear to discharge directly to the

Peters Marsh Creek tributary, located west of the site (Figure 6). Consistent with OMOE comments provided on the draft EA, a RUC assessment was conducted following the 2006 environmental monitoring program at the site to monitor potential downgradient impacts at the proposed southeastern downgradient CAZ boundary (Greenview, 2007). The RUC assessment was conducted using the concepts and procedures outlined in OMOE Guideline B-7, and using the median value of individual background parameter concentrations from monitoring wells at the site.

Exceedances were noted for a few non-health related parameters at the downgradient RUC monitors in 2007; however, are not considered to be a result of the landfill as winter road maintenance activities on the adjacent Highway 60, and historic road construction material staging adjacent to the site, are expected to be contributing to the elevated concentrations.

Based on the results of the 2006 groundwater monitoring program, the Bark Lake waste disposal site is in conformance with MOE Guideline B-7 at the southeast and western proposed CAZ boundaries.

The nearest property structure is located approximately 500 m southwest of the site; however, it is not a residential structure and is considered to be hydraulically separated from the waste disposal site, as it is located on the west side of Bells Bay (Bark Lake) and is interpreted to be part of a separate drainage system discharging into Bark Lake (Figure 7).

Surface Water Systems and Quality

Surface water systems with potential for impact from the Bark Lake waste disposal site consist of the following systems (Figure 6):

- A tributary of the creek that flows between Peters Marsh and Highway 60, located to the north and west of the waste disposal site, upgradient of its confluence with the creek flowing from Burnetts Pond to Bark Lake (SES, 2006b, 2006c).
- The creek flowing from Burnetts Pond to Bark Lake (main tributary).
- Bark Lake (Bell's Bay).
- Parissien Lake.

Local topography (northern watershed) directs surface water flow in the area of the Bark Lake waste disposal site in the tributaries feeding Bark Lake from north to south. Site topography directs surface water

flow to the north and west towards the eastern tributary originating from Peters Marsh; however, granular soils promote rapid infiltration of overland flows (Azimuth, 2005). The southern watershed directs flow to the south and east toward Parissien Lake and Bark Lake.

Groundwater flow from the landfill area has been interpreted to flow westerly and southwesterly, towards the Peters Marsh tributary (SGS, 2006a; Appendix I - C), and discharges into this creek along its length, as supported by recent temperature profiling (SES, 2006b). Surface water quality monitoring in this tributary as part of the site's annual monitoring and reporting program indicates that the landfill is not adversely impacting the surface water systems near and downgradient of the site (Greenview, 2007; SGS, 2006a; Appendix I - C).

In late 2006, field dissolved oxygen levels were recorded in December 2006 at the surface water locations on the Peters Marsh Creek tributary at the Bark Lake site. The results of the December 2006 sampling event were similar to the results of the 2006 surface water monitoring events (Greenview, 2007), exhibiting elevated dissolved oxygen levels in the Peters Marsh Creek tributary in comparison to historical data (SGS, 2006a). There were no PWQO criteria exceedances at the surface water sampling locations for dissolved oxygen in 2006 at the Bark Lake waste disposal site.

As noted above, potential impacts to the natural environment from the expansion of the Bark Lake site over the 25-year planning period were evaluated in the *Feasibility Study for the Potential Expansion of the Bark Lake Landfill, Township of Madawaska Valley*, Azimuth Environmental Consulting Inc., September 2005 (Appendix I-D). The following summarizes the findings of the report:

- An expansion volume of approximately 150,000 m³ (beyond the current remaining waste capacity) is feasible and does not pose any significant environmental impacts for the Bark Lake site to accommodate a 25-year waste disposal life span. The expansion concepts are based on utilizing a natural attenuation design for groundwater and surface water protection at the site.
- The proposed landfill expansion is not anticipated to pose any significant environmental concerns provided that annual waste landfilling rates for the site remain below 10,000 m³. If the annual waste generation rates increase above this value, then potential for impacts is possible, and the feasibility of the design should be re-evaluated.
- The Township is currently in the process of obtaining additional lands for contaminant attenuation zone (CAZ) purposes to the west of the site. The concepts and basis of the feasibility study were based on the pretence that the Township will formalize the land purchase or suitable agreement prior to implementation of the expansion.

- Expansion of the site by the identified approximate 150,000 m³ volume may present some visual impacts due to the potential height of the waste pile, which is part of the final landfill design to incorporate the additional volume.

The conceptual design for an expanded waste disposal site has proposed that the expanded landfill footprint be maintained within the northern watershed; as a result, surface water flow direction would be maintained to the west toward Peters Marsh. An assessment of projected surface water quality as a result of expanded site conditions does not suggest any increased potential for surface water impacts either directly or from groundwater (leachate) discharge, due to minimal anticipated change in landfilling rates over the study period, and increasing efforts for site operations and surface water management.

Biology / Ecology

Comprehensive natural heritage studies have been undertaken by experienced and qualified technical specialists to investigate and assess potential impacts of an expanded waste disposal site on the local natural features of the Bark Lake site.

Initial environmental impact studies completed in the fall of 2005 (SES, 2006a) within a localized study area at the Bark Lake site, which considered the requirements of Section 2.1 of the PPS (2005), including investigations of:

- Significant habitat of endangered species and threatened species.
- Significant wetlands.
- Significant woodlands.
- Significant valleylands.
- Significant wildlife habitat.
- Significant areas of natural and scientific interest (ANSI).
- Fish habitat.

Due to the Township's commitment to its public consultation schedule in the summer season (high seasonal influx), the initial field studies identified above could not be undertaken until October 2005 (SES, 2006a). However, a significant level of information and site features were observed and documented as part of the initial environmental impact studies.

The key conclusions from the initial natural heritage studies were as follows (SES, 2006a; Appendix I - E):

- The significant features identified at or near the Bark Lake waste disposal site consist of a wetland area and fish habitat in the creek system to the northwest of the site (Figure 6).
- The creek system to the northwest of the site is habitat for Brook Trout, a sensitive, coldwater species.
- The wetland area (Peters Marsh) to the northwest of the landfill area may have potential for provincial significance; however, a proper evaluation should be completed to accurately assess this area in accordance with provincial protocols.
- Vectors (birds, bears, etc.) utilize the landfill site as a dominant source for food during the spring and summer seasons. Vectors appeared to be having an adverse visual impact on the adjacent lands and wetland areas due to litter and potential nutrient additions.

From the results from the initial studies, recommendations were provided for further study at the site area to evaluate those features that were not preferable for study in the fall season, as follows:

- A wetland evaluation of Peters Marsh, located adjacent to the Bark Lake waste disposal site.
- A breeding bird survey to assess the presence of threatened or endangered species habitat in the site area.
- A vascular plant survey focusing on significant plant species within the wetland to be evaluated (Peters Marsh).
- Further evaluation of fish habitat of the small creek tributary (closest to the landfill site).

The recommendations of the initial environmental impact study were undertaken in the summer season of 2006, to evaluate the significance of the natural heritage features at and near the Bark Lake site, to complete the environmental impact assessment. The findings of the 2006 studies are documented in the report, *Supplemental Studies of Natural Heritage Features of Bark Lake Waste Disposal Site*, (SES, 2006c; Appendix I - F). Field studies were undertaken in late June, and August 2006, and the conclusions of the findings from these supplemental studies are as follows:

- The breeding bird survey did not identify any species that are considered threatened, endangered, of special concern, or of provincial significance.

- The vascular plant survey did not identify any species that are considered threatened, endangered, of special concern, or of provincial significance.
- The wetland, Peters Marsh, was evaluated and has been determined as not provincially significant.
- The supplemental fish habitat assessment indicated that the creek tributary was a cold water system along its length, and that the identified Brook Trout are not facing temperature stresses.

A comprehensive and detailed series of natural heritage studies have been completed to assess potential impacts to natural heritage features at the Bark Lake site in the event of a capacity expansion (Figure 8; Appendix I - E, Appendix I - F). The potential landfill expansion area (Azimuth, 2005) has been proposed in the area to the south and east of the current waste disposal site for groundwater (and surface water) quality reasons. A potential expansion of the Bark Lake waste disposal site per the conceptual expansion design (Azimuth, 2005) does not present any significant concerns with respect to natural heritage features at the Bark Lake site.

Air Quality

An assessment of potential air quality issues with respect to the conceptual expansion of the Bark Lake site was provided in the report entitled *Feasibility Study for the Expansion of the Bark Lake Landfill* (Azimuth, 2005; Appendix I – D). The conclusions of the assessment are as follows:

- Odour is not considered to be an issue at the site given the extended buffer distance between the landfill and nearby land users (Azimuth, 2005; Appendix I - D).
- Lateral landfill gas migration at the site is limited by the permeability of the overburden soils, and by the shallow groundwater table (Azimuth, 2005; Appendix I - D).
- Noise and dust impacts as result of landfilling activities would have no significant bearing on the adjacent surroundings given the isolated location of the site from traffic corridors and residential developments (Azimuth, 2005; Appendix I - D).

The potential expansion of the Bark Lake waste disposal site per the conceptual design (Azimuth, 2005; Appendix I - D), does not present any significant concerns with respect to air quality at, or adjacent to, the Bark Lake site.

Aesthetics

An assessment of potential aesthetic impacts with respect to the proposed expansion of the Bark Lake site was provided in the conceptual design for the site (Azimuth, 2005; Appendix I - D).

The waste mound at the Bark Lake waste disposal site is isolated from adjacent traffic corridors and adjacent residential development, as a result of naturally forested lands that surround the property, which provide an effective visual buffer (Figure 7). Aesthetic impacts from additional lifts of refuse associated with the conceptual expansion design, placed on the north-south oriented bedrock ridge, may be present in the future; however, are expected to be minimal given the extended distance from Highway 60.

5.3.2.1.2 Socio-Cultural Environment

Archaeology and Heritage

The assessment of potential cultural heritage and archaeological features associated with the consideration of the Bark Lake site for expansion were completed in Stage 1, Stage 2, and Stage 3 archaeological assessments in the areas at and near the Bark Lake waste disposal site and specifically in the conceptual expansion area footprint (Azimuth, 2005). The archaeological studies were completed in consideration of Section 2.6 of the PPS (2005), and the *Archaeological Assessment Technical Guidelines: Stages 1 to 3* (Ontario Ministry of Culture [OMCL], 1993).

The Stage 1 and Stage 2 assessments were completed with the following objectives:

- To review background information on the site area, including but not limited to, surficial geology, post-glacial landscape evolution, historical land use, and present site condition (Kinickinick, 2005).
- To conduct field tests to determine the presence or absence of cultural or archaeological features within a conceptual study area for potential development (expansion area).

The Stage 1 and 2 assessments were completed by licensed archaeologists with experience and familiarity with archaeological history in the region. The results of the Stage 1 and Stage 2 archaeological assessments (Appendix I - G) are summarized below:

- The local area defined within the potential landfill footprint expansion as BjGk-7 is a significant site discovery, due to its age, rarity, and density of artifacts.

- Thirty-seven (37) lithic specimens were collected from ten (10) positive testpits in the focused area, consisting of flake fragments, and shaped, retouched, and used tools of scrapers, drills, and perforators (Figure 9).
- The discovery was interpreted to be Palaeo-Indian and Early Archaic, similar to other local discoveries in Bell Bay Provincial Park, south of the Bark Lake waste disposal site.

As a result of the Stage 1 and 2 findings, a Stage 3 archaeological assessment was recommended and confirmed by the OMCL (Appendix I - H) if the expansion of the Bark Lake waste disposal site were to be identified as part of the “Preferred Alternative” in the Township’s WMSP. In 2006, based on the promising outlook for the selection of the expansion of the Bark Lake site as the “Preferred Alternative”, a Stage 3 archaeological assessment was undertaken to determine site extent and gather a representative sample of artifacts across the subject site (Kinickinick, 2006). The results of the Stage 3 assessment are summarized:

- The results of the Stage 3 assessment provided a collection of small stone tools that are Palaeo-Indian and Early Archaic.
- No organic artifacts or cultural features were observed in the supplemental Stage 3 excavations.
- The scarce artifact distribution from the Stage 2 and 3 assessments are indicative of short-term periods of activity separated by elevation and time, and are suggestive of workshops as opposed to habitation.

The Stage 3 archaeological assessment concludes that the discovery BJK-7 has been sufficiently documented and recorded, with low artifact frequency and no cultural features or organic remains. The archaeological consultant states that there are no heritage concerns associated with an expanded landfill footprint at the Bark Lake waste disposal site (Kinickinick, 2006). The results of the Stage 3 assessment have been confirmed by OMCL in correspondence dated October 26, 2006 (Appendix I - H).

Land Use

In the spring of 2006, the Township updated the Comprehensive Zoning By-Law for the entirety of the Township of Madawaska Valley. The purpose of the bylaw is to regulate the use of lands and develop buildings and structures within the Township in accordance with Section 34 of the *Planning Act* (County of Renfrew, 2006a)

As outlined in the Township's Comprehensive Zoning By-Law effective May 1, 2006, the Bark Lake waste disposal site is currently zoned as an active waste disposal site situated on Crown lands. Per the site's PC of A, the Bark Lake site is approved for use of a 1.15 ha waste disposal area, on a 1.5 ha site. The site on which the approved waste disposal area is located is leased from the OMNR under Land Use Permit (LUP) LUP1675-1006368, effective July 1, 2006 until June 30, 2007. The Bark Lake site currently functions as a natural attenuation waste disposal site, similar to most small, rural municipal landfills. The Township is currently in the process of acquiring lands at and surrounding the waste disposal from the Crown, a process that has been ongoing since amalgamation.

Zoning designations of adjacent properties include rural (RU), limited service residential (LSR), and limited service residential – exception 2 (LSR-E2), along the flooded area to the north of Bell's Bay (Figure 10). An aggregate extraction pit is located immediately to the north of the site; however, it does not appear to have been used for extraction purposes in the recent past.

The Bark Lake waste disposal site has been operating as a municipal solid waste disposal site at its current location since the early 1970's (Janota Patrick, 1992). Visual impacts from the waste disposal site are minimal as the site is well screened from the highway by vegetation and adequate fencing is present at the site entrance to limit use of the site during non-operational hours.

5.3.2.1.3 *Technical and Built Environment*

Transportation

Road Traffic

The potential expansion of the Bark Lake waste disposal site is not anticipated to result in traffic issues for local or seasonal travellers utilizing the Highway 60 transportation corridor (Figure 7). Recent highway upgrades in the vicinity of the site have improved highway conditions for thoroughfare, and enhanced traffic flow with the addition of hillside passing lanes. There are currently no reported traffic issues as a result of operations at the Bark Lake waste disposal site, and no issues are anticipated in the future.

Air Traffic

There are no airports or airstrips in close proximity to the Bark Lake waste disposal site, with the closest air traffic centre (privately owned) being located east of Barry's Bay, approximately fourteen (14) km east of the site. Air traffic issues are not anticipated with the expansion of the Bark Lake waste disposal site.

Marine Traffic

There are no major navigable water ways immediately adjacent to the Bark Lake waste site allowing for marine craft navigation. There is minimal potential for navigation of the adjacent surface water systems near the site, which are limited by the dimensions of the creek. Small-engine watercraft travel does occur on local lakes in the vicinity of the Bark Lake site, including Bark Lake, Parissien Lake, and Carson Lake. Marine traffic issues are not anticipated.

Local Development

Development in the area of the Bark Lake waste disposal site primarily consists of seasonal and permanent residential development along the shores of Bark Lake, located to the south of the site (Figure 7). Other development in the vicinity of the Bark Lake site includes the establishment of the Bell Bay Provincial Park, to the southeast of the Bark Lake waste disposal site

5.3.2.1.4 Economic Environment

The results of the detailed cost assessment for the landfilling “Alternative To” including projected cost information for expansion of the Bark Lake waste disposal site are summarized in Table 9. Cost modelling was conducted to determine the economic impacts related to the expansion of the Bark Lake site. Cost projections over the 25-year planning period were generated with respect to the following items: population, projected waste material tonnage, waste diversion reporting information, closure costs of waste disposal sites, monitoring and maintenance costs of closed waste disposal sites, land acquisition costs, costs for preparation capital and operating costs, hauling costs from transfer stations, inflation, and amortization of capital expenditures, as outlined in Section 5.3.

The expansion of the Bark Lake waste disposal site “Alternative Method” of the landfilling “Alternative To”, in conjunction with the Township’s enhanced waste diversion initiatives, was examined from a cost perspective with options of zero, one, and two outlying transfer stations (Table 9). Waste transfer station options were evaluated on the basis of waste transfer from the Wilno and Radcliffe waste disposal sites.

The total cost associated with the expansion of the Bark Lake waste disposal site “Alternative Method” over the 25-year planning period is \$7,220,000, \$9,500,000, and \$11,660,000, with costs reflective of transfer station operations instituted at zero, one, and two transfer stations respectively. The resultant average annual costs to the Township are \$290,000, \$380,000, and \$470,000, respectively, with average annual costs per tonne of \$301, \$396, and \$486, for each transfer station option respectively. The waste transfer

stations would be established at the Wilno and Radcliffe waste disposal sites to provide continued waste disposal services to Township residents in the former Township of Radcliffe, and Wilno area residents.

5.3.2.2 NEW WASTE DISPOSAL SITE DEVELOPMENT

Per Section 5.2, the development of a new landfill site on lands not previously developed (i.e. Greenfield) was carried forth for further study. As a result of the constraint-mapping exercise summarized in Section 5.2.2.2, two potential sites were identified for further evaluation in this regard (Figure 4):

- Lot 3, Concession 11, geographic Township of Radcliffe.
- Lot 21, Concession 13, geographic Township of Sherwood.

A phased approach in evaluating the two candidate locations was implemented for cost-containment purposes in consideration of new landfill sites.

Cost modeling was conducted to determine the economic impacts of the development of a Greenfield, natural attenuation waste disposal site. The cost modeling included the following items: population, projected tonnage of waste material, waste diversion reporting information, closure costs of waste disposal sites, monitoring and maintenance costs of closed waste disposal sites, land acquisition costs, costs for preparation of the Greenfield site, operating costs, hauling costs from transfer stations, inflation and amortization of capital expenditures. The cost modeling concluded that the development of a Greenfield waste disposal site was the “Alternative To” with a relatively moderate economic cost to the Township.

Accordingly, and consistent with Section 2.1 of the PPS (2005), the Township undertook natural heritage reviews of both sites, *Review of Natural Heritage and Ecological Constraints for Two Alternative Waste Sites in the Madawaska Valley*, SES, January 2006 (Appendix I-I).

The results of the detailed cost investigations and the natural heritage studies for the respective new site locations are summarized below.

5.3.2.2.1 Lot 3, Concession 11, Geographic Township of Radcliffe

To maintain consistency in the detailed investigation of landfilling “Alternatives To”, a similar cost assessment to the expansion of the Bark Lake waste disposal site including the options of zero, one or two transfer station operations at the Wilno and Radcliffe waste disposal sites, was investigated for the development of a new waste disposal site in the geographic Township of Radcliffe.

The total cost associated with the development and establishment of a new Radcliffe waste disposal site “Alternative Method” over the 25-year planning period is \$8,660,000, \$11,070,000, and \$12,980,000, with costs reflective of transfer station operations instituted at zero, one, and two transfer stations respectively.

The resultant average annual costs to the Township are \$350,000, \$450,000, and \$520,000, respectively, with average annual costs per tonne of \$361, \$461, and \$541, for each transfer station option respectively. The waste transfer stations would be established at the Wilno and Radcliffe waste disposal sites to provide continued waste disposal services to Township residents in the former Township of Radcliffe, and Wilno area residents.

From the preliminary natural heritage studies completed in evaluating this site for significant features, SES (2006b) concluded the following:

- No provincially significant wetlands, provincially significant ANSIs, or habitat for threatened or endangered species were located on or adjacent to this potential site.
- Significant wildlife habitat was deemed possible at this site as OMNR mapping has indicated important habitat for deer exists in this area; however, additional work (i.e. winter ground surveys) would be required to determine the importance of specific areas within the mapped deer habitat.
- Based on forest composition, possible red-shouldered hawk habitat was identified at the site; however, their specific presence would need to be assessed in a spring survey.
- Additional study is required to determine if any significant species, other than those identified, exist at the site.
- Ontario Base Maps (OBM) have indicated the presence of an intermittent stream located at this site providing possible fish habitat, which is designated as cold water habitat by the OMNR, therefore demonstrating the need for actual physical characteristics and presence and permanence of fish habitat to be assessed.
- The site is identified as licensed forest with right to access of forest resources on-site owned by the forest company in possession of the forest license.
- Two (2) active aggregate pits are located nearby, and an aggregate deposit that would be considered an important aggregate resource is located on the site.

The results of the preliminary natural heritage studies for the establishment and development of a new waste disposal site in the geographic Township of Radcliffe, indicate that natural heritage issues, and potential land use conflicts, would need further assessment before further consideration of this “Alternative Method”.

5.3.2.2.2 *Lot 21, Concession 13, Geographic Township of Sherwood*

Similar to Section 5.3.2.2.1, in an effort to maintain consistency in the detailed investigation of landfilling “Alternatives To”, a similar cost assessment to the expansion of the Bark Lake waste disposal site including the options of zero, one or two transfer station operations at the Wilno and Radcliffe waste disposal sites, was investigated for the development of a new waste disposal site in the geographic Township of Sherwood.

The total cost associated with the development and establishment of a new Sherwood waste disposal site “Alternative Method” over the 25-year planning period is \$8,660,000, \$11,070,000, and \$13,110,000, with costs reflective of transfer station operations instituted at zero, one, and two transfer stations respectively. The resultant average annual costs to the Township are \$350,000, \$450,000, and \$530,000, respectively, with average annual cost per tonne of \$361, \$461, and \$547, for each transfer station option respectively.

The results of the preliminary natural heritage studies (SES, 2006b; Appendix I - I) are summarized as follows:

- No provincially significant wetlands exist at this site; however, some forest species (balsam fir, ash, and soft maple) would need to be evaluated further for wetland characteristics.
- No provincially significant areas of natural or scientific interest (ANSI) or habitats of threatened or endangered species were identified on or adjacent to this potential site.
- Significant wildlife habitat was deemed possible at this site as OMNR mapping has indicated important habitat for deer exists in this area; however, additional work (i.e. winter ground surveys) would be required to determine the importance of specific areas within the mapped deer habitat.
- Additional study is required to determine if any significant species, other than those identified, exist at the site.
- Ontario Base Maps (OBM) have indicated the presence of an intermittent stream located at this site providing possible fish habitat, which is designated as cold water habitat by the OMNR, therefore demonstrating the need for actual physical characteristics and presence and permanence of fish habitat to be assessed.

The results of the preliminary natural heritage studies for the establishment and development of a new waste disposal site in the geographic Township of Sherwood, indicate that natural heritage issues may conflict with further consideration of this “Alternative Method”.

5.3.3 WASTE EXPORTATION OUTSIDE THE MUNICIPALITY

From Section 5.2, the Township has identified and evaluated three facilities that are currently licensed to accept municipal solid waste via export from the Township, based on their proximity to the Township. These three facilities represent the three methods identified by the Township to implement the Waste Export “Alternative To”.

Cost modeling was conducted to determine the economic impacts of exportation of waste outside the municipality. The cost modeling included the following items: population, projected tonnage of waste and recyclable material, waste diversion reporting information, closure costs of waste disposal sites, monitoring and maintenance costs of closed waste disposal sites, transfer station capital costs, operating costs, hauling costs from transfer stations, tipping fees, inflation and amortization of capital expenditures. The cost modeling concluded that of the exportation of waste outside the municipality was the “Alternative To” with a relatively high economic cost to the Township.

Given the enhanced recycling program and the wide-range of recyclable materials accepted and marketed at the OVWRC, it was the only feasible alternative considered for export of the Township’s recyclables in the WMSP.

A summary of the waste export “Alternative To” costing assessment is presented in Table 10.

Table 10 Costing Assessment Results for Waste Export “Alternative Methods”

Waste Export – Bark Lake, Radcliffe, and Wilno as Transfer Stations				
Waste	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
OVWRC	\$16,590,000	\$664,000	\$692	\$230
WMI	\$14,613,000	\$585,000	\$609	\$203
Lafleche	\$14,732,000	\$590,000	\$614	\$204
Recycling	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
OVWRC	\$2,975,000	\$119,000	\$97	\$41
Waste Export – Bark Lake and Radcliffe as Transfer Stations				
Waste	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
OVWRC	\$14,318,000	\$573,000	\$597	\$199
WMI	\$12,340,000	\$494,000	\$515	\$171
Lafleche	\$12,460,000	\$499,000	\$520	\$173
Recycling	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
OVWRC	\$2,736,000	\$110,000	\$89	\$38
Waste Export – Bark Lake and Wilno as Transfer Stations				
Waste	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
OVWRC	\$14,424,000	\$577,000	\$602	\$200
WMI	\$12,447,000	\$498,000	\$519	\$173
Lafleche	\$12,567,000	\$503,000	\$524	\$174
Recycling	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
OVWRC	\$2,402,000	\$97,000	\$78	\$33
Waste Export – Bark Lake Only as a Transfer Station				
Waste	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
OVWRC	\$11,913,000	\$477,000	\$497	\$165
WMI	\$9,936,000	\$398,000	\$414	\$138
Lafleche	\$10,056,000	\$403,000	\$419	\$140
Recycling	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
OVWRC	\$2,163,000	\$87,000	\$71	\$30
Status Quo				
	Total Cost	Average Annual Cost	Average Cost / Tonne	Average Annual Cost / Household
Waste	\$9,876,000	\$396,000	\$412	\$137
Recycling	\$4,160,000	\$170,000	\$135	\$58

A more detailed description of each of the waste export “Alternative Methods” is presented; complete with costing assessment details, in the following sections.

5.3.3.1 LAFLÈCHE ENVIRONMENTAL INCORPORATED

Lafèche Environmental Incorporated (Lafèche), located in Moose Creek, Ontario, has a province-wide service area to accept municipal solid waste. This facility is located the furthest from the Township signifying increased hauling costs; however, reduced tipping fees, and the absence of partnership buy-in fees offset the increased hauling costs. In an effort to examine all viable options for the waste export “Alternative To”, cost options for one, two, and three waste export transfer stations at the Bark Lake, Wilno and Radcliffe waste disposal sites, were investigated for the Lafèche waste export “Alternative Method”.

The total cost associated with waste export to Lafèche over the 25-year planning period is \$10,056,000, range of \$12,460,000 to \$12,567,000, and \$14,732,000, with costs reflective of transfer station operations instituted at one, two (combinations of Bark Lake, Wilno, and Radcliffe), and three transfer stations, respectively. The resultant average annual costs to the Township are \$403,000, \$499,000 to \$503,000, and \$590,000, respectively, with average annual costs per tonne of \$419, \$520 to \$524, and \$614, for each transfer station option respectively. The waste transfer stations would be established at the Wilno and Radcliffe waste disposal sites to provide continued waste disposal services to Township residents in the former Township of Radcliffe, and Wilno area residents.

The Lafèche facility offers long-term waste disposal capacity and sustainability to the Township, and is willing to undertake long-term waste export contracts. The Lafèche waste export destination facility also does not maintain a partnership program for waste disposal; therefore no membership fees are necessary for waste disposal.

5.3.3.2 OTTAWA VALLEY WASTE RECOVERY CENTRE

The Ottawa Valley Waste Recovery Centre, (OVWRC) located in Pembroke, Ontario, is licensed to accept material generated by the Township. The OVWRC, has a municipal solid waste disposal site, a material recovery facility, a source separated organics processing facility and a permanent household hazardous waste depot site. To maintain consistency between the “Alternative Methods” for the waste export “Alternative To”, cost options for one, two, and three waste export transfer stations at the Bark Lake, Wilno and Radcliffe waste disposal sites, were investigated for waste export to the OVWRC.

The total cost associated with waste export to the OVWRC over the 25-year planning period is \$11,913,000, \$14,318,000 to \$14,424,000, and \$16,590,000, with costs reflective of transfer station

operations instituted at one, two (combinations of Bark Lake, Wilno, and Radcliffe), and three transfer stations, respectively. The resultant average annual costs to the Township are \$477,000, \$573,000 to \$577,000, and \$664,000, respectively, with average annual costs per tonne of \$497, \$597 to \$602, and \$692, for each transfer station option respectively.

A detailed investigation into the cost of recyclables export was also undertaken for the OVWRC based on the facilities prominence in processing and marketing expanded blue-box material. The total cost associated with recyclable export to the OVWRC; reflective of the three transfer station options are \$2,163,000, \$2,402,000 to \$2,736,000, and \$2,975,000, respectively. Projected recycling costs (average cost per tonne) over the 25-year planning period are lower than the current cost (status quo) of recycling, as the OVWRC has recently instituted no cost tipping fees for recyclables.

The OVWRC is the closest facility to the Township of the three considered and the tipping fees are within the range of the other facilities. However, a significant partnership buy-in cost to be a member of this facility resulted in this facility not being economically feasible at this time. In addition, waste disposal security is currently unclear. The OVWRC submitted an EA to the Ontario Minister of the Environment in June 2006, identifying an existing site expansion. To date, a decision from the Ontario Minister of the Environment has not been provided.

5.3.3.3 WASTE MANAGEMENT INCORPORATED

A third export candidate, Waste Management Incorporated (WMI), is located in Carp, Ontario. WMI currently operates the West Carleton waste disposal site which has a province-wide service area to accept municipal solid waste. To maintain similarity between the assessment of alternative methods for the waste export "Alternative To", cost options for one, two, and three waste export transfer stations at the Bark Lake, Wilno and Radcliffe waste disposal sites, were investigated for OVWRC waste export "Alternative Method".

The total cost associated with waste export to WMI "Alternative Method" over the 25-year planning period is \$9,936,000, \$12,340,000 to \$12,447,000, and \$14,613,000, with costs reflective of transfer station operations instituted at one, two (combinations of Bark Lake, Wilno, and Radcliffe), and three transfer stations, respectively. The resultant average annual costs to the Township are \$398,000, \$494,000 to \$498,000, and \$585,000, respectively, with average annual costs per tonne of \$414, \$515 to \$519, and \$609, for each transfer station option respectively.

In addition, it is the Township's understanding that this facility has limited capacity and approximately 90% of the landfill capacity is reserved for the City of Ottawa. As such, it is unlikely that the facility would not enter into a long-term contract with the Township. The West Carleton waste disposal site is located between the other two facilities in terms of distance from the Township, and WMI maintains generally

higher tipping fees than the other two candidate locations for waste disposal at the site, hence, limiting the economic feasibility of this export option.

With the export of waste to an outside facility, the municipality has limited control over disposal of the Township's waste. It is not possible to foresee future changes to export contracts with respect to tipping fees, hauling costs, and landfill capacity. Also, comments received at Public Consultation Event No. 3 (August, 2005) indicated that 42% of respondents did not consider waste export as a feasible alternative.

5.3.4 DO NOTHING

No detailed studies with respect to the do nothing "Alternative To" were considered. This alternative was maintained on a control basis, whereby the anticipated results of doing nothing with respect to waste management in the Township over the next 25 years would be compared to a proactive "Preferred Alternative" for the WMSP.

6.0 IDENTIFICATION OF THE “PREFERRED ALTERNATIVE”

This section presents the evaluation of “Alternative Methods” and the selection of the “Preferred Alternative” based on the comprehensive set of various studies summarized in Section 5.3 and the results of the comparative evaluations as follows.

6.1 SELECTED EVALUATION METHODOLOGY

The identification of a “Preferred Alternative” for solid waste management in the Township for the identified 25-year planning period followed intensive data collection, background information review, and analysis. The following sections outline the methodology used to evaluate the “Alternative Methods” recommended for further investigation as presented in Section 5.2, and the selection of the recommended “Preferred Alternative” for the Township’s WMSP.

6.1.1 DESCRIPTION OF EVALUATION MATRIX

In order to ensure a defensible and quantifiable selection process, an evaluation matrix was developed to facilitate the selection. The matrix was developed with the “Alternative Methods” selected for further study assessed using the ranking system described in Section 7.1.3, against weighted screening criteria as shown in Table 11 , and discussed in Section 7.1.2.

6.1.2 WEIGHTING OF SCREENING CRITERIA

Per the ToR, screening criteria for the selected “Alternative Methods” were established for use in the evaluation matrix encompassing environment facets of natural, socio-cultural, technical/built, economic and other criteria deemed pertinent to the WMSP.

Selected economic screening criteria focused primarily on the cost of each “Alternative Method”, while the natural environment screening criteria included air/climate, land, surface water, groundwater, and biology/ecology aspects in the evaluation matrix. Screening criteria was also developed for the socio-cultural environment, consisting of planning, archaeological/cultural heritage, and visual features, and the technical/built environment including elements of associated infrastructure impacts, for each evaluated “Alternative Method”. Public interest was also included in the evaluation matrix as screening criteria were established for the risk potential for the Township (public acceptance and vulnerability), public opinion, and general service provision related to each selected “Alternative Method”.

The established screening criteria for each facet of evaluation were then subsequently weighted based on the relative importance of that particular criterion as expressed by respondents to the WMSP questionnaires from Public Consultation Event No. 2, and with respect to the specific priorities and circumstances of the Township. The results of the questionnaires indicated that respondents (the public) were most concerned with the natural environment, while the Township, in consideration of fiscal responsibility to ratepayers, considered the economic environment to be the key evaluation criterion for the respective “Alternative Methods” presented. In an effort to balance and account for both the opinion of the public, and the Township, and in consideration of the three identified general screening criteria (economic, technical, and public opinion) for the WMSP as identified in the ToR, evaluation screening criteria with respect to the natural and economic environments were assigned the same weighting value. As such, these environments had a larger weighting than the socio-cultural, and technical and built environments (Table 10).

Each candidate “Alternative Method” was evaluated according to the same weighted screening criteria for unbiased, objective comparison during the selection of the “Preferred Alternative”. The screening criteria and associated weightings are shown in Table 11.

Table 11 Weighted Screening Criteria

Environment	Screening Criteria	Weighting	Subtotal
Economic	Cost	25%	25%
Natural	Air/Climate (noise, odour, dust, greenhouse gas emissions)	5%	
	Land, soils, physiography	3%	
	Surface Water (quantity, flow, velocity, chemistry)	4%	
	Groundwater (quantity, flow, velocity, chemistry)	3%	
	Biology, Ecology	10%	25%
Socio-Cultural	Planning	5%	
	Archaeology / Cultural Heritage	5%	
	Visual	5%	15%
Technical and Built	Infrastructure, roads, highways, municipal buildings	5%	5%
Other	Potential Risk, Public Acceptance	3%	
	Potential Risk, Vulnerability	12%	
	Public Opinion ¹	5%	
	Service Provision Level	10%	30%
TOTAL			100%

Notes:

- 1 Weighting of the Public Opinion criteria is not entirely reflective of the full measure and influence of public input obtained throughout the duration of the public consultation process. The Township has considered the public's opinion as one of the key screening aspects throughout the WMSP, with input from various consultation events used, in part, to supplement/balance the weighting of criterion above. Specifically, the economic and natural environment criterion weightings were adjusted to reflect consideration of public opinion with respect to the selection of the "Preferred Alternative".

6.1.3 APPLICATION OF RANKING SCORE

For the analysis of each "Alternative Method" a numerical ranking system was developed based on the following descriptions summarized in Table 12. The numerical ranking system was applied to evaluate the identified weighted screening criteria (Section 6.1.2) for each "Alternative Method" selected for further evaluation.

Table 12 Numerical Ranking System for Application in the Comparative Evaluation

Score	Description
2	Positive Aspects
1	Somewhat Positive Aspects
0	Neutral / No Impact / Unknown
-1	Somewhat Negative Aspects
-2	Negative Aspects

Each weighted screening criterion, as discussed in Section 7.1.2, was considered objectively; independent of all other criteria, and each "Alternative Method" was evaluated and assigned a ranking score for each screening criterion. These scores ranged from -2 to 2, with -2 assigned negative aspects associated with the ranking system and 2 assigned positive aspects associated with the ranking system. These scores were then adjusted with the weighting factors and then summed to present a "score". Based on the resulting "scores", recommendations for the "Preferred Alternative" could be formulated. Per the ToR, the assessment of the potential effect of the alternatives on the environment was incorporated in the criterion weighting and numerical ranking values to include the nature of the environment affected, the magnitude of the impact, and the anticipated impact duration. The ranking scores and associated rationale are presented in Appendix I - J.

6.1.4 EVALUATION MATRIX DATA TABULATION

To determine the “Preferred Alternative” for the WMSP, the weighted screening criterion for each “Alternative Method” was assigned a ranking score as described in Section 0, and each resultant ranking score was multiplied by the weighting for that respective criterion and then summed. As the Township’s objective for the WMSP was to determine the “best solution” for long-term waste management for the Township, the “Alternative Method” with the highest total score was considered to be the best candidate for the “Preferred Alternative” for the WMSP.

6.2 RESULTS OF EVALUATION OF ALTERNATIVES

The Landfill, Waste Export, and Do Nothing “Alternatives To” were evaluated based on weighted screening criteria, as shown in Table 11. The waste diversion “Alternative To” was not evaluated as part of the comparative evaluation as waste diversion strategies will form a component of the recommended “Preferred Alternative” regardless of the waste management system chosen.

Alternatively, waste diversion strategies were compared based on cost (capital and operating), estimated (projected) increase in waste diversion rate, practicality, and economic feasibility within the Township.

A discussion of the waste diversion comparative evaluation, and the results of the evaluation matrix for the landfill, waste export, and do nothing “Alternatives To” and associated “Alternative Methods”, is presented in the following sections, and in summary Table 13 below.

Table 13 Evaluation Matrix Results

Alternative To	Alternative Method	Score	
Landfill	Existing Waste Disposal Site Expansion (Bark Lake site)	0 transfer stations	16
		1 transfer station	32
		2 transfer stations	38
	New Site Development (Lot 3, Concession 11, Radcliffe Township)	0 transfer stations	-19
		1 transfer station	7
		2 transfer stations	13
	New Site Development (Lot 21, Concession 13, Sherwood Township)	0 transfer stations	-19
		1 transfer station	7
		2 transfer stations	13
Waste Export	OVWRC	1 transfer station	-58
		2 transfer stations	-47
		3 transfer stations	-44
	WMI	1 transfer station	-45
		2 transfer stations	-34
		3 transfer stations	-31
	Lafleche	1 transfer station	-33
		2 transfer stations	-22
		3 transfer stations	-19
Do Nothing		-180	

6.2.1 WASTE DIVERSION “ALTERNATIVE TO”

The results of the waste diversion evaluation of alternatives are shown in Table 8. The current system (i.e. status quo), when projected over the 25-year project planning period with a 5% inflation rate, has a total cost of approximately \$4,160,000. This was used as a baseline to compare all proposed enhancements to the waste diversion system.

6.2.1.1 WASTE MANAGEMENT BY-LAW

The waste management by-law, as described in Section 5.3.1.1, would result in total revenue of approximately \$70,000 over the 25-year project planning period. Funds received by the Township from the sale of bag tags results anticipated in revenue for this system. The increase in diversion rate for this option, in consideration of the Township’s current program, is approximately 10%.

As part of the Township's dedication to continual development of an increased waste diversion program within the municipality, the Township is committed to increasing the frequency of household hazardous (special) waste events to two (2) per year, from the current single annual collection event. This would allow more opportunity for participation and potential for higher recovery of household hazardous (special) material and intended diversion of these materials from landfill.

6.2.1.2 EXPANDED CURBSIDE COLLECTION

For the expanded curbside collection system, many different service areas were considered, as described in Section 5.3.1.2. This option involved the collection of waste and recyclables at curbside in areas of the Township that are practical and that do not currently have this service.

The total costs for this alternative ranged from approximately \$80,000 to approximately \$2,740,000, depending on the area and the increase in waste diversion rate ranged from approximately 0.4% to approximately 13%. Expanded curbside collection for a 1.5 kilometre radius around the centre of the Village of Barry's Bay was deemed to be the most practical and cost-effective option, given the parcel fabric, population density of the Village of Barry's Bay (Figure 5). This system would result in a total cost of approximately \$1,070,000 with an increase in waste diversion rate of approximately 4%.

6.2.1.3 ORGANICS COMPOSTING

The use of the leaf and yard waste composting facility at the Bark Lake waste disposal site keeping with current operations would result in a total cost to the Township of approximately \$530,000 and would not increase the Township's diversion rate, but would offer significant operational benefits reducing the amount of soil cover required to be transferred to the site. Alternatively, the use of the leaf and yard waste composting facility at the Bark Lake waste disposal site for the sale or give away of the composted material would result in a total cost to the Township of approximately \$710,000 with an increase in the waste diversion rate of approximately 7%.

6.2.2 LANDFILL "ALTERNATIVE TO"

The following section provides a summary of the results of the evaluation matrix for the landfill "Alternative To" and associated "Alternative Methods", including the expansion of the Bark Lake waste disposal site, and the potential development of two (2) new sites in the geographic Township's of Radcliffe and Sherwood. Screening criteria were applied to each respective "Alternative Method" for waste disposal scenarios of zero, one and two operating waste transfer stations, in conjunction with domestic waste

disposal at the Bark Lake waste disposal site. The sites evaluated for potential waste transfer stations were the Wilno and Radcliffe sites, which presently operate as waste transfer stations for the Township.

6.2.2.1 EXPANSION OF THE BARK LAKE WASTE DISPOSAL SITE

The expansion of the Bark Lake waste disposal site was evaluated using the weighted screening criteria identified in Section 6.1.2, as summarized in Table 13 and Appendix I - J.

The results of the comparative evaluation score the expansion of the Bark Lake waste disposal site at 16, 32, and 38, respective of each transfer station scenario, as presented in Section 6.2.2. Supplemental natural and cultural heritage studies completed in the summer of 2006 (SES, 2006c; Kinickinick, 2006) were taken into account when scoring this "Alternative Method". The highest score was for the scenario including domestic waste disposal at the Bark Lake site, with waste transfer station operations at the Wilno, and Radcliffe waste disposal sites.

The results indicate moderately low environmental, socio-cultural, and technical/built impacts, and high scores (positive aspects) for risk potential for the Municipality (public acceptance and vulnerability), public opinion, and service provision. The cost associated with this "Alternative Method" it was deemed to have a neutral impact on waste management operations in the Township over the 25-year planning period.

The comparative evaluation results suggest that expansion of the Bark Lake waste disposal site, with the operation of two (2) waste transfer stations, appears to be a feasible solution and candidate for the WMSP "Preferred Alternative".

6.2.2.2 NEW SITE DEVELOPMENT (LOT 3, CONCESSION 11, GEOGRAPHIC TOWNSHIP OF RADCLIFFE)

The development of a new site in the geographic Township of Radcliffe was evaluated using the weighted screening criteria identified in Section 6.1.2, as summarized in Table 13 and Appendix I - J.

The results of the evaluation matrix score the development of the new waste disposal site at -19, 7, and 13, respective of each transfer station scenario, as presented in Section 6.2.2. Similar to the expansion of the Bark Lake site, the highest score was for the scenario included development of the new site, with maintained waste transfer station operations at the Wilno, and Radcliffe waste disposal sites.

The results indicate slightly increased environmental issues, but which were still moderately low, and moderately low socio-cultural, and technical/built impacts, and high scores (positive aspects) for risk

potential for the Municipality (public acceptance and vulnerability), public opinion, and service provision. The cost associated with this “Alternative Method” it was deemed to have a neutral impact on waste management operations in the Township over the 25-year planning period.

The comparative evaluation results suggest that development of a new waste disposal site in the geographic Township of Radcliffe, with the operation of two (2) waste transfer stations, appears to be a feasible solution and a possible candidate for the WMSP “Preferred Alternative”. However, concerns with an extended approvals process and associated costs for the site development present significant uncertainty with respect to this approach.

6.2.2.3 NEW SITE DEVELOPMENT (LOT 3, CONCESSION 11, GEOGRAPHIC TOWNSHIP OF SHERWOOD)

The development of a new site in the geographic Township of Sherwood was evaluated using the weighted screening criteria identified in Section 6.1.2, as summarized in Table 13 and Appendix I - J.

The results of the evaluation matrix score the development of the new waste disposal site at -19, 7, and 13, respective of each transfer station scenario, as presented in Section 6.2.2. Similar to the expansion of the Bark Lake site, the highest score was for the scenario included development of the new site, with waste transfer stations at the Wilno, and Radcliffe waste disposal sites.

The results indicate slightly increased environmental issues, but which were still moderately low, and moderately low socio-cultural, and technical/built impacts, and high scores (positive aspects) for risk potential for the Municipality (public acceptance and vulnerability), public opinion, and service provision. The cost associated with this “Alternative Method” it was deemed to have a neutral impact on waste management operations in the Township over the 25-year planning period.

The comparative evaluation results suggest that development of a new waste disposal site in the geographic Township of Sherwood, with the operation of two (2) waste transfer stations, appears to be a feasible alternative and a possible candidate for the WMSP “Preferred Alternative”. However, concerns with an extended approvals process and associated costs for the site development present significant uncertainty with respect to this approach.

6.2.3 WASTE EXPORT “ALTERNATIVE TO”

The following section provides a summary of the results of the evaluation matrix for the waste export “Alternative To” and associated “Alternative Methods”, including export to the OVWRC in Pembroke,

Ontario, WMI in Carp, Ontario, and Lafèche in Moose Creek, Ontario. Screening criteria were applied to each respective “Alternative Method” with waste transfer scenarios of one, two, and three operating waste transfer stations. The sites evaluated for potential waste transfer stations were Bark Lake, Wilno and Radcliffe sites, and a combination thereof. Each of those sites, with the exception of the Bark Lake waste disposal site which currently operates as a domestic solid waste landfill, presently operate as waste transfer stations for the Township.

6.2.3.1 WASTE EXPORT TO OVWRC

The waste export to the OVWRC “Alternative Method” was evaluated using the weighted screening criteria identified in Section 6.1.2, as summarized in Table 13 and Appendix I - J.

The results of the evaluation matrix score the waste export at -58, -47, and -44, respective of each transfer station scenario, as presented in Section 6.2.3. The highest attained score for the “Alternative Method” was for the scenario in which three (3) waste transfer stations would operate within the Township, with export to the OVWRC from one (1) central transfer station. The central waste transfer station was modeled at the Township’s Bark Lake site, with outlet waste transfer stations at the Wilno, and Radcliffe waste disposal sites.

The results indicate negative impacts associated with overall cost of the alternative, primarily a result of the significant capital costs to facilitate waste export to the OVWRC given the costly membership fees. Matrix results for the natural, socio-cultural, and technical/built environments were generally neutral, with the exception of slight negative aspects anticipated for air/climate, as impacts to the environment would be negligible with an operable waste transfer system in place within the Township. Municipal considerations associated with this alternative include slight negative aspects for risk potential, public opinion, and service provision within the Township, with the exception of positive aspects for public acceptance and service provision, provided with the operation of three (3) waste transfer stations.

The comparative evaluation results suggest that waste export to the OVWRC with the operation of three (3) waste transfer stations, appears to be the best case scenario for this alternative method; however, significant financial considerations and long-term disposal uncertainty impede the selection of this “Alternative Method” as a possible candidate for the WMSP “Preferred Alternative”.

6.2.3.2 WASTE EXPORT TO WMI

The waste export to WMI “Alternative Method” was evaluated using the weighted screening criteria identified in Section 6.1.2, as summarized in Table 13 and Appendix I - J.

The results of the evaluation matrix score the waste export at -45, -34, and -31, respective of each transfer station scenario, as presented in Section 6.2.3. The highest attained score for the “Alternative Method” was for the scenario in which three (3) waste transfer stations would operate within the Township, with export to WMI from one (1) central transfer station. The central waste transfer station would be located at the Township’s Bark Lake site, with outlet waste transfer stations at the Wilno, and Radcliffe waste disposal sites.

The results indicate generally neutral impacts associated with overall cost of the alternative, primarily a result of competitive tipping fees, and no membership or partnership fees for waste acceptance. Comparative results for the natural, socio-cultural, and technical/built environments were generally neutral, with the exception of slight negative aspects anticipated for air/climate, as impacts to the environment would be negligible with an operable waste transfer system in place within the Township. Municipal considerations associated with this alternative include negative aspects for risk potential, specifically vulnerability as long-term capacity status at the site is questionable, and approximately 90% of current capacity at the site is reserved for the City of Ottawa. Public opinion, and service provision within the Township, present generally negative aspects as well with the exception of positive aspects for public acceptance and service provision, provided with the operation of three (3) waste transfer stations.

The evaluation matrix results suggest that waste export to WMI with the operation of three (3) waste transfer stations, appears to be the best case scenario for this alternative method; however, significant long-term capacity stability, and the unavailability of a long-term contract for the Township, prohibits the selection of this “Alternative Method” as a possible candidate for the WMSP “Preferred Alternative”.

6.2.3.3 WASTE EXPORT TO LAFLÈCHE

The waste export to Laflèche “Alternative Method” was evaluated using the weighted screening criteria identified in Section 6.1.2, as summarized in Table 13 and Appendix I - J.

The results of the evaluation matrix score the waste export at -33, -22, and -19, respective of each transfer station scenario, as presented in Section 6.2.3. The highest attained score for the “Alternative Method” was for the scenario in which three (3) waste transfer stations would operate within the Township, with export to Laflèche from one (1) central transfer station. The central waste transfer station would be located at the Township’s Bark Lake site, with outlet waste transfer stations at the Wilno, and Radcliffe waste disposal sites.

The results indicate generally neutral impacts associated with overall cost of the alternative, primarily a result of decreased tipping fees to offset the considerable hauling costs associated with the facility's location relative to the Township, and no membership or partnership fees for waste acceptance. Matrix results for the natural, socio-cultural, and technical/built environments were generally neutral, with the exception of slight negative aspects anticipated for air/climate, as impacts to the environment would be negligible with an operable waste transfer system in place within the Township. Municipal considerations associated with this alternative include slightly negative aspects for risk potential, public opinion, and service provision within the Township, with the exception of positive aspects for public acceptance and service provision, provided with the operation of three (3) waste transfer stations.

The evaluation matrix results suggest that waste export to Laflèche with the operation of three (3) waste transfer stations, appears to be the best case scenario for this alternative method, as well as the most feasible option for the waste export "Alternative To"; however, significant hauling costs despite reduced tipping fees, impede the selection of this "Alternative Method" as a possible candidate for the WMSP "Preferred Alternative".

6.2.4 DO NOTHING "ALTERNATIVE TO"

This alternative was evaluated on a control basis, whereby the anticipated results of doing nothing with respect to waste management in the Township over the next 25 years would be compared to a proactive "Preferred Alternative" for the WMSP.

The evaluation matrix results presented negative aspects associated with this "Alternative To" from an economic, natural, socio-cultural, technical/built, and municipal risk, vulnerability, acceptance and public service provision perspective. The score for the "do nothing" alternative was -180.

Given that the Township has utilized a due diligence approach for waste management with the institution of the WMSP, and the Township's goal of an enhanced waste disposal plan and diversion initiative, the "do nothing" approach was clearly not a candidate for the WMSP "Preferred Alternative".

6.3 THE "PREFERRED ALTERNATIVE"

Based on the results of the comparative evaluation presented, the detailed costing assessments completed for each "Alternative To" and "Alternative Method", background information review and analysis, and comprehensive technical studies, the recommended "Preferred Alternative" for the management of solid waste generated within the Township is as follows:

- The implementation of a recommended diversion strategy, with the objective to increase the Township's existing diversion program over the 25-year planning period through promotion and education, a mandatory recycling by-law including a continued user-pay system and bag limits, expanded curbside collection limits, and a supported backyard composting program will compliment the Township's "Preferred Alternative", as economically feasible. It is anticipated that this waste diversion strategy will increase the Township's waste diversion rate by over 20% in an effort to meet the OMOE diversion target of 60%.
- The capacity expansion of the existing Bark Lake waste disposal site with transfer stations at the current Radcliffe and Wilno waste disposal sites. Consistent with waste management needs projected in the ToR, the conceptual design expansion of the Bark Lake site includes an additional 150,000 m³ of capacity, and an expanded approved waste disposal area totalling 2.3 ha extending primarily to the southeast of the current landfill area (Azimuth, 2005). The conceptual design footprint is contained within one local watershed zone at the site, and is based on natural attenuation of leachate principles, to which the Township is addressing with the process of acquiring additional lands at the site. Future characteristics of leachate derived from the landfill are not expected to increase as result of the proposed expansion, and are expected to remain similar to current leachate characteristics provided waste generation rates within the Township, and as received at the site, remain the same. As such, collection and treatment of leachate at the site were not warranted as part of the conceptual expansion design. However, as a future contingency measure associated with the potential expansion of the Bark Lake site is the consideration for future controls such as engineered leachate management systems/facilities, and available treatment capacity including the Barry's Bay Wastewater Treatment Plant, located in the Township's urban centre of Barry's Bay. Future study and detailed contingency planning in this regard would be investigated during future detailed site design and approvals stages, upon approval of the WMSP EA.

Through the comprehensive public consultation process integrated into the WMSP, significant support of respondents from Public Consultation Event No. 4 for the proposed waste diversion concepts was evident, and 64% of respondents agreed with the expansion of the Bark Lake waste disposal site for the WMSP "Preferred Alternative".

The balance of this EA Report will summarize the assessment of the potential effects of the "Preferred Alternative" on the natural, socio-cultural, technical/built, and economic environments, as presented in Section 5.3.2.1.

7.0 POTENTIAL ENVIRONMENTAL EFFECTS OF THE “PREFERRED ALTERNATIVE”

A comparative assessment of the alternative methods carried forward as candidates for the “Preferred Alternative” for the WMSP was presented in Section 5.3. The results of the detailed comparative evaluation, complete with the identification of the “Preferred Alternative” for the Township’s WMSP, were summarized in Section 6.0.

In general, the “Preferred Alternative” identified enhancements or upgrades to the current waste diversion program, and a capacity expansion of the Township’s Bark Lake waste disposal site with waste transfer stations to operate at the Township’s Wilno and Radcliffe sites to properly manage residuals not diverted from the proposed enhancements to diversion efforts in the municipality.

This section assesses potential effects on the environment of the “Preferred Alternative” that may reasonably be expected to occur. For the diversion aspects of the “Preferred Alternative”, there are no adverse impacts anticipated, with increased diversion of waste materials from disposal, and enhanced waste and recycling service to ratepayers, benefiting the public and the environment overall. In addition, the continuation of waste transfer operations for the Wilno and Combermere areas (as per existing operations) have been proposed as part of the “Preferred Alternative”. In essence, the continued waste transfer operations in these areas is not considered to have an adverse impact on the environment – continued service to the ratepayers in these areas has been supported by the public throughout the WMSP.

A conceptual design of the expanded landfilling area for the Bark Lake site is presented in *Feasibility Study for the Potential Expansion of the Bark Lake Landfill*, Azimuth Environmental Consulting, Inc., September 2005 (Appendix I-D). The key conceptual design concepts presented include:

- An estimated expansion volume (preliminary) of 150,000 cubic metres of waste materials in addition to an existing volume of approximately 36,000 cubic metres.
- The conceptual expansion area would be increased from the current area of 1.15 hectares (per January 2007 emergency PC of A amendment) to an estimated (conceptual) 2.3 ha (Figure 6), within one local watershed zone, with maintained operations as a natural attenuation site.

The following sections focus on the potential effects of the capacity expansion of the Bark Lake waste disposal site to service the residual waste disposal needs of the Township on pertinent aspects of the natural, socio-cultural, technical/built, and economic environments.

7.1 NATURAL ENVIRONMENT

This section presents a summary of the potential for the expansion of the Bark Lake waste disposal site to cause adverse impacts to the natural environment, both at and adjacent to the site, during the development, operation, closure, and post-closure activities.

7.1.1 GEOLOGY, HYDROGEOLOGY AND GROUNDWATER QUALITY

Groundwater at the site is controlled by fractures within the bedrock formation, and is generally characterized by a low-permeability base and is interpreted to flow towards to the west and southwest of the site (Azimuth, 2005). Local, shallow groundwater flow at the site follows the underlying bedrock formation beneath the site, towards the creek to the west of the site, and Highway 60 to the southwest. An aggregate extraction pit located to the north of the site does not have potential to influence the groundwater configuration at the site, as the aggregate extraction area is interpreted to be hydraulically separated, with discharge being directed to local surface water systems northwest of the Bark Lake landfill.

A comprehensive groundwater monitoring well network exists at the site, consisting of fourteen (14) wells installed in the shallow, intermediate and deep groundwater aquifers beneath the site. An annual routine groundwater monitoring program is established at the site in which the downgradient groundwater aquifers are monitored for landfill leachate related parameters. Given that the annual rate of waste disposed at the Bark Lake waste disposal site is not anticipated to increase markedly, the current monitoring well network should be adequate to detect potential downgradient impacts from the site.

The nearest property structure is located approximately 500 m southwest of the site; however, it is considered to be hydraulically separated from the Bark Lake waste disposal site, as it is located on the opposite side of Bells Bay (Bark Lake) and is interpreted to be part of a separate drainage system discharging into Bark Lake (Figure 7).

The expansion of the Bark Lake waste disposal site is anticipated to have minimal impact on the local geology and hydrogeology at, and in the vicinity of, the site.

As noted above, groundwater quality at the site is monitored by an existing network of monitoring wells at the site. A comprehensive groundwater sampling and analysis program is completed in the spring, summer, and fall, from monitoring wells downgradient of the landfill. The water quality results from each respective sample event are compared to background water quality at the site, and provincial standards and objectives for assessment purposes.

Historic groundwater quality monitoring results indicate that a leachate plume exists downgradient from the site; however, the leachate plume from waste mound appears to be decreasing in concentration with distance from the waste mound (SGS, 2006a; Greenview, 2007; Appendix I - C). Per the RUC assessment documented in the *2006 Annual Report* (Greenview, 2007) the Bark Lake waste disposal is in conformance with MOE Guideline B-7 at the southeast and western proposed CAZ boundaries.

Based on the pretence that annual rate of waste disposed at the Bark Lake waste disposal site is not anticipated to increase markedly, the current groundwater monitoring program and assessment should provide an adequate basis for determination of potential impacts associated with the proposed conceptual expansion of the Bark Lake site (Azimuth, February 14, 2007; Appendix II - D). As such, given that the results of the 2006 monitoring program indicating the site is in conformance with MOE Guideline B-7, the proposed expanded Bark Lake waste disposal site is also expected to be in conformance with MOE Guideline B-7.

The potential expansion of the Bark Lake waste disposal site is anticipated to have a minimal impact on the local groundwater quality at, and in the vicinity of, the site.

7.1.2 SURFACE WATER SYSTEMS AND QUALITY

Local topography (northern watershed) directs surface water flow in the area of the Bark Lake waste disposal site in the tributaries feeding Bark Lake from north to south, primarily the creek located to the west of the site.

Groundwater flow from the landfill area has been interpreted to flow westerly towards the Peters Marsh Creek tributary (SGS, 2006a; Greenview, 2007; Appendix I - C), and is understood to discharge into this creek along its length, as supported by recent temperature profiling (SES, 2006b). An annual assessment of surface water quality in the creek adjacent to the site, to which groundwater is interpreted to discharge, is completed by a surface water trigger mechanism instituted to monitor water quality degradation. There were no recorded trigger exceedances in 2005, indicating that current waste disposal operations are not impacting the surface water quality in the Peters Marsh Creek tributary.

The results of dissolved oxygen monitoring completed during the 2006 annual monitoring program, and the additional December 2006 monitoring event, exhibited elevated levels of dissolved oxygen, compliant with PWQO criteria, indicating that current landfill operations are not impacting the dissolved oxygen levels in the adjacent Peters Marsh Creek tributary.

The conceptual design for the expanded site (Azimuth, 2005) has proposed that the expanded landfill footprint be maintained within the northern watershed; with as a result surface water flow direction would be maintained to the west toward Peters Marsh. An assessment of projected surface water quality as a result of expanded site conditions does not suggest any increased potential for surface water impacts either direct or from groundwater (leachate) discharge, due to minimal anticipated change in landfilling rates over the study period, and increasing efforts for site operations and surface water management.

Impacts from the proposed capacity expansion of the Bark Lake waste disposal site to surface water systems and quality at or near the site are anticipated to be minimal.

7.1.3 BIOLOGY/ECOLOGY

Initial environmental impact studies were completed in the fall of 2005 (SES, 2006a) within a localized study area at the Bark Lake site, which considered the requirements of Section 2.1 of the PPS (2005).

The recommendations from the initial environmental impact study were to complete supplementary studies to further evaluate the significance of the natural heritage features at and near the Bark Lake site which were completed in the summer of 2006. The findings from the initial and additional studies are as follows:

- The conceptual expansion at the Bark Lake site (Figure 6) will remove only a small portion of natural vegetation, of which the loss of natural habitat is considered insignificant in the absence of significant species habitat (SES, 2006a; Appendix I - E).
- The breeding bird survey did not identify any species that are considered threatened, endangered, of special concern, or of provincial significance within the Bark Lake site study area (SES, 2006c; Appendix I - F).
- The vascular plant survey did not identify any species that are considered threatened, endangered, of special concern, or of provincial significance within the Bark Lake site study area (SES, 2006c; Appendix I - F).
- The Peters Marsh wetland was evaluated by a qualified and experienced in accordance with OMNR standards and protocols for significance (SES, 2006a; Appendix I - E) and has been determined as not provincially significant.
- The supplemental fish habitat assessment indicated that the Peters Marsh tributary was a cold water unit along its length, and that the identified Brook Trout are not facing temperature stresses.

The comprehensive and detailed series of natural heritage studies completed for the WMSP have assessed potential impacts to natural heritage features at, and adjacent to, the Bark Lake site.

Impacts from the potential capacity expansion of the Bark Lake waste disposal site to natural heritage features at or near the site are anticipated to be minimal.

7.1.4 AIR QUALITY

An assessment of potential air quality issues with respect to the conceptual expansion of the Bark Lake site was provided in the report entitled *Feasibility Study for the Expansion of the Bark Lake Landfill* (Azimuth, 2005; Appendix I - D). The results of the air quality assessment are as follows:

- Odour is not considered to be an issue at the site given the extended buffer distance between the landfill and nearby land uses (Azimuth, 2005; Appendix I - D).
- Lateral landfill gas migration at the site is limited by the permeability of the overburden soils, and by the shallow groundwater table (Azimuth, 2005; Appendix I - D).
- Noise and dust impacts as result of landfilling activities would have no significant bearing on the adjacent surroundings given the isolated location of the site from traffic corridors and residential developments (Azimuth, 2005; Appendix I - D).

The air quality assessment completed to date has assessed potential impacts to air quality at, and adjacent to, the Bark Lake site.

Impacts from the potential capacity expansion of the Bark Lake waste disposal site to air quality at or near the site are anticipated to be minimal.

7.1.5 AESTHETIC IMPACTS

An assessment of potential aesthetic impacts with respect to the proposed expansion of the Bark Lake site was provided in the conceptual design for the site (Azimuth, 2005; Appendix I - D). The waste mound at the Bark Lake waste disposal site is isolated from adjacent traffic corridors and adjacent residential development, as naturally forested lands that surround the property provide an effective visual buffer. Aesthetic impacts from additional lifts of refuse associated with the conceptual expansion design, placed on the north-south oriented bedrock ridge, may be present in the future however, are expected to be minimal given the extended distance from Highway 60.

Aesthetic impacts from the potential capacity expansion of the Bark Lake waste disposal site at or near the site are anticipated to be minimal.

7.2 SOCIO-CULTURAL ENVIRONMENT

7.2.1 ARCHAEOLOGY AND HERITAGE

The potential net effects on archaeological and cultural heritage features at and near the Bark Lake site associated with the conceptual expansion of the Bark Lake waste disposal site were assessed through Stage 1, Stage 2, and subsequent Stage 3 archaeological assessments. The archaeological studies were completed in accordance with Section 2.6 of the PPS (2005), and the *Archaeological Assessment Technical Guidelines: Stages 1 to 3* (OMCL, 1993).

The Stage 1 and 2 assessments were completed by licensed archaeologists with experience and familiarity with archaeological history in the region. The results of the Stage 1 and Stage 2 archaeological assessments (Kinickinick, 2005; Appendix I - G) concluded the following:

- The local area defined within the proposed landfill footprint expansion as BjGk-7 is a significant site discovery, due to its age, rarity, and density of artifacts.
- Thirty-seven (37) lithic specimens were collected from ten (10) positive testpits in the focused area, consisting of flake fragments, and shaped, retouched, and used tools of scrapers, drills, and perforators.
- The discovery was interpreted to be Palaeo-Indian and Early Archaic, similar to other local discoveries in Bell Bay Provincial Park, south of the Bark Lake waste disposal site.

A Stage 3 archaeological assessment was completed in 2006, as a result of the Stage 1 and 2 conclusions, to determine site extent and gather a representative sample of artifacts across the subject site (Kinickinick, 2006). The Stage 3 archaeological assessment concluded that the discovery BjGk-7 has been sufficiently documented and recorded, with low artifact frequency and no cultural features or organic remains. As such, there are no heritage concerns associated with an expanded waste disposal area at the Bark Lake waste disposal site (Kinickinick, 2006). Confirmation of the findings of the Stage 3 report were provided in correspondence from the OMCL dated October 26, 2006 (Appendix I - H).

Impacts from the proposed capacity expansion of the Bark Lake waste disposal site to cultural heritage features at or near the site are anticipated to be minimal.

7.2.2 LAND USE AND PLANNING

As outlined in the Comprehensive Zoning By-Law effective May 1, 2006, the Bark Lake waste disposal site is currently zoned as an active waste disposal site situated on Crown lands. Zoning designations of adjacent properties include rural (RU), limited service residential (LSR), and limited service residential – exception 2 (LSR-E2) along the flooded area to the north of Bell's Bay (Township Comprehensive Zoning By-Law, 2006), with the closest residential property being located approximately 500 m southwest of the site (Figure 10). The residential property southwest of the Bark Lake site, is considered to be hydraulically separated from the waste disposal site, as it is located on the opposite side of Bells Bay of Bark Lake, and is interpreted to be part of a separate drainage system discharging into Bark Lake.

An active aggregate extraction pit is located immediately to the north of the site; however, it does not appear to have been used for extraction purposes in the recent past. The aggregate extraction pit located to the north of the site does not have potential to influence the groundwater configuration at the site, as the aggregate extraction area is interpreted to be hydraulically separated, with discharge being directed to local surface water systems northwest of the Bark Lake landfill. Based on available information from the Township, and in consideration of OMOE land use compatibility policies and guidelines, no major developments are planned near the waste disposal site.

The proposed waste disposal site expansion, and continued use of the site, is not anticipated to negatively impact any adjacent, current, or planned land uses from an environmental perspective.

7.2.3 FIRST NATIONS

Several First Nations groups including the Algonquins of Pikwakanagan (Golden Lake, Ontario), the Algonquin Nation Tribal Council (Sharbot Lake, Ontario), and the Greater Golden Lake Algonquins (Killaloe, Ontario), have been consulted with throughout the EA process, with no issues having been presented to date. In October 2006, additional consultation with the Whitney Algonquins First Nation was conducted as a joint effort between the Township and the OMNR (Pembroke District Office).

Cultural heritage and archaeological assessments were completed with the interest of all peoples in focus at the Bark Lake site as documented in documentation included as Appendices I – G and I – H to this Volume.

The Township understands that this consultation has been beneficial to all parties, and that support from local First Nations for the implementation of the "Preferred Alternative" can be expected, as First Nations

peoples within the Township of Madawaska Valley have been included in the WMSP, as users of the Township's waste management system.

Detailed account of First Nations consultation for the WMSP is provided in Volume II of this EA.

7.3 TECHNICAL AND BUILT ENVIRONMENT

7.3.1 TRANSPORTATION

7.3.1.1 ROAD TRAFFIC

Recent highway upgrades in the vicinity of the site have improved highway conditions for thoroughfare and enhanced traffic flow with the addition of hillside passing lanes. There are currently no traffic issues as a result of operations at the Bark Lake waste disposal site, and no issues are anticipated in the future, based on an anticipated restricted waste disposal site service area (Township only), and Township population projections completed for the WMSP.

The expansion of the Bark Lake waste disposal site is not anticipated to result in traffic issues for local or seasonal travellers utilizing the Highway 60 transportation corridor.

7.3.1.2 AIR TRAFFIC

There are no airports or airstrips in close proximity to the Bark Lake waste disposal site, with the closest airfield (privately owned) being located in Barry's Bay.

The expansion of the Bark Lake waste disposal site is not anticipated to cause local air traffic related issues.

7.3.1.3 MARINE TRAFFIC

There are no major navigable water ways immediately adjacent to the Bark Lake waste site allowing for marine craft navigation. There is minimal potential for navigation of the adjacent creek to the site, which is limited by the dimensions of the creek. Small-engine (recreational) watercraft travel does occur on local lakes in the vicinity of the Bark Lake site, including Bark Lake, Parissien Lake, and Carson Lake.

Marine traffic issues are not anticipated with the expansion of the Bark Lake waste disposal site being selected as the "Preferred Alternative".

7.3.2 LOCAL DEVELOPMENT

Development in the area of the Bark Lake waste disposal site primarily consists of seasonal and permanent residential development along the shores of Bark Lake, located to the south of the site. Other development in the vicinity of the Bark Lake site includes the establishment of the Bell Bay Provincial Park, to the southeast of the Bark Lake waste disposal site.

Any future development near the site would be subject to review by the OMOE and the Township in accordance with Guideline D-4, and the EPA.

The expansion of the Bark Lake waste disposal site is not expected to limit development potential, or hinder planned developments in the vicinity of the site in any regard.

7.4 ECONOMIC ENVIRONMENT

7.4.1 ENGINEERING COST ESTIMATIONS FOR THE PREFERRED ALTERNATIVE

The expansion of the Bark Lake waste disposal site as selected as the WMSP “Preferred Alternative”, in conjunction with the Township’s enhanced waste diversion initiatives, was examined from a cost perspective with options of zero, one, and two outlying transfer stations (Table 9). Waste transfer station options were evaluated on the basis of waste transfer from the Wilno and Radcliffe waste disposal sites.

The total cost associated with the expansion of the Bark Lake waste disposal site “Alternative Method” over the 25-year planning period is \$7,220,000, \$9,500,000, and \$11,660,000, with costs reflective of transfer station operations instituted at zero, one, and two transfer stations, respectively. The resultant average annual costs to the Township are \$290,000, \$380,000, and \$470,000, respectively, with average annual costs per household of \$301, \$396, and \$486, for each transfer station option respectively. The waste transfer stations would be established at the Wilno and Radcliffe waste disposal sites to provide continued waste disposal services to Township residents in the former Township of Radcliffe, and Wilno area residents.

As noted in Section 4.4.1, the 2005 waste disposal operating cost was \$309,700 and the waste transfer operating cost was \$132,100, while waste disposal capital costs were \$308,800 and waste transfer capital costs were \$43,000 in 2005. Total waste management costs for the Township in 2005 were \$793,600; however, WMSP costs are included in this amount, which will not be incorporated in future years. This value is considerably higher than the anticipated average annual cost (\$470,000) of the capacity expansion of the Bark Lake waste disposal site, complete with two (2) operating waste transfer stations over the 25-

year planning period. Based on the above, the expansion of the Bark Lake waste disposal site is economically feasible in both short-term and long-term waste management for the Township.

The expansion of the Bark Lake waste disposal site is not expected to pose significant financial burden on the Township as the “Preferred Alternative” for the WMSP.

7.5 POTENTIAL NET EFFECTS

The potential net effects related to the implementation of the “Preferred Alternative”, the expansion of the Bark Lake waste disposal site, have been evaluated through detailed assessments, supplemental studies, and the comparative evaluation presented in Section 6.0. The analysis of the potential net effects included evaluation criteria encompassing the economic, natural, socio-cultural, and technical/built environments, as well as risk potential, public acceptance, service provision, and associated aspects pertinent to the undertaking.

The resultant outcome of the detailed assessments, the supplemental studies, and the evaluation matrix revealed that the potential net effects for each of the screening criteria resulting from the expansion of the Bark Lake waste disposal site, and the (continued) operation of two (2) transfer stations at the Wilno and Radcliffe sites, are anticipated to be minimal.

As identified in Section 5.3.2.1.1 and Section 7.0, the additional (approximate) 150,000 m³ of waste to be deposited at the site with the proposed expansion to the Bark Lake site is not anticipated to pose any potential net environmental effects to the environment on-site, and downgradient from the proposed expansion area (Azimuth, 2005). However, the potential for environmental impacts may need to be re-assessed should the design concepts utilized in the expansion feasibility study (Section 5.3.2.1.1) differ from actual concepts upon implementation.

The Township is committed to monitoring all potential net effects over the duration of the 25-year planning period and beyond, as necessary. The potential effects will be monitored and reported to the OMOE in accordance with all appropriate regulations to ensure efficient, effective, and safe waste management operations within the Township, for the protection of human health and the environment.

8.0 ENVIRONMENTAL MONITORING PLAN

Consistent with the objective of the Township of Madawaska Valley's approach to the WMSP to determine the "best solution" for waste management in the long-term for the municipality, the Township recognizes that environmental monitoring and reporting are an important part of the successful implementation of the "Preferred Alternative".

For the diversion aspects of the WMSP, annual reporting of waste materials diverted from landfill via the WDO Datacall has been a standard method of documentation and measure for the Township's efficiency and effectiveness in diverting waste. The Township is committed to continue reporting of waste diverted from landfill in this format, or similar reporting system as required by governing parties with this mandate.

As the expansion of the Bark Lake waste disposal site has been determined to be part of the WMSP's "Preferred Alternative", the Township understands that if the WMSP and subsequent EPA submission(s) are approved by the OMOE, the Township will be required to monitor the environment at and near the Bark Lake waste disposal site for potential environmental effects. Environmental monitoring of groundwater and surface water at and near the Bark Lake waste disposal site has been undertaken at the Bark Lake site locations initially in 1993 and on-going since 1997, with the results of the environmental monitoring assessed and published in annual reports to the OMOE. In addition, the Township's operators at the Bark Lake site are responsible for documentation of any and all complaints with respect to site operations, odour, noise, nuisance issues, or other concerns associated with the site's operation. The Township is committed to maintaining this high level of environmental monitoring, documentation, and reporting for the Bark Lake site into the future, and in accordance with applicable legislation and acts.

If the WMSP is approved by the OMOE, and the anticipated EPA submission is approved with an amended Provisional Certificate of Approval for expansion at the Bark Lake waste disposal site, it is the Township's understanding that appropriate conditions specifying environmental monitoring, reporting, etc. will be part of the OMOE's anticipated EPA-level approvals.

9.0 CONCLUSIONS AND RECOMMENDATIONS

Consistent with the requirements of the EAA and the PPS (2005), the Township of Madawaska Valley has undertaken an Environmental Assessment to identify the best solution for managing solid waste generated by the municipality for a 25-year planning period. The undertaking has been a comprehensive evaluation of alternatives, based on economic, technical, and consultative approach, with a detailed assessment of potential impacts to the natural, socio-cultural, technical/built, and economic environments of the Township. The undertaking has been documented in detail in the previous Sections of this report, with a complementary record of extensive consultation with review agencies, First Nations, and the interested public (Volume II).

From the assessment and evaluation of the alternatives considered for the Waste Management Strategic Plan, the following conclusions are provided.

- The Township's current waste diversion program has been an effective means of diverting waste from landfill; however, with relatively minimal resource needs, additional components to the existing program could be made to increase diversion rates, striving for the OMOE's 60% diversion target for 2008. The "Preferred Alternative" has identified: a mandatory recycling by-law including a continued user-pay system and bag limits, expanded curbside collection area (extending radially 1.5 km from the village of Barry's Bay), an increased household hazardous waste event frequency to twice annually, and a supported backyard composting program to be reasonable measures for waste diversion program increases. A comprehensive promotion and education program is vital to the success of this effort.
- For the management of residual waste that currently cannot be feasibly diverted, the "Preferred Alternative" has identified a capacity expansion of approximately 150,000 cubic metres, with continued waste transfer operations at the Township's Wilno and Radcliffe waste disposal sites, as the most reasonable, economically feasible, and technically viable alternative for the 25-year planning period of the Waste Management Strategic Plan.
- Through the comprehensive public consultation process integrated into the WMSP, significant support of respondents from Public Consultation Event No. 4 for the proposed waste diversion concepts was evident, and 64% of respondents from this public consultation event agreed with the expansion of the Bark Lake waste disposal site for the Waste Management Strategic Plan's "Preferred Alternative".

Based on the above conclusions, the following recommendations are presented:

- The Ontario Minister of the Environment approve the “Preferred Alternative” of the Waste Management Strategic Plan in accordance with the requirements of the *Environmental Assessment Act*, in order for the Township of Madawaska Valley to proceed with the necessary actions for implementation.

10.0 OTHER APPROVALS

The Township understands that further to the approval of the WMSP under the EAA, other approvals are required prior to the implementation of the identified “Preferred Alternative” which may include, but not be limited to:

- An application under Part V (Waste Management) of the EPA (as amended), including technical aspects in accordance with Ontario Regulation 232/98 for the amendment of the Provisional Certificate of Approval for the Bark Lake waste disposal site.
- Other applications as required by the EPA with respect to the “Preferred Alternative”, as identified by the OMOE in the review of this EA and in consultation for the next stages of the project.

The Township recognizes that the current emergency Provisional Certificate of Approval for continued disposal at the Township’s Bark Lake waste disposal site is finite. Accordingly, it is the Township’s intention to prepare the required applications and supporting documentation for the implementation of the “Preferred Alternative”, in the 2007 year. In the interim, the Township will be submitting an application for continued waste disposal operations at the Bark Lake waste disposal site until such time as the necessary approvals are in place for the long-term utilization of the Bark Lake site for the ratepayers of the municipality.

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