

HALIFAX REGIONAL MUNICIPALITY

**Solid Waste/Resource Advisory Committee
July 5, 1996**

To: Chairman Reg Rankin and Members of the Solid Waste/Resource Advisory Committee

From: Original Signed
~~George MacLellan, Commissioner of Regional Operations~~

Original Signed
Jim Bauld, Manager of Solid Waste

Date: July 2, 1996

Subject: Revised Solid Waste/Resource Management Strategy Cost Projection

Information Report

Origin

Halifax Regional Municipality Council approved the revised solid waste/resource management strategy framework May 14, 1996. At that time, Staff was given the approval to develop the cost profile of this strategy.

Discussion

Please find attached the report requested by HRM Council. The highlights of the report are captured in this synopsis.

Summary

This analysis demonstrates that significant savings will accrue to HRM as a result of implementing the revised strategy. Capital expenditures are reduced by 8.6 MS to 45.0 MS. Total annual system costs are reduced by 9.9 MS

(to 30.6 MS) before projected revenues are taken into account and by 4.5 MS (to 27.9 MS) after these revenues are applied.

In addition, there are a number of additional cost saving opportunities that have been identified for further study. Also, the fact that the FEP/WSF investment will be staged over two years will allow HRM to get the benefit of actual system operating experience before the second phase of the facility investment occurs.

It is important to note that the projected costs are marginally less than the system costs projected for 1997-98 (27.5 MS in 1997 and 28.8 MS in 1998) when the Cumberland export contract is in effect. The implication is that HRM will achieve the core objectives of the CSC Strategy at a cost marginally less expensive than the interim arrangement that does not achieve these core objectives.

The Keys To The Revised Strategy

- HRM remains committed to the principles contained in the CSC Strategy, including the achievement of high diversion rates and the disposal of only stabilized and inert materials at the RDF.
- Communication and education programs and other initiatives will commence immediately to encourage source separation behaviour. This program is important to reduce the amount of mixed waste that must be processed prior to disposal.
- Capital expenditures will be paced over a period of time that will reduce the probability of building over-sized processing facilities.
- Annual costs will be reduced by the savings related to reduced capital expenditures as well as reduced direct mixed waste processing costs such as labour and equipment operations.

Capital Expenditures

- The projected capital expenditures are reduced from 53.6 MS to 45.0 MS, a reduction of 8.6 MS.
- The capital expenditures are phased in over two years (1997-98) vs. one year (1996). The reduction in projected capital expenditures of the FEP/WSF (-4.3 MS), the MRF expansion reduction (-0.3 MS) and the decision to tender the residential composting plant on a design, build, finance and operate basis (-4.0 MS) contribute to this reduction.

Annual System Costs

- The total system costs, before application of recyclables' revenues, are reduced by 9.9 MS per year, from 40.5 MS to 30.6 MS.
- The major source of the reduction is the FEP/WSF where annual costs are reduced to 9.0 MS from 18.2 MS, a reduction of 9.2 MS per year.

Annual Recyclables Revenues

- Projected recyclables revenues decline to 2.7 MS per year from the original projection of 8.1 MS, a reduction of 5.4 MS.
- The key factor in this decline is the assumption that the FEP/WSF does not contribute any revenue as it now designed to process material prior to disposal only.

Net Annual System Costs

- • The net annual costs are 27.9 MS. This is a 4.5 MS reduction vs. the original plan of 32.4 MS.

1997-98: The Cumberland Transition Years

- The net system annual costs for 1997 are estimated at to range from 27.6 MS to 28.0 MS.
- The net system annual costs for 1998 are estimated to range from 28.3 MS to 29.3 MS.

Budget Implications

There are no immediate budget implications. HRM Council has approved funds for system development during the 1996/97 fiscal year. Acceptance of this report allows staff to develop and implement the integrated solid waste/resource system under a cohesive strategy.

Attachment

Revised Integrated Solid Waste/Resource Management Strategy

For further information regarding the contents of this report may be obtained by contacting Mr. Jim Bauld, Manager of Solid Waste. at 490-6716. For additional copies or for information on the report, please contact Regional Operations at 496-2276 (Tel) or 425-1466 (Fax)

Relevant HRM Council Resolutions

- February 1, 1996 HRM Council approved a motion indicating that the draft Master Agreement was a basis for further negotiations with the proposed private sector partner taking into account and responding to public comments and representations.
- March 6, 1996 HRM Council authorized Staff to engage Sound Resource Management Group to assist Staff and MIRROR NS to develop a revised integrated solid waste/resource management system.
- March 28, 1996 HRM Council authorized, as part of a six point resolution, the proposed private partner, MIRROR NS, to work with Staff to develop a budget wherein they would, in conjunction with staff, and after evaluation of the potential for source separation efforts to reduce the mixed waste stream, enable HRM to better detail the scope and utility of an FEP/WSF facility to stabilize the remaining waste.

Subsequent to this resolution, Staff worked with Sound Resource Management Group and MIRROR NS to develop a new mass balance, revised facility processing capacities, and a recommendation on a revised set of business relationships for the integrated solid waste management system. This report was presented to the Solid Waste Advisory Committee (SWAC) on May 8, 1996. SWAC recommended to HRM Council that this revised strategy be adopted. SWAC also recommended that HRM Council approve a Staff recommendation to provide funding to cost the revised strategy.

- May 14, 1996 HRM Council approved Staff's 'Revised Regional Solid Waste/Resource Management Plan Framework'. In addition HRM Council approved the funding recommendation to cost the revised strategy.
- This report represents the summary of the projected costs of the revised strategy. Staff requests acceptance of the attached report.

The Keys To The Revised Strategy

- HRM remains committed to the principles contained in the CSC Strategy, including the achievement of high diversion rates and the disposal of only stabilized and inert materials at the RDF.
- Communication and education programs and other initiatives will commence immediately to encourage source separation behaviour. This program is important to reduce the amount of mixed waste that must be processed prior to disposal.
- Capital expenditures will be paced over a period of time that will reduce the probability of building over-sized processing facilities.

- Annual costs will be reduced by the savings related to reduced capital expenditures as well as reduced direct mixed waste processing costs such as labour and equipment operations.

Summary of Results

Capital Investment Profile

The total system capital investment is now forecast to be 45.0 M\$. This compares to the initial implementation plan of 53.6 M\$.

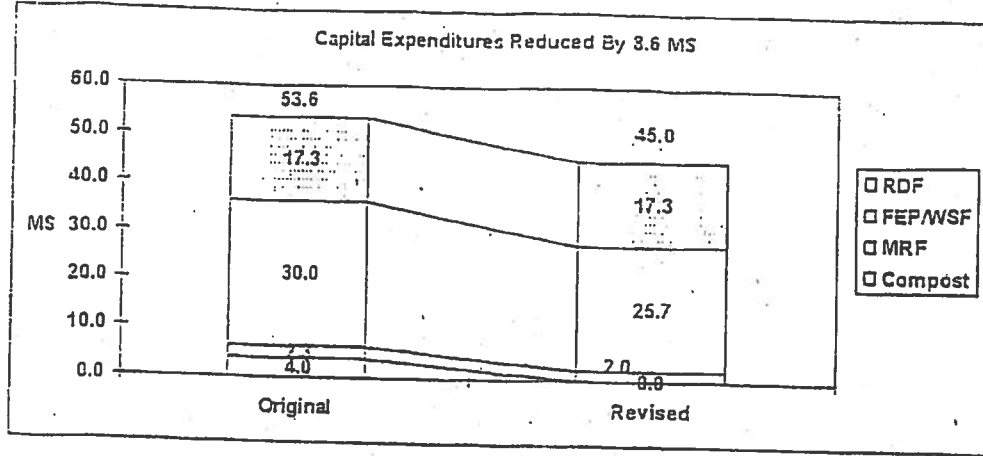
In addition to this capital expenditure reduction of 8.6 M\$, please note that this investment now occurs over a two year period (1997-98) vs. a one year period (1996).

Table 1

Facility	(M\$)					
	1996	1997	1998	Total	Original Plan 1996	Δ
Residential Composter	Private			Private	4.0	-4.0
MRF - Phase 1 - Phase 2		0.5	1.5	2.0	2.3	-0.3
ICI Composter - Phase 1 - Phase 2 - Phase 3	Private	Private	Private	Private	Private	N/A
Fibre Sorting Plant			Private	Private	N/A	N/A
FEP/WSF - Phase 1 - Phase 2		15.8	9.9	25.7	30.0	-4.3
RDF		17.3		17.3	17.3	0.0
Total	0.0	33.6	11.4	45.0	53.6	-8.6

The revised strategy saves investment capital requirements and spreads the expenditures over a longer time period.

Figure 1



Capital Cost Analysis Summary

FEP/WSF → The most important concern of the original strategy was the size and cost of the FEP/WSF. An important goal of the revised strategy was to create time to allow source separation behaviour to take hold in the Municipality. This would in turn divert materials from the mixed waste stream. Processing costs are further reduced by eliminating any reliance on this facility to create incremental diversion. This approach leads to the following benefits;

- Processing capacity of the FEP/WSF would be reduced, leading to a reduced investment.
- This processing capacity could now be developed in phases. This allows HRM the opportunity to monitor the progress of the source separation behavioural change and potentially reduce the investment of the contemplated phase even further.
- Potential upstream investment in source separated material processing is encouraged as the size of the second phase of the FEP/WSF development is very much dependent on the size of the mixed waste stream in 1998.
- Reduced reliance on the diversion provided by this facility originally leads to substantially lower annual costs of operation.

Table 2

FEP/WSF Capital Cost Comparison

	Original	Revised Phase 1	Revised Phase 2	Revised Total	MS Δ
Projected Volume (KT)					
- FEP	160.0	51.0	48.0	99.0	-61.0
- WSF	93.0	27.0	17.0	44.0	-49.0
FEP - Building & Equipment	14.0	5.9	4.0	9.9	-4.1
WSF - Building & Equipment	6.8	5.2	3.1	8.3	+1.5
Administration Building	0.6	0.5	0.0	0.6	0.0
Mobile Equipment	1.0	0.5	0.4	1.0	0.0
Design, Taxes, WC, Other	7.6	3.5	2.4	5.9	-1.7
Total	30.0	15.8	9.9	25.7	-4.3

MRF→ The MRF capital projection is substantially the same. It continues to be assumed that a new baler will be required in 1997 to eliminate a processing bottleneck in 1997 and a new fibre processing line will be required in 1998 as residential recyclables volume continues to grow.

Source Separated Composting Plant→ The projected capital requirement has been eliminated to reflect Staff's position that this facility will be built by a private sector proponent on a design, build, finance, operate basis.

RDF→ The size of the RDF will not change. The initial cell will continue to be built to dispose three years of stable and inert material. In the event that NSDOE accepts the material stabilized in the WSF as adequate cover material, it is possible that the initial RDF cell's useful may be extended by another year.

Annual Cost Profile

The original implementation plan forecasted 32.4 MS in net annual system costs, starting in 1997. These costs consisted of fixed costs related to capital expenditures (i.e., amortization and interest/return), fixed costs not related to capital (i.e., general and administration costs, program costs, etc.), and variable operating costs (i.e., direct labour, equipment operating, utilities, etc.). These costs amounted to 40.5 MS. The net cost of 32.4 MS was arrived at by subtracting 8.1 MS in forecasted recyclables revenues.

The revised plan's costs are phased in over a three year time period as processing facilities come on stream. When the new system is operating in 1999, the annual costs are forecast to be 30.6 MS (excluding projected revenues) in 1996 dollars, a savings of 9.9 MS.

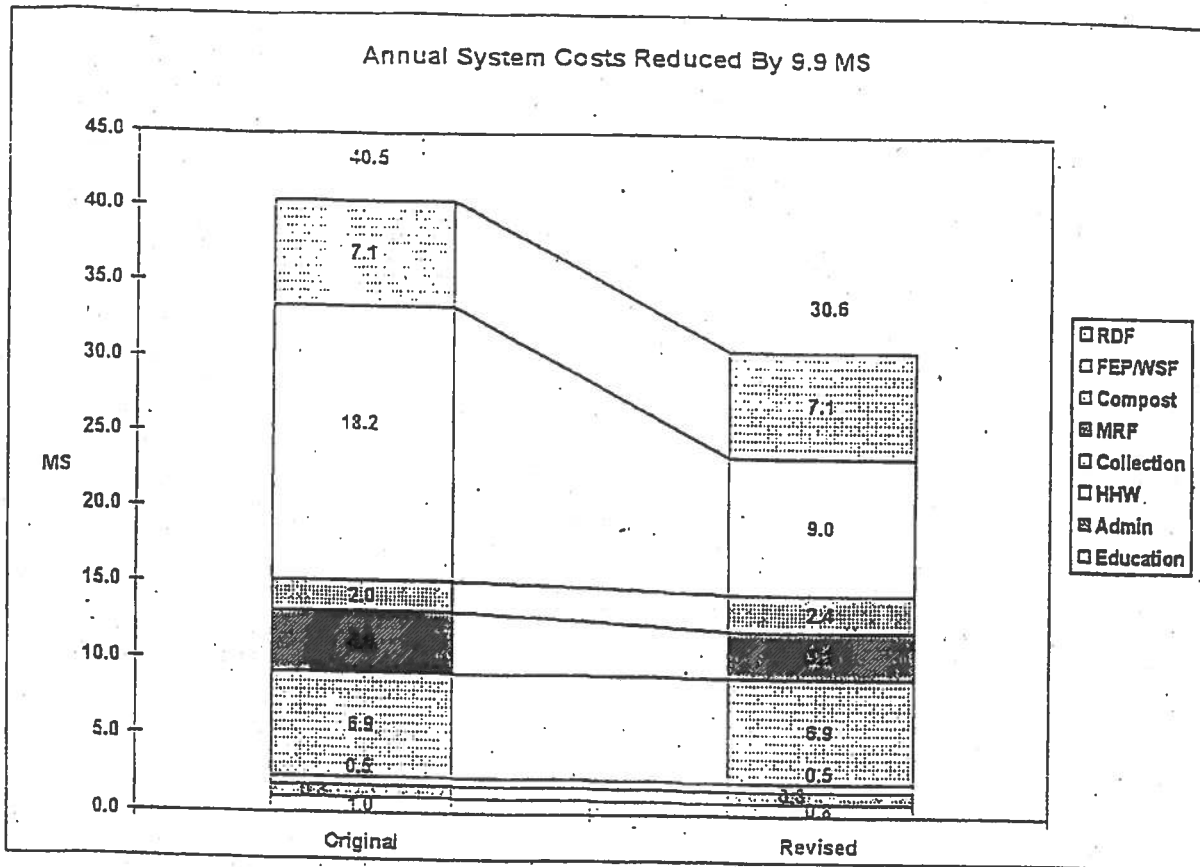
Table 3

(MS)

Activity	Revised System Annual Cost Profile	Original System Annual Cost Profile	Δ
Communication & Education	0.8	1.0	-0.2
Administration	0.8	0.8	0.0
Household Hazardous Waste	0.5	0.5	0.0
Residential Collection	6.9	6.9	0.0
MRF			
- Annual Cost	3.1	4.0	-0.9
Residential Compost Plant	2.4	2.0	+0.4
Fibre Sorting Plant [⊖]	3.0	0.0	+3.0
FEP/WSF	9.0	18.2	-9.2
RDF	7.1	7.1	0.0
Annual Cost Total	30.6	40.5	-9.9
MRF Recyclables Revenue	-2.7	-3.4	+0.7
FEP Recyclables Revenue	0.0	-4.7	+4.7
Fibre Sorting Plant [⊖]	-1.4	0.0	-1.4
Net Cost	27.9	32.4	-4.5

[⊖] Staff does not recommend HRM involvement in this facility. See Page 7 for discussion on this facility. Therefore system estimates do not reflect related costs and revenues.

Figure 2



Revised Annual Cost Profile Assumptions

1. *Communication and Education*→This budget has been decreased by 0.2 MS to reflect Staff's most recent projections for this program.
2. *Administration*→This assumption has not changed. It reflects the 1996 actual expenditures.
3. *Household Hazardous Waste*→There is no change in this estimate as it reflects the value of the current contract recently executed.
4. *Residential Collection*→ As per the original plan an additional material stream, residential source separated organics will be collected at the curbside. Previous assumptions such as recognition of the type of units in the existing hauler fleet, frequency of collection service, etc. remain the same. For example, it continues to be assumed that residential recyclables will be collected on a bi-weekly basis until the volume of materials set out increases. The collection frequency will then trend towards weekly. Organics and mixed waste will continue initially to be collected at the current frequency. Change to bi-weekly will occur as source separation increases.

5. *MRF*→ This cost reduction is driven by the new mass balance forecast for the year 2000. It is estimated that 28,000 tonnes of residential recyclables will be collected at curbside vs. the original 36,250 tonnes. This change reflects an effort to measure the impact of the container deposit program initiated by the RRF. The volume reduction reduces the annual cost forecast by 0.9 MS.
6. *Residential Compost Plant*→ The residential compost plant will be built to accommodate 30,000 tonnes of source separated material expected to be collected at the curbside vs. the original estimate of 20,870 tonnes. The original revision to the mass balance (presented to HRM Council on May 14) forecast that 24,000 tonnes of material would be generated, however, based on Lunenburg's experience Staff believes that a 30,000 tonne forecast is more appropriate. It is assumed that this plant will be privately operated under a design, build, finance, and operate agreement. The total annual operating cost of this *enclosed* facility is anticipated to be \$80.00 per tonne. This is \$20.00 per tonne less than the original estimate. The resulting changes in assumptions lead to an increase in the projected annual costs of 0.4 M\$ per year.
7. *Fibre Sorting Plant*→ The changed mission of the FEP resulted in the elimination of the ICI fibre rich processing line at that facility. The revised mass balance forecasts that 35,000 tonnes of ICI fibre can be available for processing. The revised strategy assumes that HRM will not build or operate this processing capacity. However, as indicated in the revised strategy, HRM may encourage this processing capacity to come on stream through various means.

Please note, in order to compare 'apples to apples' with the previous strategy, the cost of providing this capacity has been estimated (See Table 3). Based on a forecast capital cost of 7.5 MS that includes a constructing a free-standing building and a fibre sorting line, this capacity would cost \$88.00 per tonne annually. This represents an annual cost of 3.0 MS.

As previously indicated Staff does not recommend that HRM make this investment. However, should HRM wish to promote diversion of this material from the RDF, in addition to a supportive regulatory and pricing regime, it may have to support those who wish to bring this capacity on stream. One possible approach is the application of an arrangement that features a combination of floor pricing and revenue sharing dependent on the price levels in the commodity markets.

8. *FEP/WSF*→ The scaled down version of the facility processes 99,400 tonnes of mixed waste vs. the original 160,000 tonnes of mixed waste. Unlike the previous version, this facility will not generate revenue and related expenses through additional diversion. It's system role is limited to sorting inert material that can go directly to the RDF and stabilizing the remaining compostable material in the WSF. As a result, less capital and operating costs are forecast as less direct labour and machine operating time is required. This scope change reduces the annual cost of the FEP/WSF by 9.2 MS per year to 9.0 MS.

RDF→ The RDF's size has not changed. The first cell will be constructed to accommodate 360,000 tonnes of material. Since operating costs are a very small percentage of total annual costs, this number has not been changed.

Revenue Analysis

The net savings to the solid waste system are reduced to 4.5 M\$ because anticipated revenues have been reduced from 8.1 M\$ per year to 2.7 M\$ per year, a reduction of 5.4 MS. The factor analysis of this revenue reduction is as follows:

Table 4

Revenue Stream	(M\$)		
	Volume Δ	Price Δ	Total Δ
MRF Recyclables	-0.6	-0.1	-0.7
ICI Mixed Waste (FEP)	-1.7	0.0	-1.7
Residential Mixed Waste (FEP)	-0.9	0.0	-0.9
ICI Fibre Rich (FEP)	-2.1	0.0	-2.1
Total	-5.3	-0.1	-5.4

MRF Recyclables→ The new mass balance indicates that 26,600 tonnes of residential recyclables will be marketed from the MRF. This is a reduction from the 32,307 tonne assumption contained in the original implementation plan. The revenue reduction stems from the volume reduction and a slight decrease in the average weighted selling price from \$105.24 per tonne to \$100.00 per tonne.

FEP Recyclables→ The original implementation plan projected that 42,748 tonnes of the 160,281 tonnes delivered to the FEP from the residential mixed waste stream, the ICI mixed waste stream, and the ICI fibre rich stream would be sellable (\$109.95 per tonne). In order to save costs, the FEP is now designed to separate stable materials from compostable materials only. Although there may be some limited opportunity to generate revenue, in the interests of conservatism, it has not been included. Therefore, the revenue stream from this facility is projected to disappear.

Fibre Sorting Plant→ As indicated previously, Staff does not recommend HRM development of this capacity. If HRM actually proceeded with this facility, the fibre sorting plant was forecast to receive 35,000 tonnes of ICI fibre rich material. It is estimated that 40% or 14,000 tonnes can be sold at a price of \$100.00 per tonne. The resulting revenue of 1.4 MS would be more than offset by the projected 3.0 M\$ in annual costs (See Table 3).

Additional Potential Cost Saving Opportunities

During the course of this analysis, it became evident that additional savings opportunities may be available. In the interests of conservatism, the opportunities have not been included in the base case of this analysis. However, they deserve recognition in this report as they will be the subject of analysis in the near future. It is not inconceivable that measures such as these can reduce system costs by 1.0 - 3.0 MS per year.

- No revenue has been assumed for compost produced by the residential compost plant. Revenue opportunities are dependent on the quality of the produced material. It is reasonable to expect that this facility will produce quality compost. HRM's contract with the proponent will ensure that HRM shares in the gain.
- The Communication and Education program is a crucial part of the strategy's success. The cost estimate reflects the heavy investment required to promote source separation behaviour. It is likely that HRM will reach a 'maintenance level' of program investment within 2-4 years. This will result in a reduced budget requirement that can be passed back to HRM citizens.
- Potential exists for 'packaging' the MRF and additional fibre sorting capacity together in order to take advantage of scale economies that can reduce costs. This opportunity will be examined prior to the next MRF operations tender.
- It is also possible that HRM could sell the MRF to the successful proponent to reduce debt acquisition requirements for the RDF, etc. Again, this opportunity will be examined prior to the next MRF operations tender.
- The solid waste/resource system depends, in large measure, on composting technology to achieve diversion and stabilization. Potential exists for integrating the RFP for the residential source separated compost plant with capacity development for the ICI sector to take advantage of scale economies.
- Totally integrating the administration of the waste/resource management system will ensure that spare capacity in the system's various composting plants will be fully utilized in total before any additional capacity is developed. Staff believes that this integration at the operating level is essential to maximizing capacity utilization. Staff is developing a recommended administration framework aimed at producing this result. It will be brought to SWAC when the study is complete.

1997-98: The Transition Years

In order to reduce and phase in the capital expenditures and the annual costs of operation, while closing the Sackville Landfill by the end of 1996, HRM entered into a waste export contract with municipalities in Cumberland County.

This contract costs HRM a minimum of 14.9 MS in 1997, 12.8 MS in 1998, and possibly 6.0 MS in 1999. Staff has assumed that HRM will not pick up the option for 1999.

Related costs that will continue to be incurred include the two transfer stations. These costs are projected to be 1.7 M\$ per year during the 1997-98 calendar years. These costs will be eliminated at the end of 1998 when the export contract concludes. There will be decommissioning costs associated with the closure of the transfer stations, these have not been estimated.

Table 5

	1995/96 Budget	1997 Cumberland @ 175/180 KT	1998 Cumberland @ 150/165 KT
Residential Collection	4.0	5.5	6.9
Materials Recovery Facility	1.6	2.3	2.3
Landfill	10.2	0.5	0.5
Haulage	1.0	0.4	0.4
Transfer Stations	1.4	-1.7	1.7
Administration	0.8	0.8	0.8
Debt Service	4.6	0.0	0.0
HHW	0.3	0.5	0.5
Education	0.0	0.8	0.8
SS Compost Plant	0.0	1.2	2.4
FEP/WSF	0.0	0.0	0.0
Transfer Station Modification	0.0	0.6	0.6
Cumberland Disposal Costs	<u>0.0</u>	<u>14.9/15.3</u>	<u>12.8/14.0</u>
Total	23.9	29.2/29.6	29.7/30.9
Recyclables' Revenues	-1.0	-2.1	-2.1
Total Net of Revenue	22.9	27.1/27.5	27.6/28.8

1997-98 Assumptions

1. Residential collection costs change from 1995/96 to 5.5 M\$ in 1997 and 6.9 M\$ in 1998. This estimate assumes that collection of the residential source separated organics stream starts in July 1997. As a result, there is a half year effect of increased residential collection costs in 1997. The full year effect occurs in 1998.
2. Materials Recovery Facility processes 20,270 tonnes in 1997 and 1998 as materials bans continue to roll out and residents respond to HRM's communication and education program. Using the cost projection contained in the original implementation plan, annual costs reduce to ~\$110.00 per tonne (excluding existing debt charges). This translates into annual costs of 2.3 MS. It is assumed that the tendering of the next operating contract (April 1997) will produce this result.

3. Sackville landfill operating costs are reduced from 10.2 M\$ to 0.5 M\$. This amount covers the costs of leachate treatment plant operations, security, etc., which continue after closure. All other capital expenditures relating to closure and environmental remediation costs are not considered in this analysis. They will occur regardless of any option chosen. The costs are spoken to in the section *Costs External To The Analysis*.
4. Haulage costs are reduced to 0.4 M\$ to reflect the savings associated with no longer hauling material from the transfer stations to the closed landfill site. Haulage costs will continue to be expended in transferring material from the refuse depots to the transfer stations in Dartmouth and Halifax where the material will be transhipped to Cumberland.
5. Transfer Station expenses will increase 0.3 M\$. Unlike the previous projection, it is anticipated that the Halifax and Dartmouth transfer stations will both act as transshipment points. The facilities will have to add work hours to load the material to be transhipped. (+0.4 M\$). This additional cost will be offset by reduced service and maintenance costs (-0.1 M\$) associated with a reduction in tractor and trailer maintenance.
6. Administration expenses will remain constant as it is assumed that the existing level of managerial effort will be sufficient to manage the system. It is important to note that this has not been studied. It is certain that administration costs will increase when any form of a 'user pay' revenue generation methodology is implemented.
7. Debt Service levels are not factored into the 1997 cost alternatives as they are driven by debt levels and repayment schedules that are independent of this decision. These costs are spoken to in the section *Costs External To The Analysis*.
8. Household hazardous waste collection costs are held constant at 0.5 M\$ to reflect the current HHW contract.
9. Education and communication levels are increased to 0.8 M\$ as per recent Staff projections.
10. The Halifax and Dartmouth transfer stations will have to be modified so that they can act as transshipment points for all waste transported to Cumberland. These modifications are estimated to cost 1.0 M\$ in capital. This capital is assumed to be paid off in 24 months while attracting an interest rate of 8.0% (560 K\$ per year). The capital expenditure estimate is a 'scoping class' estimate subject to refinement and possible scope change during a detailed design effort. Pit scales and related modifications will be required to load trailers with a level of precision that will lead to maximized loads while complying with NSDOTC regulations. It is assumed that this level of capital expenditure will be sufficient to allow the transfer station to operate without any further capital injection for the next 24 months.
11. Cumberland disposal costs are based on the tonnage ranges identified as well as transportation fees. The fee structure is as follows:

- a) Cumberland tip fee = \$79.91 per tonne
- b) PST/ GST on total = \$5.15 (6.45% net of rebate)
- c) Total fee = \$85.06 per tonne

The upper sensitivity on the volumes; 180,000 tonnes in 1997 and 165,000 is based on the new mass balance and an assumption that no new private sector diversion capacity comes on stream.

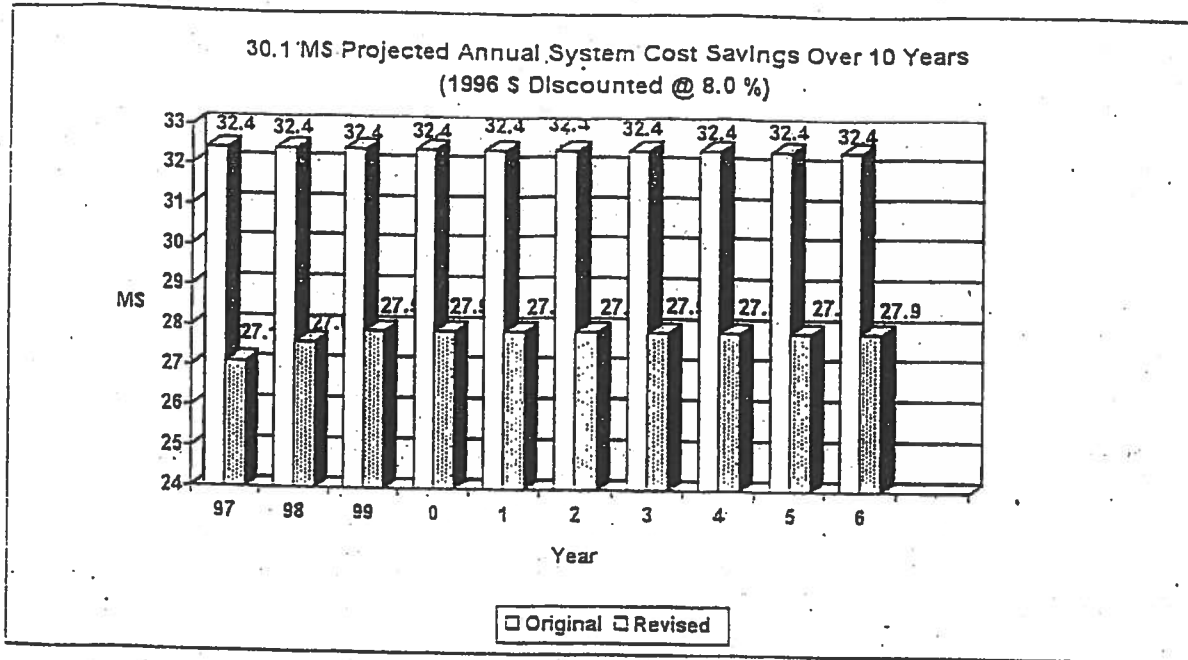
- 12. It is projected that a source separated composter will be required to reach the 150 KT transport level. It is estimated that this facility will cost 2.4 M\$ a year to process the 30,000 tonnes of residential source separated organics forecast to be generated. This number is based on a closed building compost plant and is projected to cost ~\$80.00 per tonne. This estimate is based on the professional judgement and experience of Staff in addition to discussions with MIRROR and Sound Resource Management.
- 13. The MRF's recyclables' revenues during 95/96 amounted to a weighted average of \$117.35 per tonne net of marketing fees. This is a weighted average reduction of \$38.00 per tonne vs. 94/95. This is a reflection of the changing commodity market materials prices and a deterioration of the product mix (i.e., less aluminium). The impact of the RRF is still unclear. As a result, it is assumed that a \$100.00 per tonne weighted average revenue projection is appropriate for this exercise.

Exclusions

- 1. It is estimated that the structural modifications may require the establishment of restricted operations of the Halifax and Dartmouth transfer stations for a 1-2 month period. There has been no attempt to factor the cost of this potential requirement as it will require development of a detailed contingency plan.
- 2. Severance and transition costs for displaced employees have not been calculated, as a number of landfill personnel can be assigned to the transfer stations. A calculation of these costs will be required.
- 3. Credits relating to proceeds on the potential sale or lease of existing mobile equipment and new scales (net of removal costs) have not been factored into the analysis.
- 4. Standby charges, potential trailer and tire damage claims on the part of Cumberland have not been assumed.
- 5. Possible expenses to separate Prohibited Waste from the Waste being shipped to Cumberland have been excluded.

Total Costs Over 10 Years.

Figure 3



The savings of this approach in 1996 dollars amount to 30.1 M\$ over a ten year period. These savings were calculated by determining the net present value of the cash flows using the projected cost of municipal debt (8.0%) as the annual discount factor. For reasons of simplification, inflation factors, sales of residual assets' values, etc., have not been added to the analysis.

Summary

This analysis demonstrates that significant savings will accrue to HRM as a result of implementing the revised strategy. Capital expenditures are reduced by 8.6 M\$ to 45.0 M\$. Total annual system costs are reduced by 9.9 M\$ (to 30.6 M\$) before projected revenues are taken into account and by 4.5 M\$ (to 27.9 M\$) after these revenues are applied.

In addition, there are a number of additional cost saving opportunities that have been identified for further study. Also, the fact that the FEP/WSF investment will be staged over two years will allow HRM to get the benefit of actual system operating experience before the second phase of the facility investment occurs.

It is important to note that the projected costs are marginally less than the system costs projected for 1997-98 when the Cumberland export contract is in effect. The implication is that HRM will achieve the core objectives of the CSC Strategy at a cost marginally less expensive than the interim arrangement that does not achieve these core objectives.

Analysis Caveats

Estimate Accuracy

As has been the case in all prior cost estimates performed by various parties involved in the project, these estimates are conceptual in nature. Where facilities' construction is involved, detailed engineering design has yet to be performed. As a result, these estimates are considered accurate within $\pm 25\%$. Where the cost estimates cover services that are to be provided through a tender process (i.e., residential collection), the costs are subject to the terms and conditions associated with the actual tenders. These may or may not change relative to the assumptions made in these estimates.

Costs External to Analysis

The following costs were not considered in this analysis:

- Project development costs
- Land acquisition and land preparation costs.
- Daily cover costs at the RDF
- Residential containers for source separated compost.
- Existing debt service relating to the Sackville landfill.
- Sackville landfill closure and post-closure costs.

Project Development Costs

Internal HRM project development costs and third party professional fees associated with such items as the CSC Strategy development, RDF siting, contract development, etc. are not included in this exercise. HRM Council has approved 2.3 MS in it's 96/97 capital budget for items related to this project.

Land Acquisition & Preparation Costs

All cost projections to date have not included land acquisition and land development costs in their analyses. To provide the former Halifax County Council with the possible cost implications of site development, Jacques Whitford performed an analysis that projected the development costs for sites that could accommodate the FEP/WSF in its previous configuration. The site adjacent to the RDF at Site A was estimated to have the lowest cost of site preparation of the alternatives examined. This cost was estimated to be 3.6 M\$. In addition, it is anticipated that a highway overpass will be required to provide access to the site. This overpass is projected to cost 3.5 M\$. Assuming that this expenditure is amortized over 20 years at an interest rate of 8.0%, the annual cost is estimated to be 670 K\$ per year. In the event that developers and/or the provincial government contribute 50% of the cost of the overpass, the annual cost is reduced to 505 K\$ per year.

Daily Cover Costs

As has been the case for all previous analyses, daily cover costs are not included. It has been assumed that the stabilized material from the FEP/WSF can provide the cover material. Currently, it is costing the Sackville landfill 1.0 - 1.3 M\$ annually to obtain daily cover material. Assuming that the new RDF will accept less than half the quantity accepted by the existing landfill, and that daily cover material will have to be obtained, the Municipality's worst case exposure is projected to be ≤ 500 K\$ per year.

Residential Containers For Source Separated Compost

The choice of containers will be determined as a result of HRM's residential collection 'demonstration project'. To demonstrate the potential cost to residents, the following example is provided.

In the event that rigid carts are chosen to store the residential source separated organics stream, these carts may cost ~\$80.00 per unit. Assuming 100,000 households in the Municipality, these carts will cost residents a total of 8.0 M\$. Should the Municipality offer to purchase these units on behalf of the residents and recoup the principle and interest (8.0%) over a ten year period, the annual cost to residents for this purchase will be 1.1 M\$ per year or \$11.00 per household per year for the ten year period.

Existing Debt Charges Relating To Sackville Landfill.

The Audit Committee of the former Metropolitan Authority reported on November 10, 1995 that existing debt charges would amount to 29.2 M\$ over the 95/96 - 2004/05 time period. Assuming that the service schedule has been maintained, this amount is now 25.0 M\$ for the 96/97 - 2005/06 time period. In addition a 1995 debenture is being funded through payments that amount to 3.9 M\$ over the 96/97 - 2005/06 time period.

Please note that the capital expenditures relating to community compensation and cell extension will be entirely paid off during the 96/97 fiscal year.

Sackville Landfill Closure & Post-Closure Costs

The Audit Committee of the former Metropolitan Authority concluded that the closure and post-closure care costs of the Sackville Landfill would cost ~20.0 M\$. Assuming that this expenditure is financed through debt acquisition and is amortized over 11 years (the NSDMA recommendation) at an interest rate of 8.0%, annual debt service costs will be 2.8 M\$.

Appendices

- Appendix A: Revised Solid Waste/Resource Management Strategy approved by HRM Council May 14, 1996
- Appendix B: Revised facility assumptions and year 2000 mass balance.

Revised Regional Solid Waste/Resource Management Plan Framework

Purpose

Establish the framework under which HRM staff and MIRROR staff will develop a revised solid waste management strategy.

Due Date

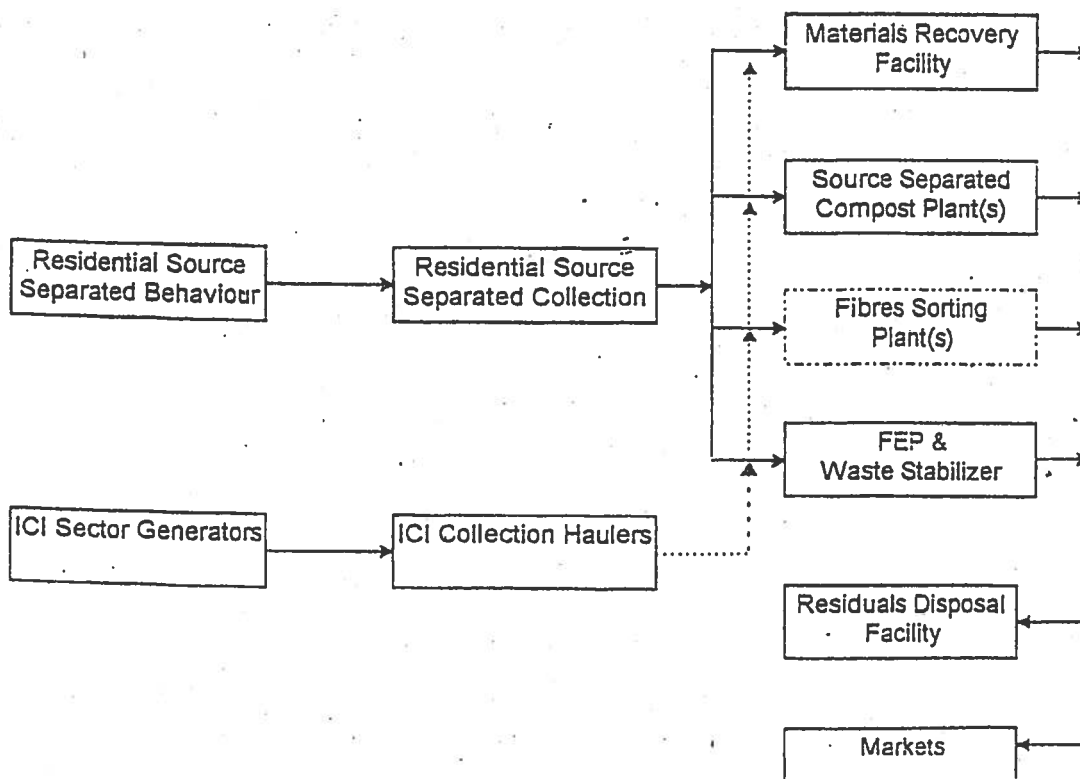
This revised strategy framework completion corresponds to April 30, 1996 goal contained in Regional Operations' work plan.

The revised plan will be complete within 30 days of HRM Council's Solid Waste Advisory Committee's acceptance of this report.

Scope

The scope of the revised strategy will encompass the roles and relationships and concept costs (i.e., capital and operating) of the various activities and facilities necessary to create a totally integrated solid waste management system for HRM. The 'logical' system elements are included in the following figure.

Figure 1



Key Planning Assumptions

1. Interim Waste Export Plan
 - a) HRM will enter into a contract that will allow HRM to export waste for a period of 24-36 months.
 - b) The export contract will not preclude HRM from beginning to divert materials from export during 1997.
2. Estimated Diversion Through Source Separation Programs (developed jointly with Sound Resource Management Group; see attachment)

(KiloTonnes)	1997	2000
Residential Waste		
Backyard Composting	3,000	5,000
Curbside Recycling	20,750	28,000
Curbside Organics	17,300	24,000
Drop-Off Materials	0	7,500
FEP Delivered Waste	<u>78,450</u>	<u>57,100</u>
Total Residential	119,500	121,600
Residential Source Diversion	34.4%	53.0%
ICI Waste		
Private Sector Diversion	42,000	42,000
Organics	12,500	20,000
Fibres	25,000	35,000
FEP Delivered Waste	<u>63,400</u>	<u>48,300</u>
Total ICI	142,900	145,350
ICI Source Diversion	55.6%	66.8%
Total FEP Delivered Waste	141,850	105,400
Total HRM Source Diversion	35.6%	53.1%
Total Source Diversion	45.9%	60.5%

3. Source Separation Behaviour Will Be Emphasized Early
 - a) Starting in 1996, HRM will intensively communicate the benefits of source separated behaviour to residents and ICI sector members in order to modify their behaviour such that they will participate and comply with their obligations under the strategy.
4. Regulatory & Pricing Regime
 - a) Provincial materials bans will be adhered to on a 'best efforts' basis for 12-24 months after implementation of the ban. At the expiration of that time period, it is anticipated that activities, facilities, and

bylaws will be fully operational to ensure that the ban(s) are rigorously enforced.

- b) ICI sector behaviour will be influenced by differential tip fees that will reward source separated behaviour. Today's perceived straight user pay system will be reviewed to determine if it is indeed a straight user pay system. If so, the continuing applicability of this approach will be determined (i.e., a 'hybrid' system; a blend of user fees and property taxes may be appropriate)
- c) Residential materials will be directed to specific processing facilities nominated by HRM. This direction will be based on the 'type' of materials (i.e., recyclables, source separated organics, etc.) collected at the curbside.
- d) Residential pricing will trend towards a 'hybrid' user pay system and away from a property tax based system. The timing of this transition will be dependent on detailed impact analysis.
- e) Clarification regarding the terms and conditions of the Resources Recovery Fund's desire to have the right of first refusal to buy processed materials will have to be obtained.

5. Residential Collection

- a) An additional stream of material, source separated organics, will be collected at the residential curbside.
- b) Choice of 'stream' containers and collection cycle periods will optimize variables such as collection cost, residential participation and compliance, and processing costs at the various 'downstream' facilities.
- c) Collection pilot programs will be initiated during 1996 on a rolling implementation basis in order to conduct controlled testing and evaluation of;
 - i) residential compliance program effectiveness,
 - ii) waste stream composition
 - iii) optimal residential container(s) selection
 - iv) optimal multi-family building service options
- d) The pilots will build early participation momentum that will shorten the ramp up time to high capacity utilization at processing facilities.
- e) Existing residential haulage contracts will be amended to reflect the impacts of pilot program roll out.
- f) New residential haulage contract specifications will be guided by the addition of the source separated organics stream.

6. Transfer Station(s) Continuing Role

- a) It is anticipated that the transfer station(s) will not be required. However, subject to further analysis, these facility(s) may continue to play a useful role.

- i) Specifically, it may be useful to have them serve as residential drop-off centres in improve diversion.
- ii) Further, it may be financially advantageous to continue to operate the transfer stations. This will require an analysis of the capital costs to refurbish and operate the transfer stations compared to savings that may be generated by the facilities' continued use.

7. Materials Recovery Facility (MRF)

- a) The existing facility will be utilized to process all source separated residential containers.
- b) Source separated ICI containers will also be accepted. Pricing for this service to the ICI sector will be consistent with the pricing and regulatory regime being developed.
- c) Residential fibres will continue to be processed, if and until, container volume fully utilizes existing facility capacity. Additional fibre processing capacity will be developed when this trend signals the need.
- d) Modifications to existing layout and equipment will be delayed in order to determine the net volume and materials mix impacts of:
 - i) anticipated increased volume from increased residential participation and compliance,
 - ii) anticipated decreased 'blue bag' container volume from existing system participants as a result of the implementation of the provincial deposit program,
 - iii) anticipated increased volume resulting from the acceptance of ICI source separated containers,
 - iv) anticipated processing capacity utilization resulting from the designation of the MRF as the regional processing facility for containers captured in the provincial deposit-refund program.

8. Source Separated Composting Plant(s)

- a) This plant(s) will be sized to process the source separated organic stream collected at residential curbside.
 - i) Anticipated processing capacity requirement is ~100 tonnes per day (TPD).
 - ii) Tender document will be prepared during the second quarter of 1996.
 - iii) The plant(s) will be assumed to utilize an enclosed building design (i.e., controlled building or closed vessel) in order to take a conservative investment approach.
 - iv) The plant(s) will be built in 1996 and/or 1997.
 - v) The plant(s) will not be co-located with the RDF unless a compelling financial case to indicate otherwise can be

advanced. This position will minimize any potential confusion regarding legal liabilities in the case of facility failure.

- b) Opportunities to process source separated organics generated by the ICI sector will be driven by the contemplated supportive regulatory and pricing environment that is integral to the strategy.

9. Fibres Sorting Plant(s)

- a) As previously stated, if and when, the existing MRF is not be able to process residential source separated fibres, residential source separated fibre will be processed at this facility.
- b) ICI fibre rich volume can also be processed at this facility(s). Pricing will be consistent with the supportive regulatory environment.
- c) It is yet to be determined the business terms & conditions required to bring this facility(s) on stream. It is possible that existing private sector fibre sorting industry participants will wish to expand capacity. HRM should wait and see if this does occur. If capacity is not expanded sufficiently, within 18-24 months, HRM will have to promote, through various means, the development of this capacity in order to achieve fibre diversion goals.
- d) Should HRM have to sponsor the development of additional fibre sorting, this facility will be built adjacent to the RDF unless a compelling financial case to indicate otherwise can be advanced.

10. Front End Processor (FEP) & Waste Stabilization Facility (WSF)

- a) FEP will be designed to perform minimal sorting. There will be equipment to separate metals (i.e., magnet) from the stream and minimal screening capability (i.e., trommel) only. As a result, the FEP will not be designed to provide incremental diversion for the 105.4 kilotonnes (KT) forecasted to be delivered to it by 2000. Rather, its role is to prepare the remaining mixed waste for stabilization.
- b) WSF will be sized to process that portion of the anticipated residential mixed waste stream (i.e., 57.1 KT in 2000) that is suitable for stabilizing after it is processed at the FEP (i.e., 20.0-30.0 KT per year).
- c) It will be designed to easily handle more capacity through modular expansion. This potential additional capacity will be driven by the impacts of the source separation program on generators of mixed waste in the ICI sector.
- d) The FEP/WSF plant will be built during 1997.

11. Residual Disposal Facility (RDF)
 - a) The RDF will accept only 'stabilized' and inert materials. It will not accept household hazardous waste and provincially banned materials.
 - b) The RDF will be co-located with the FEP & WSF.
 - c) The RDF will be built and operational in 1997.

12. Community Monitoring Role
 - a) The solid waste management strategy will be guided by the decision of HRM Council which is currently developing a model that will meet the needs of the community.
 - i) This model will focus on the key aspects of community protection; disposal of only inert and stable materials in the RDF and protection from public nuisance by any of the processing facilities.
 - ii) This model will also determine the nature of the relationship between system operators and members of the community.

13. Proposed Business Relationship Structure
 - a) HRM will tender and administer contract(s) related to communication and education programs.
 - b) HRM will tender and administer residential haulage contracts.
 - c) HRM will tender the operation of the materials recovery plant.
 - d) HRM will tender the design, build, operation of the source separated composting plant(s).
 - e) The business terms related to the Fibres Sorting Plant remain to be determined. As previously indicated, it will be dependent on the private sector's willingness to build more processing capacity. If this does not materialize over the next 18-24 months, HRM will sponsor the establishment of additional processing capacity.
 - f) MIRROR will design, build, and operate the front end processing - waste stabilization plant as well as the residuals disposal facility.
 - g) Day to day operations administration of the integrated system is yet to be determined, however, HRM retains clear policy making and oversight authority.

Appendix B

Solid Waste Facilities' Plan Assumptions

Facility	Additional Capacity	Location	Construct	Operate	Ownership	Business Relationship
SSC (Residential)	30,000	TBD (Excluding Site A)	1996	1997	Private	DBOF
SSC (ICI) Phase 1	10,000	TBD (Excluding Site A)	1996	1997	Private	DBOF
SSC (ICI) Phase 2	5,000	TBD (Excluding Site A)	1997	1998	Private	DBOF
SSC (ICI) Phase 3	5,000	TBD (Excluding Site A)	1998	1999	Private	DBOF
MRF Expansion Phase 1	5,000	Existing	1997	1998	HRM	Contract Operation
MRF Expansion Phase 2	8,000	Existing	1998	1999	HRM	Contract Operation
Fibre Plant	35,000	Site A	1998	1999	Private	DBO
FEP/WSF - Phase 1	51,000	Site A	1997	1998	HRM/MIRROR	DBOF
- FEP	25,000					
- WSF						
- Phase 2	48,000		1998	1999		
- FEP	20,000					
- WSF						
RDF	360,000	Site A	1997	1998	HRM	MIRROR DBO
Other Transfer Stations HHW BYC		Existing	1999 Closure	1997		

DBO = Design, Build, Operate

DBOF = Design, Build, Operate, Finance (in whole or in part)

Appendix B

Revised Mass Balance For Year 2000 (Tonnes)

Residential Waste		Sensitivities
• Backyard Composting	5,000	
• Curbside Recycling	28,000	
• Curbside Organics	30,000*	± 10,000
• Drop-Off Materials	7,500	
• FEP Delivered Waste	51,100*	± 10,000
• Total Residential	121,600	
Residential Source Diversion	58.0%	
<i>ICI Waste</i>		
• Private Sector Diversion	42,000	
• Organics	20,000	
• Fibres	35,000	
• FEP Delivered Waste	48,300	
• Total ICI	145,300	
ICI Source Diversion	66.0%	
Total FEP Delivered Waste	99,100	
Total HRM Source Diversion	55.9%	
Total Source Diversion	62.9%	

* Team has decided to increase residential source separated organics stream by 6,000 tonnes and correspondingly reduce the FEP Delivered Waste stream by the same amount based on data produced by Lunenburg experience.